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TELLme

Training for Education Learning and Leadership towards a new MEtropolitan Discipline

Inaugural Book

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Preface

Humanity is facing enormous challenges to our common future, such as climate change, growing inequality, environmental degradation and rapid urbanization. There is an increasing understanding that the answers to these pressing questions can only be reached at the complex space of cities and metropolitan areas. Furthermore, tackling these urgent problems requires enhanced approaches and methodologies at the metropolitan scale. The complexity and diversity of the metropolitan phenomenon demands better policy, practice and theory.

The TELLme (Training for Education, Learning and Leadership towards a new Metropolitan discipline) Project is a response to this demand for improved metropolitan tools and training from multidisciplinary perspectives. In particular, this initiative aims at providing competence to the higher education institutions while building up a community of practice with an integral approach, where the collective intelligence is formed through non-formal and peer-to-peer learning. Universities are the key actors capable of advocating for the methodology and training the future generations. They have the potential to build the core knowledge of the community of practice at the international level, while also promoting its adoption at the local level.

The Metropolitan Discipline is a nascent field of studies. It is a work in progress, an emerging framework to address the imperatives of urban sustainability more effectively. It arises from a collaborative effort among several inter-disciplinary teams from all around the world. Over the last three years, the different partners involved in the project embarked on an iterative process of peer learning aimed at the co-construction of a new discipline. This global network constitutes a valuable effort to bridge the gap between theory and practice in the approach to metropolitan issues from various disciplines.

This book represents a significant milestone of that on-going collaborative process towards the construction of a new discipline. This TELLme Inaugural book, of which CIPPEC had the privilege of being the lead partner, translates the theoretical principles into practice and systematizes the Metropolitan Discipline methodology to shape cities and metropolitan areas. The articles in this book are valuable and insightful contributions that invite and help us to become better prepared for addressing the complexity of metropolitan planning, development and governance.

I believe that, with expanded and continued collaboration from multiple actors around the world, we have an opportunity not just to co-create a new discipline but also to significantly contribute to the construction of healthier, safer and more sustainable human-centred cities. The rise of the metropolitan discipline, brightly showcased in this book, is a significant step forward in that direction.

Sebastián Lew

Cities Programme Director
CIPPEC

Introduction

The metropolitan foundation opening questions

We are in a founding moment of what we call the Metropolitan Discipline. That will provide tools to determine a city that has grown up occupying the most fertile lands, and that has to face today epidemics and natural disasters (even caused by the hubris of man). Where is the Wisdom? Here, today, we are all invited to answer questions about the way of conceiving the metropolitan dimension, which we have been asking ourselves during these three years of studies in the TELLme project[1].

This book wants to be a useful, theoretical tool for the metropolitan city agents finding a shared vision toward a critical Metropolitan Approach to Complexity to bridge the gap between academic knowledge and the cities' practical needs. That is an Inaugural Book for the Metropolitan Discipline. We took that concept from a suggestion of F. Choay in her famous Book La Règle et le Modèle: Sur la théorie de l'architecture et de l'urbanisme, 1980[2], she defined Inaugural a book whose aim is to found a new space, not only arguing about that but trying concretely to build it. In the history, Inaugural Books were the Architectural Treatises which defined the procedures of shaping cities and their buildings through principles and shapes' rules, and the books about Utopia, which aimed to generate built spaces through model's reproduction. The relevant issue is that an Inaugural Book is not a prescriptive one; it does not refer to the established space organisation to definite rules dating back to an unknowable order.

The metropolis is a complex territorial rooting system for a new way of life and a renewed robust civic image

We worked on the idea that the metropolis is a complex system. Control of such complexity only focused on infrastructures and aimed at finding the optimal solution, eventually results in the 'generic city' - as Koolhaas[3] called it (1995). “We are therefore wondering if any alternative to this approach based on Western rationality is available. Understanding metropolitan areas and being able to make their understanding a discipline requires making decisions, generating policies, avoiding reductionism, and anticipating uncertainty (Tapia, 2021[4])”. Planning in uncertainty is part of today's condition that requires definitively sealing a pact between the city, its citizens and nature reaching a respectful territorial rooting for the Metropolitan way of life and a new idea of its common realm’s robust civic image. That is the necessary precondition for achieving the final objective expressed by the TELLme Project: to generate the condition for the improvement of the four principles of Environmental Justice, The Common, Senses of Belonging and Rights: to the city, to the landscape, to inclusiveness, and dignity (Tapia, 2021).

Over the years, we studied "things" and their hierarchy, then "relationships" through networks and parametric computation. Many scholars are taking on the study of probabilities, indexes and not codes and their potentials, which sometimes seem to be endless. The TELLme Team felt the need to understand which ontology the Metropolitan Discipline refers to. Consequently, we must also think about how the city subject has changed over time. Today subjects are free and independent agents from the boundaries of their field of action, modifying their surroundings for their interest (the term etymologically meaning is 'in-between', thus indicating a gradient between two implied entities). Moreover, the project has acted in its development trajectory by the different actors and therefore, it

1TELLme Training for Education, Learning and Leadership towards a new MEtropolitan discipline is an EU co-funded ERASMUS+ PROGRAMME 2014-2020 (KA2 – Strategic Partnership for Higher Education).

2 Choay, F., (1980), The Rule and the Model, (1986), Rome: Officina Edizioni.

3 Koolhaas, R. (1995) “Bigness, or the Problem of Large”, S, M, L, XL. New York: The Monacelli Press.

4 Tapia, C., (2021) MGPI TELLme Glossary Software.

is no longer a project conditioning the growth trajectory of a city community. It is not sure, though, that each member of our society's goal is in the interest of all the other organisms: what is the cost in individual energy to achieve a result that we could call Metropolitan Collective Intelligence? What are the areas of metropolitan opportunity? What are the conditions for a Metropolitan Collective Intelligence to develop?

Suppose the metropolitan field is an uncertainty or probability field. In that case, can we bet that even though we passed Hercules' tipping point, we can still correct the shot of the construction activities in the metropolitan region?

Bruno Latour[5] reminds us that Galileo's infinite universe is contracting at Anthropocene's time (2017). Fear determined a return to the closed and limited cosmos. According to Hesiod, Gaia emerges from blood and steam with Chaos and Eros, and her essence seems to have nothing to do with harmony. He wrote about the issue of ecology: “What paths did we follow, and what is the logic behind our decisions? These questions have several answers, and this is what disorients us. More than a "bet", where the loser pays, we would like to think that Pascal's wager could be understood rather as a pact, a commitment; therefore, more than an act of pure utilitarianism, a decision to be taken when the stakes are high because the endeavour is challenging". Therefore, the challenge is to define new approaches capable of innovating the socio-economic sphere and production processes for collaborative urban generation and regeneration between mother cities, medium and small towns in the metropolitan region, leveraging a sustainable heritage and culture. In the past, we have already highlighted the metropolitan paradox of the possible atopic proximity since the Meta-City layer (Shane, 2005[6]). That is determined between places physically distant and connected by new technologies and the necessary discontinuity of the metropolitan city allowing the metropolitan architecture or structure to exist: the green-grey infrastructure continuity.

Metropolitan knowledge. An epistemology interpretation of the optimising metropolitan values process

A discussion has begun on whether the urban system can be compared to a semiological system. Can the metropolitan city be considered a non-verbal system of essential elements? Is it possible to restore the symbolic value of the items that compose it in the full dimension of the current hypothesised city system? Moreover, how to communicate this value? A unique contribution of the TELLme project to the Metropolitan question is the epistemology approach. It focuses on clarifying and strengthening the theoretical part of the Metropolitan Discipline and its practical-theoretical ontology.

According to Patrizia Giordano[7], in the Metropolitan Discipline we are founding, we identify "good" with sustainability. We have begun to clarify what we mean by this concept; however, we also deal with the metropolitan citizenship idea. We investigate "values" effects that transform the city and the territory and the kind of "goodness" they attribute to them. However, what do we mean when we talk about metropolitan "values"? "When we speak of "values", we tend to substantiate what is a "process" - in which there is a variable and a "value" attributed to the variable. This "value" is quantitative, intensive, and contains the modality according to which we pursue, we choose our variable. So, we can show the tendency to maximise or optimise the tracking of the variable we consider good" (Giordano,2018).

The TELLme project founds its knowledge in optimising the values systematising the Practice of Metropolitan Discipline Metro-dology. It shapes the Metropolitan space, translating the Metropolitan General Principles derived from the practical-theoretical texts into the located Issues (MGIP)

5 Latour, B. (2017). Facing Gaia. Eight Lectures on the New Climatic Regime. Cambridge: Press Cambridge UK.

6 Shane, G. D. (2005). Recombinant urbanism. Conceptual Modelling in Architecture, Urban Design, and City Theory. West Sussex: Wiley-Academy.

7 Patrizia Giordano’s Lecture during the Guadalajara TELLme Training Lab.

discovered in the Metropolitan Cities Existing Situation Analysis (MESA). The Book' structure must follow the logical succession of choices that the Metropolitan Experts must make to create a sustainable project. Its space organisation like the organisation of the metropolitan city space must refer to a model of knowledge to experience it, and to elaborate the concepts of right to the city, to the landscape and the lifestyle illustrating a method to get the rights ecosystem conditions construction possible.

The metropolitan tools. The MGIP Glossary Software and the Metropolitan Cartography

The TELLme project looked for tools to make the sustainability language adopted globally by 193 countries as 17 SDGs, operative. The TELLme Team articulated the sustainability language to metropolitan reality identifying the dynamics of the metropolitan processes that determine the leap in scale of our cities toward their four dimensions: physical, economy, social and governance. Identifying metropolitan dynamics first requires extracting keywords and related concepts from Architecture and Urban Discipline's literature and the Metropolitan project practical experience. Consequently, the TELLme central pillar is the Metropolitan General Principles and Issues Glossary Software. Recognising the metropolitan issues through keywords, then selecting related concepts, allow to integrate the different discipline's perspectives and to be able to synthesise them toward a new open-source cartographic methodology: The Metropolitan Cartography.

The Metropolitan Discipline uses the map as a figurative collective thought. Maps are tools to detect unfinished projects in the territory and express vocational scenarios in which real data - or simulations if the data are not accessible - are used to break down the city and its territory into its constitutive parts. The region and the metropolitan city need an integrated approach since suburbanisation creates the conditions for population fragmentation and marginalisation.

New technologies are intended as a tool for knowledge exchange or competition between cities; instead, today in the open-source data era, they are a tool that implies the acceptance of open collaboration and project sharing. Technology allows us to recognise the contribution already made by others in the social field, multiplying its effects, to identify and promote Territorial Intelligence.[8]

The metropolitan genome

In defining what a metropolis is, we started from the Genome model (Ortiz, 2017[9]) which we interpret as a synthesis model whose objective is the determination of the relationships between the elements that make up the four metropolitan dimensions: physical, economic, social, and governance dimensions, the latter determining the ethical axis of every metropolitan operation. Thus, each investment is obliged to agree with the social project. Where the two projects do not meet, conflicts arise, and the political class loses consensus. These dimensions are crossed by a series of questions, which inspired the dialogues that animated our pages.

8 Territorial Intelligence is a concept developed within the Sixth Framework Programme of the European Community between 2002 and 2006. In post-industrial societies, Territorial Intelligence is the science that has as its object the sustainable development of territories, and that has as its subject the territorial community. In particular, this concept links the multidisciplinary knowledge of territories with their dynamics. It strengthens the capacity of territorial communities to participate in their development fairly and sustainably; it improves the sharing of territorial information and disseminates its methods and tools of analysis using new technologies; it promotes governance, decision-making processes and practices that enhance participation and partnership and research-action that contribute to the fair and sustainable development of the territorial community.
This concept underlines the contribution of intangible resources to general development, allowing differences not to become an obstacle to these needs' affirmation, but underlining the value of the territory's heritage. Territorial Intelligence reconciles post-material values with those of the culture of industrial society, supporting the development of territorial resources, and recognises the latter implicit qualities and uniqueness and makes their use attractive to heterogeneous glocal societies.

9 For more information see: www.pedrobortiz.com.

We would read the Genome model as a matrix to understand what relations between the territorial components allow those who govern to get out of their disciplinary dimension to have access, as agents of transformation, to metropolitan areas of opportunity. The question that we would like to discuss is the ontological assumption of the discipline, the relations between practitioners and the academy, and, on the other hand, the types of knowledge the Metropolitan Approach to Complexity needs and produces. Besides, we would like to present an approach and a methodology that identifies the "political" and "aesthetic" as our transdisciplinary field of action. Aesthetics is the domain of choice and judgment, activated by the forms and vision of the metropolitan project; in this sense, it is linked to politics, to the public realm in which decisions relevant to the community are taken. We are interested in developing a type of knowledge that we call knowledge-to-action, restoring its role as "central political activity"[10]. It is a method conceived as an epistemological thought on Metropolitan Architecture to move from a functionalist vision of the city and its architecture, to a vision that starts from the meaning of design choices related to metropolitan physical space and its urbanity (Choay, 2004[11]). For us, the physical space project is a vital instrument of knowledge and action, aimed at supporting those who make choices and reject a "mechanical" development of metropolitan complexity, focused only on infrastructure and the "strong" texts that mark the territory.

Faced with the difficulty of describing this evolving structure through traditional statistics and indicators, we began to conceive the metropolitan project starting from a definition of the dimension of physical space capable of generating innovative social, historical and economic changes in society. However, we still must integrate the landscape (which is part of the physical dimension) into the other metropolitan dimensions. Today, it must be transversal to all other dimensions. Arguing about the metropolis, we can no longer only talk about the architecture of the governance in general, as a relationship between institutions. Nevertheless, we have to introduce ecosystem services, environmental governance, and water management today concerning traditional land use planning at the local and municipal scale only.

The metropolitan public good

However, how is it possible to uniform the disciplines in different languages? We think it is essential to find a shared answer to the question related to what it means Public and Common Good at the metropolitan scale, and how the different agents who act in the metropolitan region and arenas could find common aims and ways to act: intentions and motivations. However, it must also be a response to modernity and the value given to the Institution concept (if Institution is not just an automaton replicating a function).

What is Metropolitan Public Good? The one for which we are training policymakers, administrators and professionals through Metropolitan Discipline? What is the agency that decides on the city? These question about the meaning of the words "Institution", "Public", and "Municipality". It is a matter of understanding how the Metropolitan Discipline intends to interpret the Institution's function. In his Book on borders Luca Gaeta (2018)[12] introduced the concept of 'control': the counter-roll of the Romans, as a way of the norm, as a cast, the practices that citizens already carry out on a territory. The Institution must first understand how citizens practice their territories and then regulate those practices. The rules are the exact cast of the practices from which they arise (and not vice versa), because they have understood them, and this is how the meaning of the word control is interpreted even today. Does the Institution have to implement an unchanged rule, or does it require a strategic adaptation to the situation to be addressed? Luca Gaeta wrote: “The taking of political and administrative power over everyday practices presupposes the sharing of a horizon. In this sense, Certeau's appeal is useful not to neglect this subversive aspect of everyday practices and

10 Arendt, H., (1958), The Human condition, Chicago: The University of Chicago Press.

11 Choay, F., (2004), Espacements. Figure di spazi urbani nel tempo, Milano: Skirà.

12 Gaeta, L., (2018) La civiltà dei confine Pratiche quotidiane e forme di cittadinanza, Roma: Carocci, Roma.

their inexhaustible inventive way of uses not foreseen by the authorities". What is the Metropolitan "Common Good" over which the Institution is exercising its control? The possibility of giving a shared answer to this question considering a Public Institution within a metropolitan city that returns to be a Polis, because it still has the places where people can participate in public decisions, is fundamental.

Metropolitan time and identity

The style of behaviours has changed, it is metropolitan, and no longer just rural or urban. In these new spaces, it is necessary to address the phenomenology of the social behaviour of citizen-actors, inhabitants or users of the city or commuters or tourists. Today, these people practice the city's spaces and experience their novelty as an effect, as a solicitation of the attitude to assume active roles, that is, to play new roles and appear in new spaces of relationship with new responsibilities. How can different identities coexist within modern urban societies?

Metropolitan economy

Each metropolitan project starts from a question about the type of urbanisation and use of resources as a basis for determining the rule for the presence of new quantities, morphologies and functions. The question then shifts to what kind of analysis to conduct locating sustainable projects. Functionalising the analysis means thinking about two different types of reality: one is the existing reality, which usually will not resist the change, the other is the new reality to be located. As a premise, we need to understand local ownership regimes, the logic of regularity of relations: what is the model of the market, accessibility, institutions regarding the culture of living in a metropolitan region? The aim is to understand where there can be the local model's evolutionary social innovation, real growth and transformation. They can start from the economic system, and local lifestyles, but above all, from the definition of a transformation able to recognise what "must not be broken" not to destroy sustainability that locally the places have achieved.

An integral metropolitan project can attract investments (in the social, economic and energy spheres) on the local material and immaterial culture's heritage, to counteract the economic stagnation. It could reduce the speculative logics based only on the urban income that characterise today's urban and territorial transformations. For this objective, it is necessary to modify the city's administrative and governance models and the territory based on unbalanced relations between the public and the private sector with the latter, which, especially in recent decades, has guided the choices of the public sector towards private interests and building waste. This situation has left as a legacy phenomenon of exclusion and marginalisation of significant social strata in some large cities and less economically developed territorial areas, as demonstrated by certain internal European areas. In this way, it is intended to innovate the rules of public action in the transformation, restructuring and regeneration of even the most fragile tissues, through an Implementation of Governance and the tool of competition projects. The scale of the urban project, like the one that best acts on the context is known. It is less common to talk about the scale of the metropolitan project, which has a field of action of at least one kilometre by one kilometre and must integrate different disciplines and decision-making bodies. The project or rather a preliminary meta-project could constitute a negotiation level between different stakeholders.

Metropolitan landscape. History and memory

The TELLme method tries to show how the heritage received from the city's past and its territory still functions today to support the contemporary metropolis. We use an approach based on understanding complexity by identifying and studying the concrete dynamics of transformation of the territory and its cities. Through the Metropolitan Cartography and the synthesis of data mapping, we can show first, how the topography and the presence of water that is the geography of the place

interpreted as a resource by the inhabitants of different eras can identify essential territorial factors conditioning of regional, metropolitan, and urban projects. Fundamental is the analysis of the territory' structure starting from historical cartography and plans for understanding the processes and dynamics that have tampered with it and, finally, the study of the current regional, metropolitan, and urban fabric that reveals the underlying structures as legacy, permanence, and support.

The complexity is linked to time and its drama, history, geography and memory. If this is not considered, there is a risk of misunderstood globalisation, depriving territories of their identity and culture. We want to generate metropolitan processes and phenomena that in a first approach seem to have been completely disconnected from the city's historical and geographical origins in its traditional conception. That is, we start from its urban-territorial heritage and the societies that have interpreted and made it.

Today, the physical space of a Metropolis tends to be expansive and dynamic in its territory. In terms of space, the contemporary metropolis' urban dimension calls into question the past's centralities, giving rise to new centralities more linked to the network of regional green-grey infrastructures than to local contexts. The local image of a place is given by geography, which is, above all, a history built through mental images, historical and archaeological evidence. If we ask ourselves what the future cities and their new metropolitan centres will look like, we cannot ignore the value of their strategic position linked to historical processes. Moreover, the history sets all the city sites precisely, reinforced them by epic narratives. However, geography, history, and myth merge in contemporaneity with air and rail links, representing our way of connecting the local with space and time, now disconnected, especially in the distracted contemporary tourist's experience. Unfortunately, in the interweaving of the global and the weaker local, the metropolis runs the risk of no longer making sense. What do conscious management of the landscape and cultural heritage mean? What are the tools of a project based on ecological, economic and social sustainability that will build a consensus between actors, public administrations and private investors? That would reinforce the adequacy between the place and the new inhabitants, considering the metropolitan landscape as a built cultural heritage, essential to understanding the term public good (Portugali, 2000[13]).

The metabolic operations: transformation, replacement and maintenance

We propose a way of conceiving the metropolis where society continues to be its subject: a people that has found understood, imagined and created the point of support for a given territory, mapping it, interpreting its geography and building it through acts of foundation carried out by a public or common institution. In Leonardo's maps, the ground is built and oriented on geography. Referring to his maps, the Metropolitan Cartography is a first example of what Lynch[14] called “dynamic maps”. They refer to a design's plan based on a rhetorical-persuasive system (graphic semiology) superimposed on real space that incorporates dynamic meanings, thought and memorised, and then structured in new coded narrative forms of Metropolitan Architecture projects. Many studies focus on the sustainability of anthropological, social, technological, economic and management development and transformation processes. The TELLme approach considers the consumption of energy, materials, and especially soil as the loss of a good within a metabolic approach that emphasises the ecological issues.

Therefore, the temporal component of metabolization as a life cycle project is relevant concerning the spatial qualities, even as a generational legacy. How does an idea of continuous growth impact on structures, mobility, lifestyles, institutions and the use of resources of limited availability, while respecting essential human needs: the quality of life and, therefore, the quality of the environment

13 Portugali, J. (2000). Prototype Urbanisms. In J. Portugali (Ed.), Self-Organization and the City (pp. 17-47). Berlin, D: Springer.
14 Lynch, K. (1960). The image of the city. Cambridge Massachusetts: MIT Press.

in which it develops? The TELLme proposed approach, therefore, is systematic, creative and participatory, for which three metabolic operations are defined: Transformation refers to system structural change and its functioning, not only at the scale of the territory but also related to the historical urban centres. Space, energy and material released from the new scale must be sustainable by integrating the sequences of new landmarks and landscapes. Replacement is a typical operation in unoccupied areas, which implies an overall rethinking of new local structure and layout. Maintenance, an operation typical of historical centres and city fabric, is increasingly applicable to heterogeneous and extensive environmental contexts, allowing the transition from use to the symbol.

In this process, the problems of consensus and participation are linked to the psychological dimension of individual judgment, choosing between acceptance or change and loss of identity; but also, to the problem of globalisation and the need to homogenise spaces, histories, uses and values that put the individual self in crisis. The question then arises: How to define new spatial reference points as mental maps linked to local identity, as part of new multiple citizenships - urban users, tourists, migrants - coming from other places, and therefore no longer linked to local ethnic roots and origins? These citizenships bring with them a double demand: on the one hand, to dislocate in space at very high speed; on the other, to settle down, slowing down the rhythm of movements and assuming a "one to one" relationship with spatiality. That is the symbolic exchange of which Baudrillard (1976)[15] spoke, essential for an intergenerational relationship between the heterogeneous groups that constitute the metropolitan citizenship.

Nevertheless, these metabolic processes -transformation, replacement or substitution and maintenance- are produced concerning the consumption of energy, materials and soil, through a transformation of the territory that we can associate to the contemporary landscape concept. The most recent definition of the landscape that even exceeds the European Landscape Charter of 2000 is provided by the Landscape Charter of the Americas (Peñalosa et al., 2018[16]), that distinguishes five layers of the American landscape but also recognisable in other contexts: the conditioning of primordial nature, which speaks of geography; the metaphysical aspect of the landscape as cosmovision, which speaks of myth; the cultural palimpsest as a witness to territorial biography, which speaks of history; environmental ethics as a principle, which speaks of sustainability; and the interrelationships in the landscape as a sign of identity, which speaks of community. These principles based on the idea of landscape make it possible to make the leap from urban biography to regional or metropolitan biography and to understand its historical dimension through the evolution of its metabolism in the territory.

Environmental justice

Today, the Latin American world has transmitted to us the concepts of "Other knowledge", "Buen vivir", and "Environmental Justice". The theme of the link between the environment, socio-economic conditions and spacial justice sets the issue of the social justice at the centre of the development debate, making it explicit how in the world, pollution and degradation of natural resources affect the weakest and most vulnerable populations. How do we solve the redistribution of wealth, communities' right to exercise control over resources in terms of access and distribution? These questions lead us to reflect on the theme of ecological economy, environmental debt (or environmental responsibility), and unequal ecological exchange. In short, about ecosystem services and environmental accountability.

15 Baudrillard, J., (1986) Amérique, Paris: Éditions Grasset & Fasquelle.

16 For more information see: https://www.iflaworld.com/newsblog/charter-of-the-landscape-of-the-americas.

Grounding the city need

The Metropolitan Architecture project should be grounded in the territory's resources. "Grounding the City" (Sanna, 2016[17]) means a willingness to engage the ground in a Metropolitan Architectural project by rethinking geography. The ground is considered a physical extension and a physical body that carries the history of a community. We attempt to stand against the mere technical transformation of the landscape that leads, as a consequence, to the loss of importance of "place." Therefore, the ground is not considered pure amorphous support for hyper-planned networks but rather as the meaning-bearing structure of the metropolitan project: the place of history and archaeology, leading to the foundation of the urbanity projects at the metropolitan scale.

Bernardo Secchi (1986)[18] argues that type-morphology's primary goal is not the typical classification for documentation when considering the specific physical features of different parts of a city and its territory. These analyses aim to recognise the processes and the systems of relations that generated different city parts. Therefore, the perception of such elements with their specific morphological features is relevant to describing the same region's generative methods and an integrated territorial system. Following this view, traditional type-morphology could enlighten the different levels and scales of articulation of the metropolitan space. Moreover, it assumes an essential role in marking the hinge-points of such "scale-leaps" and arranges their spatial configuration. That is precisely the aim of Metropolitan Architecture project. The articulation of the different scales in the metropolitan context can qualify a specific locality through selected formal solutions with multiple possible uses and meanings. At a metropolitan scale, to "pin" down the metropolitan images, which also represents the memorable elements within it requires a coherent order "to see the hidden geographical forms and their meanings in the vast sprawl of our city." (Lynch, 1960[19]).

The Metropolitan Architecture dimension's complexity regards measure and scale, which is neither associated to human dimensions nor commensurate with the urban fabric, parameters of density, and other indexes of urban concentration as represented in the concept of proximity. The Metropolitan Architecture project is slightly related to people and goods' mass mobility, which implies a different relationship between individuals and groups. The technological Utopia erased pre-existing geographical traces and disjointed or disrupted historical urban and agricultural topological patterns. The old urban typo-morphological structure, whose functioning was mostly centripetal, suffers from congestion and lack of efficiency. Some of the issues derived from the discipline of Landscape Urbanism that determines a deep technologization of the ground should also integrate the concept of Paesaggio: therefore, the green infrastructure, which allows an innovative "renewal" of the environmental qualities, is linked to an infrastructure produced by the industry. Nowadays, Metropolitan Architecture is a territorial project that involves the environment (geography, infrastructures, and landscapes) as the operative element for a project. That must aim to produce a shared and robust civic image of public space (also by using ICT) to meet the inhabitants' needs concerning their economic activities. It determines the need for a continuous dialogue with public politics and policies (new instruments and tools of knowledge-understanding, recording, operating-) about their vision regarding the metropolitan identity and the quality of life of a dwelling's inhabitants. However, it must also consider the five elements for the sustainability of a project (water, energy, networks, pollution, welfare). Following the nature/water-based approach, the project explores the landscape's productive potential and the green infrastructure as new contents for Metropolitan Maps and Scenes (new uses, economies, and public spaces). The eco armatures then are not anymore only the background of the Architecture of the Metropolis but are agents of the metropolitan space. Grahame Shane (2005)[20] called them: the body space.

17 Sanna, S., Grounding the City. The project for a metropolitan urban form between architecture and landscape, Master Thesis, A.A.2016/17, Politecnico di Milano.

18 Secchi, B. (1986). Progetto di suolo. in CASABELLA, 520/52, 19-23.

19 Lynch, K. (1960). The image of the city. Cambridge Massachusetts: MIT Press.

20 Shane, G. D. (2005). Recombinant urbanism. Conceptual Modelling in Architecture, Urban Design, and City Theory. West Sussex: Wiley-Academy.

Thus, shall we, as architects, urban designers and planners still use the traditional procedures and categories of type morphology to define the new way for the definition of the public and common realm, conceiving the social change through our production? Are architecture and urban studies merely a reflection of society, or can they be a more critical statement about society? Can we create an embodiment and reinforcement of a new or revised structure of a given society? Or are we instead going to ask to the new Metropolitan Discipline to identify them? The TELLme Inaugural Book would like to present a critical theory and new proposal referencing utopian possibilities: Our way of interpreting the Utopia della Realtà (Rogers,1965[21]). Nevertheless, it is essential to the critical analysis and evolution of traditional Architecture, Urban and Planning Disciplines.

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21 Rogers, E.N., (1965), L'utopia della realtá: un esperimento didattico sulla tipologia della Scuola primaria, Roma: Leonardo da Vinci Editrice.

Part I

Genesis of the book

Chapter one

Metropolitan contemporary debates

The genesis and purpose of metropolitan architecture, its discipline in the era of the bigness at the metropolitan scale[22]

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Metropolitan architecture from static forming to dynamic spacing

Always, within the solid street-square matrix, which is the structure of the city of the past (Rowe,1980), Architecture is a work of man who marks a horizon as something that "stands there" erected in itself, comes into position and remains in position.

At the basis of the very concept of Architecture there is a demand for original stability, followed by a place in a context within a defined sphere of relevance, within its own limit (πέρας), and its own term (τέλος), which are constitutive, do not therefore qualify a deprivation but make clear the particular sense of every form that man builds and roots on the ground.

With this 'stance' the architectural subject begins to be. We are talking about that "taking a position within its own limit" that Aristotle (IV century B.C.) calls εντελέχεια, to which corresponds the assumption of a μορφή, a form.

Now and only now the idea that the designer has turned in his head for nine months,- as Filarete taught us (c.1460-c.1464) -, can take shape in space and the thing appears (ιδέα), manifests itself (φαίνεται), expresses itself in its own οὐσία, better, its own παρουσία, a word in which the addition

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of the preposition παρά (near, at the same level) gives greater consistency with the authentic meaning of being, which is "to remain within and not beyond one's own limit" assumed by taking a position, "near" the sphere defined by this limit.

The process, caught in itself, of this stance is called φύσις, a term that goes so far as to mean "nature", complex, that is, of entities that have taken a position and have to become. Φύσις therefore contains in itself a double nuance of meaning: the one concerning movement, and the one concerning stabilization. Heidegger thus, with great evocative power, defines the φύσις: "What opens up from itself (such as the blossoming of a rose), the unfolding and in such unfolding the entering into the appearance and the staying in it; in short: the unfolding-permanent imposing itself". Opening-up - permanent - imposing itself: movement and stasis, conquest and its enjoyment: becoming and being are connaturalized in a sequence that sees the overcoming of the state of latency to reach the position (the happening of the non-latency, of the famous αλήθεια).

To reach the position corresponds the entrance in the τέχνη, defined as a "generating, a building as a wise production". The taking of position corresponds therefore to a "remain collected" within its constitutive limit, marked by a form, self-manifesting. Φύειν, οὐσία, λέγειν, φαίνησθαι (manifesting itself through a μορφή) define the landscape of being. The medium in which the divenient is formed is space, in a meaning, however, not extensive (space as extensio, as one would expect), but topical, much more circumstantial: space as τόπος in the meaning of χώρα, not translatable, as Heidegger points out, neither with space nor with place, but as "what is occupied by what is there", a "local space", but also the population that inhabits it and that the Greek Theatre welcomed and embraced by placing it in a cultural landscape, together with the Temple, and natural through the Panorama. The project ac_cade... falls to the ground.

Beyond the limit. Measure and scales of the contemporary city

Since time immemorial, especially in Europe, the measure and scale of Architecture of the city are linked to human size, they are almost defined by immovable types, they are commensurate with the urban fabric and density parameters of urban concentration and are fixed in the fabric of the city through monumental objects, as symbolic mediators. Today, on the other hand, the limit of the Architecture of the city skipped and it must be considered that this order of magnitude, which is essentially due to proximity, is rather inserted in a context of mass mobility of people and goods that implies a different relationship between individuals, crowds and different identities, and in the now globalized exchanges. The theme of incommensurability appears in the last century, a bigness linked not only to the performances, times of flows and meetings on the networks and in the places of intermodal exchange between networks, but also to a new sensitivity towards natural capital; and also, to new styles of behaviour, induced by virtual communications in real time. We have called it the paradox of atopic proximity.

Movement and stasis and the mental city-map at metropolitan scale

Lynch (1981) described a city that is very close to the nowadays metropolitan city that is composed by a network of spaces of place and spaces of flows (Castell,2004). He reviewed the Gallion’s formulation (1963) and explored his own pattern system, which makes a fundamental distinction between movement and stasis. Settlement form is the spatial arrangement for person doing things. The resulting is the space of flow for persons, goods and information, and the physical features, which modify space in some way significant to those actions, including enclosures, surfaces, channels, ambiences and objects. The language of urban forms is based on the activities of urban actors, either those locally active in a place (creating matrix of adapted spaces or enclaves) of those in transit, who need pathways or armatures (creating flow facilities).

Each citizen constructs a mental city-map consisting of a system of fragments, each of them with its own characteristics, building types, and microclimate. This mental map contains nodes as attractors that attract citizens to various points. We can name it Psychological geography. Lynch created his favourite imaginary model from this matrix of elements. In his alternating net model, he reintroduced the concepts of time, geography and attractor basins focused on nodes within networks. The network is a loosely defined grid with fast and slow channels of movements. The settlement maintains a permanent reserve of circulation space and may gradually accumulate a layering of notable structures saved from successive epochs.

The contemporary metropolitan city with its armatures, enclaves and heterotopias (Shane, 2005) is able to determine an imaginary that allows citizens to create their personal mental maps so that they can move around the city still experiencing a “feeling of adequacy” (Lynch, 1960). The question of our research considers the transformation of the spatial map at the metropolitan scale as a problem of the reform of mental maps, through new tectonic and architectural signs, which strengthen the action of citizens (residents and city users) in a now global field of action, in order to reposition the local areas of origin in an enlarged horizon, generating a new sense of belonging. The underlying question seeks to analyse how the transformations of contemporary urban territories, the reforms of typological and morphological paradigms of architecture and metropolitan cities (private, semi-public and public space, intermediate urban-rural areas) have been addressed in terms of metabolism, i.e. considering processes of transformation, replacement and maintenance of the context, with respect to the three essential forms of sustainability: economic-social, ecological-energy, and managerial-entrepreneurial.

How do we live in the metropolitan city? What, as architects and urban designers, do we build for this "how"? are there alternative ways to inhabit and build it compared to the past? How do we qualify the way we live in a world whose places are networked and where the vertical notion of time seems cancelled out by an absolute and horizontal proximity? These questions give rise to the need for a Metropolitan Architecture Project. As Architects our task is to root through the places we have found and then made, the new Generations. Today, in the dimension of a city that has been defined generic (Koolhaas,2006), our effort turns to the search of what are the conditions of space in order to create new relationships and new metropolitan identities.

The other fundamental element that leads us to say that the new metropolitan identity is also a hybrid identity is that we have to integrate in the new dimension the past that becomes a fundamental element, in order to obtain the qualified dimension of living as a sign of new lifestyles. Signs, marked in places, that Lynch (Lynch, 1960) defined Landmark, characterized by a vivid and therefore memorable image and object of desire. Shane (Shane, 2005) called the Landmarks Heterotopias, architectural entities that Fenton (Fenton,1985) was the first to define Hybrid Building.

We must define a new approach to this scale design that no longer requires only a management of the bigness phenomenon (Koolhaas,1995), therefore, an adaptive system, that needs an inventive and creative process based on a geographical and geometric approach, on art and memory. These new procedures will determine new tools that will be the interpretative maps of Metropolitan Cartography and the Metro Matrix. These two tools will define the possibility of analysing, interpreting and designing the new hybrid landscapes and the new metropolitan typological form.

The scale

Our demand for research has as its horizon the metropolitan extension, especially of small and medium-sized cities that are proliferating, its management (metropolitan management), its architectural dimension (metropolitan architecture), its ecologies and landscapes. It concerns the definition of cosmopolitan globalization, which does not cancel places, but instead reinforces them by raising them on a bigger scale: it enhances ancient positions and creates new ones; others let them decay, making them reborn as symbolic mediators (sustainable heritage). The new urban and

architectural individualities thus result from reinterpretations linked to their position, but at a different scale.

The metropolitan landscapes

We need to build a neo-eco-pastoral landscape awareness, we need technology that supports new activities and connects them with the network of the cities of the word, changing our aesthetic tradition, linked to the picturesque landscape of the valley, in relation to our renewed environmental awareness. New technologies that give life to a new idea of public space. Urban Design and New Technologies together will allow to define a network of paths through which rethinking public space (Agenda of public metropolitan space design), which in the metropolis we call public realm (Reeve, Simmonds, 2000).

Innovation and continuity

Starting from the belief that the shape of architectural and urban space should be understood as a fundamental factor based on models of sustainable urban metabolism, our research in medium and small growing cities aims to balance macro and micro-economic factors with cultural factors: the physical shape of the city made up of residential areas, public spaces and landscapes. The objectives are the socio-economic development of the territories, through operations of high architectural and urban quality, carried out within the metropolitan system; the creation of innovative processes of integration of the different metropolitan cities through the definition of public spaces; the respect of qualitative and quantitative standards for an infrastructural revival, also through the development of new renewable energy sources and intermodal transport that will change the shape and image of urban settlements.

The discontinuity with traditional architectural and urban disciplines. Contemporary metropolis and polis

We believe that the metropolitan architectural discipline needs to strongly feel a discontinuity with the disciplinary experiences of recent years. The morphological catastrophe that is taking place especially in fast growing countries, represents an important element to frame today's architectural problem:

a) the definition of landmarks in relation to the new metropolitan typologies, which mark, like pickets, the new widespread urban formations linking them to regional urban territories and constitute their relays for the interconnection between the stairs;

b) the definition of new types of settlements that include urban agriculture;

c) the definition of an image of architecture - from the City as a Museum to the City of the Muses - (Rowe, 1984), which, by denoting the relationship between networks, city fabrics, and landscapes can still become the identifier of the metropolitan identity, defining its new measure and the relationship between natural landscapes and internal landscapes.

How does the transition from modern to contemporary metropolis take place? From the original stability, today the occasional is an absolutely typical element of the urban landscape of the contemporary metropolis, especially when several occasionally generated elements meet in a metropolitan context to constitute alienating scenarios: this is what emerges, for example, from some photographs of dispersed "urban scenarios" taken by Joel Meyerowitz (2001), Robert Polidori (2015) or Giovanni Chiaramonte (2015).

Paola Viganò (1999) introduced, talking about composition, the theory of games: puzzles, patchwork, overlapping layers that "partially intersect". Today we talk about labyrinths, hypertexts,

networks, fractal figures, zapping, hybridization, dominoes and inlays, to represent the fragmented figural reality of the metropolis we live in. A metropolis that besides being the place of visual multiplicity is also the place of social multiplicity, of "difference": it is "a patchwork of cultural, religious, linguistic, ethnic minorities, income levels, lifestyles, architectures and knowledge that tend to lock themselves, through complicated processes of exclusion-inclusion, within their own "villages", enclaves or "fortresses", themed cities floating in a sea of mass solitude [...]". (Amendola, 1993). On the other hand, some scholars can even think that it is possible ignore any χώρα, the space is streaked and flows between "erratic boulders" (Calvino, 1985 and Nicolin,1992) without the right measure and limit. Having lost the concept of Polis and public space as a space of representation of an entire society, the metropolitan city seems to be able to disregard any form of co-presence between people and perhaps even architecture.

The contemporary city is the privileged place of fragmentation and simultaneity where an artificial placement of urban entities and materials on different levels generates new hybrid compositions. An example: the republican-era villa that has become part of Renzo Piano's Parco della Musica complex in Rome and is perfectly visible from the foyer. A city where fragments, or entire networks (such as that of the metro line) sink into the lower layers of the ground. Some operations can be alternatives to the polyploid (Bateson, 1984) contemporary metropolitan city and can be produced from the fabric of the city: for example, the defunctionalisation of some areas (industrial areas) and the consequent decommissioning have given the opportunity to reinvent their use, which has thus become residential or commercial; the fragmentation of scales, fabrics and landscapes has generated interesting hybrids between new function and pre-constituted form; the de-semantisation of the structure of the modern city and the removal of its typical "positional values" has allowed principles of democratisation in terms of urban space.

Metropolitan architecture

The generic metropolis has progressively lost its informative vocation, which in the medieval city, was proper to the "space of contact" (Choay, 2004), the space of circulation today downgrades the road to pure medium between points. The infrastructure system has a less intense charge of information because information is progressively delegated to communication structures that are increasingly light (up to the telematic network) and differentiated, in its most evolved phase. The new paradigm of growth that the Metropolitan Discipline proposes is not linear but a net and the themes of the Metropolitan Architecture project concern condensers of rare metropolitan functions and new land uses. It concerns New built form Type, but also its context, whose dimension is about 1km x 1km. It is an "exchange pole" between the infrastructural networks that organizes the relative "exchange district" and that today more and more often integrates the urban agriculture and is defined through patterns of Linkage Urban-Rural (UNHabitat, 2017). These new types require:

- A project of integrated functions.
- A project of fabrics at different scales.
- A project that gives back the depth of the urban biography.
- A project of urban scene as a section that integrates geography and landscape to the city.

For each metropolitan city the goal is to grow in size in order to establish a balanced level of synergy between the parties, evaluating moments of crisis and strength. We work for the construction of scenarios of potentiality born from a vision that is a moral idea for the city.

When we talk about Metropolitan Architecture, we use the word Architecture and we refer to the "way the various parts of an organism or a work are designed and distributed" (Encyclopedia Treccani. Item: Architecture). The metropolitan structure and form is determined by a Green - Grey Infrastructure, with respect to which we identify places, or hinge points at the intersection of high ways and railways where the metropolis will be densified. What used to be the background for the

city now is its structure, its figure and its image. The Green-Grey infra-structure has become a metropolitan structure or armour. Could we say that this is the new Metropolitan Architecture? Yes, if we refer to architecture in its deep meaning of logical structure and ordering of the metropolitan dimension, however, we prefer to use such a strong word as Architecture to identify still and always an inhabited space capable of producing urbanity and intersomaticity (Choay,2004). That's why we indicate as the main problem of Metropolitan Architecture the need to define Urban Morphotypes, New Hybrid Typologies also called Megaforms (Frampton, 1999) able to constitute the new centralities in the diffuse fabrics.

Metropolitan Architecture project, then, concerns the typologies that, like malls and air terminals and stations, can be understood as the definition of the paradigm of the typo-morphology that, in widespread urbanisation, links the global scale of the networks to the local scale of the fabric. We consider the new morph-type not only from a territorial point of view, as places that mark the territory in strategic places, and act as points of support for a territorial reinforcement of structuring a vast area; but also studied regarding the expressive character of their image.

I wanted here to make a clarification on the term "brand". Leaning on the interpretation of some statements of Derrida (1967), the "brand" is the very possibility of language. And it is always present when two things are related. The "brand" does not need language is a sign that indicates the relationship.

To constitute the brand of a territory and a landscape, an architectural object needs a denotative image in the immediacy of an identity. In this regard Bachelard, in his The Poetics of Space (1957), went in search of "an intimate and concrete essence that can be a justification of the singular value of all our images" and even went so far as to hypothesize not only an "inhabited space that transcends geometric space", but also an image that can be captured in itself, in its immediacy, as isolated from its context and not necessarily interpreted, but assumed in the instant. This necessarily opens the discussion on the value of contest, denied by Koohaas (1995) in his concept of Bigness.

The metropolitan centralities. Urban quality and recognizability of a place

What we have called "condensers of rare metropolitan functions" and which, using a metaphor, we call "differentiated containers" have been studied how:

- Land markers
- Interior Landscapes

In one of his texts, Dematteis (2003) argued that if we look at the current territorial context from a perspective that prefers spatial observation, we notice a loss of territorial connotations of urban systems, due to the fact that the networks of the different central functions (trade, finance, information and transport) tend to have their own and different geography (Castell,2004). It is therefore difficult to think in traditional terms of "centrality" as an attribute of individual localities, where functions are concentrated according to different hierarchies. Centrality has become an attribute of the network, since, at least apparently, there is not a single geographically recognizable centre. The city as a central location loses, therefore, its territorial identity and is broken down into as many fragments as the networks from which it is crossed: network interconnections prevail. Hence the homologies with very distant cities and the awareness that "what is similar is not close". (Secchi,1984). The space of the nets assumes new categories: it is sunken; dissipated (relational condensation/nodes); shattered (by the multipolarity of the nodes). We must ask ourselves the problem of a re-identification of the different parts of the metropolis through the design of new types of morphologies.

Masterplan as a process

What is Metropolitan Architecture then? The Metropolitan Architecture project is a vast project, which occupies at least one kilometre by one kilometre, which is in the context and creates it. It is able to select the durable values among the elements that structure the region and the metropolitan city by activating or reactivating the relations among the significant places of the metropolitan scale: new and old places and architectural entities, land uses, infrastructures and landscape sets.

It is a process and not a masterplan. That said, Metropolitan Architecture builds a gradation between the scales and the corresponding maps, then, composes a set of scales and landscapes through the use of decipherable signs, physical signs marked on the territory that allow the formation of a mental-map even at the vast scale of the metropolitan area.

The architectural projects will determine differentiated containers, new types of housing capable of introducing agriculture in the metropolitan city, new forms of land use that introduce the theme of green space as a public or common space. This is the way we believe we can respond to explosive growth, and it is also the way we interpret the map that tells us how explosive urbanization has meant that, in some metropolises, the economic efficiency is even higher than in their National State. We are interested in this data to say that this economic growth must produce a wellness and sustainability that means the possibility to grow up to the threshold of the sustainable scale (the right measure), a fair distribution and an efficient management.

To conclude, we assume the concept of Heterotopia (Shane, 2014) whose meaning is that we have to insert in our architecture something that we discover today fails at that local scale. That is the landscape dimension, which to be comprehended and evaluated at the large scale must be discovered first at the small one that is the only true scale of the human being (scala al vero).

This means that we have to choose and build models that are powerful intellectual constructions, conceptually orienting. Our tool is the Metropolitan Chartography, but we know that the map is not the world. We remain small meanwhile the metropolis is growing and we understand the world and we build it in a sustainable manner only through the intelligence to understand the object that appears as effectual and important at the larger scale, making it able to be significant also at our small scale that is unique. It is always the only one.

Urban quality in the contemporary metropolis

It is the theme of urban quality, which is naturally linked to the complexity of metropolitan functions, but for us it is also intimately linked to the question of identity and signification or image; a question that is still too marginal in urban studies.

In other words, the actors of the new urbanization process have changed together with the spatial and temporal measures of the city (Ortiz,2014), due to the leap in scale that it is a matter of fact. This is why the way of marking places and territories has changed. The question, then, arises of what the monumental space is today, which is also linked to the search, in discontinuous places, for a "city effect" that allows the inhabitant and the city-user to find the things they were not looking for. In this time, in fact, the city brings together what it was not before: functions, but also places that allow serendipity ("surprise, the making of unexpected happy chance discoveries"), that constitute mental spaces, that respond to a new need for beauty and more and more often a planned night. This change is the object of the research.

The mission of the academy. The Galileo's Tool

Developing and sustaining a metropolitan discipline of practice in higher education. The university responsibility

The contemporary massive growth needs to face the largest challenges of these times: resiliency and inequality in developing metro areas. These goals won't be achieved if cross-sector, cross-jurisdictional collaboration and long-term time span are not enhanced. What is, then, the question we have to face? The question is to define a discipline, which exists between architecture, urban planning and regional planning that can handle the metropolitan phenomenon. It must be based on an integrated vision of the various disciplines and different scales. The discipline presents tools for managing the dynamics of growth, economic and social, under an ethical axis guaranteed by the public institution, especially those relating to the explosive growth of the illegal and informal settlements. A discipline based on a precise idea of the role that in the process must have the local scale. The metropolitan discipline, so, has a fundamental role of regulation among the scales, but it is able also to conserve the robust civic image of that local identity (Lynch, 1960).

We aim to lay the foundations for a new Practice of Metropolitan Discipline as an answer to the limitations of public policy, professional practice and academic studies in facing the metropolitan complexity and fragmentation. We understand this social need and we are deeply convinced that is the university's responsibility to manage the contemporary metropolitan complexity and fragmentation through a new Higher Education Institution's (HEI) program able to build and use new ICT tools too.

Our attempt is to sketch out a disciplinary approach for a high quality of life within the metropolis (Lynch, Rodwin,1958). We are convinced that modernity is essentially a research project (Habermas,1983). In order to achieve an objective dimension in urban studies, we must go through an integrated logic of our respective disciplines that today are trying to explain the complexities of the contemporary metropolis by sectorial analyses. Integrated logic means that we are looking for a new set of relations and new knowledge research fields that are segregated in silos now. We also need the local particular case issue raises to a wider dimension, in order to fully understand the complex meaning of its insertion into the metropolitan network of relations.

To face these challenges, we want to improve the Practice of Metropolitan Discipline at the HEI level. And so, our mission is to generate applied knowledge to improve the awareness about these metropolitan issues by bridging the gap between theory and praxis. We must form professors and professionals able to use new instruments and intellectual tools and who are able to apply their skills to the metropolitan complex dimension. Consequently: what, why but mainly "the how" of the metropolitan projects.

The universities and public authorities' metropolitan pact

The construction of a metropolitan discipline taught must be regarded from two different points of view or subjects. The first point of view is the project aim of who expresses the project for the future. It's the one of those that must be enhanced, local citizens who know their needed project. The other one, is the perspective of the academician who triggers the path, he/she is a wise and in a certain way, knows that, relating to the project, he/she should take a step back. This latter, however, knows how it must begin. This is essential, because the former doesn't know how to begin. We must, then, determine the matching of local citizen (who wants to learn for a future project) and wise person that is willing to enter into a process of case studies to pass on what they have already learned in an operative action. This is a practice-theory, i.e., a knowledge to action.

Research innovation and education: a cultural change

Research, innovation and education are synergic pillars for a metropolitan discipline of practice. Research produces social capital due to the fact that it invents the future. According to Fuggetta (2012), visionary researchers used to trust in the idea of the possible transformation of the world utilizing advanced knowledge and imagining new words. Innovation, therefore, needs research, but on the other hand, produces experience. The common aim of research and innovation, related to the urban studies, is to define dwelling practices that create the quality of life. This goal is reachable sharing a network of knowledge toward new design logic. According to Lynch (Lynch, 1960) we would like to delineate a process that produces a conscious design for a visual plan. In particular, the aim of the Metropolitan Discipline is to foster a reflective attitude ('critical thinking') with regard to scientific practice, to the consequences of technology for society and to the moral and social responsibility of technicians. We, the academicians, have to invent the future, serve the society and teach how to learn. We also aim to impart cognitive skills and knowledge required for arriving at informed judgments and decisions on issues that are at stake. It is clear that the challenge is a cultural change that needs to envisage the two different processes of research and innovation that require different methods, skills, competence and funding mechanism.

The Galileo's method for the metropolitan discipline

Human being is the centre of metropolitan studies (new humanism). The object of the study is not only the primary needs of the human being but rather their expectation for a high quality of life. This is the main legacy left us by E. N. Rogers (1958) through the concept of the Utopia of Reality and the discussion he carried on in the courses held at the Faculty of Architecture in Milan between the 50s and 60s discussing the Formula of the Architectural Phenomenon and the changing relationship between necessity and affect.

To understand the continuity with the past, even in the necessary discontinuity of the present, it is fundamental to understand what the genealogies of our research demand are.

Through the method, Galileo (1624) intuits the phenomenon, produces the experiment by building the tool to implement it (the Tool), - binding the conditions of the experiment in order to be able to replicate it - and finally understands the reason for the experiment and then communicates it with a language that, he said, is mathematics. The experiment, then, defines the conditions of observation by making the phenomenon that was previously intuited appear, and that will then have to be communicated.

Galileo is the final point of a research starting from Alberti (first in de Pictura (1450) and then in De re aedificatoria (1452)) which enlightens the artisan Brunelleschi, who meets Leonardo, a craftsman/architect who lived in the Milan of Bramante, on whose work Michelangelo's work stands out. It is important to quote this genealogy in order to understand the necessary continuity of the Renaissance, that from the craftsman/architect, who invented science and art together, goes to the one who invented science (Galileo), and does the experiment to observe that the world is written through mathematics signs. Thus, the cause and effect of the phenomenon revealed by the experiment (tool) are defined, whose relativity is constituted by the constraints of the field within which the observation takes place. The experiment, which in the Metropolitan Discipline is configured as a workshop during a Training Lab, is always a process because when new metropolitan constraints are better understood, the knowledge of the past architecture and urban disciplines decays. This passage explains the necessary discontinuity of the Metropolitan Discipline with respect to the architectural and urban disciplines of the past.

The design concept

The Metropolitan Discipline within the Training Lab. often uses the project workshop as a method and communicative moment where the intuitive imaginative conditions of thought are established; these are the conditions through which we can build our tools. The objective is the understanding of the phenomenon, which will be given in an image that today we call "concept". In that context of study of the metropolitan phenomenon, according to the way we have established the conditions of constraint, the "concept" is the intuitive ratio of the intervention, which is then extroverted into language that communicates: it becomes a sign. Whoever carries out this action, then, represents this intuition as an image, before as language. For us, this means that linguistic notation regarding the image is poorer in expressive power. It is this Power, in fact, that makes us feel the meaning of the metropolitan phenomenon and this feeling is the active/passive moment that allows us to react internally, as reflective citizens. We could call it passivity but in action: the receptive man is struck by the world (the wonder [thaumazon]). Without wonder there is no communication because there is no real time; A man who knows the time value, that is, she /he knows it is ending. Giordano Bruno, instead of mathematics, elected the poetry to communicate the intuition: "[mathematicians] are like those interpreters who translate words from one idiom to another; but it is the others who are deep in feelings, and not themselves". That is why not only mathematics is for us architects the means to communicate our intuition.

Beyond Galileo, we have to consider the relevance role for us of the Giordano Bruno 's though (1584). In the American Lessons, Calvino (1985) speaking about the poetic theory, went back to Bruno, clarifying the essential content of Bruno's thinking, and explaining why numbers are not enough. In fact, numbers do not create, and cannot invent without the help of symbolic mediators. Symbolic mediators are urban concrete facts as testimony of value to successive generations. Instead (Shane,2005) symbolic intermediaries are the new metropolitan actors and their practices producing social and individual projects. The synthetic and poetic intuition of the metropolitan phenomenon (bridging the gap with the abstract and invisible world), through the great memorable images mentioned by Lynch (1960), transforms a site (within its symbolic intermediators) in the symbolic mediator. This mechanism allows to shift from the experience to the knowledge and so, to the awareness of the metropolitan city role for the cosmopolitan democracy foundation.

This feedback explains why to talk about Metropolitan Discipline we have to mention the figures of Leonardo / Galileo / Bruno. Leonardo was the artisan who became a scientist, Galileo was the one who postulated the scientific aspect and invented the experiment, but Bruno was the philosopher who opened himself to scientific invention, teaching us that the "visual imagination" or the "figural imagination" is "the gulf, never saturable, of shapes and images (Bruno)" to which drawing quickly, accurately and taking into account the multiplicity of images and all their possible combinations. This is the "fundamental human faculty to focus on visions with closed eyes". As Hilberseimer indicated in 1929, the possibility and capacity for abstraction are necessary conditions to manage the new complexity of the Grosstad; today we add intuition and invention.

Open questions

Regarding the Metropolitan Discipline, some challenges ahead are still visible, at this moment. According with Professor Wang Hongyang of the Nanjing University who is joining us in the Metropolitan Discipline construction process, these challenges are innate in the relational and holistic nature of matter, and to solve them, it is not enough to break the existing urban, planning, development and governance paradigms. It requires a paradigm shift in existing ontology, epistemology and methodology.

Such challenges include:

How to synergize? Prof. Wang argued this is different from building a metro-matrix framework. It is true, he said, that the existing approach to the complexity of metropolitan development, planning and governance is too unholistic and undialectical. But a more difficult question is that when we approach as much as possible the totality of the thing, how can we find the synergetic solution? Indeed, it seems the disciplinary “development” has been always getting close to the totality of a major. But the world is still desperately divided. How can the contradiction be reconciled, no matter it is stasis-dynamic, openness-limit, or equity-efficiency? It is evident that the post-modernization and neo-liberalism approach, which often tends to render the answer to all kinds of self-organization and autonomous gaming, cannot work. But it is also wrong to believe that the failure of the post-modernization and neo-liberalism represents the victory of modernity and traditional management. Rather, it indicates the inadequacy of both existing models. So, the challenge is: how to jump out of all the existing models and find a new way?

To answer, we have to return to E. N. Rogers' concept of discontinuity of the discipline within the continuity of the tradition. It cannot be a simple tool for upgrading. However, it must be a radical transformation. Nevertheless, in the urban design and architecture disciplines' field, always it happened that to moment-events, which broke the paradigm, extended times of traditional praxis follows.

Today, however, we must admit that if we want to attack completely new problems in our societies (the endemic increase in inequalities; the hunger scandal; the recurrence of financial crises of vast proportions; the bursting of identity conflicts that add to the well-known conflicts of interest the paradoxes of happiness; the sustainability of development, etc.) we must take a standby choosing the point of observation from which to shake reality. Otherwise, the discipline will also continue to expand and increase its technical-analytical apparatus, but if it does not come out of its self-referentiality, it will be less and less able to take hold of reality and therefore less and less able to suggest effective lines of action. Metropolitan discipline must concern the ontological dimension that refers to individualism as the main reason for the practical, functional and efficiency dimensions. These are ways of reducing human experience to the "accounting" dimension of instrumental rationality. Dilating the cultural horizon of research to include the "value of connection" is today the intellectual challenge that is urgently needed. That takes into account the emotions, beliefs, values, symbolic representations, which have relevance for the part that affects behaviour.

The TELLme methodology allows ontological and epistemological reform. First of all, we set our assumptions framing the Metropolitan General Issues and Principles Glossary Software. In doing so, we have reversed the pyramid of knowledge: it is not the process from data to information and knowledge that makes us wise. However, vice versa, we need to be wise to be able to explain the reasons why choosing the data we can illuminate the complex processes that impact on the metropolitan territory. Through the assumptions of sustainability, we interpret the metropolitan region's dynamics producing the groundlessness that our metropolitan architecture project must heal. Besides, using our metadata open-source Metropolitan Cartography tool always it is possible to explain the reason for the elements and related indicators choice.

Following the Professor Wang’s discourse, then, if the above challenge is serious, deeply exploring into it will soon suggest another challenge: are we looking for a new way of governance, or a new way to apply the existing knowledge (i.e. existing knowledge is basically valid), or are we primarily re-inventing our Weltanschauung and methodology? The reason underlying the difficulty of synergy lies on the relational nature of thing’s property (and hence e.g. people’s opinion). The relational nature of property, meaning, value etc. however conflicts against the “scientific” ontology and then epistemology and methodology, in which thing has fundamentally an atomistic nature. Introducing the relational approach to the metropolitan governance will lead to difficult questions such as who is right and who is not, or what is the nature of a specific space (from different relational perspective, a space can have infinite properties; indeed, any space has infinite properties)?

Nevertheless, today the ambition of neoliberalism to become the model of absolute government failed. It is a machine that has internal dysfunctions so much so that the market, which claims to provide maximum security against the uncertain future. This matter today gives strength to alternatives, to a different model of political economy than the neo-liberal economy (Bruni, Becchetti, Zamagni, 2019). The TELLme approach to complexity proposes a multi-dimensional humanism, in which the territory is not fought or "controlled" but is seen as a civilized place on a par with the others as a moment in the public sphere. That is conceived and experienced as a place open also to the principles of reciprocity and gratuitousness and contributes to the construction of civitas and its polis. Can the metropolis be a polis?

As Academy, we believe we have to enunciate our assumptions and to be the curators of the maps, as an assumption of responsibility. On this basis, we will then be able to open a dialogue with the other agents of the contemporary city. We consider our discourse to be scientific because it is based on explicit assumptions, the Principles. Through the assumptions of sustainability, we interpret the metropolitan region dynamics producing the groundlessness that our Metropolitan Architecture project must heal.

Based on our assumptions, the maps illuminate the problems of the real city illustrating the issues of the unsustainability of the metropolitan territory in the light of the assumptions of different disciplines. With our tools, then, it will be possible to define a meta-project as a basis for negotiation between the different metropolitan agents, which will lead to consensus for the definition of a sustainable project.

Participatory Governance is the Enzyme that activates, nourishes and also transforms the Meta Project whose goal is the negotiation plan for the shared definition between the Academy and Metropolitan Agents of the rules of the metropolitan form for the definition of public policies. Since the multiple metropolitan agents, the Participatory Governance Process aims to produce a shared metropolitan vision. Through Contract Competitions, then, we will ask Private Agents not only to define the physical project, but also to construct the practices the physical dimension can facilitate. In this sense, we are talking about the Implementation of Governance.

Finally, Professor Wang introduces the Knowledge and terminology issue. If new weltanschauung and methodology have to be invented, he says, the knowledge and terminology, which build on the basis of philosophy, should also be reformed or even rebuilt.

Metropolitan Glossary is one of the fundamentals of the TELLme Training Program. Together with the Metropolitan Existing Situation Analysis and Metropolitan general Principle and Issues it makes the basis of building the complexity of Metropolitan Discipline.

By its nature, the new discipline is interdisciplinary, merging different academic fields and practices. Every sector has its own terminologies defined within each circle and there is a limit in using the terms without reach an agreement on the meanings of the vocabulary used in the discussion.

However, the Metropolitan Glossary is not a simple list of words with static definitions. The discussion goes be the individual terms and focuses on the relationship amongst words composing the concepts that are fundamental in the metropolitan discipline. The complexity of the new discipline requires a different perspective in framing the issues and solutions and the MGIP Metropolitan Glossary is a way creating the new conceptual structure of the discipline. It is an open-ended collection of vocabularies brought and discussed by experts of various fields. The discussion will constantly change throughout the entire project period and the evolution of the glossary will demonstrate the development of the discipline itself.

A collection of Semantic Packages is the main output of this activity. It is a visual mapping of key words and related concepts that are mandatory in the Metropolitan Discipline.

The aim of the Metropolitan Glossary is to define the concepts of the new discipline defining the individual words, inventing some news, sometimes. The Metropolitan Discipline, then, is bringing

various issues that are transversal rather than sectoral, conceptual operators and operations. Therefore, reaching an agreement on the words used to describe complex issues touching various fields is a challenging yet mandatory activity.

The Metropolitan Glossary has a potential to define the Metropolitan Discipline with clear concepts and words that could be the common language amongst the professionals and scholars. It also helps people to understand where a word or a concept comes from and how it was defined and formed within the metropolitan context.

References

Alberti L.B., (1452) Dell'Architettura, (1565), Venezia: Francesco de Franceschi.

Alberti L.B., (1450) De Pictura, (2011) a cura di L. Bertolini, Firenze: Polistampa.

Aristotele, (IV secolo a.C.), L'Anima, a cura di G. Movia (2001), Milano: Bompiani.

Amendola, G. (1993), «La città fortezza», Quaderni di sociologia, voi. 37, n.4.

Bachelard G., (1957) La poetica dello spazio, (2006), Bari: Dedalo Ed.

Bateson, G., (1984), Mente e natura. Un'unità necessaria, Milano: Adelphi.

Bruno, G., (1584), La cena de le ceneri, in G. Bruno, Opere italiane, vol. 2, UTET, Torino, 2002, p.447.

Bruni, L., Becchetti,L., Zamagni,S., (2019) Civil economy and sustainable development, Roma: Ecra.

Calvino, I. (1985). Lezioni americane. Milano: Mondadori.

Castells, M., (2004), La città delle reti, Venezia: Marsilio.

Choay, F., (2004), Espacements. Figure di spazi urbani nel tempo, Milano: Skirà.

Derrida, J., (1997), De la grammatologie; trad. it. di R. Balzarotti, F. Bonicalzi, G. Contri, G. Dalmasso, A.C. Loaldi, Della grammatologia, (1968/2006), Milano: Jaca Book.

Eisenman, P., (1997), Madrid: El Croquis; 1st Ed. Edition.

Fenton J., (1985), Pamphlet Architecture 11: Hybrid Buildings, Princeton: Princeton Architectural Press.

Ferrez M., Polidori, R., Rio, (2015) Steidl: Slp edition.

Filarete, (c.1460-c.1464), Filarete's Treatise on Architecture: Being the Treatise by Antonio di Piero Averlino, Known as Filarete. Originally composed in Milan. Translated by John R. Spencer. (1965). Facsimile ed. 2 vols. New Haven: Yale University Press.

Frampton, K. (1999) Megaform as Urban Landscape. Raoul Wallenberg Lecture. Ann Arbor, Michigan: The University of Michigan A. Alfred Taubman College of Architecture + Urban Planning.

Fuggetta A., (2012), 3 + 1 Challenges for the future of universities, in The Journal of Systems and Software 85 (2012) 2417–2424.

Galileo de, G., in Opere di Galileo Galilei, Edizione Nazionale, a cura di Antonio Favaro, Firenze: G. Barbera, 1890-1909; ristampe: 1929-1939 e 1964-1968.

Gallion A.B., Simon Eisn, (1963), The urban Pattern, Princeton: D. Van Nostrand.

Habermas J., (1983), Modernity: An incomplete project, in H.Foster (Ed.) Postmodern Culture.London: Pluto Press.

Hilberseimer L., (1929), Das neue Frankfurt 1926-1931 a cura di G.Grassi, Torino:Dedalo Edizioni.

Koolhaas, R., (1995) "Bigness, or the Problem of Large", S, M, L, XL. New York: The Monacelli Press.

Koolhaas R., (2006) Junkspace. Per un ripensamento radicale dello spazio urbano, a cura di Gabriele Mastrigli, Macerata: Quodlibet.

Lynch K., Rodwin L., (1958), A Theory of Urban Form, Journal of the American Institute of Planners, Volume 24, Issue 4.

Lynch K., (1981), A theory of good city form, MIT press, Cambridge, Ed. Italiana (a cura di) Melai Roberto, Progettare la città. La qualità della forma urbana, (1996), Milano: Etaslibri.

Lynch K., (1960) The image of the city. Cambridge Massachussettes: MIT Press.

Dematteis, G., Ferlaino F., (2003), Il mondo e i luoghi: geografia delle identità e processo del cambiamento, Torino: Ires.

Marinoni,G., Chiaramonte, G., (2015), Città Europea in Evoluzione, Milano: OwnPublishing 2015.

Meyerowitz,J., (2001), Text by Colin Westerbeck. 55. London: Phaidon.

Ortiz Castano P.B., (2014), The art of Shaping the Metropolis, New York: Mc Graw Hill.

Nicolin,P., (1992) "Relazione allegata al progetto" in Progetti per Milano, Milano: Abitare Segesta Cataloghi.

Reeve A., Simmonds R., (2000) 'Hyperreality' in the shire: Bicester Village and the village of Bicester, URBAN DESIGN International 5, 141–154; Oxford: Joint Centre for Urban Design, Oxford Brookes University.

Rogers E. N., (1958), Esperienza dell'Architettura, Einaudi, Torino.

Rowe C., Koetter F. (1984), Collage city, Cambridge: MIT press.

Secchi, B., (1984). Il racconto Urbanistico. Torino: Einaudi.

Secchi B., (1986), Progetto di suolo, in CASABELLA N.520/521 1986.

Shane G. D., (2005) Recombinant urbanism. Conceptual Modelling in Architecture, Urban Design, and City Theory, West Sussex: Wiley-Academy.

Shane, G., (2014). Meta City. Origins and Implications. Innovative Technologies Urban Mapping: Built Space and Mental Space, pp 59-72. Berlin: Springer.

Treccani: http://www.treccani.it/enciclopedia/

Viganò, P., (1999), La città elementare, Milano:Skirà.

Un Habitat, (2017), Implementing the new urban agenda by strengthening urban rural linkages https://unhabitat.org/implementing-the-new-urban-agenda-by-strengthening-urban-rural-linkages.

Metropolitan political power[23]

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Introduction

Physical, Economic, Social and Institutional, the knowledge of Metropolitan management is there. The framework of knowledge has already been set up. Developments and improvements of the discipline have to be pursued. That is the goal of the present paper.

We are actually performing a disastrous management of metropolises around the world. This is going to have a very high long-term cost. Similar to the disastrous management of European cities in the early industrial revolution of the first half of the 19 Century. We are still suffering, 200 years later, the effects of the misguided disjointed incremental development. These urban areas developed at that time are home today to the worst urban conditions in European metropolises. Not just physical. Social and economic, as well. Home of the worst security and marginality conditions.

The difficulty we are confronting on the adequate management of our rapid growing metropolises is not the lack of knowledge of the incipient metropolitan discipline. It is the lack of education, human resources, and mental inertia, that is the poor state of social resources. Both, added up, amount to a serious deficit of Collective Intelligence.

1. Governance dichotomy: efficiency versus equity

Economies of scale apply to metropolises. This is why metropolises are more efficient than cities and why they are becoming more powerful. Metropolises are reaching competitive capacities even beyond those of nation-states. The late 20th and early 21st centuries will be the Age of the Metropolis.

Economic efficiency and *social equity* conflict with each other (see the Metropolitan Genoma). Metropolitan management must address the dichotomy of reducing that conflict while maximizing both elements of it. Numerous techniques achieve the goal of efficiency. We have social indicators to provide equitable access to social facilities and reach a progressive distribution of consumption.

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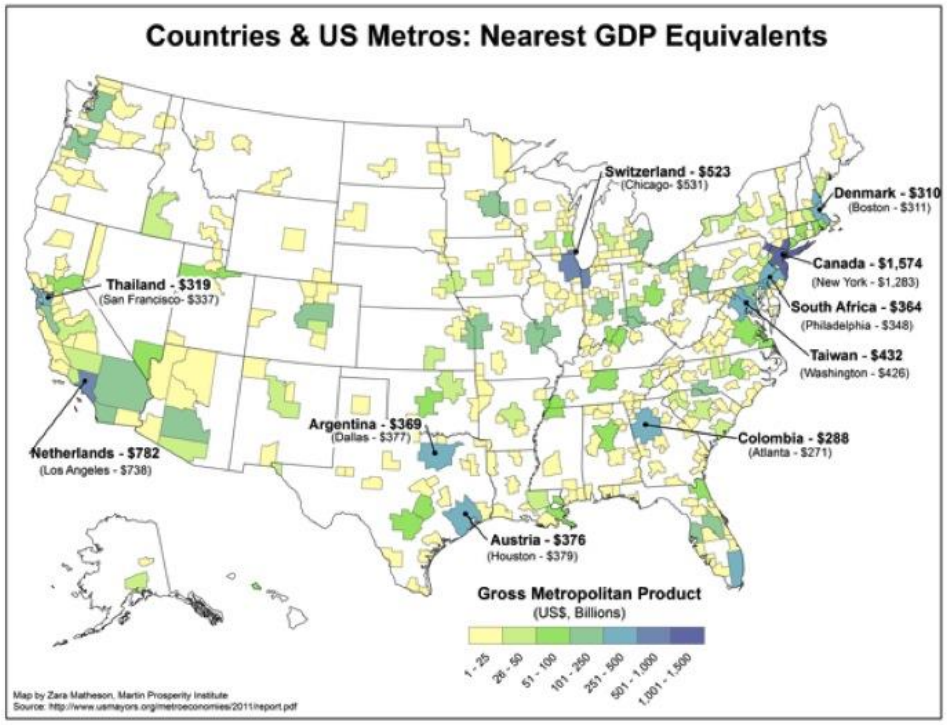
We have no such means, however, to establish the equilibrium between efficiency and equity. Taxation formulas have tried hard to overcome this dichotomy, but they have failed.

There can be no equity without growth, and no growth without equity. This is an essential problem for long-term sustainability. There are no technical formulas. The dichotomy must be solved by social and political means. That is the role of politics in metropolitan governance.

Figure 1. GDP capacity: Metropolises compared to countries



Source: Zara Matheson, Martin Prosperity Institute (2011).

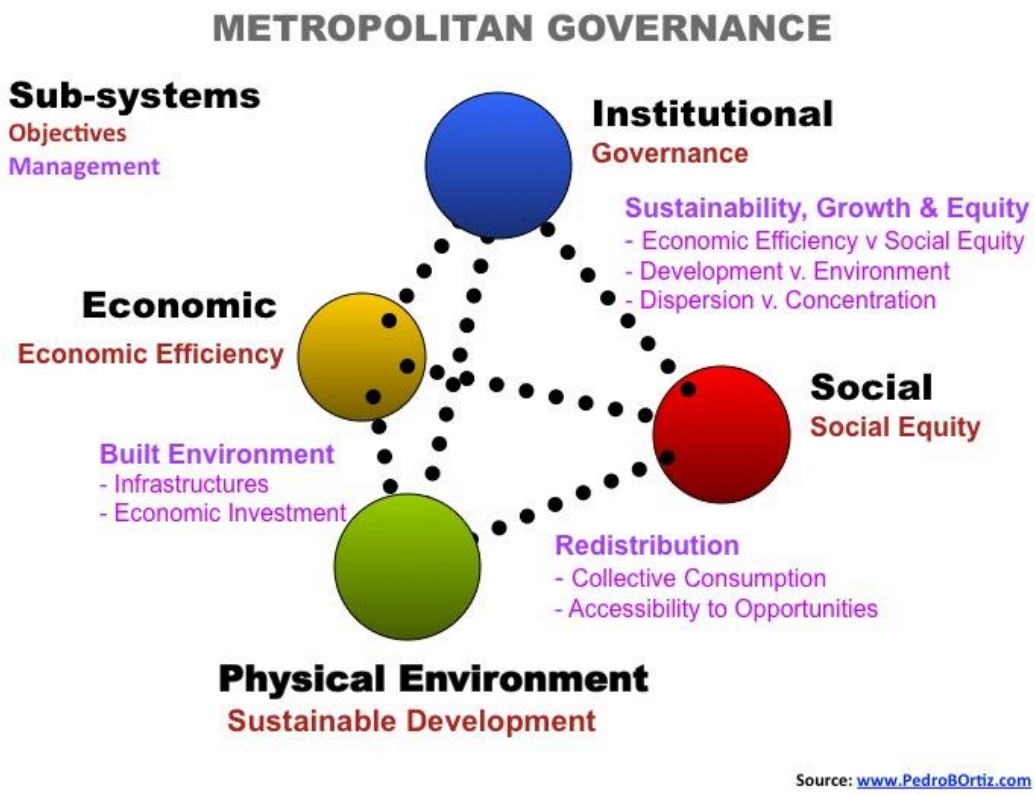
2. Physical component

In addition to the components of the basic dichotomy, there is a third component: Physical substrata. The physical environment is substantial when we are dealing with territorial structures, which is what metropolises are. This component includes both the natural environment and the built-up urban environment.

Conflicts can be tamed in the physical context: The development of productivity typically occurs at the expense of the natural environment. Urban mechanisms can foster social marginalization and inequity. Urban planners deal with this on a daily basis, but we do see this reflected in the media.

The physical component can ease socioeconomic friction. For instance, the right physical approach can reduce the ever-present antagonism of the urban centre versus the periphery that fosters the marginalization of peripheral social groups. Polycentric metropolitan policy allows a plurality of privileged locations and easier social access to public facilities. New paradigms, such as the Metro-Matrix, are ground-breaking in the resolution of these conflicts.

Figure 2. The four components of metropolitan management, challenge for governance



Source: www.pedrobortiz.com.

3. Political equilibrium, governance challenge

The balance among equity, efficiency and environmental sustainability is subjective and can be achieved only thorough politics. Politicians represent their constituencies, which have their own subjective proposals for equilibrium. In a democracy, the electorate chooses between alternative priorities, social (left) or economic (right). Priorities change according to the specifics of the economic situation. Political power fluctuates like a pendulum, achieving what the electorate subjectively interprets as the long-term equilibrium.

These are the basics of politics, national politics. The same framework applies to managing the metropolis; it is not unlike the requirements for urban management.

Reaching pendulum equilibrium requires time. The process involves trial and error and government substitution. Fast-growing metropolises suffer from an influx of rural migration at annual rates of more than 4% or 5%, which translates to a doubling time of about 14 years. When you double in size every 14 years, you do not have time for trial and error. These metropolises therefore are confronting very difficult challenges to address and they do not have the governance instruments to address them. Urban instruments are inadequate for this level of political challenge.

Metropolises do not have governance mechanisms to organize either social resources or the dialogue to reach political equilibrium. Academic papers on metropolitan governance often describe the myriad of governmental arrangements. These descriptions do not frame the necessary structures for policymaking. Describing is not solving.

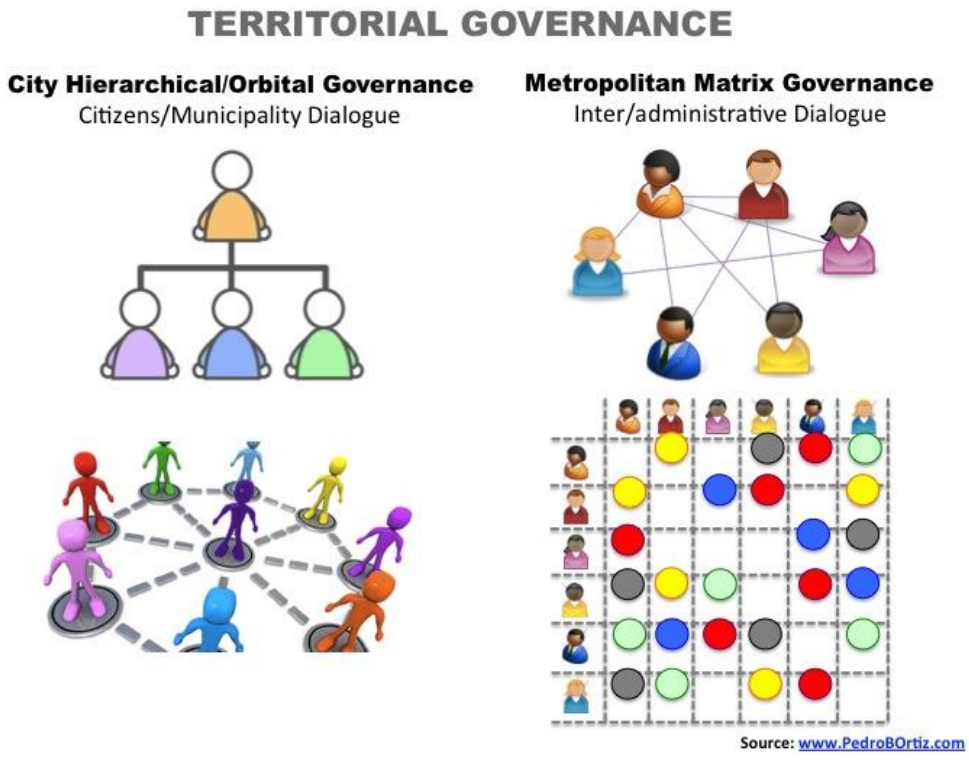
Metropolises have developed as complex supra-urban systems. They are made up of multiple cities or urban units. ***They have the management complexity, productive capacity, and the socio-economic complexity of nation-states.*** Take the example of Singapore. Is such a model the way forward?

4. The metropolitan matrix versus the municipal hierarchy

Metropolises must follow the model of national politics, but most of the time they are not provided with adequate government institutions to do so. Because the economic productivity and social complexity of metropolises are similar to those of nation-states, not cities, they require instruments similar to those of nation-states.

City governments are unitary systems. The basic unit of territorial coexistence is the village, the town, and the city. A single institution deals with the issues that require joint or cooperative management.

Figure 3. The different DNA of municipal and metropolitan policy-making



Source: www.pedrobortiz.com.

Metropolitan governance is more complex. It involves multiple municipalities, many administrative tiers, and many ministries and departments of national government, such as transport, housing, finance, public administration, health, education, and so on. Metropolitan governance also involves multiple utility agencies, which can be public, private or a mix. Each of these institutions has its own set of objectives, purposes, and competences as provided by law. None can impose on any other beyond its legal limits.

Metropolitan management, unlike that of cities, is not based on orders imposed from the upper tier. It is based on the dialogue among all the institutions involved. This dialogue abides within the limits established by the legal framework that distributes responsibilities and competences. A metropolitan management structure is not based on a hierarchy of orders; it is based in a matrix of dialogues among actors and stakeholders in the metropolis. A metropolis needs a national governance model, not one cobbled together from a disjointed accumulation of municipalities.

5. Typologies of national governance

National governments, in contrast to those of municipalities, have evolved from diverse alternatives. Some come from submission to a centralized unitary system after a conquest or independence—France, England, or Spain for example. Others come from the cooperative confederation of a league of cities like the Greek Hellenic or German Hanseatic leagues. With time, alternatives have evolved into more complex solutions such as federations. The three basic systems of national politics are as follows.

Unitary

In a unitary system, power is instituted at a single centre. Sovereignty stands at that centre. Most countries work this way. France would be a good example. Management can be *decentralized* in sectors or territories. Heads of departments, the prefects, are appointed by the national president, and are accountable only to the president.

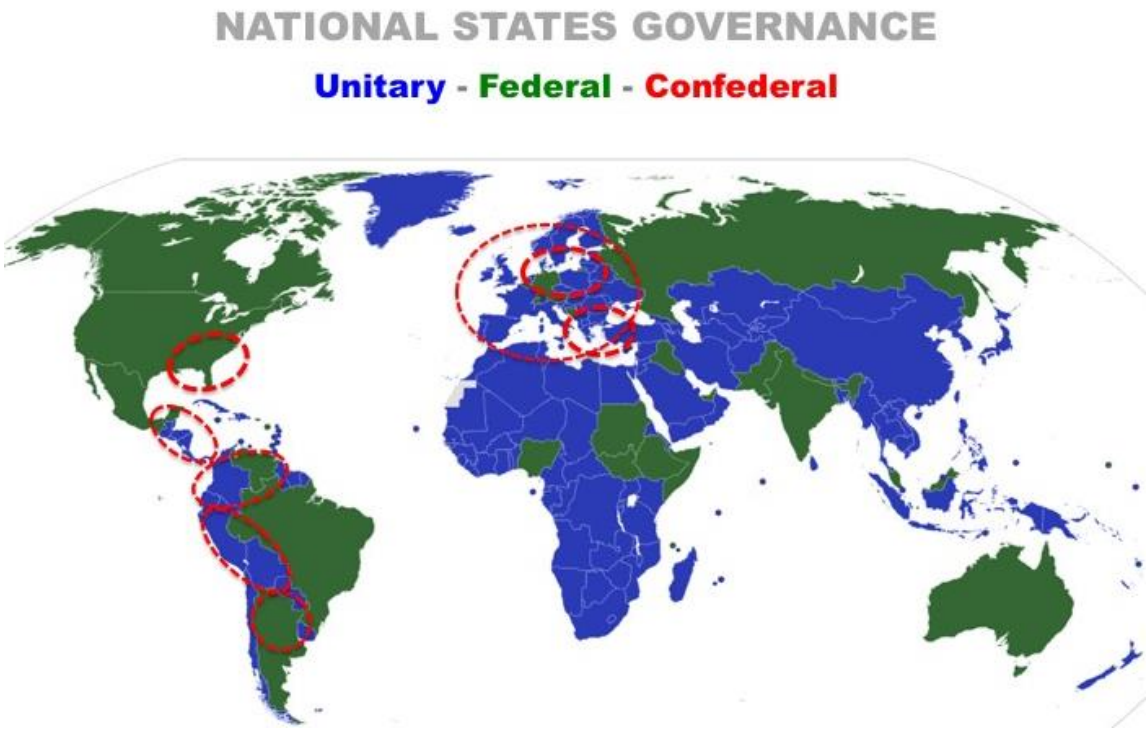
Confederate

In a confederate system, sovereignty stands at the member states or cities. The German Hanseatic and the Greek Hellenic systems are examples. The Confederate States of America (CSA, 1861–1865) and the European Union are closer forms of the confederate system.

Federation

In a federal system, sovereignty is at the centre, but management is not just decentralized, it is *devolved*. The different tiers of government have their own independent designation systems and are accountable to their population, not to central power. Germany and the United States are examples.

Figure 4. Unitary (blue) versus federal (black) systems around the world



Let me point out, for the sake of later discussion, that the German Federation has "federalized" metropolises such as Hamburg, Bremen, and Berlin. We should not, however, mistake them with federal cities such as Washington DC or C. Mexico, which are in fact unitary direct-controlled administrations.

6. The metropolitan confederation

The need for a new urban dimension, the metropolitan one, has been felt since the second half of the 20th century. There have been many attempts to build up some sort of metropolitan coordination among the cities affected by the phenomenon.

One approach implicitly assumes that integrated strategies can be built up from disjointed incremental community action. This approach has also been suggested for national governance (the anarchist ideology approach of the 19th century). This approach for metropolitan governance would be the modern offspring of Bakunin and Gramsci. It is a good-hearted, well-intentioned, bottom-up approach that suggests that by collaboration cities can develop metropolitan projects and metropolitan policies.

Multilaterals like the United Nations' Group align with national governments. It is a politically correct attitude that works within the actual framework of power distribution. They foster the soft-governance aggregative approach, the confederate one.

The confederate approach is an incremental process. Stepping-stones work in four stages.

- Round Table: First stage of coordination is about sitting around a table and presenting what everyone is doing. Sharing information allows learning from each other by benchmarking good results. Most important, the process facilitates the detection of conflicts or inconsistencies and the means to address them. It is negotiation of confrontation.

These “round tables” are known under various institutional names. They are “consultative bodies” (e.g. Ile de France). Their essence is just information sharing. They have no objective to implement common policies or projects.

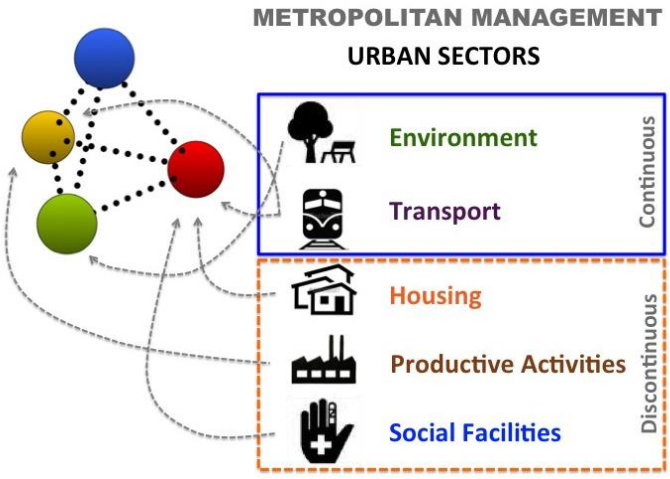
- Parallel Projects: Out of those round tables and resulting from the cross insemination of ideas and experiences, some of the involved administrations may replicate each other and develop similar projects. Parallel projects are run by each municipality, but they are not integrated in a single management. Non-Motorized Transport (NMT) and pedestrian street conversions are general examples.
- Common Projects: Once confidence has been developed among the members, and after years of primal steps, some administrations decide to undertake a common project. Planning is done together, but implementation is still run independently. Economy-of-scale benefits can be achieved by a common initiative that can reduce prices. River parks across municipal boundaries are examples of these (such as in Neuquén, Argentina).
- Management Agencies: When the complexity of the project requires technical skills and a continuous maintenance, the project might be provided with a management agency. Cross-boundary transport projects are examples (such as in Washington DC). These agencies are just management agencies and are only rarely endowed with substantive decision-making capacities. Sovereignty remains on the founding administrations. If the agency works beyond the administrative or political objectives, the founding administrations pull out.

Note: metropolitan components

The five basic components of metropolises are Environment, Transport, Housing, Productive activities, and Social facilities. (The Art of Shaping the Metropolis, Pedro B. Ortiz, McGraw Hill, NY 2014). Among these components, transport (grey infrastructure) and environment (green infrastructure) are continuous systems. The other three are discontinuous. It is in the continuous systems that collaborations are mostly promoted and achieved. That is Environment and Transport, best known as Green and Gray infrastructures.

There is a tendency to think that continuous systems require more coordination than discontinuous ones. Municipalities feel more keenly the need to reach a consistent metropolitan policy when dealing with green and grey infrastructure than they do with housing, productive, or social policies. Coordination seems less urgent for discontinuous systems and it is achieved only in more complex and evolved metropolitan stages.

Figure 5. Continuous and discontinuous: five components of a metropolitan system



Source: www.pedrobortiz.com.

Limits to metropolitan confederation

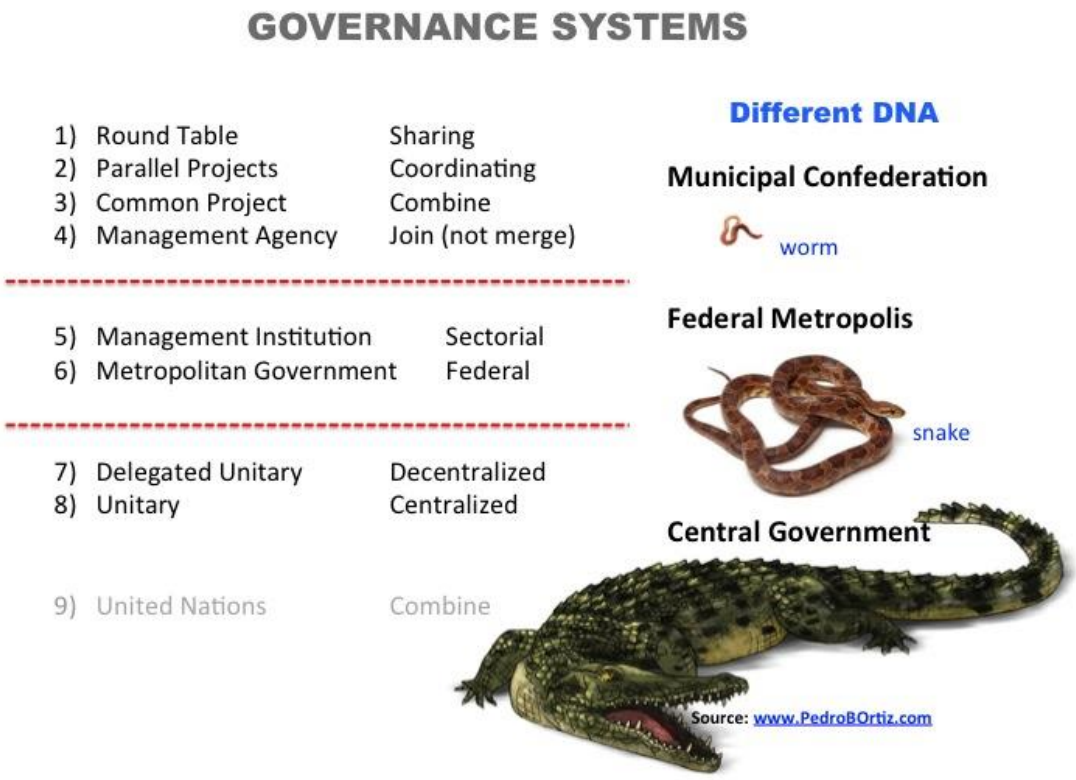
The successive stages of a confederation take time: five to ten years each at least. They never reach next stage if confidence has not been built to allow for further development.

We must understand, however, that the confederation has a limit. None of the administrations involved or politicians in charge will be willing to cede power, nor transfer sovereignty to a metropolitan agency.

Confederations do not develop willingly into federal or unitary systems. The Hanseatic League imploded when confronted from the outside. The Hellenic League was taken over by the Athenian Empire, and the CSA required the American Civil War to be terminated.

Europe is now a confederation. A unitary monetary system such as the Euro requires a federal fiscal and economic policy. Founders of the Euro knew it. The lack of such is the cause of many European troubles. A constitutional attempt was made a few years ago, and failed. As a result, Europe is now confronting centrifugal forces from England and Greece.

Figure 6. Three metropolitan governance systems, each with a unique DNA (worm, snake, crocodile)



Source: www.pedrobortiz.com.

7. National unitary system

At the other end of governance mechanisms, we have the unitary system. With the exception of metropolitan Singapore (often presented as a success!), the unitary system is used mainly at the national level.

There are many paths to national unity; most often, they involve some sort of violence. Unitary systems are usually at some moment imposed by either war or revolution, although many are afterwards legitimized by democratic constitutions. The system has a top-down approach. Issues at the local level are often contested, mostly when management is not attentive to bottom-up community interactions.

National unitary systems are often deaf to metropolitan needs. Instead, they focus on national issues and take limited interest in metropolitan ones because the latter are more difficult, conflictive, and expensive to solve (e.g. Bogota). Lack of interest takes place even when the metropolis can be credited for producing more than 50% of the national GDP (e.g. Manila, Nairobi, etc.). National governments seem to be unaware that if their metropolises do not work, the country as a whole cannot work either.

Decentralization and devolution

Sometimes metropolises benefit from decentralization. An agency is instituted by the central government (e.g. Madrid, 1970) and the President appoints the CEO. Decentralization is as democratic as central government gets, but it does not represent the inhabitants of the metropolis. Rather, it represents the inhabitants of the nation (e.g. Kampala).

Sooner or later, the metropolitan population will insist on accountability from the appointee. He or she will be asked to answer to the metropolitan population, not the national president. Devolution then becomes the next step for metropolitan governance.

Decentralization is not to be mistaken with devolution. In a process of metropolitan devolution, the accountability of the metropolitan appointees is transferred from the central government to the citizens of the metropolis. The head of metropolitan “agency” is then accountable to the metropolitan electorate. This executive becomes an elected government, and central government cannot remove it unless exceptional circumstances, stated in the national constitution, allow for it.

Metropolitan devolution is compatible with unitary states. There are, however, two difficulties.

1. No politician wants to lose power or control and the national government does not like to lose decision-making capacity concerning the metropolis. The metropolis represents a large proportion of the national population and an even greater proportion of national GDP. The politician’s DNA urges the accumulation of power, not the other way around.
2. When a metropolitan government is elected, its majority party might be different from that of the national government. The elected president of the metropolis, managing more than 50% of national GDP and a large and influential proportion of the national population, will immediately aspire to the position of national president, thereby becoming, in effect, his political opponent (e.g. Buenos Aires). No politician wants to breed his own opponent.

8. The metropolitan federal system

As presented, it is not possible to build up a metropolitan government using the confederate approach. It would be possible, though, to build it from unitary decentralization and devolution.

It could be argued that a metropolitan government is not necessary. A confederation or a decentralization framework would therefore be quite enough. This argument, however, fails to consider that many problems and challenges of metropolises are not municipal, nor are national. If they are specifically metropolitan problems, they should be addressed at the metropolitan level. This implies the need for a metropolitan institution to address those problems.

- A confederation does not have the capacity to produce a unified and capable response to the issue.
- A national unitary system could produce such a response, but only if the national unitary system does take the issue to heart. National systems are concerned mostly with international and national issues, not metropolitan ones. But if it does address metropolitan issues, it does so with a top-down approach. Such a system addresses metropolitan issues only when they become national problems, either because of disruption of the national economy or an issue of social unrest (e.g. China). One could also mention the negative national electoral impacts.
- Addressing problems after they have become chronic is not the best way to be globally competitive. Metropolises must have the instruments to address problems sooner rather than later. Waiting only allows the damage to become more extensive.
- A decentralized unitary system could, however, address metropolitan issues, provided it has the popular support and resources to address them. It could be the right means for addressing problems that need a top-down approach. It might not be adequate for problems that need a bottom-up approach and any that need empowerment of participatory community action. The top-down approach of a decentralized system alienates popular involvement.
- A federal metropolitan system is the one that articulates top-down and bottom-up. The devolution approach, in which citizens of a metropolis control their government, requires attention to bottom-up concerns. The top is accountable to the population and the top-bottom dialogue works.

9. The way ahead

In a globalized world and a competitive environment in which metropolises are as productive and competitive as nations, and where the wealth of nations depends on the efficiency of their metropolises, there is little room for suboptimal solutions.

Metropolises must be provided with the most effective system of governance to maximize efficiency. They must have the institutional framework necessary for the equity objective. Appropriate governance is an essential piece of equilibrated metropolitan policymaking.

Metropolises are new urbanization phenomena that have been experienced in the last century. The pace of growth and their world impact is requiring a new discipline of knowledge, an academic *discipline of practice*, which will allow decision-makers to understand and handle it.

Need for a discipline of practice

The necessary discipline has yet to be developed. Although some professionals, practitioners and scholars are pushing for it, Academia has not yet understood the urgency. The 5% actual annual growth rates of many metropolises demand urgency. We are already 20 years too late. 1996-2016 Madrid's Metropolitan Plan and books like the Art of Shaping the Metropolis are stepping-stones, 20 years ahead, in the right direction.

Physical management

Metro-Matrix provides the framework for the *Physical* development. It harnesses and allocates explosive growth. The slums that have evolved are because of a lack of skills and ethics of decision-makers and politicians who are in charge of these metropolises. This might be seen as criminal. The consequences of NIMTOO ('Not in My Term Of Office') will negatively affect generations to come as exemplified in Europe 200 years after the early industrial revolution where development was mishandled.

Governance management

The second urgent matter, *Governance*, has to be approached in a ground-breaking perspective. Metropolitan governance should be compared to nations rather than to cities. The metropolitan interactive matrix of administrations, agencies and institutions is the pattern of nations, not to hierarchical/centripetal structure of Municipal management.

10. The power of metropolises

Metropolises provide for most of the productivity of the world. If Metropolises were Nations, among the 100 largest world's Gross National Products (GDP) 46 would be Metropolises, not Nations.

Figure 7. Metropolitan and national GDPs

The United Metro/Nations

Among the top 100, 46 metros

	GDP in US Billions	(% of National (Σ = Sum of larger))
0 Europe (Confederation)	18495	
1 United States	15094	
2 China	7298	
3 Japan	5869	
4 Germany	3569	
5 France	2774	
6 Brazil	2476	
7 United Kingdom	2416	
8 Italy	2198	
9 India	1897	
10 Russia	1857	
11 Canada	1739	
12 Spain	1492	
13 Australia	1483	
14 Tokyo Japan	$ 1479	(25%)
15 New York USA	$ 1406	(10%)
16 Mexico	1154	
17 South Korea	1116	
18 Indonesia	846	
19 Netherlands	837	
20 Los Angeles USA	$ 792	(Σ 15%)
21 Turkey	773	
22 Switzerland	637	
23 Saudi Arabia	576	
24 Chicago USA	$ 574	(Σ 18%)
25 London UK	$ 565	(23%)
26 Paris France	$ 564	(20%)
27 Sweden	537	
28 Poland	514	
29 Belgium	512	
30 Iran	499	
31 Norway	485	
32 Taiwan	467	
33 Argentina	446	
34 Washington DC	$ 433	(Σ 21%)
35 Houston	$ 420	(Σ 24%)
36 Osaka Japan	$ 417	(Σ 33%)
37 Austria	417	
38 South Africa	408	
39 Dallas-F. Worth USA	$ 401	(Σ 27%)
40 Mexico City Mexico	$ 390	(33%)
41 Sao Paulo Brazil	$ 390	(15%)
42 Philadelphia USA	$ 388	(Σ 30%)
43 United Arab Emirates	371	
44 Boston USA	$ 363	(Σ 32%)
45 Buenos Aires Argentina	$ 362	(80%)
46 Thailand	345	
47 Denmark	333	
48 Colombia	333	
49 Moscow Russia	$ 321	(17%)
50 Hong Kong Hong Kong	$ 320	(100%)
51 Venezuela	317	
52 Madrid Spain	$ 308	(20%)
53 Atlanta USA	$ 304	(Σ 34%)
54 San Francisco USA	$ 301	(Σ 36%)
55 Greece	299	
56 Miami USA	$ 292	(Σ 38%)
57 Seoul South Korea	$ 291	(26%)
58 Malaysia	278	
59 Nigeria	272	
60 Finland	266	
61 Singapore	$ 259	(100%)
62 Toronto Canada	$ 253	(15%)
63 Detroit USA	$ 253	(Σ 40%)
64 Israel	243	
65 Portugal	237	
66 Seattle USA	$ 235	(Σ 41%)
67 Chile	234	
68 Shanghai China	$ 233	(3%)
69 Egypt	230	
70 Philippines	224	
71 Frankfurt Germany	$ 221	(6%)
72 Ireland	217	
73 Algeria	217	
74 Czech Republic	215	
75 Sydney Australia	$ 213	(15%)
76 Mumbai India	$ 209	(11%)
77 Pakistan	209	
78 Rio de Janeiro Brazil	$ 208	(Σ 25%)
79 Phoenix USA	$ 200	(Σ 43%)
80 Iraq?	195	
81 Minneapolis USA	$ 194	(Σ 45%)
82 San Diego USA	$ 191	(Σ 46%)
83 Romania	189	
84 Kazakhstan	186	
85 Istanbul Turkey	$ 182	(24%)
86 Barcelona Spain	$ 177	(Σ 32%)
87 Peru	176	
88 Melbourne (Australia)	$ 173	(Σ 26%)
89 Qatar	173	
90 New Delhi India	$ 167	(Σ 20%)
91 Beijing China	$ 166	(Σ 5%)
92 Denver USA	$ 165	(Σ 47%)
93 Ukraine	165	
94 New Zeeland	161	
95 Kuwait	156	
96 Manila Philippines	$ 149	(66%)
97 Montreal Canada	$ 148	(Σ 23%)
98 Cairo Egypt	$ 145	(63%)
99 Rome Italy	$ 144	(6.5%)
100 Guangzhou, China	$ 143	(Σ 7.5 %)

Source: information gathered by the author from several sources. Minor inconsistencies might be detected.

The world revisited in bullet points

- Among the 100 most efficient metro/nations 46 are metropolises.
- The 14th nation of the world would be Tokyo
- Singapore, the most benchmarked example of good metropolitan management, is a metropolis with national status. Hong Kong, a self-governed economy, is another one.
- Many nations' wealth depends on the national metropolis: Manila; 66% of national GDP, Cairo; 66% and Buenos Aires 80%!
- The 5 spearheading metropolises of the USA are accountable for 25% of the national GDP. (USA is 25% of world GDP). The 19 top ones are 50% of the GDP. Subtract them and the USA, with 7,547 billion dollars of GDP, would be about to be overtaken by China.
- Many economies have capital metropolises that account for national GDP's share in the '20's %: Paris, London, Madrid-Barcelona, S. Paolo-Rio, Tokyo, Seoul.
- Some countries such as Germany or China have metropolitan dispersions that become an asset for polycentric efficiency (Frankfurt 6% of GDP, Shanghai-Beijing 5%). Speed trains become an inter-metropolitan must.
- The following five beyond the 100's list, before any other nation, are:
  - Brasilia, Brazil $ 140 (Σ 30 % Sao Paolo and Rio)
  - Milan, Italy $ 136 (Σ 13 % added to Rome)
  - Tehran, Iran $ 127 (25 % of Iran)
  - Saint Louis, USA $ 126 (Σ 48 % of USA)
  - Tampa, USA $ 123 (Σ 49 % of USA)
  - Vietnam 123
- In a 120 list, Metropolises will be more numerous than nations.
- The UN only has 193 nations. The 193rd nation, Tuvalu, has a 39 m USD GDP. The equivalent 193rd city, Medellin in Colombia, is 43 b USD. One thousand times more. Don't both deserve to be at the UN?
- China Mega-Metropolises: The 3 largest ones amount to 28% of China GDP.
  - Shanghai-Yangtze River Delta Metropolis GDP amounts to 900 b USD: 12.5 % of China. The 3rd World Metropolis just after Tokyo and New York. The 18th nation in the world.
  - Pearl River Delta Metropolis (From Guangzhou through Shenzhen -500 b USD- to Hong Kong) would amount to 820 billion USD: 11 % of China. The 4th metropolis of the world just before Los Angeles.
  - Beijing Metropolis with Tianjin and Tangshan would be 330 b USD: 4.5% of China.

11. Federal devolution, unitary decentralization or else

National Governments are uncaring for Metropolises. They are feared because their potential power. That is why they are proposing Confederal solutions. That is the way to postpone, dilute the metropolitan needs. Terrible both for Nations and Metropolises in the long term, but beneficial for the Nation-States in the short-term political vision.

Conversely, municipalities that pursue anarchical autonomy hate the Metropolises. Metropolises are squashed between the aristocratic nations and the populist municipalities. A bourgeois revolution is needed.

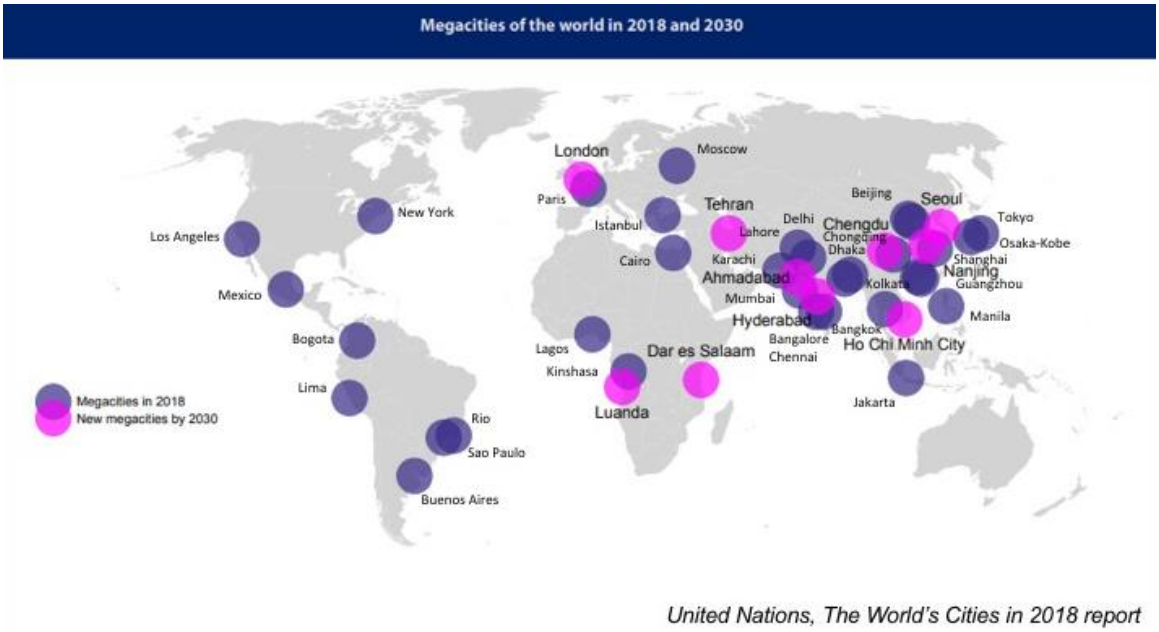
Metropolises now represent middle classes, wealth and democratic stability of Nations. They must reach management independence from national governments that are run by neglect or fear towards metropolises. Federalization of Metropolises is the response not to avoid breaking nations. It provides enough self-government without a total breakoff. And that will be for the benefit of nations and municipalities, as well as metropolises.

12. Megapolis governance. A new challenge

Megapolises is a new scale we have to address. A new 'power of ten' scale. The 105 one. A scale 10 times larger than the metropolitan one. A scale we have not yet addressed, nor comprehensively understood.

We have defined Megapolises not by numbers, as they are usually defined, but by their inner structure, their DNA. Metropolises are not 'large' cities. Metropolises are a set of urban units that share a significant daily commuting. In the same way we think Megapolises are not just 'large' metropolises. It is not a question of numbers. It is a question of inner structure. When an animal is ten times larger than another species, (IE: worms and serpents) it does not have the same DNA. Megapolises do not have the same DNA as Metropolises.

Figure 8. Megacities of the world in 2018 and 2030



Source: United Nations, The World's Cities in 2018 report.

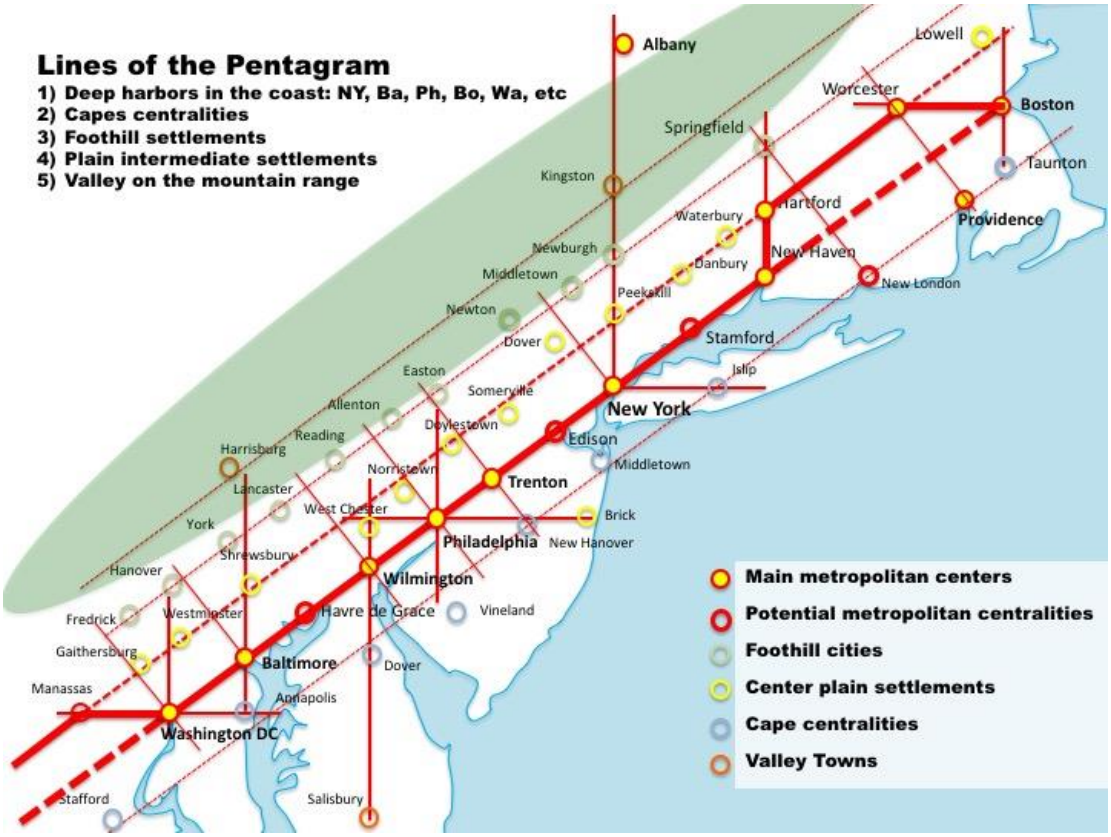
Megapolises are sets of interactive metropolises. Similar to metropolises as sets of interactive cities. Megapolises are not metropolises over 10 million inhabitants, as are mostly defined in the actual literature. Metropolises are neither to be defined by numbers. That would make metropolises out of metastatic urban conurbations. A lump of meat is not a living animal. A megapolis is a clustered network of metropolises, not a large metropolis. In China, the official term corresponding to the meaning of "megapolis" is 城市群 (chéngshì qún), which literally means "city cluster". It would be more convenient the term 都会群 (dühuì qún), "metropolis cluster".

Figure 9. Recent Beijing Megapolis

Metropolises are not conurbations. The conurbation phenomenon is a metastasis of unmanaged urban expansions. The conurbated dimension of a Megapolis, for instance Mexico with 19 million inhabitants, is in no way a Megapolis. Not even a metropolis. The metropolis of Mexico includes Puebla and Toluca. A concept the metropolitan managers of Mexico (education and mental inertia) have not yet grasped. Mexico Megapolis obviously incorporates the metropolitan phenomenon of Puebla and Toluca, but it must envisage as well the location of the new airport in the Aticpac area and the interaction with El Bajío Metropolis from Queretaro to Aguascalientes.

We are not just in a new dimension, we are in a new DNA. Mega-York runs from Washington to Boston incorporating several metropolises within its system. Delhi Megapolis (Mega-Delhi) runs from Meerut to Rewari and from Rohtak to Aligarh, if not Agra. Probably in the future w will have to address the Delhi-Mumbai Megapolis (now just called 'Corridor') including Jaipur, Udaipur, Ahmedabad and Surat among others. Beijing is another good example, where the Chinese authorities have already defined a Megapolitan area of 250 million inhabitants.

Figure 10. Mega-York Metro-Matrix structure



Source: www.pedrobortiz.com.

13. Countries

We have discussed in other papers (see www.PedroBOrtiz.com Theory/Governance) how metropolises are challenging the power of nations. For metropolises to be more efficient and inclusive they have to have more decision power in detriment of nations, not in detriment of their cities. Proof of this, is the efficiency of Metropolitan Nations as Singapore. The more metropolises accumulate competences, now in the hands of Nations, the more efficient and equitable they will be for their citizens. That is why we are seeing new metropolitan independence movements as the one surging in Barcelona, seeking independence, as a metropolis, from Catalonia as a nation.

We have discussed in other papers the new role of nations. How they have to find a new role form the one they have had since their recent creation 200 years ago. As they are confronted with this growing power, and final independence, of metropolises, they have to find a role of pursuit of equilibrium between the increasing efficiency of metropolises and the lagging efficiency of the rest of the medium size cities and rurality areas within the nation.

That new role is essentially going to be a role of promotion of the metropolitan hinterland and development of complementarity in terms of economic efficiency. They have to focus on the transfer and redistribution of wealth in terms of social equity. Metropolises can only justify their independence if they assume the political duty of sharing that increase of efficiency with those that do not benefit from the metropolitan wealth. Transfers to nations, already occurring by the national tax system, has to be increased. More efficient metropolis has to contribute more to the rest of the national non-metropolitan areas. A constitutional Federal system, where the metropolis will be a State on its own within the system, is the best way to approach it.

14. Megapolis Governance: Confederations, national or transnational

Could Megapolises, a set of metropolises, address their governance systems in the same framework of metropolises or nations? Could they look for a solution on the frame of the three alternatives, Unitary, Federal or Confederal, applicable to nations and metropolises?

Unitary

A Unitary system would be impossible, and inadvisable, if the metropolitan system is already a Federal one. It would be genetically incompatible. You cannot impose a Unitary system upon a Federal one.

If the National System is Unitary, you could. The Delegation capacity of the President, either upon a Metropolitan Delegate (IE: appointed Governor) or a Ministry for Metropolises, could. A Ministry for 'all' metropolises in the nation, would become in fact the national Megapolis Ministry.

Federal

In a Federal System an integration of Federalized Metropolises into a higher tier of federalization could be conceptually envisaged. It would be the subtle extrapolation of the 'subsidiarity principle' already applied in the European Union and the USA. It is the approach for institutional inter-governmental distribution of competences and management of scales within sectors.

I must confess I do have my doubts on our intelligent capacity to organize a Federal system for Megapolises. First, because we have not yet been able to organize the necessary Federalization management of our metropolises. Once we would have been able to manage that, we might envisage the next level of governance complexity for the Megapolises. Second because, due to the small size of many countries as in Europe, some of these Megapolises would be transnational. You cannot build a feral system across national mechanisms. It directly confronts the genetics of the national system.

Confederal

Thus, the possibility that remains, and looks like a safe first step to Megapolis governance management, would be a Confederal system. The metropolises that will join the Megapolis Confederation will keep their own sovereignty within their own federal system. A confederation is a very loose system. We already know it does not work for metropolises. But it might be a first step that can give time and room to think about what would be best in the long term for megapolitan governance.

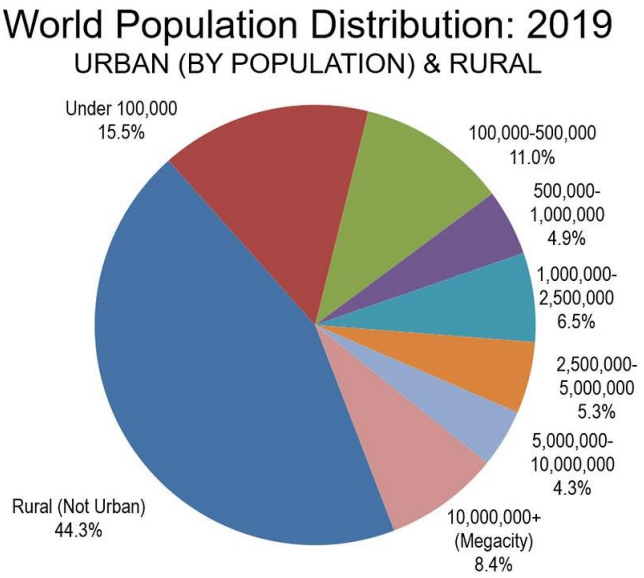
We are not suggesting any revolutionary idea. We are only looking at the issue in a larger time/space framework than standard academics do. A Transnational Confederation of cities already has existed in history and it worked relatively well for 300 years. Not, however, in the long term. But it would be good enough for those who think 300 years is long enough. We are referring to the Hanseatic league, as well as the Hellenic league of cities that constituted classic Greece.

We are not suggesting the dissolution of the recent 200-years Nation concept. That would be a different discussion. The Megapolis organization into a loose Confederal system of metropolises does not confront, nor jeopardizes, the national existence. It will just provide a framework to address megapolitan issues, now unaddressed. Time to build the metropolitan federal systems. Time to

envisage the best for Megapolises to address their institutional governance in the long term. A cautious solution. Time for us to give us a break of 30 years to find the right solution.

It is huge what is at stake. The GDP of the 500 cities beyond 1 million inhabitants, 25% of world population, is 75% of world GDP. Megapolis, as defined by population, is 8.5% of world population. In the range of 30% of world GDP. That is more than the USA, first world economy.

Figure 11. World population distribution 2019



What is a XXI century metropolis?[24]

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Contemporary debates on the Post-Metropolitan Net-City

Over time, the relationship between the city and the metropolitan region has changed significantly. Instead of the city-countryside opposition, the form of the metropolitan city has been generated simultaneously as a multitude of medium and small cities are involved in the growth. Based on a metropolitan diffusion of networks and cultivated lands, these local places are transformed. In the end, these small and medium-sized entities, investing in the local territory and connecting to the infrastructure networks, determine the way in which 1:1 scale is embedded in 1:100/200, and this in 1:500/1,000, and this in 1:5,000/10,000, and this in 1:25,000/50,000. Metropolitan fields are created, within which linear systems of widespread urbanisation determine the inclusion of lower scale fields, often an unplanned inclusion, which generates sprawl.

In order to define the metropolitan approach, it is important to recognise the paradigm shift from the urban to the metropolitan scale, thus seeing the contemporary metropolis as a “net-city”. According to D. G. Shane (Shane, 2005), the Net City is “a multi-centred network system” emerged “to handle the apparently chaotic flows of diverse participants in an increasingly global network Growth appears to take place at random over the network, with no clear hierarchy or top-down patterning. Relationships can shift and change among actors, resulting in rapid change and instability.”

The Net City is essentially a system of cities of different sizes functioning as a whole throughout a network of physical and virtual infrastructures. In this polycentric system, however, we are not only dealing with the nodes and edges of the network. According to authors such as Terry McGee (2014), Edward Soja (2000), Neil Brenner (2014), and many more, we are facing a hybrid territory where urban and rural scales define a seamless heterogeneous landscape. This space in-between the network is called “body space” (Shane, 2005), where the continuity and the connection with the previous system are lost due to metropolitan infrastructure systems. The Body Space needs to be reconceptualised with new meaning and new image in the metropolitan era. The recognition of “body-space” allowed us to discover new patterns of settlements that are beyond the dichotomy of urban and rural patterns. It opened whole new possibilities of shifting between different scales and time that require new spatial practices, social behaviours, and organisational structures. This change also fostered engagements of new spatial agencies such as private and public organisations,

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universities, families in the interactions amongst global and local forces challenging fixed administrative boundaries at different scales and requiring innovative forms of institutional organization, and planning.

In many parts of the world, metropolises are steadily being recognised as autonomous governance and administrative entities, while establishing a sense of belongingness to a much larger society. However, this doesn't mean urban or city scales don't exist or are not relevant anymore. The Metropolitan Approach to Complexity, investigates the scale of complexity within the Net-City arrangement and focuses on the Body Space to provide metropolitan visions with a multidisciplinary perspective moving away from a traditional urban goal of efficiency. Even though, the scale of a metropolis shifted, as Kevin Lynch argues, "a feeling of adequacy, the sense of mastery" can be experience through "both manoeuvrable velocity and sensuous contact" (Lynch, 1960). In the new discipline the ultimate goal is to achieve the wellbeing of the citizens living in the metropolitan area, which does not only require the functional effectiveness of the urban structure.

Metropolitan form is the architectonics (the structure) of the new 1:1 scale map. We practice the metropolitan city in the concrete local map, with the body, at the 1:1 scale. Let's say, therefore, that there is an "urban fact" of the metropolitan scale, as well as a portion that is not built city, but cultivated or natural field within the metropolitan city: we call it "agricultural or natural fact". The metropolitan city with its networks of medium and small cities, is the urban vertebrae of an eco-region.

We analyse the contemporary territories that we define as fragile based on an integrated learning approach that refers to metropolitan complexity. Our goal is to identify the metropolitan dynamics that have generated the fragility of territories, recognise their shortcomings, and finally propose a project that is based on a metabolic vision (maintenance, improvement or transformation) of the life cycle of the city, which determines the metropolitan biography over time.

The specificity of the current city is a multipolar way of local growth/transformation involving increasingly large areas based on the effectiveness (performance) of infrastructure networks. The shift from the paradigm of a polycentric model, to the network of the net-city (Shane, 2005) is significant for the contemporary metropolitan city, because it causes the need to deal not only with the nodes of the network and the infrastructures that make them accessible, but also, with the space between the networks, which must be re-conceptualised. We have to give back meanings, structure and image to the space between the networks, the "Body Space" (Shane, 2005).

The middle cities are the champions of the metropolitan area

That means the middle cities of the metropolitan area have to be the main actors of the process: they have, in fact, strong roots in the past history or in the latest industrial period. They take care of a particular territory, perform functions, provide services, and in many cases are rich of fundamental facilities for the organization of the citizens' life. All this, through a sharing of choices and projects which link the metropolitan city area deeply to the neighbouring municipalities of the first and second bands.

The construction of the modern metropolitan city is possible through:

a) an enhanced institutional cooperation

b) the definition of agreements

c) processes and projects.

In short, the new statute of the metropolitan institution and its functions will be defined by the municipalities, moving from a shared starting point: to share the objectives not only the rules. The metropolitan city, in fact, is not intended only as a chance to pursue a model of efficient management, but also as a model of new urban policies and as a new urban paradigm that shifts from a radial

conception, to a multicentre and linear one. One of the issues that seems most relevant, for example, is the need to rewrite the rules of the different municipalities' relationships, the legal concept of new urban spaces, and the approval procedures for the completion of the huge public works. The municipalities will be "weighted" to determine a new balance without altering the established one, all this, in the interest of the territory and not of an individual municipality. The fundamental concept, in fact, will be entered in the motto: "to grow together".

New infrastructure systems determine a new type of metropolitan space, and are able to relate the different layers and the different scales of the city. The actual land transformation issue, can also be read in terms of changing modes of production from an industrial to a post-industrial way, or to an "informational" one. This perspective leads to new building types combinations, which use the ground and the technologies of high-speed transport. The environment, then, changes. It is considered as a social product.

So, it is not only a model of a general plan that we need. Therefore, it is a cultural leap to a new identity, which must represent, through its regulatory structures, forms and territorial vocations within common strategies and rules. Consequently, it is possible to share the objectives and not only just rules. Finally, in any case, it's very important to look into the spatial dimention of the process, that is a formal discontinuity in the process, the radical reconfigurations of the metropolitan city.

Post landscape. The environmental and the new public space question

Brenner (2014) analysis links to the environmental question, which will carry the urbanization discourse to understand the profound changes of production processes, spatial and economic urbanization of contemporary society (Luis Monte-Mor, 2014).

According to Henri Lefebvre (Lefebvre, 2014) the country, right now, is the town's environment, its horizon, and its limit. But the urban problematic can't engage every problem. So, there are problems that are exclusive to agriculture and industry, even though the urban reality modifies them. Therefore, our responsibility is to identify, analyse and design what happens to the forms, functions, urban structures and landscapes within their different contexts that are transformed by the breakup of the ancient city and the new process of fast urbanization.

Lefebvre introduces, then, the considerable idea that urban society, virtually, covers the planet by recreating nature that has been wiped out by industrial exploitation of natural resources and the destruction of the so-called natural particularities.

If it is so, today, there are important issues of post-urbanization which will characterize our landscapes (built and natural) in the same way as post-industrialization did in the past. For example, what will happen to the previous low urban context spread in our territory?

Regarding the natural landscape, we try to describe new common spaces where people could relate to the land not as individuals but as persons inside a community, through new inclusive land uses and social facilities for different citizens. This means that we have to insert the post landscape dimension (Harvey, 2005; Wall e Waterman, 2017), reclaiming land for new hybrid territories, understood and evaluated at the large scale, but discovered at the small one that is the only real scale.

Observing the built landscape, though, as Wall claims, inside the city new landscapes of intense control, through security, gating and fencing-off, were countered within the creative resistance, of protests and demonstrations – both approaches attempting to redefine social relations through appropriation and occupation of public spaces. In practice, these new metropolitan landscapes, reconfigured landscapes formed through mass demonstrations, which gathered in public spaces, undermine scenography promises of managed, pacified and comfortable urban spaces which had accompanied contemporary developments across the city. For this reason, contemporary cities with

highest informality rates are the most prominent laboratories to experiment alternative forms of socio-ecological organization through alternative re-combinations of public/common space patterns informing the city (Frigerio, 2016). The public space issue and the concept of public realm which alternates a space that today is only a public-use space will be a relevant point to discuss along the chapter.

The post-metropolitan city project

The ideas of form, disposition, the architectural figures and their strategies of section, in short the Metropolitan Architecture, - that determines, through the project of the physical space, the typo-morphology in order to pass from one scale to another-, are managed within the open source data maps at different scales (Metropolitan Cartography).

We believe that the project of the contemporary city maybe defined throughout meetings that take place between those who tell the story of the territory and those who identify the problems: the group that we call "metropolitan expert" is not only competent in project solving but also in problem finding and setting and it includes a wide range of stakeholders such as decision-makers, civil servants, local population, and academia. Those who tell the story of the territory and decide the projects need tools that allow them to identify the problem and provide a solution. Within the TELLme project, we are trying to determine the conceptual framework within which the metropolitan city and its "fragile" contexts are analysed, interpreted and designed. Moreover, we are developing tools consisting of a set of open-source maps (Metropolitan Cartography) and the methodology to build them. Through the maps, we propose a reading of the territory, which identifies its fragilities and values, to which to respond with the design. We believe that every problem must first be seen, identified, understood, and communicated through maps at different scales, to be compared with the principles which can represent the metropolitan city we have in mind.

The encounter with reality and the explanation of the passages to reach the metropolitan dynamics interpretation are fundamental. Through the selection and collection of open sources data and utilising them to make a set of maps that can represent the data, spatializing them, we can verify our principles and our interpretation system by comparing it with the data of reality. We are trying to build a vision, an interpretative framework related to the General Principles and Issues of the Metropolitan Dimension, and that is continuously compared with the data of reality.

‘Megaform’ with ‘bigness’

Architecture has long been regarded as the basic constituent unit of the city. It is almost self-evident that the buildings have risen from the ground and eventually formed a modern city. However, in 2006, Charles Waldheim’s ‘The Landscape Urbanism Reader’ came out and proposed to adopt ‘landscape’ as a design unit to deal with urban problems. Since then, an increasing number of related urban theories from different perspectives have been discussed by both supporters and opponents. But in the face of the rapidly expanding and evolving global urbanization process, almost everyone has reached a consensus on the point that, when dealing with today's urban problems, architecture is no longer the only design unit.

Based on the position of the consensus, Kenneth Frampton believes that the landscape is also regarded as a generalized visual unit, the two elements of ‘architecture’ and ‘landscape’, which have long been regarded as the basic unit of human settlement design, are eventually integrated into the concept of ‘megaform’

(Frampton, 1999). Although ‘megaform’ indicates a larger design scale, it is not constrained to an absolute value. It can be a building, it can be a landscape, it can be used in a variety of situations, and it can vary depending on the scale of the project and the complexity of the form and function.

The ‘megaform’ emphasizes the need to jump out of the isolated, closed individual building scales, based on public facilities

and the dimensions of public spaces. It is also crucial to design its living space as well as where it radiates, endowing the space with new meanings, resisting the abduction to urban space by the commercial and capital. Frampton is hoping to reconnect people from the human scale with fragmented cities through this intervention in the public domain of the city. Frampton expects the practice of the “megaform” can recreate critical places and new urban landmarks that can be used to transform these debris in the reality of a broken city filled with big roads and image consumption, looking for and creating the realm of humanity and life in the emerging urban life.

Similar to Frampton’s hope that ‘megaform’ could reconnect people from the human scale with fragmented cities, Rem Koolhaas (1995) believes in the potential of the property ‘bigness’ in architecture. The philosophical foundation of Koolhaas's theory of ‘generic city’ is that chaos ends the overall structure of the city, fragmentation and diversification become the status quo of the city. If ‘generic’ is the main feature and state of modern cities that Koolhaas recognizes, then ‘bigness’ is one of his main strategies for his integration of combatting the fragmentation and chaos of modern cities. However, what clearly distinguishes the theories by the two architects is their preference towards the ‘megaform’ and ‘megastructure’. Frampton in his ‘Megaform as urban landscape’ clearly interprets the difference and relationship between the terms ‘megaform’ and ‘megastructure’. He believes in ‘megaform’ rather than ‘megastructure’ because ‘megaform’ focuses on the global overall of the internal space order and the formal texture, and does not have to highlight the structure’s performance; it may seem to show some of the formal characteristics of ‘megastructure’, but it is ‘a form that is not freestanding but rather insinuates itself as a continuation of the surrounding topography…, a form that is oriented towards a

densification of the urban fabric’ (Frampton, 1999). More importantly, the interior space of the ‘megaform’ should accommodate public space.

On the contrary, in Koolhaas's view, what matters the most could be the physical size alone. It is not important whether the form of the ‘megastructure’ takes care of the past; the historical heritage has been fragmented, the context has not continued, the regional differences are bound to disappear, the convergence of the ‘generic city’ is inevitable. Only by moving forward to the future, solving new problems in complex space in a random and selective way with continuous innovation is the only way out. Nevertheless, these views of Koolhaas are undoubtedly proposed in the context of a metropolis like New York.

Unconsciously, they are generalized into universal urban theories and architectural values and have the right to speak globally.

Figure 1. Vision for the metropolitan discipline

‘Megaform’ as ‘Heterotopia’

David Grahame Shane redefined ‘heterotopias’ from Foucault as ‘a place that mixes the stasis of the enclave with the flow of an armature, and in which the balance between these two systems is constantly changing’ (Shane, 2005). The ‘megaform’ is undoubtedly the ‘heterotopia’ of our contemporary city by definition, which has a form, function and development model that is distinct from the urban matrix. The ‘megaform’ could be either a variation of the urban material form or an exotic implant: derived from foreign form templates or international design and capital operation. But this ‘heresy’ refused to be marginalized from the beginning, and produced what Foucault (1984) mentioned, the ‘illusion’ of entering into the heterotopic sites. The ‘megaform’ has become the object of competition and imitation by many developers, it has begun to move towards the center of the stage and continues to expand its boundaries.

Every component of such a giant construction plays its part in the city: broad, horizontal, complex and distinctive, enough to create different urban spaces. Its unique image and the shaping of the place aim to create a heterogeneous space based on different cultural attributes. The creation of landmarks is a resistance against the similarities in modern cities in a subconsciously way, trying to create a newer regionalism in a revolutionary way. In this context, urban fabric and context have become more of a meaningless word game.

In the context of heterotopia, time and space are discrete segments, and people's lives have also split. The ‘megaform’ itself, as a product in a window display or a work of art displayed in a gallery, affects and undertakes the desires and imaginations of the citizens. In a commercial office ‘megaform’, it is the place where white-collar lovers date, the place where fashion girls consume, and the place where multinational companies work. For most people, their experience of this space only exists at certain times such as holidays, and they are invested in other lives that are completely different and spatially separated on a working day.

The ‘megaform’ artificially creates a kind of mass culture yearning, but only the short-stay life mode and space entity, especially the white-collar escape from the current life, and gain a temporary heterotopic space for physical and mental comfort.

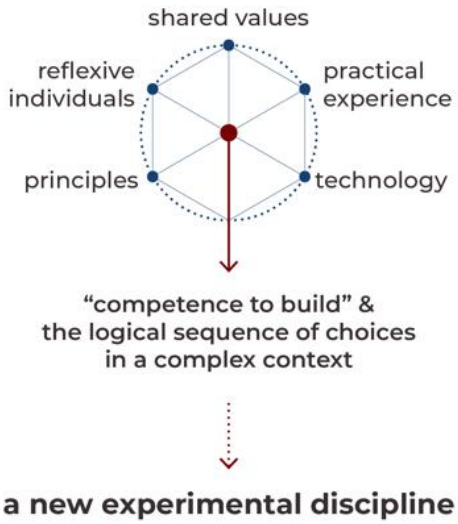
In conclusion, can a ‘megaform’ provide a new perspective and method for us to solve the problem of modern urbanization? It is difficult to say that the ‘megaform’ has achieved a thorough and subversive replacement of the existing urban development model, but it does have a certain degree of in-depth impact. In such a historical tide, the ‘megaform’ has been immersed in the aura of urban glory and has become an important entrance to thecity's ambition. The distinctive place behind the attraction of people is the stage for social wealth competition. Under the wave of commodification and materialization, it has naturally become a kind of expectation of urban regeneration. The thinking behind this concept clearly expresses Frampton's concern about the status quo of the city: architecture and the cities that they formed have long been captured by capital operation and consumerism.

Towards a practice of metropolitan discipline

The contemporary metropolis cannot be defined by statistics nor be considered as a globally homogeneous phenomenon. Instead, we need to focus on the paradigm shift from city to metropolis that brought us a new way of understanding our living context, the new measure and scale of contemporary lives. Therefore, considering the different nature of the contemporary metropolis and its inherent issues, we cannot understand it within traditional disciplinary boundary. We try so to overcome this limit by framing the “Metropolitan Complexity” as the basis of the “Metropolitan Discipline”.

The vision of the Practice of Metropolitan Discipline is to provide an environment where the various perspectives of dealing with the metropolitan complexity are collected and connected to one another using a framework (MGIP), methodology (Metro-dology), and tools (semantic package, cartography). Françoise Choay says, “The competence to build could be defined as the human ability of shaping a specific environment, its set of scales, the articulation of its spaces, and its differences being the setting for human existence and experience”. The various aspects we described in the metropolitan dimensions are considered together to lead to this competence to build the metropolises in a meaningful way. (fig. 1)

Figure 2. The practice of metropolitan discipline



The necessity of a comprehensive and multidisciplinary approach to the study and practice of Metropolis became a common ground for our academic exchange in the past years. The metropolis spatial structure needs a Practice of the Metropolitan Discipline able to support its construction with an organizational technical expertise, and a big project of urbanity based on a physical and virtual network between the new city shape and the new forms of conviviality. The Metropolitan Discipline assumes that cities in the 21st century are the crucial fields that directly reflect the processes and achievements of political, social and economic situations. The metropolitan vision will lead to the improvement of the Practice of the Metropolitan Discipline (fig. 2) with new competences.

The role of the practice of the metropolitan discipline

The role of the Practice of the Metropolitan Discipline in the production of urbanity at the new metropolitan scale, through metropolitan architecture projects, rises as our research question.

We believe that safeguarding the life of our cities and territories from artificiality and seriality is the ethical and political mission of our time, and with this perspective, cultivating an axiology of values that assigns the primacy of beauty means implementing a practice of daily cultural resistance against technological dictatorship and urban planning practices aimed only at efficiency. Looking after the local scale is the reason to think of the city at the metropolitan scale. Therefore, beauty is the way, not the goal of metropolitan city design. We say, then, that the structural base of the metropolitan

sustainable beauty is a hybrid structure that we call green-grey infrastructure. This structure has replaced the solid matrix of streets and traditional public space, in order to create a new public realm, which includes a common space, and a robust civic image (Lynch,1960). The green and grey entities are not alien to each other because they are born from the same concept of harmony. It is also the call to a lifestyle: It is a question of harmony, a question of aesthetic.

The contemporary metropolis is no longer a radial centric city, but a conceptual framework that we call the metro matrix that allows us to serve the peripheries as the new metropolitan centralities.

The physical phenomenon of removal of old (and disused) urban systems replaced by new urban morpho-types immediately involves the citizens who see their original field of life manipulated. The change, moreover, is made necessary by the specific contemporary way of switching between infrastructural networks linking the citizens to the pre-existing urban fabrics. This fact produces local transformations and unprecedented impacts on urban or natural landscapes. It is an introduction to new metropolitan territories, new rites and desires. For these temporal events in space, the physical conformation of the new architectural entities must be constituted as a segment of usable space and its scenario. This new concept of space, relevant to the new situation of metropolitan life, must be immediately perceived and must be understood as a principle of mapping and mental map possible even at the metropolitan scale — the tone of the style of behaviour that becomes metropolitan, and no longer rural or urban, changes.

In the new discipline the ultimate goal is to achieve the wellbeing of the citizens living in the metropolitan area which does not only require the functional effectiveness of the urban structure. Therefore, the approach of the discipline is rather complex, with multiple actors involving a wide range of fields. The metropolitan vision will lead to the improvement of the Practice of the Metropolitan Discipline with new competences. The main component of the metropolitan approach is the Metropolitan General Issues and Principles, the theoretical framework resulting from the process of taking the field experience and merging with the academic expertise of the complex process of Metropolitan Projects. It is a Metropolitan Approach to Complexity, a way to translate the general and theoretical point of view of the HE into the more specific practical ‘operations’ in the metropolitan construction.

That is the reason why the physical dimension, we can say the tectonic determination of the "fragile" context is fundamental because it returns a knowledge in exercise that is never abstract. All the semiology of the city's territory must pass through matter and its tectonics, otherwise, we cannot have any notion of it, therefore we cannot "know" it, because we have lost the communicative moment of thought of the architectural and urban disciplines. However, the discovery of the abstract space of the GIS map is crucial because it allows us an infinite scale within which something invisible, some relations hidden at the local scale for example, is made visible. We are interested in understanding how to read not only the fragile territories of the metropolitan city but also the causes of their fragility over time. We move from an analytic, to a productive, to a theory of metropolitan design, which is essential as an operation whose key is a "utopia of reality", that is, a utopia, but possible. That is the Metropolitan Architecture.

References

Brenner N., (2014), Implosions/Explosions: Towards a Study of Planetary Urbanization, Jovis, Berlin.

Frampton, K. (1999) Megaform as Urban Landscape. 1999 Raoul Wallenberg Lecture. Ann Arbor, MI: The University of Michigan A. Alfred Taubman College of Architecture + Urban Planning.

Frigerio A., (2016) Facing rapid urbanization: a century of East African Urbanism, IPHS Proceedings.

Foucault, M., (1984), Des Espace Autres, in Architecture, Mouvement, Continuité.no. 5: 46–49.

Geddes, P., (2018), Town Planning towards City Development: A Report to the Durbar of Indore, (2017) London: Routledge.

Harvey D., (2014), Cities or Urbanization? in Brenner N., Implosions/explosions, Jovis Verlag, Berlin.

Koolhaas, R. (1995) “Bigness, or the Problem of Large”, S, M, L, XL. New York: The Monacelli Press.

Levebvre H., (2014), From the city to urban society, in Brenner N., (2014), Implosions/Explosions: Towards a Study of Planetary Urbanization, Berlin: Jovis.

Lynch K (1960) The image of the city. Cambridge Massachussettes: MIT Press.

McGee T., The Emergence of Desakota Regions in Asia: Expanding a Hypotesis, (2014), Implosions/Explosions: Towards a Study of Planetary Urbanization, Berlin: Jovis.

Luis Monte-Mor R., (2014) Extended urbanization and settlemen patterns in Brazil: an environmental approach, in Brenner N., Implosions/explosions, Jovis Verlag, Berlin.

Ortiz Castano P.B., (2014) The art of Shaping the Metropolis, New York: Mc Graw Hill.

Shane G. D., (2005) Recombinant urbanism. Conceptual Modeling in Architecture, Urban Design, and City Theory, West Sussex: Wiley-Academy.

Soja E. W., (2000), Postmetropolis: critical studies of cities and regions, Blackwell Publishing, Los Angeles, Ed. spagnola (a cura di) Hendel Veronica, Cifuentes Monica, Postmetropolis. Estudios criticos sobre las ciudades y las regiones, Traficantes de sueños, Madrid, 2008.

Wall E., Waterman, T., (2017) Landscape and Agency, London: Routledge.

Chapter two

Metropolitan behaviour

Metropolitan metabolism: the ecological footprint[25]

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Times of great uncertainty and serious risk are being experienced as a result of the high pressure imposed by human action on the planet's biosphere, which has exceeded the carrying capacity of natural ecosystems. It is becoming increasingly evident that this circumstance may irreversibly alter the biogeophysical dynamics that explain human existence itself.

An updated overview of the Millennium Ecosystems

Some indicators are very clear about the environmental imbalance that is currently occurring (Intergovernmental Panel on Climate Change -IPCC-, 2019; Credit Suisse Research Institute, 2019), and its effect on the health of the world's population. Consequently, the state of climatic emergency that is being experienced in this historical period has been clearly stated by the main international institutions (World Meteorological Organization -WMO-, 2019; United Nations Environment Programme -UNEP-, 2016; United Nations Development Programme -UNDP-, 2019), and clearly perceived by measures related to the reduction of the life cycles of tree species (Hubau et al., 2020) or the level of pollution supported (European Environmental Agency -EEA-, 2019). Through

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published data, premature mortality due to air pollution is predicted to reach nine million people per year (Lelieveld et al., 2020; Burnett et al., 2018).

It is a certitude at the beginning of the third decade of the 21st century, in the age of the Anthropocene, that we are in a situation of universal health emergency caused by the COVID-19 pandemic, and immersed in the context of a dramatic scene within many of the metropolises that previously felt strong and safe. This immense health crisis must contribute to face, this time on time and with sufficient clarity, the greatest social, ecological, economic, and also health challenge of the 21st century: Climate Change (Salazar-Galán, 2020).

Approach to the concept of metropolis. The need for a paradigm shift

The word metropolis has been used since its Greek origin in the context of colonization (Consejo nocturno, 2018). This concept constitutes nowadays the new biopolitical nomos of the planet, which arises when the modernization process has been concluded and nature has disappeared (Jameson, 1991).

Thus, it is considered that the health status of the metropolises could worsen in the current situation of socio-economic crisis and serious ecological deterioration, because they represent complex urban systems that could offer particularly vulnerable profiles in the face of global eco-social destabilisation[26].

In order to try to provide healthy living systems capable of living together in a fragile and finite biosphere, it is necessary to initiate: "transitions around universal coverage of social and gender rights, preservation at all costs of life cycles and systems, and reconfiguration of values, logic, principles and lifestyles" (Prats et al., 2017).

Comprehensive proposals are required to promote the creation of a vital security space (Raworth, 2014, 2017) in which the socio-economic systems established in the metropolises are sufficient[27], providing social welfare, promoting environmental justice and respecting the limits of natural cycles and systems (Felber, 2015). In this sense, the Basque Declaration[28] has established the need to propitiate a technological, socioeconomic and socio-cultural transformation of societies with the aim of achieving this scenario in our metropolises (Basque Country, 2016).

This transformation must be based on the following main objectives: decarbonising and reducing overall energy consumption; creating sustainable patterns of urban mobility and accessibility; protecting and enhancing biodiversity and ecosystem services; reducing consumption of undeveloped land and natural spaces; protecting water resources and air quality; adapting to climate change and reducing the risk of disasters; improving public spaces to create living environments; providing sufficient and adequate housing for all citizens; ensuring the social inclusion and integration of all sections of society; and strengthening our local economies and local employment opportunities (Basque Country, 2016).

26 Caused by the following phenomena: strong disconnections and decentralizations in global governance; difficulties in maintaining complex metabolic systems that are highly dependent on supplies in crisis and far away; the incidence of climate change depending on the geographical position of the metropolises; and a foreseeable increase in social conflicts (Prats et al., 2017).

27 For this purpose, it is essential to modify the logic of growth inherent in the Sustainable Development Goals 2030 towards economic models where the objective is sufficient and sustainable human welfare (O'Neill et al., 2018).

"Similar to the model of nature, sustainability requires the creation of a socioeconomic structure based on units that evolve and adapt to their environment to create basic goods primarily from the resources of their territory and in harmony with the natural environment, using local technologies, appropriate for the use of indigenous resources" (Glaser et al., 2008).

28 Prepared at the 8th European Conference on Sustainable Towns and Cities in 2016, this document established a new agenda for European towns and cities by proposing the creation of productive, sustainable and resilient municipalities for a liveable and inclusive Europe.

To promote this transformation, we should be able to initiate an eco-social transition that allows to rethink our metropolis from the theory of systems and the paradigm of complexity (Morin, 1990; García Jiménez, 2014; Laguna Sánchez et al., 2016). Only in this way can we approach its analysis from an organic and not a mechanistic perspective; that is, considering it as an open system with the capacity to maintain a permanent exchange of flows with natural ecosystems, on the basis of which its viability is sustained over time.

Assuming that "every ecosystem is a complex system organized structurally and functionally according to a hierarchical configuration formed by a series of interdependent components" (Montes del Olmo et al., 1998), we conceive the metropolitan ecosystem as a complex entity made up of a set of unique subsystems, with different levels of organization. Through this conception, it is possible to study them at different spatial and temporal scales, which are interconnected (Gallardo Ramírez, 2019). Each of these components functions as ecosystems in which there are interactions between natural and social capital through the flow of ecosystem services and institutional decisions about the territory (Jiménez Herrero, 2016).

Resilient relations in the territory through the concept of Bioregion: Urban metabolism, environmental justice and heritage system

It is necessary to consider metropolises as complex and adaptive socio-ecological systems[29] whose continuity is based on their resilience and on the adaptive capacity of the metabolism of the metropolitan socio-ecosystem to the biocapacity of natural ecosystems and to climate change[30]. All of this has been conceived in the context of a common territorial model, regardless of administrative delimitations, with the need to reach "almost zero" carbon balances before the central decades of this century. In addition, another requirement should be the reconnection of the metropolises with the related rural spaces, promoting management around the bioregions. (Prats et al., 2017).

Resilience applied to spatial planning and management at all scales requires: biological, landscape, social and economic diversity; ecological versatility; implementation of a modular system; slow variables and boundary control; social memory; social capital; innovation; overlaps in governance and maintenance of ecological services (Díez Medina and Monclús, 2018; Walker and Salt, 2006). This approach represents the capacity, and the opportunity, for urban managers to face a crisis situation, adapt to the new situation, and rebuild the process in order to propose new alternatives.

Therefore, the resilience of the metropolitan socio-ecosystem must be based, within the scope of the bioregion[31], on the correct definition and configuration of its Heritage System, on the balance of its Urban Metabolism and on the establishment of Environmental Justice. These elements must assume a fundamental role in the formulation of new development logics that allow us to "move towards more sober and simple economies, with balanced ecological, energy and carbon footprints in relation to the biocapacities of the bioregion" (Prats et al., 2017). In turn, these new patterns of action must offer adequate support for life, optimize self-sufficiency and proximity in basic resources

29 Based on the following definition: "a complex adaptive system is one that is made up of a dynamic network of adaptive agents, which act and react to the actions of other agents, on which their behavior depends. These systems can have very diverse natures, both of biological origin, and artificial, material, immaterial, etc. (Holland, 1996). Therefore, these systems "are pattern seekers. They interact with the environment, learn from experience and adapt as a result" (Cardona et al., 2011).

30 The concept from resilience of regions and communities facing the effects of climate change is linked to these ideas: "flexibility, adaptability, persistence, self-regulation and self-organization, etc." (García García, 2016).

31 Territorial areas with an ecological and cultural significance, characterized by similar biophysical features, land use and socio-economic context. It is necessary to achieve that the bioregion tends to its sustainability as a socio-ecosystem, promoting "a harmonic, balanced and equitable relationship between a maintained functionality of the natural systems and a rational exploitation of the multiple benefits that these generate" (Borja Barrera and Montes del Olmo, 2008).

and environmental services, and integrate urban, rural and natural realities in a compatible approach.

Achieving these objectives will require the identification of new instruments that help to implement processes for the development of territorial and economic planning and management policies that build socio-ecological resilience. In this way, it is advocated to promote those processes that have greater social value in terms of the quality of the flow of eco-services in the new territorial model[32].

The necessary preservation of landscapes for the correct balance of the urban metabolism

This new socio-ecosystemic infrastructure must be supported by the positive network of the bioregion, organized as a modular[33] and polycentric structure. Additionally, it must be constituted by its Heritage System, that is, by the set of cultural or immaterial, natural or anthropic goods that have a social value, as well as by their relationships and interconnections[34]. The capacity of this landscape structure to articulate and promote socio-territorial identity will help to improve the function of ecological systems as green infrastructures, as connectors for biodiversity and also as elements of adaptation to climate change (Gallardo Ramírez, 2019).

Likewise, it is necessary to analyse the complex interactions that are established in the exploitation of the ecosystems of the bioregion, as an integral part of the new proposed infrastructure[35]. The aim is to understand and simultaneously manage these relationships in order to preserve their capacity to generate supply and cultural (non-material) services, with the aim of regulating the benefits obtained (Millennium Ecosystem Assessment, 2005). It is precisely these benefits that form the basis of economic, social and cultural development (Montes del Olmo, 2007), and the improvement of the health and well-being of the inhabitants of the metropolises.

Based on the "recognition that human beings and their culture are an integral part of ecosystems and, therefore, the objectives of environmental management are of an eminently social nature" (Paredes Castillo, 2016), the third essential element of the new socio-ecosystemic infrastructure of the metropolises should be the promotion of Environmental Justice[36].

We refer to the generation of a more inclusive community, through the definition of strategies of proximity, gender, recovery of identity and promotion of the local economy. These achievements should be based on the production of hybrid spaces for the generation of food and energy, for recycling and for new technologies, shaping a territory equipped and suitable for a community rooted in the place; capable of identifying possible emerging community spaces (Gallardo Ramírez, 2019).

Only through the conception of a reality that must be valued in a collective and synergic way due to its environmental, historical, social, cultural and productive charge, will it be possible to articulate conducts that allow the development of a balanced urban metabolism in the scope of the bioregions.

32 The incorporation of these concepts into the reflection on the planning of the present and the future is encouraging. Recent examples related to European urban regions such as Brussels, Florence or Alava show it.

33 In this particular context, the modular concept refers to the ability to formalize larger structures or systems from modules or structures that are connected but not overlapping. Each of these modules is flexible and capable of adapting to external conditions, without disturbances affecting the whole ecosystem (Walker and Salt, 2006).

34 Based on these approaches, the Lower Lea Valley regeneration (planned for the period 2012-2026) aims to transform the Lea River corridor, located in east London and designed as a space to host the 2012 Olympic Games. This proposal emphasizes the capacity of articulation of the open spaces and their integration in the metropolitan green matrix.

35 Following this line, the project Atelier Rotterdam (2014) proposes an innovative way of mapping the region of Rotterdam, by understanding that the city and its surroundings are interconnected by metabolic flows, whose analysis allows us to work in the search for territorial resilience.

36 This commitment to Environmental Justice is evident in the Qian'an Sanlihe ecological corridor project (2007-2010), located in China. The proposal aims to correct the loss of functionality of natural systems and cultural heritage, through a set of landscape actions that reduce the ecological and social vulnerability of the region.

All this, thanks to the construction of individual visions that, within the framework of a common imaginary, assume the landscape as a reality capable of condensing all those potentialities that should allow a sustainable future, assumed as a legacy for future generations.

References

Basque Country (2016) 'The Basque Declaration. New Pathways for European Cities and Towns to create productive, sustainable and resilient cities for a liveable and inclusive Europe.', in 8th European Conference on Sustainable Cities and Towns. 2016 Bilbao, Spain: Euskady Basque Country.

Borja Barrera, F. & Montes del Olmo, C. (2008) 'La gestión ecosistémica como herramienta territorial para la toma de decisiones. Ecorregiones e integración funcional de carreteras y espacios naturales protegidos.', in II Congreso Nacional de Medio Ambiente en Carreteras.

Burnett, R. et al. (2018) Global estimates of mortality associated with long-term exposure to outdoor fine particulate matter. Proceedings of the National Academy of Sciences. 115 (38), 9592–9597.

Cardona, R. et al. (2011) Circadiana en el paisaje urbano desde la epistemología compleja. Orbis. Revista Científica Electrónica de Ciencias Humanas. 18 (7), 82–115.

Consejo nocturno (2018) Un habitar más fuerte que la metrópoli. Logroño, Spain: Pepitas de calabaza.

Credit Suisse Research Institute (2019) Global wealth report 2019.

Díez Medina, C. & Monclús, J. (2018) Urban Visions. Carmen Díez Medina & Javier Monclús (eds.). Cham: Springer International Publishing.

European Environmental Agency -EEA- (2019) Air quality in Europe (2019 report). EEA Report No 10/2019. Luxembourg: Publications Office of the European Union.

Felber, C. (2015) Change Everything: Creating an Economy for the Common Good. Croydon, UK: CPI Group.

Gallardo Ramírez, C. (2019) Método de evaluación para la regeneración integrada del espacio turístico litoral: la costa del sol occidental. Universidad de Sevilla.

García Jiménez, R. (2014) Teoría general de sistemas y complejidad. Contribuciones a las Ciencias Sociales.

García García, M. (2016) Desmontando la paradoja de la sostenibilidad. Ambienta. 4–22.

Glaser, M. et al. (2008) Human/Nature Interaction in the Anthropocene Potential of Social-Ecological Systems Analysis. GAIA - Ecological Perspectives for Science and Society. 17 (1), 77–80.

Holland, J. H. (1996) How Adaptation Builds Complexity. New York, USA.: Basic Books.

Hubau, W. et al. (2020) Asynchronous carbon sink saturation in African and Amazonian tropical forests. Nature. 579 (7797), 80–87.

Intergovernmental Panel on Climate Change -IPCC- (2019) 2019 Refinement to the 2016 IPCC Guidelines for National Greenhouse Gas Inventories. Kanagawa, Japan: Institute for Global Environmental Strategies.

Jameson, F. (1991) Postmodernism, or, the cultural logic of Late Capitalism. Durham, U.K.: Duke University Press.

Jiménez Herrero, L. M. (2016) Hacia ciudades y territorios inteligentes, resilientes y sostenibles. Gestión y Gobernanza para la gran transición urbana. Madrid, Spain: Asociación para la Sostenibilidad y el Progreso de las Sociedades (ASYPS).

Laguna Sánchez, G. A. et al. (2016) Complejidad y Sistemas Complejos: Un aceracimiento multidmensional. México D.F., México: CopIt-arXives y EditoraC3.

Lelieveld, J. et al. (2020) Loss of life expectancy from air pollution compared to other risk factors: a worldwide perspective. Cardiovascular Research.

Millennium Ecosystem Assessment (2005) Ecosystems and Human Well-being. Synthesis. Washintong DC, USA: Island Press.

Montes del Olmo, C. (2007) Del desarrollo sostenible a los servicios de los ecosistemas. 16 (3), 1–3.

Montes del Olmo, C. et al. (1998) Reconocimiento Biofísico de Espacios Naturales Protegidos. Sevilla, Spain: Consejería de Medio Ambiente. Junta de Andalucía.

Morin, E. (1990) Introduction à la pensée complexe. Paris, France: Editions du Seuil.

O'Neill, D. W. et al. (2018) A good life for all within planetary boundaries. Nature Sustainability. 1 (2), 88–95.

Paredes Castillo, D. (2016) Enfoque ecosistémico y corredores de conservación de la biodiversidad.

Prats, F. et al. (2017) Ante el antropoceno. Reflexiones sobre la cuestión biorregional en el País Vasco.

Raworth, K. (2014) A safe and just space for Humanity: Can we live within the doughnut? London, UK: Oxfam GB.

Raworth, K. (2017) Doughnut Economics: 7 Ways to Think Like a 21st Century Economist. White River Junction, USA: Chelsea Green Publishing.

Salazar-Galán, S. A. (2020) Crisis sistémica y coronavirus (I). Semanario Voz. Available from: https://semanariovoz.com/crisis-sistemica-coronavirus-i/

United Nations Development Programme -UNDP- (2019) Human Development Report 2019. Beyond income, beyond averages, beyond today: Inequalities in human development in the 21st century. New York, USA: UNDP.

United Nations Environment Programme -UNEP- (2016) Summary of the sixth global environment outlook (GEO-6) regional assessments: Key findings and policy messages.

Walker, B. & Salt, D. (2006) Resilience Thinking: Sustaining Ecosystems and People in a Changing World.

World Meteorological Organization -WMO- (2019) WMO provisional Statement on the Status of the Global Climate in 2019.

Equity versus equality as an example of the metropolitan complexity[37]

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The way in which complexity has been in charge of what the mechanistic-reductionist paradigm has taken over from Newton to the 1970s has not been a simple terminological substitution. A long adaptation has been and still is necessary, because the scientific-technical foundations have prevailed when a collective work has tried to understand the temporal widening and the spatial dilations that the technologies themselves have brought to contemporaneity, but without being able to give the necessary answer. Once the complex foundation has been assumed, as Morin would say in the 1970s (2008), it is now a matter of abandoning the attempt to reconstruct an organism from fragments of reality and to establish topological connections and analogies, in the sense of high-frequency and excitability relationships, but also in conditioning the place of things to be understood. This *topos*, in the architectural and urban sense, has been defined since Hegel by its objectual presence within the terms of reality, dedicated since then to symbolize its functioning as a donor of a refuge and an enclosure. Today, this reading is no longer possible. It is not necessary to sheath the architecture of a post-modern veil (relativistic and ambiguous) to justify it, but even the most rigorous science gives us a convincing guideline from which to establish an extended logic for the arrival of knowledge.

But even if we understand the paradigmatic change from the simple to the complex, the practice, which is complex, becomes complicated. The complicated is not the complex, as is easily understood, and its pressure leads to inaction. A permanent sensation of temporality, expecting to find the necessary correlations for each articulation of reality as a whole, immobilizes institutions, managers and rulers.

It feels like the world is at work. And it's run by caretaker governments. By default, the government is exercised in place of the one who should exercise it. It may be an extension of the rulers before they leave office, but always with a limitation of action, an inability.

This inoperative, complex, functioning time does not seem to be relative to a necessary transition, but rather a symptom of an end state, for which there are no objectives. Latour (2018) has cleared up the doubt of inaction due to overacting by quoting Trump's son-in-law in 2017 on the first page with his sentence "we have read enough books". If it was a matter of taking action, it was certainly not with a sense of community, but of knowing that he was in the right place on the right day to save his way of life, since a change in the course of the collision is impossible. It is no longer time to

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redress inequities but rather to paradoxically reaffirm identities. However, that division in which the fascisms are ratified in an idea about the essence of the community, and the communisms, on the basis of a non-substantial praxis, seem to be made by a group of users of a library of books on paper, without a budget for acquisitions since 1945. Neither does the local/global polarity, nor the opposition in politics of the left against the right.

These plastic card users do not have a desire to belong - in our case, to belong to the city - nor do they point their thoughts in the right direction. As Jean-Luc Nancy (1991, p.31) would say, this invention of the community is an excrescence of what we call "society". It is a trap -this is how Nancy defines it-, economic, technical, political, cultural. The community is "what happens to us" from society. And that is why Latour diagnoses as short-sighted anyone who conceives of making decisions by way of politics that do not take into account the new delimitation of conflicts, which go, according to the French author, from the Modern to the Earth. This is a new object-oriented political ecology, which is on the table of the main universities and among them, the Schools and Faculties of Architecture.

If we look at what happened in 2015 in the European Union when it launched its priority proposals for its mandate, we find these prerogatives: *Employment, growth and investment; Digital Single Market; Energy and Climate Union; Internal Market; A fairer and deeper Economic and Monetary Union; A balanced and progressive trade policy to harness globalisation; Justice and fundamental rights; Migration; A stronger partner on the world stage; Democratic change.*

With these keys, we do not see a limit state of the last few days, but a perfection of what already works with autonomy, that is to say, that does not depend on the will of action of its leaders. Europe feels itself to be the cradle and universal champion of democracy. But it would be a question of seeing in this lapse of time what it wanted and what it seeks to be, if those priorities have meant effective changes, and if inaction for temporariness is transferred from society to the communities. Understanding metropolitan areas and being able to make their understanding a discipline requires making decisions, generating policies, avoiding reductionism, and anticipating uncertainty.

In the list of priorities of the European Union for the recently completed period, in which the TELLme project has been developed, it has only been possible to recognise the notion of equity, as a statement, under the *heading A fairer and deeper Economic and Monetary Union*. This section is explained by the phrase: combining stability with equity and democratic accountability. If there is equity, it is in the economic distribution, as a political attitude, subordinated to general stability, in case anyone forgets that we are in office. This warning is inscribed in the very term chosen. In other words, it is not a question of equality, but of equity.

In 2017, the French newspaper Le Monde published one of its informative but rigorous atlases, entitled "Atlas of Critical Economy", which included the short text "equity: the trompe l'oeil of equality". Equality, the Atlas explains, establishes, from the French declaration of the Rights of Man (humans we say today, without even achieving equality in gender with it) and of the Citizen, that all individuals have the same rights and duties. It is known that each citizen, at that time, if he was such, had to submit peacefully to the new social order, germinal, obliged with the fulfilment of rights and duties proper to the rule of law. Let us recall at this moment two books by Rancière (1991 y 2014) on equality for education in Jean Joseph Jacotot (1770-1840).

At present, as a statement, it is not disputed, but its function is far from being fulfilled as far as objectives are concerned. Or, in other words, if it is used on a political level it is accepted, but its short range on a social level since the French Revolution until today is unacceptable. This leads us to think about the interim nature of the ruler who sets his agenda with the political, given that there is no action that transfers it to society (and, therefore, to the communities, trapped by their own designs). If equality at the political level could be defined as a political ideology for the common goods governed by laws, equity at the social level would be a type of "positive discrimination" in favour of the recognition of differences. An expanded perception of this would be undermined if we said that equality is not possible without -previously- inequity. But that in knowing that nothing

prevents capitalism from maintaining its order, either we are unfair in improving the disadvantaged, or there will be no improvement at all. It is a contradiction in terms whose articulation would entail going beyond mere economic improvement, which would necessarily be sought in more priority sections in Europe in the previous period and in the one to follow.

What do we mean by equity? Equity, in the opinion of team TELLme, is composed of several principles, as a constitution, which would establish a basic charter, which on the territory of the city could have a title for its mandate: Urban Political Ecology (UPE according to Cook and Swyngedouw, 2012). But it should free itself from its manifestation by the urban, reaching a territorial rooting more by the approach of nature and society intertwined as a single entity. Perhaps you could bet on the bioregion. In a bioregion, urban metabolism does not establish that vital factors (water, energy, food, etc.) become commodities to be manipulated by specialized labour and high profit for a few. A Bioregional Political Ecology would have 4 principles, as we have concluded in the TELLme project: Environmental Justice, The Common, Senses of Belonging and Rights (to the city, to the landscape, to inclusiveness, to dignity, etc.).

For Environmental Justice, we would break down 4 essential aspects that are complexly intertwined (based on Iris Marion in 1990 and cited by David Schlosberg in 2007): a Distributional Justice (which would be the need for environmental ills not to be concentrated in or near disadvantaged communities but (re)distributed more equitably), a Procedural Justice (the need for a more just and democratic decision-making process and the participation of disadvantaged groups in it), a Capacity Justice (the need to build 'the capacities needed for a healthy and functional community') and an Acknowledgement Justice (the need for recognition and respect for disadvantaged communities suffering from environmental injustice and for those involved in their struggle).

In order to measure their potentialities, operators are articulated, which would be, among others, Cohesion and Social Fabric, Mobility, Governance or Wealth (note that it is not the wealth located above, but the way in which work or the economy are integrated into society for purposes very different from those that have been taken into consideration until now, such as the division of labour that promotes inequity by definition, and which Lefebvre would join differently with architectural action in the need for "une architecture de la jouissance").

For its part, the use of the term "the Commons" or "the Common Goods", refers to a change of mentality, more than to great ideas that are renewed, but that struggle to disapprove the senses attributed to basic notions, apparently immovable, that shape societies, as David Bollier has written in the chapter entitled "The Growth of the Commons Paradigm" (2007). Reorganizing the guidelines of the so-called "Global Public Domain" is its function. The archetype of the commons is not primarily based on a system of property, contracts and markets, but on social rules and norms, as well as legal mechanisms that allow people to share ownership and control of resources. "The tragedy of the Commons", written by Garrett Hardin (1968), and cited by the now-famous author Yochai Benkler in the early 2000s in his lecture on the economic policy of the commons, together with the publication of Elinor Ostrom's 1990 book (reedited 2015), "Governing the Commons" is the main genealogical line on this hugely developed issue to this day, and held as a political key in today's Europe. Here, operators such as Public Space, Heritage, Services, or Knowledge are crucial. Nancy Fraser (2003) has written, based on Foucault, that if Fordist regulation aspired to universality despite its persistent inequality, post-Fordist governmentality for its part separates and channels individuals according to their degree of efficiency and risk prediction, enunciating a "dual society" of the hyperconnected and the excluded. Thinking the Commons, bends, or at least, pretends, the vector of inequality by counterbalance.

Regarding the sense of belonging, self-designation or collective consciousness, it can be said that the communities do not respond to the regulations and projects located on traditional boundaries (municipal, district, etc.), but rather, in a more complex manner, new territorialities are opened in the old boundaries, now areas of confluence. These can range from the emergence of new metropolitan areas, processes in the so-called post-metropolis, communities in transition, etc. Their operators

would be the assembly of the human with the non-human, the centrality, the resilience of communities, etc.

Finally, the Rights. Everyone is familiar with the research carried out by Lefebvre at the end of the 1960s, under the name of "the right to the city". Understood in its origin, it must be considered as an enthusiastic postulation of a new and radical type of urban policy. Today, it is difficult to reconstruct this origin, although it is common to try to invoke it unaltered in more reformist contexts. It was Harvey, in his 2008 essay "The Right to the City", who re-articulated Lefebvre's central belief, arguing that "the right to the city is much more than individual freedom to access urban resources: it is a right to change ourselves by changing the city". Despite Lefebvre's mistrust of giving architects a place in this urban policy, we in architecture have believed that we can find a solution to give all citizens a portion of equity based on our actions to achieve the participation and appropriation of public space by the inhabitants.

It is not time to extend a "principle of hope" in the sense of Ernst Bloch, nor even in the sense of responsibility for that of Jauss, it does not have an *alter-globalization posse*. It is a matter of locating practices that are based on the 4 principles defined for equity living together in the orphanage of interim governments. With this, the aim is to understand the daily life of an architectural intelligence in gestation, along with other social practices. Such a meeting could be called a bioregion, blurring the limits imposed by a city on the rise in terms of economy and representation.

References

Benkler, Y. (2003) 'The Political Economy of Commons', UPGRADE, the European Journal for the Informatics Professional, IV (3).

Bollier, D. (2007), The Growth of the Commons Paradigm, MIT Press, Cambridge, Massachusetts/London, pp. 27-40.

Cook, I. R., & Swyngedouw, E. (2012). Cities, Social Cohesion and the Environment: Towards a Future Research Agenda. Urban Studies, 49(9), 1959–1979. https://doi.org/10.1177/0042098012444887.

Enzensberger, H. M., Grimm, R. and Armstrong, B. (1982) 'A critique of social ecology', in Critical Essays: Hans Magnus Enzensberger. Bloomsbury Academic (German Library), pp. 186–223.

Fraser, N. (2013) '¿De la disciplina hacia la flexibilización? Releyendo a Foucault bajo la sombra de la globalización', Revista Mexicana de Ciencias Políticas y Sociales, 46(187), pp. 15–33. doi: 10.22201/fcpys.2448492xe.2003.187.42392.

Hardin, G. (1968) 'The Tragedy of the Commons', Science. American Association for the Advancement of Science, 162(3859), pp. 1243–1248. doi: 10.1126/science.162.3859.1243.

Harvey, D. (2003) 'The right to the city', International Journal of Urban and Regional Research. doi: 10.1111/j.0309-1317.2003.00492.x.

Latour, B. (2018) Down to Earth: Politics in the New Climatic Regime. Wiley.

Lefebvre, H. (1968) Le Droit À la Ville. (Société et urbanisme).

Lefebvre, H., Martínez Lorea, I. and Ruiz Martínez, N. (2018) Hacia una arquitectura del placer. CIS, Centro de Investigaciones Sociológicas (Clásicos Contemporáneos).

Mondiplo, F., Diplomatique. (2017) El Atlas histórico [de Le monde diplomatique en español]: El Atlas de Economía Crítica.

Morin, E. (2008) On Complexity. Hampton Press (Advances in systems theory, complexity, and the human sciences).

Nancy, J. L. (1991) The Inoperative Community. University of Minnesota Press

Ostrom, E. (2015) Governing the Commons. Cambridge University Press (Canto Classics). 1990

Rancière, J. (1991) The Ignorant Schoolmaster: Five Lessons in Intellectual Emancipation. Stanford University Press.

Ranciére, J. (2014) The Emancipated Spectator. Verso Books.

Schlosberg, D. (2007) Defining Environmental Justice: Theories, Movements, and Nature. Oxford: Oxford University Press. doi: 10.1093/acprof:oso/9780199286294.001.0001.

Metro Gaps. A method to understand and guide sustainable metropolitan development[38]

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The world is urbanizing at a rate never before seen. In recent decades, the migration of people from the countryside to the cities has increased considerably and this trend is expected to increase over time (Tómas, 2016). According to figures from UN-Habitat (2016), two thirds of the world's population will live in cities within the next ten years, and by 2050 that value will reach 72% of people living in cities.

This process is both cause and consequence of the great transformation experienced by urban centres in the recent years. Currently, cities have become the main catalyst of social, cultural, and economic change, as well as in the major powerhouses of innovation and opportunities. According to UN-Habitat (2016), 80% of global wealth originates in cities.

Cities have grown at a much quicker rate than have the tools and technologies available to solve the rising issues caused by this rapid increase in population. Matters such as inequality and climate change are not limited by borders and cannot be resolved locally, rather require comprehensive policies coordinated among different actors.

In order to achieve the provision of an equitable environment for all, it is necessary to agree on comprehensive public policies between different stakeholders and government officials that act on the same urban cluster, to create a “metropolitan” approach. However, this process and its complex dimensions are not always understood by decision makers when designing public policies, nor by academics when preparing educational programs on urbanism. A new metropolitan culture needs to be developed, which we know as “metropolitanism”, and it requires the development of specific tools designed to tackle these complex issues. The question this article will try to answer is how to fully understand the different factors that represent a metropolitan perspective, and this will reference many ideas developed by Lanfranchi and Contin in “*El surgimiento de una nueva disciplina para gestionar los sistemas urbanos metropolitanos*” (2017).

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The crisis of previous metropolitan approaches

The expansion of the urban area generates fragmented urban systems where various actors and levels of government with different authorities interact with each other. In these contexts, where there is an absence of effective coordination mechanisms, the fragmented management (according to the public administrations) tends to prevail in detriment of holistic approaches.

However, in metropolitan areas where institutional fragmentation hinders decision-making, urban problems spread and become more complex, making it difficult to provide a high-quality environment for the inhabitants. Simultaneously, the new metropolitan dimension challenges the traditional method of urban planning, not only because it distorts the appropriate scale to tackle the increasing metropolitan challenges, but it also modifies and introduces new values, distorting the prevailing institutional agreements.

Today, planners should be able to employ innovative methodologies to tackle the current environmental and socioeconomic problems. The metropolitan complexity requires a holistic understanding instead of the more traditional methods which were less interdisciplinary, as well as new ways of sharing knowledge and experiences among the various actors involved in metropolitan management.

To achieve this, it is necessary to create a new disciplinary focus which facilitates sustainable development. To generate a new framework that guides urban leaders to a better territorial understanding and which provides them with the necessary tools to identify the best practices for metropolitan management, with a focus on the environment, the community, generation of wealth, governance, and culture.

Reasons for a new discipline

As explained, there is an increasing demand for professionals who are capable to understand the intricate dynamics in metropolitan areas. Still, it is unclear which kinds of knowledge they should behold or how these experts should be trained. According to Lanfranchi and Contin (2017), “Metropolitan management requires knowledge that can be general because it includes aspects of other disciplines, while simultaneously being specific because the action focuses on the best possible management of metropolitan urban systems”.

With this in mind, a “metropolitanist” emerges as a different type of planner. This professional requires a set of knowledge and approaches which differ from those used by traditional urban and/or regional planners. More precisely, this class of expert diverges from two crucial points: the scale and the comprehensiveness of the approach used to develop their work.

For the first topic, the scale in which a metropolitan planer has to work in is unprecedented. According to Pedro Ortiz (2014), an architect works on a scale of 1:50 – in line with the human scale – while an urban designer works on a scale of 1:500 – comparable to a neighbourhood scale. At greater levels, an urban planner works at a scale of 1:5,000 – which relates to a municipal scale – and a regional planner does so at a superior scale. The metropolitan scale has a ratio of 1:50,000, where municipal boundaries lose meaning, although the link between territory, form, and culture is maintained.

For the second topic, metropolitan administration requires the capacity to understand the metropolitan complexities, from the need to integrate not only the scale but also the management of different variables, actors, and sectors. This requires the capability to provide integrated responses to problems that are common in metropolitan areas, which incorporates knowledge from various

disciplines such as ecology, geography, planning, engineering, sociology, anthropology, political sciences, and other.

Effective governance is key to a sustained economic development in metropolitan areas. According to the OECD (2015), administrative fragmentation negatively impacts equality and limits productivity. However, the establishments of institutional coordination mechanisms would help with the rough edges caused by the fragmentation.

However, establishing an effective governance or coordinating the implementation of solutions is a difficult task. Without an existing collection of information necessary to understand metropolitan issues, the vast majority of officials learned through their praxis. As a result, this lack of preparation brings significant costs which directly affect the performance of metropolitan management.

Modelling metropolitan discipline

Once the growing demand for metropolitanists and the importance of their role is established, it is necessary to identify which capacities the expert should wield in order to understand which disciplines could contribute to the formation of a specific academic body. With this objective in mind, the 2015 Metro Lab initiative from the Massachusetts Institute of Technology brought together different academics, students, and professionals which were able to dynamically contribute different ideas on the matter. Presently, these premises are used as the framework of the Metropolitan Urbanism Postgraduate Program of the College of Architecture, Design and Urbanism at the University of Buenos Aires.

The first premise that emerged from this process was that both metropolitan knowledge and its object of study are fragmented, therefore, various disciplines are needed to define its analytical framework. The absence of specific material is what hinders the creation of the necessary tools for this to happen. The mixture of different specialist and their practical experience in the realm of urban management would foster the co-creation of an analysis method, also known as “Metro Gaps”.

The “Gap Analysis” methodology was applied during the development of “Metro Gaps”, which recognized which elements of the process could be improved. Then, a three-level matrix was established; composed of “dimensions”, “components”, and “metro gaps”, which serve as a support for the analysis of the different elements that make up a metropolitan area.

The first level of analysis, “dimensions”, were organized in a classification system that would allow for a transdisciplinary interaction between social, economic, morphological, and organizational matters with the objective to contribute to the integral analysis of the territory.

- The first dimension, “territory”, puts a special focus on environmental issues and the existing built environment of a cluster. It includes an analysis of natural systems, available infrastructures, and the metropolitan landscape.
- The second dimension, “society”, focuses on life within the metropolis. It observes the level of social cohesion (in terms of respect for diversity and tolerance), generated capital (in relation to empowerment and citizens’ ability to act), and the issue of “metropolitan citizenship”.
- The third dimension, “wealth”, focuses on productive capability of a metropolis and to generate economic capital. To do this, it deals with issues related to efficiency and competitiveness, as well as issues regarding access to land, strength of businesses, knowledge and skill of the workforce, and other factors that affect economics.
- The fourth dimension, “governance”, shifts the focus to emphasize the ability of institutional organization of a metropolis. This is where the legal, institutional, and administrative framework of metropolitan systems are observed, such as panning and taxation.

- The fifth dimension, “culture”, analyses different aspects of the relationship between people and their metropolis: initial questions related to the sense of belonging, the following questions to the metropolitan practice in decision-making, and finally questions about the development of a metropolitan theory that allows the existence of a single language to define it.

The second level of analysis, the components (15 in total), recognizes the factors present in each of the dimensions and leads us to the third level of analysis, the “metro gaps”. It is in the latter where “the failure or breach of knowledge becomes evident when an intervention at the metropolitan scale is carried out”.

When analysing a certain urban cluster through the resulting matrix, each of the levels of analysis provides the necessary information to interpret the metropolitan peculiarities present. In other words, the dimensions enable us to establish what kind of knowledge is required regarding environmental management, community strengthening, generation of wealth, metropolitan governance, and the cultural dimension. Meanwhile, the components promote an understanding of which focal lens and type of discipline could serve as a basin of knowledge. Finally, the “metro gaps” permits the understanding of which type of “known how” is required by a professional in order to manage a metropolis.

A metropolitanist must acquire information which is sufficiently broad to fully comprehend the general situation and to “build a fluid dialogue with technical understanding, negotiating with stakeholders, and advocate with decision makers for a comprehensive metropolitan management” (Lanfranchi and Contin, 2017).

In turn, a metropolitan expert should strive to develop two types of capabilities. The first are hard skills related to knowledge and management of tools and methodologies for impact evaluations in dynamic urban environments, enough to adequately interact and converse at a basic level with specialists of each topic and to guide them towards an integrated focus.

The second include soft skills, such as negotiation, leadership, participation techniques, the ability to build and maintain partnerships, ability to innovate and communicate, and conflict resolution mechanisms necessary for the metropolitanist to promote metropolitan governance.

Conclusion

With the continuous advance of urbanization, cities have rapidly mutated. The transformations are a product of technological and environmental changes which lead society to consider new standards in urban planning in terms of speed and resilience. Faced with new global challenges, the existing tools available to planners have proven to be obsolete. This situation requires new ways of planning and managing clusters.

In the context of territorial fragmentation, the sum of the fragmented solutions does not have the same impact as an integrally coordinated one that spans among the different stakeholders at the metropolitan level. For that to be possible, it is necessary to build governance models which allow for consensual solutions to problems shared by the different jurisdictions that make up a metropolitan area.

Currently, there is a growing need for knowledge and information that permits large cities to be managed in an effective and coordinated manner. The first step to achieve this is to develop a metropolitan theory. We believe that the co-creation and learning between peers are key to surpass the challenge and that the “Metro Gaps” will allow the construction of new information regarding the management of natural resources and human settlements.

In the meantime, it is essential to train metropolitanists to serve as transversal coordinators. Their role should be to generate consensus and promote sustainability in a given metropolitan area. An

expert metropolitanist is one who possesses a more complete understanding of the complexity of metropolitan cities and their main task would be to transfer, communicate, and guide metropolitan leaders towards decisions that guarantee the future of humanity.

References

Lanfranchi, G., & Contin, A. (2017). El surgimiento de una nueva disciplina para gestionar los sistemas urbanos metropolitanos. In Gómez Álvarez, D., Rajack, R., López Moreno, E., & Lanfranchi, G. “Gobernanza Metropolitana: el gobierno de las metrópolis para el desarrollo urbano sostenible”. Washington: BID.

OECD. (2015). The Metropolitan century: Understanding urbanisation and its consequences. París: OCDE.

Ortiz, P. (2014). The art of shaping the metropolis. New York: McGraw-Hill.

Tómas, M. (2016). Tendencias metropolitanas en el mundo. Barcelona: Observatorio Metrópolis. Asociación mundial de las grandes metropolis.

UN-Habitat. (2016). Urbanization and development: Emerging futures. World Cities Report 2016. Nairobi: United Nations.

Metropolitan architecture[39]

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A political project

The challenges the Metropolitan city has to face are:

- the explosive dimension of the metropolitan scale and its functional reading through the definition of geographic locations and the permanence of lasting relationships among them;
- the problem of defining an identity of the metropolitan scale city and of the quality of its lifestyle, that must be expressed, at the metropolitan scale, through mental maps typical of each metropolitan reality.

The coexistence of the instances of different metropolitan places and their communities is the essential issue of metropolitan societies. Thus, a purely political theme of consent and participation in the mutation of reality and related mental maps emerges, because the metropolitan paradigm shift leads to the deeper complexity in the mapping and organisation of citizens' lives. The new metropolitan dimension motivates us to consider the city such as the theatre of memory or as the theatre of prophecy (Rowe,1980). The need of consider the city as the theatre of memory, rises from the fear of losing the intelligibility and control of the space of our lives, of certainty personal social identity, which makes extreme and exclusive the conservative perspective on the change that is a matter of fact. On the other hand, there is the hope that prevails of a future and its benefits that often disregards the past to move forward to the future. The problem of identities that are radicalised make us indifferent to the dangers of obsolescence or divestment, and the conflict only exacerbates with the acceleration of the change.

Dealing with the political question and of how it is rooted in the disciplinary terrain of Metropolitan Architecture, it can be seen that we are still going through a period of extensive and accelerated change. When the people become vulnerable with the accelerated change and uncertain in defining themselves, the space that represents the society also abates its characteristics and the meaning. Therefore, regarding the metropolitan project, when the focus of economic and political power is evidently on one side only, the importance of participation and consensus is as much as the project itself. Many topics require different groups of stakeholders due to the very nature of the subject. Flexibility and cooperation in dealing with such issue are mandatory, facing the current situation of working in silos.

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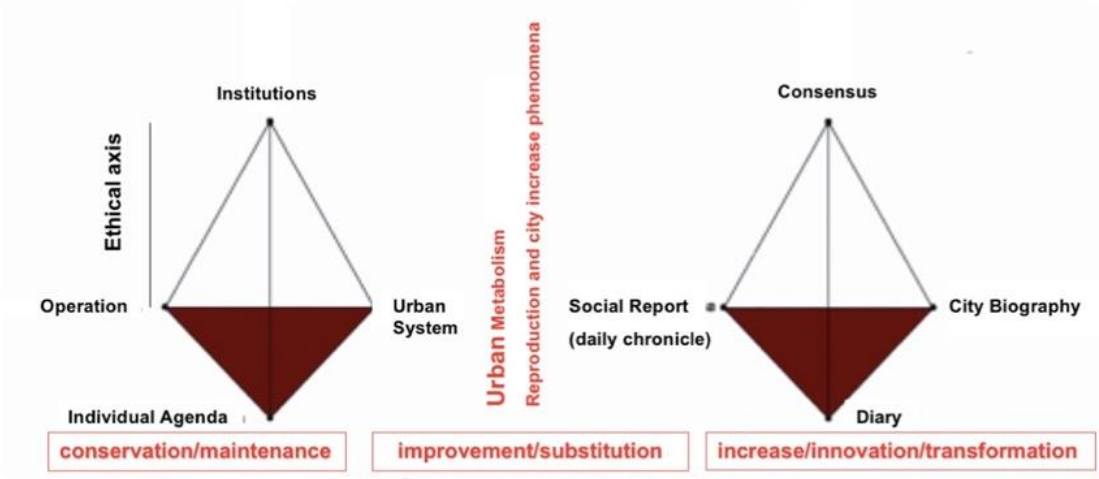
The metropolitan discipline methodology tries to address the issue of governance promoting the local and global metropolitan actors, and the metropolitan experts. However, the decision-making of a metropolitan project is always done at the political level.

The physical space builds citizen participation

Today, an intentional and naïve removal of the anthropological time in the physical space, that builds common sense and citizen participation, is a matter of fact. The irony seems that, in order to join the modern civilization, it is necessary to take part in scientific, technical, and political rationality which very often requires the pure and simple abandon of a whole cultural past. It is a fact: every culture cannot sustain and absorb the shock of modern civilization. This is the paradox: how to become modern and to return to sources, how to revive an old, dormant civilization and take part in universal civilization (Ricoeur,1961).

The recognition of the metropolis as a closely connected network of small, medium and large urban centres spread across vast regions, thus the Net-City arrangement, demonstrates the necessity of shifting from the traditional urban study approach. These urban nodes, or epicentres, and their infrastructural connections frame the 'hybrid territory' (McGee, 2009), where the traditional boundaries between city and countryside, formal and informal, culture and nature, are blurred into an amorphous in-between 'Body Space' (Shane, 2005). It is necessary to re-conceptualize the in-between space, understanding the physical and environmental characteristics of a local site to promote a quality of life for the inhabitants.

Figure 1. Urban Metabolism Scheme based on The Prism of Sustainability Model (MS Lab)



Urban metabolism (fig. 1) is an approach looking into the process of transformation, substitution, and maintenance of contemporary urban territories. Metabolism related to the metropolis means understanding the incremental goal of a metropolitan work according to the relations between cultural, energetic and productive investments, and re-configuring the urban system under the lens of sustainability. This implies considering the changes occurred to the typological and morphological paradigms of space and their impact both on private space and the variety of the public realm and how the old part, the new part, and the neglected part can be integrated as a whole. It is necessary to think about a new language of composition, which refuses direct references to a pseudo–picturesque historicism. Thus, the public realm requires the construction of a narration, through the Architecture, that is able to tell stories about who we are and what a city wants to be. The public realm introduces, above all, a symbolic dimension that brings the architectural project to the use of

formal archetypes, which are able to evoke a new meaning in the global culture. The new project is born, of course, from local scale but now it could transcend to the global scale. It also means to understand the various necessities, desires, contributions, and relationships of inhabitants and their prosperity. The vast possibilities of institutional structures to accommodate these physical, social, economic diversity sets the ethical axis of the transformation and is an important goal of the metabolism.

The architecture of the metropolis as spatial phenomenon and environmental question

While in Latin culture the keywords for urban discipline are scale and limit, the Anglo-Saxon urban keywords are scale and growth (without necessarily defining a measure). Often the Anglo-Saxon world has interpreted the Latin world according to the characterisation of its models (Pictorial) and not by its paradigm value. In defining contemporary urban models, the 20th century had three crucial moments:

- 1850 Paris: The theme of density. The attainment of the limits foreseen by the General Plan;
- 1911 Chicago Plan: the overcoming in one hundred years of the limits previewed and the consequent invention of an original type of settlement that comes from the urgency of exchange between the points no more tied by contiguity of fabric.
- After 1950: the discovery of the regional dimension. Hilberseimer said "on the side of the city" is no longer visible; later Lynch (1980) considered the regional dimension as a total environment made visible and Forman perceived as the landscape ecology.

Today, we return to Lynch ‘s question (1980): how can we come up with a new model of the city that, embracing the environmental issue, becomes part of a spatial phenomenon? We are interested in analysing the city as a spatial phenomenon, which integrates the natural element, necessary to obtain a model of sustainable development. Today, an investigation on ways of thinking about spaces that change, as a study of the urban paradigm over time that creates a series of mental and real where the highest scales imply the lowest scales, is necessary. We are developing the Metropolitan Cartography as a useful tool to define urban paradigms that are more complex, concerning the cultural theme of urban biography.

New metropolitan paradigm and metropolitan architecture

In 2005, D. G. Shane identified heterotopias as the new architectural bodies and urban morphotypes that articulating scales and determine original and self-generated configurations. They are the foundation of mental-map, a tool to mark how we live the city, now dotted with landmarks for the memory and communication at the metropolitan scale.

In the Middle Ages and Renaissance, the Roman villa or convent and palaces were the matrix of the city. The measures of the body regulated their dimensions because they commensurate with the temporality of daily life and thus the representation of the city was unitary. Since the rise of the “city of the car”, the representation is instead given by the integration of the landmark sequences. Today, the new big dimension is scaled according to a new way of offering and exchanging. According to Shane, in history, the development from one form of city to another brought some places called "heterotopias" with it, that is the "other space" or "the space of others", a new systematic organisation

of the codes of architectural practice, which defines the grammatical structure of the architectural language, fundamental for determining the image that inhabitants have of their city as Gandelsonas (1998) reminds us:

"The establishment of society can be seen as the establishment of order through conventions, or, more specifically, the establishment of a language through symbolic codes". At each stage of development, then, a period of chaos opens: "an infinite field of potential for the manipulation of the individual and collective spheres, from the verbal to the sexual", to which follows "the systematisation and institutionalisation of the rules in these domains, the manufacture of the rules, and an invention of social codes of a "language" of relations ".

The image, conveyed by the new urban signs, is therefore linked to the definition of a new structural paradigm, which regulates the leaps in scale, which are the reason before the change of city models. From the European and Italian city (from its maps and its scenes), we learn that the Architectural Image is not just a comment on the form, but is a constructive montage of three-dimensional images, not scenography, linked to an urban paradigm. The purpose of changing this paradigm, therefore, is always to produce a systematic organisation of the linguistic codes of architectural practice, to define several finite and stable forms, with their related meanings within a closed system, that is, to create a language of the Architecture of the metropolitan city today.

However, if in the history of architecture, it was possible to recognise a fully constituted language (orders and types) from which to draw in support of a grammatical structure, in modernism the linguistic organisation is in crisis. Since then, with each passage from one model to another, codes have changed, and a new symbolic organisation has been founded. In particular, in the passage from a city of faith to a city of machines (Lynch,1981), the body ceases to orient itself in the world through that network of symbols that has distributed space, time and the order of meaning in the past. Always in the past the functions have explained the origin of the signs, but they didn't say anything about their combination, through the logic of grammatical structure, neither of the architecture nor of the city.

The metropolitan paradigm has changed since the last century. Its purpose is a possible relationship (new mode of connection) and the reactivation of a tension between the historical centre and the periphery. The Metropolitan Architecture project is an agent capable of mediating and negotiating. It is about new metropolitan centralities linked to the old parts that change their role from being functional to being symbolical, conceiving the centre as the place where a tension is determined for the articulation of the metropolitan contexts with the new functions, and with the new actors that appear in the metropolitan arena in the search for quality of life.

Within a definition of the new metropolitan paradigm, having understood that the critical threshold of growth has been reached, it is a matter of producing the design of the metropolitan works that evolve the existing city paradigm at the scale of the Net-City (Shane, 2005) according to a new paradigm that must:

- strengthen citizens' personal-social actions (Right to the Lifestyle)
- be sustainable (Right to the Landscape/ Environmental Justice)
- accept a democratic principle (Right to the City/Social & Spatial Justice)

The skills we need to achieve this are:

- Competence regarding the historical-geographical situation of the area: a survey on the strong geographical support point for the living (Febvre,1922).
- Competence concerning the moments-events that establish the broad present, i.e. the biography of a city: how each culture has interpreted the role of the geographical situation (orography) as a constituent element of the city (Focillon, 1934).

Competence in choosing metabolic interventions of substitution necessary for the growth/ development of the settlement, whose current state has been produced by activating what has been preserved or invented in the territories of the past.

Architecture is not anymore the ground floor of the city for settlement orientation, with different layers, aimed at marking the differences between the set of landscapes that people had learned to recognise and live and, at the same time, had built them. In the past, in fact, it was just the architecture of the city, which allowed man to elaborate an anthropological image through geometric semantics of the city fabrics. The place known as living space was conceptualized through geometry and recognized, therefore, through its constructed forms. The Metropolitan Architecture has to follow first of all the principle of Continuity to the green-grey infrastructure defined by the Metro Matrix, that requires protecting the still free areas and the water system. Traditionally, we have to deal with the traditional idea of Permanences; Metropolitan Architecture, instead, deals with the idea of Durability. The Durability of a Metropolitan Architecture means maintaining, developing and transforming the relations with elements that define the metropolitan dimensions. The dynamic relations that change over time make the project permanent in the metropolitan structure. Contrary to the static monumental value of the past, the new public realm has an urban quality that deals with the complexity of the new functions linked to metropolitan dynamics, which is intimately linked to the question of identity of the local scale and its significance conveyed by the architectural image in the metropolitan scale. The intensity of time is fixed in the Metropolitan Architecture that is dynamic with durable values. Durability is the character and the aim of the long-term metropolitan project.

The possible locations of the different Metropolitan Architecture projects are selected through the Metropolitan Acupuncture Chart. That is a map that coordinates the Net-City Hinge Points by taking into considerations the structure of the metropolis and the needed projects stemming from the Metro-Matrix, the spatialisation of the metropolitan dynamics and of the local values.

Metropolitan architecture deciphers metropolitan dynamics

The metropolitan dynamics transform existing landscapes, infrastructure networks and city fabrics. The dynamics are processes of transformation of form and map of the urban field in a metropolitan scale. Growth through densification and investment of larger spatial fields change the value of the existing poles and settlement patterns, concerning the new metropolitan paradigm. For this reason, Metropolitan Architecture needs to protect the local value, and also be equipped with "sensitive" infrastructures so that they do not remain or are uprooted or "museumised".

For this reason, the essential architectural problem becomes that of the relationship between measure and scale. The terms of the relationship are the human body (measurement) and the inhabited field in its totality, the metropolitan unit. From a metric point of view, the measure of a man is, therefore, a relative invariant, and the scale of the city is a variant. On the other hand, this relative invariable, the measure changes in reality, if not in size, in value or sense. The change in value is the ability to commensurate, according to the variations of the urban field, its possibilities of action, now immeasurably increased by infrastructure. For this reason, nowadays, temporary measures prevail over spatial measures and the measures become more sensitive and sophisticated.

It is through metropolitan architecture that the entire city acquires a multiscale character. The continuity of the ground is articulated and segmented into relatively discontinuous fields based on the distance from the interchange poles; the metropolitan centralities are then communicating with even larger fields through interchange poles of a higher order. However, connected to the multi-scale and multi-function exchange poles, we immediately find local fields which are in turn made discontinuous by the metropolitan, regional and national infrastructures, yet adequate accessibility

in terms of time is ensured. That is how the net-city is born, which differs from the polycentric city because the interest is no longer on poles and actions of communication, but on the space that is now disjointed Body Spaces (Shane, 2005).

The physical phenomenon of removal of old (and disused) urban systems replaced by new urban morphotypes immediately involves the citizens who see their first field of life manipulated. The change, on the other hand, is made necessary by the specific contemporary way of switching between infrastructure networks and of linking them to existing urban tissues: in this way, local transformations and unprecedented impacts on urban or natural landscapes are produced.

The metropolitan experts need to make the decision related to the field of action of the metropolitan project following a set of determined principles. The principles are defining what the priority for the action is and allow the dialogue among different experts in the level of the value/principle that goes beyond the matter/issue. The main question here is: where do we have to intervene with a metropolitan project to make this system sustainable?

Metropolitan architecture project expresses shared values

Even at the basis of a metropolitan project there are values that are considered worthy of lasting. To produce this value (now linked to a sustainable project) what kind of key processes must we produce?

We have argued that the structural basis of the metropolitan project is the Green-Grey infrastructure. This new entity is not inhabited by individuals belonging to a multitude, but by people (reflective subjects) belonging to a society or a community.

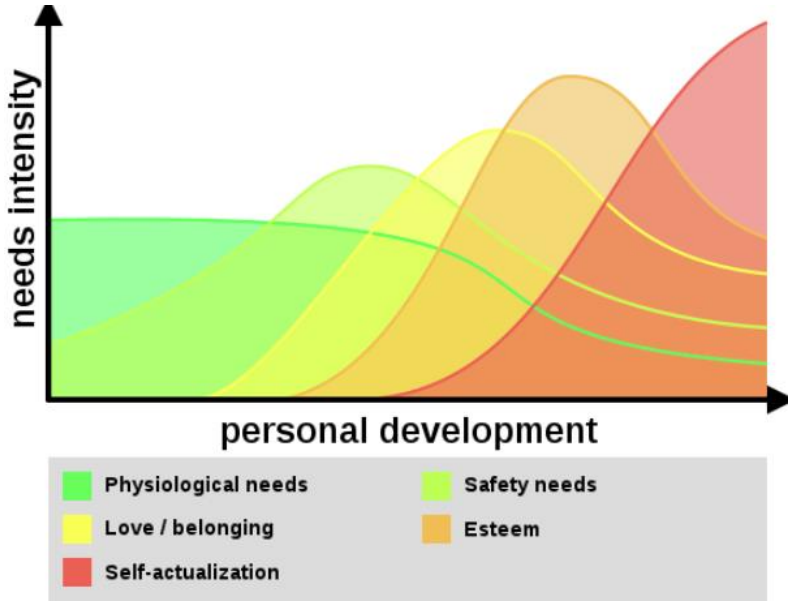
We are therefore talking about a space that can be appropriated by different subjects and a project that is not designed only for the individual. We can say that the community has a priority access requirement to be part of it, for example it is rooted in a particular place. While the society has an inclusive but exit requirement in the sense that it shares a common goal, an interest (which we could call "enthusiastic society").

The Green-Grey infrastructure space is an "agora space" or place of democracy par excellence. This means that for us, it must be designed as the place of cosmopolitan democracy that recognizes all human beings as bearers of rights and duties even if not legally “citizens” (compared to the legal framework of a nation).

If a public space today represents cosmopolitan citizenship as a body/person’s rights and duties, we have to explore in which way this space represents the body of people who by no civic law have "rights". The theme, so, is how the Feeling of Adeguacy (Lynch, 1960) can be achieved as a notion of cosmopolitan democracy through the Metropolitan Architecture Project, today.

The Metropolitan Architecture project is always a morphological invention but also a functional one. First, it integrates a function proper to the spatial characteristic of a space of transition (zone of contact and permeability), and later other functions open to negotiation and appropriation of different citizenships will be integrated: places of know-how, learning, service able to determine the landscape citizenship (Wall, 2019) that incorporates the right to the landscape, the right to the city, and to the life style. It is interesting to refer to Maslow's pyramid of needs (1943) according to which the reflective subject does not necessarily have to express itself in every single function; there is a transition zone that contains different levels of awareness.

Figure 2. Personal development and needs intensity



The metropolitan citizens shared a civic space. What is a civic space today? Civic for whom? Who does it represent? We think that this notion should be based on an "affective notion" of civic space rather than a code or a prescription. What we are talking about is a "feeling of civic space".

It must be robust and flexible. Not because it can be modified but to allow the probable appropriation of different identities; it must have a vivid but not exclusive image, so to be representative of a multiple metropolitan identity. It is above all a "used" place and for this reason, it becomes part of an urban imaginary and becomes representative for multiple populations more recognisable as hybrid community, rather than as a society. For this aim, it must have qualities, that is, it must express the properties that identify a shared value for that community. This shared value represents the people's awareness related to the notion of the qualifying and qualified aspects of the reality of the metropolis. I note that there is a substantial difference between the word quality and the word requirement. Requirements are qualities necessary and required for a purpose, to satisfy a program. Programs require requirements; we instead are thinking in terms of the tonality of the quality of space (Eco,1962). Lynch (1960), too, when talking about the image, foreshadowed a possibility like this. For him, the image of a civic space had to be: vivid, open and plastic.

In the transition space determined by the Green-Grey infrastructure we will have spaces that will meet requirements functional and specific. Particularly in the central location of the Linkage Urban-Rural, we must instead identify pure qualities and then it will be the subject who will determine from time-to-time which requirements the qualities can meet: for example, the requirement of quality to be located in relation to the city must to have environmental qualities that meet the requirement of environmental comfort, etc.

This civic space is similar to an ecotone in the sense of the architectural and urban disciplines: it must express the different tones of the quality of metropolitan living. We are imagining a living space that is hyperconnected, but for this reason it must not erase the characteristics of the place that root it in a precise place in geography. In this space the metropolitan citizens will land with the whole body and all their senses that will produce a total image by integrating itself.

The new built form types and new land uses

The perspective within which it is desirable to act in the planning of a new metro system, is the one that aims to redesign overall a connection and mobility armature structured through a pattern that integrates the new multifunctional type with its field of action (1Kmx1Km), and that combines, as part of the building type, also the grey and the green armature. We are talking about an exchange pole and its exchange district, therefore, a city system, which re-conceptualised the areas that today are "peripheral" in relation to large flows, aiming to widening the city's development scenario. The main objectives are:

- to redefine the development policies of the territories thinking to a "geographical" positioning of the New Morph-Types that we could call "genetic";
- to integrate the strategies of the different municipalities involved in terms of strengthening and proximity policies;
- to create an integrated and shared system in which, the new metropolitan plans and their territorial reference systems, represent an opportunity to give new impetus to epicentric and reticular development, through the strengthening of connections between large infrastructure networks, city fabrics, and landscapes. The aim is to connect the entire metropolitan systems, also through the connectivity of intangible networks (ICT) connected to local territorial armatures;
- to identify the network of interests, capable of feeding the project partnership necessary for territorial performances;
- to identify actions to mitigate negative impacts and to enhance/promote positive impacts (vulnerability and potential) in a sustainable and compensatory perspective.

The most interesting aspects are therefore the synergies that can be established between tangible and intangible infrastructures and, above all, the creation of a global system for the design of urban facilities, based on the integration of green and grey infrastructure; the management and control of flows of goods and people along multi-modal corridors and interchange nodes; the conceptualisation of those territories that are today defined as linkages between urban and rural areas. They were before considered peripheral but today, instead, they are nuclei of new morph-typological inventions, capable of introducing a "contagion effect" for the development of metropolitan regions.

This is a vision of the development of the metropolitan region, which can be implemented primarily through the identification of a shared "model" of development and governance of metropolitan facilities, not only starting from a functional chain. It is fundamental, so, to identify the geographical support points of penetration into the territory (Febvre, 1922), in relation to an urban biography. These are deep planning elements that lead to the identification of some intermodal nodes or epicentres of the Net-City, to be designed in relation to the green-grey infrastructure of the territory, whose continuity must be safeguarded. This is only possible, however, if the strengthening of the connections between the new polarities and the agricultural and natural territory; the development of an extensive and sustainable network of logistic centres and structures and services; and the strengthening of the interconnections of renewable energy networks and communications are implemented.

Three key concepts must now be introduced:

- the attractiveness of Metropolitan Regions that have as a necessary premise, a metabolically sustainable growth, a sophisticated product of quality research, production and management regarding the preservation and enhancement of pre-existing identity, natural and anthropic features;

- the sustainable metabolic development, as a complex of the social vitality of the entire community, and not only as an energy balance. Development, in short, is sustainable only if it is determined by a potential stimulus for improvement, for the attractiveness of today's multipolar metro system;
- urban metabolism, which concerns the system of production and reproduction that growing, to produce, necessarily consumes, but also re-produces. It is essential, therefore, that in the relationship between cultural, energy and productive investment, there is always an understanding of the incremental goal not only for private investment, but also and above all for common and public investment.

New types of buildings, land use units and/or landscape types. A communication problem

A research that concerns the new types of Metropolitan Architecture intended as units of land use and/or types of landscape studied in relation to a metropolitan paradigm, must also give a definition of its meaning and of its scopes, that is, a precise definition of its size and bigness, linked to its recognisable image and a possible determination of mental map at the scale of the metropolitan city. Our starting question is whether these are structures or genetic New Morph-Types capable of changing the face of the territory and the metropolitan city, in other words, capable of putting the new spatial, decisional and relational structure in coexistence at the scale of globalization and the value of a coherent local claim. This phenomenon, identifiable in economic and spatial growth, is linked to the evolution of technologies, to be utilized toward the analysis of the impact between economic growth and territory.

The method of analysis adopted is based on the study of the impact of large public works on the consolidated historical fabric; the impact on the environment and landscapes of Hybrid Buildings (Fenton, 1985), as an element of social aggregation and as a way of transforming abandoned industrial areas; and on the definition of new mediating landscapes between urban and rural areas able to take advantage of the advanced services of the city, allowing metropolitan citizens to choose an alternative lifestyle.

A purely functionalist and quantitative vision does not allow to evaluate the added value of new building types that we call "urban morphotypes", such as place/icon, landmarks, inner landscape and new land uses. In particular, the very close relationship between the character of icon, landmark and interior landscape and the space of flows and communication that characterizes the public space of today's city is not understood, and the relationships to the scale of networks, and to that of speed, with the mental maps of citizens, while they plan their routes or trips that connect the places of their lives to all the places in the world, which they visit more easily than in the past.

The debate on new metropolitan typologies is flattened by the dispute over environmental impact and the skyline of cities, while the environment and the territory are always considered only prey to the aggressiveness inherent in any large-scale work.

This results in the project of a building that is only a pure an envelope rather than a development project over the entire metropolitan area involved, since a value of mutual benefit between the resident inhabitants and the new metropolitan communities is never tested. Only through their reciprocity is it possible to activate changes in customs, ways of life and use of the city. In the process that urban transformations stimulate, through the comparison and contrast of the local spatial character with other places, often known through the new means of communication (television and internet above all), citizens lose the unconscious identification with their neighbourhood, in its social and spatial sense, to assume a new and enlarged one. That fact, sometimes, is considerated by the local inhabitants as a risk of alienation.

Denotative image of an urban identity and mental map

It emerges the need to define a new project at metropolitan scale - as a mark of local space that can be perceived as a sign of mental maps, linked to the dimension of the metropolitan city - closely associated to the local identity. For some power groups, in fact, the search for recognition and identification with the local space through identity images is increasingly strong. But this need for recognisability and belonging to places is now also a need for the new multiple citizenships, coming from elsewhere and no longer linked to local origins and ethnic groups, which presuppose belonging and "proximity" of another type, which don't have any contiguity with the city fabric and in which the mediations of urban forms play a fundamental role. Citizenships that have a twofold need: on the one hand, to dislocate in space at very high speeds; on the other, to relocate, slowing down movement times and assuming a "1-to-1 relationship" with spatiality. In the analysis and interpretation of the new metropolitan realisations the following question arises: how to "welcome" these new citizenships?

One of the most interesting aspects that concerns the project of the new metropolitan types is the one that recovers the theme of the value of the denotative image of an urban identity, as a rule of constitution of the mental map of the diffused city. The project of new types of Metropolitan Architecture concerns, in fact, an articulation of identity through the constitution of an identity image for the different spaces that compose them: space of the crowd, of proximity and expectation, of circulation (Choay, 2004), studied both from the functional, dimensional and distributive point of view, and from the point of view of an expressive image of the quality and identity of the metropolitan space. This is the ideal outcome of Milanese culture in architectural and urban design.

The value of image also allows to recognise and dislocate in mind, in an inner path, places/icon in order to be able to constitute, even at the scale of the networks, that is the scale of speed, a mental map to support a topographic map that must manage the paths that connect each place of one's life to all the others.

New built form types

We can define the New Built Form Types, to be analysed as landmarks and interior landscapes in many ways: as producers of increase in the size of cities to the limits of the paradigm shift; as producers of artificial proximity between remotenesses; as openings of local proximity to remoteness; as urban regenerators through local transformations; as producers of wealth; as producers of alterations in historical or traditional forms; as producers of mutations in urban functioning and identity image; as opportunities for the design of new units of land use and/or landscape types and, therefore, as points of support for the functioning of geographical areas or as formations that integrate mutually combined urban forms and building types.

If we want to understand the meaning of these metropolitan projects for the city, let's pose the problem of a relevance to the re-identification of the different actors of the city itself, through the design of new types of metropolitan morphologies. This, knowing that a new metropolitan landscape is only possible through a project able to give impulse to the transformation of places, by means of a new way of transforming geography, orography and landscapes, which are fundamental elements to be able to recognize and enhance an identity character. It is the theme of urban quality that is linked to the complexity of functions, intimately connected to the question of identity and the signification of the image.

Today, the New Built Form Type is understood as an element that forces the typology to hybridize. Colin Rowe, (Rowe,1976), when he introduced the theme of the Chicago skyscraper frame,

distinguished the pragmatic approach to technology, typical of the American mentality, from the more compositional and symbolic one of European matrix. And (Fenton,1985) introduced the theme of the skyscraper as a hybrid building opening up to the historical dimension of American architecture, which mainly meant bigness: the new size of the buildings on the New York General Plan in 1811. Since then, the skyscraper as a symbol of the new metropolitan typologies has become a point of view on the city, which provokes a wonderful feeling of relation with respect to it, where a vertical city looks from above the horizontal one for a few miles and thus allows the ability to see and grasp it easily as if it were all a symbol. The skyscraper is not only a tall house, but an infrastructural hub, a symbol of real estate development, but above all, a powerful pop image, offering the pleasure of a familiarity with a new, complex and varied world, on a new and immeasurable scale. Pelli's Unicredit Tower in Milan and Renzo Piano's Shard in London are the contemporary heirs to these early 20th century visions.

The theme is the ability of the new metropolitan types to constitute an element of recognizability and identification for places, both macroscopically, as containers settled in landscapes and relative territories, and microscopically, as distinct sites within urban–rural patterns, buildings and urban interiors, new horizons of the intimate life of metropolitan citizens, - the monument for the Choay (1972). In this perspective, in the new containers or urban morph-types, the relationship with space passes through a representation of the world that today is enriched by a dilated sensorial perception, by new relationships between changing social groups, and by new possibilities of interpersonal relationships. This explains the birth of a new "globalizing" aesthetic intention, which characterizes the new projects. It is unquestionable, in fact, that the media (especially television) attribute to places a recognizability that acquires an extraordinary iconic typification.

The predominance today is that of the image of immediate decipherability, surprising at times, because those who frequent it must be placed in a state of recreation, understood as a condition of free exercise of human faculties, not forced or inhibited by an exclusive and conditioning purpose. The image, related to the deep structure of the city, must be thought of in such a way that everyone can immediately read and use it. It can be demonstrated that the interaction between deep, structural, original communication and information communication in the space of today's flows is determined by an elevation in the complexity of identification and recognition of the local in the global, which the project must communicate in the simplest and most immediate way.

The determination of new typologies character put into practice in the spatial form and figure is what on the one hand, extends common sense, and on the other, must be studied as a priority. The main theme for a designer of Metropolitan Architecture, then, becomes the study of the ways in which a new identity figure can be inscribed in the mental map.

The new scale and new types of space

The relationship between housing and urban universe passes between a multitude of places/function and places/icon at the scale of metropolitan region, the metropolitan city or the city district which refer to each other according to the scale value they imply, and according to which the new ways of proximity/closeness, crowd/spectacle, circulation/communication, connection/practice of the places of the world must be studied.

There are two types of spaces: the space of places (local economy) and the space of flow (which is part of the global economy (Castell,2004). This second type concerns the terminals of large infrastructures and the whole system of support around them: regional shopping centres, trade centres, technopolis, tourist destinations, stadiums, etc. It is in this space that we encounter buildings with new sizes and types and also the new hollow metropolitan skyscrapers.

These are the places/icon that belong to the sphere of Public Realm as a space of flows. There are three categories according to which reading and designing them, according to Reeve and Simmonds

(2000): as Information System/Communication Space; as Movie Set; and as a new Appearance Space.

In this sense, the theme to be addressed concerns the recognizability of a place in relation to an "infinity" of places to be recognized, and implicated in everyday life, starting from the housing itself; and in particular, it will be necessary, for each project, to verify the way in which it contains and relates to each other the various areas of scale, which constitute today's urban horizon.

Inner landscapes. Internal structure not pure visibility

These new types must be studied first of all as tonalities of indoor landscapes, before they have a specific function.

Reading the theme of the icon regarding to these constitutive modes of indoor landscapes, allows us to think of spaces and their identity images from the point of view of their internal structure, in the sense of their relevance to a function and not only in relation to the theme of visibility and functionality. In fact, the icon has visual value, but it has no in relation with the body engagement, and is never localized. The real problem, therefore, is how the thing (name-icon) is localized (relationships that it instructs in space), when the habitability that an urban situation of immeasurable dimensions requires is different. The project at the scale of the metropolis is intended as capable of re-describing a place and re-proposing the invention of a new topography. It is in this way that the landscape becomes projectable; we pass from nature to design, but then, necessarily, also vice versa. The culture of the environment must, therefore, refer to new urban elements and must rethink what is the legacy of the local identity in the perspective of a coherent claim. The theme is, at the metropolitan scale, identity and yet growth.

The narrative structure of the agro-urban metropolitan territory

To understand the metropolitan issues, the relations of various types of space and nature are managed by metropolitan mapping that is constantly updated. In the contemporary urban narrative, especially from the governance perspective, there is a lack of storytelling, to establish a new physical metropolitan paradigm and discourse. To introduce the metropolitan hybrid urban-rural linkage to the new metropolitan populations, requires a process of building a narrative of the territorial identity and citizenship, through a powerful metaphor. The figure of the urban-rural linkage represents the transitional space between the urban and the rural areas (Contin, Sbacchi, 2008): It is an ecotone where the different set of landscapes with different tonalities coexist. It is, therefore, the location of “the catastrophic discontinuity and change” (Thom, 1989) that allows various types of inclusions and exclusions. It is a territorial suture that constrains us taking a critical distance from the traditional tools of architecture and urban discipline. The goal of a metropolitan project is to define a space with collective and public dimensions through the new hybrid urban forms that are public, common, entertaining, or productive. In order to build this gradient of metropolitan space and define its functional and symbolic values and forms, it is necessary to develop new syntax and grammar for the design (Contin, 2016). To understand how to do this, we can refer to the stories of the twentieth-century cities. The anguish story of a huge city, the dissolution of the "magical place” (Weber, 1980). demonstrates the hope of establishing a different kind of citizens with new behaviours by providing a new dimension of welfare through modern forms.

From these experiences, we can learn that it is essential to give meaning to the shape of a city. It means to represent the intention of urban design through images and feelings that complement it. Today, this specifically refers to the invention of a dominant metropolitan figure, that is a new geometry tied to geography, water, topography and new social practices. This allows us to read the territory with new types of maps that are local, yet addressing the metropolitan scale context: The maps support us to practice in places that are far away, through recognizable nodes that express the will of meeting the “differences.” They are the critical tools that are necessary, especially when dealing with the abandoned historic centres in medium-sized cities and planning of public open spaces.

Metropolitan architecture and new land uses. The role of the new agriculture pattern

Lynch (Lynch, 1960) wrote about physical and activity patterns, trying to investigate if it is possible to explore how activity pattern and physical pattern interact. Patterns in a coherent way produce the legibility of the cityscape and nowadays of the metroscape. In Metropolitan Architecture projects there are formal and functional patterns, which describe the structural ground of the metropolitan digit – field of action of the intervention-, and which describe spaces for various activities. Besides, other patterns describe the transformations of the form during the time.

Returning to the topic of the urban-rural linkage, today, it is mandatory that agriculture plays a dual role in the metropolitan context: addressing the importance of nutrition promoting citizens’ wellbeing, and creating the renewed signs of affective domesticity. The agricultural area has an advantage over the urban area when talking about a place where there is a strong connection with collective memory. Nowadays, the agricultural area goes through a mediated transformation that is participatory and engaging. The transformation finds the balance between conservation and transformation to respect what was already living in the territory while planning for the future. The agricultural field is a powerful symbolic place for transformation that provides a positive horizon for future life. On the contrary, the city goes through conflicts of transformation and eventually "loses its charm", as described by Deleuze (1968) and Max Weber (1980).

The strength of the agricultural space comes from the section of the landscape: from the strong image of the tectonic of earth that expresses the energy leading to the creation of “objects" and places with a strong identity. The projects of agricultural spaces that are linked to the hybrid territory of the metropolitan urban-rural linkage become one of the realised imagined territories of the metropolitan narrative and the metropolitan value communication, which replace the virtual images of territories distributed almost entirely, by the cinema, the television, and information. Today in the urban-rural linkage territories, citizens become “farmers by choice”. The agricultural territory bridges any critical distance and embraces the reality and its image that is related to a new modern futuristic landscape. It is the physical structure of a new metropolitan reality.

It is necessary to introduce this urban-rural linkage patterns to the new metropolitan populations through stories of inventive imaginations. This can happen in the fringe areas of large conurbations or in the medium-sized cities network, which is the fields of action for heterogeneous multiple elements that are not only related to the measure of size but also in the deep structure of geography. These places are characterised by their distance from the city centre (order of distance), not by an order of magnitude, and they cannot be explored unless the stories are experienced physically on site. The Metropolitan Architecture project deals with the definition of the Urban–Rural linkage pattern, its figure and images, and its sustainable land use requirements, in particular, related to the water management.

Metropolitan architecture issue critic readings

The Metropolitan Architecture project can get a meaning such as a social work that it enhances. The Metropolitan Architecture project, in fact, is a social work that involves the history and the geography of a place establishing a discontinuity within the continuous relation with the collective memory of a territory.

According to Secchi (Secchi, 1986), a good map as an origin for the metropolitan project has to concern a ground project. Ground project means that we have to consider the definition of the characters of the surface where the buildings, related to the metropolitan architecture project, will be rooted. In the urban studies history, this act was ever the first act of construction: from the “centuriazione” such as the foundation of a city, to the transformation of the existing one.

We can describe three tendencies regarding this issue nowadays. The first one, sucks the ground and its functions and meanings inside the building: a huge condenser of images, functions and relations; the second, reduces the ground such as a podium for technical element devoted to fluxes; and the last one, considers the ground due to its physical extension, and economic value. To Secchi, instead, a ground project must take care of the history and the geography of a place: traces of these have to be signed on the map.

Metropolitan architecture within metropolitan landscape

Due to the Bigness issue, - spatial extension and temporal acceleration -, a specific equipment of techniques for structuring and intervening at big scale, related to a formal definition, is needed. Landscape at this scale is a possible material for Metropolitan Architecture too, that gets a new and vast meaning. In the past, the Baroque Architecture used the landscape such as a constructive material for the Baroque city: nature was a dialectic element in relation to the production of buildings; not a background only.

According to Gregotti (1966), in fact, the environmental question not only concerns a biggest set of problems but rather different problems.

If it is so, the territory of the Practice of Metropolitan Architecture discipline becomes more extended dealing with environmental sets at the all scales. An audit of the architecture discipline is mandatory, that allows considering architecture such as a work on the transformation at the metropolitan scale too.

The Practice of Metropolitan Architecture discipline, in fact, must deal with the specialization of the different methodology related to the form issue at different scales. The Practice of Metropolitan Architecture Discipline, consequently, founds a technology for the form of the metropolitan anthropic -geographical landscape (Gregotti, 1966). According to Gregotti, Metropolitan Architecture also is such as the technical description and related project of the “surrounding”, so that, a synthetic way to define a place constitute by built and natural environment together, related today to the scale of bigness (cfr. Focillon (1934), La vie des formes: Physiologic Landscape of Art concept).

Metropolitan architecture to shape a robust metropolitan civic image

Nevertheless, Landscape is not only a productive process but also a meaningful element for a bigger scale city project per se. It produces the quality of the figure of a specific landscape, so that, its identity (Lynch, 1960). Metropolitan Architecture, in fact, applied to the landscape issue is not only a technical language for a little group of technicians, and a deeply poor language, but also, it is such as a linguistic corpus, - within its syntax, grammar and vocabulary -, coincident with the total physical ambient got visible. That is the reason why landscape works such as signs marked into the ground by human beings (their values and ideas) will be forever the shape of the collective memory of a specific social group.

According to Secchi's Project of the Ground (1986) and Paola Viganò's Discovery of the empty space (2012) such as a project related to the space in between and its sequences, which allow new ways of land uses. Viganò argues that the term Landscape Urbanism originally means that the urban space is made of landscape, because it is built with landscape's materials. First of all, in fact, we have to deal with the non-built space where urbanity diffuse and fragmented does exist, in which the landscape has an important part. This context, indeed, requires rethinking the materials and techniques of the project.

A new Metropolitan Landscape, - its structure and imageability-, so is needed and this issue involves a sensitive reshaping of an already existing environment too (Lynch, 1960): natural and built. Nowadays the exclusive technology approach to landscape reduces the local value of the characters of a place, due to the fact that, - according to that vision -, they are more and more connected to supra-local economies, and the progressive globalization of the system of values considers nature and cultures a heritage to make money out of it (Gregotti, 1966). Although, the metropolitan dimension, - considering the metropolitan continuity of eco-armatures and their articulation with the grey infrastructures through a Metropolitan Architecture project-, can be the engine for the construction of a new relational non-static identity, that revaluates the local characters of a place but connecting them to the net of the cities of the world. Frampton promoted an interaction between the "wet" landscape place-form and the "dry" rationally assembled product-form.

Besides, for Lynch the manipulation of the world, - and we would like to remind Secchi speaking about the modification of the existing territory and cities through a project of the ground not ordinary, reductive, technic and inarticulate (Secchi, 1986) -, it is possible for sensuous and so that, for strengthening a robust public image at strategic points. He proposes to introduce inside the analysis and proposal of the Urban Design a visual plan whom final objective is not the physical shaping and reshaping itself but the quality of the image in the mind. For us the quality of the image reveals the quality of dwelling that is the principal aim of the Metropolitan Architecture. According to Lynch, we consider that the human modification must be done with an awareness of the interconnectedness and yet the individuality of both: natural resources and human purposes (Lynch, 1960).

At the metropolitan scale, the need to recognize and pattern the surroundings is crucial too (Lynch, Gregotti). A clear image enables us to move easily and quickly, and it is able to furnish the "raw material for the symbols and collective memories of group communication" (Lynch, 1960). Lynch wrote about the chance to pin together the images at different level of organization in complex environments through landmarks to avoid an extra burden of organization on the observer (Lynch, 1960). This issue reminds Secchi's observation (Secchi, 1986) about the need of articulation of the different collective and private spaces, or among infrastructural net's elements, or among different types of infrastructural elements and built form types. To Secchi, the descriptive rules of possible articulations hint at city dispositive rules. This is the role of the type-morphological value for the metropolitan discipline: to analyse the articulation between the metropolitan elements (in the

complex environment) aiming to a local qualification through a selected solution among a plurality of possible uses and meanings.

In short, we need to pin images (the memorable ones) to the ground to be able to see the hidden forms in the vast sprawl of our city (Lynch, 1960). So that, we need a coherent order, - such as an antecedent form – ordering this complex environment.

Bernardo Secchi (Secchi, 1986) argues that we have to take into consideration the different parts of a city and its territory, so that, their differences and specificities. But it is not only a need of documental classification. The aim of that analysis, in fact, is to recognize the generative processes or the system of relations, which have produced these differences. The perceptual characters of the parts, which reveal their morphological features, are relevant to describe generative processes. At the end, to Secchi we have to mark the leaps in scale to enlighten the different spatial levels articulation; this is the Metropolitan Architecture's aim. And this is exactly the Metro-Matrix model's aim (Ortiz, 2014): to provide the need of a formal ordering to make perceptually manifest the conceptual essence of a new built form type through a Metropolitan Acupuncture Chart.

The antecedent form of any Metropolitan Architecture project is geography as the structural holder point for the shape of a territory. According to Gregotti (Gregotti, 1966), therefore, geography structures landscape, in which we can find an esthetical will. Our perception, so that, gets the awareness of the figural quality of a landscape as a footprint of a specific identity of a place, that nowadays can be conceived such as a formal type of image into which we can divide the metropolitan image, - Set of Landscape or Section of Landscape (Lynch, 1960, Smithson,1968). As we know, according the Matrix model, the shape of the metropolis is a green/grey structure. So that, we do not only have path, landmark, edge, node and district but Green-Grey infrastructure too. The Metropolitan Architecture so is perceived such as a total environment.

Geography within Metropolitan Architecture can be considered as a whole project, which controls the process of continuous substitution of the environment, determinate by production activity: geography, so that, must be continuously invented again in a sustainable way (Gregotti, 1966). Although, our cultural experience as metropolitan territory users continuously found geography again. Metropolitan Architecture contributes to the definition of the metropolis' great figure and image: landscape is a whole and we have to discuss about the formal structure of architecture at all the scale.

Memorable landmarks

Memorable landmarks, remarkable objects in term of their setting in the whole are the Metropolitan Architecture projects able to pin images to the territory defining its mental map. This is the reason way, according to Eisenman (Eisenman,1963), the individual expression cannot prejudice to the comprehensibility of the environment as a whole, so a general system of priorities must be proposed, that only can legitimise individual expression. The individual building cannot be regarded as an isolated entity, as an end in itself, but merely as a transitional element in the establishment of the whole. It may still assume an ideal state in itself, but only within the limitations imposed by envisage future order. Any notion of future order would be open to the criticism that it is romantic-utopian. Is it possible to say that the fabric is a network, an urban fields network, and that the monument is no longer bounded to a type in particular and that it still is able to go beyond time limits? In short, we would like to consider the metropolitan monument such as an architectural subject able to re-activate a geographical dimension, able to act so, as an interpreter of the geographical dimension, and that is not only the object of a documentary preservation. The quality of an object, according to Lynch, that might be called imageability, gives it a high probability of evoking a strong image in any given observer. The object, so, is into the environment and builds it due to the fact that it is the shape,

colour, arrangement which facilitates the making of vivid identified, powerfully structured highly useful mental images of the environment itself. The total landscape gets visible.

Frampton, in *Megaform as urban landscape*, (1999) introduced the Megaform idea as an urban nexus set within the "spaceendlessness" of the megalopolis. Megaform (and not megastructure!) is a "unifying environmental trope" that "tends to blur in different ways the conventional differentiation between architecture and landscape". To Frampton the project of ground is done through canals, railways cuttings, autoroutes, dykes and other artificial earthworks which all have "the potential of gathering up the contingent landscape around them by virtue of their anthrogeographic status, so much so that they may at some juncture appear to merge with the ground or alternatively to become, through their topographic presence, the status of being a landmark" (Frampton, 1999). A seminal attribute of the megaform is, according to Frampton its quintessential horizontality, - civic microcosms, space of public/human appearance, the cultural and the political together, within the universal ever-expanding context of Webber's non-place urban realm (Frampton, 1999) -, which is integrated as much as possible with the site on which it sits (Frampton, 2010). Frampton then, lists some piecemeal strategies for development or modification of urban form that already exist: piece urbaine; catalytic form of urban intervention using large roof forms as devices for creating identifiable urban place-form; urban acupuncture, catalytic small-scale interventions.

All these three strategies converge about the concept of urban megaform involving, Frampton wrote, the creation of a largely horizontal fabric capable of effecting a local transformation in the megalopolitan landscape (Frampton, 2000).

The Frampton's megaform "may come into being quite different scales and assume a distinctly different place-creating potential depending not only on the scale but also on programmatic complexity of the form in each case […] it has the capacity of providing a public domain in what is otherwise a totally privatized, processual and largely placeless environment […] It may possess a catalytic potential".

At the end, Frampton's primary principle of architectural autonomy resides in "the tectonic rather than the scenographic: the revealed ligaments of the construction and in the way in which the syntactical form of the structure explicitly resists the action of gravity […] tectonic is not be confused with the purely technical […] we speak of the presentation of a structural poetic rather than the re-presentation of a façade […] readdressing the tactile range of human perceptions, so that, the capacity of the body to read the environment in terms other than those of sight alone." (Frampton, 1983).

New built form types. bigness = urbanism vs. architecture

According to (Koolhaas, 1995) I would like to extract some keywords related to the qualities of new metropolitan built form types:

- complex interactions; choice and clarification of objectives and values; a creative task of imagining;
- figure need/significant urban form/ project of the ground;
- cultural precept/ "place" creation / public-human appearance, the cultural and the political together / creation of a micro-cosmos;
- general greening strategy /the cultivation of landscape;
- integration as much as possible with the site;

- largely horizontal fabric capable of effecting a local transformation in the megalopolitan landscape;
- programmatic complexity of the form in each case;
- catalytic potential tectonic.

If we agree that these are some of the characteristics of the new Metropolitan Architecture, we cannot accept the Frampton's assumption in favour of a rear-guard position of Architecture in opposition to the avant-garde modern architecture tradition. The Italian contribution to the architectonical culture, in fact, is an approach that gets the context's new conditions meanings promoting always new conceptual categorises such as in the Futurism's avant-garde tradition. This is radically in opposition to the idea of Architecture as post-production of the Industrial Design high-tech production approach.

The Metropolitan Discipline approach tries to define what is the meaning of a project of Metropolitan Architecture. It is a huge project, - it occupies at least one kilometre for one kilometre -, it is inlayed into the context, though, it creates the context, due to the fact that it is able to select the durable values among the territory's elements activating or re-activating their possible permanent relations. This is on-going process not a master plan.

Discontinuity into the continuity of the tradition

We'd rather say that the metropolitan new identity is a hybrid one, due to the fact that we must integrate the past into this new dimension too; this fact is crucial getting what we define a qualified dwelling dimension, so that a sign of new metropolitan life styles and citizenships marked on the ground (constructed ground, project of the ground) by the Lynch's landmarks. These are characterised by a vivid and sensual image, a memorable one and are objects of desire. That physical consistency of the modern hybrid spaces and mostly the environmental question determine the need of completely different procedures of analysis, interpretation and project.

Grahame Shane (Shane, 2005) in Recombinant Urbanism: Conceptual Modeling in Architecture, Urban Design and City Theory defined deeply the enclave concept introducing the three models of Heterotopias. Shane 'd rather prefer to name the Metropolitan Architecture projects Heterotopias than Landmark, so that, they are architectonic subjects such as the Fenton 's Hybrid Building (Fenton, 1985).

In Small, Medium, Large, Extra-Large (1995) Koolhaas argued that beyond a certain scale, architecture acquires the properties of Bigness. In Delirious New York (Koolhaas,1978) he theorized a latent "Theory of Bigness" based on five theorems.

According to Bigness concept, beyond a certain critical mass, a building becomes a Big Building that cannot be controlled by a single architectural gesture, but by a team of different disciplines experts. Depending of this, and due to the fact that new buildings' impact is independent of their quality, Koolhaas considered that the traditional art of architecture discipline composition did not work anymore and even the city changed.

For him, Bigness coexists within the classical city, in fact the relationship that it determines is "in the quantity and complexity of facilities it offers, due to the fact Bigness is itself urban". So that, Bigness no longer needs the city, but rather competes and represents it overwhelming the nowadays-meaningless architecture. Though, Bigness allows a new concept of architecture: a hyper-architecture in an after-architectural landscape, "a world scraped of architecture in the way Richter's paintings are scraped of paint". According to Koolhaas "only Bigness can sustain a promiscuous

proliferation of events in a single container. It develops strategies to organize both their independence and interdependence within a larger entity in a symbiosis that exacerbates rather than compromises specificity".

Anyway, beyond the Koolhaas' Manifesto force, we must take into consideration the Bigness multi-scalar cross-reference: among global, regional and local dimensions. To understand how to pass from one scale to another, we have to define different scale maps from 1:50.000 to 1:5.000, to 1:500 until 1:50 sometimes. We must consider their synergy, so that, the relationship among the four essential relational levels of the nowadays net-city:

- the interaction among intercontinental metropolis;
- the metropolitan one among regional different places;
- the urban relation between centres and peripheries;
- the collaboration inside the neighbourhood.

The control of these relationships and collaborations cannot be defined by totalitarian plans such as Brasilia and Tokyo, above all, due to the widespread diffusion of the web. It is mandatory, instead, to harmonize the urban development phenomena emerged in the last decades: we have to reconsider the modern spontaneous settlements, - showed by Venturi (1972) -, for example, we must re-examine Las Vegas as a spontaneous city antithetic to the age of Nolli's Enlightenment city or such as a rationalization of the medieval city too. I mean that it is mandatory to conceive the sprawl from that point of view including it into the new difficult metropolitan whole again. Meantime, providing a counterweight for the dominance of the sprawl rules, we need to find a new coexistence between portions of old and new city fabrics and the hyper planning of the infrastructural nets: the transportation and communication networks which work in real time (a-topic proximity).

We can recognize the strategic value of the metropolitan multi-scales hinge point, recognized through the Metro Matrix model (Ortiz,2014), a new network centrality such as a global-network hub where all the other nets converge too: so that, defining a strategy for the synergy between the telematics nets (Meta-city, Shane, 2005) and the transportation ones.

Metropolitan Architecture project, so, is dealing with the metropolitan epicentres, which, coordinated within the historical ones, have to provide the new public spaces necessary for the social metropolitan life equilibrium (wet and dry synergy). That is why is mandatory to read again the urban historical- theoretical literature in light of the fact that it can be a way to react to the fast growing and placeless metropolitan phenomenology of the last years, starting from the Frampton's mega-forms thesis and the new types of differentiated containers: tower, high rising building, row building trying to find the necessary connection between roof and earth works that today are not only structural ones. We can argue that basement and garden roof of new built form types constitute new ground levels of the metropolitan public realm.

Although, it is crucial to consider the Fenton and the Steven Hall's thesis related to the Metropolitan Architecture hybrid types compared with the Foucault's Heterotopias that Shane considers from the urban design point of view, such as new built form types able to interpret the metropolitan citizenships life style.

Anyway, we think that we do not have to leave the classical type-morphological formulation that considers the relation between typology and urban morphology, due to the fact the so-called hybridization is realized through the graft in the new differentiated container of "organs" characteristic of the urban morphology, conveniently scaled, miniaturized and transformed, integrating different building typologies. To conclude, the new built form types, - that we named mega-form, heterotopia, container, new urban morph-type -, are defined through four original characters:

a) the mega-form container as built. Its technical structure coordinates both the huge earth works and the roof works light of heavy;

b) the mega-form container ‘s image that impacts on the skyline. The new built form type’s image, indeed, identifies the building inside the city. So that, it becomes a city-icon able to characterized it, a new metropolitan brand that identifies the city dominant function. It is a land-mark not only because it is visible from afar, but due to the fact that it marks the local scale ground. It is a ground-mark organizing and qualifying the local scale context such as a mental map related to the local time: it is, so, a time-mark too;

c) the mega-form such as a layer machine: a dispositive complex map and a section strategy too. In fact, inside the new built form type, a layer machine distributes, for every building’s part, the different scales and functions, through intra-typology hinge points and interfaces. These hinge points define the adequate functional proximities that allow reciprocal exchanges and grafts among the scales. The functions or uses map is such as a layout of the amount of the surfaces (square metres) gathered together into the mono-typological “box”, which concretise the traditional typologies mix as the multi-typological programs provides for;

d) the mega-form’s inner landscape: a set of inner landscapes, which detonated the layout’s local specificity such as a tactile/visual interface of the inner local map (the plastic character of the Lynch’s mental map), allows the new built form type‘s inhabitants to choose their inner path. This path is the last one segment of a fluxes movement that starts outside within the metropolitan infrastructural networks (green and grey) and converges the hinge points such as virtual attractive meeting points inside the mega-form.

References

Castells, M., (2004), La città delle reti, Venezia: Marsilio.

Contin A., Sbacchi M., (2008) Canicatti, Canicattì: campagne abitate, paesaggi d'arte, Firenze: Alinea Ed.

Contin A., (2016) The narrative structure of the agro-urban metropolitan territory.

The metropolis as Hypertext for the history of the XXI century: A network of middle cities as an operational topography, Berlin: Springer.

Choay F., (1972), L'allégorie du patrimoine, Paris: Seuil.

Choay, F., (2004), Espacements. Figure di spazi urbani nel tempo, Milano: Skirà.

Deleuze, G., (1968), Differenza e Ripetizione (1997), tr. Guglielmi G., Milano: Cortina.

Eco U., (1962), Opera aperta, (2013), Milano: Bompiani.

Eisenman, P., (1963), The Formal Basis of Modern Architecture, Zürich: Lars Müller Publishers.

Febvre L., (1922), La terra e l'evoluzione umana. Introduzione geografica alla storia, (1980) Torino: Einaudi.

Fenton J., (1985), Pamphlet Architecture 11: Hybrid Buildings, Princeton: Princeton Architectural Press.

Focillon H., (1934) Vita delle forme seguito da Elogio della mano, (2002), Piccola Biblioteca Einaudi, Torino.

Frampton, K., (1983), Towards a Critical Regionalism: six points for an architecture of resistance, in The Anti-Aesthetic, Hal Foster ed., Seattle: Bay Press.

Frampton, K. (1999) Megaform as Urban Landscape. 1999 Raoul Wallenberg Lecture. Ann Arbor, MI: The University of Michigan A. Alfred Taubman College of Architecture + Urban Planning.

Frampton, K., (2000,), Seven points for the millennium: an untimely manifesto”, in The Journal of Architecture, (5) 1.

Frampton, K., (2010), Megaform as Urban Landscape, Urbana, IL: University of Illinois School of Architecture.

Gandelsonas M., (1998) From Structure to Subject: the Formation of an Architectural Language, in K. Michael Hays (ed.), The Oppositions Reader: Selected Readings from A Journal for Ideas and Criticism in Architecture 1973-1984, MIT Press, Cambridge Massachusetts – London England.

Gregotti V., (1966), Il Territorio dell’Architettura, Milano: Feltrinelli.

Koolhaas, R. (1995) “Bigness, or the Problem of Large”, S, M, L, XL. New York: The Monacelli Press.

Koolhaas R., (1978) Delirious New York. Un manifesto retroattivo per Manhattan, (2001) Ed. Italiana di Marco Biraghi, Milano: Electa,

Lynch K (1960) The image of the city. Cambridge Massachusetts: MIT Press,

Lynch K., (1980), Managing the Sense of a Region, Cambridge Massachusetts: Mit Press.

Lynch K., (1981), A theory of good city form, MIT press, Cambridge, Ed. Italiana (a cura di) Melai Roberto, Progettare la città. La qualità della forma urbana, (1996), Milano: Etaslibri.

Maslow, A. H., (1943), A Theory of Human Motivation, Originally Published in Psychological Review, 50, 370-396.

McGee T., (2009), The Spatiality of Urbanization: The Policy Challenges of Mega-Urban and Desakota Regions of Southeast Asia, UNU-IAS Working Paper No. 161.

Ortiz Castano P.B., (2014), The art of Shaping the Metropolis, New York: Mc Graw Hill.

Secchi B., (1986), Progetto di suolo, in CASABELLA N.520/521 1986.

Shane G. D., (2005) Recombinant urbanism. Conceptual Modeling in Architecture, Urban Design, and City Theory, West Sussex: Wiley-Academy.

Smithson, R., (1968), A provisional theory of non-sites, in Robert Smithson: The Collected Writings, University of California Press: ed. Jack Flam 1996.

Reeve A., Simmonds R., (2000) 'Hyperreality' in the shire: Bicester Village and the village of Bicester, URBAN DESIGN International 5, 141–154; Oxford: Joint Centre for Urban Design, Oxford Brookes University.

Ricoeur, P. (1961), Civilisation universele et cultures nationales, Seuil, Paris. Cit. in Frampton K., (1983), Towards a Critical Regionalism: Six Points for an Architecture of Resistance, in The Anti-Aesthetic: Essays on Postmodern Culture, edited by Hal Foster, Bay Press, Port Townsen.

Rogers E.N., (1958), Esperienza dell'Architettura, Torino: Einaudi.

Thom, R., (1989) Structural Stability and Morphogenesis, Boston, Massachusetts: Addison Wesley Longman Publishing Co.

Rowe C., (1976), La struttura a telaio di Chicago, in La matematica della villa ideale e altri scritti, (1990) a cura di P. Berdini, Bologna: Zanichelli.

Venturi, R., Scott Brown, D., Izenour, S., (1972), Learning From Las Vegas, (2017), Cambridge Massachusetts: The MIT Press.

Viganò, P., (2012), Il territorio dell'urbanistica, in Lotus, n. 150.

Wall E., (2019), Landscape citizenships. A symposium, University of Greenwich, 16 Nov.

Weber M., (1922), Economia e società, (1980) Milano: ed. Comunità.

Chapter three
Metropolitan methodology

The Metro-dology[40]

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The methodology for the practice of metropolitan discipline

As we describe above, the metropolitan complexity can be analytically broken down into its four dimensions, the physical, social, economic, and governance dimensions. Each of them has a specific goal to reach, but they all contribute to achieving the Metropolis' ultimate goal: sustainability. These dimensions are internally articulated into a series of principles, issues, operators, and operations to address metropolitan dynamics. Together with the goals, these elements build up the Metropolitan General Issues and Principles framework, that is the basis of the Metropolitan Approach to Complexity for bridging the gap between the goal of the metropolitan real constructed city and its virtual model.

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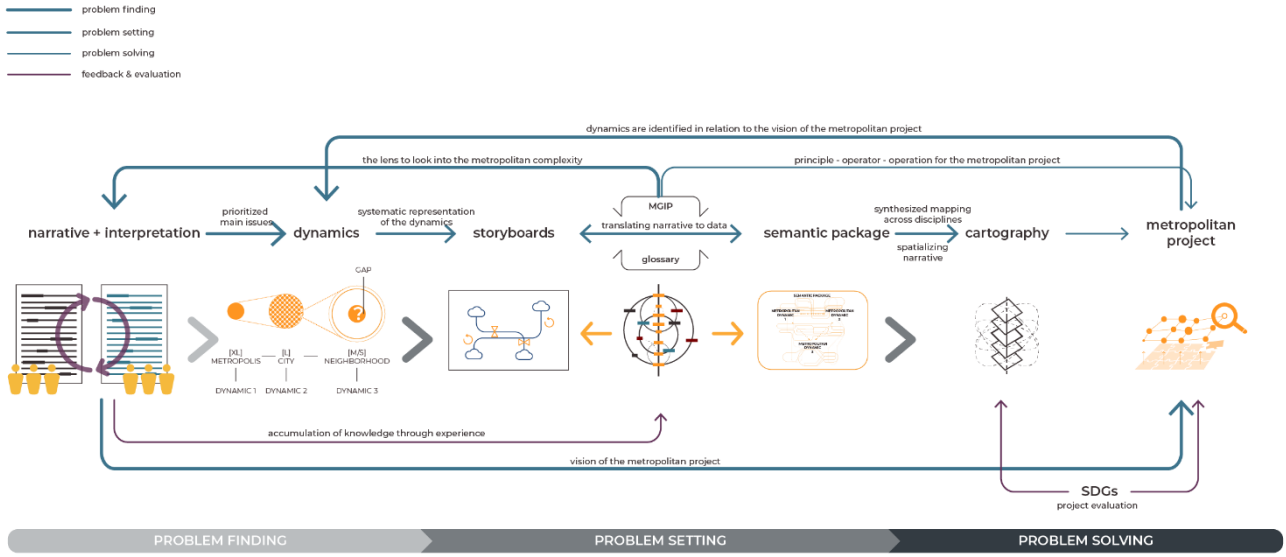
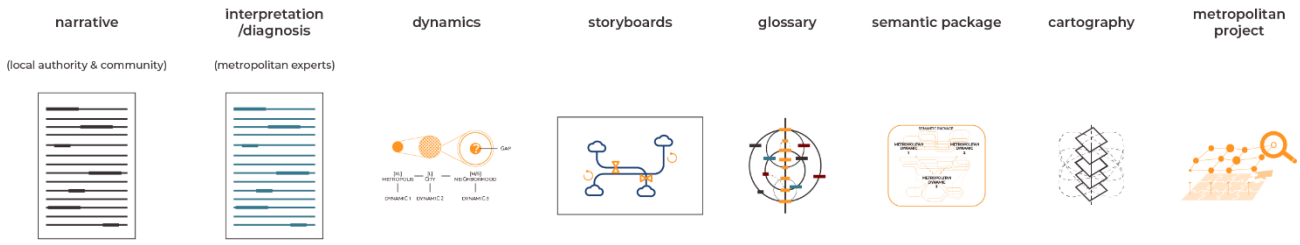
Figure 1. The Metro-dology



In this chapter, we explain how to apply this theoretical framework in actual contexts through Metro-dology, the methodology for the Metropolitan Discipline Practice. Metropolitan Discipline's aim is not only the territory's administration. It also wants to implement a new goal, a new objective of a higher level. Positioning Strategies (Metropolitan Strategic Planning) do not solve problems. They set goals, aims, ambitions, life projects. Metro-dology is a method insert into the practical-theoretical part of the Metro-Discipline specifically for the Practice of the Metropolitan Discipline, is the design process of the Metropolitan Architecture projects. (fig. 1) It is a sequence of phases (Problem Findings, Settings and Solving) implemented with specific tools that support the decision-making process of the physical transformations of a metropolis through the building of a metropolitan narrative.

Figure 2. The Elements of the Metro-dology



The result we want to achieve is a metropolitan narrative, which is not meant to be a linear process, but consists of different phases that relate to each other through a feedback mechanism: Narrative, Interpretation/Diagnosis (Protocol Maps & Metro Matrix), Dynamics, Storyboard, Glossary, Metropolitan acupuncture chart and Metropolitan Project. (fig. 2)

As a synthesis done by the metropolitan expert obtains from the analysis of metropolitan agents' specific literature and knowledge, the metropolitan narrative sets up an intellectual context that is already strategic in the approach. It contradicts the civil servant's role, such as the 'problem solver administrator', and instead introduces the conditions for the collective intelligence production.

The Metro-dology is applied to metropolitan contexts that are a territorial assemblage of rural and urban patterns of settlements, and infrastructural networks merging with the natural elements and the historical traces of places and producing hybrid landscapes that are the new living environment for billions of metropolitan citizens. Building a multi-dimensional and multi-scalar narrative of these

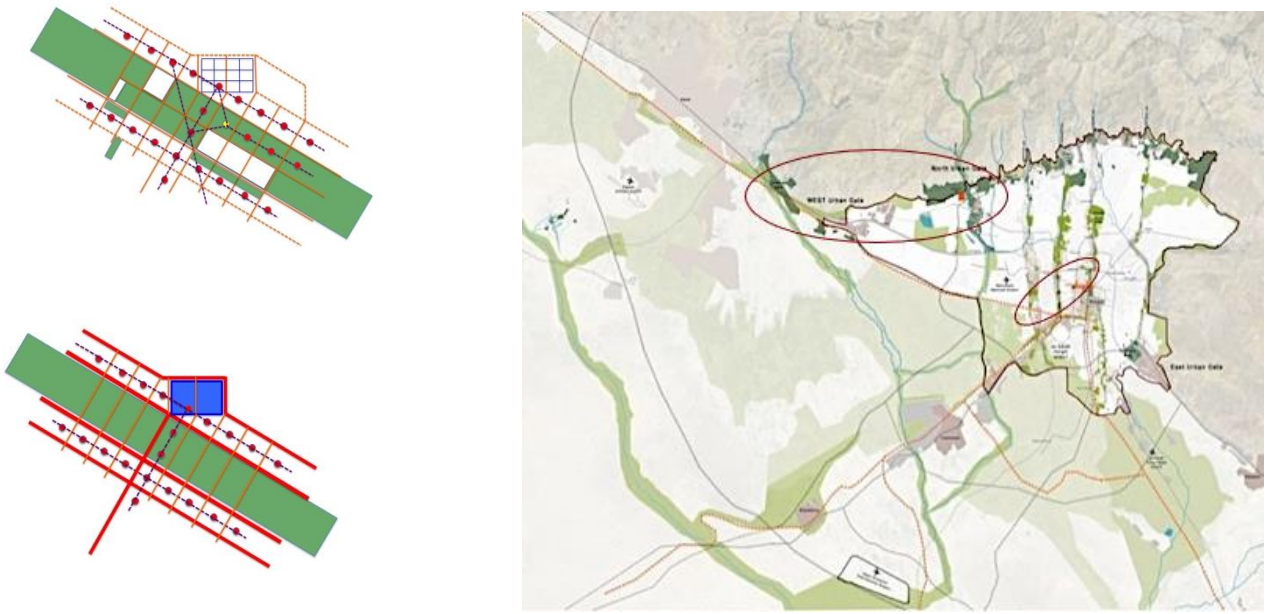
territories is essential for investigating the complexity of a metropolis, thus implementing the Metro-dology.

The narrative of a metropolis

Geography, geometry and memory are the first three components of analysis the Metro-Matrix carries on. The result is a territorial assemblage. It is a multi-dimensional narrative that allows us to investigate territorial, social and ecological complexity. Through the Metro-Matrix, we interpret the geo-historical DNA of the metropolitan context. We can then define the points of geographic support that can allow us to define the metropolitan acupuncture chart where we can generate innovation in a new inventive system through our metropolitan architecture projects. The strategic "metropolitan acupuncture" approach selects action-oriented priorities on metropolitan investments, both tangible and intangible, and reinforce discussion, the debate of quality of dwelling, governance, participation and integration. The completion of the Problem Setting phase is the production of the Maps of Dynamics, which are the synthesis done by the Metropolitan Expert, of the experts' perspectives.

The Maps of Dynamics within the Metro-Matrix diagram allow producing a geographic-based diagram that lets to identify the correct location for the priority metropolitan projects. That choice is due to identifying geographical and historical position values strategic for the metropolitan relations activation. The Acupuncture Chart is the analysis of the underlying, hidden structure of the Metropolis. The DNA: that is the outcome of the strategic and structural plan combination. The Strategic Plan is the Metropolis' 'objective in life' (What do you want to be) and the Structural Plan is 'what you have to do, in physical terms, to achieve that goal'. The Acupuncture Chart is the Structural Plan instrument to put the necessary things (that fulfil your Strategic Plan objectives) in the right place.

Figure 3. Teheran (Iran): Metro -Matrix Diagram; Scheme and Analogical Metropolitan Acupuncture Chart

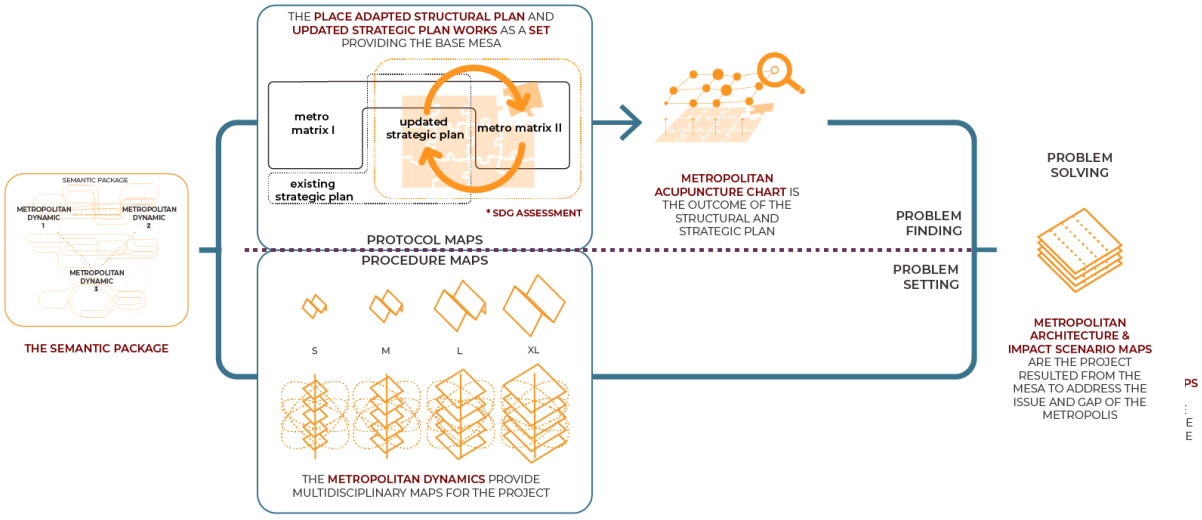


Source: www.pedrobortiz.com.

The selected areas and the themes of metropolitan architecture are: The central area. This area and its historical axis, have a bypass with the diagonal metropolitan south-west axis of the dismissed Ghale -e-Morghi airport; The northern area with its critical aspects within the nature/culture relations, which looks as compromised by the recent urban development filling the gap between the flat land and the mountains and even sprawling on the sloping topography; The area of the old airport, Ghale –e-Morghi, that is the real infrastructural hinge point of the metropolitan area that connects the metropolitan axis, the urban and the historical one from which the penetration into the territorial regional starts.

The project of the physical space activates the inventive system in the metropolitan context. The Metropolitan Cartography is the tool that unifies the Physical (Structural) approach to the process. (fig. 4)

Figure 4. The Zoom-in in the Metropolitan Cartography: Protocol Maps & Procedure Maps

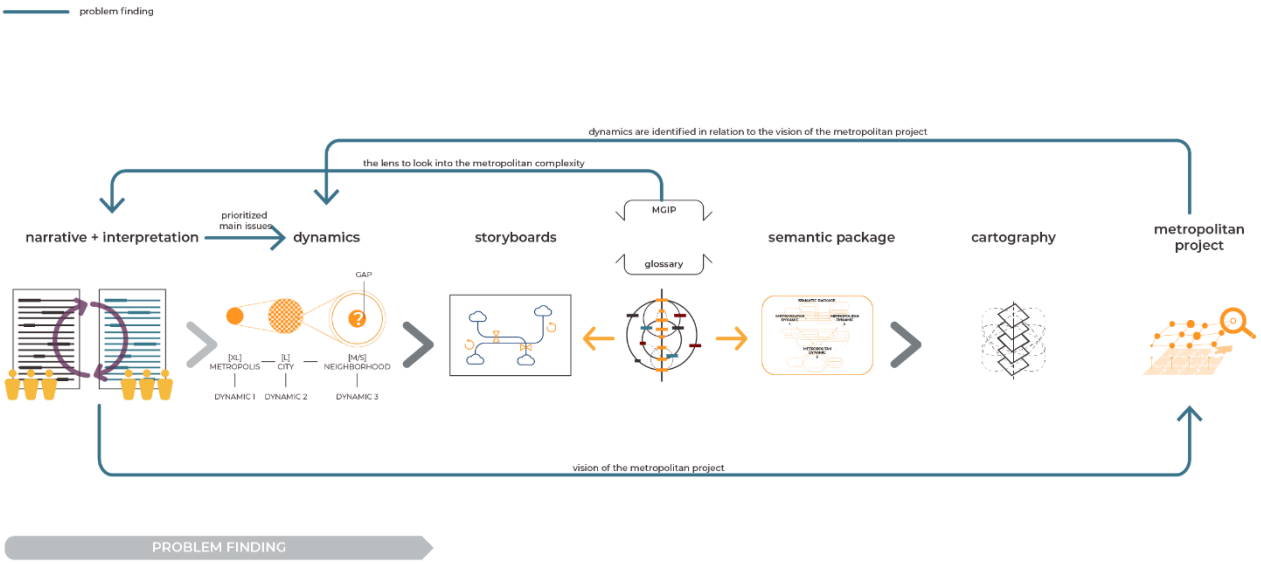


Regarding the Higher Education Institutions, the primary role is to connect the school's knowledge and the knowledge of the global and local essential conditions of the metropolitan region under examination. The question is how to regulate the two types of knowledge. Following the definition of a stakeholder's map, through a workshop dedicated to this phase, we first set up a comparison between a pool of experiences of the different actors of the metropolitan city (Issues) and a reference to principles of general sustainability (Principles) expressed through words and key concepts (TELLme Metropolitan Glossary). It is necessary to test the technique to verify the hypothesis of metropolitan dynamics, which are previously arranged using a set of open-source maps (Metropolitan Cartography/ Procedural maps). We propose maps that spatially highlight the data that are the premises for orienting metropolitan planning that starts from a hypothesis of explosive growth (the main issue), but that also presents the idea of a possible "social work" between communities, public and private institutions. That is the difficulty: How to represent in maps things that are not physical: economic flows, social values, and institutional procedures.

Problem-finding. TELLme lab. Phase 0. The inception workshop

Problem or Fact-finding is the first phase of the Metro-dology. It starts with the narrative of Internal Expert or Local Stakeholders, namely local decision-makers of a metropolis. They describe the problems, needs, and expectations of their Metropolis and the tools available to address them. Metropolitan experts, who are External Experts, analyse in a constant dialogue with local authorities this storytelling and have an insight into the problems of the Metropolis and the processes that may produce them.

Figure 5. Metro-dology: Problem Finding Phase



The TELLme Lab. Phase 0 starts with the Inception Workshop dedicated to the Metropolitan Decision Makers.

1. Participants: Decision Makers (Local stakeholders) and External Experts.
2. Tools: Protocol Maps and MGIP Software Glossary.
3. Outputs:
   a) Stakeholders Map.
   b) Comparison between TELLme Team ‘s literature analysis ‘results and real dynamics of metropolitan process.
   c) Dynamics of the Metropolitan Processes definition.
   d) Strategic Plan describing the projects, physical and non-physical, the Metropolis needs to define the local long-term goals in the global context.
   e) Civil Servants needed training according to the Issues and Gaps identifications (through outputs; inputs and outcomes).
   f) Maps of Dynamics of Metropolitan Processes produced by the TELLme Team.

The narrative interpretation process starts with the **Stakeholders map creation** organised through a matrix calculation on the questionnaire distributed among the **Decision Makers**. Participants are selected among the representatives of:

Economic resources answering the question: What economic resources can support a change in the short and long term?

Structural resources answering the question: What are the rules of the form of the metropolis? (Official of the most relevant sectors for metropolitan planning)

Professional resources: answering the question about the new competences and soft skills to carry out the metropolitan project?

Know-How Resources: answering the question about water treatment, renewable energies, sustainable construction, metropolitan planning (public and private)

Legal Resources: answering the question: which Licenses/Authorisations (the link between formal and informal); which legal frameworks implement a social innovation project?

Civil society resources: answering the question: Which city do the citizens have in mind for which society?

Before the inception workshop

The TELLme team sends a questionnaire to the identified Decision Makers. From the questionnaires, Stakeholders Map is defined. A map of issues is then drawn, and gaps of knowledge are identified and discussed at the tables. The Team could ask the questions related to their process and results indicators considering background the dynamics of metropolitan processes identified from the narrative's syntheses the TELLme team extracted from the literature. Then, the Team presents their analysis results to see if the real dynamics rooted in the territory come to light.

Negotiation tables' construction

Negotiation Phase 1. The articulation methodology between actors consists of questions asking each agent who are the other most important stakeholders to have a dialogue since they can be considered strategic for reaching their sector competence' sustainable-base goal. Each actor will give a list of preferences marking from 1 to 5. The location of these values in a matrix will immediately give the interrelated interest groups, and these will form the inception workshop groups. These groups will have to negotiate their positions in exchange for those who need dialogue.

Negotiation Phase 2. As the actors will be in more than one group, these actors will have to change groups in the next phase of the workshop (secondary priorities). They will come in this second phase with agreements adopted in the first. The agreements of this second phase should not contradict or invalidate those of the first phase. If the second meeting results invalidate the first phase, the actors must assess the cost of this contradiction to their interests.

Negotiation Phase 3. The same for a third phase. Once the negotiations of this cycle have been developed, some will have to return to the former to notify them or renegotiate the previous phases' agreements.

Once the stakeholders' tables are defined, the fundamental questions for all Local Stakeholders (Internal Experts) and External Experts are how to structure the metropolitan region's basic knowledge affected by a radical global transformation from the narrative of local metropolitan issues. To answer this first question, a set of Protocol Maps, the axiology of values, as principles that can ethically guide the decision making on metropolitan projects, must be produced by the TELLme Team before the Inception Workshop. These are the same for every Metropolis. They show the continuity of the green and grey infrastructures. They are essential for detecting metropolitan areas and regions' underlying structure and understanding its agencies and parts' relationship through the Metro-Matrix definition (Ortiz,2014). The Metro-Matrix will be one of the results of the TELLme Lab.

Using a set of Protocol Maps helps all the participants in the working groups understand the premises and ask their particular question by applying the General Principles of the Metropolitan Discipline concerning their own culture and professions. That will figure out the Metropolis' Issues. The General Principles and Issues of the Metropolitan Discipline can be implemented considering the local situation and context shown through the maps. That determines the phenotype of the actual Metropolis. In fact, on many occasions, specific interpretations of metropolitan transformations, which we have envisaged before, are possible. It is challenging to prove that an understanding is adequate, unique, and necessary, for example, a priority for city's common and public good (Ortiz, 2014: chapter 8 of the Art of Shaping the Metropolis).

We read the Metro-Matrix as an infrastructural connection. Where different infrastructures meet and intertwine, new centralities are born, giving life to a dynamisation of the territory "in-between". It is a matter that all this must be negotiated concerning the sustainability principles. The metropolitan area's infrastructure will be implemented through the connection between the airport, train station, and metro while answering how to pass commuting to public transport.

The Metro-Matrix Metropolitan Acupuncture Chart presents:

1. a supra-municipal vision in a supra-regional, non-topographical sense (not following the water basin). It starts from the airport as a hub expression of equivalent temporal proximity. This fact is a sign of the vitality of the modern city that must defeat a reality of peripheralisation represented by the different time of the cities in the region;
2. an answer to the question of how to overcome a topographical vision in urban planning;
3. it deals with the problem of decentralisation: how people move around the territory to qualify their lives;
4. it deals with the territorial dimension of the Metropolis to save the suburbs by "getting out of the suburbs";
5. it deals with the ecological structure of the settlement.

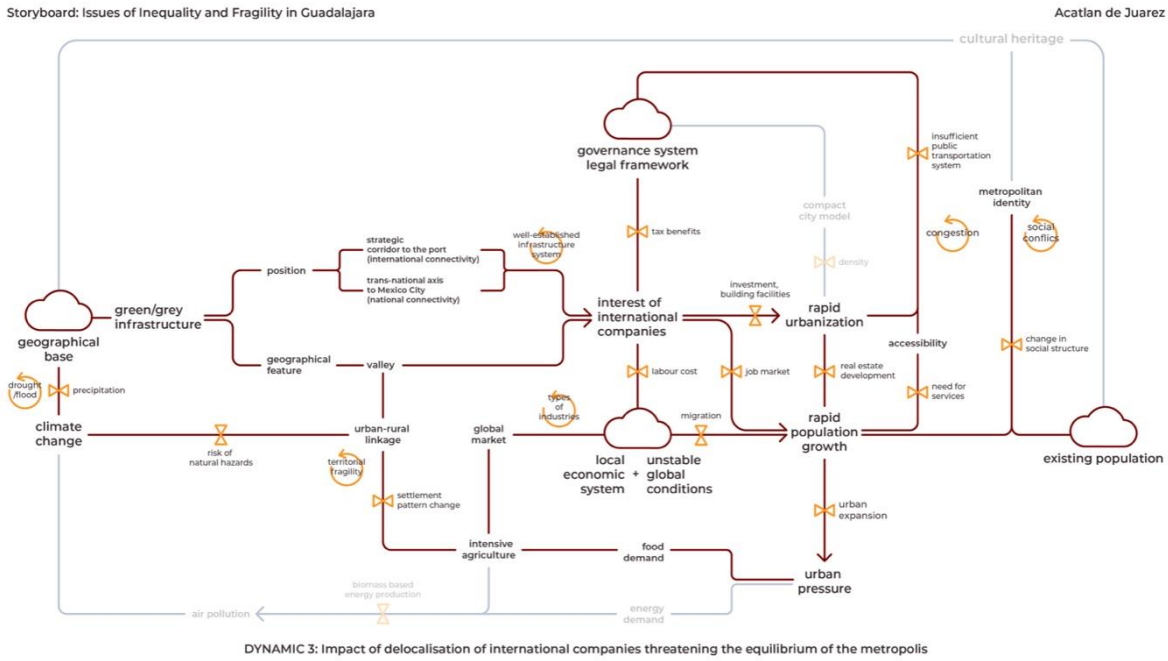
It must play through cities and their airports to build an integrated polycentric metropolitan area. The theme is how to carry out the mother-city decentralisation through a relationship between airport, railway and metro. The mother-city develops itself into a multiplicity of centres, each playing a predominant role (specialisation) and keeping an intrinsic balance of the required elements to make an urban unit (city) enjoyable equitable and efficient. That is the Metropolitan Digit definition and need in order to decentralise and to make the territory grow. In the region, the airport aerostation, unlike the train station, centred inside the urban fabric, structures the territories since it is positioned as the hub of a vast area, which will become for this fact, metropolitan. Nevertheless, the answer is to strengthen the centralities in the metropolitan region and, in the local area, to study the relationship: historic centre, growth and peripherality. The metropolitan region's value does not lie in the centre of the metropolitan digit, but its possible opening towards the peripheries so that they leap in scale and quality of life.

Storyboard & semantic packages

Once the local experts communicate their problem (the gap, so that a lack of specific knowledge), the External Experts lead the dynamics that generate it: the reduced complexity as a series of phenomena related to particular topics (problems). Metropolitan Dynamics Map represents the interplay among phenomena explaining the processes generating an issue and the reality gap. These are related to specific issues, (Ortiz,2018) therefore, have limited factors to consider compared to the real complexity. However, the relations network reconstruction allows the restoration of each part's meaning within the system. Once the narratives data have been collected, the metropolitan experts describe the dynamics through a synthesis scheme called **Storyboard** (fig. 6), an interpretation of the cause of the issue that emerged during the Inception Workshop. The

storyboard represents the big picture of a given metropolis' issues and the dynamics that produce them. Through the MGPI Software Glossary of metropolitan keywords and related concepts used in describing the dynamics, the storyboard is connected to the semantic package.

Figure 6. An Example of a Storyboard (Guadalajara, Mexico)

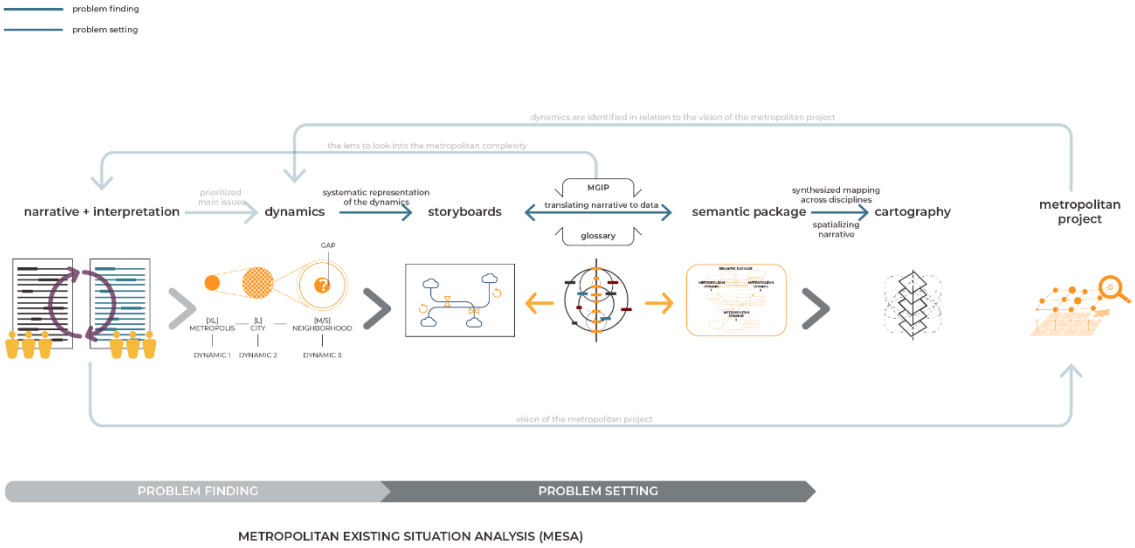


The issue is a set of problems and factors that emerge from the Inception Workshop conducted with the Decision Makers. Narrations are the basis on which the metropolitan experts, through a deep intuition, can give a name to the metro dynamic; the name of a dynamic, which can be presented at different scales, expressed through a sentence, re-elaborates and links the narratives to the fundamental concepts (keywords) contained in the Glossary.

Through a pattern of causes and effects (feedback loop), the storyboard relates pre-conditions in the four dimensions, and rate of exchange produced by the new relations that the metropolitan dynamics foster. We may say the storyboard simplifies the system's complexity and serves to select the system elements to investigate the relationships between them because of a metropolitan dynamic.

Problem setting and the TELLme training lab. Phase 1

Figure 7. Problem Setting



The TELLme Lab. Phase 1 is dedicated to the Metropolitan Civil Servants and other Local Stakeholders who are used to manage the Metropolitan Projects.

1. Participants: Civil Servants, NGOs officials, Professionals (Local stakeholders) and External Experts.
2. Tools: Storyboard, Maps of Dynamics and MGIP Software Glossary.
3. Outputs:
   a) Dynamics of the Metropolitan Processes comprehension through the Maps of Dynamic.
   b) Metro-Matrix and Metropolitan Acupuncture Chart.
   c) Structural Plan locating the projects, physical and non-physical of the Metropolis.
   d) Cross-cutting sectors approach to work “out of the box”.

Meta-Projects proposal produced by the TELLme Team.

The metropolitan city and its dynamics are the subjects of the problem setting. The Civil Servants and other local actors selected since their actual involvement in managing a metropolitan area have been aware of the political choice regarding a metropolitan transformation. They must report verbally on the Issues (goals, challenges, strengths and weaknesses, gaps and tools used) that affect the city’s expectations due to their management’s limits. The other fundamental component in the problem setting phase is a corresponding objective and uncritical attitude on the External Expert’s part towards the subject’s production. The metropolitan experts’ function is to listen without prejudice and tendentiousness, without introducing any predetermined concept on the origin or meaning of the metropolitan phenomena being investigated; their only interest is to help the local actors analyse and understand the metropolitan dynamics of their city. This part of the technique needs to eliminate any additional cause of ambiguity in communication.

That narrative’s objective is to create a complex of observation plane conditions in which data provided exclusively by the local subject are integrated with spatialised data presented through

open-source maps. Therefore, all the data are initially observation data, analysed by the metropolitan External Expert through the general Principles agreed upon based on the Metropolitan Genome and sustainability.

However, there are contamination factors that introduce dynamic mutations in this analytical situation. These “incidents” can provide essential data that bring new knowledge and developments. We started from the definition of Genome (Ortiz,2018), but real life, the Phenome, provides the contaminants in the field of observation. The metropolitan city’s actual events, dynamics, and contexts introduce dynamic mutations in the previous (more ideal) analytical situation. Still, the observer’s detached attitude must also be preserved towards them.

Once the observation data have been collected, then, through the dialogue conducted in working tables, the process of correlation and interpretation takes place, taking into account the coherence of the hypotheses, the repetitive patterns (types) of sequences of relationships, the ability to predict certain phenomena, based on the knowledge of specific patterns of relationships derived from the Genome. The result of Problem Setting phase is the verification of the Inception Workshop ‘s hypothesis on the metropolitan dynamics.

Through the Metropolitan Cartography the Metro-Matrix identifies the metropolitan project themes and its development hypotheses. It allows a geometric interpretation of a metropolis; it is an abstract model related to the sustainability of a territory translated into actual contexts through maps that represent the lines of force of a territory. The Metro-Matrix diagram sets the Structural Plan for the location of the metropolitan physical projects. Its result is the Metropolitan Acupuncture chart

Today we recognise that the urban elements having an active part in urban phenomena changed due to the new urbanisation process and following the city's subsequent enormous spatial and temporal measures. We have to admit that the city structure, its physical and temporal relations with the citizens, is altered due to its scale; the temporality of people and citizens is particularly changed. The Metropolitan Acupuncture Chart is a map that arranges the different Metropolitan Architecture projects' possible locations by considering the structure of the Metropolis and the needed projects stemming from the Metro-Matrix tool, the spatialisation of the metropolitan dynamics and the local values.

When the Metro-Matrix is complete (like a truss) immediately, the important links that are missing appear, in particular, we refer to the first metropolitan strategical and structural plan define in Madrid in 1995. The Metro-Matrix allows a more detailed description and Analyses and Proposals. Following a Chess analogy, it provides links and examples of projects made in Madrid as a result of this methodological approach (Fig.8).

Figure 8. Detection and Selection of Priority Projects in a Metropolis

1)Integrated Framework: Chess board
- ***a) Prospective Analysis***: Set up the Metro-Matrix truss with urban nuclei and strength lines,
- ***b) Policy***: Detect existing and missing links.
- ***c) IE:*** Madrid Analogical, Diagrammatic, Schematic

2)Public Transport: Chess tactics
- ***a) Prospective Analysis:*** Locate the important urban nuclei with potential rail linkage.
- ***b) Policy:*** Develop existing rail service, unused rail infrastructure, and expandable one.
- ***c) IE:*** Madrid rail extension to Toledo and Guadalajara

3) Road Transport: Chess tactics
- ***a) Prospective Analysis:*** Locate where the road system is in collapse.
- ***b) Policy:*** Add and the bars needed in the truss to make it flow evenly.
- ***c) IE:*** Madrid M-45 breaking metropolitan monocentric structure into a polycentric reticular one.

4) Environment: Chess strategy
- ***a) Prospective Analysis:*** Locate the links missing in the environmental network
- ***b) Policy:*** Complete the links to make of the environment system a continuous network.
- ***c) IE:*** The Guadarrama, Jarama and Henares river protections, up to Sierra, down to Tagus

5) Housing: Chess Pawns
- ***a) Prospective Analysis:*** Calculate housing land needs for the next 30 years
- ***b) Policy:*** Develop housing land within train stations walk/cycle range (urban centralities)
- ***c) IE:*** Arpegio 200.000 dwellings land in urban units

6) Industrial Productive Activities: *Chess Bishops*
- ***a) Prospective Analysis: L****ocation avoiding urban fabric with nat./international accessibility.
- ***b) Policy:*** Industrial developments along nat./international Metro-Matrix thoroughfares
- ***c) IE:*** Arroyo Culebro across Getafe, Pinto, Leganes, Fuenlabrada, Mostoles and Alcorcon.

7) Tertiary Productive Activities: Chess Rooks
- ***a) Prospective Analysis:*** Where do productive activities and train intersect
- ***b) Policy:*** Tertiary Centralities linked to the Airports to promote airborne global positioning
- ***c) IE:*** Getafe and Torrejón freight airports

8) International Positioning: Chess Queen
- ***a) Prospective Analysis:*** Airport expansion potential: Runaways expansion land protection.
- ***b) Policy:*** Airport expansion reserve, or new airport location.
- ***c) IE:*** Barajas expansion and Campo Real relocation

9) Diachronic Variable Geometry: Chess strategy in time (4th Dimension)
- ***a) Prospective Analysis:*** Conflicts on development evolution.
- ***b) Policy:*** Prioritize projects that are compatible in time within forecasted integrative evolution
- ***c) IE:*** Metro to Arganda, and then Campo Real Euro-American airport

Source: www.pedrobortiz.com.

The Meta-Project proposal is the result of that phase.

Problem solving. TELLme training lab. Phase 2

The TELLme Lab. Phase 2 is dedicated to the Metropolitan Civil Servants and other Local Stakeholders and aims defining the Metropolitan Architecture Projects Action Plan. It uses the Balanced Scorecards Methodology applied to the Metropolitan Participation Process.

- Participants: Civil Servants, NGOs officials, Professionals (Local stakeholders) and External Experts.
- Tools: Metropolitan Acupuncture Chart, Maps of Dynamics, Meta-Project proposal and Balanced Scorecards Methodology[41].

Outputs:

a) Selection and location of the Priority Metropolitan Architecture Projects (through the Metropolitan Acupuncture Chart).

41 See the chapter: The six steps on a path towards agreement, between subjects with potentially divergent interests and objectives, by Gianluigi Contin and Guglielmo Mormina.

b) Metropolitan Architecture Project Key Actions.

c) Action Plan definition for a project contract competition.

Every city needs a tool to help politicians and administrators defining objectives based on SDGs at the global and local scale and their impact indicators to make decisions on the metropolitan scale. The traditional Active Managerial Approach takes the planning agents to see what the city looks like today. They collect information, analyse it, understand it, decide and finally do it. It is an approach that is equivalent to a guide who only looks through the rear-view mirror because everything they analyse has already passed.

The storyboard's result produces the meta-projects proposal done by the TELLme Team. That will solve the metropolitan issues and leap ahead of the Metropolis into a collective project (Strategic Collective Intelligence). The role of the Metropolitan Meta-Project is the definition of the metropolitan form rule for public policies. The public authority position will be the definition of an Action Plan for a project contract competition.

Once these meta-projects are established, the Metropolitan Experts must advise the Civil Servants to convert them into a physical proposal once they reach the Metropolitan Decision Makers 'consensus. The Metropolitan Approach to Complexity proposes a new design thinking approach, where the designers produce innovation and do not know in advance if their product will be successful. It is a new phase to take a decision on the meta-project assumption, and its constituted by a participatory action through the analysis of the potential field of activity, the vision: what it is possible to do; the local action project: to do it; the innovative proposal: the decision; the errors analysis: what we have learned; finally, the balance and adjustment of the errors: the budget of mistakes. Our goal is to improve something or invent something that changes the rules.

Consequently, we have changed our assumptions. Usually, an only efficiency approach deals with Rationality, Objectivity and Measurement. Instead, our Design approach is also related to the subjective experience that allows us to be proactive as reflexive individuals (Giddens, 1991) to build a new reality. We are aware that our Design Approach insertion in the Metropolitan Methodology could be tricky. Design Thinker doesn't know all the strategic variables and items of the Genome involved in the outcome of the project's proposal out of the storyboard and the Metro-Matrix integrative process. Their proactive subjectivity can have disastrous secondary effects that they are not aware of. However, Design Approach inclusion is due to the necessity to a much deeper form of immanence and renunciation of control over a definitive form. It is related to a Metropolitan Architecture Project where appropriation is negotiated collectively and will occur at the moment of fruition also, rather than in the design moment only. That means the final project proposal cannot be a simple masterplan, but a meta-project. The need is to internalise the project with a different vocabulary that includes effects not only intentions. We seem to identify this space in the metropolitan transitional territories (McGee, 2014) and their design.

To produce metropolitan projects, then, according to our Principles and the values linked (TELLme Project MGIP) to a sustainable project, we have to define what kind of crucial processes must be produced in how long and short time. Working within the different metropolitan agents will allow defining the Metropolitan Architecture Project Key Actions. We can describe that moment as "to Know-How" needed to manage other operations: water purification, renewable energy, sustainable construction, metropolitan planning. Exploring how the different sectors can collaborate is essential. For example, what economic sector can support the desired change in the long and short term; which rules of form the structural sector can provide; which key processes; roles, resources and needs we demand and who can give them.

It is fundamental also to recognize the professional who can support the project with new soft skills, too; which licenses/authorisations (between formal and informal) and legal frameworks we have to know; to identify the civil society agents; the key partners (to find the resources). During the

negotiation among the Metropolitan Agents, if there are dystonic result indicators or missing resources, the discussion among the metropolitan agents at the tables defines how to feel the gaps.

The selection of sustainable projects that better represent the city biography's expectation and Action Plan definition is the final step of the Metro-dology. The Public Authority can launch the development plan for the authorisation studies and the Metropolitan Architecture project's detail. The competition-contract phase will then follow the study phase; the sustainability study related to ecosystem services analysis; feasibility; competitiveness; and the economic support search. That phase can be decided by a Community Foundation (a legal entity that can comprehend the different metropolitan agents within the public authority). It can be managed by a private entity. The Community Foundation can start the development contract assembly involving the private agency that will begin the inspections; the authorisations; the negotiations and partnerships. Lastly, the Metropolitan Architecture Project final investment decision can be taken.

Our proposal aims to relay on the urgency to continue to offer a substantial critique and an intellectual contribution to the arrogance and finitude of the operative and interpretative dimension of the design. We deal with a less intense and functionalist, but not superficial and straightforward approach, addressing, without overdetermining uses, functions and subjectivities. We propose a substantial critique to pragmatism and functionalism as methods for producing Metropolitan Architecture Projects as idealised, autonomous objects that reproduce a determined function. The Metro-dology is indeed used as a key to understanding and as central intellectual scaffolding. We insert very central strength in our work and the needed change in urbanism and architecture disciplines and an incursion in the architectural and design new explorations.

Technical note to consider the metropolitan context as a method. Framing the activities of the stakeholders to help achieve shared concerns about spatial changes

The TELLme Lab. second phase starts with our participatory plan methodology towards some questions of research:

How can we provide a physical base for the new communities that allows smooth integration with the hosting communities?

Which areas of the cities are suitable, which land would be available, how to connect new settlements, how to formalise already existing pockets of informal settlements? What are the main challenges or opportunities in remediating the impact on the existing society and land caused by the expansion of informal settlements?

How can environmental risk be reduced (caused by informal or spontaneous settlements)?

What are the main challenges new communities face for economic inclusion or when starting and scaling enterprises in host communities?

What are the main opportunities for hosting communities when faced with a large influx of people, especially in a crisis?

What are the main social challenges felt by the local and migrant communities and hinder integration and social cohesion?

What are specific challenges faced by women, youth and the most vulnerable of both?

Academy research analysis as TELLme lab.'s tools provision

To frame the TELLme Lab. second phase, we would like to go deep into some needed. Technicalities. First, some note regarding the Academy analysis needed towards the TELLme Lab. entire process.

Through the TELLme Phases, we want to co-produce the local metropolitan agents' technical expertise to merge the Metropolitan Architecture Project with the metropolitan inter-scalar planning. We based our training on open-source mapping, bringing a sustainable perspective and aligning it with regional responses, national policies, local development visions, and other regarded frameworks.

During the TELLme Lab. second phase final group work sessions, the Local Teams must develop concrete action plans to implement the selected projects and define appropriate tools (such as guidelines, spatial planning standards and physical planning regulations) needed for their concrete implementation. The TELLme Lab aims to train the Metropolitan Agents to use metropolitan planning and projects to reduce spatial (and social) inequalities and local economic development. To obtain that goal is mandatory to raise awareness of planned city extensions applying metropolitan integrated urban and territorial planning approaches facing real estate speculation through participatory mapping and planning of metropolitan contexts to increase social cohesion. The expected outcome is though the Metropolitan Acupuncture Chart linked to the Structural Plan.

Our first act of research before the Inception Workshop is a Metropolitan Region Profile through the Protocol Maps. Metropolitan Cartography protocol maps can also provide information on:

- Ecosystem services assessment and improvement as metropolitan supporting infrastructure;
- Natural resources preservation and development of sustainable consumption patterns for reducing climate change impacts.

That can suggest us as a total output the Stakeholders map for an inclusive governance structure for all-encompassing cities and establishing a cohesive governance structure—integrating the most vulnerable into society.

Then, producing the set of Maps of Dynamics, we can study the urban part of Metropolitan Areas (including territorial perspective) to better understand their main Issues. We analyse the spatial distribution of services and then prioritise actions; including identifying gaps in housing, infrastructure and services, and developing incremental upgrading strategies.

In a dialogue with the local authorities, which help to define priorities and provide additional expertise on opportunities and challenges of local situations, tangible and sustainable metropolitan projects for improving the life of local communities will be designated for specific locations and based on the particular local (social, economic and environmental) context. That for promoting long-term strategies on land value capitalisation, revenue and investment strategies, including market space development and assessment of economic development potential.

The output is the selection of Priority Metropolitan Architecture Projects. Finally, specific areas will be chosen for the implementation of any particular action.

Survey identifying the stakeholders' role and issues for the TELLme lab. Phase 2

Organizing the second phase, the TELLme Team will send to the stakeholders a straightforward questionnaire on the two dynamics identified and their effects on the selected territories. The question will be related to four outputs produced by their action (What are you for?); and four inputs (map of technical, relational, management, know-how, licenses, hardware or resources) needed to transform their outputs in outcomes.

From the questionnaires, a map is drawn of issues that refer to the inconsistencies that we will verify between our stakeholders' objectives. When we find an inconsistency between those themes, we will build the workshop's tables on the first day. We could ask the questions related to the outputs and inputs in the background of the dynamics we identified.

Once the tables have been set up in the light of the inconsistencies between the results identified by the different stakeholders, the discussion will have to be managed based on the two identified dynamics, their effects on the different metropolitan landscapes shown through the maps, the

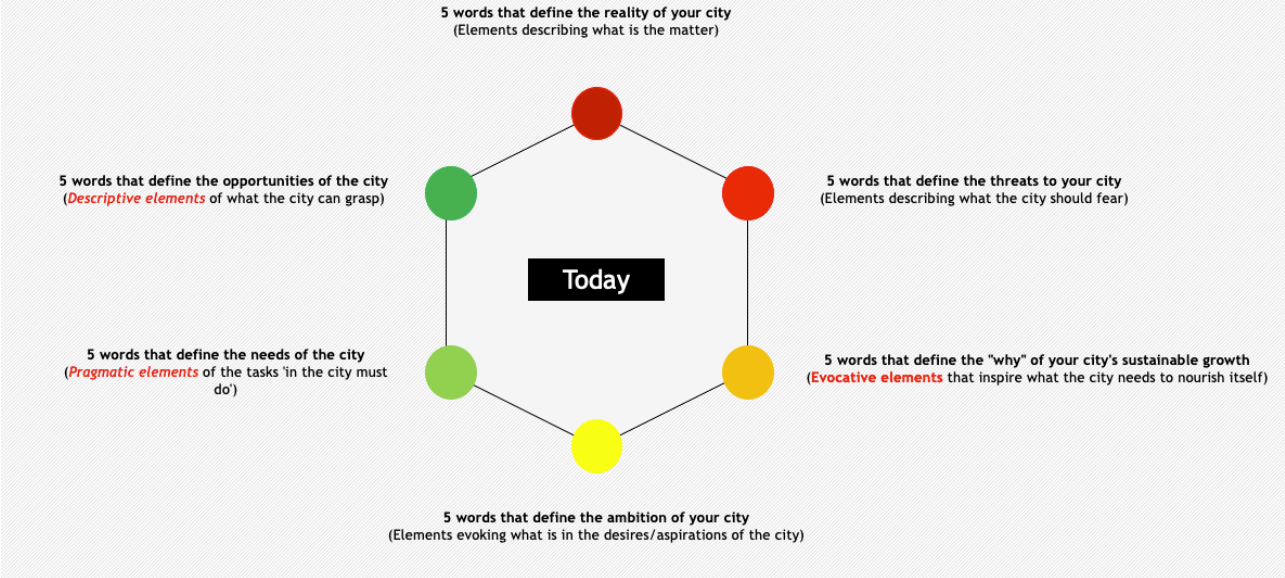
discussion on the fundamental processes that could solve the gaps in the city, and the definition of the metropolitan projects through a discussion on the Metro-Matrix.

The Post-It Wall Day

The Post-it day is dedicated to the Metropolitan of Today vision. We will facilitate a dialogue among the metropolitan agents asking question-related to descriptive elements, pragmatic elements and evocative elements. The aim is to envision the stakeholders' perception regarding their metropolis conditions.

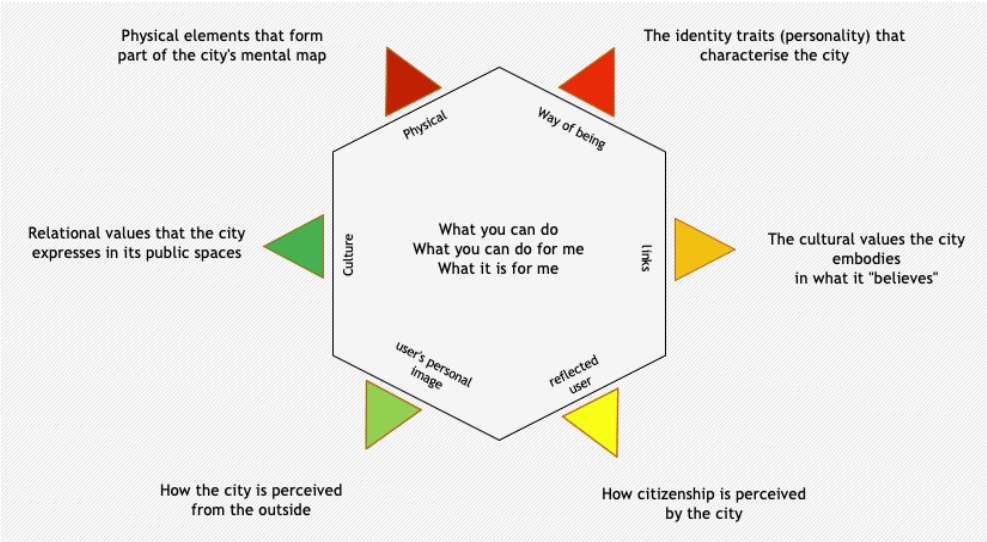
The second day of the workshop is dedicated to build the identity of the metropolitan city:

Figure 9. Post-it day



Source: Contin, Ortiz and Kim (2021).

Figure 10. Building the identity of the metropolitan city



Source: Contin, Ortiz and Kim (2021).

Then, we will open up a debate to define the action plan that will inform the Priority Metropolitan Architecture Projects analysis. Seven are the questions that will stimulate the debate:

1. Why: all in a minute, you say "a good reason to come to your metropolitan city".
2. What are the obstacles to planning a metropolitan city that need to be removed or avoided?
3. What solutions are proposed to eliminate or avoid them?
4. Why these solutions and not others (data, experiences, good practice cases)?
5. What the city expects of you.
6. The First Steps to Take Immediately: Key Processes and Priority Projects.
7. The Action Plan of the Metropolitan Architecture Project implementation will be the result. It will be possible for the Public Agents to start the Contract Plan process preliminary inquiry.

References

Giddens A (1991) Modernity and self-identity: Self and society in the late-modern age, Cambridge, Polity Press.

Ortiz, P., (2018), The Metropolitan Genoma, /www.pedrobortiz.com/.

Ortiz, P., (2014), The Art of Shaping the metrópolis, New York: McGraw-Hill.

The six steps on a path towards agreement, between subjects with potentially divergent interests and objectives[42]

Gianluigi Contin
VVA and VVA Business Consulting

Guglielmo Mormina
Brand Strategist

Is it possible to obtain truly shared decisions, that is, that lead to truly common actions, by different stakeholders with divergent goals, culture, values and mindsets?

We believe so, provided that (without prejudice to good faith) this people share a cultural process designed to highlight what they have in common, and not what divides them. The underlying logic is certainly not new, because it is the same commonly used by professional negotiators all over the world: the orientation to create a systematic "bridge" so that the counterpart reflects on the fact that obtaining a common result will certainly be a success, if compared to the worst alternative to the result itself, and not to an ideal alternative. The "bridge" that connects the counterparties to the "best achievable result" is our framework of reference; it is no coincidence that the leader of one of the most long-lived and successful organizations in the world calls himself the "bridge builder", the Pope.

What we are going to build on this bridge is not a usual practice, because we adapt reasoning and decision tools typical of the marketing world, to the need to obtain shared decisions and sincere interest in a common outcome, as a decisive step towards the construction of virtuous paths for the common welfare.

To illustrate the methodological path, let's start by exploring the topic of the Brand building, that is, of everything that summarizes the identity, character, personality of anyone, even those who therefore sit at a working and negotiating table.

Talking about brands without taking into account the perceptive mechanisms is objectively illusory and dangerously misleading. In the field of communication, the information that we generally believe to be reliable is that which we obtain directly from our senses. The absolute certainty is that we are

42 To cite this article: Contin, G. and Mormina, G. (2021). The six steps on a path towards agreement, between subjects with potentially divergent interests and objectives. In: Contin, A., Giordano, P. and Nacke, M. (eds.). (2021). Training for education, learning and leadership towards a new metropolitan discipline. Inaugural book. Buenos Aires: CIPPEC.

convinced that we have a “direct line” with information thanks to our senses: what our senses transmit to us are perceptive certainties, on which we base our first "simple" decisions.

These "simple" decisions become the basis of the whole system of "complex" downstream decisions. Why sometimes the information that we believe to be reliable and on which we make decisions, turns out to be erroneous and misleading? Because our perceptive software has its own precise constructive logic, it is based on “active processing”, not on “passive recording”; in other words, it does not passively "record" the information, but processes it, interprets it, personalizes it with respect to its own filter of experience, memory and prejudice.

We start from this statement. In Communication it makes no sense to start from the "information", and from the way in which to transmit it, the only sensible possibility is to start from the "response" we want to get, trying to understand what is the most effective stimulus in provoking it, avoiding any possible perceptual distortion.

So, the first decision to make is this: what answer do we want to get from our communication? In other words, do we want to "sell" or "impose" a solution on someone, or do we want inspire, facilitate them to desire to "buy" our solution?

If you want to reach this last goal, we suggest to manage your team works following this process, named “Progressive focus approach”.

The first phase of this approach stimulates people to ask themselves what their differential value is, what distinguishes them from the crowd. Without a perceived differentiation, which can be considered as of "value", the basis of our agreement, and therefore of our work plan, would be fragile and precarious. To create our Perceived Differential Value, we encourage people to discuss on a number of conceptually simple elements:

- How our background is structured
- What is our originality
- What are our motivations
- What are the reasons for our reference "audiences"
- What is our perceived differential value, being together

The perceived Differential Value is a point of arrival, not of departure, because we will not decide at the end of the path if it is real value, but our target audience, the beneficiaries of our action. Therefore, it is a precise and structured path, which requires great consistency over time.

The second phase of the approach leads the participants to create the "brand" of the work group, what unites them as people, making it clear, for each component, what makes it:

- original
- relevant
- defensible
- visionary

Professionals and managers accustomed to using marketing tools will have noticed the exercise in which a brand positioning is built, so that it can be immediately recognizable.

The third phase is aimed at bringing out areas of overlap of thought, of commonality of visions and perceptions, stimulating participants to communicate to others:

- 5 words that define the reality they are facing, that is the descriptive elements of what is it in the facts

- 5 words that define the threats they will face, the elements that precisely describe what they have to fear
- 5 words that define what inspires them to work on this topic, the evocative elements of what they nourish and feed their commitment
- 5 words that define the opportunities that in their opinion can be seized
- 5 words that define their needs, the pragmatic elements of the tasks to be performed
- 5 words that define their dream, the evocative elements of what is in their desires and personal aspirations.

The fourth phase continues the process of highlighting what the members of the working group have in common, leading them to the definition of the "ambition" of the working group, the "place" that the group must reach in its trajectory of creating value, in the mind and in the hearts of the reference audience, and then to the definition of the group's "identity", or the "vehicle" that the group will have to use to reach its established destination (the ambition described above) in the mind and heart of the public of reference.

To obtain a description of ambition and identity, we structure the discussion by collecting individual contributions from everyone on these issues:

- The main cultural values
- The Individual personality traits
- The relational values through which everyone relates to his audience
- The aesthetic and style elements that qualify each member of the group
- How the target audience is perceived
- How the target audience perceives the members of the group

The fifth phase brings the group to converge towards a common vision, facing one after the other the typical elements of any business model, transformed into the basic elements of the team's "action plan":

1. The “consumer” and the “reference” targets. The former are the ultimate recipients, the users of the value generated by the action plan, the latter are the subjects to which the former are inspired and influenced; both are described, profiled, and their number is quantified.
2. The real value offered to the targets. It consists of the description of all the project outputs: products, services, guidelines, design elements and others. If some of them require a payment, the reference price is indicated.
3. The intensity of the relationship. For each identified target, is defined the degree of intensity with which the relationship is ideally managed: for example, through a dedicated account, or a customer care team, or a website, or an Artificial Intelligence assistant. Four levels of intensity mean four levels of financial investments.
4. The three channels. The team is asked to design the three channels of contact with the reference and consumer targets: the communication channel, the "sales" or involvement channel, the distribution channel. For each channel, the main instruments used in their management, analog and digital, are indicated.
5. The flows of entry. Whether they are monetary or not, participants are asked to quantify, with the help of measurement indicators, the set of "project revenue".
6. The key activities. Indication of the set of processes, activities and work instructions required for the "production" of the value (products or services or outputs in general described in point 2) or for the management of the contact channels (described in point 4).

7. The key resources. For each agreed key activity, the resources necessary to perform it in an ideal manner are indicated, within five categories of resources: economic, professional, structural, intangible and specific know-how.
8. The key partners. Analysing together the key activities and the key resources indicated in points 7 and 8, we identify the partners that should be involved if there is a lack of internal competence, useful for carrying out some activity, or any type of resource necessary to manage the disbursement of value.
9. The cost structure. This last point summarizes the cost categories resulting from the performance of the first eight points, and each of them is quantified, to enhance the total investment to be incurred to manage the generated project model.

The sixth and final phase is the one that completes the team work and leads it to define an operational summary, a work plan or a business plan. It starts from the comparison between the entry flows (point 5) and the cost structure (point 9) indicated in the previous phase; if this comparison is not satisfactory, because for example the costs exceed the revenues, the group is called to review the entire structure of the proposed activities, the value outputs, the type and number of targets, the contact channels, the intensity of the relationship, or of all the items directly related to an income or cost, until the comparison between these two entities is acceptable to everyone.

The learning carried out in many years of facilitation of operational work teams is that the more the path is structured the more it reassures participants on the existence of "rules" that prevent the emergence of conflicts, so the natural discussions that arise at internal teams are largely cushioned by this system of rules.

If the road is clear, all that remains is to question the sincere interest and intellectual honesty of the various participants in the working groups. If these assumptions fail, it is difficult to say that any technical approach can make a difference; if, on the other hand, the group was made up of intellectually honest subjects, the use of illustrating techniques could lead to results unthinkable in terms of design quality, in-depth analysis and operational applicability.

Because if we are invited to a dinner where everyone has to bring food, the probability of eating well is higher, when the quality of the food we bring, first, is high.

Chapter four
Metropolitan practice

Metropolitan cartography: practice, tactics and projects[43]

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Introduction

The purpose of contribution "Metropolitan Cartography: practice, tactics and project" of the TELLme Inaugural Book is to present Metropolitan Cartography as a creative tool for the representation and design of the metropolitan area. During three research years, Metropolitan Cartography, within the TELLme project *Training for Education, Learning, and Leadership towards a new Metropolitan Discipline*, is presented as the result of a process of experimentation that starts from the theoretical and conceptual sphere to manifest itself through an immediate image of representation of metropolitan territorial complexity. Today's city must be able to make its map; skilful map to facilitate the participation of citizens in decision-making process. Generally, mapping a city means examining analytical information projected on the geographic level to describe urban and morphological growth phenomena, while instead the maps produced by the research divulge the intention of defining a new idea of spatial and temporal mapping in order to design new inter and multi-scale architectural entities to operationally delimit the relationship between built space and mental space.

The study is developed with the intention of enhance an experimentation on new possible uses of the soil that include new urban morpho-types, mega forms, heterotopies of the metropolitan landscape through the ability to determine itself as potential inner landscapes and landmarks. To achieve these objectives, the definition of the Metropolitan Approach to Complexity, in the

43 To cite this article: Contin, A. and Galiulo, V. (2021). Metropolitan cartography: practice, tactics and projects. In: Contin, A., Giordano, P. and Nacke, M. (eds.). (2021). Training for education, learning and leadership towards a new metropolitan discipline. Inaugural book. Buenos Aires: CIPPEC.

construction of the Metropolitan Discipline, was the first step in outlining the principles underlying contemporary urban planning and design, with the aim of improving the *coordinated, interdisciplinary and executable* territorial strategy to optimize the processes of growth and sustainable urban development which aims at a higher quality of life.

The Metropolitan Approach to Complexity in the TELLme project is the preliminary descriptive framework for the construction of the Cartographic project: the definition of the critical issues arising as a consequence of the physical and spatial transformations of the metropolitan regions, such as social inequality, the vulnerability and fragility of the systems, is decisive. The environmental, natural and historical heritage systems, political and governance issues determine the dynamics of rapid change and growth of contemporary cities. It is a complex approach in which it is essential to highlight the relationship between the elements through an innovative form of presentation of reality.

The research favoured the construction of the definition of Metropolitan Cartography intended as an innovative methodological device in which the act of representation is not only descriptive but also explanatory of the process of selecting and extracting information; the method for the construction of the map becomes the project to facilitate multidimensional decision-making processes.

The systemic actions necessary for the construction of the TELLme map project define an inventive survey project, as they contribute to make the map an active agent of cultural intervention (Corner, 2011). Therefore, the cultural theoretical-practical research of the Metropolitan Cartography allowed to define a new interest for the map: not a single descriptive product but a practical act of logical actions. Therefore, it is a project of composition and disposition of the relations between the morphological and tectonic elements of the metropolitan city. Then it needs an inventive methodology that comes from the analysis of spatial information to be carried out in a sustainable urban and architectural planning project. For this reason, it is possible to define the act of the Metropolitan Cartography as inaugural because result of a logical sequence of choices defined by "rules of form" (L.B Alberti, 1472) that guarantee the establishment of a preliminary mental map (Semantic Package) which allows the generation of geo-referenced maps in space. The maps are built following a process that aims to "inform the shape". The invention of new two-dimensional and three-dimensional forms placed in the real space through which it is possible to create combinations of different information elements capable of obtaining possible scenarios through multiple visions and interpretative readings of the metropolitan territory.

1. How to inform the urban morphology of metropolitan contexts through Metropolitan Cartography maps

Recent growth models have shown limitations in achieving new life quality and well-being indices of the metropolitan inhabitant due to the effect of driving forces of urban development such as externalities linked to economic growth prototypes, the differences between the local and international political agenda and the optimization of industrial and technological skills in the metropolitan area.

Priority should be given to metropolitan contexts in which the complexity of the relationships between the factors of territorial alteration of the physical, social, political and economic dimensions are most evident. Today it is extremely important because it is believed that the question of how to deal with the metropolitan complexity to achieve the goal of sustainable population growth is mandatory in the field of academic research. Nevertheless, some issues cannot be addressed with a single, static and traditional disciplinary approach, but understanding them requires a comprehensive and multidisciplinary vision. The Metropolitan Cartography methodology allows the possibility to focus on

four main lines of research: the management and relationship of data in physical space, scale of representation of them in different spatial dimensions, spatialisation of territorial vulnerability processes due to exposure and risk sensitivity evidences of some metropolitan contexts. Therefore, the study of metropolitan complexity through Metropolitan Cartography maps is always linked to the relation of scale between the different territorial levels, from global to local, because the study of the city has a systemic character and currently has a global extension (Martinotti, 2012).

Thus, in order to understand the spatial relation between physical and social spatial relations of Net-City (Shane, 2005), the MC' maps action framework is tied to the location of the possible dynamic interactions of the contemporary metropolis:

- interaction between the intercontinental and trans-national metropolis;
- interaction between the metropolitan scale and the different regions;
- interaction between urban centres and suburbs;
- collaborative interactions between neighbourhoods within the urban scale.

Moreover, the TELLme maps allowed to generate an experimental process that informs the shape by redefining the structure of a spatialized information through the determination of criteria such as:

- The categorization of the concept and the data, from the semantic package to the map, through the use of ISO 37120: 2014 standards, indicators for city services and quality of life, defined by the United Nations Member States (Sustainable Development Goals) for sustainable development as stated in the for Sustainable Development 2030 Agenda;
- Data Quality identified with respect to the potential use of the data through a selection that takes into account the completeness of the data, the accuracy, the timeliness (time of acquisition and production of information), consistency with respect to the main purpose that the map intends to bring out, plurality of information with respect to the 4 metropolitan dimensions (geographical, social, economic and management), integrity with respect to how the original data is used in the Protocol maps and in the Maps of dynamics, formal compliance with the in order to guarantee how they respect the semiological criteria established by the methodology in the case studies tested;
- Historical Data Sequence (Data Time Series) which allows to identify a series of interrelationships between changing physical variables by ordering them with respect to the dynamics expressed in a phenomenon.

2. Metropolitan cartography as innovative methodological approach for inaugural operative action

In the last decade there has been a development and a particular interest in the representative practice of the geographical map and the digital visualization of material and immaterial cultural data in the knowledge of design and multidimensional planning. Indeed, the study of the masters of architecture and cartographic representation has allowed the research to understand how the formation and decomposition of composite proportions into minor harmonic relationships is not an academic fact but it is a spatial experience managed by the individual. The origin of the research for the spatial representation of the elements of reality is an historical knowledge that can be traced back to Renaissance cartographic experiments up to the new cartographic experiments that mean the map as open-connectable experimentation with real Corner, 2011).

Nevertheless, innovation that the TELLme project proposes with Metropolitan Cartography is the establishment of new projective representations of cartographic practices giving particular emphasis to the manifestation and manipulation of the physical and abstract components that make up the metropolitan territory. Its feedback is possible through the intersection of the digital components, the experience and spatial intelligence of the architect, the metropolitan expert and the local agent.

Maps are also intended as the result of experiments on reality from useful traces to determine an order (Deleuze and Guattari, 1980), as a practice for rational reasoning.

Therefore, Metropolitan Cartography is presented as an innovative methodological tool for the representation of the infinite possible relationships between the elements in order to read the variability that symbolic information can have in different metropolitan areas.

The research of the Metropolitan Discipline has allowed to experiment the application of two types of maps of the Metropolitan Cartography in different metropolitan contexts: Protocol Maps and Maps of Dynamics.

The Protocol Maps are tools that facilitate the reading of the generating principles of the critical issues of development according to ethical values of planning on a metropolitan scale. They reveal the metropolitan structure by layering physical aspects of geographic, historical, and geometrical data. Protocol Maps are used as a base for discussing the metropolitan dynamics. All metropolises have the same set of maps that are comparable, as can be shown in figure 1.

Protocol maps are generated through the collection of open-source data of global and local coverage, starting from the unique association between the Semantic Package concept[44] and information level.

It is therefore open-source maps constrained according to a transparent process and shareable in both academic and professional.

Figure 1. Green-Grey Protocol Maps Guadalajara, Seville and Mendoza XL

Source: V. Galiulo, 2019.

Maps of Dynamics are also produced using open-source data selected according to the unequivocal correspondence between concept and information level. From the Semantic Package it is possible to choose the necessary and sufficient concepts for the description of the phenomenon through reading areas, linked to the experience of the user, in order to understand metropolitan phenomena according to interdisciplinary points of view. The Maps of Dynamics operate on a large scale and aim to highlight the complex dynamics intersected between the geographical, social, economic and

44 See chapter Cartography and Open data, Tagliolato, Galiulo, Žižek, Oggioni.

territorial management dimension. Their purpose is to define strategies for promoting the sustainable development of the metropolis.

The production of a set of Protocol Maps has allowed us to verify how an equivalence of meaning of a concept, explained in the Semantic Package, can have a different semiotic value in the graphic and spatial restitution of information.

The practical and theoretical project of the Metropolitan Cartography allows to evolve the research towards the opportunity to compare the Metropolitan cities through protocol Sematic Packages and highlighting the different image of the territory of each urban reality.

The process of connecting the information level to the territory, compared to a multi-scalar development, is important in order to extract the intrinsic cultural value of each territory, of each housing settlement, city and region. A differentiated cultural analysis is required for each metropolis that frames the complex reality as a study system.

The maps produced using the TELLme methodology are not simulations of reality, but are tools through which, on an infinite scale in the abstract space of GIS (Geographic Information System), something invisible is made visible. It is interesting to understand how to read, not only the fragile territories of the metropolitan city, but also the causes of their fragility over time. It is possible to move from an analysis to a theory of metropolitan design which requires the presence of geographical references related to topography. The topographical aspect, which is architectural and tectonic, is the main support for metropolitan analysis.

Therefore, the geographical reference is not a simple vector point, but it is the relationship between information elements that generate lines of forces (Contin, 2005). They allow to root the use and meaning of quantitative information of the data to the cultural identity of the spatial context in which it acts. As in Leonardo da Vinci's representation of the city of Imola, the line of force is the river, as for Milan, in the Protocol Maps, the change in frame and scale is determined by the permanence of the line of force in its three XL - L - M dimensions (Kolhaas, 2002), which correspond to three different scales: 1: 500.000, 1: 150.000, 1: 50.000. The lines of force are constant signs in the territory that maintain a meaning and usefulness from the passage of the mental map to cartography.

For Milan case study, the representation of the Green-Gray Infrastructure in the Protocol Map allows us to highlight how the mountains, valleys, ridges, rivers and existing vegetative heritage represent the potential of the geographic support on which geocoded data is grafted. Geography is not an aesthetic tool but it is the necessary physical component (Fig.2) that allows to trigger transversal readings of information systems for the development of Decision-Making strategies.

Moreover, through the trans-territorial and multi-scale reading of the narrative of a place it is possible to understand the logic of the Shrinking Scale that binds the spatial digression, from the large to the small spatial dimension, through the correspondence between concepts of the Semantic Package (XXL - XL - L- M - S) and spatial information.

2.1 Shrinkage Scale in MC’s maps

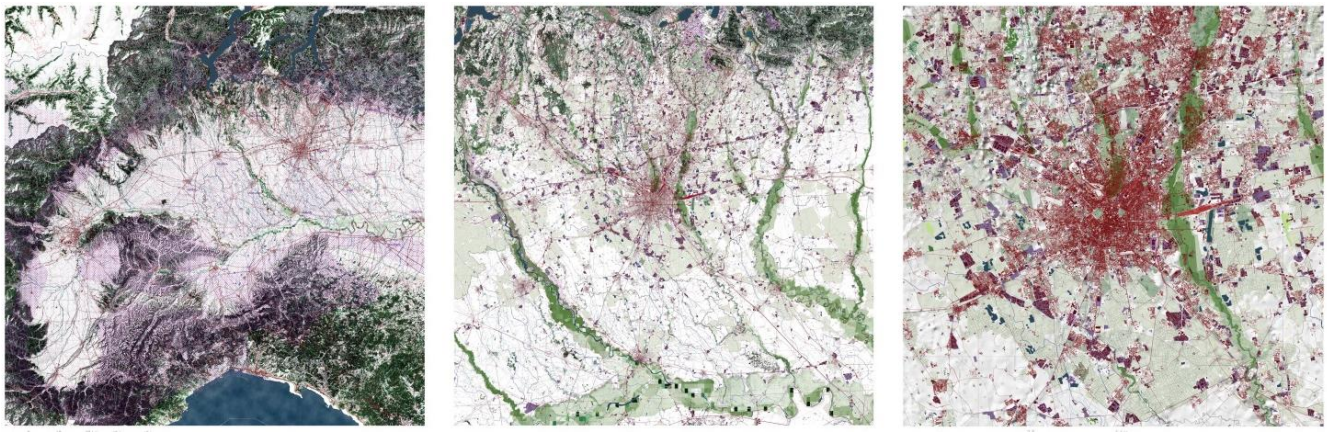
What is necessary to visualize data on a large scale is related to the territorial macro-structure of the Metropolitan city and its relation with the sovra-national and trans-regional borders that determine the condition of city in hyper-infrastructural connection. At the small scale, however, the structure of the territory acquires greater significance because loaded with new spatial information patterns, linked to active socio-cultural dynamics and visible at the scale closest to the strategic project. In summary, therefore, it is possible to define that the Shrinking scale in MC’s maps is the result of logical design sequences that link the projective geometric dimension with the topographical and morphological dimension of the metropolitan city since the process is the result of a methodology

from a mental abstraction that is evaluated by the choice of the global or local coverage data in the phase of Data Mining and Data Collecting of the Metropolitan Cartography.

Some operations that define the process of Shrinking scale from the spatial geometric representation and Problem Setting goals are:

- Use related concepts, based on shrinkage of Semantic Packages, to detect real-world phenomena and effect on iper-local dimension;
- Visualize similar and distorted transformations of spaces in shapes;
- Identify categories of similar figures by comparing shapes and attributes;
- Distinguish that lengths between similar shapes and vector changing by a constant scale factor;
- Recognize the relationship between similar and equivalent shape but with different alphanumerical features;
- Determine and use scale factors to find unknown attributes of informative level in order to compare them with other similar;
- Make distortion between alphanumerical values for global coverage data applied locally using geometric and geographic software to explore controlled distortion of spatial data;
- Search for patterns based on quantitative and qualitative spatial relationship of information levels;
- Observe and visualize ratios of lengths and areas on morphological space and learn the effect of scale factor on length and area ratios.

Figure 2. Green-Grey Protocol Maps Milano, XL – L – M



Source: V. Galiulo, 2019.

So that means that the operation of Shrinkage scale between concept and map design of the MC is determined by the manipulation and distortion of spatial information and its bond in order to operate in a plastic way between mental perception and metric projection on the ground about the strategical purpose of the map and project field of action.

Conclusion

In conclusion, the progress of the research has allowed to define the Metropolitan Cartography as a project and tactical tool (from the Greek taktikós "concerning the order" intended as a system of rules), cognitive and technical experiences that allows to order the necessary elements for understanding the causes of territorial context vulnerability. Cartography as a rational reasoning

practice allows the analysis and representation of new realities by determining constraints, quantity and quality by making explicit phenomena of existing conditions through immediate visual communication that allows participants of the metropolitan reality to recognize their experience as a citizen.

The potential of the methodology explained is the ability to produce a flexible mapping tool through the generation of maps, at different scales, allowing decisions to design new public and common metropolitan spaces for the sustainability of the local context with global value. The selection and connection of the concepts of Metropolitan Discipline and the interpolation of the corresponding levels of information, according to a tactical and strategic vision, allows the metropolitan expert to operate through non-linear processes that, as in scientific experimentation, require numerous tests, feedback and controls in specific case studies. It is a flexible analytical method, and it is also a project tool that allows to analyze the processes of change in the physical and social dimension; Not least the health dimension of the city and the citizen, understood, as in the current situation of the pandemic Covid-19, as a global local effect.

The direct experience of the researcher, first of all citizen and thoughtful individual, allowed to raise questions and considerations on the event of global spread of virus Covid-19; referring to the relationship between health and the place where you live, it has been possible to comment that scientific progress in this disciplinary field is expressed in modern times, unfortunately, in terms of spatial functionalism. For this it is necessary a remodelling of the method of analysis and interpretation of the territory to draw new urban morpho-types that can also be understood as a space of re-appropriation of the public.

It is, in short, a problem of collective action and management through the definition of a new geometry of spatial relations able to promote a network of community based on communication, inheritance and trust.

References

Alberti, L.B. (2010). L'arte di Costruire. Torino: Bollate Boringhieri.

Contin, A. (2005). Bari: Studi per la Metropoli. Firenze: Alinea Editore.

Contin, A., Kim, S., Musetta, A., Manfredini, F. (2017), Metropolitan Cartography as a tool for the metropolitan approach to complexity: the Ugandan Key Study. International Conference. Un futuro affidabile per la città Apertura al cambiamento e rischio accettabile nel governo del territorio. XIV EDIZIONE PROGETTO PAESE. Milano: Triennale di Milano.

Corner, J. (2011). "The Agency of Mapping: Speculation, Critique and Invention", The Map Reader: Theories of Mapping Practice and Cartographic Representation (First Edition), p 89-101.

Deleuze G., Guattari F. (2010). Mille piani. Capitalismo e schizofrenia. Roma: Castelvecchi.

Lynch, K. (1964). The image of the city. Cambridge (MA): The MIT Press.

Lynch, K. (1984). A theory of good city form. Cambridge (MA): The MIT Press.

Manetti, A. (1992). Vita di Filippo Brunelleschi. Milano: Edizioni il Polifilo.

Koolhaas, R. and Bruce, M. (2002). S, M, L, XL. New York: The Monacelli Press.

Un – Habitat, NYU, Lincoln Institute. (2016), Atlas of Urban Expansion. [Online]. Available at: http://www.atlasofurbanexpansion.org/about (Accessed: 4 April 2020).

Metropolitan discipline, a terminology[45]

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This article seeks to explain the relevance of identifying and ordering a metropolitan terminology. For this, a brief reflection of the language (communication system used by all people) and terminology (specialized communication system that is mainly used by those who practice the same discipline) is made, their role in communication is analysed. The general context in which neologisms arise is also explained, and the importance of terminology in the processes of knowledge production is valued. In order to clarify the process of representation and transmission of knowledge through the use of specialized terminology, some graphs are made. Finally, from the identification of the main urban-metropolitan problems, the article seeks to explain the importance of having a terminology proper to the metropolitan discipline, which could also contribute to strengthening the identity of this new metropolitan discipline.

Each discipline has a set of own and necessary terms to define and understand the specialized language that characterizes it, which is composed of words of common use, but with a different connotation, as well as new terms or neologisms that arise parallel to social, economic development and technological because the existing ones do not satisfactorily express the meaning of what they want to name. The terminology is a very specific discipline, and arises from the need to create a specialized language in the different scientific fields, looking like the lexicology the systematization of the structure of the language, that is, according to linguistic conventions, a conceptual structure formalized for symbolic purposes (Cabré, 1999, en Marinkovich, 2008). Language, in its generic form, is a communication system commonly used by every person, while the terminology, being more specialized, is used by technicians and professionals who practice and share the same discipline, because it integrates all the terms and neologisms related to a specific area of specialization. The terminology is defined as the set of technical words or expressions used in a particular subject, and it is common that this, regardless of the theme that characterizes it, is integrated into glossaries and other documents that seek to clarify its use, which are very common in scientific and normative documents, laws and regulations, among others. The specialized language used by any discipline does not arise at random, but by the need to order the terms related to objects, techniques, methods, processes, phenomena, etc., which are exclusive to a specific field of knowledge.

> One of the most outstanding linguistic characteristics of scientific-technical texts is the presence of specific units of a specialized field. The degree of specialization of these texts varies their terminological density: the higher the level of specialization, the greater

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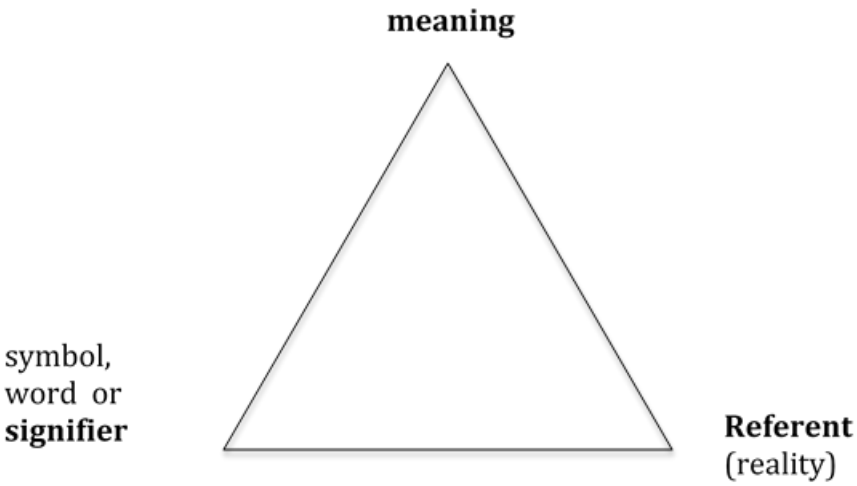
> the thickness of the terminology. Therefore, if the terminological units are the privileged mode of expression of specialized knowledge, we can say that their first function is to represent such knowledge. Each terminological unit corresponds to a cognitive knot within a field of specialty, and the set of those knots, connected by specific relationships (cause-effect, all-part, contiguity, anteriority-posteriority, etc.), constitutes the conceptual representation of such specialty. If this is so, there is no doubt that, through terminology, we represent the specialized reality. (…) We can say that the terminology, whatever its theme or the context in which it occurs, systematically fulfills two functions: the function of representing knowledge, always specialized, and transmitting it. (Cabré, 2004:99) (free translation).

According to the above, these two basic functions (representing and transmitting specialized knowledge) clearly define the importance of terminology in knowledge production processes. The utility it brings with respect to specialized reality can be illustrated using the semiotic chart of Guidens Ogden and Richardson, modified by Stern Ullmann (Fuentes, 1998, en Miyara, Pasch, Cabanellas and Yanitelli, 2014), In this graphic description, three elements are mentioned: referent, meaning and signifier (where the referent is the real object, the meaning its mental idea and the signifier, the external image) (Miyara et all, 2014). Each of these elements is placed in one of the angles of the triangle, as can be seen in the figure below:

Figure 1. Semiotic triangle of Ogden and Richardson modified by Stern and Ullmann



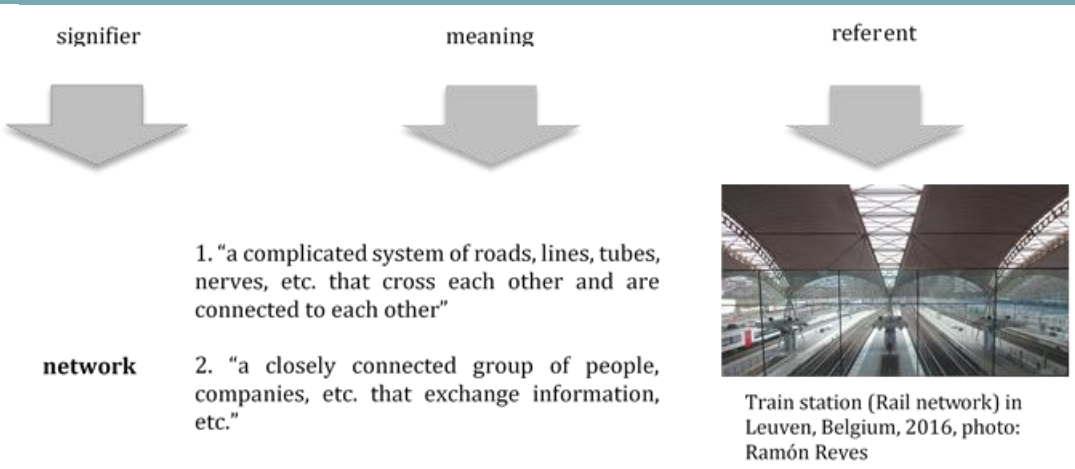
Source: Fuentes, 1998.

According to the dictionary, *signifier* is the form of a linguistic sign, for example its sound or its printed form, rather than the meaning it expresses, or part if the signs that the receiver perceives by one of its sense; *meaning* (of something) is the thing or idea that a sound, word, sign, etc. represents, or concept or idea associated with the signifier, its semantic content (the designated); and the referent is the reality (he person, thing, or idea that a word, phrase, o object refers to).

Although there are linguistic currents that establish a dichotomy between the “word” (lexical unit that denotes something general) and the “term” (terminological unit that denotes something specific), authors such as Cabré (1999, in Marinkovich, 2006), state that despite that both units may have differences in their function and meaning, between them there are more coincidences than divergences. In this regard Marinkovich (2006) states that specialized languages adopt certain properties of artificial languages, and adds that they also have features belonging to the general language, for this author, “the dividing line between the general and specialized language will have to look for it based on pragmatic criteria derived from use, as well as based on the levels of categorization existing in the speaker's mind.”

Considering the previous statements, and according to our interpretation, the process of representation and transmission of knowledge of the word and the term according to the following figure can be explained in a general way:

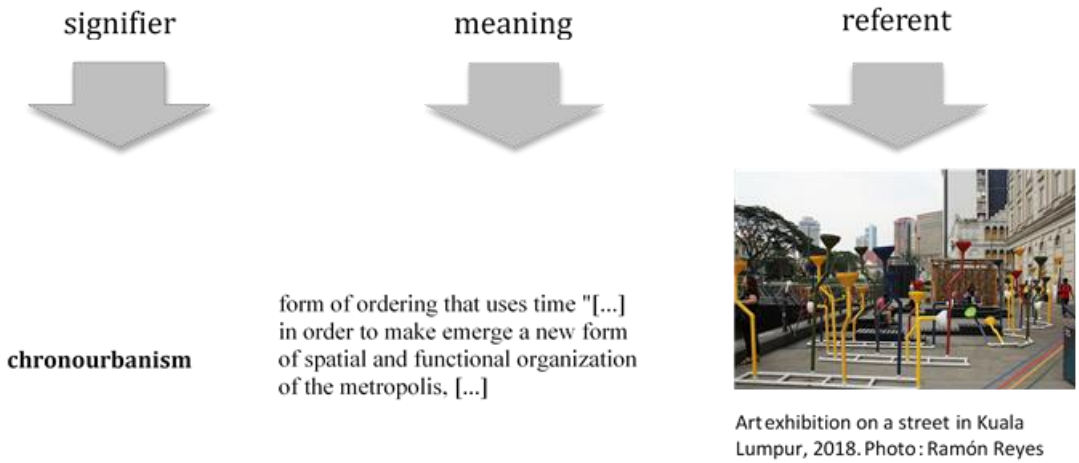
Figure 2. Process of representation and transmission of knowledge of the word and the term



Source: Oxford dictionary.

In the previous example, we observe the word or lexical unit "network", which is used in the common language, and is understood and used regularly by every person, however, this lexical unit has different meanings depending on the context, and its meaning may vary, even the two definitions given in the table above have different meanings; the first definition can refer to a rail, road or channel network, and the second can be used to denote communications network or to name a network of friends. On the other hand, a term, being a specialized terminology unit, has no variation in its meaning, since it denotes something specific, the above can be represented in the following figure:

Figure 3. Example of chronourbanism in a street in Kuala Lumpur



Source: Gwiazdzinski, 2011, Torres, 2019, in Becerra y Reyes, 2018.

In the previous example, the term "chronourbanism", which is also a neologism, refers to the temporal ordering of urban spaces destined to house functions other than the original purpose for which space was created, and its meaning is univocal, that is, it expresses only one reality.

Disciplines and specialized language

In reality, traditional disciplines already have their own terminology, which is adopted and adapted at the time to define and identify the elements that compose it, many terms were also created, and their daily use at this time can be common.

The emergence of new terms or "neologisms" is associated with the advances experienced in society, in technology and in science in general, authors such as Juránková (2012, in Becerra and Reyes, 2019) affirm that neologisms are created to accurately design new ideas, new objects that generated the technological fields, scientific and social mechanisms, among others. The process of acceptance of neologism in the common language does not depend so much on time but on the frequency and extent with which the word appears, although normative grammar strives to clean the language of several new words. In Hispanic culture, the Real Academy of the Spanish Language[46] (acronym RAE in Spanish) has established the process to accept a neologism or a foreigner: once detected its use, “the new term is registered in its database (...); wait a reasonable period of time to ensure that it is not an ephemeral use (. .) and finally addresses its incorporation into the dictionary with the technical intervention of the Institute of Lexicography, the different commissions formed by academics and finally the consultation of the American and Philippine academies. (Mellado, 2012, in Becerra and Reyes, 2019).

In the case of emerging or newly created disciplines, which also arise from the need to analyse new phenomena, due to the urgency of covering knowledge gaps, there are a lot of new terms whose use, in many cases can be uncertain and ambiguous, due to its recent appearance in the literature. This uncertainty and / or ambiguity can be attributed to the fact that the term, in the evolution of its use, moves from one discipline to another, or comes from a language other than its own; An example may be the term resilience, which arises in the area of physics (resistance of materials) and is then adopted in other areas of knowledge such as in psychology until reaching disciplines such as urbanism, where we talk about resilient cities.

In some cultural contexts it is common to use foreign words, that is, words that are adopted from another language, and are translated literally in many cases; Thus, for example, in the Spanish language, specifically in Latin America, it is common to find literature that interchangeably mentions the terms “*sustentable*” and “*sostenible*”, the reason is because the first term (*sustentable*) is derived from the translation from English to Spanish. In the second case, the proper term to describe the phenomenon, in the Spanish language, is “*sostenible*”. In fact, if the study of language and terminology is deepened, the subject is more complex, our objective here is only to give an explanation of why every discipline requires having its own terminology.

Neologisms are usually classified according to two of their characteristics; by its origin and by its formation:

> (…) from the first we get a division that are: denotative and stylistic neologisms. The first is to give a name to a new reality and in the second case the desire for originality or expressiveness, by designating an existing reality with another word. For Pokorny (1991), the formation of neologisms is divided into three groups: "Existing expressions where change of meaning occurs, new words belong to the second and the third group is made up of foreign language loans." Regarding the criterion of use of a neologism in relation to who coins it, it can be subjective or used only by an author or small group of people who employ new neologisms that shortly after fall into disuse and objective neologisms, used more common. (Becerra and Reyes, 2012)

46 Founded in 1713, the Real Academy of the Spanish Languaje is an institution with its own legal personality whose main mission is to ensure that the changes experienced by the Spanish language in its constant adaptation to the needs of its speakers do not break the essential unity that it maintains throughout the Hispanic sphere” (https://www.rae.es/la-institucion).

The relevance of a terminology for the new metropolitan discipline

According to the above, this section seeks to explain the relevance of using a language appropriate to the metropolitan discipline. It is evident that the technological development of the last fifty years has produced profound transformations in the different spheres of society. New forms of social organization, coexistence, communication, learning, etc., allow us to see that today's society is not the same as half a century ago; urban contexts and forms are far from what they were in the past. In the scientific field new phenomena and paradigms have been presented; social, environmental, economic, and political crises, among others, impact the city in different ways, it has been exceeded in its forms of administration and governance, the individuality of the human being is also affected; “It is altering our way of knowing and our way of relating to the world, even in the interactions of our bodies with their surroundings.” (Vergara Alfonso and De Las Rivas Juan Luis, 2016).

Parallel to these changes, new forms of communication have been developing, and since the creation of the first chip in 1971, which gives rise to a technological revolution has led the human being to face realities never seen before, which transform the traditional perception of the world, of the human being and its forms of communication and organization, throwing humanity in a world without borders, to territories without limits, hardly imagined without the advances of technology.

In this context, the evolution of the city in troubled areas (when integrating the urban fabric of one city with others), and later in the metropolis (when two or more urban territories are integrated, keeping socio-economic and political relations, etc.), It also gives rise to the emergence of phenomena associated with the emergence of new terms in contemporary specialized literature, a series of neologisms that seeks to designate new abstractions of reality; to name and explain the phenomena, techniques, technologies, methods, procedures, forms and emerging urban structures.

In this evolution, we cannot ignore that the reality of the urban has transcended, giving rise to the metropolitan, and its implications; The changes that this transformation entails are not only quantitative, it is not only about high levels of population concentration, of the integration of inhabitants of different municipalities in a territorial unit, of expansion of the boundaries of the urban fabric, it is not only a change in the scale of occupation of the territory, etc., but of deeper aspects of social, economic, environmental, territorial political order, etc. This situation places the metropolis in the face of new challenges to solve, therefore, aware of this, institutions such as the United Nations believes that the new urban agenda “must respond to the challenges and opportunities of urbanization. The same institution, referring to high demographic and urbanization rates in the world, and especially in developing countries, emphasizes the emergence of many large cities (5 to 10 million inhabitants) and megacities (more than 10 million of inhabitants) ”, the emergence of the latter is projected mainly in Asian, African and Latin American cities. (Onu-Habitat, 2016). This transformation of cities is associated as already mentioned to new challenges where it is crucial to address the emerging problem in social, environmental, and economic aspects, among others. Due to the new needs that derive from this urban, metropolitan and/or megapolitan complexity, the new phenomena that arise begin to be named, often with words that adapt to the lexicological or terminological needs.

Referring to the metropolitan terminology, and knowing the importance of identifying the fundamental terminological units that allow structuring the specialized language of the metropolitan discipline, the group of researchers participating in this international project has identified four basic areas that need to be studied in their complexity: territory, society, governance, and economy. Around them, we have realized that different terms are related, and according to their function, they are linked in different ways to metropolitan processes: some terms may have the function of “Goal” (the term defines a goal or disciplinary objective); other terms may constitute “Principles” (the term constitute a disciplinary principle); some terms work as “Issues”: (the term refers to a problem or constitutes a

theme); others have the role of "Operators": (the term expresses a function that transforms another), and some constitute "Operations" (the term expresses a process or mode of operation or operation of something). Although there is a very specific methodology, this is explained in detail in another document corresponding to the glossary of metropolitan terms, also produced by the team of researchers participating in this project.

From the above the relevance is deduced, in this section, of identifying the terms that give coherence to a metropolitan language whose definition allows to clarify a form of univocal communication that makes communication between the members of a community that shares the same scientific practices more agile, technical professionals, as well as among the institutions, giving in some way a sense of belonging to them.

Can the clarification of a specific technical language or terminology provide identity values to the metropolitan discipline?

There are two key elements that according to Causse (2009) define cultural identity: those of a structural and functional type, in the first case reference is made to the physical-geographical delimitation of the place inhabited by a community, while in the second Reference is made to objective needs and common interests. Accordingly, population centres constitute the structural element, and language is part of the functional elements. Other definitions affirm that “the cultural identity of a people is historically defined through multiple aspects in which its culture is shaped, such as language, an instrument of communication between the members of a community (…)” (González, 2004, in Molano, 2007) (free translation).

If we also admit that the metropolis, as a structural element and material object, is a product of culture, and if the specialized language used to denote objects, processes and phenomena is associated with it, then this is an intrinsic part of the identity of a social or cultural group. According to the definition of Zimmermann (2016), culture "is the set of practices and the system generating them", or as in the dictionary, is the "set of ways of life and customs, knowledge and degree of artistic, scientific, industrial development, at a time, social group, etc. " On the other hand, the dictionary defines identity as: “Set of features of an individual or a group that characterize them in front of others.” Accordingly, cultural identity includes those practices or objects that characterize a group and differentiate it from another. Therefore, both the common language and the technical language constitute an important part in the formation of the cultural identity of a community, and contribute to consolidate its integration.

The emergence of new identities is strongly linked to language, the sudden changes in coexistence and organization of the space that we are currently experiencing due to the impacts of the covid-19 pandemic, exemplifies the way in which new elements of identity and new terms emerge. If in the everyday life of all people this health contingency has catalysed the forms of behaviour and social coexistence, in the scientific field, all disciplines without exception have been affected. In the first case, there is no doubt that interpersonal relationships have been altered, nor that the transformation of the physical relationship of people with the environment is creating new habits (new identities of person-space behaviour), the ways of using space physical in its different scales have been modified, in terms of planning, the management strategies of the metropolis are being questioned, and new paradigms envision other conditions of coexistence between people and their relationship with the urban-metropolitan space. One of the most recent neologisms in common use is "social distance" referring to the minimum distance (1,5m) that a person must maintain with respect to another, in order to protect themselves from a possible contagion, at the beginning of the pandemic of Covid-19, in Mexico the term "healthy distance" began to be used, which is practically a synonym

of the previous one, as it also refers to maintaining a minimum distance between people in order to keep both in good health.

Figure 4. Social distance, Guadalajara, México

Source: Reyes Rodríguez, 2020.

In an anthropological-social line, for example, there are authors who affirm that the body of the person and the places are closely related by the symbolic feedback that occurs both between people and in the places where they have been travelled (Lindon, 2009, cited by Chávez, 2020), likewise, it is affirmed that the places by themselves are not symbolic, their meaning also depends on the interaction that takes place in the place (Chávez, 2020).

Therefore, this alteration in the forms of behaviour of people in the space in which they move also entails new symbols of identity, and therefore a new vocabulary, a new terminology to name the language of these new realities. In fact, in general, throughout 2020, new terms associated with the covid-19 pandemic are being incorporated into the dictionaries of all languages.

The previous example, show us that the occurrence of an event impacts the different scales of the territory; from the common spaces of intra-family coexistence to regional scales, since the current forms of regional and metropolitan planning are questioned (distribution of facilities that provide medical services, and others). Parallel to this, new forms of social behaviour whose name does not exist and terms arise spontaneously, for example, the emergence of collective phobias such as hypochondria and agoraphobia, which, in countries like Spain, are translated into the expression " Madrileñophobia", defined as "the fear that some have developed in the face of the imminent arrival of a mass of tourists to the coasts, coinciding with the opening of provincial borders in the de-escalation of Covid-19". A similar example has been documented (from Orange) by Enguix (2020), who mentions that between March 13 and 17, 2020, 1,2 million inhabitants of Paris (17% of the total) left this city to take refuge in the countryside. In the absence of a generic name, we propose the term "urbanphobia", which describes the fear of staying in the city because of feeling threatened by strange agents. In reality, the pandemic has unleashed global phobias, in the sense of the closure of national roads and international borders.

Another of the important fields of urban-metropolitan terminology mentioned in this work is related to the environment, never as at this time some terms such as "ecourbanism" take relevance, which refers to the development of multidimensional human communities (all environmental aspects involved), sustainable in built, harmonious and balanced environments." (Ruano, 1998)

The urgency of managing this type of urban planning has been made present when observing, for example, the return of different types of fauna to natural spaces that over time are gradually occupied by man, however, the forced confinement of people in their homes due to the COVID-19 pandemic, allows various species of animals to retake (at least temporarily) part of the habitat of which they have been stripped by man. In this regard, we are aware of the emergence of another term that we can identify with the term "social confinement".

Two more disciplinary fields that are basic in metropolitan terminology are the economy and governance, both linked in an important way to what has just been mentioned about the environment,

in the case of the environment, it could be logical that an energy saving presupposes a reduction costs and opens the possibilities for society in general to benefit from technological advances. A neologism of recent emergence is for example the one that refers to the "blue economy", which is defined as the "use the knowledge accumulated over millions of years by nature to reach ever greater levels of efficiency, respecting the environment and creating wealth, and translate that logic from the ecosystem to the business world. " (Alvial, A., 2015).

Regarding governance, and more specifically the term "urban governance", it is understood as "the sum of the many ways in which individuals and public and private institutions plan and manage the affairs of the city (UN-habitat, 2003), and although this can be given a business interpretation, where the city is organized as a collective actor, in order to privilege its economic growth, a second interpretation or modality seeks to reconcile economic growth with the preservation of social cohesion (Le Wales, 1996, cited in De Mattos, 2004).

References

Alvial, A., (2015) "ECONOMIA AZUL Una revisión en el marco de nuevas tendencias en Economía" Disertación. [On line] Available from: http://www.cursobioeconomia.mincyt.gob.ar/wp-content/uploads/2014/12/1.-Econom%C3%ADa-azul-A.-Alvial.pdf [Accessed: 28 nov 2020].

Becerra Mercado Olga Clarisa y Ramón Reyes Rodríguez (2012), "El lenguaje contemporáneo del urbanismo", en Instituto Tecnológico de Celaya (2012), Congreso Internacional de Investigación de Academia Journals.com, 14, 15 y 16 de Noviembre, memories of the congress.

CABRÉ, M. T. (2004) "La terminología en la traducción especializada". In: Gonzalo García, Consuelo; García Yebra, Valentín (eds.) Manual de documentación y terminología para la traducción especializada. Collection: Instrumenta Bibliológica. p. 89-122. ISBN: 84-7635-578-5. (CL). Madrid: Arco/Libros.

Causse Cathcart, Mercedes y (2009), "El concepto de comunidad desde el punto de vista socio-histórico-cultural y lingüístico", Ciencia en su PC, Vol., núm.3, pp.12-21 [On line] Available at: https://www.redalyc.org/articulo.oa?id=1813/181321553002 [Accessed: Dec 25th 2019]. ISSN: 1027-2887.

De Mattos, A., (2004), "De la planificación a la gouvernance: implicancias para la gestión territorial y urbana", en Revista Paranaense de Desenvolvimiento, núm. 107, Curitiba, [On line] Available on: akana.infd.edu.ar/file/download/182524[Accessed: 16th appril 2011]

Enguix, S. (2020), "Madrileñofobia", La vanguardia, 17 de junio de 2020. [On line] Available at: https://www.lavanguardia.com/local/valencia/20200617/481817516314/madrilenofobia-salvador-enguix-covid-19-turismo-de-masas.html [acceced: 27 nov. 2020]

Marinkovich (2008), "Palabra y Término: diferenciación ó complementación?" Revista Signos, 41/67, pp. 119-126 [On line] Available at: https://dx.doi.org/10.4067/S0718-09342008000200002 [Accessed: 25 dec. 2019].

Miyara Federico, Vivian Pasch, Susana Cabanellas, Marta Yanitelli (2014), "Ruido y contenido semántico", [On line] Available at: http://escueladesonido.com.ar/files/Federico-Miyara,-Vivian-Pasch,-Susana-Cabanellas,--Marta-Yanitelli---Ruido-y-Contenido-Semantico.pdf [Accessed: 30 dec. 2019].

Molano L. Olga Lucía (2007), "Identidad cultural, un concepto que evoluciona", revista Ópera, num. 7, pág. 69-84, ISSN: 1657-8651. [On line] Available at: https:/wwww.redalyc.org/pdf/675/67500705.pdf. [Accessed: 08 mar. 2020]

Onu-Hábitat (2016), Urbanización y Desarrollo: futuros emergentes, reporte ciudades del mundo 2016.

Ruano, M., (1998). Ecourbanismo. Entornos humanos sostenibles: 60 proyectos. Barcelona, Gustavo Gilli.

Vergara Alfonso, De Las Rivas Juan Luis (2016), La inteligencia del territorio, supercities, Pamplona, Fundación Metrópoli.

Untersinger, M. (2020), "Confinement: plus, d'un million de Franciliens ont quitté la région parisienne en une semaine". Le monde, 26 de marzo de 2020 [On line] https://www.lemonde.fr/pixels/article/2020/03/26/confinement-plus-d-un-million-de-franciliens-ont-quitte-la-region-parisienne-en-une-semaine_6034568_4408996.html [Acceced: 27 nov. 2020].

Zimmermann, Klaus (1991), "Lengua habla e identidad cultural", Estudios de lingüística aplicada, [S.l.], p. 7-18, oct. 2016. ISSN 0185-2647. [On line] Available at: https://ela.enallt.unam.mx/index.php/ela/article/view/162/148. [Accessed: 08 mar. 2020].

TELLme project as a tool for territorialising SDGs in metropolises[47]

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Metropolises are the predominant type of city in the twenty-first century. There are currently 1934 metropolises with more than 300,000 inhabitants and during the next 15 years a new metropolis will arise every two weeks (UN-Habitat, 2020a). Recent reports by United Nations highlight the importance of metropolitan governance and metropolitan management for sustainable development, underlining that today at least one third of humanity lives in metropolises and that by 2035 almost 1 billion more people will become metropolitan inhabitants (United Nations, 2019; UN-Habitat, 2020b). From the way these metropolises be governed, planned, regulated and financed over the next 10 years will depend, to a large extent, the achievement of many of the targets of the Sustainable Development Goals (SDGs), the commitments of the New Agenda Urban and other global development agendas.

Urban inequity exacerbated by the Covid-19 pandemic; the growing migratory dynamics; disasters caused by climate change; the constant violations of Human Rights; the weakening of democracy; among others, have all increased the social, economic, environmental, cultural and institutional complexity of metropolises. These problems have also jeopardised and even caused a significant regression in the implementation of the 2030 Agenda for Sustainable Development adopted in 2015, being the most abrupt the turnback in health, poverty and education, which is already calculated in a couple of decades.[48] Metropolises of all sizes and configurations have been affected, since neither climate change, nor migrations, nor pandemics recognise local administrative boundaries and, instead, their negative effects increase due to institutional fragmentation and to the lack of integration and cooperation of territorial management at the metropolitan level.

In September 2019, the United Nations Secretary General marked the year 2020 as the beginning of a decade of ambitious actions to achieve the Sustainable Development Goals: actions at global level, actions at local level, and actions by people. Since then, the notion of “territorialising” the SDGs and the other global development agendas has acquired increasing importance, and many national, sub-national and local governments have even started to voluntarily report their respective progress.[49] However, the tools available to guide policy makers and public servants in these

47 To cite this article: Forero, R. (2021). TELLme project as a tool for territorialising SDGs in metropolises. In: Contin, A., Giordano, P. and Nacke, M. (eds.). (2021). Training for education, learning and leadership towards a new metropolitan discipline. Inaugural book. Buenos Aires: CIPPEC.
48 See, for instance, The Sustainable Development Goals Report 2020.
49 See the Voluntary National Reviews Database and UCLG and UN-Habitat. (2020). Guidelines for Voluntary Local Reviews.

territorialisation processes have not been so common, specially those addressing territorialisation from the metropolitan scale.

The Project “Training for Education, Learning and Leadership towards a new MEtropolitan discipline - TELLme” led by the Politecnico di Milano and the Fundazione Politecnico, offers a series of tools aiming to connect metropolitan complexity with sustainable development, which represent a significant opportunity to guide metropolitan governments and authorities towards the territorialisation of the SDGs. Below are presented some of the elements that must be taken into account to carry out said territorialisation using the TELLme Project, while achieving important synergies between the theory and practice of metropolitan management and contributing to closing the gap between the academic knowledge and the pressing needs of sustainable development.

The language of metropolitan sustainability

In 2015, a new sustainability language was reviewed and agreed at global level and formally adopted by the United Nations Member States as the 2030 Agenda for Sustainable Development. This language is instrumentalised by 17 major objectives among which the number eleven (SDG11) refers specifically to sustainable cities and, at least, other ten include targets with an urban component (UN-Habitat, 2020c). Since 2015 and based on the targets established by the 2030 Agenda, several declarations and more specific agendas have been formulated and adopted to accelerate the SDGs achievement as well as to emphasise some of the issues that are considered as priorities within the Agenda.

The Montreal Declaration on Metropolitan Areas and the New Urban Agenda, both formally adopted by the United Nations (2016a; 2016b), urge territorial actors and governments of all levels to advance the implementation of the 2030 Agenda from seizing the existing linkages between urbanization and development (Table 1). These specific linkages as well as the general language of sustainability adopted through SDGs are establishing new forms of metropolitan management that put people at the centre of the interventions and that promote a territorial balance across the urban-rural continuum and local political-administrative borders.

Table 1. Nexus between SDG11, other SDGs and the New Urban Agenda

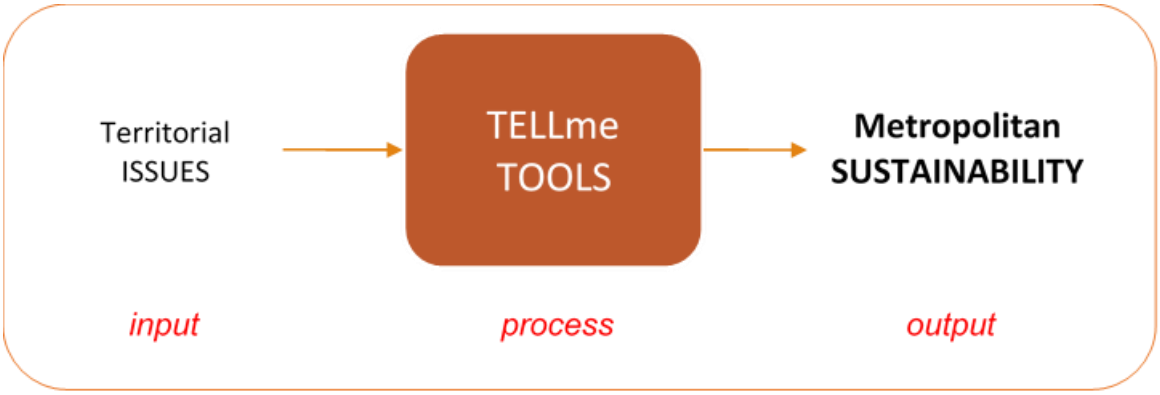
SDG11 Target	Linkages to other SDGs	Linkages to the New Urban Agenda Paragraphs
11.1. By 2030, ensure access for all to adequate, safe and affordable housing and basic services and upgrade slums.		31, 32, 33, 34, 46, 61, 70, 99, 107, 108, 110, 112.
11.2. By 2030, provide access to safe, affordable, accessible and sustainable transport systems for all, improving road safety, notably by expanding public transport, with special attention to the needs of those in vulnerable situations.		48, 50, 54, 113, 114, 115.
11.3. By 2030, enhance inclusive and sustainable urbanization and capacity for participatory, integrated and sustainable human settlement planning and management in all countries.		29, 39, 40, 41, 42, 92, 149, 155, 156, 157, 160.
11.4. Strengthen efforts to protect and safeguard the world's cultural and natural heritage.		38, 63, 66, 121, 122.
11.5. By 2030, significantly reduce the number of deaths and the number of people affected and substantially decrease the direct economic losses relative to global gross domestic product caused by disasters, including water-related disasters, with a focus on protecting the poor and people in vulnerable situations.		65, 68, 69, 71, 73, 74, 75, 76, 77, 78, 119, 123.
11.6. By 2030, reduce the adverse per capita environmental impact of cities, including by paying special attention to air quality and municipal and other waste management.		65, 68, 69, 71, 73, 74, 75, 76, 77, 78, 119, 123.
11.7. By 2030, provide universal access to safe, inclusive and accessible, green and public spaces, in particular for women and children, older persons and persons with disabilities.		37, 53, 55, 56, 67, 100, 109.
11.a. Support positive economic, social and environmental links between urban, peri-urban and rural areas by strengthening national and regional development planning.		87, 88, 89, 90, 91, 158, 159.
11.b. By 2020, substantially increase the number of cities … adopting and implementing integrated policies and plans towards inclusion, resource efficiency, mitigation and adaptation to climate change, resilience to disasters, and … disaster risk management.		77, 78, 86, 94, 95, 96, 97, 98.

Source: UN-Habitat (2020c).

The TELLme Project is valuable to the aforementioned purposes by establishing a systemic relationship between metropolitan management and sustainable metropolitan development (Figure 1). Its tools guide the reading, understanding and interpretation of complex territorial dynamics and propose methodologies to move from the diagnosis of the state of sustainability to actions and projects, an innovative approach to carry out an adequate territorialisation process of the SDGs at

the metropolitan scale. In other words, TELLme does not improvise by formulating a new language of sustainability, but rather adapts to different metropolitan realities using the language defined globally through the SDGs and offering a series of tools that can be customised according to local contexts.

Figure 1. TELLme process and its final goal



TELLme tools and the territorialisation of the Sustainable Development Goals

The territorialisation of the Sustainable Development Goals refers to the definition and implementation of subnational and local actions by which progress is made in meeting the targets established by one or more of the SDGs, including, among others, the plans, programs and projects adopted and implemented, as well as their monitoring, evaluation and reporting processes.[50] Recent reports from international organisations show how the SDGs territorialisation have constantly increased in recent years (UCLG and Metropolis, 2020; UCLG and UN-Habitat, 2020), however, it can be see that there are still no specific tools to guide these processes from the metropolitan scale and, moreover, that most of the current territorialisation is guided by short-term political agendas and not by accurate technical evidence or prospective development scenarios.

The tools offered by the TELLme Project can strengthen the territorialisation processes by connecting the SDGs with the social, economic, environmental, cultural and institutional complexity characteristic of the twenty-first century's metropolises. Specifically, the Metropolitan Glossary and the TELLme HUB can be instrumental for territorialising the SDGs at the metropolitan scale: (i) **The Metropolitan Glossary** provides a semantic understanding of metropolises' territorial challenges, and its connection with the SDGs targets results in an interpretation of the state of sustainability; (ii) **The TELLme HUB** offers a digital platform to move from sustainability interpretation to metropolitan cartography and territorial projects, identifying specific interventions and actions to improve the state of sustainability while progressing in meeting SDGs targets. A basic sequence of steps to connect the TELLme tools and the SDGs is proposed below:[51]

50 Adapted from UCLG and Metropolis. (2020). The Localization of the Global Agendas How local action is transforming territories and communities: The GOLD V Thematic Report on Metropolitan Areas.

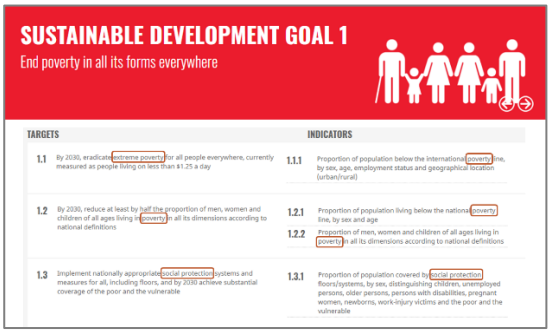
51 For a better understanding of the terminology used at each step it is recommended to review the chapters of this book where each of the TELLme Project tools are detailly presented.

PHASE 1: CONNECTING THE METROPOLITAN GLOSSARY WITH THE TERRITORIAL DYNAMICS OF THE METROPOLIS:

Step 1: Extracting keywords and related concepts from the SDGs

The first step to start the SDGs territorialisation at the metropolitan scale using TELLme consists of identifying and extracting keywords and their related concepts directly from the SDGs names, and SDGs targets/indicators, respectively. Figure 2 shows an example corresponding to SDG1 “End poverty in all its forms everywhere” in where poverty is extracted as keyword from the SDG name and extreme poverty, social protection, economic resources, basic services and resilience as related concepts from the SDG targets/indicators. Figure 3 shows the same exercise with SDG6 and SDG11 and Table 2 features a basic and initial proposal of keywords and related concepts (that can be used and/or complemented according to local contexts) for all the urban-related SDGs[52].

Figure 2. Extracting keywords and related concepts from SDG1



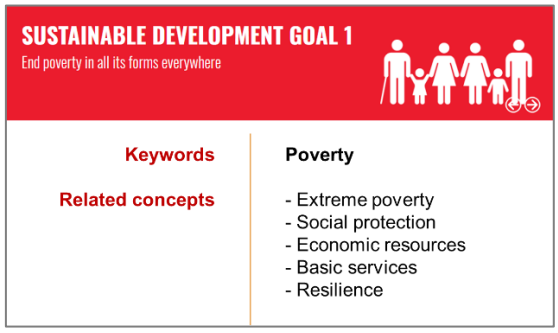
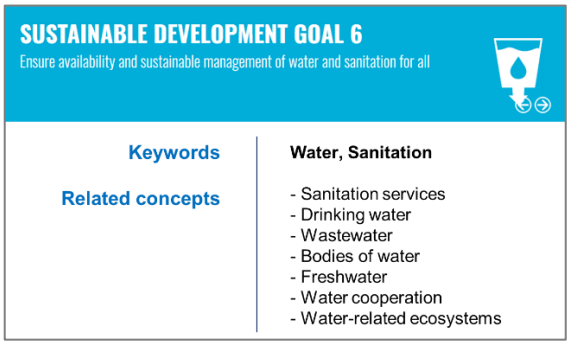


Figure 3. Extracting keywords and related concepts from SDG6 and SDG11



52 According to UN-Habitat (2020c), the SDGs featuring urban targets are SDG1, SDG2, SDG5, SDG6, SDG7, SDG8, SDG9, SDG11, SDG12, SDG13 and SDG16.

Table 2. Basic keywords and related concepts extracted from the urban-related SDGs

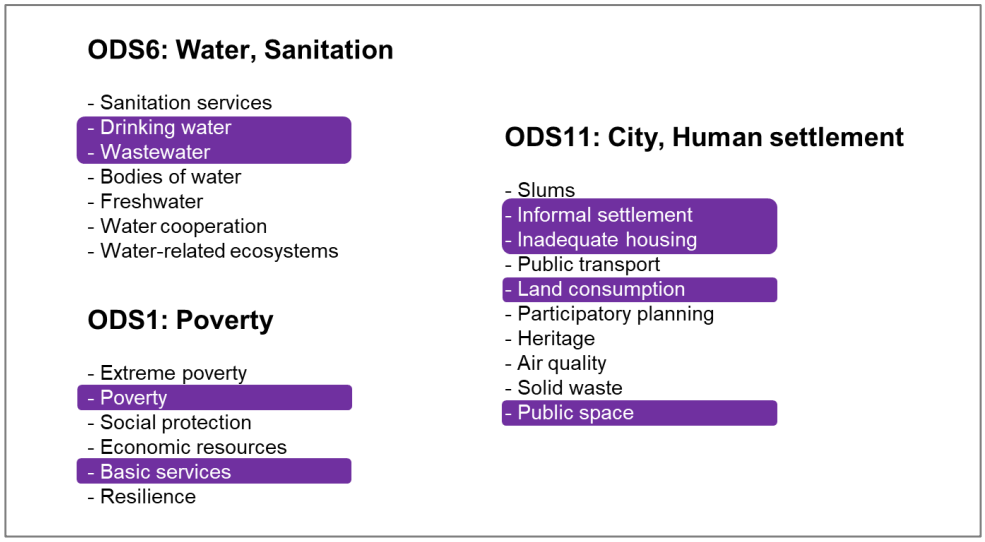
Sustainable Development Goal (SDG)	**Keywords** (from the SDGs names)	**Related concepts** (from the SDGs targets/indicators)
SDG1. End poverty in all its forms everywhere	Poverty	Extreme poverty; Social protection; Economic resources; Basic services; Resilience.
SDG2. End hunger, achieve food security and improved nutrition and promote sustainable agriculture	Food, Agriculture	Nutrition; Food security; Agricultural productivity; Food producers; Access to land; Rural infrastructure.
SDG5. Achieve gender equality and empower all women and girls	Women, Girls	Gender equality; Discrimination; Sexual violence; Unpaid care and domestic work; Social protection; Economic resources; Land ownership; Enabling technology.
SDG6. Ensure availability and sustainable management of water and sanitation for all	Water, Sanitation	Sanitation services; Drinking water; Wastewater; Bodies of water; Freshwater; Water cooperation; Water-related ecosystems.
SDG7. Ensure access to affordable, reliable, sustainable and modern energy for all	Energy	Energy services; Clean fuels; Renewable energy; Energy efficiency; Energy intensity; Cleaner fossil-fuel technology; Energy infrastructure
SDG8. Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all	Growth, Employment, Work	Economic growth; Economic productivity; High-value added; Labour-intensive sectors; Decent job; Entrepreneurship; Informal employment; Unemployment; Child labour; Labour rights; Tourism; Local culture and products; Banking, insurance and financial services.
SDG9. Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation	Infrastructure, Industrialization, Innovation	Quality, reliable, sustainable and resilient infrastructure; Regional and transborder infrastructure; Economic development; Human well-being; Manufacturing employment; Industries; Value chains and markets; Domestic technology development; Information and communications technology; Mobile network; Internet.
SDG11. Make cities and human settlements inclusive, safe, resilient and sustainable	City, Human Settlement	Slums; Informal settlement; Inadequate housing; Public transport; Transport systems; Road safety; Land consumption; Participatory planning; Heritage; Air quality; Solid waste; Public space; Risk Reduction.
SDG12. Ensure sustainable consumption and production patterns	Consumption, Production	Consumption and Production Patterns; Natural resources; Material footprint; Waste; Recycling; Procurement practices; Lifestyles.
SDG13. Take urgent action to combat climate change and its impacts	Climate Change	Resilience; Disasters; Risk reduction; Mitigation and adaptation.
SDG16. Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels	Peace, Justice, Institutions	Violence; Rule of law; Access to justice; Conflict resolution; Crime; Corruption; Effective, accountable and transparent institutions; Public services; Decision-making; Governance; Fundamental freedoms; International cooperation; Discrimination.

Source: With information from United Nations (2020b).

Step 2: Identifying zones of reading (from an issue)

The second step consists of identifying a *metropolitan issue* and characterising it through the keywords and related concepts extracted from the SDGs, resulting in a *zone of reading* for each of the associated SDGs. Figure 4 represents a metropolitan issue that involves SDG1, SDG6 and SDG11, where the zones of reading (in purple) include the concepts that best describe the problem.

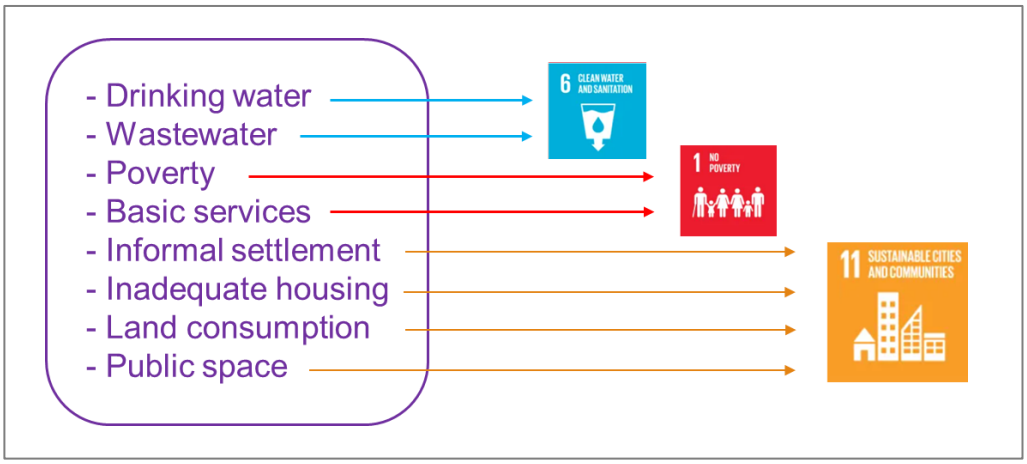
Figure 4. Zones of reading from SDG1, SDG6 and SDG11



Step 3: Composing semantic packages from the zones of reading

The last step to connect the Metropolitan Glossary and the SDGs with the territorial dynamics of the metropolis consists of composing *semantic packages* from the identified zones of reading. The semantic packages avoid silos thinking by integrating all the SDGs associated with the metropolitan issue and enabling the design of inter-sectoral actions/projects to address the problem in a comprehensive way. At this step it is recommended to perform a final review of the keywords and concepts identified to dodge possible repetitions and/or redundancies. Figure 5 shows the semantic package that describes a metropolitan issue related to SDG1, SDG6 and SDG11.

Figure 5. Semantic package representing a metropolitan issue related with SDG1, SDG6 and SDG11



PHASE 2: USING THE TELLME HUB TO PROFILE TERRITORIAL PROJECTS:

Step 4: Mapping from a semantic package

At this step the semantic packages are spatialised through the *metropolitan cartography methodology* (Figure 6). The maps can be elaborated from one or more semantic packages, representing, in turn, one or more metropolitan issues. The maps' scales and conventions are defined through the TELLme HUB which can be nurtured with the information, layers and shapes provided by different metropolitan actors. At this point it is recommended to prepare at least the basic protocol maps and the map(s) corresponding to the metropolitan dynamics represented by the semantic package. An example of a protocol map on the Metropolitan Area of Guadalajara prepared with the TELLme HUB is shown at Figure 7.

Figure 6. Metropolitan cartography from semantic packages

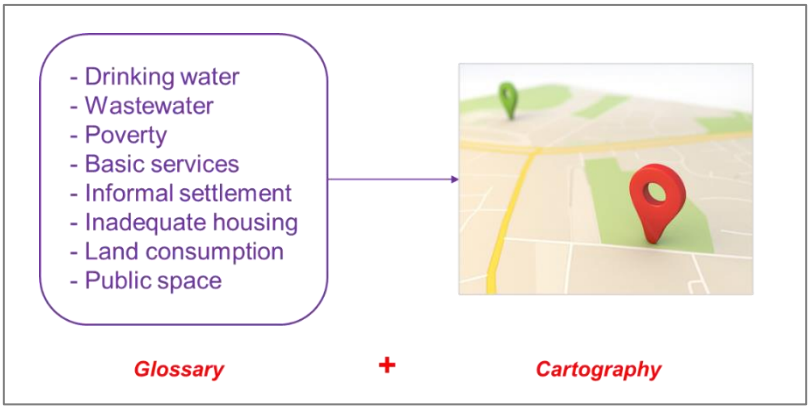
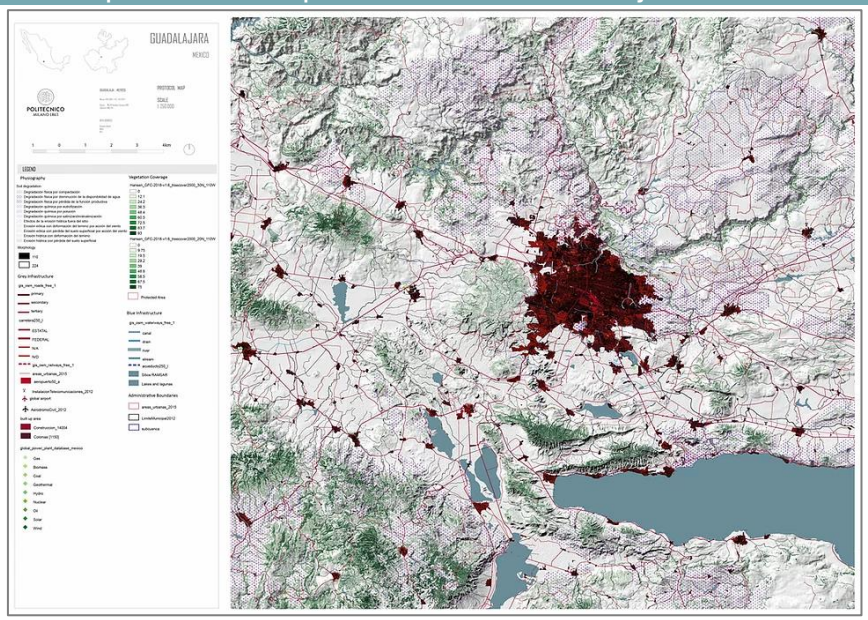


Figure 7. Protocol Map of the Metropolitan Area of Guadalajara



Source: https://www.tellme.online/guadalajara.

Step 5: Profiling the project from the cartography

The final step of the territorialisation process consists of profiling territorial actions/projects with metropolitan impact[53], which address the problems identified and whose implementation signifies progress in achieving the related SDGs targets. At this step, one project/action can address one or more metropolitan issue, in the same way that a single issue can require several territorial projects/actions to be solved. The specificity and scope of the profiles depend on each metropolitan local reality and on the institutional capacity that the metropolis has to deal with the respective implementation.

Finally, it is recommended that the entire territorialisation process be carried out with a participatory approach, involving as many actors and sectors as possible, and supported by local universities that can benefit from capacity building and methodological transfer for they to develop future territorialisation processes by their own means.

The metropolitan discipline and the way forward

As Lanfranchi and Contin (2017) explain, the metropolitan is a discipline that has been forged mainly from practice, but that needs a new body of knowledge to be consolidated, as well as a new generation of professionals who must be trained in the different areas that comprise the management of metropolises. Sustainable urban development and the quality of life of most of humanity are and will depend, to a large extent, on these new generations of metropolitanists, as well as it is for the territorialisation of the 2030 Agenda, the New Urban Agenda and other global development agendas.

The TELLme Project is a significant contribution to consolidate the new metropolitan discipline, since its tools are constituted as practical instruments to guide the work of decision makers and public servants at metropolitan institutions/authorities/governments around the world. The Metropolitan Glossary is the “hinge” to link metropolitan complexity with sustainable development and the TELLme HUB allows to face complexity through metropolitan cartography and territorial projects. Both are useful for improving the state of metropolises’ sustainability and for advancing bridging the gap between academic knowledge and the practical needs of cities, setting the foundations of the Metropolitan Discipline from both theoretical and practical approaches.

Metropolitan partners, governments of all levels and international organisations should use the TELLme tools to improve their understanding of the metropolitan phenomena, its complexity, and the ways to better manage diverse metropolitan dynamics. Academic institutions can use TELLme to nurture new metropolitan programmes, as well as to train new generations of metropolitanists on sustainable ways to manage and govern the twenty-first century’s metropolises. As said by the UN-Habitat Executive Director*: “(…) the way in which they (metropolises) are governed will have a direct impact on the lives of much of the global population for many decades to come”*.

References

Lanfranchi G. and Contin A. (2017). “The Rise of a New Discipline to Manage Metropolitan Urban Systems” in Steering the metropolis: metropolitan governance for sustainable urban development. Washington: IDB.

UCLG and Metropolis. (2020). The Localization of the Global Agendas How local action is transforming territories and communities: The GOLD V Thematic Report on Metropolitan Areas. Barcelona: UCLG.

53 A methodology to determine the metropolitan impact of territorial projects can be consulted at https://cider.uniandes.edu.co/es/publicaciones/node%3Atitle%5D-47.

UCLG and UN-Habitat. (2020). Guidelines for Voluntary Local Reviews: VOLUME 1 A Comparative Analysis of Existing VLRs. Barcelona: UCLG.

United Nations. (2015). Transforming our world: The 2030 Agenda for Sustainable Development. United Nations: General Assembly Resolution A/RES/70/1.

United Nations. (2016a). Montreal Declaration on Metropolitan Areas. United Nations: General Assembly Resolution A/CONF.226/PC.3/4.

United Nations. (2016b). New Urban Agenda. United Nations: General Assembly Resolution A/RES/71/256.

United Nations, Department of Economic and Social Affairs, Population Division. (2019). World Urbanization Prospects: The 2018 Revision (ST/ESA/SER.A/420). New York: United Nations.

United Nations. (2020a). The Sustainable Development Goals Report 2020. New York: UN.

United Nations. (2020b). Global indicator framework for the Sustainable Development Goals and targets of the 2030 Agenda for Sustainable Development (A/RES/71/313), annual refinements contained in E/CN.3/2018/2 (Annex II), E/CN.3/2019/2 (Annex II), and 2020 Comprehensive Review changes (Annex II) and annual refinements (Annex III) contained in E/CN.3/2020/2. New York: UN.

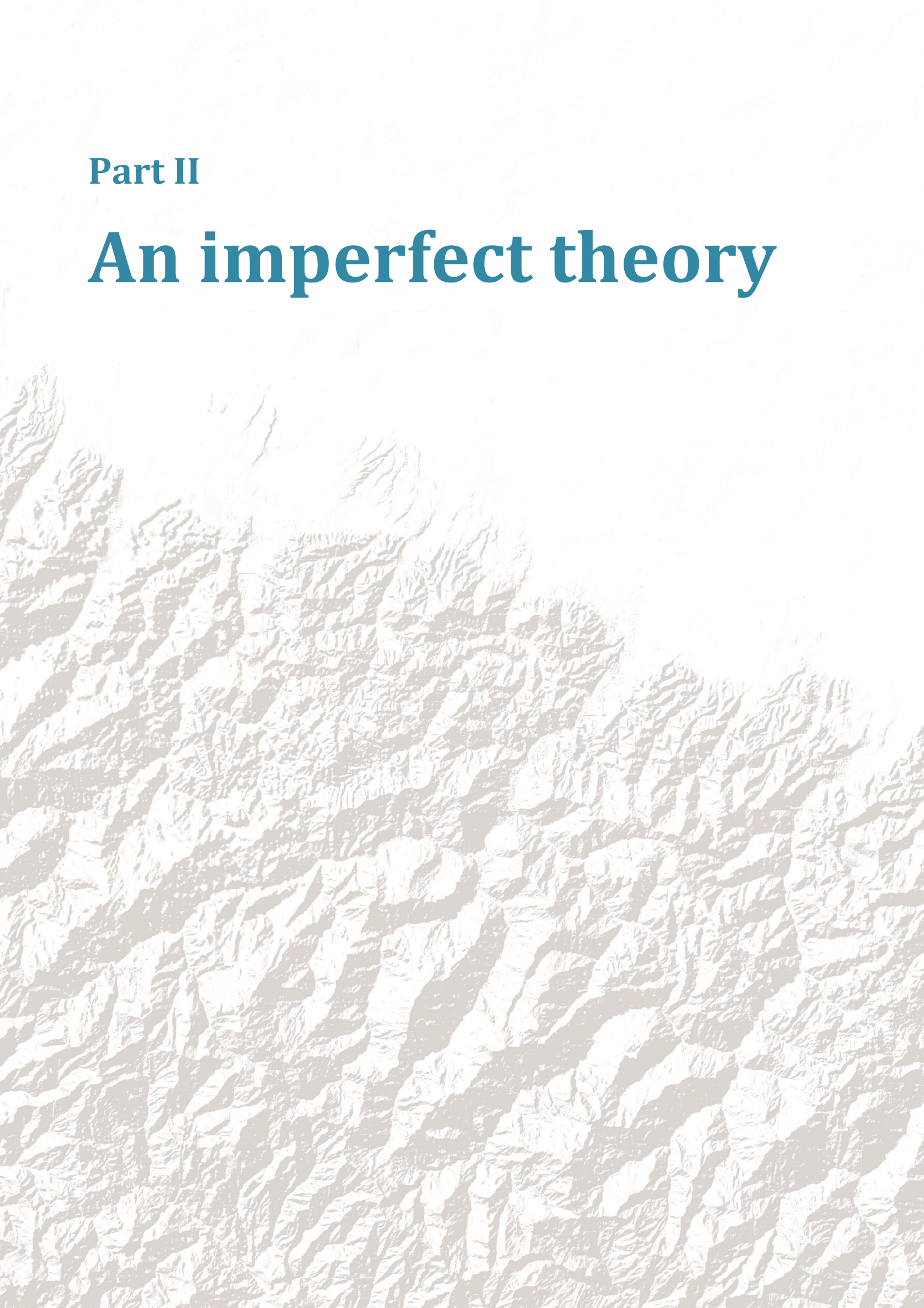
UN-Habitat. (2020a). Global State of Metropolis 2020 – Population Data Booklet. Nairobi: UN-Habitat MetroHUB.

UN-Habitat. (2020b). Governance Assessment Framework for Metropolitan, Territorial and Regional Management (GAF-MTR). Nairobi: UN-Habitat MetroHUB.

UN-Habitat. (2020c). The New Urban Agenda Illustrated. Nairobi: UN-Habitat.

Part II

An imperfect theory



Chapter one

Metropolitan theoretical approach

The metropolitan genome[54]

Pedro Ortiz
International Metropolitan Institute

Rural population is rapidly moving to urban areas. This is a result of the development process since mid-20 C. Urban areas are growing fast. Many are becoming poly-nuclear metropolises. Only 3 cities in history had reached the 700.000 population threshold. We have now 600. Much of this growth is been informal and uncontrolled. This is going to be the inheritance of the present generations to the future ones.

The uncontrolled growth is mostly due to the fact that we have a large knowledge on how to deal with cities; we have been developing urban knowledge for many years, but we lack the knowledge to deal with metropolises. The 10-fold difference in size, from a 1:5.000 scale to a 1:50.000 one, requires a different approach to economic, social, physical and institutional approach. The DNA of cities and Metropolises is radically different.

We need a Discipline of Practice, to deal with the new phenomenon of metropolises and the challenge of their management. The Physical framework was addressed in the book 'The Art of Shaping the Metropolis' (1) but we lack a general theory on how internal phenomena work and how interactions between components, sectors, instances or elements can be understood and managed. This text is the result of 25 years of metropolitan practice, where these principles were applied and whose response defined the process of conceptual building. We name it Imperfect Theory. The aim of it is to provide the first step to what we understand is the Genome of the Metropolis. Many steps lay before us in this process.

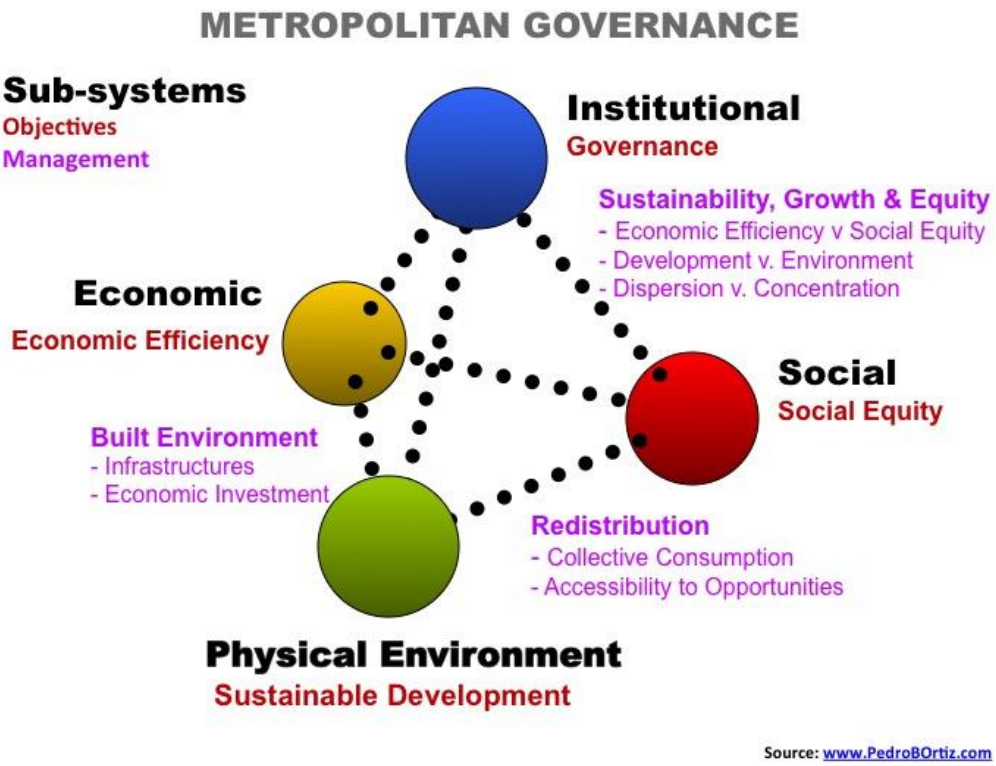
A comprehensive view on how to address a general theory of the metropolis is necessary. This is the first time this is enterprise, and thus is open to surprise, controversy, and disagreement. Nevertheless, it is a must in a foundational moment of a new discipline, as *The Art of Shaping the Metropolis* was a foundational treatise on how to address the spatial aspects of it. What follows is

54 To cite this article: Ortiz, P. (2021). The metropolitan genome. In: Contin, A., Giordano, P. and Nacke, M. (eds.). (2021). Training for education, learning and leadership towards a new metropolitan discipline. Inaugural book. Buenos Aires: CIPPEC.

the result of two weeks of discussions at the second edition of MIT's Metro Lab in January 2017. G. Lanfranchi and D. Gomez-Alvarez skillfully directed the discussions, with the participation of numerous professors and professionals, all of them among the world elite of metropolitan thinking.

Introduction

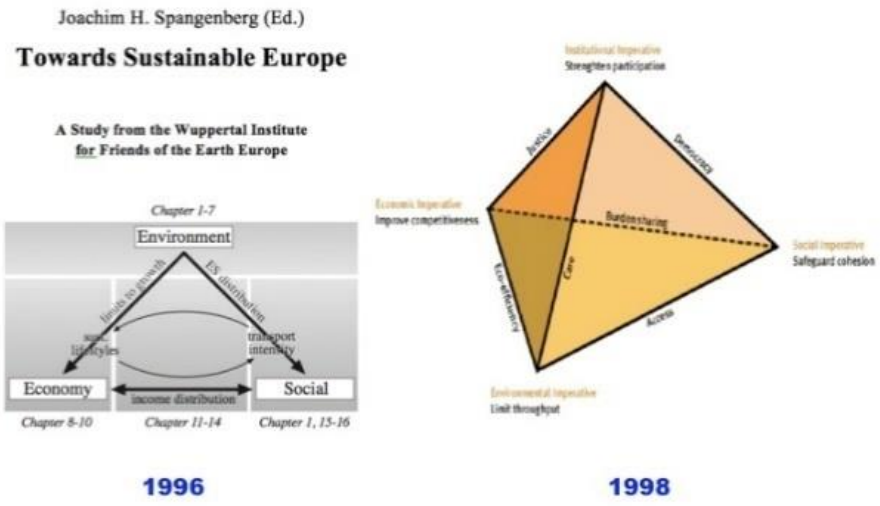
The metropolis is composed of four components: the economic, social, institutional, and physical. This was developed in *The Art of Shaping the Metropolis* and was an input to the Metro Lab discussions.



Source: www.pedrobortiz.com.

These components had their origin in two sources: 1) the European Union 4C's policy of compensation in projects, which involved manufactured, natural, social, and human capital and 2) the previous analysis of the Dutch scholars Spangenberg and Bonniot, in which they produced the pyramidal integrated approach.

Joachim H. Spangenberg and Bonniot prism



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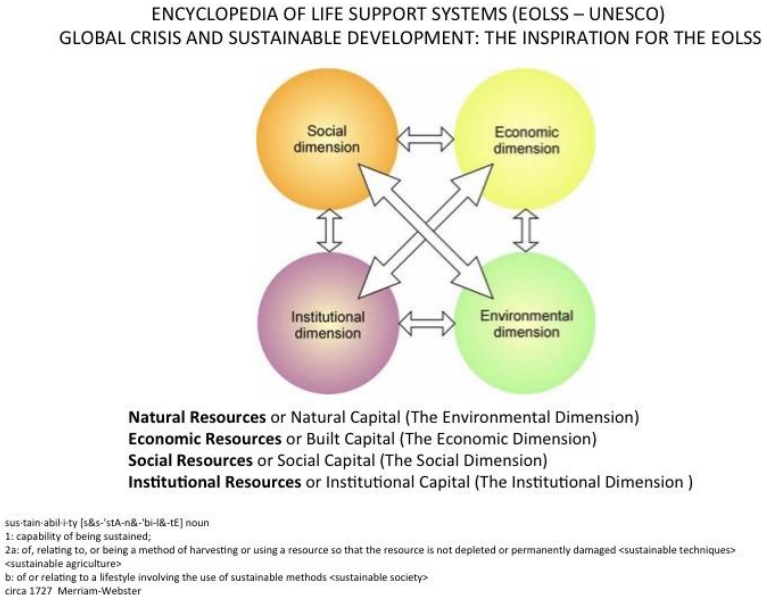
The approach was incorporated in the 1996–2016 Madrid Regional (Metropolitan) Plan built on the 5 sectors of the Physical Component. It has been extensively used in metropolitan presentations around the world. A report for the World Bank in 2010 formalized the pyramidal approach before it was finally published in *The Art of Shaping the Metropolis* (McGraw-Hill Education, 2013).

The European Four Capitals (4C's) Approach is deeply related to the four components of the metropolis.

- Manufactured Capital is the fixed capital of the economic and environmental components of the metropolis
- Natural Capital is the natural environment of each component
- Social Capital is the institutional and social resources of each component
- Human Capital are the human instance of the social capital of each component

The European Union has recently aligned their metropolitan analyses with the 4 Components approach that we are presenting in this volume.



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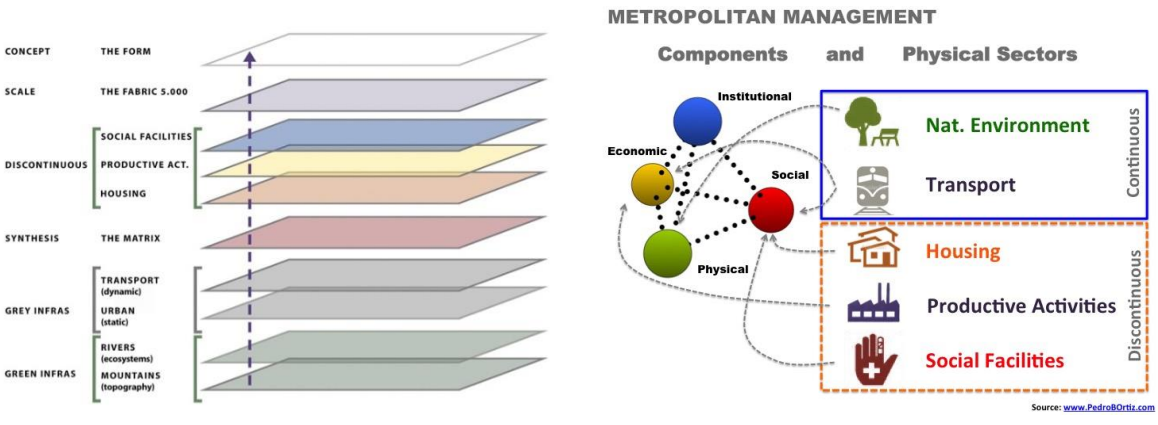
The four components of the metropolitan atom

The Madrid Regional Plan of 1996 developed this approach, especially for the physical environment component, which corresponded to a metropolitan structural plan, the outcome of the previous Madrid Strategic Plan (1988–1994).

The physical environment (natural and urban) component was decomposed into the five sectors of the plan: environment, transport, housing, productive activities, and social facilities.

The development of metropolitan architecture teachings by Professor A. Contin of Milano Politecnico MSbLab required a methodology to deal with these sectors. The methodology was produced, publicized, and applied, showing the process from the “blank sheet” of the natural environment capital to the integration of the other sectors.

That methodology has proved its resilience in multiple projects developed by Contin’s Milano Politecnico research. It has also been redesigned in the MIT Metro Lab to make it consistent with the other components presented in this paper, but its mechanisms have not changed.



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Each component belongs to a unique set of knowledge and disciplines, and each discipline has named the elements of which it is composed in different ways:

- (Classical) economists have named the elements as **factors.**
- Planners have named them as **sectors.**
- Political scientists have named them (after Montesquieu) as **branches** of the state.
- Psycho-sociologists (such as Jung) have named them, as Freud did, **instances**.

We respect those wordings, even as we understand them in a homogenized way as **elements**.

1) The economic component

We start with the economic component, as it and the social component are the basic long-term strategic objectives that feed the physical and institutional components. These later ones are the trays in which to serve the metropolitan plate. The capacity to produce (economy) and the capacity to share (social) are essential components.

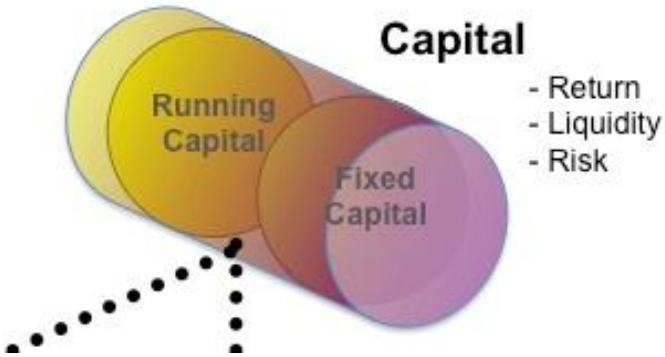
Classical economy defines three factors of the production process: capital, labor, and land. Entrepreneurship has replaced land in the writings of modern liberal theorists, and we have adopted this approach.

That, however, is not enough. Each factor has internal sub-elements that must consciously be taken into account by metropolitan analysis and management theory. This is because the policies concerning these sub-elements will shape the success or failure of a metropolis.

1.1 Capital

Capital has three determining factors: return, liquidity, and risk. The metropolis must attract capital to multiply its capacity to produce wealth. If metropolitan policies are to attract capital, they must produce the following three features.

- **Risk**: Reduced risk. This implies a strong and sustained vision of the future, a strategic vision of that future that is trustworthy and resilient to political differences and shifts.
- The highest **return** possible. This is especially so in our globalized and competitive world, in which capital moves from metropolis to metropolis, from country to country, from continent to continent. If the metropolis cannot offer an internationally competitive return for capital, capital will go elsewhere. Only when social policies would be at risk should the potential of return be jeopardized.
- An attractive **liquidity**. The metropolis does not want invested capital to flee. Allowing it to do so could precipitate an economic downturn and degrade the capacity of the financial base to comply with loan commitments and budgets. On the other hand, liquidity is an asset when trying to attract capital. Providing security to investments can facilitate this possibility, which is necessary to attract capital.



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Capital is composed of fixed capital and running capital. The distinction between the two is important in metropolises, as infrastructure and the built environment, especially economic facilities, are essential for efficiency. The accumulation of fixed capital has a multiplier effect on the productivity, efficiency, and the GDP of the metropolis. GDP must be shared by means of social policies to reach all levels of social and personal needs and across all levels of income, essentially the lower ones.

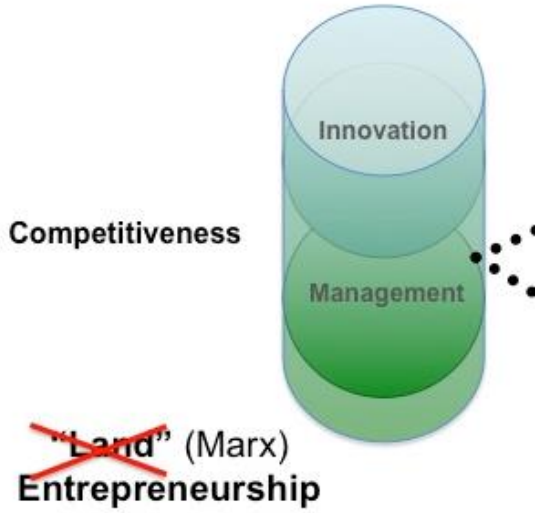
Running capital is necessary to maximize efficiency. It is not a metropolitan objective, unlike fixed capital, and should be proportionate within a management efficiency focus.

There is some misunderstanding in the academic world on metropolitan fixed Capital. Edward Glasser, author of the populist book, *The Triumph of the City*, stated in 2012 at the World Bank: “Urban Transport can be summarized in four words: ‘Buses good. Trains bad’.” His message was that flexibility is necessary for adapting to changes of needs (bus routes are much easier to change than train tracks). Following up, someone then asked if he then supported buckets instead of pipes for water provision.

Fixed capital, intelligent and productive fixed capital, is the wealth of metropolises. If you have any doubt, compare London, Paris, or New York with Lagos, Bogota, or Manila.

1.2 Entrepreneurship

Classical economics identified land as one of the factors. Although land is an essential asset in a metropolis, it was identified as a factor of capital later and has since been replaced by entrepreneurship. Marx did not grant value to entrepreneurship, as he conceived value as being created by labor, not management. In the end, entrepreneurship is a factor that is relatively more difficult to grasp, but it is nevertheless essential for the production of wealth.



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The objective of entrepreneurship is to produce goods that will be able to compete in the market at an advantage. The last 50 years has been a time for cheap labor to produce competitive goods. Not anymore. Innovation is increasingly replacing cheap labor. In a more sophisticated market that is looking for outstanding products, it is not price but performance that is the ruling factor. Innovation provides for a temporary monopoly and supply control over price produce substantive returns.

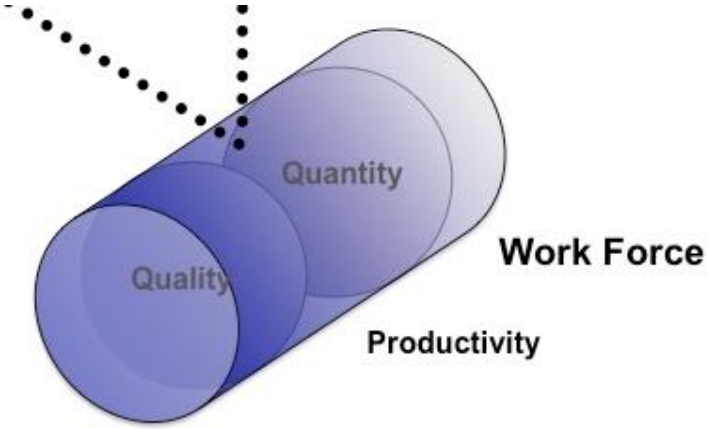
Entrepreneurship is essential for the advanced economies (Europe or the USA), where the extra cost of the welfare-state social provisions and wages, an extra 30% cost to production, must be balanced by innovation. This is the only way that these economies can maintain their actual status.

Competitiveness is thus achieved by the professionalism of sound and solid management and the innovation capacity to stay ahead of others in the production of wealth. That extra capacity enables the social advantages of advanced economic nations and metropolises.

How to create an ambience for innovation, not to be mistaken with research, is one of the fashionable issues most discussed in trendy international conferences. Important as it is, however, it should not be sought to the detriment of other as important and integrated issues. The smart cities movement, a commercial strategy, is part of this trend.

1.3 Workforce

Productivity is the desired economic outcome for the workforce factor. **Quantity** is obviously a significant objective. But we are not talking about the size of the population of the metropolis, we are talking about the elements that define the character of the workforce: active population, age, part-time/full-time availability, hiring conditions, working schedules, etc. We obviously include in this category the social conditions of the working force and the struggle to increase both the welfare-state provisions and the productivity of the workforce.



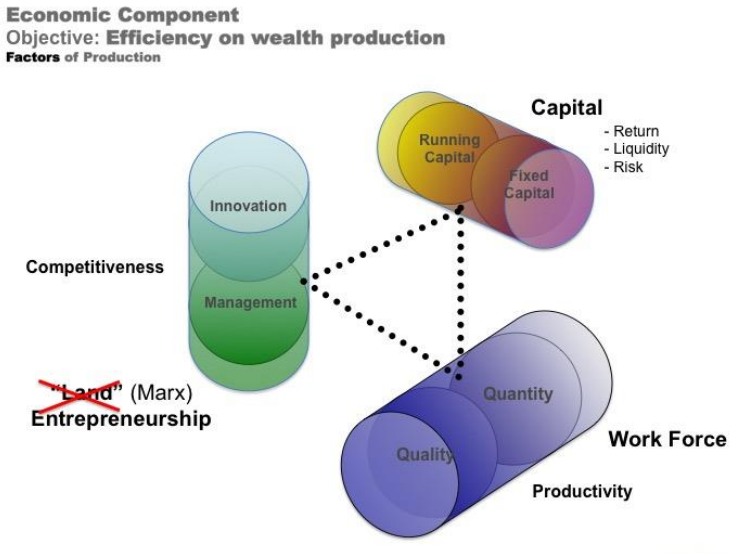
Source: www.pedrobortiz.com.

Quantity is obviously not the driving force for productivity. In an innovative and competitive world, **quality** is the driving element. Quality takes us to the formation, skills, and education of the workforce, which is directly related to the social component of the metropolis. A highly educated population and with a value system (Social Resources element) that endorses a strong work ethic is an asset (e.g. USA, Germany, etc.) For now, however, let us account for the relevance of workforce quality in the competitive output of the economic proceedings and wealth production.

1.4 Interaction of economic factors

Interaction is complex. For maximum efficiency, the blend requires the full benefit of economic knowledge. That, however, is beyond the scope of this basic metropolitan approach.

The interaction among the three economic factors is what produces either wealth with the maximum efficiency or a suboptimal output. If we could quantify the three factors in a metropolis and assign each to an axis (x, y, and z), the product of the three values would correspond to a volume that would indicate the economic efficiency of the metropolis. As a matter of fact, this indicator of economic efficiency is an alternative way to quantify the GDP of the metropolis.



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2) The social component

The European 4C's approach noted a distinction that is essential for understanding the mechanisms of a metropolis, if not a country. It sees a difference between human resources and social capital. The approach fails, however, to specify the institutional and governance elements, which it tacitly includes in the social capital concept.

The metropolitan tetrahedron has reshuffled this approach slightly, but keeps the right concept proposed in the European 4C's model. The human resources and the social resources are part of the same social capital component as human resources. The institutional setting and governance proceedings, however, are included in a different component of their own. Obviously, it is closely related to the social resources element. As close as human resources and workforce elements can be, or as fixed capital and infrastructures are as well. That is the strength of the integrated component analysis and toolkit we are presenting. The concepts discussed are as integrated as metropolitan knowledge and management must be.

The social component is thus made of two elements. In honour of Erich Fromm and his Freudian extrapolation of psychic analysis to social dimensions, where entire societies have a subconscious, we shall use the Freudian term of 'Instances'. The social component of the metropolis has two instances: human resources and social resources.

- Human resources are the accumulation of knowledge and needs of the individual members of the metropolis
- Social resources are the proceedings and interactions of the individual residents of the metropolis. They can foster either positive or negative output.

Human resources are the summation of the metropolitan residents. Social resources include a multiplication factor that these members can achieve by their attitudes toward collaboration and fairness. Human resources are just the adding of individual value. Social resources represent the value system of that society. They either enable or hobble the society in its effort to enlist its members for a common cause.

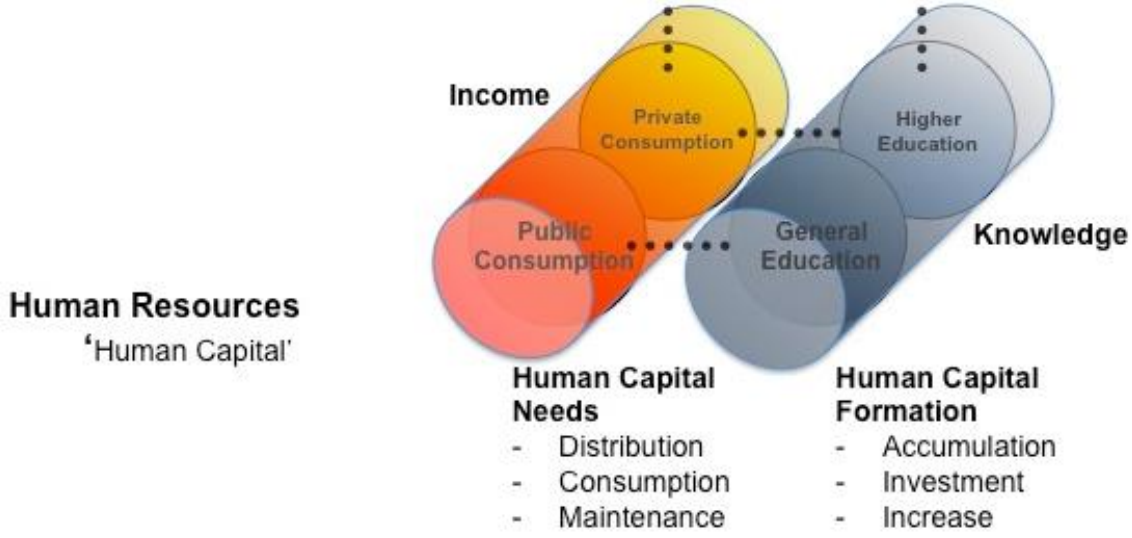
Social resources are extremely relevant It is an essential capital yet difficult to grasp.

- Human resources can be built up with time and money. If you need 50 more engineers, you promote 50 new students to get an engineering degree and post-degree practice; soon, you will have the 50 new engineers you need.
- Social resources are more intangible. How can you change the work ethic of a metropolis so its professionals do not enter a negotiation with cheating in mind? This is a social system of values that can evolve only from inside. This does happen, but who controls it? Who watered the seed of corruption in the public and private sectors? Did anyone control it? It was the outcome of the disruption of the collective Id and the dissolution of the collective Super-ego.

There are countries that are rich in human resources, but poor in social resources. They will be unable to address a challenge. For instance, we can compare the reaction of different societies.

2.1 Human resources

The human resources instance is composed of two elements: production and consumption. The individuals in a society need to produce and need to consume.



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- Human Capital Formation: Human capital must be prepared to feed the needs of the economic machinery. That may sound harsh to charitable ears, but it is the harsh reality. The population must be well prepared to produce wealth and to share that wealth. No wealth to share, no social policies to promote.

In Western European culture, there have been two ethical approaches to knowledge and education. For the Roman/Latin cultures (appendix), knowledge was a gift from God and thus one had a right to reach for it. You could learn whatever you were interested in. Once the social welfare state was introduced by social revolutions, learning became free, and thus you were allowed/entitled to learn whatever you felt interest for, irrespective of whether that investment in learning was useful for the society that was paying for it. That was the rationale for the Latin countries. The budget was the limit.

For the northern, Anglo-Saxon cultures, if the tribe paid for knowledge, the tribe had to benefit from that expenditure and acquisition. Knowledge was provided in the areas and at the scale society required. In the struggle of pragmatism versus idealism, pragmatism has won. The world is following this second path. Knowledge must be useful and societies need that knowledge to thrive.

The metropolis requires knowledge in specific areas, at the right numbers, and at the right intensity. The vision of the metropolis, its strategy for the future, will define those area, numbers, and intensity.

We need individuals that will have simpler tasks, which are as important as any, but that will only require only basic education. And we need individuals specialized in the areas the strategy of the metropolis requires.

The extent and share of the human capital formation will be balanced by the needs of the metropolis and its vision for the future.

- **Human Capital Needs:** People have needs. Sometime they can convert these needs into demands (e.g. housing). That is because they have the money or the income to pay for it. They are therefore able to participate in the private consumption market.

Often, people don't have the economic capacity to provide for their own needs. Then needs must be provided with public help. The ethical argument should be good enough, but we can provide an additional argument: The workforce must be maintained for the economic machinery to work, and to work efficiently. If the workforce has neither adequate health care nor education, the economy will not produce. And there is a further argument for the unbelievers of social equity and justice: An under-serviced population will come to a level of social unrest that the whole economic machinery

will be at stake. So let's understand that social equity is not for the benefit of the beneficiaries, it is for the benefit of all, on moral idealist grounds as well as on pragmatic economic grounds.

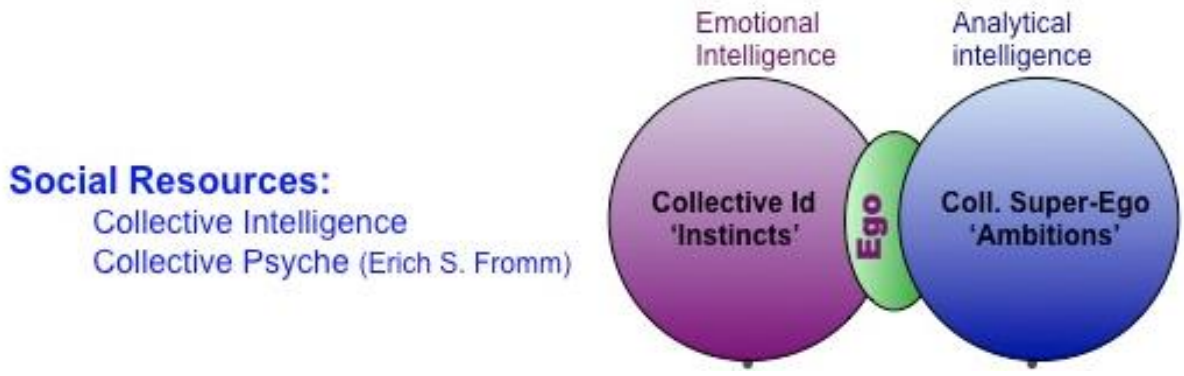
Although it is a matter of the Institutional Component, let us indicate here that providing for public consumption can be realized by subsidizing either the supply or the demand. The public administration can fund either the social service directly or a management company that will enable the individuals in need to access the service(s) through the private market. This significant aspect of metropolitan management is often distorted by ideologies and personal interests rather than being driven by rationality. Our purpose here is only to indicate the significance of the issue.

2.2 Social resources

We do not have an extended theory of Social Resources. Some call it 'Collective Intelligence'. We can have a double approach: Empirical or Neo-Platonist. Something similar to the Perception theory where the two mainstreams The Viennese Gestalt Theory and the Chicago Mosaic one present alternative approach. This time we have the Collective Intelligence (Empirical/USA) research of New School and MIT on one hand, the Collective Sub-consciousness (Neo-Platonist/Europe) of the Viennese school on the other.

Our stand is that social resources are the psyche of a social group. Erich Fromm wrote about the collective subconscious, extrapolating Freudian instances analysis to social groups. We shall take that road in a more long-running path, waiting for a more extended proposal that will reflect this reality of social resources or collective intelligence.

Social resources or collective intelligence is the capacity of a society (such as a metropolis) to perform better than a similar society with similar human resources. Let me explain it this way: Two engineers have the same human resource value in whatever society they belong to. Two good engineers are worth 2 whatever in country A, B, or C. But depending the country, their value in terms of social resources will be different. In country A they might produce 2.5, while in country B they might produce 1.5, and in country C just 0.5. That is the factor (multiplier) of social resources.



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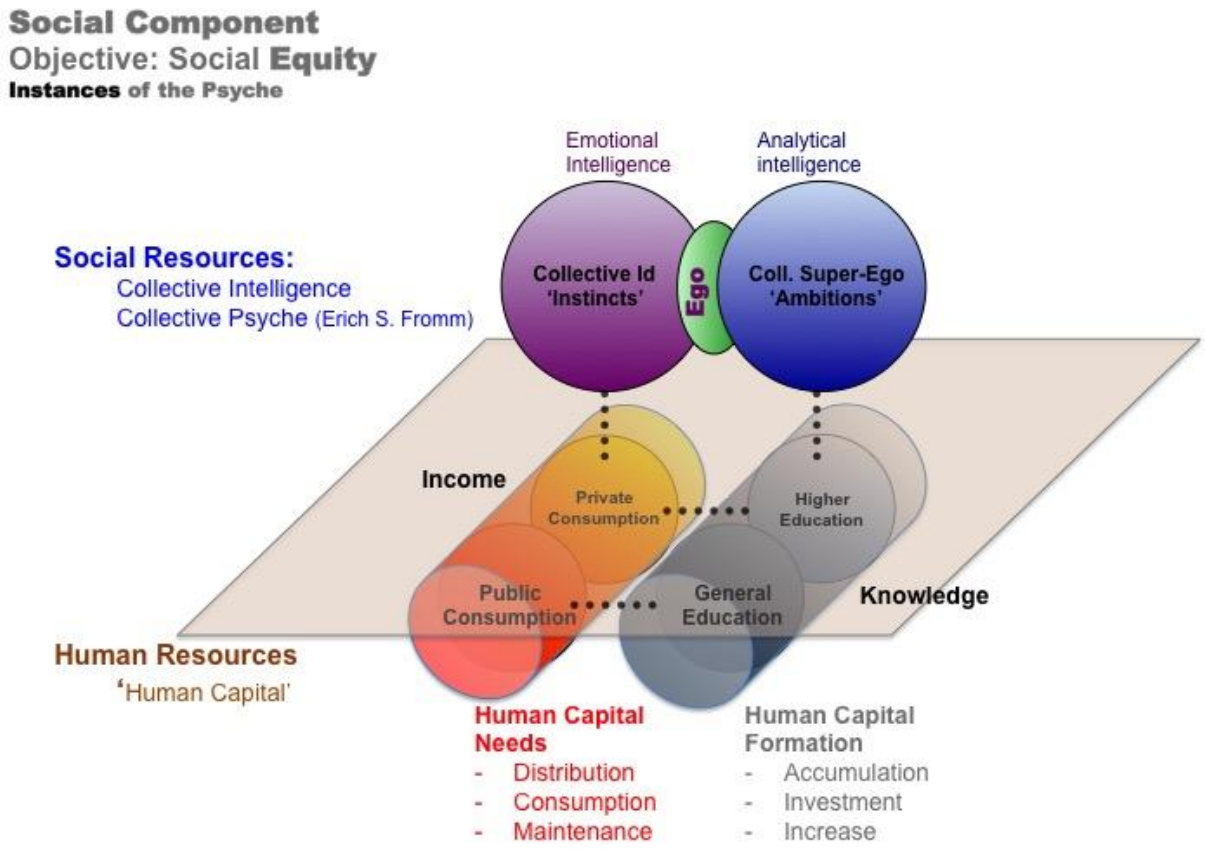
Why? Because in country A they will know how to work together and share responsibilities in relation to their specific skills and capacities, and they will share the outcome in a fair way. This is teamwork as taught in British public schools and German gymnasiums. They will produce more than they would have on their own. They will produce 2.5 instead of 2.0. In country C, one of the engineers will receive the commission and then will make the other do the work and will give him only a small share of the resulting income. The cheated engineer will under-motivated and the output will be worth 0.5 (and paid 0.3) instead of his potential human resources 1.0 output.

What makes the difference between a 2.5 to a 0.5 output is not human resources, it is social resources. And that is an essential difference among metropolises even if they have the same human capital or the same fixed capital. Neither of them are independent from the collective intelligence of other decision-making procedures and means.

2.3 Social resources: the neo-Platonist Viennese school

How this difference can be interpreted or researched? The three instances of the psyche are the Id, the Super-ego, and the Ego. To make things simple, the id is mostly our survival instincts, the Super-Id are the ambitions and moral rules that we try to realize in our behaviour. Both have conscious and subconscious aspects. As a matter of fact, most of it is subconscious. In between, trying to address the confrontation between instincts and ambitions is the Ego. He rarely succeeds, but he tries. If he does succeed, he will have a stable balance between the antagonist forces. He will be able to feed/please the id at some moments and make that compatible with pleasing the Super-ego. If he doesn't, the subconscious realm will punish with anxiety. This is what we call neurosis.



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To wrap up all Jung and Freud theory in a paragraph is quite ridiculous, but we want to present the basic framework for those who do not know and let those who do know think for themselves.

How can we apply this collective psyche to the metropolis's social resources-collective intelligence?

- The metropolis has conscious wishes for improvement and efficient production. When it creates strategic plans that is obvious. Strategic plans reinforce this **Super-ego** base. But even when they have not developed this formal dialogue, there is a whole set of subconscious dialogues that derive from the ambitions of the metropolis.
- Metropolises have undeclared instincts, their **Id**. It strives for uncontrolled consumption and disruptive social forces. Collective emotions, as dangerous as we know them to be, are part of the metropolis's id.
- The Ego tries its best to mediate. Assaulted by the Id and the Super-ego, it sometimes wins and sometimes loses. The open consciousness of the metropolis of its identity is often addressed,

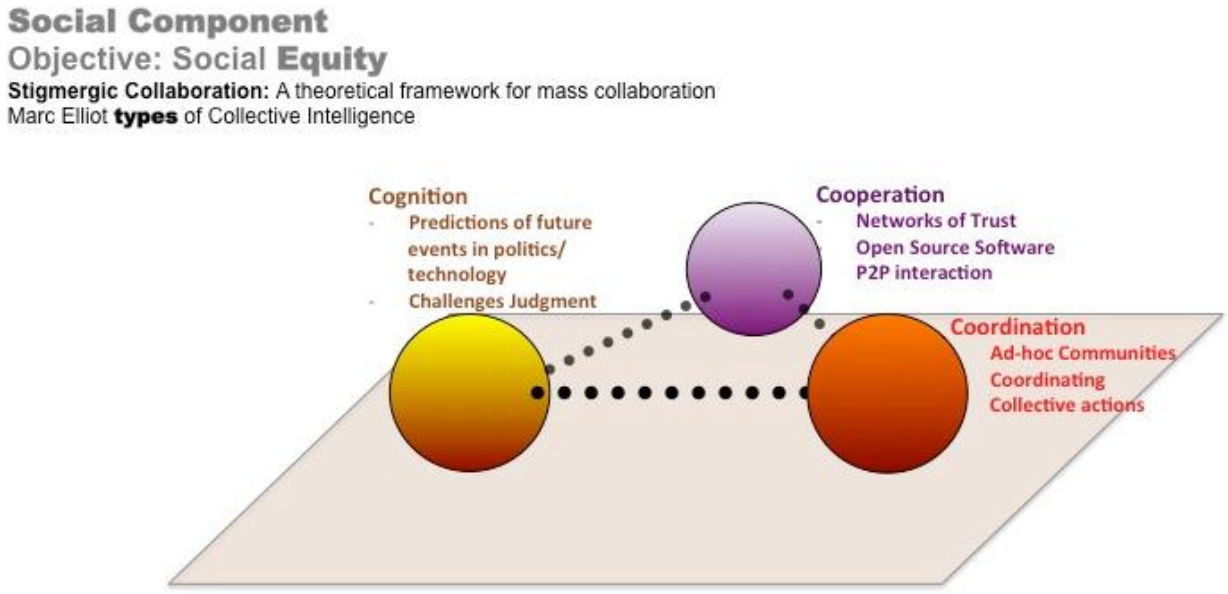
especially by the media. But the **ego's** actors are mostly the public institutions through the governance process. We are moving thus to the institutional element of the metropolis.

Question: In what field do football teams play? Id, Super-ego or Ego?

The ambitious aspects we supposed to be related to education and knowledge, and the survival instincts behave beyond 'limits'. That is why we have linked the Super-ego to the formation of human capital and the id to need for human capital.

2.4 Social resources: the empirical USA school

Collective intelligence, as the American approach use to call it, is the brand-new concept of the Genoma. It is currently under research. When confronted with societies with poor Institutional capacity, often misunderstand it as a Governance issue. It does have effects and impact on the Governance dialogue, but the roots are not there. The roots are in the lack of a sound Social Resources/Collective Intelligence capital (SRCI).



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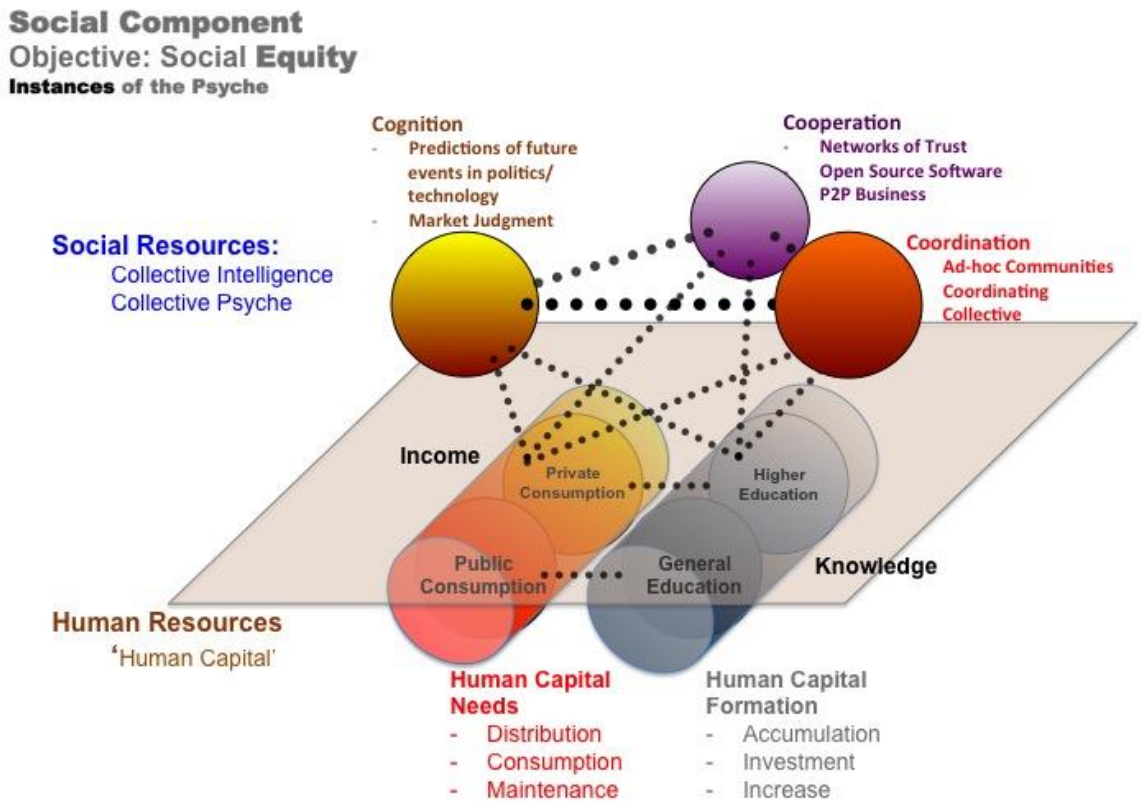
As a field of research, there are alternative theories approaches that are under discussion. We just saw the Jung approach (Neo-Platonist- Conceptual integration- Integral calculus). There is an alternative approach to collective intelligence: the M. Elliot one (Empirical – Accumulation of experiences – Statistical mathematics).

Mark Elliott, among other members of MIT Center for Collective Intelligence are doing research on the Genome of Collective intelligence. According to Don Tapscott and Anthony D. Williams, collective intelligence is mass collaboration. In order to happen, four principles need to exist:

- **Openness**: Sharing ideas and intellectual property.
- **Peering**: Horizontal organization more effective than hierarchical management for certain tasks.
- **Sharing**: Sharing can bring outcomes and synthesis faster.
- **Acting Globally**: A globally integrated thinking has no geographical boundaries and may access new ideas and paradigms.

New literature is well underway every year and we have to refer to it to keep up with the subject. For the purpose of the Metropolitan Genoma we integrate this as an empirical approach using Marc Elliott stigmergy research.



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The Collective intelligence would be composed of three **Types**:

- **Cognition:**
  - Predictions of future events on politics and technology
  - Challenges judgment
- **Cooperation:**
  - Networks of trust
  - Open-source software
  - P2P interaction
- **Coordination**
  - Ad-hoc communities
  - Coordinating collective action

These typologies are very relevant for managing the Confederative approach to Metropolitan Governance.

We are aware that both approaches are highly controversial. Both are highly disputable analysis and proposals. We must be open to discussion and we must foster research on this very important and necessary field. Integrative research if possible though the two alternative approaches, Neo-Platonism (Plato) and Empiricism (Aristotle) have not reached that synthesis in the last 2.350 years.

We keep hopes high as it is, as we see, essential for metropolitan success. In the meantime, if metropolitan managers find any of both approaches useful, aims will have been fulfilled.

2.5 A critical approach to the concept of the common good expressed by North Europe and North America neo-liberalism

So far we have represented the reality of a world that is based on the dominant Capitalistic Nordic model different from the sensitivity and spirituality of the culture of countries whose matrix is Latin, Catholic and not Calvinist. The two approaches appear to be antithetical to some of their traits. In particular, the world of the southern Mediterranean is wary of the idea that wealth is a sign of election, of the idea that rationally targeting only one's own profit is the best service to collective prosperity.

There is a different biodiversity among the forms of economy in Europe. Doing business is different.

The “economic machine” of neoliberal capitalism of North Europe and North American origin is a machine of destruction of social bonds that tends to create a world where there are no friends (Massimo De Carolis (2017). The Inverse of Freedom. Sunset of neoliberalism and discomfort of civilization, Quodlibet Notebooks).

For the Latins, instead, the common good is not the sum of the interest, on the contrary, something must be given up for the common good. The common good must be sought directly and intentionally, not left to the indirect game of interest. Intentions are important and must lead to the direct pursuit of the good of all and not of each one. In northern Europe, from a theoretical point of view, the difference is that for Smith, for example, the idea of the common good is entrusted to the interaction of private interests.

Today, the ambition of neoliberalism to become the model of absolute government has foundered. It is a machine that has internal dysfunctions so much so that the market, which claims to provide maximum security against the uncertain future, instead generates a growth of endemic insecurity that leads large strata of the world's population to what Hobbes called the state of nature: poor, miserable and short. This well recognized reality today gives strength to alternatives, to a different model of political economy than the liberal economy.

We still need to try to understand what Smith's deep-seated motives were for appealing to the common good, and for relationships between friends. His distrust actually stems from the idea that relationships between friends appear as asymmetrical and power-soaked relationships.

They depend on the benevolence of those who exercise a condition of power (we can think of the monarch's power) over those who hope, submitting themselves, to be freed from a situation of fear and uncertainty.

The neoliberal market economy is based on the false idea of the perfect market (based on contracts and civil rules) that produces value and is not bound to the power that of this perfection is the exact opposite.

The market is thus understood as the liberation from unchosen hierarchical relationships; and who better than the Mediterranean peoples could hope that this will be accomplished? But unfortunately market and political dynamics are deeply linked, that is, it is not true that the market is neutral with respect to power. On the contrary, today it is more and more supported by a strategic or predatory calculation that has a speculative structure where value and power are continuously and simultaneously at stake. Economic value and political power are two different measures of the same magnitude are social attributions of power to people and institutions that can guarantee us an effective response against the fear of insecurity.

Today, instead, we have to build a market economy in which the two moments: market value and ethical power, through the governance that knows how to be the ethical axis of society and the transformations of the city, know how to stay together by doing what Keynes had hoped, namely that

if the market works well it must defeat the dark forces of time (Bruni, Becchetti, Zamagni, 2019). Nothing seems truer today.

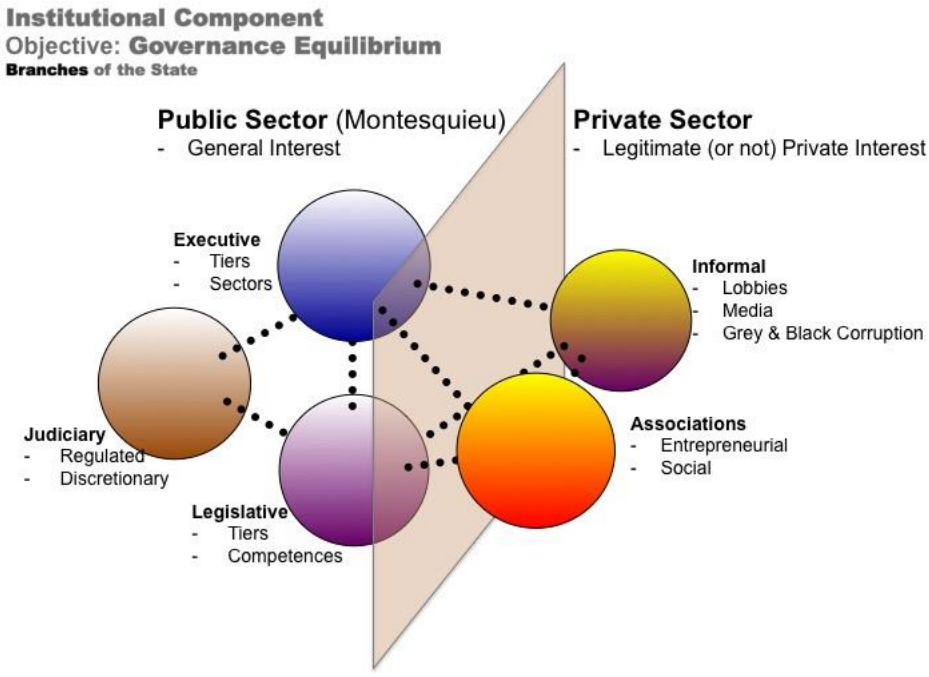
3) Institutional component

We must understand that the economic objectives of efficiency are constantly conflicting with the social objectives of equity. We have many professional techniques to maximize efficiency and many techniques to share equity, but we have no technique to balance the two.

This is because the balance between economic efficiency and social equity has so many subtle aspects that there is no rational approach to blend them all. And some of those aspects are not technical, they are ideological and ethical. That is why there is no technique for it. It is a subjective balance, and professionals are not the ones who should make it. It is political, and so the results of elections should produce that sharing, that balance.

In evolved democracies (not the tribal ones), some parties suggest the balance should favor economic efficiency, while other parties suggest the balance should favor social equity. The population sometimes votes for economic priorities and sometimes votes for social priorities. Such are the result of elections, with priorities adapting to new challenges and changing circumstances. Metropolitan management must be able to absorb those changes and be adaptable. That is the purpose of the variable geometry and the sliding horizon techniques.

Concerning the governance component, especially for the government side of it, there is plenty of literature. Montesquieu's (1689–1755) works are still at the core of all democratic nations. The separation of powers: legislative, executive, and judiciary, are to be found in all Western-influenced democracies. The Chinese are trying to find an alternative to Western parliamentarian democracy that would fit other world cultures. We will follow with interest these studies and attempts, as they are a must for China's growth beyond the $24,000 GDP threshold, into high-level development.



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3.1 Public sector: government

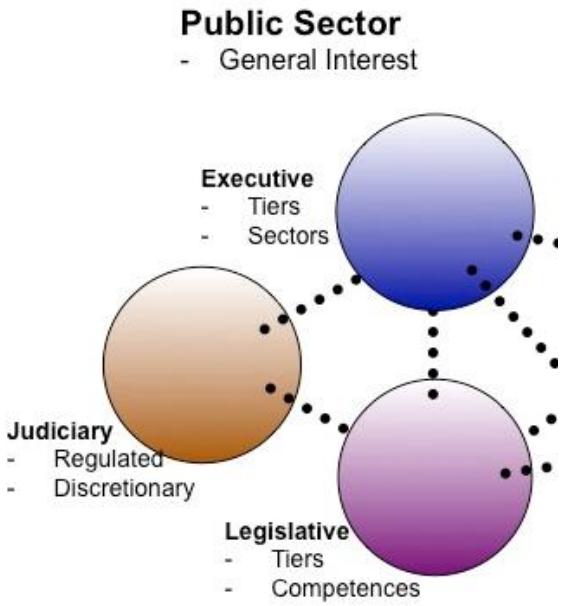
There is little need to go through that literature. For metropolitan purposes, I will only point to these issues:

- The executive branch is divided in sectors that deal with the different aspects of government. They are the ministries. They will be the sectors that a decentralized or devolved metropolitan government will need (see “Metropolitan Governance Stripped Naked”).
- The legislative branch is developed in tiers depending on the structure (confederate, unitary or federal) of the state. Depending on the system, the legislative tiers will have different competences:

  - In the **Confederal** state, sovereignty is kept at the ‘local’ level, and the legislative branch is preeminent. Some aspects are assigned to the ‘federal’ congress, but these can always to be drawn back by the confederate powers if they decide so.

  - In the **Unitary** system, all sovereignty is at the central legislative body. Some might be decentralized and play more the role of executive control than legislative functions.

  - In the **Federal** system, competences are well allocated to the different tiers of government. The middle tier, the one that corresponds to the ‘states,’ sometimes includes metropolitan states such as Bremen, Hamburg, and Berlin in Germany. These have a very clear responsibilities and competences defined in constitutions. This will be the ultimate framework for metropolitan devolution, not sovereignty, for future working metropolises.



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3.2 The private sector: governance

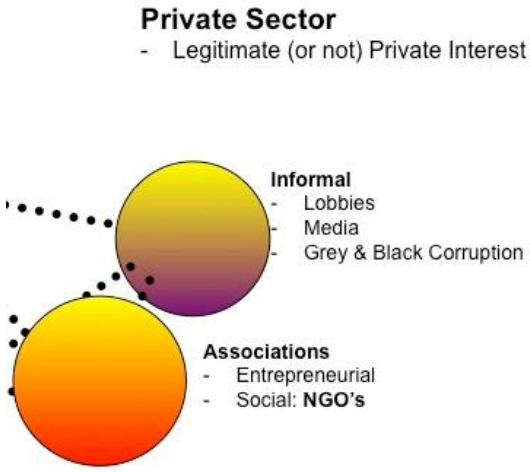
Scholars have produced much literature on governance in the past 15 years, making governance studies fashionable. Some academics, institutions, and multilaterals even consider governance as a kind of philosopher’s stone for metropolitan management. Important as governance is, however, it is a mistake to start all metropolitan management from a governance perspective.

Governance is a tool for a purpose: **Equilibrium** among the three legs (economic, social, and physical) of the metropolitan stool. This is a concept developed by the Madrid Metropolitan plan and

was published in The Art of Shaping the Metropolis. It has been well taken over by scholars, although without attribution. The risk of focusing on governance to the exclusion of other perspectives is like designing a tool without knowing the tool's intended use. You might end up with a hammer or a pizza cutter when what you need is a screwdriver.

Governance is the dialogue between the government and civil society. Latin countries—built on the power of a centralized government, as the outcome of the figures of the emperor or the king, even if transformed by republicanism—have a tendency to minimize the involvement of the private sector and the social culture in policy making. The public-private dialogue of governance is more of an Anglo-Saxon cultural innovation. We must appreciate this leadership.

- Informal Dialogue: The issue then becomes how to articulate this dialogue. In any society, it is informally articulated. The problem is that informality, centuries old, can facilitate corruption. The means that the powerful or wealthy use to influence political decisions are well known. These would be providing either indirect benefits and backing (media promotion of a politician, financial backing of a politician's activities, lobbying for politician's career, etc.) or by direct benefits (also known as bribery). Such pressures from the private sector go as deep as history goes. Let us suggest alternative names for these two procedures: gray corruption, when the compensation is indirect, and black corruption, when direct bribery is involved.



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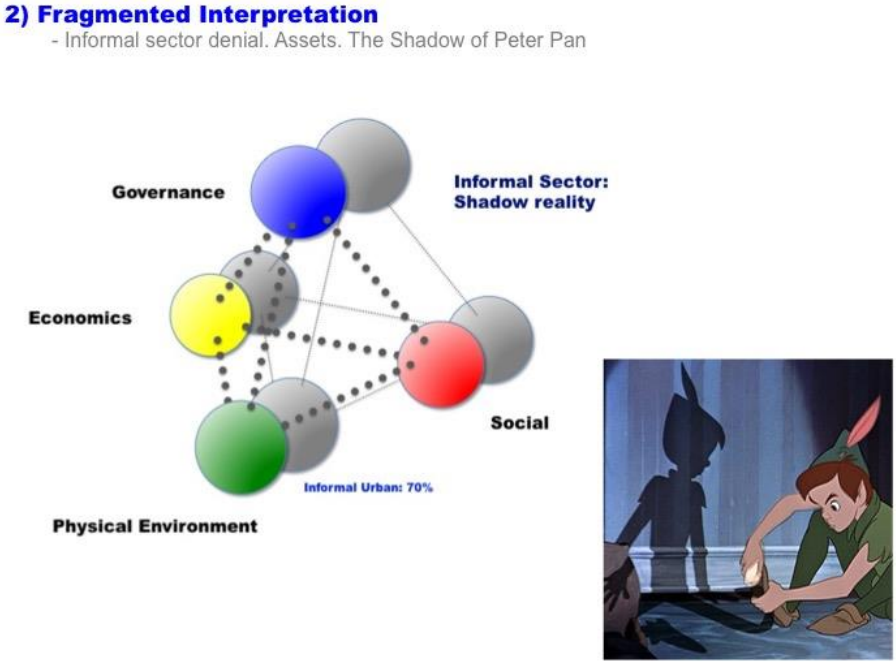
- Formal Dialogue: The issue is how to establish the dialogue in such a way that you can avoid, or minimize, the informal pathways that can lead to corruption. The way to do it is to formalize this dialogue; conduct it through established institutions that represent diverse interests and that have a corporate representation and stand, rather than a personal, backdoor approach.

The most obvious corporate institutions to open a governance dialogue in the economic sector would be the chambers of commerce; these are more than a century old in many places. Other business-sector organizations that represent industry, development, etc. could also suffice. Trade Unions must be addressed as well. There are many social institutions that do not have as a purpose to influence Government decisions. They represent nevertheless sets of interests and centres for cocooning political opinions and transferring values and positions among its members. Ultimately, unaware, they become social ideological institutions that build up an influence public opinion. Institutions such as an amateur football club, neighbours help association or a church gathering group. They reflect healthy social resources 'Ego'. They play a very important role: they make conscious the network of subconscious dialogue among the members of the society. Some sociologists see these associations as part of the Social Resources Capital. They are, but once they become formalized

and are able to affect, or be involved, in Governance I rather set them in the Institutional-Governance realm. Politicians generally address them as such.

On the social side, we would suggest the social **NGOs**. The role of NGOs could be extremely relevant in certain circumstances. In many developing economies, the informal (shadow) sector is very significant, sometimes representing 80% of the economy. But its relevance is not only economic. The shadow sector is also present in the urban, social, and governance components. If you govern with only the formal sector in mind, you could be planning for only 20% of your development assets. If you want to develop, you must incorporate 100% of your assets into your strategies, especially the informal ones. If you work with only 20% of your assets, you are never going to achieve the development you seek. We call this the “Peter Pan syndrome.” Peter Pan could not control his shadow, and he could never grow up.



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The public sector, by antonomasia (by definition) cannot work with the shadow sector. The shadow sector is the one that escapes from formal control and is essentially “a-legal,” if not directly illegal. The formal sector cannot, but NGOs can. NGOs are legal and formal on their ‘bright’ side but can still work with the informal sector, as they are not tied up by the rigid administrative procedures of a state of law. NGOs can be of great help because they can reach areas the formal sector cannot. They can complement public action. The problem is that, too often the public sector does not realize this. Not only do they frequently not realize this, they typically see NGOs as organizations that prove their incompetence and their incapacity to deal with these peripheral problems. That is an unfounded belief. The formal institutions cannot deal with these problems because their formal structure does not allow them to do so. It is not their fault. The DNA of the formal and the informal systems is incompatible.

The formal administration must understand that the NGOs are their instruments to incorporate informality into the development mechanisms of the four components: economy, social needs, physical management, and governance. Taking a moment on this last component: if the formal sector is not able to provide security, a basic role of government, then someone else will provide for it. Most often, it will be mafia organizations. The police know this well. If the government cooperates with intermediating NGOs (as they already do in many places, such as the Brazilian favelas), then

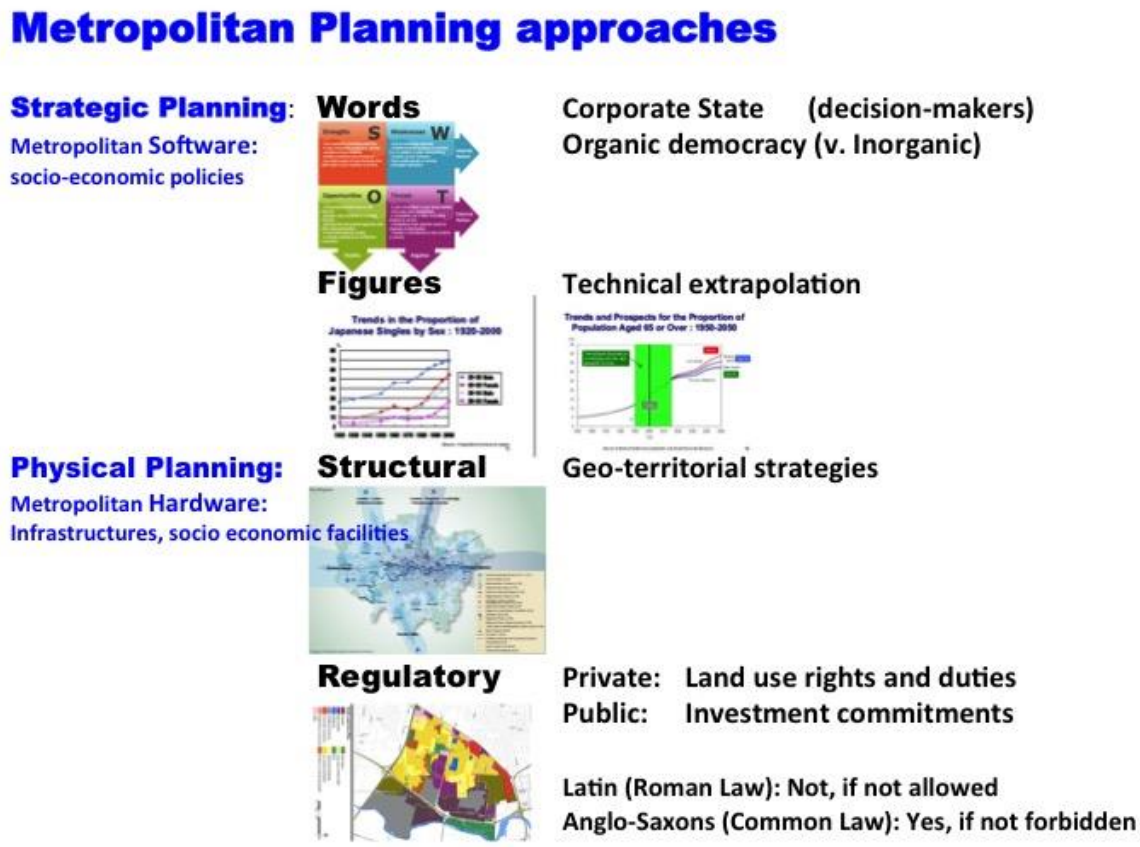
the mafias will not be necessary, nor even have the room to play. Janice Perlman's work in this area is known around the world.

Source: www.pedrobortiz.com.

Planning in such way (we call it "Nollywood Planning") develops the following idea: You cannot do Hollywood film productions when you are in Mumbai. You will not have the means or the resources. In Mumbai, you must to do Bollywood films. In a similar way, you cannot do Hollywood planning, which is what most developed countries are used to and have a tendency to export through their international consultancies and multilateral organizations. It obviously does not work in Mumbai or in similar places. In Mumbai, you must do Bollywood planning. And in Nigeria, home of "Nollywood" filmmaking, you must do Nollywood planning. You must adapt the technology to the local cultural setting. You will still be able to drive your screw, but you will do it with a tool appropriate to the cultural setting. Power drills are useless when electric power is unavailable.

4) The physical component

All of this integrative approach to economic and social objectives managed and balanced by governance ultimately comes down to a physical project that will structure, restructure, or build up a new vision for the metropolis.



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A metropolis is never finished. Every generation makes a new interpretation of it. Every year brings new challenges and new possibilities. The role of metropolitan management is to minimize the problems and challenges and to maximize the potentials for improvement.

There are various techniques to approach this goal. The SWOT approach has already been around for some time; it has achieved excellent results in framing issues. The answer is to be developed by a **strategic plan** that has a sound methodology with proven results. To build a consensus, strategic plans delivered in words (**Delphi**) are rather more effective than ones delivered in figures (**quantitative**), but a combination might be the best. Whatever the results of these technical procedures, the outcome must be shaped into a **structural plan** for the metropolis. A plan that that integrates projects into a common vision and allows for each project to be developed with awareness of how it interacts for a better coordination and higher multiplier effect.

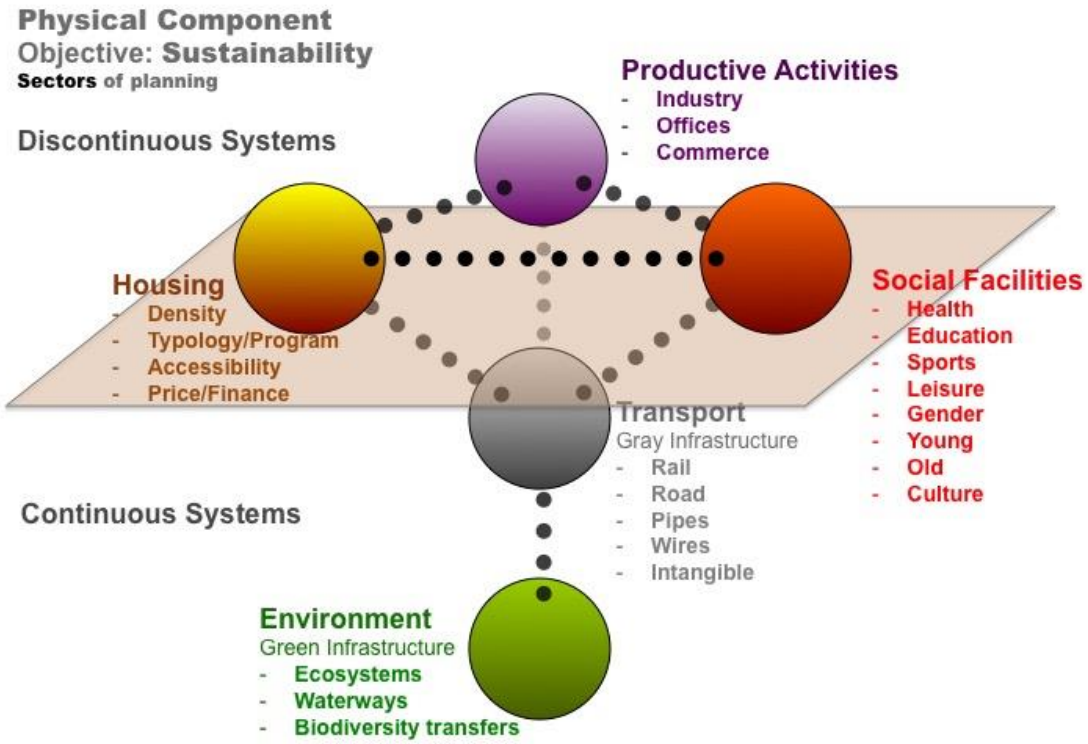
This would be the best way to do it, but managing is 'making immediate decisions with a general vision for the future.' This sound procedure can take several years and several million dollars, if not tens of millions. For emerging metropolises (growing at 5% yearly rates) that do not have the time or the money (1% of a wealthy metropolis's budget), a complementary Metropolitan Brainshop technique has been developed. It provides a consensual empowered response by integrating the decision-making institutions of a metropolis in a one-week governance process for a minimum amount.

5) The sectors of the physical metropolis

The five sectors of metropolitan physical planning are environment, transport, housing, productive activities, and social facilities. This can be discussed at length, as there are many sub-sectors that could be disaggregated, but the way it is shaped has been proven to work for 20 years, since Madrid Metropolitan Plan of 1996.

Among these sectors there are two that have a continuous nature and three that are discontinuous.

- The **continuous** sectors have elements that must display direct physical continuity. They are **environment and transport**. A train cannot have its tracks segmented, nor the buses and metros have their intermodality disconnected. Environmentally protected areas must express a physical continuum to allow for the flow of diverse biota.
- The **discontinuous** sectors, even though their systems have interrelated parts, these parts can be physically separated and be handled with more flexibility. They are **housing, productive activities, and social facilities.** A health system can have all its hospitals specialized and interlinked, but they need not be physically connected and can be strategically relocated. The same approach can be taken for the housing system and for the industrial system.



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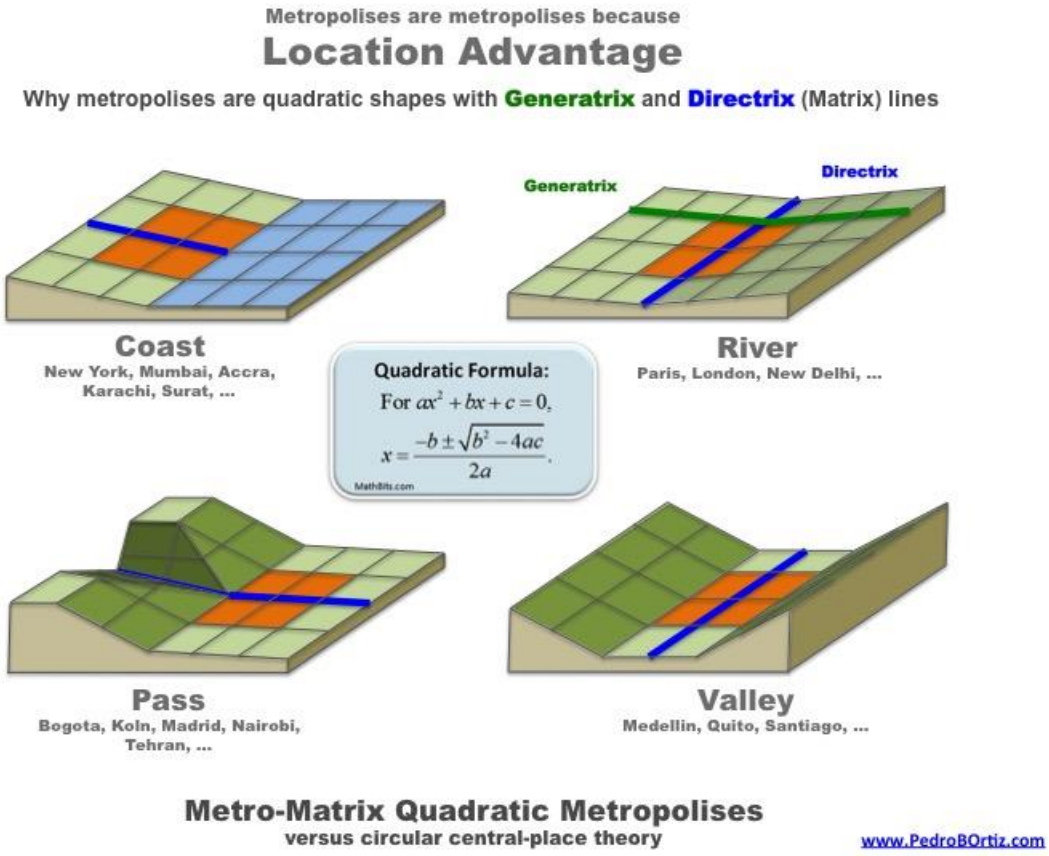
5.1 Continuous sectors

The continuous sectors are typically seen as the most metropolitan sectors, as they must be dealt with in an integral way whenever a set of municipalities get together to solve their metropolitan issues. Transport and environment include the sub-sectors of water provision, wastewater treatment, and solid waste disposal. These are the priority sectors for any confederation approach to metropolitan management. The continuous sectors build up a network on the surface of a territory. Networks on a flat surface can be compatible without conflict only if they are arborescent (dendriform or treelike). Examples include topography and hydrography. They are arborescent and fit in the interstices of each other in a complementary way. But when the networks are real cross-linked

networks, they will necessary conflict. That happens with transport and the environment (the grey and green infrastructures). Try to build a useful road network without crossing any waterway.



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This integration, an outcome of the structural analysis of the metropolis, is the origin of the Metro-Matrix mental map. The Metro-Matrix provides not only the long-term compatibility of the green and grey based in the inner structure of the metropolis out of its main directionalities (directrix and generatrix), but also forms the basis for the acupuncture chart that will provide for the location of the elements of the three discontinuous sectors as well.

So metropolitan physical planning starts by making the two continuous conflicting networks compatible:

- You start with the green infrastructure that must not only be protected but as well restored and enhanced in many urban areas. The green is the fundamental layer.
- Then you superpose the grey. In the superposition, you minimize the interactions, especially those that come from the grey that would harm the green.
- When this happens, you adapt the grey to border and protect the green or to affect it with the minimum impact, as in crossing at the minimum width of the green.
- When it is impossible to avoid impact that might damage large economic or social concerns (accessibility), you establish compensations (the 4Cs policy) so the green will be better off than it was before the intervention.

To do so is inexpensive in the short run and extremely advantageous in the long run. An administration that resists such investment is insensible to its green assets and should be held directly accountable for its decisions.

5.2 Discontinuous sectors

The other three sectors—housing, productive activities, and social facilities— are also systems. Housing, with its aspects of income levels, typologies, and accessibility to labour and services, is a system, but it is a discontinuous system. Some, especially those with little experience in metropolitan management, think these elements can be dealt locally and that the result of a disjointed incrementalist municipal approach will be good enough.

In the long run, however, that doesn't work. Nevertheless, for the sake of facilitating cooperation between local authorities such as mayors and the more critical sectors of environment and transport, one should not force the necessary integration, leaving that for the next stage of Confederal integration.

- **Housing** takes as much as 50% of the total land of the metropolises well served by social facilities and public space. When uncontrolled developments this figure goes as high as 80%. It is a decisive element of the physical metropolis. It involves most of the construction activity and thus is an economic engine. Beware though: it is an economic engine under Keynesian laws. It is a consumptive sector and too much effort on housing construction could divert resources from other strategic sectors that need capital investment to be internationally competitive. In addition, overinvestment in housing can bring about a financial crisis, as it did in 2007 in many countries, e.g. Spain, or could do in the future, e.g. China. This element requires a full library of literature, as it is directly linked to the social, economic, financial, legal, and political aspects.
- **Productive Activities**: Most professionals mistake the productive activities of the physical component with the economy. The productive activities of the 'land' sector obviously relates to industry, offices, and commerce. Businesses support the metropolitan economy but need land allocations and services at the right locations and for the right price if the metropolis is to be global competitive. They are not the economy, although they support it and are part of the fixed capital assets of the metropolis.
- **Social Facilities**: As for the elements of productive activities, social facilities might bring some confusion. Some professionals will see these as the services the population needs to have a sustainable and equitable life. That is so. Social facilities serve the social component, but they definitively part of the physical one. Built facilities for health care, education, leisure, sports, young and old, gender, and cultural activities support social policies.

As discontinuous elements, they have more flexibility concerning location than the continuous ones, which require contiguity. The general location for a metropolitan hospital may be clear, but you have options within that general area in terms of private (ambulance road access) and public (patients and relatives) accessibility.

Discontinuous sectors should be introduced later in the process of metropolitan planning after the continuous ones have been integrated, after coordination between the green and gray has been achieved. The Metro-Matrix provides guidelines for this.

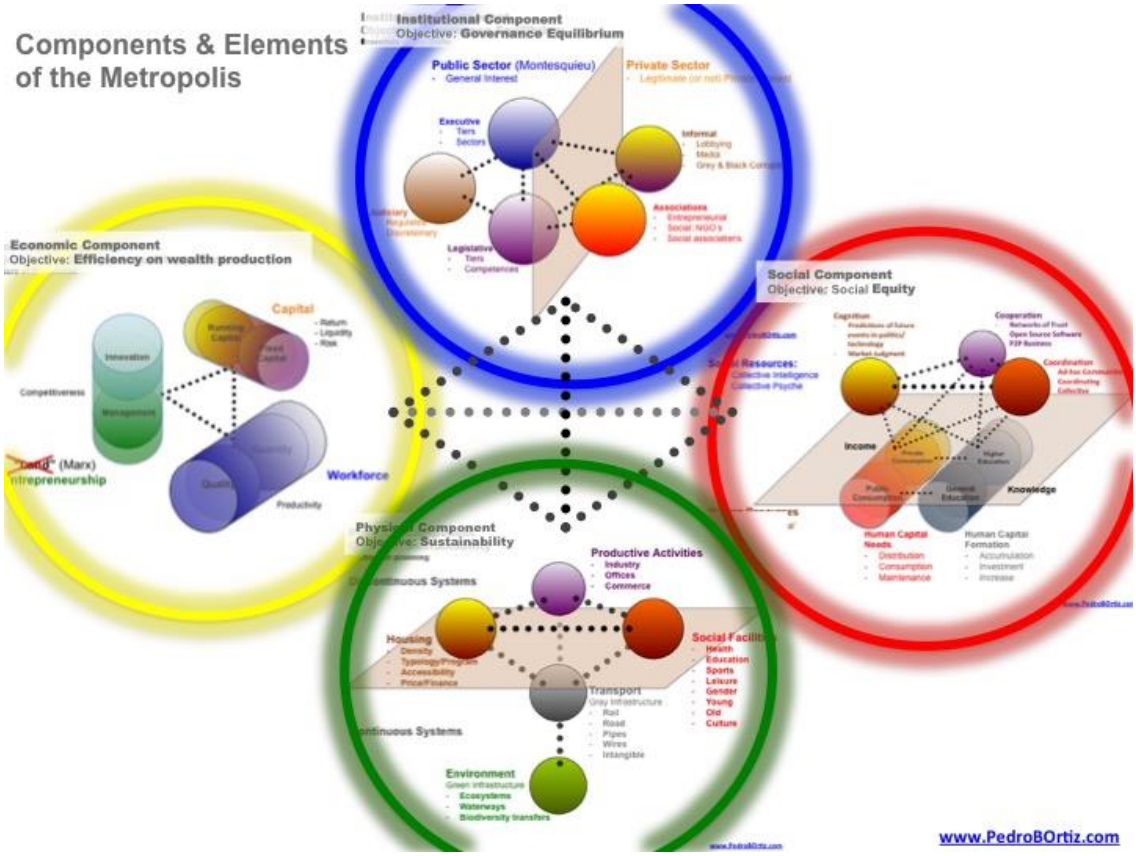
Within this coordination of functions scales also must be coordinated. Balanced urban development (BUD) provides for coordination among the national (1/500,000), metropolitan (1/50,000), and urban (1/5,000) scales, providing urban locations for the three discontinuous sectors.

6) Combining the metropolitan components with the metropolitan DNA

The components' elements are here aggregated in an image that, although synthetic, can be complex to grasp. It can be called "the periodic table of metropolitan chemistry." It requires the previous reading on how each component works internally and individually. Once understood, the full table can facilitate understanding the phenomena of interactions and mechanisms of

metropolises. Such understanding could lead to the ability to trace back solutions, and hopefully to implement them.

Figure 1. The Periodic Table of Metropolitan Components



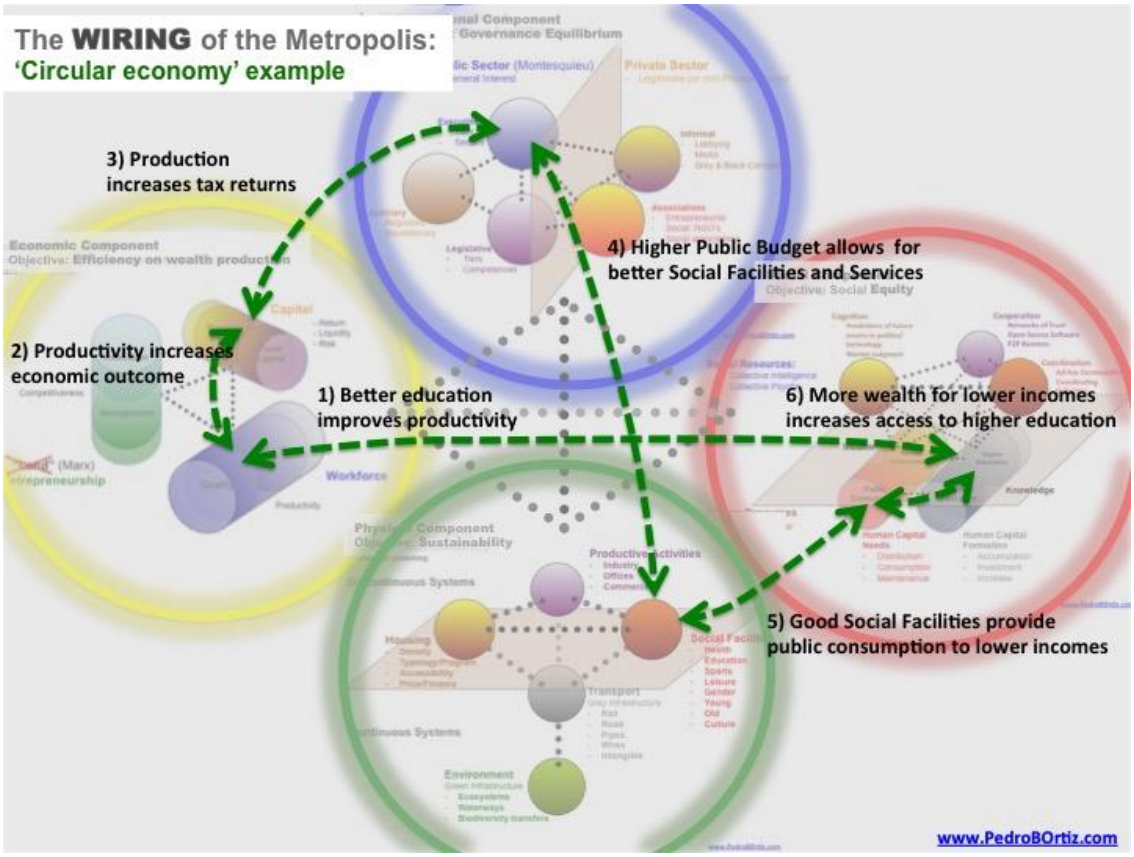
Source: www.pedrobortiz.com.

We must be aware that when we talk about ‘cycling’ or ‘rural-urban linkages’ we are talking about urban transport issues or physical proximity. These are issues that must be addressed either within a physical sector (transport) at the metropolitan scale, and between two physical sectors (housing and environment) at the smaller urban scale. They are very important issues, but the difficult problems of the metropolis—the hard ones to solve—are the interactions among the 20+ elements of the four components at a metropolitan scale.

Multilaterals that think that by designing a pizza cutter they will be able to screw something into a wall do not seem to understand the complexity of the metropolitan system. A metropolitan manager must be able to overcome the colour blindness of a single-minded sectorial vision. An institutional setting without targeted strategic projects, or strategic projects orphan from institutional management, is like being colour blind in front of a traffic light.

A metropolitan manager must be able to overcome the myopia of close proximity. He or she must be able to see the whole picture and address the critical issues that probably are not the ones in front of his eyes. These include how to increase long-term educational quality; how to feed the productive system in a way that will increase GDP, family income, and public revenue; and how to increase social facilities for the lower incomes. Some professionals might find this overwhelming and boring, but a metropolitan manager has no choice but to deal with them.

Figure 2. The real Circular Economy. How elements are interrelated across the four components



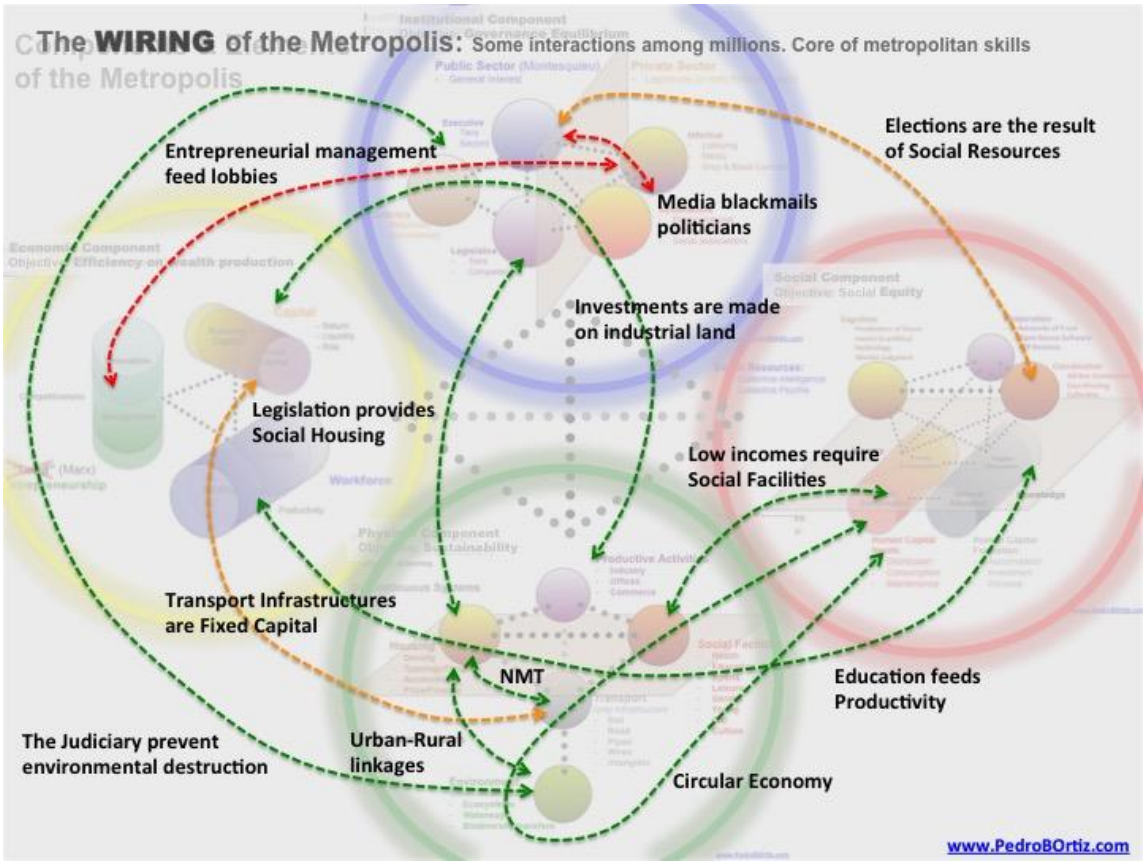
Source: www.pedrobortiz.com.

7) The wiring of the metropolis: interaction among elements

The example of the 'circular economy' is just one out of a million. This is where the metropolitan gaps fit in. The accumulation of experiences, perceptions, and interactions among the elements of the metropolitan system can be traced back to the system as it has been synthesized in these pages.

Observation is essential to the epistemological process of science and intelligence building. All empirical science requires empirical confrontation; otherwise it would not be a science. But observation is not enough, out of it must come a synthesis that could explain the relevant phenomena (F=ma in Newton's Physics). The proposed theory must then be confronted again with experimentation to verify its accuracy.

Figure 3. The Wiring of the Metropolis. How interaction of elements produces phenomena and provides solutions



Source: www.pedrobortiz.com.

References

Adler, S. P. and Kwon, S.K. (2002) "Social Capital: Prospects for a new Concept", Academy of Management Review 27: 17-40.

AK Yetisen; LR Volpatti; AF Coskun; S Cho; E Kamrani; H Butt; A Khademhosseini; SH Yun (2015). "Entrepreneurship". Lab Chip. 15 (18): 3638–60. doi:10.1039/c5lc00577a. PMID 26245815.

Bruce, V., Green, P. & Georgeson, M. (1996). Visual perception: Physiology, psychology and ecology (3rd ed.). LEA.

Bruni L., Becchetti L., Zamagni S., (2019) Economia civile e sviluppo sostenibile, Roma: Ecra.

Contin, Antonella. (2015) Questo Metropolitan Architecture. Maggioli Editore. https://www.ibs.it/questo-metropolitan-architecture-libro-antonella-contin/e/9788891609038#.

De Carolis M., (2017), Il rovescio della libertà. Tramonto del neoliberalismo e disagio della civiltà, Macerata: Quaderni Quodlibet.

https://dusp.mit.edu/idg/project/metro-lab.

http://cci.mit.edu/research_developing.html.

Hensel, C. R. and A. L. Turner. 1998. “Making Superior Asset Allocation Decisions: A Practitioner’s Guide.” In Worldwide Asset and Liability Modeling, Chapter 4, edited by W. T. Ziemba and J. M. Mulvey. Cambridge, United Kingdom: Cambridge University Press.

Institute for European Environmental Policy (IEEP) Together with CEE Bankwatch Network BIO Intelligence Service S.A.S. (BIO) GHK Institute for Ecological Economy Research (IÖW) Matrix Insight Netherlands Environmental Assessment Agency (PBL) September 2010. http://www.ieep.eu/assets/913/Supporting_Paper_2_Task_4_report_October_2011_.pdf.

Jacobs, Jane (1961). The Death and Life of Great American Cities. Random House.

Joachim H. Spangenberg, Odile Bonniot. Sustainability Indicators – A Compass on the Road Towards Sustainability. Whuppertal paper N0.81, February 1998. http://www.ulb.ac.be/ceese/STAFF/Tom/spangenberg.pdf.

Jung, Collected Works vol. 9.I (1959), "The Concept of the Collective Unconscious" (1936).

Madrid Regional Plan 1996-2016 Gobierno de la Comunidad de Madrid Consejeria de Obras Publicas y Urbanismo. Direccion General de Urbanismo y Planificacion Regional. http://www.pedrobortiz.com/display-articles/listforcountry/id/105.

Madrid Strategic Plan 1989-1994. http://www.pedrobortiz.com/display-articles/listforcity/city/164.

MSLab - Misure e scale della città contemporanea, Dipartmento di Architettura e Estudi Urbani. http://www.dastu.polimi.it/index.php?id=1922.

Ortiz, Pedro B. (2014). The Art of Shaping the Metropolis. McGraw Hill, https://www.mhprofessional.com/9780071817967-usa-the-art-of-shaping-the-metropolis-group?cat=114.

Ortiz, Pedro: https://www.linkedin.com/pulse/metropolitan-governance-stripped-naked-pedro-b-ortiz.

O'Sullivan, Arthur; Sheffrin, Steven M. (2003). Economics: Principles in Action. Upper Saddle River, New Jersey 07458: Pearson Prentice Hall.

Paul A. Samuelson and William D. Nordhaus (2004). Economics, 18th ed., "Factors of production", "Capital", Human capital", and "Land" under Glossary of Terms.

Perlman, Janice. Favela: Four Decades of Living on the Edge in Rio de Janeiro.

Smith, Adam: An Inquiry into the Nature And Causes of the Wealth of Nations Book 2 – Of the Nature, Accumulation, and Employment of Stock; Published 1776.

Sorel, A. Montesquieu. London, George Routledge & Sons, 1887.

Stigmergic Collaboration: The Evolution of Group Work. Mark Elliott. http://journal.media-culture.org.au/0605/03-elliott.php.

Tapscott, D., & Williams, A. D. (2008). Wikinomics: How Mass Collaboration Changes Everything, USA: Penguin Group.

The Forms of Capital: English version published 1986 in J.G. Richardson's Handbook for Theory and Research for the Sociology of Education.

Warren Schmaus, Durkheim's Philosophy of Science and the Sociology of Knowledge: Creating an Intellectual Niche, 1994.

The sustainable metropolitan heritage. A profound mutation in our relation to the world[55]

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Why should we embrace heritage when we talk about sustainability? The fact that, over the last few decades, the sustainability paradigm has emerged as one of the great challenges to be met from very diverse spheres has led, perhaps belatedly compared to other areas, to its coming to the attention of culture and heritage. This means, on the one hand, that inherited elements must be maintained sustainably -which, in many cases, has resulted simply in an economic problem- but, on the other hand, also that heritage assets -as well as any cultural manifestation- must contribute to both the physical and social sustainability of the context in which they are located.

Moreover, what could be understood as a merely practical debate has, in fact, a deeper conceptual root (Del Espino Hidalgo, 2019). About heritage, and concerning the widespread use of the term for economic matters, its origin lies in the reference that since Roman law is made to the properties that the patricians inherited from the father -pater- to be transmitted, generation after generation, within the family (Engels, 2008). When, centuries later, its use was associated with the goods that a community possesses in the sense of cultural heritage (Prats, 2000), two fundamental characteristics that already appeared in the first definition are conserved: the appreciation of those goods that are inherited and the need to transmit them to the future, in a sort of sense of transcendence.

In this sense, the definition of heritage is particularly consistent with the first time that, in 1987, the Brundtland Report stated what was considered to be sustainable development: that which meets the needs of the present without compromising the ability of future generations to meet their own needs (Brundtland et al., 1987). As can be seen, both concepts include the appreciation of common goods at present that must be safeguarded, but, more importantly, must be passed on to future generations. Thus, it can be understood that our heritage - what we have inherited and, therefore, has been maintained over time - is, in an innate way, sustainable and, beyond this, because of its need for transcendence, it must continue to be sustained in the same or better conditions than those in which we have received it. The latter also bears similarities to the current criteria for the protection or safeguarding of heritage.

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Since it was first enunciated, the sustainability paradigm has become one of the foundations of policies at both local and global levels, originally defined based on three dimensions: economic, environmental and social (Elkington, 1998). Soon after, however, from the academic scope, it is proposed the inclusion of a fourth pillar, the cultural one (Hawkes, 2001), which has also been interpreted as a framework that includes the three previous ones or as the centre of the triangle formed by these.

As a result of this debate, culture -and, within it, cultural heritage- has gradually become part of the discourse on sustainability, even becoming part of institutional documents such as UNESCO's Hangzhou Declaration, which recognizes the role of culture as a value system, as a resource and a framework for achieving truly sustainable development, the need to learn from the experiences of previous generations, the recognition of culture as part of global and local commons, and as a source of creativity and renewal (UNESCO, 2013). This document is important not only because it systematizes the values of heritage for sustainable development, but also because it provides a formal institutional framework for what had already been proposed in the academic world: the fact that culture and heritage are not only the object of sustainability but, more importantly, a source of inspiration for a more sustainable world and in line with the goals set in other areas of international organizations.

In this sense, the principles set forth by UNESCO (2015) for the contribution of heritage and culture to the contemporary challenges of sustainability, which have been subsequently developed from the statement of the United Nations Sustainable Development Goals (2015) and the subsequent formulation of the New Urban Agenda (UN Habitat, 2016), specifically concerning article 38, should be considered as it highlights the active role of the diverse cultural heritage manifestations on rehabilitating, revitalizing urban areas and strengthening society.

Nevertheless, when we speak of sustainable metropolitan heritage, we must consider another of the most recognized definitions of heritage, enunciated by Georges-Henri Rivière (1989), who states that it explains people and their ascendants' common territory. In this way, shared guardianship, in terms of possessions common to a group of people who share a legacy or a culture, causes the emergence of common identity which, in this way, becomes a quality proper to cultural heritage (Keitumetse, 2014).

The ability of cultural heritage to remark the bonds of the society to the territory described by Rivière would also influence the strengthening of a feeling of metropolitan citizenship as described by Walter-Rogg (2018). This fact allows us to establish a linkage with other fundamental concepts for the metropolitan discipline: the existence or not of a metropolitan identity and the determination of the factors that allow its definition. This would mean not only the main monuments and outstanding landscapes generally concentrated in historic centres but, furthermore, any cultural or artistic assets which are particularly important when considering peripheral settlements within the metropolitan area (Fernández, 2002). Additionally, Carrà (2016) states that knowledge and shared guardianship of heritage goods in a metropolis would have social cohesion as a consequence, what implies a sense of metropolitan common identity.

It is particularly this understanding that heritage offers us of the territory in which it is embedded, and which gave it meaning that will interest us most when we speak of metropolitan heritage. This is linked to the theories of geographical determinism and its subsequent critical revision, offered by Lucien Febvre (1922) with the concept of geographical support for human settlement: Thus, the metropolis would be located in strategic points of the geographic support, which, although being determinant for human settlement, its agglomeration and aggregation, is not exclusive, since it comes together with the social capacity to bend the physical and environmental conditions, and also from the power structures since these began to influence the decision making on human settlements and urban structures-. These three questions would, therefore, determine the existence of the metropolis and its survival over time, but out of the three, the first is the one most closely linked to cultural heritage. Accordingly, when analysing the keys to metropolitan sustainability, we will

necessarily speak of a heritage system that includes natural and cultural heritage (if it makes sense to maintain such a division today).

Figure 1. The Giza-pyramids and Giza Necropolis, Egypt, seen from above, 2008. Cultural and natural heritage constitute a whole, linked to a strategic point of geographical support, that gives sense to the ancient and contemporary Metropolis

Source: Robster1983 via Wikimedia Commons. Under CC0 license. https://commons.wikimedia.org/wiki/File:Giza-pyramids.JPG.

But neither in its heritage component can we forget the great importance that the social dimension acquires when we speak of sustainability, and even less when we refer to the metropolitan discipline. Cacciari (2004) defines the contemporary city as a geography of events, where the Greek polis, limited and united in place, is replaced by the Roman civitas, without limits, in constant growth and growing entropy, made up of inhabitants of diverse origins who live together under a common order. This ends up being the basis of the formation of the metropolis, where the symbols and traditional urban landmarks are replaced in their urban relevance by the centres of production and logistics (industry and market). According to the author, this would leave the historical centre as a commodified repository of memory, which compromises the definition of a metropolitan heritage, which we will try to elucidate in the following paragraphs.

Indeed, numerous authors, particularly those from the sociology area, have identified the contemporary city and the metropolis as places of the social interchange at different levels: Sassen (2005), in her concept of Global City, introduces the ability of the urban fact, located in strategic places, to work as a catalyst of floods proceeding from the most diverse locations, what favours the increase of human capital. Glaser (2001) insists on the last concept based on the ideas formulated by Jacobs (1969) about the capacity of urban areas to enhance individuals in their relationships with

a complex and diverse society. Castells (2013) will add a layer of complexity, according to the above mentioned by Sassen regarding the global condition of the metropolis, when the era of information is incorporated to the problem, while Florida (2005), on the contrary, puts a stress on the opportunity that the physical confluence on the territory provides for enhancing creativity and innovation.

Consequently, the relationships set in the metropolis respond to various scales and diverse dimensions: social, economic, power structure or the one we maintain with the territory. Their multiscale condition (Soja, 2011) provokes a permanently dynamic and expansive space of growing metabolism, which may cause a disconnection with the past. However, in this crescent metropolis, the point of territorial support which gave a sense to its establishment is still maintained regarding heritage references even in the newest territorial cities. This occurs particularly in many European places, where these urban aggregations had a greater physical dimension in the past than at the present. From them, they remain built milestones in the landscape where the archaeological heritage testifies, precisely, the permanence of their metropolitan sense along the time (Contin et al., 2019).

Figure 2. L'Arc de Triomphe, Paris, seen from La Défense, 2017. The prolongation of the historical axis from Champs-Élysées to the new business district, as well as the replication of the Triumph Arch to the new Grand Arch, shows the permanence and multi-scalar qualities of metropolitan heritage goods as milestones in the city-region

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In this sense, Cacciari (op. cit.) defends that beyond the explosion of the metropolis, we are today in the time of the post-metropolis or city-region defined by Soja (op. cit.) in which they no longer exist references built with a certain stability, what prevents maintaining the urban memory beyond one generation. Thus, the only reference that can speak to us of a sense of metropolitan heritage is, once again, the territory, the link with the geographical support that Febvre already spoke of 80 years

before and that comes into contact with the abovementioned conception of the metropolis as an interface of people and knowledge, between the physical place and the world.

In this context, the geographic-heritage system as support, permanence and place to belong, but also as a perceived, lived and built territory in the history and from the present time, fits within cultural heritage environment when we refer to landscape. Due to its capacity to incorporate different dimensions, it is of a particular accuracy the most recent definition given by the Charter of the Landscape of the Americas (Peñalosa et al., 2018), which distinguishes five strata in the case of the American landscape: the conditioning given by the primitive nature, which speaks about geography; the metaphysical aspect of landscapes as a cosmovision, which speaks about myth; the cultural palimpsest as a testimony of the territorial biography, which speaks about history; the environmental ethics as a principle, which speaks about sustainability; and the inter-relations in the landscape as a sign of the American identity, which speaks about community.

Figure 3. Plaza de Mayo, Buenos Aires, 2013. The concept of heritage is a social construct and, as such, is linked to community identity and its values are in constant transformation. The Plaza de Mayo in Buenos Aires, originally linked to the presidential palace 'Casa Rosada', is today a place of popular vindication after Grandmother of Plaza de Mayo occupied the space

Source: Jrivell via Wikimedia Commons. Under CC license. https://commons.wikimedia.org/wiki/File:Plaza_de_Mayo-_Panuelos_de_las_Abuelas_de_Plaza_de_Mayo_y_casa_Rosada.JPG.

The abovementioned community value of heritage proceeds from a classic paradigm where cultural heritage is understood as a social construction (Prats, 2000), linked to the identity shared by a group of people, generally at a local level, who generally have a common past and memory. Nevertheless, the change of paradigm happened in the XXI century implies a step from the general interest of

heritagization of the object -understood as the inherited good about which a social agreement about its values' construction exists-, to the individual subject. That is why the contemporary definition of cultural heritage goes necessarily through the object-subject duality (Criado-Boado and Barreiro, 2013). This provokes a continuous updating of the heritage values, which need to be revisited on each contemporaneity to be converted on an accumulative process (Jokilehto, 2018).

Françoise Choay (1986) suggests to distinguish the closed systems -those premodern places that signify through the interplay of their proper elements without help from supplementary verbal or graphic systems- from the open systems -the landscapes of cosmopolitan cultures depending upon vast codes of supplementation, traffic codes, graphic signs, and, most of all, texts-. We could affirm that, undoubtedly, the contemporary metropolis belongs to this second type.

Thus, how could we identify metropolitan heritage? Once milestones and symbols have disappeared; once we have lost the collective memory; once local identity has been replaced by the addition or aggregation of individual contemporary identities, how do we recognise heritage? How can we recognise ourselves within the territorial city? Metropolitan heritage has become a mechanism that allows us to place ourselves in the territory, to locate ourselves in the world. Reassuming the idea of the integration of culture as the fourth pillar of sustainability, the metropolitan sustainable heritage system must be understood as a mean to adapt and integrate ourselves in a constantly changing, expansive and vaguely demarcated world.

References

Brundtland, G. H. et al. (1987) Brutndtland Report. Our common future. Oxford: Oxford University Press.

Cacciari, M. (2004) La città. Rimini: Paccini.

Carrà, N. (2016) 'Heritage / Culture and social cohesion in the project of Metropolitan City', Procedia - Social and Behavioral Sciences, 223, p583–589.

Castells, M. (2013) Comunicación y poder. Ciudad de México: Siglo XXI Editores.

Choay, F. (1986) 'Urbanism and semiology' in Gottdiener, M., Logopoulos, A. (ed.) The city and the sign: An introduction to urban semiotics. New York: Columbia University Press, pp. 160-175.

Contin, A, del Espino Hidalgo, B., Alcántara Onofre, S., Reyes Rodríguez, R., Becerra Mercado, O., Rodríguez de la Vega, G. (2019) 'Revelando la historia del territorio como soporte de una nueva disciplina metropolitana. Aproximación la complejidad de la metrópolis iberoamericana mediante el análisis cartográfico' in Annals of 2º Congreso Iberoamericano de Historia Urbana. Procesos históricos que explican la ciudad iberoamericana. México: UNAM.

Criado-Boado, F., Barreiro, D. (2013) 'El patrimonio era otra cosa', Estudios atacameños, 45, p5-18.

Del Espino Hidalgo, B. (2019) 'Assessing sustainability within territorial and urban heritage: An indicator-based evaluation in the case of medium-sized cities in inner Andalusia', Journal of Cultural Heritage Management and Sustainable Development, 9(1), p121-132.

Elkington, J. (1998) Cannibals with Forks: The Triple Bottom Line of 21st Century Business. London: NSP.

Engels, F. (2008) El origen de la familia, la propiedad privada y el estado. Madrid: Alianza Editorial.

Febvre, L. (2013 [1922]) A Geographical Introduction to History. Oxfordshire: Routledge.

Fernández, B. (2002) 'Reflections on the metropolitan identity of urban redevelopment in the outskirts of Madrid', on the w@terfront. Public Art. Urban Design. Civic Participation. Urban Regeneration, 3, p253-257.

Florida, R. (2005) Cities and the creative class. Oxfordshire: Routledge.

Glaeser, E. (2011) Triumph of the city: How urban spaces make us human. New York: Pan Macmillan.

Hawkes, J. (2001) The fourth pillar of sustainability: Culture's Essential Role in Public Planning. Melbourne: Common Ground.

Jacobs, J. (1969) The economy of cities. New York: Random House.

Jokilehto, J. (2008) 'Heritage values and valuation' in Measuring the value of material Cultural Heritage-Quality in Cultural Heritage Management-Results of the HERITY International Conferences-dossier (No. 2). Roma: DRI-Fondazione Enotria ONLUS.

Keitumetse, S. (2014) 'Cultural Resources as Sustainability Enablers: Towards a Community-Based Cultural Heritage Resource Management', Sustainability, 6, p70-85.

Peñalosa, R., Alcántara, S., Jankilevich, C., Veras, L., Ocejo, M. T. (2018), Carta del Paisaje de las Américas. Ciudad de México: IFLA.

Prats, L. (2000) 'El concepto de patrimonio cultural', Cuadernos de Antropología Social, 11, p116-136.

Rivière, G.H. (1989) La muséologie selon Georges-Henri Rivière. París: Dunod.

Sassen, S. (2005) 'The Global City: Introducing a Concept', Brown Journal of World Affairs, XI(2), p27-43.

Soja, E.W. (2011) 'Beyond postmetropolis', Urban Geography, 32(4), p451-469.

UN Habitat (2016) New Urban Agenda [Online]. Available at: http://habitat3.org/wp-content/uploads/NUA-English.pdf (Accessed: 6 March 2020).

UNESCO (2013) The Hangzhou Declaration. Placing Culture at the Heart of Sustainable Development Policies Convention [Online]. Available at: https://unesdoc.unesco.org/ark:/48223/pf0000221238 (Accessed: 6 March 2020).

UNESCO (2015) Policy on the integration of a sustainable development perspective into the processes of the World Heritage Convention [Online]. Available at: https://whc.unesco.org/document/139146 (Accessed: 6 March 2020).

United Nations (2015) Sustainable Development Goals [online]. Available at: https://www.un.org/sustainabledevelopment/ (Accessed: 6 March 2020).

Walter-Rogg, M. (2018) 'What about metropolitan citizenship? Attitudinal attachment of residents to their city-region', Journal of Urban Affairs, 40(1), p130-148.

Sustainable natural and cultural heritage[56]

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Nowadays, the heritage is understood as the set of cultural and natural goods that document the different periods, the historical evolution, spiritual, scientific, artistic and environmental within a community, which we are obliged to protect and transmit, as much as possible, the intrinsic cultural message of the built and environmental heritage, the trace of the past, of what is document-building, to guarantee the conservation of the matter, mainly spatial that makes the site a cedulary of knowledge. The Architecture is transformed by the normal course of its functional life, it is affected by the destructive capacity of atmospheric and telluric events, incoherent uses or its substitution by anodyne buildings, those are aspects that limit the action of the architect and define the philosophy of conservation or innovation.

Heritage enhances the public sphere in various ways: it shapes the urban silhouette and its metropolitan area, it uniquely marks the city, leads the observation of the human being towards its exploration, underlines the crossing of the streets, even at its most modest level, as a traditional *Mazahua*[57] house, the way in which construction systems are linked to the human scale is significant for the metropolitan landscape. The smallest detail has a crucial effect on the totality. Any building with a certain pretension of beauty -that transcends the everyday and elevates the spirit of its users- must have those precepts.[58]

The global city, is the one that includes the metropolitan area, is randomly reaching its limits of density and self-exploitation, a lot of the metropolitan areas in Latin America have absorbed historic districts, understanding their cultural and natural heritage, generating a *unicum* and *continuum* conglomerate that should be added to the beauty, to sense and proportion, the prudence, in sustainability benefit: in the past, a church was a church, a theatre was a theatre. Now it is possible that this church will end up being a theatre or cultural centre. Therefore, in the structure of metropolitan areas, the cultural heritage of development must not be disarticulating. Historical buildings must be given a degree of flexibility, but without transforming their cultural message.

The TELLme project made us understand metropolitan areas - their past, present and future- in a new light of cartography, analysis and metropolitan dynamics, of the *Metro-Matrix*.[59] The metropolitan areas are organisms, which consume resources and produce waste. The larger and

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57 Pre-Hispanic culture that still survives in the State of Mexico, which is part of the metropolitan area of Mexico City.

58 Rogers, Richard, Cities for a small planet, Editor Gustavo Gili, Barcelona, Spain, 2000, p. 71.

59 Metropolitan - Matrix, is an abstraction of the metropolitan structure, either by the main roads or by the urban land parcels. This concept was created by Pedro B. Ortíz.

more complex they are, like Metropolitan Zone of the Valley of Mexico, their dependence on the surrounding territory and their vulnerability to change in their cultural landscape increase.

Previous urban cultures have been destroyed. Teotihuacan culture, 1,280 – 2,200 years ago, the deforestation and the consequent suppression of the vegetal mantle finished with the necessary humidity, even in summer, was a site with springs, *chinampas*[60] and aquatic vegetation, was the paradise of *Tláloc*. The decrease in rainfall along with declining soil fertility and a growing population caused the Teotihuacan culture to lose its resource base and collapse. Undoubtedly the specific causes of such phenomena are several, but there are four variables present: population, culture, environment and resources.

Almost all metropolitan areas were absorbing historic districts, with their natural and cultural heritage, the faster the growth of communities, the greater the danger of losing social cohesion and heritage are. During the course of the TELLme project methodology, I have thought that the good mental health, of the metropolitan citizens, requires that we return to the idea of valuing the heritage city as a structure of the intangible heritage, to maintain the cohesion of inner urban life and preserve it from the destruction of the outside.

In the TELLme team, we all know that there is something wrong with the sustainability of metropolitan architecture, and that it could get hopelessly worse if we do not come up with a different kind of metropolitan discipline for the future, based in the historical memory, an ecological metropolitan area, as Richard Rogers said *that contact needs to be encouraged, equal, open and, above all, the city is a place of equality, openness and, above all, beauty, where the art, the and the landscape will stir and satisfy the human spirit*. [61]

In the metropolitan areas we must consider how to adapt a number of historic buildings, leaving aside the conservation of larger monuments such as cathedrals, churches or municipal palaces, the preservation of the societal architectural legacy a number of significant issues. The buildings have always been rehabilitated, innovated, re-engineered its infrastructure of facilities have been renewed during its life in a harmonious process. They must be flexible, not expensive to reconvert and can adapt new uses and functions. In the Metropolitan Area of the Valley of Mexico there is a practice of maintaining the facade and building a structure totally alien to its interior, reducing it to what Richard Rogers mentions, *"reduces an interesting building to its historicist shell".*

Historical memory teaches us that cultural heritage can be updated to meet new needs, creating dialectic between the new and the old.

Preserving historical appearance in metropolitan areas also brings problems. A good contemporary work done with order and quality can better complement the historical context. Associating old and new architectures is a practice that has a long tradition in our cities and metropolitan areas.

Cities and particularly metropolitan areas are producing a delicate social instability associated with the inevitable environmental and heritage decline. Despite the global increase in wealth, due to free trade agreements, which surpasses the population one, poverty is worsening and continues to grow. Most of these poor people live in the metropolitan areas, in the most disreputable environments such as Ecatepec, State of Mexico, exposed to the limit of habitability conditions and perpetuating the cycle of erosion and contamination, to the loss of identity due to the lack of appreciation of its cultural and natural heritage.

The metropolitan areas are destined to house an increasing proportion of this poor population and it should not surprise anyone that societies, lacking in cultural equality, are suffering an obvious social

60 The original meaning of chinampa (in the fence or fenced land) denotes the wooden stakes placed around a constructed floating islet that resembled a raft.

61 Rogers, Richard, Cities for a small planet, Editor Gustavo Gili, Barcelona, Spain, 2000, p. xi.

erosion that accentuates environmental and heritage precariousness, components that are intertwined.

Poverty, unemployment, a poor health, transportation and education system, and conflicts -social, cultural and environmental injustice in all its manifestations- all hinder the ability of metropolitan areas to be environmentally and culturally sustainable.

Mexico City and its metropolitan area exemplify the growing pollution and global polarization of a society divided between rich and poor, with its dubious privilege of being the most populous and polluted of cities. In 1900, its population was 471,000; today it exceeds 22 million, with 6 million cars, in the cultural and industrial heart of the country. Sometimes the smog layer is four times denser than those of Los Ángeles, United States of America, and six times more toxic than the maximum standard set by the World Health Organization (OMS).

The ozone level exceeds the permitted risk level for more than 220 days a year and, when pollution is too dense, industrial production is stopped while citizens are encouraged not to use their cars. Nevertheless, rural immigration continues, and this poses a serious housing problem, public services and facilities for the 6,000 new residents per month. These factors are making the Valley of Mexico Metropolitan Area, as well as other rapidly growing cities, an environmentally and culturally unsustainable city.

The city and its metropolitan area are a complex and changing *Metro-Matrix* of human activities, environmental and cultural effects. Planning a sustainable metropolitan area requires the broadest understanding of the relationships between citizens, services, transportation policy and energy generation, as well as their impact on both the immediate environment and the cultural and natural heritage. For a metropolitan area to generate true sustainability, the disciplines and concepts of urban ecology, economics, sociology, and cultural and natural heritage must be integrated into urban and landscape planning.

Environmental considerations cannot be separated from cultural and social heritage, since the policy aimed at improving the landscape must favour the quality of citizen’s lives.

Cultural, natural heritage and social factors feed off each other to build healthier, more educated and more open metropolitan societies. Above all, sustainability means a better life and culture for future generations.

In the scenario of urban development policies that have been applied in the last 60 years in Latin America, without any discussion, have not been born, nor grown to human measure, due to the fact that they have given way to building speculation outside the human and landscape scale, as well as the increase in environmental and cultural deterioration.

It is unavoidable to mention, to the city's quasi-physiological need to shift primary uses to tertiary, to the building of road infrastructure, of mega services, creation of releases and landfills, of the establishment of huge gasoline distributors, of the abuse of advertising in the streets and avenues.

In addition to all of this, the lack of planning in the architecture of public space, both in sterile, and eroded or residual areas, to the uncontrolled exploitation of natural ecosystems within the city and its metropolitan area, construction of shopping centres represented by anodyne architecture that leaves established small merchants defenceless, to light pollution in historical sites, in the city and metropolitan area as a whole.

This urban landscape, typical of Latin American cities, is configured as a privileged terrain for a political, technical, cultural: the recovery or re-qualification of monuments and the environment in the most deteriorated parts of the metropolitan areas, that are the most intensely populated, which must be considered, as a priority, for the landscape reordering of the territory.

It is important to highlight the value of the architecture of open spaces and green, in particular, with specific attention to the gardens, orchards, urban groves, open spaces between the housing, between education, health, work, transport and circulation buildings, which up to this day are absent from architectural and landscape ideas.

It is important to emphasize the specialized and irreplaceable role that open space architecture plays in the metropolitan area, among them, green elements mainly native plants, the ground, the water both for the physical re-qualification and for the vital functions of the city and the opportunities that these sites offer to the work of landscape architecture. From this point of view, the challenge is interesting and extremely current, considering that:

- The open spaces, to carry out an environmental requalification of urban or metropolitan areas, however, appearances, and exist in great quantity, in the great majority of the sites are resources that are exposed to useless waste, are currently areas that are lacking in ideas.
- Due to the morphological characteristics of the historical urban structure and contemporary cities and metropolitan areas, the insertion of spontaneous or designed natural elements, physiologically find their space in the city, the existence or insertion of spontaneous vegetation in sanitary discharge areas, urban orchards or gardens, in sterile spaces or urban remnants, residual spaces along the abandoned railroads. The lack of planning for green elements, as landscape design components or urban requalification is a missed opportunity, and a subsequent cause-effect of environmental decline.
- Environmental aspects escape the rules of rationalist urbanism or zoning, in the eighties of the last century, concepts in force today in traditional planning that ignores the importance of plant architectures and the quality life, according to the numerical - quantitative and land use definitions of the urban standards, the Urban Development Plans consider the green area as AV and is only painted green on the plans, even if they are sterile areas or urban remnants. Nevertheless, the ecological aspects constitute a system, a fabric and an incessant and continuous link of the urban structure. The cultural and natural heritage establish the connection between the different functions of the city, streets, squares, atriums, canals or apantles, residual spaces between schools, public parking lots, public and private green, or everything that is not built. The architecture of open space resurfaces as a filter, through which the population uses the city, it transits, and it goes through the life of every day.
- The architecture of open space is the inverted image of the metropolis that defines the functionality or waste of available public spaces, also shows the different phases of the city's growth, in a logical or illogical way, thought out and designed in terms of feasibility or abandoned to spontaneity.

Similarly, it concerns, above all, the natural cycles that occur in the city and its metropolitan area, with singular attention to the standards, not of quantity like the urban ones, but of quality, measurable not with square meters, but with chemical, acoustic, biological analyses, e.g., reading of sulphur dioxide pollutant emissions, carbon dioxide, chromium, lead, nitrogen dioxide, nickel and even asbestos. Long-term exposure to these chemicals can cause a wide range of serious health problems, such as hypertension, diabetes, heart and cardiovascular disease.

Poisoning our environment means poisoning our own body, and when you experience chronic respiratory stress, your ability to defend yourself from infection is limited.[62]

It is necessary to classify the architecture of the open space in the weighting of the uses of environmental, perceptive, functional, artistic and historical order to understand which are the purposes of each open space in the city and its metropolitan area, and what role it could play in a process of monumental and environmental re qualification.

62 Ogen, Yaron, Linking pollution to deaths from COVID, Newspaper Reforma, April 21st, 2020.

When talking about open or public spaces it is not only referred to the green, considered by many people as a neologism, the green concept is still subject to many shortcomings of traditional urban practice, rather it should refer to the system of reorganization of the architecture of an open space, that is, to the negative of the city, built or mineralized, or, to the spaces in which the reproduction of the animal and vegetable life, still can be given.

The very specialized role of open spaces in the city expresses concerns and demands of environmental order and in the case of Mesoamerica of a spiritual culture.

Each city and its metropolitan area are characterized by its physical-environmental elements, which must be valued, the weather, the wind, rainfall, temperature and the determination of the heat island, altimetric movement, hydrology, vegetation, intrinsic characteristics of human settlements, risk areas, transportation networks, socially problematic areas, among others.

From these categories the pathological elements can be isolated, since each element is capable of influencing and qualifying the Formal Units of Heritage and Landscape that constitute the urban scheme, so it is possible to diagnose the problems and induce intervention therapies through a Landscape Plan, based on the identity and characteristics of the environmental subjects.

It is a matter of rearranging the spaces that penetrate the metropolitan area to the city, a search that can and must be innovative, nature + history + spirituality and landscape design.

The components of urban green in Latin American metropolitan areas are the cosmetics of the disfigured face of cities that have grown badly, that is, the makeup that hides and mimics the deformations.

Nowadays, open spaces, in most metropolitan areas, are an anti-city where part of the collective life of its inhabitants. Governments are reluctant to venture into the field of landscape heritage design, planning and conservation, because of the costs compared to other forms of urbanization. However, the building and rehabilitation of vegetation are among the lowest costs, is moderately inferior to a banal asphalt binder or stamped concrete for paving a street.

Metropolitan areas should celebrate life in society and respect for nature. The current need for a sustainable landscape gives us the opportunity to establish a desire and new aesthetic orders capable of giving a revitalizing boost to the new metropolitan discipline.

Most of our parks, squares, and avenues have been bequeathed to us from the past. In this 21st. Century, many more important contributions on the public sphere could be expected, but, on the contrary, we are faced with the fact that our contribution seems to be more the erosion of such spaces due to building speculation, informal land tenure, trafficking and the greed of some people.

The architecture of open spaces must be understood as a quality element to design, plan and preserve the historic city and its metropolitan area with a renewed hierarchy of historical values, environmental, spiritual and artistic, among which architecture and environment are intertwined, using open space architecture planning for this purpose in a logical relationship, as between male and female, between positive and negative pole, without the subordination of one to the other.

Chapter two

Metropolitan practical-theoretical approach

The Metro-Matrix[63]

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The Metro-Matrix (Ortiz, 2014) is one of the tools of Practice of Metropolitan Discipline. It is a reticular system of axes: few structural geographical axes and some completing penetrative ones, which first, determine the development of structural axes along lines and, second, define hinge points of activity and densification. The matrix assumes its legitimacy from the definition of the logic of historic and geographic settlement-distribution, which makes possible the localization of interchange nodes even in those areas of the metropolitan region hitherto considered peripheral to the only centre of the mother city.

A cognitive tool

The Matrix is an abstract interweaving network considered as an interdependence between the mental and the physical temporal space of the city. It is held in the mind as a scheme (the term of idealistic Kantian phenomenology), not so much in its ontological nature, which is immutable, but as a structural basis for the acquisition of a competence by each individual in their exercise of exploring a territory in order to know it and to act in the reality. As elaborated by thought, this scheme encompasses the space-time nexus developed by a mental, i.e. virtual, exploration of the world in which to live and act. Not a psychological world, but a concrete and practicable world. The

63 To cite this article: Ortiz, P. and Contin, A. (2021). The Metro-Matrix. In: Contin, A., Giordano, P. and Nacke, M. (eds.). (2021). Training for education, learning and leadership towards a new metropolitan discipline. Inaugural book. Buenos Aires: CIPPEC.

metropolitan architect is the person in charge of theoretically elaborating the paradigm of the space-time scheme. Not as an abstract, but as a concrete one, which conforms to a practical knowledge, i.e. a knowledge of where and how to locate and build activity containers, not just as efficiency-bound buildings but as well as signs on the map (metropolitan acupuncture chart) to be explored, frequented and lived in.

The three elements that constitute the Metro-Matrix are geography, geometry, memory, and its instruments are: schema, diagram, model-name (Madrid, Teheran for example), maps.

The attitude of reduction (geometric simplification) is the indispensable starting point. It can be defined as an intermediate layer between the solid street-piazza matrix (Rowe,1980) which forms the omnipresent background of the traditional city and the new structure of the metropolitan city. Engaging in geometric reduction (schema) means exercising a systematic ability to understand complexity in a glance, thus opening up new possibilities within our usual mental flow. It is the Platonic quest for the conceptual ‘Idea’ behind perceived reality. The result of geometric simplification is an "acute intuition" so that the immediacy of experience appears surrounded by a multiplicity of horizons towards which we can divert our interest. This intuition of the synthesis is fundamental because it represents the basis of the criterion of exactness in the analysis of the metropolitan discipline, the nature of its evidence. If the ‘Synthesis Idea’ is the beginning of this process, it regenerates the exercise of imaginary variations (scenarios or exercise of thought), in the virtual space of the mind, and then multiple possibilities of the metropolitan phenomenon appears through the cartography. These ideal variations are familiar to us from mathematics.

Schema diagram model-name map

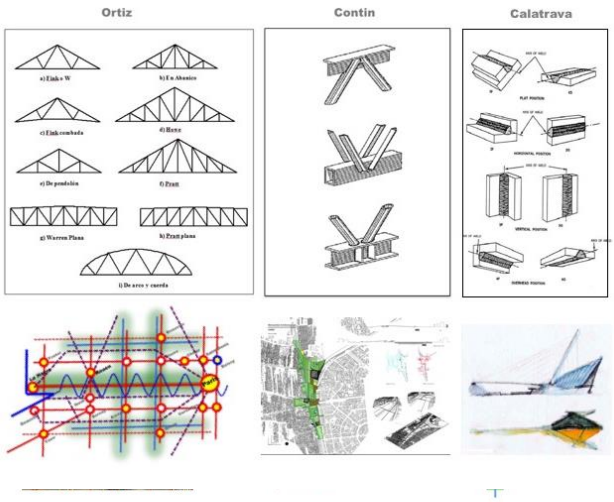
From the interpretation of a satellite map (a google map often) the mind produces an abstract schema that is a relational tool. It defines the hinge points of a metropolitan region or city towards their existing and/or possible relations. It becomes a diagram, then, and we are able to produce the topographic map, that is, unlike an ortho-photo, a mental construction. We build it through the Metropolitan Cartography tool that is an instrument to produce series of synthetic open-source maps. The figures of the schema and diagram allow the model of a specific city appears within its name identifying it. With the model, the map of the city suddenly appears also, letting suddenly memorize the strategic hinge points of a metropolitan city structure through a mental map: the metropolitan acupuncture chart.

The process to shape a model passes through a schema and a diagram, which since are factual (the diagram, in particular) give to the model a total factuality that is not synthesized in the model-name; it is much more complex. That factuality, so its capability to be operative, is possible through the interpretation of the figure (schema and diagram) of the model-name and then, through a map. The figure of the model-name coincides with the model when we look at it synthetically and is valid also as the name. The model-name then, necessary, evokes the topographic map. A real map that is no longer necessary if only we have to name the city but it becomes necessary when we have to operate at the scale of the place. The map is fully identity. The scheme is a mathematical geometric operation, but when it is conceived since its rigidity, the properties of the places (their values) often are not visible. The schema is like a telescope used to see better. Instead, in the map, space is not considered in its quantity and extension, but as *topos*, as its value and quality. By naming the places.

So, the though movement is through the 1) Ortho-photo, the 2) Diagram and the 3) Scheme (Synthetic Cubism). Then it is possible to see what is missing in the Idea of the city and program the investments to complete it. (Isostatic Truss 3-scales analogy).

These investments can be either bars (connecting infrastructures) or nodes (urban centralities). Both are necessary for the truss. Otherwise, it will fall.

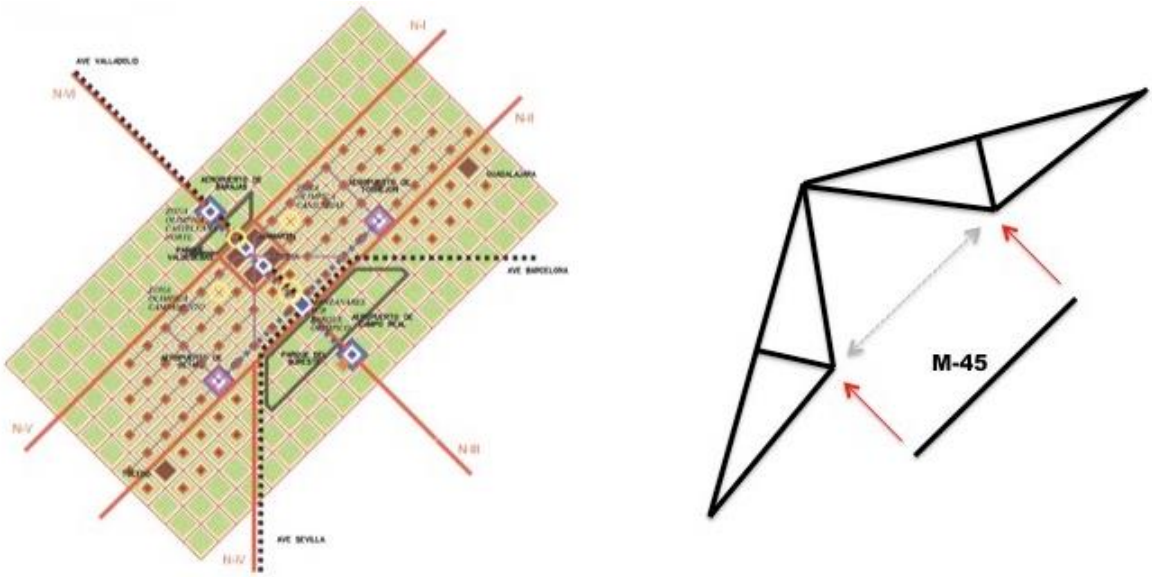
Figure 6. The Metro-Matrix concept process

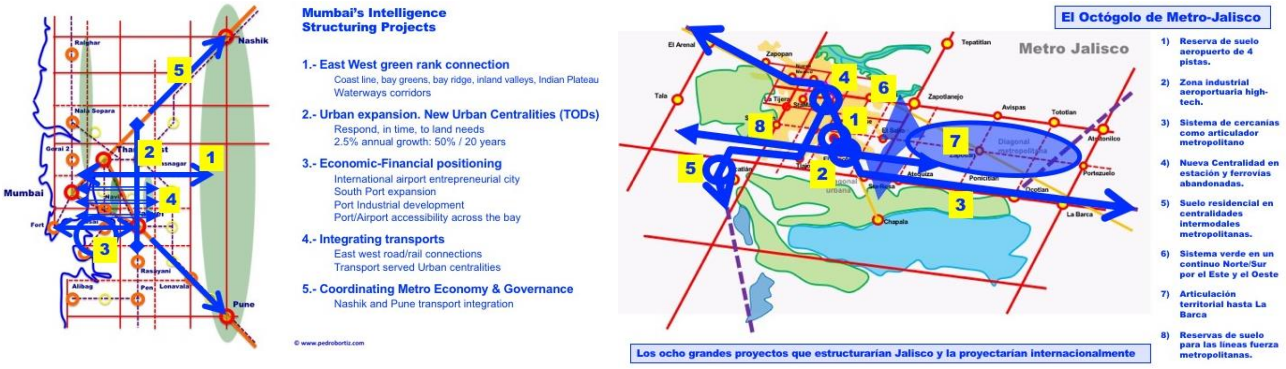


Integration of scales

Each truss is different at Metropolitan scale. Each urban centrality has to be designed differently because they respond to different pulling/contracting forces (Urban Scale). Then it is possible to decide the welding (which is the specific urban spaces and architectural scales).

Figure 7. From the Schema to the Metropolitan Acupuncture Chart





As the Newton Formula is a synthesis of complex situations, each different, to stop at a geometrical reduction, however, would mean condemning this method to the production of non-operational assessments. The formula is to be applied to practical means. For 300 years it has defining the evolution of all our technological developments, from pullies to moon travel. Intuitive evidence must be translated into communicable terms, through the language of spatial disciplines or through other symbolic scripts: that is the aim of the Metropolitan Cartography. On the other hand, the concrete physical execution of the descriptions/schemes of the metro-matrix is an integral aspect of the simplification process itself, and shapes our experience as much as the intuition that generated it. In other words, it is not so much a matter of "codifying" the territory, but of attributing qualitative value to the points that we have identified through the matrix scheme. Through an accurate graphological semiology the maps of Metropolitan Cartography give body and shape to what we experience through the schemes and diagrams of the matrix meter. The maps of Metropolitan Cartography can complete the knowledge of metropolitan dynamics through the representation of the qualitative "variations" of each position identified by the scheme, i.e. the precise conditions under which an observation can be communicated. Thus, the local variations of each position, once recognized and related to each other, become invariant to the metropolitan scale.

A practical example

We want to give a practical example of the logical succession of choices needed to achieve conception while the Metro-Matrix

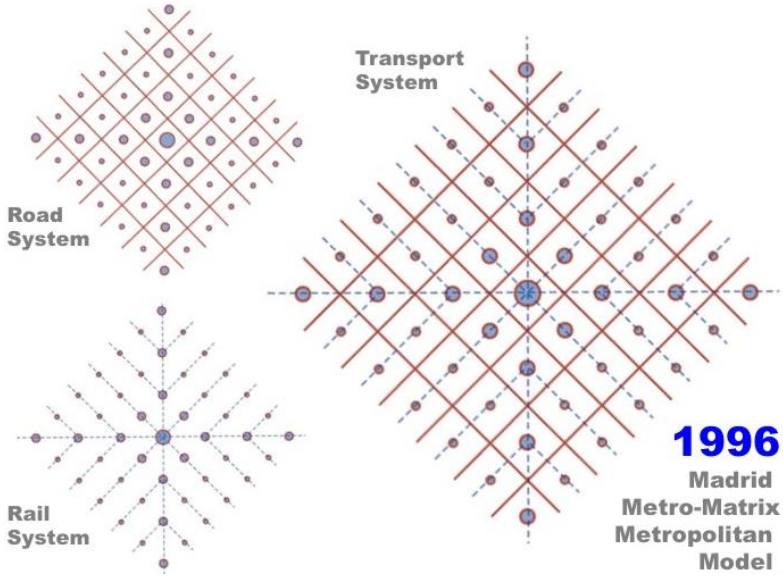
The starting point is a satellite map (zooming in and out to understand the different scales) and ‘discovering’ the main structural green lines (main directionality and secondary one). Then, it is necessary to locate the historic urban settlements and see the periodicity between their locations. That gives the ‘mesh width’. Most of those lines have already been historically built as ‘the ancients were not stupid’ and they already had a practical perception of the patterns of the green infrastructures determining the territory.

To complete the lines, which have only been partially understood by the existing plan with discontinued implementation, it is necessary to fill up the gaps of the mesh. These lines might, or might not be for location of infrastructure. It all depends on geo-topographical possibilities and development strategies. They just are the necessary lines to understand the pattern of historic-cultural location in the territory. Each node so that, acquires a specific personality and function. Plays a different role that has to be defined and designed. Completed in its components to play and fulfil its role (Karma) to the best. To the best in social, economic and environmental terms. As the pieces in the chess game. Each game is different; each piece has to play its strategic role to fulfil to its best.

Only then does the geometric simplification arise in the mind as an insightful intuition. The synthesis formula of the scheme and the diagram comes, that is, from a higher level of conceptualization. This

(Fig.1) is the Metro-Matrix reticula, like the Gravity Synthesis Formula applied specifically to a given physical experiment.

Figure 8. Metro-Matrix _ Schema



The Metro-Matrix and the question of the birth of a metropolis

The Matrix is a way to pose the question of the birth of a metropolis with respect to the rule of its physical shape and not according to an economic model. In fact, to define the rules of the games (chess board) and their possible combinations is to deny the possibility that the condition for which we can say: "play your game ...". So, following the game's metaphor, considering the territory as a chess, at the beginning of the planning action, allows us to describe the functioning of each points of the territory's rules. Through the game, it also eliminates the possibility of descending urban formation from myth, that is, from a dogma.

The Matrix is a mental paradigm that comes from a deep ambition to synthesis showing a strong will towards a geometric choice. After the synthesis obtained, however, the rule that derives from it must be impeccable: by changing the existing shape of the city, the city articulation changes among the different units, and the risk is leading to a fogging of the existing relations. We will no longer have blocks in the metropolitan fabric but fields of practicability. The form of the city has opened to the line. No longer, then, only street and blocks, no longer the interpenetration of a microcirculation in the centre, but articulation between different orders of magnitude.

The question of the metropolitan project will concern the definition of the unit of intervention and how should micro intervention be articulated at the higher macro scale: what persists, what changes? We are looking for the definition of a metropolitan potential.

The Matrix represents the faculty of thinking and imagining: it has a mental imprint, that is, through the Matrix we can conceptualize the relation among the territory's elements (we can mathematize the element). It is based on the exercise of the mind that produces a metropolis paradigm, - within a schema and a diagram -, that, then, becomes a model (a city model-name: Madrid, Istanbul, Tehran) through memory and imagination. We do not start from the territory functions, then, but from the

matrix relational idea that sustains its possibility of being scalable to obtain a homogeneous cellular space (the metropolitan digit).

The Metro–Matrix reticula, therefore, implies an imaginative (mental) approach that concerns a mental operation of totalisation. It is therefore, an ideal operation. The tracing of the lines, then, refers directly to the infrastructures, i.e. the traced lines prefigure the tracing of things that connect or separate parts of territory. What we get is an infinitely large cellular shape homogeneous of cells expandable to infinity (the dimension is variable and depend by the character of different geographical region). The schemas of the metropolitan cities are the figures of metropolitan models - type declinable. With the Metro-Matrix we experience the principle of scalability, - already sanctioned by Leonardo with his figure of the square and the circle -. Its grid is a figure that scales to infinity and divides to the infinitesimal, such as the renaissance painters' grid. The question is: at the metropolitan scale has the principle of scaling been questioned? we mean that if we start from real measurements and not from reticular abstraction, are we able to scale them? That is why from the paradigmatic schemes we obtain, then, the diagrams. These are produced conformed the schema to the geography of a territory.

Rule and model

In the world of urban planning first of all, there is the program, that usually descends from a city model. There is a difference between planning and programming. Planning is the long-term consistent vision of the whole (4- or 8-years vision, beyond mandate responsibilities). Then, there is programming, which is the 4 years priorities on investments within the political mandate. The Plan has to have 'variable geometry' capacity so different programming approaches can be acceptable. That will be the difference from a government that prioritizes social facilities form the ones that prioritize productive activities.

It raises the question of the transformation of a territory and a city conceived through governance and policies or, above all, as a question of Form, because the program can design, but cannot do what the form of a metropolis does: establish how all the places needed to inhabit a mental map are interconnected. The mind map provides many more alternatives that are necessary and defined by a planning process, so you can choose and decide what will be the priorities of the city. This is the condition to design a metropolitan city where all citizens can satisfy everything they need and want to live a territory and a city. Therefore, the program as a real program never gives the syntax of space/time organization. This is the role of Metropolitan Architecture. According to the Matrix model, the shape of the metropolis is a green/grey structure. So that, we do not have path, landmark, edge, node and district following the Lynch 's idea of the structure's elements of a city, but, above all, the green-grey infrastructure. The Metropolitan Architecture so is perceived such as a metropolitan total environment (see First Phase, A. Chapter 1. The genesis and purpose of Metropolitan Architecture, its discipline in the era of the bigness at the metropolitan scale. (A. Contin)).

The diagrams, however, cannot be sensory inhabited. They, as every traditional topographic map, are mental maps but still more abstract. It is necessary to know that the spaces to be used, with the relevant equipment, have a distributive arrangement of functions that is not a problem of program, but of form (multiple pockets) within their physical properties and qualities. That is why the Matrix must to be understood, above all, as a tool to define the rules for composition / form and not only as an instrument for the definition of program / functions for a metropolitan city model (capitalistic city, socialist city, XXI century city, Smart city, and so on); albeit It works as well. A paradigm that becomes a model through a schema and a diagram to which we give the name of the metropolitan city that we are analysing.

Today we recognize that the urban elements having an active part in urban phenomena changed, due to the new process of urbanization and following the subsequent huge spatial and temporal

measures of the city. We have to admit that the city structure, its physical and temporal relations with the citizens, is altered due to the change of its scale; the temporality of people and citizens is particularly changed. In order to keep the physical issue as a focus of the design approach, the Metro-Matrix methodology produces a metropolitan city mode. Through its schema/diagram/protocol maps, - the latter obtained through the Metropolitan Cartography tool-, we have a conceptual shape of the metropolis that provides metropolitan architecture scenarios and allow the metropolitan expert to study the metropolitan dynamics impact on territory, society and on legal and institutional forms.

The metropolitan unit

We could say that this is a discontinuous reform, the creation of the interferences inside the new metropolitan roads: a development method. Referring to the result of Ortiz's methodology, rather than a formal model we need to talk about a development model, which consists of both series of:

- patterns that indicate a direction of the settlement's growth;
- a series of maps or networks that suggests possible configuration and characterization of specific qualified locations with a gradient of formality: from the centre (new metropolitan morph-types related to real estate development) to the countryside (new urban-rural settlements able to involve urban agriculture). This aspect contrasts with the relative immobility of the traditional cities order, based on a now outdated horizontal system of traffic, and leads us to propose an integrated model that is also based on a capillary action, on the rapidity and the multiplicity of communications, which lives and spreads freely in space in any direction, reclaiming the land for nature.

The metro-matrix schema is a simple square geometry that reflects the forces of the geo-topographical features of the historical territory. It responds to the geography of the region and the structure of the historic towns as well as historic urban evolution models. The digit of the plan is the figural landscape unit (named Unidad de Desarrollo Equilibrado (UDE), or Balanced Unit Development (BUD)) that is the medium distance between urban settlements in that specific metropolis. As large as 15 km in Buenos Aires due to the, poor, edaphological values and the colonization proves. As short as 3 km in Havana or Piacenza, for the same factors working in a different setting. Most of the time it is in the range of 4.5 kilometres X 4.5 square kilometres. Which corresponds to the span of the medieval length of a League. The anthropological distance of an hour’s walking travel. In Madrid, as the first case study, that was the medium distance. But it is different in each metropolis depending on the distance between the historical urban settlements that reflect the properties of the territory, geography, agriculture production and culture. This is a lattice topology, a sign of human presence in motion inside the territory. The schema is not only a tool that mimics reality, or represents it, but also an operational tool that extrapolates and necessarily allows an experience of cognitive mapping. Geography becomes the original archetypal form of Western knowledge and needs to be redesigned to meet the challenges of the globalized society.

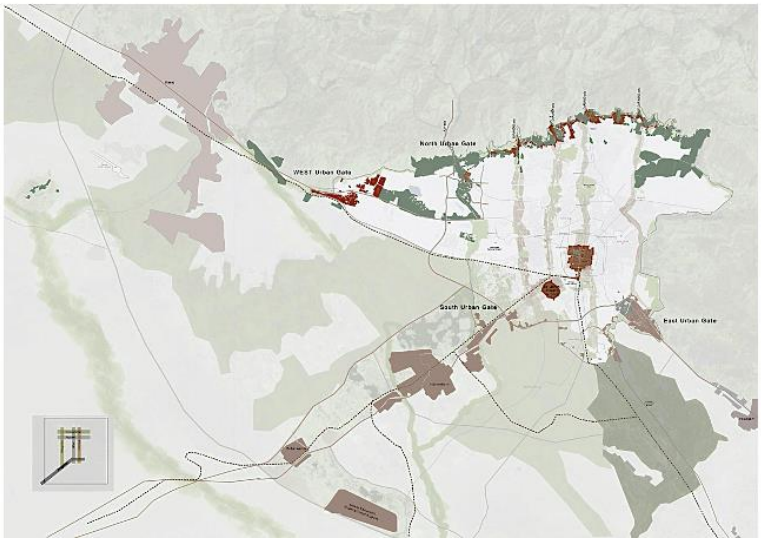
The interpretation of the new “metropolitan region dimension” is achieved through geometric linear lines of green-grey infrastructures. The interpretation of the new “local dimension” is a topological network that determines a new portion of the body space. The grid tames the existing infrastructures, which become linear, not circular. The new infrastructure model is conceived as an interrelated system between commuter trains and highways within the green infrastructure system.

After a first phase that identifies the force lines (geographic lines) of the territory (we name it Metro-Matrix 1), then the Metropolitan Architecture comes out from the location and integration of large-scale structural elements, which coalesce the metropolitan size and extend urban-style living standards to larger populations in suburban areas. We name that phase Metro-Matrix 2 or Metropolitan Acupuncture Chart and it is the result of the analysis of the Maps of Dynamics.

Figure 9. Metropolitan Acupuncture Chart _ Teheran

The Metro-Matrix result: The Metropolitan Acupuncture

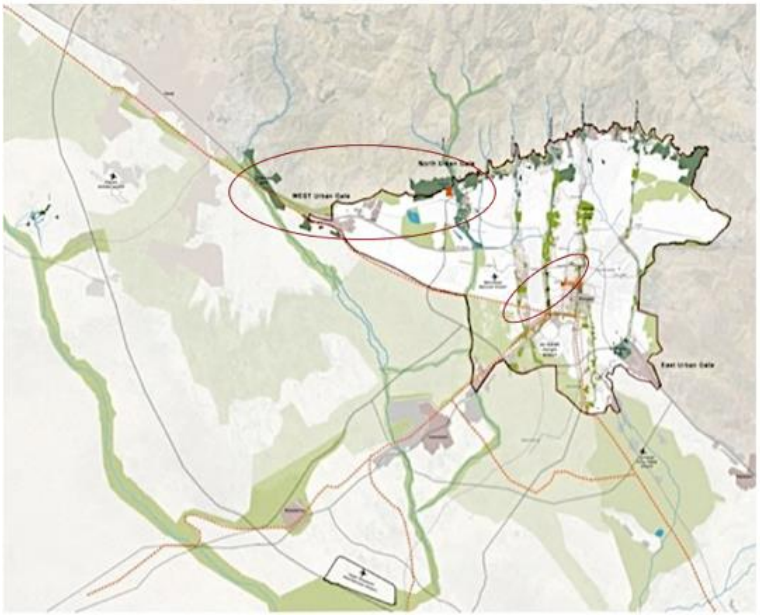
hinge points + metropolitan themes
1 metropolitan layer



a) the gates towards the region and two ecologically relevant areas east and west;
b) a very critical area for the city's bio-potentiality in the north, where we have to deal with the explosive growth;
c) the center of the city that is the hinge point with the historical urban axis of the city;
d) the old airport Ghale-e-Morghi now abandoned;
e) the industrial city Eslamshahr raised inside the agricultural area in the south of the city;
f) the new airport.

The areas are present together and interconnected through projects of metropolitan architecture that operate as bypass.

3 Selected area and themas



The selected areas and the themes of metropolitan architecture are:
a) the central area. This area and its historical axis, have a bypass with the diagonal metropolitan south-west axis of the dismissed Ghale -e-Morghi airport.
b) the northern area with its critical aspects within the nature / culture relations, which looks as compromised by the recent urban development filling the gap between the flat land and the mountains and even sprawling on the sloping topography.
c) the area of the old airport, Ghale -e-Morghi, that is the real infrastructural hinge point of the metropolitan area that connects the metropolitan axis, the urban and the historical one from which the penetration into the territorial regional starts.

The Metro-matrix as a political tool for the governance of a metropolitan territory

The profound criticism of the Metro-Matrix toward a vision of an only economic or ecological territorial development is especially represented by the way it addresses the matter: its empathy on metropolitan infrastructure and regional development. Within the discipline of the metropolitan project and the territorial analysis, we are often increasingly facing the implementation of the infrastructure, due to its resilience affordance, as the key to the structuring of the territory. This topic has been the subject of some infrastructure works that have selectively destroyed landscapes of greatest importance for local populations. The Metro-Matrix implements a sustainable infrastructure strategy. The territory for that strategic issue is fundamental because it is the context of the memory of the inhabitants, but, overall, because it is the framework of their experience and the space of their everyday life.

Finally, one the most important result that we obtain from the application of the Metro Matrix is the construction of a new series of open-source maps (Protocol Maps and Maps of Dynamics), which are the device capable of supporting a mental map at the metropolitan scale, the Metropolitan Acupuncture Chart through which we can identify the correct place where it is possible to locate the Metropolitan Architecture Projects. These maps are made up of a continuous and a discontinuous system (local space within the global scale) and by layered ground. The matrix, so, moves from a geographical scale to local geography. Compared to the traditional structural urban paradigm, the Practice of Metropolitan Discipline still wants to recognise the possibility of a value for a syntactic and communicative Metropolitan Architecture (a cognitive value), through the definition of a geographical and historical statute of the architectural subjects, which is recognized as fundamental for the construction and the symbolic interpretation of the built environment but at the new scale: a metropolitan landmark, as a new relay, a hinge point for the interconnections between the scales.

Tool for action

The metro-matrix presents a diachronic, dimorphic and diastatic structure which is stable and complete in time, form and scale. It provides the clues for what is missing or what is needed. As in an Isostatic Truss structure each knot and each bar are necessary. If any are missing the structure fells. In the Metro-Matrix if a bar or a knot is missing the structure is under performing and should be provided. The Metro-Matrix allows for redundancies. Inherited wrong decisions have to be assumed, as possible unbuilt yet wrong investments but politically committed. The Metro-Matrix includes these deviations although plays on minimizing redundancies and allowing for unwanted alterations to the core of the structure.

The Metro-Matrix immediately allows to prioritize the main strategic projects necessary to the metropolis. It is an integrated tool for action even if political and administrative action is mostly disjointed and incrementalist. Comprehensive Strategic and Structural Plans (see difference in attached document) would be welcome but are not imperative. As a matter of fact, Metro-Matrix proposals have been implemented around the world (see Diagram) as independent projects without the backing of an integrated Plan.

Figure 10.The schema that becomes the model-name

Principles, operators and operations[64]

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"An operator is an analytic tool that serves to generate the rules of the building and the order of an inaugural book. It is about how to deal with metropolitan dynamics. With the name principia, partes or rationes, some of them are explicitly identified by Alberti. The operators of first type are considered as axioms and respectively called: the axioms of the triad (which generates the general plan of the book), the axiom of the bodybuilding, the axiom of the classification of uses.

Note. The operator is here understood in the sense of indicator of sign transformations which allows defining the rule of operation following the definition of N. Dunford and J.B. Schwartz in Linear operator".

- F. Choay, (1980), The Rule and the Model, Officina Edizioni, 1986, Rome. Page 99

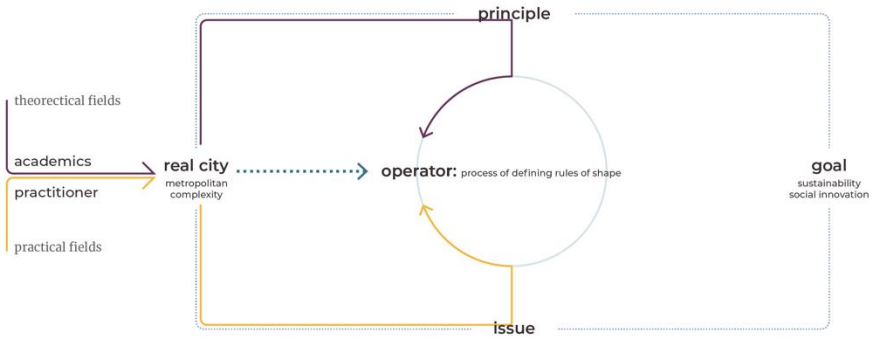
"The Operation is not only a practical action, but it is a principle of conception. What we would like to underline then is the logic of the action. In the Alberti's book the six "principles" of conception concern the region (regio), the area (area), the plant division (partitio), the wall (paries), the roof (tectum) and the openings (aperitiones). For Alberti, there are three fields of application: necessity, comfort and pleasure. After a lógico-critical deduction, which serves to establish them, the six operations of the conception are briefly defined then, in the order in which they recur from beginning to end of the project, examined one after the other and crossed with the three principles of necessity, comfort and beauty, which make them generate specific rules each time".

- F. Choay, (1980), The Rule and the Model, Officina Edizioni, 1986, Rome. Page 103

The reconnection of the ideal city with the real built city in the MGPI (Metropolitan General Principle and Issues) framework comes through the process of a conceptual operator that brings the principles and issues together for finding how to transform, develop, or maintain the existing situation and reach the goal of sustainability. Sustainability is a goal but also is the foundation of our project. Towards this perspective, both the academic knowledge's theoretical field and the practical field of the Governance and management of a metropolis are equally acknowledged. (fig. 1).

64 To cite this article: Contin, A. (2021). Principles, operators and operations. In: Contin, A., Giordano, P. and Nacke, M. (eds.). (2021). Training for education, learning and leadership towards a new metropolitan discipline. Inaugural book. Buenos Aires: CIPPEC.

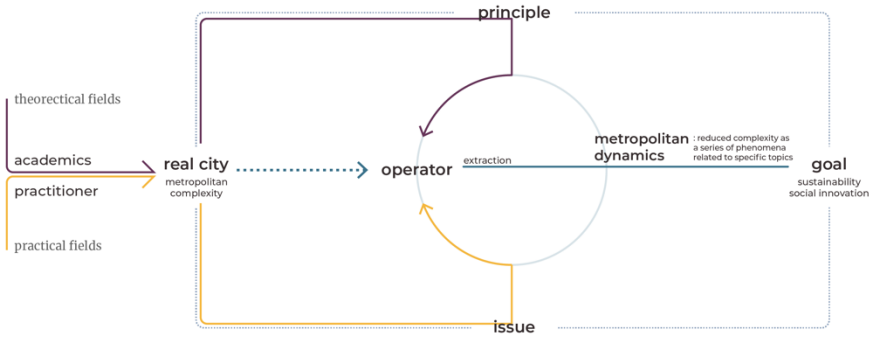
Figure 1. The Operator within MGIP Framework



Operators are "rules of shapes", that is, they are analytic tools that enable to produce concrete entities from theoretical concepts through a complex process. The operator as a logical process consists of two moments: "extraction" and "concretisation". The “extraction” moment (fig. 2) aims at exploring metropolitan dynamics and, as a consequence, the intention of the project, and at translating them into information through data related to the elements of the metropolitan contexts that need investigation.

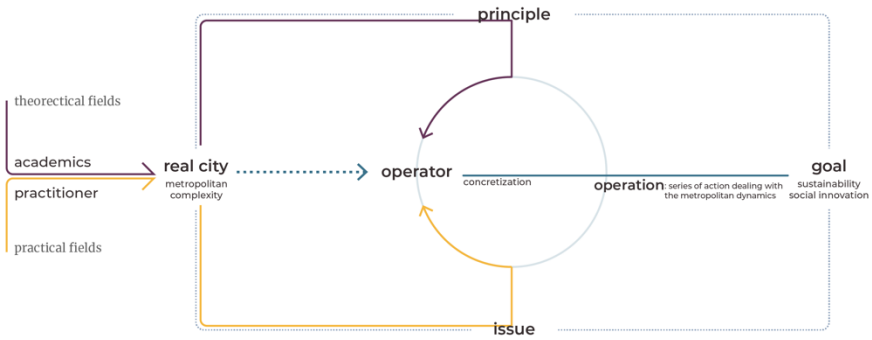
In the Metropolitan Discipline framework, the conceptual operator, - developed within the Metropolitan Cartography tool-, extracts from the MESA (Metropolitan Existing Situation Analysis) the Metropolitan Dynamics and Processes, which determine the Metropolitan Issues. Then, the Operations are the specific actions following the concretisation done towards the conceptual Operators, to address the given issue and bridge the gap between the city reality and the goal. These operators and operations are represented visually as maps using open-source data in the Metropolitan Cartography tool.

Figure 2. The Operator – extraction – Metropolitan Dynamic



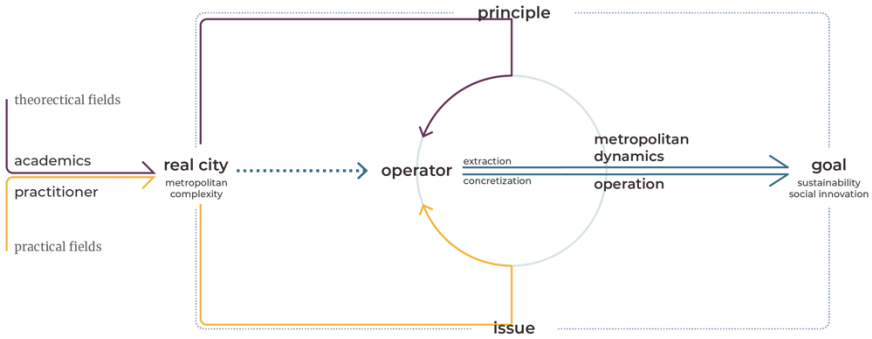
Reducing the metropolitan complexity into metropolitan dynamics is an essential role of the MGIP framework. Compared to the entire entangled system that is the metropolitan complexity, metropolitan dynamics represent a series of phenomena explaining the issue and the reality gap. These are related to specific topics and issues, therefore, have limited factors to consider compared to the real complexity. Recognising metropolitan dynamics is one of the most important works for collective intelligence. The academics, together with metropolitan agents will understand the issues and holistically define the dynamics.

Figure 3. The Operator – concretisation – Operation



By forming catalogues of data selected according to value judgements expressing the intention of the project, the second moment of the operator process, "concretisation" (fig. 3), aims at the definition of concrete operations to shape the real Metropolitan Architecture project. Selected catalogues of information, or semantic packages, within the MGIP Glossay Software, are used to produce geo-referenced maps of metropolitan dynamics needed to determine the metropolitan projects.

Figure 4. The MGIP Framework



The rules for selecting the data, creating catalogues of information, and their synthesis into semantic packages constitute the operator process for translating into concrete operations what was previously conceived on an abstract level. (fig. 4) The maps produced under the ethical lens of sustainability are, therefore, a mental representation of reality. Nevertheless, they become operators of reality through the concrete operations they suggest. The geo-reference and the representation of data that is the semiology of space indicate the different map points in quality and quantity. These are potential points of the intervention of the metropolitan projects. Through maps, it is, consequently, possible to reveal the specific importance of the Metropolitan Architecture projects as projects for the quality of life of and the well-being of the metropolitan citizens.

Within the Metropolitan Cartography, the operators as a set of rules to define a metropolitan fact (linkage urban-rural; public-private; urban-metabolism) refer to a common meaning also for other disciplines (e.g. the rules of urban metabolism through the definition of an urban biography are among the concreting metabolic operations for the production of a planned part of a city).

The operators, then, are within the maps, the rules of the production process of the metropolitan city through determined operations.

Urban Biography and Metropolitan-urban metabolism

Through the Principle of Urban Biography, we propose a different interpretation of the Urban Metabolism that we do not consider only as a model to facilitate the analysis of the ecological footprint of a city. Urban Biography tells how each culture has interpreted in the urban system the geographical situation. It is the spatialised narrative integrating the morphological and geological image with the work of the society that interpreted and transformed the territory. The Urban Biography, or the evolution of urban age, is closely linked to the historical and geographical meaning of metabolism, and it is understood as the constant transformation that has produced the current state over the centuries. On the one hand, it aims to establish strategies for the adaptation of metropolitan metabolism to the capacity of the natural systems that surround it and to climate change or to increase the capacity of wise use of soil, energy and climate. It is also intended to promote the connection of metropolises with their rural areas, to reconcile a healthy life with the preservation of local ecosystems, as well as the correction of global ecological imbalances.

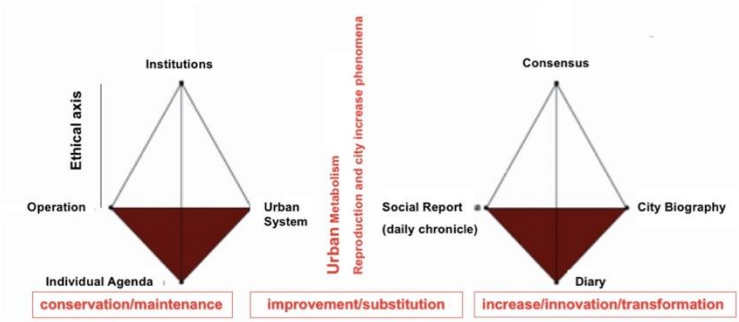
Urban Metabolism is more related to the project of developing a coordinated, interdisciplinary and changing territorial strategy to enlighten and manage spatial, social and economic dynamics, through a sustainable approach to metropolitan planning, connected to a better quality of life and accessible to all citizens. Metropolitan Citizens have the right to choose between different qualitative lives' offers corresponding in terms of temporal equivalence. That involves an incremental demand for space with low environmental impact and conscious choices between transformation, replacement and maintenance operations, linked to the development of the complex and heterogeneous European "metropolitan landscape" designed and restored through new tools for reading the current state, and its potential projection.

The Generic City and the Metabolic Approach

With the achievement of the bigness scale, theorised by Rem Koolhaas in the '90s, we passed from the paradigm of sustainability in the finite urban form to the question of how to define new metabolic sustainability that may lead to a model for urban growth. The emerging question allows us to consider the urban growth phenomena through critical thresholds and paradigmatic transformations, which remove and replace parts of the city by selecting the pre-existing structures that cannot support the new scale and complexity of the contemporary city and therefore might be abandoned. Nevertheless, today an intentional and naïve removal of the anthropological time in the physical space, that builds common sense and citizen participation, is a matter of fact. The irony seems that, in order to join the modern civilisation, it is necessary to take part in scientific, technical, and political rationality which very often requires the pure and straightforward abandon of a whole cultural past. It is a fact: every culture cannot sustain and absorb the shock of modern civilisation. That is the paradox: how to become modern and to return to sources, how to revive an old, dormant civilisation and take part in universal civilisation.

The recognition of the metropolis as a closely connected network of small, medium and large urban centres spread across vast regions, so that the Net-City definition demonstrates the necessity of shifting from the traditional urban study approach. The metropolitan centralities, or epicentres, and their infrastructural connections frame the 'hybrid territory' (McGee, 1999), where the traditional boundaries between city and countryside, formal and informal, culture and nature, are blurred into an amorphous in-between 'Body Space' (Shane,2005). It is necessary to re-conceptualise the in-between space the metropolitan nodes, understanding the physical and environmental characteristics of a local site to promote quality of life for the inhabitants.

Figure 5. Urban Metabolism Scheme based on The Prism of Sustainability Model (MSLab)



In our concern, Urban Metabolism (fig. 5) is an approach looking into the process of transformation, substitution, and maintenance of new urban territories. Metabolism related to the metropolis means understanding the incremental goal of a metropolitan work according to the relations between cultural, energetic and productive investments. That re-configures the urban system under the lens of sustainability. It implies considering the changes occurred to the typological and morphological paradigms of space and their impact both on private space and the variety of the public realm, and how the old part, the new part, and the neglected part of a territory can be integrated as a whole.

Nevertheless, it is critical thinking about a new language of composition, which refuses direct references to a pseudo–picturesque historicism. Thus, in particular, the metropolitan public realm requires the construction of narration, through the architecture, that can tell stories about who we are and what a metropolitan city wants to be. The metropolitan public realm introduces, above all, a new symbolic dimension that brings the architectural project to the use of formal archetypes, which are able to evoke a new meaning in the global culture. The new project is born, of course, from the local scale but now it could transcend to the global scale. It also means to understand the various necessities, desires, contributions, and relationships of inhabitants and their prosperity. The vast possibilities of institutional structures to accommodate these physical, social, economic diversity sets the Governance as the ethical axis of the transformation. That is an essential part of the metabolism.

The three metabolic operations

Regarding the growth, the issue of urban metabolism is linked to the evaluation of the city correct size: how big it can dream of becoming. That allows, even if in the progressive direction (i.e. towards a developing economy), to preserve the citizen's sense of belonging to a place. We have to define the sustainable incremental degree (δ) of soil consumption for every size, or, better, what is the scale upon which to test its appropriateness: home, town, city, metropolitan region? For every scale, there is a digit (minimal unit of intervention), which is also the element that citizen can understand and memorise in order to produce their mental map of the place. That is fundamental for rooting identity and belonging. Participation and consensus to the territory transformation, replacement or maintenance, which are necessary for the fulfilling of the life cycle, or urban biography, is mandatory. We test the ways of representation (Metropolitan Cartography) and interaction between Governance (at the different levels), the other metropolitan dimensions, physical, social, economy and citizens' participation, which will facilitate the comprehension of one of the most significant metropolitan phenomena linked with planning methodologies at the metropolitan scale: a verification of impact, from the urban metabolism perspective, of the great public works, on existing urbanised territories, transportation networks, residential city fabric and natural landscapes.

This phenomenon is recognisable with the economic and spatial growth linked to technological evolution. It can be conceptualised through the analysis of the impact of economic growth on the territory, can be checked through regulation tools, and explained to the citizens within open-source

cartography for a participated decision, towards the foundation of a new common sense. That means recognising that the participants to the new process of urbanisation have changed. Nevertheless, also the spatial and temporal measures of the city are changed; and its structure concerning metropolitan contexts and citizens. It must change the way to mark places and territories.

Many studies focus upon the sustainability of space demand – that is environmentally low-impact space – in metropolitan processes of anthropological, social, technological, economical and managerial development and transformation. The consumption of energy, materials and, above all, soil, is to be considered, thus, the consumption of a rare public good towards a metabolical approach stressing the ecological issues of the different parts involved. It becomes, therefore, relevant the temporal component of “metabolisation" seen as a project of the life cycle, concerning the spatial qualities linked to it, or even as a generational passage, through the different evaluations of the scale, according to which the mode of the manipulation necessary for development – through transformation, substitution, maintenance – can be decided, in terms of sustainability. For this, Governance is the expression of the culture of a world embodied in a City Form.

The three metabolic operations are:

- maintenance - restoration interventions, conservation;
- replacement - ordinary state of design and approval of the works;
- transformation - verification of compatibility, integration project concerning impact studies and the European Landscape Convention.

Urban Metabolism within the metabolic operations is a comprehensive and diversified concept, well beyond mere energy issues and matters of sustainable building practices to reduce energy consumption. It should instead be regarded as a model of land/ground use and development in a perspective of continuous growth, which would inevitably imply an impact on structures, mobility, lifestyles, institutions and use of limited-availability resources. The challenge would therefore be to make these structures of complex systems and balances work, respecting the essential human needs: quality of life and thus the quality of the environment in which life takes place (i.e. well-being, safety, harmony, privacy, progressivity and resources preservation). It is evident that in each territory the balance between resources and development ought necessarily to be: fair concerning social dynamics, sustainable about the safeguard of environmental resources, which are non-renewable, rare, and therefore precious. Today, we are not looking anymore for competitive concerning a network of cities at the same scale, because the goal of a metropolitan region is “to growth together”.

The proposed metropolitan model should therefore be systematic, creative and participative, facing issues of the social and physical sphere, both considered from the point of view of Urban Metabolism. Thus, the model will be read about the necessary economical/energetic resources. The result will be a shared, fair and sustainable model of development.

- We will name transformation (change) a structural change of the system and of its functioning, something that today takes place by nodal points, not necessarily linked by a systematic vision of a transformation of the whole system. Growth, linked to the scale jump and sometimes out of control, takes place in different ways and discretely, by hierarchically organised points, that will become strategic fulcra not only at the scale of the territory but also concerning historic urban centres. In the big and netted dimension of the exchange modes, our problem will be to make the obtuse quantities of the bigness space, energy and material released by the new scale, “civic", that is, sustainable, through a new symbolic organisation which will be accomplished utilising an integration of the sequences of new landmarks and landscapes. In a transformational perspective of a stable system, we will have, therefore, to determine the coefficient of possible modification, to outline a different balance between what will be preserved and will change (hence the issue of the ethical problem of landscape). That is an essential generational passage that must be safeguarded. In this line, then, the concept of decline is not comparable to that of crisis, which arises instead from an interpretation of the potential (Magnitudo) of a place requiring a new

project, that is, the enablement of competences and capabilities in a new configuration. It is then necessary to inscribe crisis in a trend of change even in its discursive formation (metaphors), which for human procedures constitutes the possibility of a paradigmatic morphogenetic invention. "Metaphors should tell us not only the growth but also the decline of a city, which is familiar to us as much as growth." (Lynch)

- We will name Substitution or Replacement an operation which is usually typical of dismissed areas, which implies a global rethinking of the structure and the outline of new premises, negating the old ones.
- We will name maintenance a keeping of the status quo, in daily life, i.e. an operation usually typical of historical centres which today is increasingly becoming applicable to extended a heterogeneous environmental context, and which permits the passage from use to the symbol. It is a wholly European way, ancient and conscious of its fading (such as letting the repertoire of historical-architectural highlights die, in order to make it even more symbolic in the eye of new generations).

As mentioned above, space consumption is thus linked to the development of reform of urban structure. It is a structure that changing its outlook provides itself of the conditions to change the modes of production and consumption. The conversion of structure and production invests the several fields of know-how and living and behavioural styles, each of them representable on new maps capable of make knowledge evident, and, through the development and diffusion of measured potentials, will make metropolitan urban structure attractive. However, the problems of consensus and participation are linked to the psychological dimension of individual judgement, choosing between diversity acceptation or change and identity loss. It is also linked to the problem of globalisation and the necessity of homogenising spaces, uses and values, which put the individual self into crisis, in a scenario of distant places colliding together in short times (in places of intermodal exchange), substantiating contemporary two-fold increase in spatial dilatation/contraction of temporal dimensions.

General Objectives: multilevel finalities

Finally, the aim of the Metropolitan Architecture project is, therefore, to develop innovative interdisciplinary coordinated and performative strategies to fit Urban Metabolism with social and spatial dynamics, and, thus, through new metropolitan planning and design sustainable approach, which directs governance practices, for a higher European and Global life quality: the decoupling of the impact of resource use from economic development, the reduction of materials and energy consumption, and also the minimisation of environmental and socio-economic impacts.

That involves an incremental demand for environmentally low-impact space. That need, thus, forces political decision-makers, administrative officials, investors, to make coordinate and implementable evaluations of the choices between the operations of transformation, substitution and maintenance of the complex and heterogeneous European urban landscape. That can occur at the three scales (Metropolitan, which in the project will be called LARGE SCALE; Urban, which in the project will be called MEDIUM SCALE; Local, which in the project will be called SMALL SCALE). Every evaluation should be coherent with the indications derived from field exploration, elaboration, experimenting and from the synthetic evaluation of the complex factors that urban metabolism implies.

Metropolitan Architecture Projects have, therefore, to face the task of contributing to the development of a sustainable vision of urban transformation for better life quality, through:

- identification of key-points, which will interpret in a critical and inventive the synchronic relationship between real and virtual networks at diversified scales (networks of small, medium and large cities, networks of exchanges and infrastructural/immaterial communications) and of their links with local and geographical/territorial contexts. The nodes within each of these networks and between them will identify "structure articulation points", "land/ground markers",

"symbolic mediators" (big-box buildings and multi-modal interchange buildings) which in turn will clarify the articulations of "attraction basins";

- development of urban structure reformation, which is made urgent by production and consumption changes, which in turn cause knowledge and recognisance changes, and thus changes of usage, towards the definition of new possible attractivity, and also different "behavioural styles", wherein "landscape" becomes the "body space" of the scale of the one-to-one relationship, towards a new "citizenship project";
- a renewed “operational geography”, which will be structured by the comparative and inventive analyses of the conflict between urban development (i.e. sprawl/polycentric development) and environmental preservation. It will concern methodological and spatial more than political/administrative value. Thus, it will derive a new mapping transcription operation into “facts/actions”, which will interpret and select the places, delineating new “scalar gradients” between history/place/structure and geography/territory.

Such a synthesis is not the simplification of the complexity of the involved elements. Instead, is a sophisticated interpretation-reworking of these, communicable and exchangeable. It will be the result of comparisons between the multi-various cultural, geographical and modus agendi ambits, all aimed at producing a common vocabulary and shareable keywords. The new mapping, using some interdisciplinary translations, regards to subjects dealing with urban sustainability (sociology, architecture, planning, economics, energy), in terms of creativity and adaptability, and it will be open to the rapidity of the continuous transformations characterising contemporary age.

The cartography will provide indications, which will be directed to the elaboration of new instruments for reading and rendering the state of the matters and its potential projections (diagnostic and dynamic maps, interactive diagrams, performable schemes, sustainability indicators). However, above all, it will suggest a system of actions aimed at direct governance choices, addressed to citizenship, which has to be capable of understanding, and thus to recognise and approve, the alternative strategies of transformation – substitution – maintenance, within the life cycle (U.M.) of their city and territory.

At a time when a “landscape ecology” cannot be delayed much longer, we propose a biological/cultural system approach involved in the several spatial/temporal scales of the cross-relations between human activities, spatial configurations, processes and transformations. The definition and activating assessment of territorial and landscape/environmental systems management strategies should be useful, even in terms of ecosystems biodiversity preservation, for all their being strongly bonded to the relationship man/nature.

Also, regarding the economic and social perspective, the Metropolitan Architecture project lies down several aims: The first aim of this project is to understand how, the creative management of the definition of a new metropolitan system could affect the multiscale system of a regional territory, and how region sustainability can be enhanced by the development of its "social and spatial capital".

A second aim is to define a methodology for embedding in the multi-scale of a territory, the nature of changing social and economic events together with built forms which are emerging interdependently with them; including the new building types, many of which are giants: land use clusters, high-speed corridors of movement.

A third aim is to understand the claimed emergence of new types of "public realm", in the social and spatial sense of that term, and to relate it to the new forms of citizenship.

Urban Biography and Metabolism as Metropolitan Principles

We consider our discourse to be scientific because it is based on explicit or explicit assumptions.

Our scientificity is in having set our assumptions. In doing so, we have reversed the pyramid of knowledge: it is not the process from data to information and knowledge that makes us wise. However, vice versa, we need to be wise to be able to explain the reasons why choosing the data we can illuminate the complex processes that impact on the metropolitan territory. Through the assumptions of sustainability, we interpret the metropolitan region dynamics producing the groundlessness that our metropolitan architecture project must heal.

Every discourse has assumptions; scientific discourse has many implicit assumptions. The TELLme method in defining the field of action of metropolitan architecture planning and design has extracted, clarified and highlighted them. We called these assumptions "Principles" and included them within the Metropolitan General Principle and Issues. The Principle is not a vision of a static "good city". We have identified through the MGPI Glossary software the keywords and relative concepts that identify the structural elements of the territorial dimension in its four dimensions. Then, through the Metropolitan Cartography tool, we interpret the data by the realisation of two sets of synthetic maps: Protocol and Dynamics maps.

Our maps are all exhibitions, - "what it shows"- of the Principles that we have set out as conditions that allow us to interpret the territory and that can always be discussed. As an academy, we believe we have to enunciate our assumptions and to be the curators of the maps, as an assumption of responsibility. On this basis, we will then be able to open a dialogue with the other agents of the contemporary city.

Based on our assumptions, the maps illuminate the problems of the real city. Unlike standard GIS analysis systems, Metropolitan Cartography produces a set of synthetic, non-thematic maps that represent the territory through the combination of its structural elements. From the reading of this first set of Protocol maps, it will then be possible for each expert to define his or her perspective. By selecting a different composition of elements, Cartography can illustrate the issue of the unsustainability of the metropolitan territory in the light of the assumptions of different disciplines. We have called maps of dynamics, the synthesis of different perspectives.

With these tools, then it will be possible to define a meta-project as a basis for negotiation between the different metropolitan agents, which will lead to consensus for the definition of a sustainable project for the real city. In this way, concerning Spangenberg's Prism of Sustainability, which includes the dimensions of the metropolitan space: physical, social and economic, Governance will represent the ethical axis capable of shaping the metropolitan city we have in mind.

References

Choay, F., (1980), The Rule and the Model, (1986), Rome: Officina Edizioni.

Contin A.,(2016) The narrative structure of the agro-urban metropolitan territory.

The metropolis as Hypertext for the history of the XXI century: A network of middle cities as an operational topography, Berlin: Springer.

Choay, F.,(2004), Espacements. Figure di spazi urbani nel tempo, Milano: Skira.

Frampton, K. (1999) Megaform as Urban Landscape. 1999 Raoul Wallenberg Lecture. Ann Arbor, MI: The University of Michigan A. Alfred Taubman College of Architecture + Urban Planning.

Shane, D.G. (2005) “Heterotopias in City Modelling and Urban Design”, Recombinant Urbanism.

C. Rowe, (1976), La struttura a telaio di Chicago, in La matematica della villa ideale e altri scritti, a cura di P. Berdini, Bologna, 1993 (V ed.).

Fenton, J., (1985), Pamphlet Architecture 11: Hybrid Buildings, New York, San Francisco, The University of Michigan Ed.

Koolhaas, R. (1995) “Bigness, or the Problem of Large”, S, M, L, XL. New York: The Monacelli Press.

Urban economy and planning in a changing world[65]

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"How did you go bankrupt?" Bill asked.
"Two ways," Mike said. "Gradually and then suddenly.
Ernest Hemingway, The Sun Also Rises

Urban management and more specifically metropolitan administrations have to deal with disciplines dealing with sustainable urban management, urban planning, the economy, and municipal finance, and those are under pressure to redefine their principles from a number of shocks that are impacting the urban fabric and the world economy; the most recent one, the COVID-19 global pandemic is particular is ravaging urban centres are exposing the weaknesses of our current social order, but there were others in the making such as the long and continuous effect of climate change, and the protests against social inequality and poverty. Several areas that pertain to metropolitan discipline and policymaking will need to adapt and respond to these challenges by integrating growth with social equity, productivity with livelihoods and health with sustainability. The answers are not ready, as the full effects of these shocks, that will affect cities in developed and developing countries for decades to come, are yet to be seen. This essay examines these new challenges, analyses the issues and establishes the questions that planning and urban economy professionals must answer to redirect and redesign policies.

1. Four urban shocks

The first shock, a long time in the making, is climate change. Cities are responsible for 75% of global CO2 emissions and transport and buildings are the largest sources. Emissions of fossil fuels are largely driven by transportation; the UN Intergovernmental Panel on Climate Change (IPCC) estimates that the transportation sector is responsible for nearly 23% of total energy related emissions worldwide (IPCC 2018). Additionally, construction accounts for roughly 36% of energy related CO2 emissions, including power generation (UNEP 2017), which is on the rise in Asia and Africa. In India alone, emissions from construction are expected to double by 2035, despite new buildings being Net Zero Carbon (NZC) by 2050 to comply with the Paris Agreement. Today, not even 1% of buildings are NZC free (WRI 2019). Climate change impacts drought, flood and weather

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66 (*) The comments in this essay do not necessarily reflect UN-Habitat position.

cycles that have a disproportionately higher effect on vulnerable, low altitude cities and small island states, disrupting food production, impairing service delivery and the livelihoods of the most vulnerable population.

The second shock is the combined effects of extreme poverty and inequality. These are measured by the World Bank, that defines extreme poverty as the percent of population living on less than $1.90 USD per day. In 2015, 10 percent of the world's population, almost 734 million people lived on less than $1.90 a day. This was a dramatic reduction from the 1.9 billion people living in poverty in 1990. The region has the largest percentage of poor in Sub-Saharan Africa, with 41% of the population living below the poverty line, comprising almost 413 million people (WB 2018).

Inequality shows how wealth is distributed and measured by the Gini coefficient (WB 2018). Inequality has several dimensions, between countries, high, middle and low income, as well as income segment in countries that present issues of social, education and health. Academics have studied the adverse effects of inequality (Milanovic 2010, Piketty 2017, 2020) in societies, and its most perverse effects are in urban segregation since people have limited opportunities, and in basic services. Although the contexts are different, the massive protests that erupted in more than 20 countries in 2019 have been linked to poverty and inequality, with massive, spontaneous political mobilisation taking place, strongly denouncing social issues (see Davies 2020 for inequality in Chile, and Wright 2019 on global protests).

The third shock is the coronavirus. The COVID-19 started in Wuhan, China at the end of 2019 and spread to all continents afterwards. This is the worst pandemic since the Spanish flu in 1918 that infected a quarter of the population at that time. As cities were unprepared for this pandemic, which is affecting both high income and low-income countries, it will lead to a reformulation of urban planning and urban economies, with strong emphasis on health systems. At the time of writing of this article (December 2020), the evolution of the pandemic, and the policies adopted by countries, are still to be seen. Still, it is already severely questioning established principles of planning, finance and economy.

The fourth shock is the economy. Pandemics are costly, as shown by the SARS epidemic which cost $53 billion in China and Hong Kong (Lee & McKibbin 2003); the potential costs of an avian influenza pandemic are estimated at US$3 trillion (World Bank 2010). With the current COVID-19 and the world in lockdown, the short-term collapse of production is affected by supply -output related- and demand factors -income and consumption, so if the world economy is not reactivated soon, services will suffer, triggering unemployment and provoking a global recession, with a long-term depression a possibility that needs to be avoided; the IMF estimates a 3% drop in the global economy costing $9 trillion to the world product (IMF 2020, April 14).

The four shocks are connected, as inequality is interlinked with the pandemics. During the flu pandemic of 2009 in England, the death rate was three times larger in the poorest fifth of the population than among the rich (Rutter 2012); the Ebola epidemic in 2010-2016 killed almost 10,000 people, in low-income countries in Sub-Saharan Africa, Liberia, Ghana and Sierra Leone, and attacked the poor and vulnerable. Pandemics also affect those with lower levels of education, since, for those working in services, options such as telecommuting or remote access work are not possible. Climate change is also linked to pandemics; as a zoonotic disease that is transmitted from animals to humans, such as Ebola, bird flu, H1N1 flu, MERS, SARS, and Zika, COVID-19 has been caused by changes in ecosystems that have forced animals to move due to environmental changes or ecological disturbance, (UNEP 2016), and, on average, one new infectious disease appears in humans every four months (McDermott & Grace 2012). All shocks are a combination of endogenous and exogenous factors, as they are related to the economy producing short- and long-term effects.

2. Challenges of urban planning

Urban planning is the discipline that deals with land use and the design or physical layout of cities with the basic infrastructure, composed of energy, potable water and water management, air quality and landscape. It integrates them with the different local infrastructure networks, with transportation, communication and distribution networks providing a social setting for residents and commerce to operate in a geographical area. Urban Planning uses several techniques to estimate population growth, demand for water, transport patterns, healthcare, food and systems of production with a critical emphasis on land use.

Planners use principles that are applicable to different settings, as the urban planning theory, summarised by UN-Habitat, proposes: (i) the street network should occupy at least 30 per cent of the land and at least 18 km of street length per km²; (ii) High density with at least 15,000 people per km², that is 150 people/ha or 61 people/acre; (iii) Mixed land-use with at least 40 per cent of floor space should be allocated for economic use in any neighbourhood.; (iv) Social mix trying to accommodate houses in different price ranges and tenures to accommodate different incomes; 20 to 50 per cent of the residential floor area should be for low-cost housing, and each tenure type should be no more than 50 per cent of the total; (v) Limited land-use specialisation to limit single function blocks to less than 10 per cent of any neighbourhood (UN-Habitat 2014). These principles apply to a neighbourhood level between ¼ of a mile to one mile for a population between 5,000 to 20,000 people (for a summary of historical typologies see Park & Rogers 2015, Ortiz 2013). In practice, the neighbourhood dimension is inspired by Jane Jacobs' approach, where at street level mixed-use and people with different income ranges are combined in a mix, which doesn't indicate a specific size, as it is an approach based on experience and observation.

When we refer to metropolitan planning, the principles apply to their neighbourhoods. A metropolitan area contains at least 500,000 people and its boundaries are political and based on governance. In the United States, the New York-Newark-Jersey City Metropolitan area comprises a region with almost 19 million inhabitants. Still, several key concepts in planning are present, such as density, compact city, or public space. Let's review those concepts and how they may change vis-a-vis the four shocks.

Density is a crucial planning concept with developments in urban economics. The concept is rooted in economics (see next section) and adopted by urban planning, by the new urbanism school in vogue in high-income cities of North America, UK and Australia. There is no consensus and the concept is contested, for example, Jack Gehl indicates that high urban densities make cities car dependent, several studies link urban density with air pollution, several other urban planners claim that density leads to expensive real estate, congestion and gentrification. In the US a quarter of the population lives in metropolitan areas of at least 5 million people. New York is dense on its own, with an average 31,000 people per mile, due to high Floor Area Ratio (FAR) and tall buildings that make it possible. The design of neighbourhoods with high density will change.

Compact city, this concept is influenced by Jane Jacobs, and it was systematised by other authors (developed by Dantzig & Saaty 1973), the compact city incorporates the concept of density, but only to a level that provides it with amenities and a certain level of space and transport that reduces the use of cars, making the city more sustainable. Walkability and public space are associated with the compact city, and the compactness means that people are able to walk or cycle to their jobs. To different degrees, the compact city model has been applied in cities in Australia, Belgium and North America.

Public space, this is a "gathering space" where people assemble, usually free of charge. The concept has two connotations, one is for residents, where public space is necessary to achieve a vibrant neighbourhood and to promote interaction and exchanges, creating urban value (land value), and supporting local economic growth. For the municipality, public space is linked to the power to plan and reorganise the city through land layout, creating increasing value for properties that can

later be captured by people, commerce and the public sector. In general, public space has different connotations, but it also contains elements of participatory approach and solidarity movements. Public space has also been included in the Sustainable Development Goals (SDG11) with a minimum standard for public space in urban areas of 45% -the percentage needed to implement public transport- with 30% for pedestrian zones, and 15% for green areas, when the minimum density of 150 inhabitants per hectare is achieved (SDSN 2015).

The examples above are some of the basic concepts of urban planning that guide the design of neighbourhoods, which may be limited upon application to the metropolitan dimension, especially in developing countries. Some of the most pressing issues in developing countries in Africa, Southeast Asia and Latin America are **overcrowding**, **the existence of slums, and informal settlements**. Almost 55% of the population in Sub Saharan Africa lives in slums, and in Latin America, despite being middle-income countries, there are fewer slums than in Africa, but informal settlements are extensive. When the metropolitan dimension is added, then slums and pre-urban areas become part of urban management, and metropolitan regions incorporate rural areas. This presents a set of elements that goes beyond the design of neighbourhoods, such as the provision of urban infrastructure and its location, food systems and agriculture production, and the migration associated with increased productivity in rural areas.

The concepts of density, compact city, public space, and others are difficult to implement in slums or informal settlements, since they are places without funding and a functional local government, and the cost of retrofitting is far beyond the cost of building neighbourhoods from zero in new areas. The political issues surrounding the improvements of slums and informal settlements are hugely complicated and challenging to tackle. As a result, slums have become permanent features of cities, instead of being integrated with the formal fabric (UN-Habitat 2003, 2016).

3. Challenges of the urban economy

As more than 50% of the world's economic activity is now concentrated in urban areas, urban economics has gained importance as a set of tools for the understanding and policy design of the spatial setting in interplay with the physical land and its geographical contexts. Urban economics focuses on the function of the cities and, in contrast with planners, studies the markets as centres of economic activity. Alain Bertaud defines the city as a labour market (Bertaud 2018), Edward Glaeser indicates that nobody can understand cities without the tools of economics. Still, economics also needs to borrow from other disciplines to understand historical and cultural dimensions in a scientific way (Glaeser, 2007).

Density in economics is linked to the economics of the effects of proximity of suppliers and producers. Some recent studies summarise the status of density in economics. Density is associated with lower costs to deliver basic services, boost innovation and entrepreneurship, improve energy efficiency and transport effectiveness, but they also have an impact on crowding (Duranton & Puga 2020). On the effects of density, Ahlfeldt & Pietrostefani (2017) show that in an average high-income city, a 10% increase in density in per capita and annual terms is associated with a $140 increase in wages and a $243 increase in rent, where the extra cost of rent is related to aggregate amenities.

Alfred Marshall described the dynamics of **agglomerations** as a process where economic activities organise among different assets, Paul Krugman received a Nobel prize for his work on trade and developments in spatial economics, Michael Porter developed the concept of **value chains** -a set of activities a firm operating in an industry performs in order to produce a goods or deliver a service- **supply chains** -the process of transforming and integrating processes into the value chains- which came with a formulation of industrial clusters (Porter 1998), geographic concentrations of industries and firms in a location. Examples of clusters are the innovation hub in Silicon Valley, the Italian

leather industry in the north of Italy, the production hubs in the Great Bay Area in China, Guangzhou, Shenzhen, Hong Kong.

The localisation of industries leads to **productivity**, another key concept of urban economics. Economics of scale enhance specialisation and efficiency and produce higher productivity. Reverting to Marshall, agglomerations produces three key effects: **input sharing** composed of more advanced, less costly components that improve the quality and value of the final products; **labour market pooling** as a larger urban economy that facilitates the movement and transport of people and goods, which will lead to the hiring of the most efficient workers at a certain cost and reduce the time to produce the final goods; and **knowledge spillovers** is the ideas and innovation that comes from better coordination by specialisation in an industry.

So, the way density operates in the urban economy is as follows: a geographical and urban setting offers advantages for an industry to develop, offering a combination of labour, inputs and other conditions external and internal to the industry. Within the industry, firms compete by organising activities and better strategies to position themselves in the market. All this process is facilitated by the urban setting, which, by providing good transportation, ICT, education, health centres, housing, and other factors, supports increased productivity of the industry and firms. As productivity increases, labour expands in number and quality with migration of talent and educational institutions, universities and colleges expanding in numbers. The combined proximity of industrial clusters reinforces the generation of knowledge spillovers and innovation. The process produces a virtuous circle where innovation gives birth to more industries and sectors by multiplying the **economic complexity** (CID 2020; Hidalgo & Hausmann 2009), the greater the diversity of an economy, the greater its capacity to innovate in new areas.

The four shocks are going to have an impact on urban economics in several areas. Density will not be an end in itself if it is not accompanied by minimum levels of equity. Inequality of income is not a problem if it is a temporary situation that promotes competition between firms and people. But in urban areas in high-income countries, homelessness is an enormous problem, and the US is estimated to have more than 550,000 homeless, which is not a tolerable by-product of the economic system, but a social issue that must be solved. On another level, high-income countries are uneven in **social insurance and social care**, and in several countries, people are without cover, with almost 7 million in this position, just in in the US.

In developing countries, as with planning, the combination of slums, informality and overcrowding pose an enormous threat to the economy, causing countries to face constraints to growth. In major cities of the developing world, slums are part of the economy (Henderson et. at. 2016) sharing contiguous land with affluent areas. In the slums in the low-income economy next to the high-income areas, poor people live with lower costs for rent, food, limited transport, and basic health care, and urban settlers provide services to the formal sector. However, if the economy is not able to generate enough quality jobs, then the slums cannot be absorbed into the formal economy.

At a metropolitan level, internal and external migration, lack of jobs, land issues and poor planning just add to the issues of urban sprawl and expansion of settlements into new land that is unserved and too far and costly from public management to receive proper basic services. Maps on the extent of urban sprawl and the quality of urbanisation have been produced by the "Atlas of Urban Expansion" (Marron Institute, UN-Habitat, Lincoln Institute 2017) showing that **the type of urbanisation in large parts of the global south is unsustainable** and will be extremely difficult to reconvert in the future, as new neighbourhoods in peri-urban areas have insufficient space to provide transport roads and a minimum of pedestrian zones.

The principles of urban economics, with productivity at the centre, must be adapted to the context of developing countries by integrating the informal settlements into the formal economy and improving housing and living conditions. Some existing ideas must be adjusted, and new disciplines developed.

4. Priorities for urban management

The changes posed by the coronavirus as part of the four shocks described earlier in this essay have been so dramatic that they will oblige different disciplines and policies refocus their approaches for policy. Though it is still too early to understand the evolution of the pandemic, and its effects on the economy, impacting against inequality and poverty, it is evident that urban policies and context will be at the forefront.

Some considerations are however necessary, for urban planning and urban economy. The principles that govern those disciplines will have to be adjusted and integrated for policymaking. Planning needs to understand the economy and the economy needs to focus more on the individual and livelihoods.

The basic objectives of planning, providing a “proper livelihood” to people, and of the urban economy, supporting enhanced productivity to generate resources and improve livelihoods, are both interlinked. Those objectives, livelihoods and productivity, require improving policymaking in cities in the following areas:

Eradicating slums. Slums are located in areas that are often farther away from places of employment, which increases the risk of disease spreading. This is a reason to invest in slum eradication and upgrading to provide basic services and sanitation. All institutions working with urban settlements must redouble their efforts to understand better the rationale and existence of slums in their country context and identify the elements that block their eradication, and the conditions that may allow policies to be implemented. As 50% of habitants in most of the cities in less developed economies live without access to basic services, with precarious jobs, and without a clear path to progress, slums are the evidence of policy failure.

Basic health and insurance systems. Adverse health outcomes of slums. High levels of proximity of slum dwellers and unhygienic living conditions make them more vulnerable to disease. Providing basic health services and a mechanism for a universal insurance system, and access to care in rural areas is desirable, but beyond the capacity of less developed countries. However, governments should aim to provide a minimum simple coverage to the general population by investing in national health networks that provide health care from informal settlements -through cooperation and community networks- to the national systems that allows all citizens a basic coverage.

New industrial policies. The world has plenty of examples of cities that were designed according to the principles of planning, but once they opened, people just didn't live there and they became "ghost cities"; those plans didn't consider access to jobs or a proper functional economy that attracts investment and professionals serving as a labour market that increases productivity. By the same token, there are cities with a high product per capita but which are unsustainable, because of pollution, segregation and crime. But despite those realities, no city exists without a proper functional economy, and so it is the task of the policymakers to provide a business environment that creates employment and growth. Industrial policies that increase the productivity of cities and countries are relevant and will be even more necessary to support developing countries to catch up with those with higher incomes, designing those productive policies will need to provide a proper business environment with appropriate urban planning that supports productive policies with better livelihoods. A new generation of national productive policies combining properly funded national urban policies and industrial policies will be needed.

Municipal Finance. Cities are in developing countries are strapped by cash, whether by unreliable transfer from central governments of for lack of technical capacity and proper legal framework to implement own-source revenues policies based on land value capture than can expand property taxes to capture value from urbanisation. In low-income countries cities have incomes of $30 USD per capita per year (UN-Habitat 2020), so municipalities, live by the day struggling to cover covering operational costs, and little is left for capital investment, basic health, or emergencies. At a

metropolitan level, cities will need a concerted effort with other layers of governments to finance and prioritise local and regional infrastructure. With economic conditions deteriorating a combination of lower commodity revenues, fall in tourism and lack of foreign direct investment will add to the narrowing fiscal and monetary space of central governments.

Urban Policies and Technologies. Managing data to understand urban expansion, access to basic services, epidemics and economic activities are essential to managing the city. Using Artificial Intelligence, Big Data, 5G communication protocols, Internet of Things, internet platforms, and mobile application help to reduce the costs and increase the speed of gathering information. Technologies can help informal settlements to leapfrog their integration with formal areas and become part of the formal economy.

The basic objectives to improve livelihoods and productivity are not easy to achieve and belong to different governance instances. Eradicating slums and providing universal basic health needs multilateral global efforts. Integrating industrial policies at metropolitan or local level require national leadership with support, alignment and resources, same with municipal finance which needs a global initiative, and a national focus. Al those basic policies have a local action which must be potentialized and linked to a metropolitan, national and global level.

5. A social contract for prosperity, resetting the urban planning and the economy

A new social contract is needed to fight the pandemic era and achieve sustainable growth and prosperity. This social agreement should bring vulnerable communities as a key stakeholder and re-establish the local, national and global instances for sustainable development. In the last decades, markets have been privileged in economic policy, leaving population and communities unserved and without proper access to housing, settlement upgrading and basic services. This has led to a reaction from the public sector to intervene sometimes in a way that impairs market functioning and crowding out investment and private sector. This has caused a political cycle where the pendulum moves from more to fewer state interventions, with private activity taking over.

The result is that the communities are marginalised and left out from action, voice and decision making. In developing countries, communities that account for up to 60% in cities, the informal population, are not included in decision making though those work and consume and are part of the integral economies of their cities. More on opening spaces to community participation and with improving the slums and informal settlement where they inhabit must be a priority.

Fighting the COVID-19 requires a new social contract that acts in the short term and long term through proper integration of the State, the **Markets** and the **Communities**, providing proper financial resources; societal well-being, employment and growth, and health for cities (Figure 1).

The three pillars, the Markets requires to provide coverage and inclusivity to communities, States must protect communities, and Communities requires representation and voice, but to a level that does not impair implementation slowing decision making. The framework incorporates various approaches[67] to attend to the need to have a social contract that allows each of the pillars to operate in an integrated way supporting societies and human settlements (Figure 1).

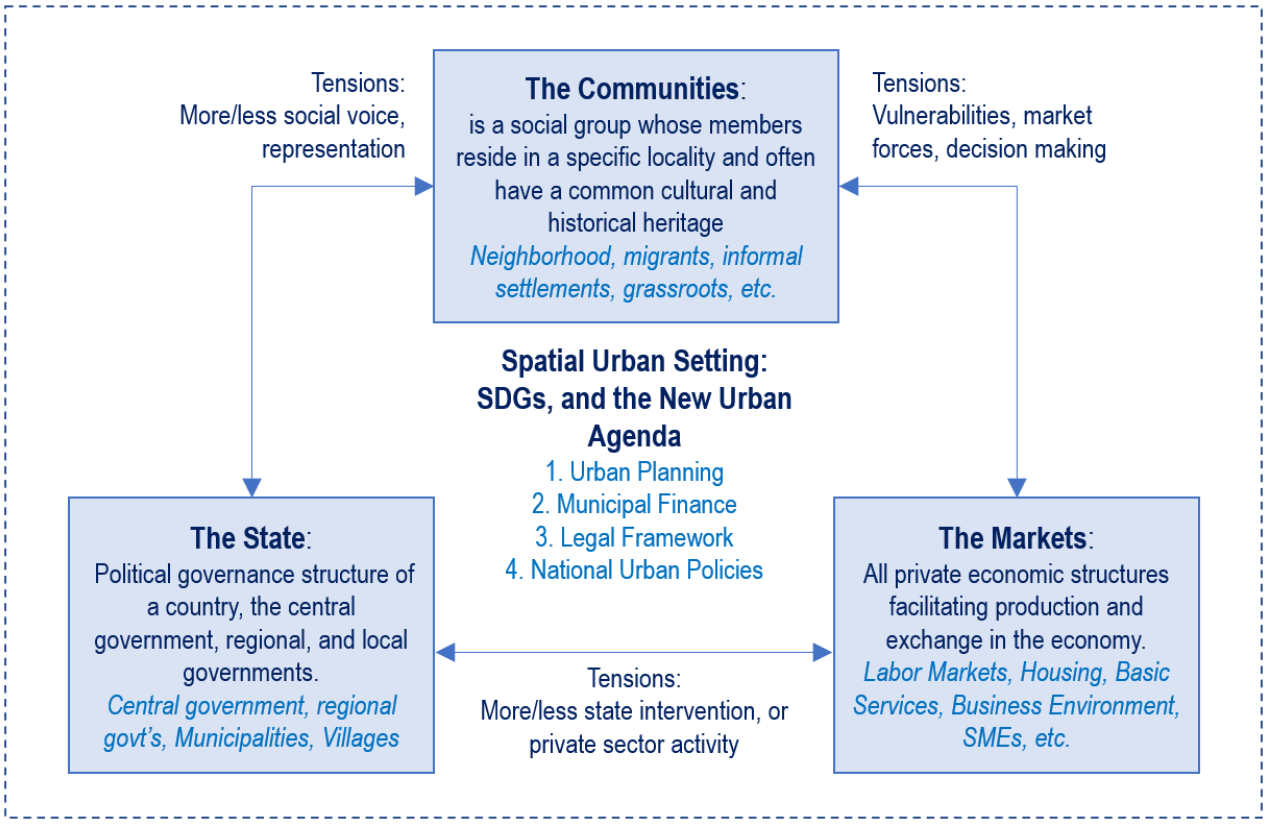
The importance of the market may sound controversial; however, it is the space for the market what must be protected. The State should allow the private sector to act in areas such as construction, and provision of basic services and local infrastructure. When joint ventures or private-public partnerships work better, there is no need for the State to take over private sector activities.

67 The framework incorporates the approach by Rajan 2019, building on UN 2016, UN-Habitat 2020c, and UNDP 2016.

Nationalisation of private activities in the areas of planning without a proper strategy may affect the economy and prosperity in the long run.

In time, the State, represented by the central and local governments, needs better governance that allows subnational entities, such as metropolitan governments and cities, to have sustainable financial frameworks and clear demarcation of activities. In the area on urban planning, local governments need to be further empowered to provide the city with a proper legal framework and rules and regulations, so the private sector -the market- can operate under control. Local governments also require incorporating communities, especially those informal and without representation, to make sure a broader and more participatory approach to urban management.

Figure 1. A Social Contract in the Era of Pandemics: Markets, States and Communities[68]



Source: produced by the author.

6. Changing conditions

As new approaches to the economy and planning will be developed to organise cities, some ideas are being considered, such as expanding the concept of **circular economy** at the metropolitan level; the idea of **common prosperity**, advocating a more humanistic and collaborative society; **co-production**, the practice used between local authorities and their residents in order to improve and make public service provision more appropriate; and several other similar concepts that will develop in the near future as the crisis unfolds.

68 Author's contribution, incorporating the approach by Rajan 2019, building on UN 2016, UN-Habitat 2020c, and UNDP 2016.

City managers will require to work with their central governments, and national governments will need to elevate the most pressing issues to a multilateral level, as in developing countries, the challenges are not always within the control and capacity of central governments.

Policies will have to open a third space between the market and the State, between the private and the public. The city as a whole can be a broader "public good" offering livelihoods and amenities and provide security against calamities. In this regard, concepts such as resilience, that means a city that resists better internal and external shocks, becomes essential, and to be converted into policies need to be designed with the proper market mechanism, incentives to avoid abuse and moral hazards, and financial schemes.

Sustainable urban development is only achieved by cities that provide decent livelihoods and stable jobs and economy to their residents, so to finance cities a proper economy that generates income is necessary. The guidance provided by the New Urban Agenda and the Sustainable Development Goals will require fine-tuning in a new world post coronavirus, and their aspirational objectives remain relevant for policymaking to face the current and future shocks.

References

Ahlfeldt, Gabriel & Elisabetta Pietrostefani (2017) "The Economic Effects of Density: A Synthesis". SERC Discussion Paper 210. Economic and Social Research Council (ESRC). Spatial Economics Research Centre (SERC), London School of Economics. London, UK. http://eprints.lse.ac.uk/83628/1/sercdp0210.pdf

Bertaud, Alain (2018). Order Without Design, How Markets Shape Cities. MIT Press. Cambridge, MA, US.

Center for International Development (2020). Atlas of Economic Complexity https://atlas.cid.harvard.edu/

Dantzig, G. B. and Saaty, T. L., 1973, Compact City: Plan for a Liveable Urban Environment, W. H. Freeman, San Francisco.

Davies, Richard (2020). Extreme Economies: What Life at the World's Margins Can Teach Us About Our Own Future. Farrar, Straus and Giroux. UK, US.

Duranton, Gilles & Diego Puga (2020). The Economics of Density. March 20, 2020. https://diegopuga.org/papers/density.pdf

Glaeser, Edward (2007) "The Economic Approach to Cities". NBER, National Bureau of Economic Research. Cambridge, MA, US (22 February 2007).

Henderson, Vernon; Venables, Anthony; Regan, Tanner & Ilia Samsonov (2016). "Building functional cities". Science, 352 (6288). London School of Economics. London, UK.

Hidalgo, Cesar & Ricardo Hausmann (2009). "The Building Blocks of Economic Complexity". CID Working Paper 186. Center for International Development. Harvard University. Cambridge, MA, US. https://growthlab.cid.harvard.edu/files/growthlab/files/186.pdf

IMF (2020). Global Financial Stability Report. Washington DC, US.

IPCC (2014) "Fifth Assessment Report (AR5) Mitigation of Climate Change: Transport". Inter-Governmental Panel on Climate Change. IPCC. WMO, UNEP. https://www.ipcc.ch/report/ar5/wg3/transport/

Lee, Jong-Wha & Warwick J. McKibbin. Estimating the Economic Costs of SARS: Learning from SARS: Preparing for the Next Disease Outbreak: Workshop Summary.

Marron Institute, UN-Habitat, and Lincoln Institute of Land Policy (2016). Atlas of Urban Expansion. New York University, US. http://www.atlasofurbanexpansion.org/cities

Mansueto Institute of Urban Innovation (2019). Million Neighbors. University of Chicago. US. https://millionneighborhoods.org/

McDermott, J. and Grace, D. (2012). Agriculture-associated disease: Adapting agriculture to improve human health. In Fan, S. and Pandya-Lorch, R. (eds), Reshaping agriculture for nutrition and health. International Food Policy Research Institute, Washington, D.C.

Milanovic, Branco (2010). The Haves and the Have-Nots: A Brief and Idiosyncratic History of Global Inequality. Basic Books.

Ortiz, Pedro (2013). The Art of Shaping the Metropolis. McGraw-Hill. US.

Park, Yumi & George Roberts (2012). "Neighborhood Planning Theory, Guidelines, and Research: Can Area, Population, and Boundary Guide Conceptual Framing". Journal of Planning Literature 30(1) · February 2015.

Piketty, Thomas (2020). Capital and Ideology. Harvard University Press.

Piketty, Thomas (2017). Capital in the Twenty-First Century. Harvard University Press.

Porter, Michael (1998) Competitive Advantage. Free Press, New York, US.

Rajan, R. (2019). "The Third Pillar: How Markets and the State Leave the Community Behind" Penguin Press New York.

Rutter, Paul et al (2012). "Socio-Economic Disparities in Mortality Due to Pandemic Influenza in England". International Journal of Public health, August 2012.

SDSN (2015). Indicators and a Monitoring Framework for the Sustainable Development Goals. Leadership Council Sustainable Development Solutions Network, 2015. https://sustainabledevelopment.un.org/index.php?page=view&type=400&nr=2013&menu=35

UN (2020c). UN/DESA Policy Brief #59: Corona crisis causes turmoil in financial markets. https://www.un.org/development/desa/dpad/publication/un-desa-policy-brief-59-corona-crisis-causes-turmoil-in-financial-markets/

UNDP (2016). "Social Contract in Situations of Conflict and Fragility". UNDP: Oslo

UNEP (2017). "Global Status Report 2017: Towards a zero-emission, efficient, and resilient buildings and construction sector. United Nations Environment Programme. Nairobi, Kenya. https://www.worldgbc.org/sites/default/files/UNEP%20188_GABC_en%20%28web%29.pdf

UNEP (2016). UNEP Frontiers Reports 2016 Emerging Issues of Environmental Concern. United Nations Environment Programme. Nairobi, Kenya.

UN-Habitat (2020). Global Municipal Database. https://globalmunicipaldatabase.unhabitat.org/

UN-Habitat (2016). Slums Almanac, Tracking Improvement in the Lives of Slum Dwellers. Nairobi, Kenya.

UN-Habitat (2017). Salat, Serge; Kamiya, Marco & Loeiz Bourdic. Economic Foundations for Sustainable Urbanisation: A Study on The Three-Pronged Approach: Planed City Extensions, Legal Framework and Municipal Finance. Nairobi, Kenya.

UN-Habitat (2014). "A New Strategy of Sustainable Neighbourhood Planning: Five Principles". Discussion Paper No. 3. Nairobi, Kenya.

UN-Habitat (2003). The Challenge of Slums, Global report on Human Settlements. Nairobi, Kenya.

Wright, Robin (2019). "The Story of 2019: Protest in Every Corner of the World". The New Yorker. US. https://www.newyorker.com/news/our-columnists/the-story-of-2019-protests-in-every-corner-of-the-globe

WRI (2019). "Accelerating Building Decarbonization: Eight Attainable Policy Pathways to Net Zero Carbon Buildings for All." World Resources Institute. Washington DC, US. https://www.wri.org/news/2019/09/release-new-research-shows-zero-carbon-buildings-are-possible-where-you-might-least

World Bank (2018). "Poverty and Shared Prosperity 2018: Piecing Together the Poverty Puzzle". Washington DC, US.

World Band (2018). Global Database on Shared Prosperity. https://www.worldbank.org/en/topic/poverty/brief/global-database-of-shared-prosperity

World Bank. 2010. People, Pathogens and our Planet: One Health Approach for Controlling Zoonotic Disease. Washington, DC.

Part III

The rules of metropolitan shape

Chapter one

Metropolitan governance and shape

Rules of urban-metropolitan shaping and re-shaping[69]

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This work seeks to make an analysis of the principles that lie, at the origin of the transformation processes of the city-metropolis during the 20th century, seeks to identify, in a general way, the lines of analysis and the associated methodology that allows us to understand and plan these large population centres. By definition, the city is the quintessential urban art-fact that has been studied from different perspectives; in the middle of the 20th century, in the field of anthropology and sociology, researches on the subject attributes the existence of a dual character to the city, that is, its physical-material characteristic and its social-cultural characteristic; that is, the city is an entity formed by a material structure and a culture produced by the social groups that give it dynamism, that animate it and give meaning to its materiality. At the end of the 20th century, this term of "dual city" was used with a different connotation, referring to the existence of processes and spaces of social segregation, where a large professional and executive middle-class sector coexist, with a growing class urban of less qualified workers, social groups that although they share the same space their lifestyle and structural position in society are different (Castells, 1995, cited in Dalla and Ghilardi, 2012).

Without opposing the previous definition that is constructed taking into account economic and social considerations, the dual character of the city to which we refer has to do with the anthropological conception of the term; The material object and the social subject that the city cannot renounce. Over time this conception has evolved, and currently this duality necessarily involves the environmental factor, specifically sustainability. Thus, the analysis seeks to explain how this dual character can be associated with a specific morphology of cities. What methodological instruments can we use to understand the evolution of the metropolis? Subsequently, other proposals that try to value both aspects will be analysed, giving importance to the interdependence relations between

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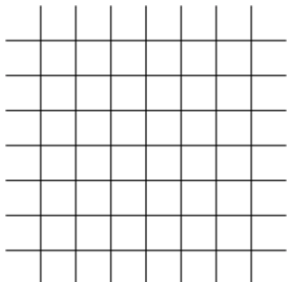
both aspects, recognizing the relationship between social actions and the physical nature of the city-metropolis. Through the identification of contemporary issues, the relevance of studies based on new needs associated with the metropolis will be explained. Basically, the article addresses three issues: 1. The city-metropolis, a dual entity with a complex structure; 2. The contemporary metropolitan characteristics, and 3. New rules in the metropolitan configuration.

The city-metropolis, a dual entity with a complex structure

Historically, studies of the city and, by extension, of the metropolis, are located either in approaches that give preponderance to the materiality of the city (emphasizing the value of urban objects as a catalyst for social dynamics), or in positions that give greater relevance to aspects related to the characteristics of the social order in general (situating the materiality of the city as a backdrop unrelated to other values of a social nature). This is due in part to methodological reasons that attempt to explain phenomena in a simplified way. This dual nature of the city-metropolis has been discussed since the middle of the last century by authors such as Levi-Strauss (1955), who since then affirmed that the city is an "object of nature and a subject of culture". In the studies of the urban, this inclination for the studies of the city from the social subject or the material object is present in the work of philanthropists, intellectuals and professionals of the late nineteenth and early twentieth centuries, who sought to respond imminently to the problems of the city caused by the impacts of industrialization in different parts of the planet. In studies that start from the materiality of the city to explain the urban phenomenon and all its complexity and to make proposals to improve its conditions, two very clear lines are identified by Choay ([1965] 1979): progressivism and culturalism, the supporters of the first, start from the human (individual) condition of the present to project the city into the future, explain the urban phenomenon, voluntarily denying the cultural values of the past; the latter start from the socio-cultural (collective) condition and look at the past to explain the conditions of the city and to base their proposals. Derived from these two main lines, we witnessed the emergence of two urban models at the beginning of the 20th century: modernist or functionalist, with a futuristic vision regardless of the destruction of the historic city, and without efficient proposals to amend the environmental deterioration, a city of segregation in whose model, the social housing that is produced seems to be the piece of a puzzle that is placed at least in its beginnings, systematically close to the industrial centres to make production more efficient, rather than to provide a benefit to the worker.

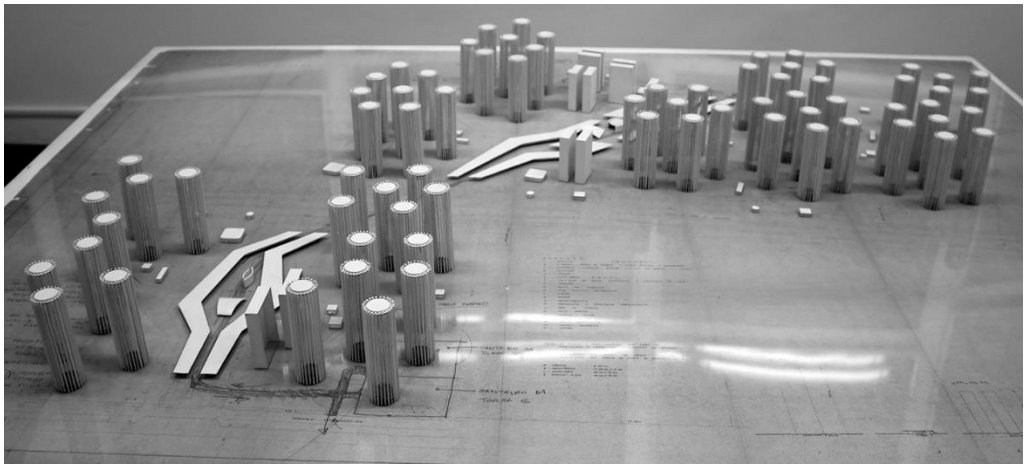
Figure 1. Characteristics of the progressive proposal

principles of the progressive proposal	
It starts from a criticism of the living conditions of man as an individual	
Space ordered according to the functions of man: dwelling, recreation, work, transportation, etc.	
Simple conception of the space	
Austere aesthetics	
Rigid spaces	Simplified urban principle

Source: Choay (1968), the urban plot is the author's interpretation.

In this proposal, the pedestrian scale of the city is transformed, morphologically, the production centres are major players in the urban structure, the large industries are installed in places where they can supply raw materials, water, and preferably where there is a supply of cheap work, this produces that with time, the city expands. Making use of technology and new materials, new urban developments break with the traditional typology, transforming the territory and offering new ways of life.

Figure 2. Model of Barra da Tijuca-Niemeyer Spatial city project (year 1970), Río de Janeiro, Brasil



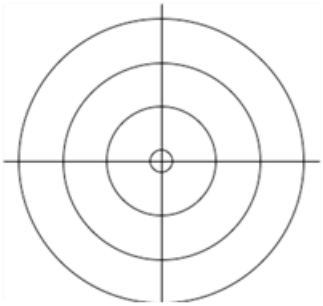
Source: author's photo, 2016.

An example of this way of conceiving the city is the Niemeyer project announced as the space city, an urban development projected for about 80,000 people in the Barra da Tijuca area, next to the beaches of Rio de Janeiro, Brazil, despite the comfort and modernism that was advertised, the project was not successful.

In the modernist vision, the urban actions carried out in different cities of the planet are aimed at re-organizing the structure of the city for the benefit of economic-productive activities. Under these principles, urban centres are notably affected to amplify roads and to introduce railway lines in order to transport raw materials to industries and their products, as well as for the transportation of people. According to Soja's (2008), "the insertion of large-scale manufacturing industries in the urban space was […] what constituted the main triggering factor of the Third Urban Revolution". Concerns about connecting sectors of the population with workplaces are resolved by organizing the city according to the characteristics of the means of transport such as cars, trams, and trains. etc., to the detriment of the spaces through which the pedestrian moves. In the traditional city, restructurings are made to the urban fabric, in order to facilitate the movement of motorized vehicles, in new sectors or cities, an orthogonal structure is adopted that favours the functionalist sense of the city, and housing is mass-produced, adopting a vertical morphology in many cases. A great ally that allows achieving such transformations is technology, which allows the use of new materials that facilitate the development of the city with the characteristics mentioned.

Having the same challenges in urban terms, the second proposal is resolved by offering an organic structure that introduces nature into the city, and although it does not ignore the automobile, it establishes internal zones in urban sectors that favor social coexistence, housing is more like horizontal, integrating the whole to the traditional urban typology.

Figure 3. Characteristics of the culturalist proposal

principles of the culturalist proposal	
Part of a critique of the living conditions of society	
Space inspired by urban tradition (medieval cities)	
Complex conception	
More elaborate aesthetics in contrast to nature	
Flexible (organic) spaces arranged between nature	

Source: Choay (1968), the urban plot is the author's interpretation

Due to its characteristics, it is a city that for methodological purposes can be called a culturalist city, since it organizes, transforms and projects the city based on cultural values. In this model, the consideration of the needs of society as a collective entity takes strength and they influence the way the city is structured.

Figure 4. Biéreau neighborhood center in Louvain-la-Neuve, Belgium

Source: author's photo, 2015.

An example of the above is Louvain-la-Neuve, a Belgian city whose construction dates back to the first years of the 70's of the last century and which for its construction was rejected a project with characteristics of the progressive model, preferring instead to elaborate and to put into practice a model that adopts a traditional organic structure, rescuing rural buildings with historical heritage value from which four sectors or neighbourhoods of the city emerge and implementing the principles of the garden city in its conception. Although it is not a metropolis, in this city the culturalist principles are clearly expressed, which are adapted in different ways in urban sectors of different metropolises.

On the other hand, the studies of the urban that give preponderance to the social fact as the producer of space, are the investigations of sociologists, anthropologists and philosophers who, since the beginning of the 20th century, have predominantly positioned the social subject (the interaction of society) in the origin of the urban. The works of the Chicago School, notoriously Park's studies (1925) situate the city as a social product, the materiality of the city is not necessarily seen as a strong

conditioner in the development of social events. Exception to the above, are the works of Lynch (1960), who give importance to the material structure of the city, identifying urban elements that have a significant influence on the behaviour of people, on the way of behaving in an urban environment.

From these two proposals, the one derived from the progressives, due to its practicality, becomes a model that is adopted in different cultural contexts, giving rise to many errors derived from urban restructuring imposed, often arbitrarily on local contexts. There are very clear answers that propose alternative city models to what functionalism proposes, they are proposals that theoretically try to reconcile the importance of the object and the subject by adding historical value, and offering an eclectic or postmodern structure that rescues the three values. This new thought is reflected in urban regulations, which strive to protect the traditional city, and in the case of Latin America, the historical centres are delimited, to maintain the cultural hegemony of those places that possess a great strength of identity. In other cases, small cities arise, in whose planning, according to our judgment, the implementation of the principles that characterize the culturalist-postmodern city is observed.

Structure of the metropolis associated with the industrial period

The current metropolises are, of course, the result of the accelerated urban production that is caused by industrialization, no matter of when it begins in different countries (in Europe since the 18th century, in the United States since the 19th century, in Latin America from the end of the XIX century); Taking the city of Los Angeles as an example, which due to its productive and socio-economic characteristics, among others, constitutes one of the main metropolises on the planet, Soja (2008) states that:

> By the mid-1960s, the greater Los Angeles had been transformed into a federally growing metropolis to the point that it was second only to the District of Columbia, much more confined in territorial terms. The massive suburban growth was significantly fuelled by federal mortgages and home loan programs; the fastest industrial growth in United States history was spurred and sustained by billions of dollars from the Department of Defense and other federal agencies; Federal funds for the development of an interstate highway system (also designed for defensive purposes) played a key role in building the dense network of urban freeways. (p. 200) (free translation).

The industrialization of cities in the world is the result of their complex evolution, history shows that in addition to having a considerable capital reserve, it is an important condition to have the political will of the rulers to facilitate investment and commercialization processes. Reviewing history, at the time of the industrial take-off, the predominant commercial transport was carried out by water (rivers and oceans), as well as by the rail network; for this reason, having a privileged location near seaports, rivers and near an efficient rail network ensured the transport of inputs and the commercialization of the products of the industries. There are even cases in which canals are built in order to create the right conditions to be able to navigate and connect the territory, as happened at the beginning of the 19th century (1815) in the city of Montreal, where to avoid the Rapids of the Saint Lawrence River, the construction of the Lachine canal begins, in whose adjoining lands different industries and population groups will later settle. "About 600 industries were established in the Lachine corridor between 1840 and 1850, regrouping about 25% of the artisans and workers in Montreal's manufacturing sector." (free translation) (Desjardins: 2020).

Figure 5. Old industrial site on the canal Lachine corridor, Montréal, Qc., Ca

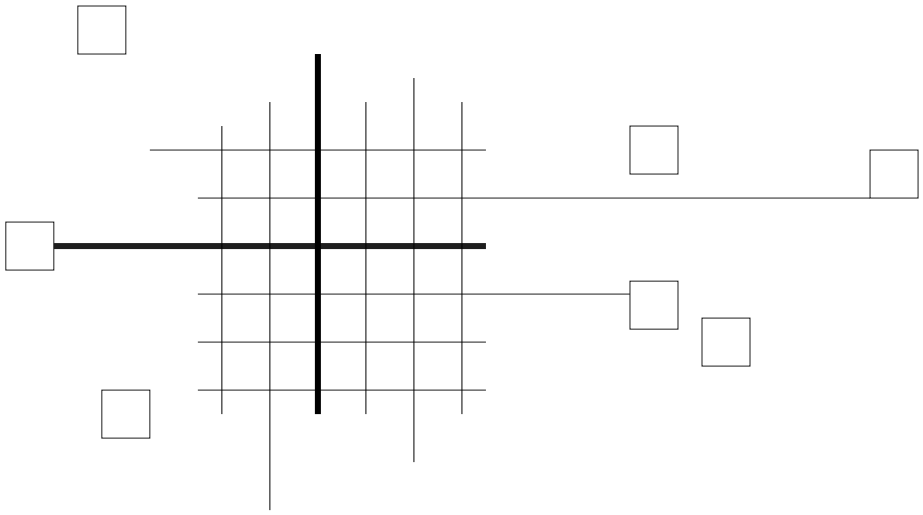
Source: author's photo, 2015.

As the city enters a stage of deindustrialization, these spaces turn into brownfields (which have now been restored or transformed into residential areas). In the case of cities that were not well located, railway lines are implemented that lead from the production centres to the sea ports, an example of this are some cities in Mexico: the capital of the country remains connected to the Port of Veracruz on the Atlantic. Ocean; Monterrey, connected with the Port of Tamaulipas, and that of Veracruz, and Guadalajara, connected with the Port of Manzanillo on the Pacific Ocean. In fact, for their implementation, most industries systematically seek a location close to sources of water, a primary natural resource for the development of their activities, smelting companies, for example, keep their smelting furnaces on 24 hours a day and they cannot work without the water resource.

The growth and development of the city-metropolis, according to what we can rescue from historical events, is due to the conjunction of several factors, of which we can point out eight fundamental ones:

the first is due to economic policies, on all when these are associated with a unilateral liberal position (without sociocultural considerations). The government's position in this regard facilitates industrial development and land commercialization, among others; the second is due to the location (generally peripheral) of the production centres; the third is due to reasons of a socio-demographic nature, when social groups are concentrated in specific areas of the metropolis; the fourth is associated with technological advances; the fifth is due to the characteristics of housing production (location, density, typology of the complex), influenced by stylistic trends; the sixth is associated with the development and expansion of the means of communication and transportation and their implementation in the territory; and finally the seventh is due to "hygiene" reasons, that is to say, to build the city in such a way that its organization can contribute to establishing better health conditions, the way in which these factors combine shapes the metropolis, and gives it specific characteristics.

Figure 6. The industrial city



Source: prepared by the author.

Later, after the economic slowdown of the 70s of the 20th century, there is a counter-urbanization or deindustrialization, when the productive centres outsource their activities (hiring services so that other companies carry out tasks that do not belong to the core product of the activity) and many of the original production sites stop having activities.

Figure 7. Old industrial sites transformed in the city of Toronto

Source: author's photo, 2015.

In this regard, Márquez and Pradilla (2008), interpreting other authors, refer to "the contraction of the industrial base of cities as part of the "natural process of counter-urbanization (...) inherent trend in the development of advanced capitalist societies in their transition to post-industrial society." These new production conditions also have an expression in the material structure of the city; the large territorial extensions that the industries inside the city occupied, are abandoned or affected with different uses. One of the characteristics of the metropolis of this industrial urbanization is the urban dispersion.

The contemporary metropolitan characteristics

The concept of metropolis as «dominant nucleus surrounded by several cities, towns and villages economically and socially integrated in it» (Isin, 1996a, in Soja, 2008) is currently obsolete, for this author, the period of metropolises (with these characteristics) takes place between 1921 and 1971. In this last year, modernism as a reference for urban development ceases to have strength, instead, a new metropolitan morphology begins to emerge in whose transformation technological advances have a very important role, in fact, it is in this year that the first microprocessor appears, which will cause a revolution in technology, radically transforming the forms of communication and establishing new paradigms of the territorial reality, in which the physical borders are no longer an obstacle to communication, commercial transactions or work. In its evolution process, after those years and during the last quarter of the 20th century, the metropolis became a polycentric urban region (Ibid, p. 329). This is related to the urban dispersion inherited from the recent past and in a certain way with the conceptual transformation of territorial limits. There are other characteristics of the contemporary metropolis associated with the effects of globalization, such as the emergence in peripheral areas of technology parks, commercial zones, and urban developments for social classes of a high economic level.

The evolution of Information and Communication Technology (ICT) has been revolutionizing society, and therefore, the dynamics and morphology of cities; socially, the forms of communication and interaction between people are not the same as 50 years ago (when the first microchip was created); the characteristics of production are more mechanized (which is associated with the reduction of labour); Marketing is more agile due to the development of digital communication and the emergence of more efficient forms of work. Faced with this technological development, the city is not the same, and as a derivation of technological development, the concept of Smart city arises. Considering that, the use of technologies seeks in a common way a sustainable development (social, environmental and economic):

> The concept refers to a new relationship with citizens, tourists, suppliers and public workers, based on transparency, accountability, interaction and dialogue, the appropriate use and consumption of resources and the early identification of needs. Today the concept is broader and more ambitious, associated with the Smart attribute not only with its digital dimension, but also with the desirable attributes of sustainability, efficiency, participation, innovation, governance and social inclusion. This, considering such fundamental and diverse areas of the urban environment such as mobility and transport, energy efficiency, urban planning, waste management and environmental pollution (air, water, soil and / or noise) the generation of economic value and social welfare of citizens, among others.
>
> Ontiveros, Vizcaíno and López (2016:57).

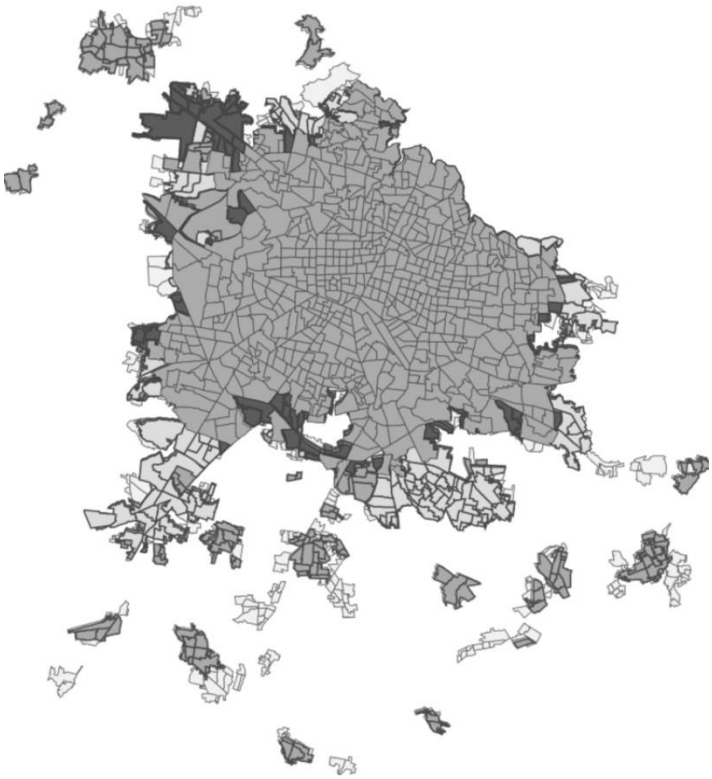
At the end of the last century, Vernez- Moudon (1995, in Reyes, 2007) makes a comparison of the old city and that of the 90's:

Figure 8. Characteristics of historical cities and contemporary sites

Historical cities	Contemporary cities
Reduced geográphical area	Large geographic area
Compact, fortified	Dispersed, irregular
Stratified by history	Free transformation

Source: Vernez-Moudon (1995, cited by Reyes, 2007).

Figure 9. Guadalajara Metropolis, Mexico

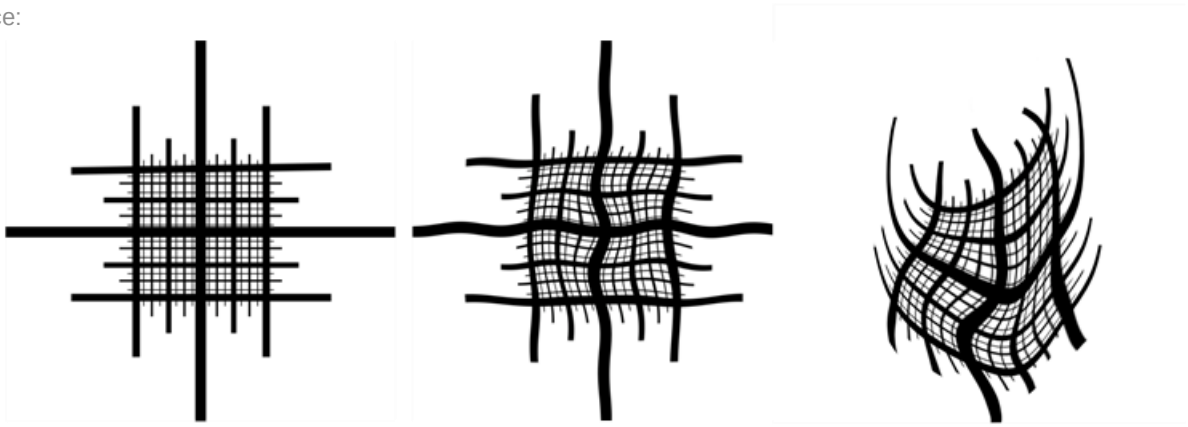


Source: COEPO 2015, modify by author.

A quarter of a century later, this comparison is in force, also adding that the metropolis of our times, as mentioned above, is polynuclear, and in many cases (notably in Latin American cities) there is a reduction of natural areas invaded by urbanization, thus as an investment process in the urbanization processes, trying to repopulate the historical centres, and establishing densification policies in the central areas, in order to counteract urban dispersion. The use of new technologies has had an impact on morphology, since the structure of the city and the metropolis acquires different functions and forms, following an order associated with the communication routes and / or specific nodes for the provision of services, and the production. Sassen (2003) identifies three forms that centralities assume today: first, the centre continues to be the key modality of centrality, and when it has an international relevance, it is deeply reconfigured by technological and economic change; second, the centre extends into a metropolitan area in the form of a network of nodes of intense commercial activity; third, the centre acquires a trans-territorial character. For this author, “The most powerful of these new geographies of centralities are the interurban levels that link the largest international business and financial centres such as New York, London, Tokyo (…). But this geography now includes cities like Mexico and Sao Paulo”. (Ibid, p. 14).

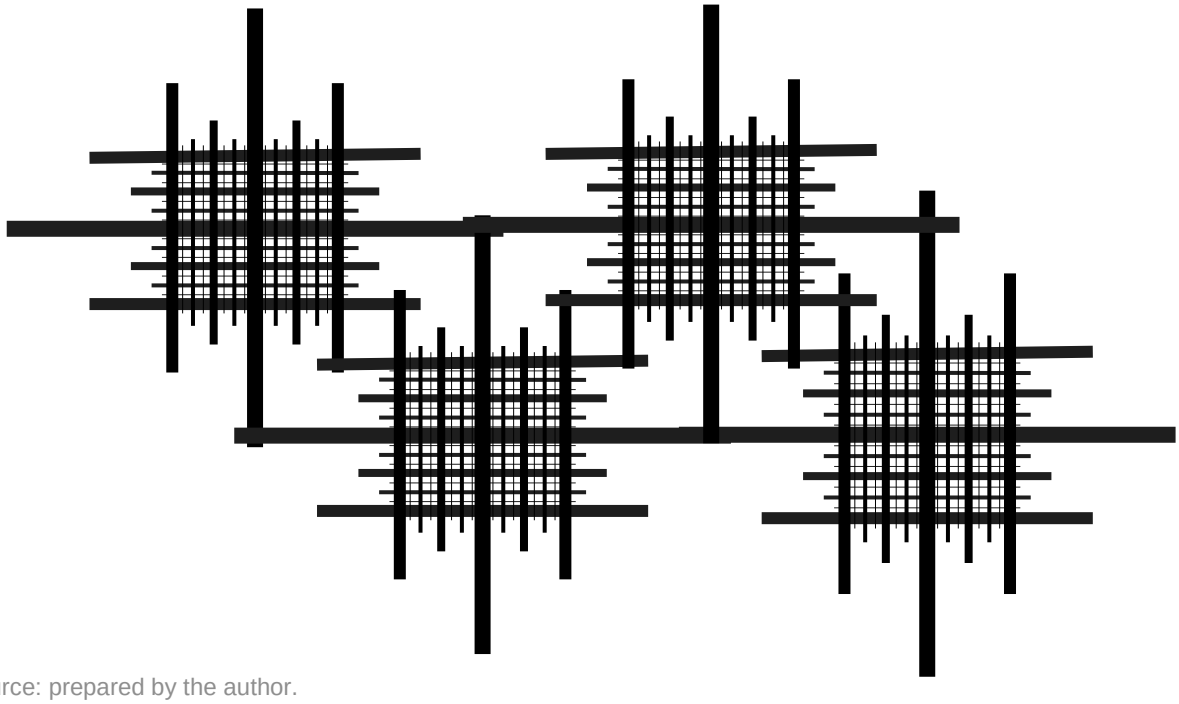
Figure 10. Conceptual principle of the contemporary polynuclear metropolitan structure, where the territory and the historical urban fabric modify the form

Source:



prepared by the author.

Figure 11. Conceptual territorial morphological structure of the contemporary metropolis



Source: prepared by the author.

We are witnessing the development of a type of metropolis that tries at all costs to integrate into the network of global cities. According to Sassen (1991) The raison d'être of the global city is its high-level tertiary functions. In these cities, "the headquarters of the main companies are concentrated, and those of those that generate the essential services for the development of operating systems that allow the existence of a single command centre" (Muxi, 2009, in Reyes, 2019). In this globalization structure, "regions, territories, cities and neighbourhoods are delimited in a strategic functional logic that calls for the regrouping of forces" (Reyes, 2007), here, the concepts of the local and the global are confronted, due to the new paradigms that are presented in urban terms. Some of the transformations caused by globalization in the materiality of the city can be seen in the following table:

Figure 12. Characteristics of the (urban-metropolitan-territorial) object in the local and global context

concept	local	global
territory	limited	unlimited
city	morphologically heterogeneous	morphologically homogeneous
neighborhood	integrated	dispersed
architectur form	creacion singular	consumable product

Source: Reyes (2007)

These new conditions give a particular morphology to the metropolis that demands different methods to approach its study, and to plan territorial development. “Au risque d'être réduites à un espace utilitaire et fonctionnel, les villes deviennent des lieux nécessaires pour le développement d'activités des systèmes économiques mondiaux tels que des échanges commerciaux, services, production, concentration d'équipement, etc. (Sassen, 2002, cited by Reyes, 2007). In order not to be out of the global network, the use of technology to stay connected to the network and be well connected is vital, however, for its proper functioning, every metropolis seeks to have an efficient connection of its territories and between the spaces of housing and work and between these and the services that facilitate communication and local and international transportation.

Figure 13. New York city

Source: Author’s photo, 2017.

In reality, there are multiple challenges facing the contemporary metropolis, of which we can highlight three: sustainability, security and resilience. The first challenge is to make the metropolis environmentally safe, socially inclusive and economically productive (Un Habitat, 2009, in Reyes, 2019); The second challenge refers to (social) security that seeks to combat crime and violence, tenure insecurity and forced evictions, as well as natural and anthropogenic disasters (UN Habitat, 2007, in Becerra (2019); and finally the third challenge is refers to the capacity of a territory (a city, a neighbourhood, a community) to face an external threat (Pairs, 2015, in Naples, 2019). Although the previously mentioned challenges are important, this last challenge (resilience) is highly relevant at the moment, since we cannot ignore the coronavirus pandemic (COVID-19), which until March

22, 2020, maintained close to 1,000 Million of people confined, forcing 35 countries to apply severe security measures, paralyzing economies, transportation and daily life (Milenio, March 22, 2020).

Towards a new metropolitan morphology?

In urban terms, history teaches us that economic recessions are accompanied by changes in the structure of cities and metropolises. Although at the time of writing this article, the COVID-19 pandemic has already ravaged some countries, in others the devastation is just beginning to be felt, and the time for it to be controlled and less eradicated is not in sight. The United Nations is already announcing an economic recession, a sign of this is the collapse of the stock market that in recent days is announced as the worst crisis since 2008.

With respect to the central theme of this writing, there is no doubt that this global health crisis makes us rethink the future, since we are facing a new paradigm where some hypotheses related to the future transformations of the metropolis may fit: some social, labour, and educational isolation practices, for example, that may influence the design of spaces and organizational systems, as preventive measures in terms of health (both locally and globally), with effects on the environment, in public health, in saving time and in the efficiency of economic resources; new forms of social coexistence, educational teaching and scientific development, as well as labour relations, and commercial transactions where the physical space and by extension the territory acquires another dynamic and takes on another meaning.

Everything indicates that the metropolis virtual dynamism in communications is going to increase. It is very premature to say where its organization, planning and structure is heading, but we can hypothetically say that its morphology can lead to the creation of flexible structures, spaces and buildings in their materiality, disposition and dynamics of use; chrono urban or chrono metropolitan elements that is, including in his planning what Asher (1997) describes as temporary zoning of activities […], as a temporary qualification of the territory. Regardless of the fate of the metropolis, the importance of its study and its consideration in the agendas of the countries is undeniable.

References

AFP (2020) Covid-19 deja más de 13 mil muertos y mil millones de personas en cuarentena, in Milenio. 22nd march 2020. Available from: https://www.milenio.com/internacional/europa/coronavirus-deja-13-mil-muertos-mil-millones-cuarentena [accessed: 22nd march 2020]

Asher, F. (1997) Du vivre en just á temps au chrono-urbanisme. Available from: http://www.annalesdelarechercheurbaine.fr/IMG/pdf/Asher_ARU_77.pdf. [Accesed 7th jun 2016].

Castells, M. (1995), La ciudad informacional. Tecnologias de la información, reestructuración económica y el proceso urbano-regional, Madrid, Alianza, en Dalla Torre, J. & M. Ghilardi, Aproximación a la ciudad dual. Fragmentación epacial y segregación material y simbólica en el Área Metropolitana de mendoza, Proyección 12, Planificando la complejidad, Vol. VI, junio 2012, Available from: http//:www.bdigital.uncu.edu.ar/objetos_digitales/13450/02dallatorre-proyeccion12.pdf [accessed 09th March 2020]

Desjardins, Pauline. (2020), Canal de Lachine et son corridor industriel en Encyclopédie du patrimoine culturel de l'Amerique française. [On line] Montréal. Available in: http://www.ameriquefrancaise.org/fr/article-341/Canal_de_Lachine_et_son_corridor_industriel.html#.X8MWeNXwZp9 [Acceced: 28 nov 2020]

Choay, F. ([1965] 1979): L'Urbanisme, utopies et réalités: une anthologie, Paris, Seuile.

Isin, E. (1996a) « Metropolis Unbound: Legislators and Interpreters of Urban Form, cited in J. Caulfield & L. Peake eds. City Lives and city Forms: Critical Urban Research and Canadian Urbanism, Toronto, University of Toronto Press, pp. 98-127, cited in Soja, E.W. 2008, Postmetropolis, (trad. Hendel, V. & Cifuentes, M.), Madrid, Traficante de sueños.

Soja, E.W., (2008), Postmetropolis, (trad. Hendel, V. & Cifuentes, M.), Madrid, Traficante de sueños.

Levi-Strauss, C. (1955), Tristes tropiques, Paris, Plon

Park ([1925] 1979), Propositions de recherche sur le comportement humain en milieu urbain, dans Yves Grafmeyer et Issac Joseph (edit), L'École de Chicago, translation from english by Yves Grafmeyer et Issac Joseph, Paris, Champ urbain.

Lynch, K. ([1960] 1976), L'image de la Cité, traduit de l'anglais par Marie-Françosie et Jean-Louis Vénrard, Paris, Dunod.

MárquezLópez, Lisset, y Pradilla Cobos, Emilio. (2008). Desindustruialización, terciarización y estructura metropolitana: un debate conceptual necesario. Cuadernos del Cendes, 25(69), 21-45. Available from: http://ve.scielo.php?script=sci_arttext&pid=S1012-25082008000300003&lng=es&tlng=es. [accessed 22nd march 2020.

Muxi, Z. (2009), La arquitectura de la ciudad global, Buenos Aires, Nobuko, cited in O., Becerra Mercado, O., & R. Reyes Rodríguez 2019, El lenguaje contemporáneo del urbanismo. Glosario de términos urbanos. Guadalajara, Universidad de Guadalajara.

Ontiveros, E., D. Vizcaíno, V. López Zabater (2016), Las ciudades del futuro: inteligentes, digitales y sostenibles, Barcelona, Madrid, Ariel y Fundación telefónica. Available from: http://www.observatorioabaco.es/biblioteca/docs/805_FT_CIUDADESINTELIGENTES_2017.pdf. [Accessed: 28th nov. 2020]

Onu Hábitat, 2007, en Becerra (2019) cited in O., Becerra Mercado, O., & R. Reyes Rodríguez 2019, El lenguaje contemporáneo del urbanismo. Glosario de términos urbanos. Guadalajara, Universidad de Guadalajara.

Pares, M., (2015), Crítica de la resiliencia urbana: por una ciudad realmente transformable/eldiario.es, Catalunya, Pista Urbana. Available from: http//: www.eldiario.es/Catalunya/pistaurbana/Critica-resiliencia-urbana-realmente-transformadora_6_348625173.html [accessed: 20th may 2015], cited in Nápoles, D. (2019), resiliencia urbana, in O., Becerra Mercado, O., & R. Reyes Rodríguez (coord.), 2019, El lenguaje contemporáneo del urbanismo. Glosario de términos urbanos. Guadalajara, Universidad de Guadalajara.

Reyes Rodríguez, R. (2007) L'emergence et la transformations des secteurs industrialo-residentiels de Monterrey dans un contexte de libéralisme económique, 1890-1970: Une analuse morphologique. Ph.D. Thesis, École d'Arqchietcture, Faculté d'Aménagement, d'Architecture et des Arts Visuels, Québec, Université Laval.

Sassen, Saskia, ([1991] 2001), The global city: New York, London, Tokyo, Princeton (N.J.), Princeton University Press.

Sassen, S. (2002), Global Networks, Linked Cities, New York-London, Routledge.

Sassen, S. (2003), Localizando ciudades en circuitos globales, EURE (Santiago), 29(88), 5-27.

SASSEN, Saskia. Localizando ciudades en circuitos globales. EURE (Santiago), Santiago, v. 29, n. 88, p. 5-27, dic. 2003 . Available from: <https://scielo.conicyt.cl/scielo.php?script=sci_arttext&pid=S0250-71612003008800001&lng=es&nrm=iso>. [Accessed 30th nov. 2020]. http://dx.doi.org/10.4067/S0250-71612003008800001.

Un Hábitat (2009) Global reporto on human settlements: Planning sustainable cities. United Nations Human Settlements Programme. London: Earthscan, en Becerra Mercado, O.C., & R. Reyes Rodríguez, 2019, El lenguaje contemporáneo del urbanismo. Glosario de términos urbanos. Guadalajara, Universidad de Guadalajara.

Rules of metropolitan governance[70]

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Introduction

World urban population growth has made cities relevant like never before. Day by day, national social, economic and political dynamics are more frequently affected by processes occurring at the local level, which positions metropolises as the privileged centres for public and private decision-making.

As a correlate of this phenomenon, international agendas are increasingly linked to the sustainable development of urban agglomerations, and several efforts have been made to highlight the leadership of metropolises. The Montreal Declaration on Metropolitan Areas, promulgated in 2015, is a milestone in this regard. The proclamation marked a before and after by recognizing the crucial role that metropolitan areas play in the struggle against the global challenges affecting humanity, such as climate change and economic development. Metropolitan areas currently cover more than half of the world's urban population and are likely to constitute two-thirds or more by 2050, producing between 70 and 80 percent of global GDP and more than 70% of global greenhouse gases (Birch, 2019).

The Montreal Declaration on Metropolitan Areas underlines the importance of providing urban agglomerations with the necessary mechanisms to respond to these global challenges and the need to provide metropolitan governance with a legal and institutional framework based on democratic principles.

In similar fashion, the New Urban Agenda, adopted in 2016, calls to adopt sustainable and comprehensive approaches to urban and territorial development by implementing policies at all levels of government. The New Urban Agenda urges nations to “implement effective local and metropolitan multilevel governance, across administrative borders, and based on functional territories, ensuring the involvement of subnational and local governments in decision-making and working to provide them with the necessary authority and resources to manage critical urban, metropolitan and territorial concerns”.

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Nowadays, there is a wide consensus about how metropolitan governance contributes to the prosperity of urban areas. However, there is neither a unique definition of what metropolitan governance is, nor a single model to be replicated in all metropolises. In the following document, we discuss the definition of metropolitan governance and its characteristics. Then, we analyse the positive effects of metropolitan arrangements over metropolitan areas. Finally, we identify some obstacles in the set-up of metropolitan governance schemes.

The definition of metropolitan governance

The concept of “governance” has emerged in the debate on public management in the face of the involvement of new actors and the sustained transformation of power structures that has taken place in recent decades. The concept arises to describe the new decision-making processes that have developed, especially in urban areas.

Roberts and Abbott (2017) write about the difference between government and governance and point to the former as the formal system of administration and laws through which a country is managed; while the second includes the roles that the private sector and the community play in managing change in society. In this sense, the definition of governance is broader than that of government and involves formal and informal institutions and networks rather than formal hierarchies.

Bevir (2013) similarly suggests that governance differs from government because it focuses less on the state and its institutions and more on social practices and activities. In this respect, governance refers to the processes of social organization and social coordination of a community. According to the author, “governance is the action or manner of governing a state organization and refers to all of the processes of governing, whether undertaken by a government, market or network, whether over a family, tribe, formal or informal organization or territory and whether through the laws, norms, power or language”.

Another definition of this concept is the one proposed by Borraz & Le Galès (2001), who define governance as a process of coordination of actors, social groups and institutions with the purpose of achieving collectively debated goals defined in fragmented environments.

In the metropolitan context, Lefèvre (2005) states that governance is not only about solving collective problems in a given territory, but also about promoting socio-economic development, which means that such governance is oriented towards the future. In other words, metropolitan governance is the capacity of metropolitan areas to develop tools, mechanisms, instruments and regulations to make these territories governable.

These definitions show that there are multiple ways to promote and build governance in metropolitan areas. Over time, different metropolitan institutions have proliferated all over the world, and show that there is not one-model-fits-all, but that several factors determine the nature of the resulting metropolitan governance structures, such as the levels of fragmentation or consolidation between the different governments, the degree and level of control over urban functions, and the degree of formality or informality in the coordination of metropolitan units (Gómez-Álvarez et al., 2017).

The importance of metropolitan governance

The longstanding process of urbanization is expanding cities and their functional areas far beyond their existing political limits. In this sense, metropolitan fragmentation can be a barrier to achieving prosperity as it reinforces inequality and limits productivity (OCDE, 2015). In the face of today's major

urban challenges, such as growing inequality and climate change, which do not recognize political borders, metropolitan governance has become a valuable tool for dealing with urban fragmentation.

In this context, metropolitan governance can foster and coordinate comprehensive solutions for common problems within a metropolitan area. Developing governance mechanisms such as a coordination body able to oversee an agglomeration as a whole and thus grant a more equal distribution of public services and land uses could reduce poverty and decrease inequalities in territorial development (OCDE, 2015). In many cases, the existence of marginalised clusters and differences in the standards of public service provision within a metropolitan area are the product of uneven fiscal capacities between the various local governments (Polese, 2001).

Additionally, according to Polese (2001), globalization widens the differences between the urban rich and poor, but metropolitan governance can reverse that trend through centralised planning. Metropolitan arrangements can command greater resources and capabilities for solving collective urban problems, protecting common resources, providing better connectivity and centralising crisis management (Birch, 2019). Metropolitan arrangements could also be the main tool for facing externalities and foster scale economies in urban areas.

The promotion of a metropolitan governance system is generally associated with the implementation of a common plan between leaders of separate city governments, with their ability to translate it into a common government program. The implementation of metropolitan governance involves more than one local government, usually a central city together with those that surround it, as well as addressing issues that go beyond jurisdictional boundaries.

However, coordination and agreements between different government actors demand political will, which will only be achieved if coordination is associated with comparative advantages of the group approach over the individual one. Ahrend & Schumann (2018) suggest that there are two basic aspects that constitute metropolitan governance, on the one hand, it should be broad enough to include the heterogeneity of existing organizations; and on the other, it should be limited in order to distinguish metropolitan governance from other forms of administration. Furthermore, metropolitan governance is characterised by being multilevel and horizontal.

For the implementation of a metropolitan model of governance, Lefèvre (2005) argues that there are two main options: those based on institutional construction and those based on cooperation. The former contains both those institutions built through inter-municipal arrangements (where the actions of the authorities are based on voluntary or mandatory cooperation between the units that are part of the metropolitan area), and those that are made up of supra-municipal arrangements (where a metropolitan authority exists at a higher level). The latter includes those arrangements that are based on the coordination of existing structures, and those formalised agreements between agencies for the coordination and implementation of policies.

Other authors like Tomas (2015) propose four types of metropolitan arrangements according to the fragmentation of the territory, the competences of the entities, the type of financing and the form of representation. Organised from highest to lowest degree of institutionalisation, the four types are:

1. **Metropolitan government**, a new level of government in charge of metropolitan issues.
2. **Metropolitan agencies**, bodies in charge of managing or planning only one or a few services.
3. **Vertical coordination models**, which manage policies based on de facto cooperation between existing government levels, without the creation of a metropolitan institution.
4. **Voluntary cooperation** between metropolitan units.

The obstacles to metropolitan governance

There is no doubt that metropolitan governance is required for the efficient management of today's large urban areas, however, the development of such mechanisms is never a simple process. For instance, the deeper the social segregation or the inequalities within the population, the harder to reach an agreement between the metropolitan actors. Paradoxically, those metropolitan areas which are socially fragmented and where income distribution is more uneven, are those which need coordination mechanisms the most (Polese, 2001). Also, political differences between governments make it harder for metropolitan representatives to balance metropolitan and local interests.

According to Andersonn (2015), "good intentions are not enough to create functioning coordination arrangements for a metropolitan area". Metropolitan entities need political legitimacy, a clear decision-making process, well-defined functions, an explicit territory and adequate fiscal resources in order to make long-lasting changes in society (Andersonn, 2015; Bouchier et al., 2019; Slack, 2019). It is really important to develop an institutional framework that fosters metropolitan integration and also facilitates subsequent institutional adjustments in order to respond to new situations.

According to Chacon Romero (2016), this process may face several obstacles, such as struggles between the local governments and the metropolitan government due to overlapping functions, the lack of interest of the national executive and legislative powers in promoting metropolitan governance, the lack of coherence between legal and institutional frameworks and the absence of dialogue between levels of government, among others.

Political struggles are also a relevant source of conflict between metropolitan units while setting up metropolitan arrangements. According to Chacon Romero (2016), these problems can be classified into three types:

a) Those that arise from conflicting interests between local governments and metropolitan institutions.

b) Those which are a consequence of the lack of medium and long-term vision in local politics.

c) Those that emerge from logistical problems as a result of technical issues, a lack of economic resources or administrative difficulties.

In this context, it is crucial to provide legitimacy to the metropolitan structures. A metropolitan arrangement that lacks legitimacy will not have enough power to enhance longstanding coordination and cooperation between local units. In this regard, it is relevant to advance into metropolitan mechanisms that foster consensual decision making and take into account the differences between metropolitan units (Bouchier et al., 2019). It is important to have a clear definition of the functions to be carried out at each level, and the power and means to carry them out.

At the same time, it is important to introduce democratic schemes that encourage citizen participation in metropolitan governance. As Klink (2017) observes from the case of Sao Paulo (Brazil), institutional strengthening and building technical capacity are necessary but insufficient conditions to improve metropolitan governance if the existing arrangements have no support from civil society.

Finally, financing metropolitan institutions is one of the most controversial issues in metropolitan governance agreements. Metropolitan governance cannot be implemented effectively if the metropolitan institutions have not got the proper resources and if they depend exclusively on other levels of government. Hence, Bouchier et al. (2019) mention that it is necessary to foster a financial framework based on fiscal equality between the local governments that guarantees the fiscal autonomy of the metropolitan governance system.

Conclusion

The main challenges of the contemporary city such as inequity, adaptation to climate change and the use of new technologies do not recognize jurisdictional borders. Cities capable of thinking and governing themselves in an integral way, that is, with intersectoral and interjurisdictional approaches and with the participation of their main actors, will have a strong basis on which to handle these challenges and achieve sustainable urban development.

However, in spite of the fact that metropolitan institutional arrangements are required in today's cities, it is important to recognise that there is not a single model of metropolitan governance that can be applied to every situation due to the differences between countries and local government organization. Different metropolitan arrangements have worked in different places and circumstances and no model of governance is necessarily better or more efficient than another (Birch, 2019; Slack, 2019). Furthermore, since metropolitan governance is multilevel (both top-down and bottom-up), where institutional and financial arrangements are made, they may also need a model that is adapted to a particular context and that evolves as requirements and circumstances change.

Urban growth, together with the development of transport and communications, integrates the functional socio-economic areas of central cities and their peripheries. While the functional limits become increasingly blurred, the political limits tend to be quite stable. Metropolitan governance is an opportunity to improve the relationship between socio-economic integration and political fragmentation. A metropolitan agreement can be beneficial for managing shared services and resources such as water, waste, public transport, etcetera.

Nevertheless, any joint action mechanism or definition of a metropolitan governance structure should be accompanied by the necessary budget, as well as by the political validation of all the stakeholders (metropolitan governments, local governments, higher level governments and citizens), mainly through institutionalised mechanisms for the election of authorities and to regulate the management of government. This will ensure the sustainability of the government structure at the metropolitan level, while making the actions and services provided by city governments more efficient through economies of scale.

Even if it is difficult to pin down a single definition of metropolitan governance, given the complexity and diversity of the many contexts it exists in, there are variables that can be taken into account to analyse metropolitan areas in a comparative way. The level of institutionalisation, the type and quantity of delegated responsibilities and their associated funding levels and structure, alongside the level of inclusion of other sectors (such as private, academic, civil society, etc.) in decision-making, should all be taken into account when analysing metropolitan governance.

References

Ahrend, R., & Schumann, A. (2014). Approaches to metropolitan area governance: A country overview.

Andersson, M. (2015). Unpacking metropolitan governance for sustainable development. Eschborn: Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH.

Bevir, M. (2013). Governance: A very short introduction. Oxford: Oxford University Press.

Birch, E. L. (2019). 1.2 Institutions for Metropolitan Governance: Lessons for Nations and Stakeholders. In Gómez-Álvarez, David, Robin Rajack, Eduardo López-Moreno and Gabriel Lanfranchi, eds. Steering the metropolis: metropolitan governance for sustainable urban development. Washington: Inter-American Development Bank.

Borraz, O. y Le Galès, P. (2001): "Gouvernement et gouvernance des villes", en LERESCHE, J.-P. ed: Gouvernance urbaine et action publique en Suisse. Paris: Pedone, págs. 343-367.

Bouchier, J., Kalfon, M., Varney, J., & Geay, P. E. (2019). Fortalecimiento institucional y técnico de las áreas metropolitanas en América Latina.

Chacón Romero, A. (2016). El asociativismo intermunicipal en Latinoamérica, una propuesta de ordenamiento. En Chacón Romero, A. & Cravacuore, D. (Eds.). El asociativismo intermunicipal en América Latina. Universidad Tecnológica Metropolitana: Santiago de Chile.

Fedeli, V. (2017). Metropolitan governance and metropolitan cities in Italy: Outdated solutions for processes of urban regionalisation? Raumforschung und Raumordnung Spatial Research and Planning, 75(3), 265-274.

Gómez- Álvarez, D., Rajack, R. M., López-Moreno, E., & Lanfranchi, G. (Eds.). (2019). Steering the metropolis: Metropolitan governance for sustainable urban development. Washington: Inter-American Development Bank.

Klink, J. (2017). Recent Trajectory and Perspectives in Greater São Paulo. In D. Gómez-Álvarez, R. Rajack, E. López-Moreno, & G. Lanfranchi, Steering the metropolis: metropolitan governance for sustainable urban development. Washington: IDB.

Klink, J. (2019). 3.10 Trayectoria y perspectivas recientes en el Gran San Pablo. David Gómez-Álvarez• Robin Rajack• Eduardo López-Moreno• Gabriel Lanfranchi, 345.

Lefèvre, C. (2005). Gobernabilidad democrática de las áreas metropolitanas. Experiencias y lecciones internacionales para las ciudades latinoamericanas. In Rojas, E., Cuadrado-Roura, J.R. y Fernández Güell, J. M. (ed.). Gobernar las metrópolis. BID.

OECD (2015), The Metropolitan Century: Understanding Urbanisation and its Consequences, OECD Publishing, Paris, https://doi.org/10.1787/9789264228733-en.

Polèse, M. (2001). Cómo las ciudades producen riqueza en la nueva economía de la información: desafíos para la administración urbana en los países en desarrollo. EURE (Santiago), 27(81), 5-23.

Roberts, B., & Abbott, J. (2017). Collaborative Governance: Improving Sustainability of Development in Metropolises. In Gómez-Álvarez, David, Robin Rajack, Eduardo López-Moreno and Gabriel Lanfranchi, eds. Steering the metropolis: metropolitan governance for sustainable urban development. Washington: IDB, 2017.

Slack, Enid. (2019). “Metropolitan Governance. Principles and Practice”. BID.

Tomas, M. (2015). La gobernanza metropolitana en Europa: modelos y retos. Barcelona: Área Metropolitana de Barcelona: European Metropolitan Authorities.

United Nations (2015). Montreal Declaration on Metropolitan Areas. Montreal Thematic Meeting on Metropolitan Areas. United Nations: Montreal.

United Nations (2017). New Urban Agenda. Habitat III. United Nations: Quito.

Zimmermann, K., & Feiertag, P. (2018). Return of the metro-model? Governance and planning in metropolitan regions under change. An international comparison of France, Italy and Germany. Papers: Región Metropolitana de Barcelona: Territori, estratègies, planejament, (61), 0016-26.

Rules of metropolitan relations between urban and rural landscapes[71]

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The chapter focuses on the landscapes of metropolitan borders, those interface areas where urban, rural and portions of a more or less transformed nature are intertwined. According to some authors, the dynamics and relations established in these borders –given the current process of economic globalization and capital's expansion capabilities- acquire a central role in the organization of both metropolitan territories and landscapes in the context of the metropolitan project.

The text is organized in two parts. The first presents a brief theoretical introduction to the territories and landscapes of borders and then the second proposes a set of considerations that allow reading the landscape. This, eventually, could lead to diverse actions within a framework aimed at environmental justice.

The rural and urban in metropolitan borders. Diverse territories and overlapped landscapes

Theoretical proposals about the rural and urban, as well as their relations, are usually discussed in academic spaces and territorial administration forums (Roy, 2013). It is no longer enough the category of urban or rural to name diverse territorial portions (Rincón, 2010). Territories have been transformed and the concepts to name them have changed or are suffering renovation processes. The metropoli notion itself has changed too. From concepts supported by quantitative data on population and land area in the relation residence/labor (Burns et al, 2009) to be defined by the complexity of processes and economic, political and social centralities that they contain and generate (Ramírez, 2011; Roy 2013). These are processes that in their scales establish connections and separations between territories, actors and places and that in their borders reach their biggest tensions (Harrison and Heley, 2014).

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Traditional approaches to metropolitan phenomena have focused on the perspective of urban planning, in which context the city has emerged as the prime object of studies and prospective argumentation. An urban planning that, during the XX century, has evolved as knowledge but not always had practical consequences in decision-making processes. Nevertheless, the different modes to apply this planning have made evident the difficulties to represent the non-urban: those territories and territorialities that exceed the city. In its desire to organize urban spaces, planning has faced difficulties working with categories that implied overlaps; hence its limitations in understanding the superposition of spatialities inherent to a metropolis (Estévez 2012). This is what De Mattos (2010) defines as the generalization of the urban by the expansion of the accumulation space in urban concentrations derived from the insertion in global economic dynamics. Thus, numerous authors have tried to advance in the production of theoretical categories to capture the metropolitan territorial transformation particularly, the complex relationships network deployed in both internal or external border areas.

The advances of neoliberal capitalism of the 1970's caused significant changes in the agricultural sector (Teubal, 2001) and, of course, in rural societies. This implied that the construction of territory would be understood by new flux and exchange systems that affected the reconfigurations of both the rural and urban and today make hard to signal a clear separation between them (Concha et al, 2013; Harrison and Heley, 2014; Saravia, Letelier and Micheletti, 2018). De-ruralization processes in the countryside and urban dispersion start to be approached by new perspectives and disciplines that focus in the bio and social diversity of the territories (Górgolas, 2018). Wider perspectives start to be taken into account to understand holistically and to, consequently, act over the complexity of territorial tissues.in general and urban tissues in particular (Pemberton and Shaw, 2012; Harrison and Heley, 2014). This perspective has also been recognized by the United Nations Framework Convention on Climate Change (COP 22), calling to "create strategies to protect and conserve biodiversity as the cultural knowledge territorially deployed".

In this context, the search for theoretical concepts that could explain metropolitan borders prompted the development of adjective terms (urban spaces, peri-urban spaces, spaces of displacement, peripheral crown, rural periphery, rural urban border). Even so, in recent years, rural-urban interactions have begun to be thought of as interfaces to distinguish these spaces from those that simply surround the city (Galindo and Delgado 2006). Its prime territorial manifestation is the formation of hybrid spaces where the rural and the urban are combined and, therefore, hard to identify, analyze, and contextualize with traditional paradigms (Delgado et al, 2003). We could add, that these combinations also contain the interactions with nature. In this sense, some authors propose the concept of agropolis to name the "web of populations distributed in one or several valleys, cities and towns, with multicentered economic activities like fishing-forestry, agriculture and Livestock" (Saravia, Letelier and Micheletti, 2018, p. 32) or rurbanity to name the "dialectical relation where the urban culture re-appropriates natural and cultural goods commonly seen as belonging to the rural world, thus reinforcing the social links" (Saravia, Letelier and Micheletti, 2018, p. 33). Both concepts constitute hints of new theoretical approaches that try to ease the understanding of those hybrid territories where the "metropolitan peasant is no longer the traditional inhabitant" (Agudelo Patiño, 2012, p. 557), as neither is it the metropolitan urbanitas.

It is relevant to consider the social expression of hybrid landscapes in metropolitan borders as a mottled social formation (Zavaleta in Antezana, 1991). This concept proposes to think about the large number of societies that coexist in a space-time; the historical times that intersect, the modes of production and languages, forms of government and representation that mix and influence (Díaz Carrasco, 2011, p. 2). What it is about is to recover the dimension of the diverse and co-existing, the continuities, discontinuities, combinations and rejections (Antezana, 1991). The complexity of metropolitan territories and particularly those in their borders are entities that lead to consider its social dimension from perspectives that overcome the static conception of identities and the dualisms center-periphery (Da Rocha et al, 2016). That's why it is more relevant to revise the contrasts, continuities and heterogeneities than the social markers based in binary oppositions of differences and/or similarities. As hybrid places (García Canclini, 1989), the metropolis supposes a

constant mix and recreation of diversities where the sense of belonging is constructed and reconstructed in complex, changing, fragmented and diverse scenarios. This condition explains that, in them, people move in several different spatial-temporal planes at the same time, and their identities aren't homogeneous nor developed once and forever (Velho, 2010) but articulated as "the arrangement of the parts as a whole" (Kropf, 1996).

If landscape is a social construct (Nogué, 2007) and the perceivable expression of the territory, metropolitan borders integrate in the physical space the construction of the interface nature-rural-urban by a set of overlaps and juxtapositions that contains: multi-centered economic activities, the imprints of mottled social formations, their mobile, fluid and multi-placed identities that at the same time articulate cultural valuations in which the social actors, by their practices (Pérez and Fernández, 2008) turn evident the always asymmetrical power relations. That's why these places suffer the biggest territorial transformations and, at the same time, are the most vulnerable (Galindo y Delgado 2006, Rincón 2010).

Challenges to the metropolitan project. Some previous considerations to reed, understand and eventually act in the border

The following considerations for the rural urban landscapes linkage are designed as both theoretical and methodological basis for the metropolitan shape relation. Their end is to allow the understanding of how these landscapes are and how they could be, in the context of a fairer metropolitan project.

1. The border landscape is a heterogeneous complex built over the historical and environmental configurations that derive in hybrid places. These are deployed not only in the outskirts of the metropolis, as traditionally were, but within the texture itself of the metropolitan region. Every time that we observe the metropolitan inner and external borders, we must be aware of the layers built over time. In that way, we will be able to understand the complex articulations between cities, rural and natural spaces pointing out the landscape biography.
2. Its production is expressed in the history of the exercise of power by the diverse actors in different scales (from the global, to the regional, to the local). The landmarks that signal this biography lead to esthetical valuations, propose new esthetics and create disciplinary processes crossed by these hierarchies and valuations.
3. The border landscape as "mottled social formation" leads to think in overlaps, assemblies and hybridizations in between complex territories. It points out the way people and places reference to different times, kinds of production and relations, that coexist not free of conflict, in overlapped spatialities. Medium and small cities, different ruralities and the more or less transformed portions of nature constitute the socio-historical tissues to build a place-based metropolitan project.

Even if these considerations are deeply connected, we have proposed some keys to "think", eventually "act" in plural, hybrid and complex contexts, with capability to promote territorial resiliencies. In frameworks of increasing uncertainties, conservative actions would mean a safety measure to advance towards fairer intra and inter-generational landscapes in the metropolitan project.

References

Agudelo Patiño, L. (2012) Ruralidad metropolitana. Entre la tradición rural y el «brillo» urbano. Una interpretación. Bulletin de l'Institut français d'études, 41 (3)2012. Available at: http://journals.openedition.org/bifea/432; DOI: 10.4000/bifea.432 Accessed 23 february 2019.

Antezana, L.H. (1991) Dos conceptos en la obra de René Zavaleta Mercado: Formación abigarrada y democracia como autodeterminación. In Latin American Studies Center. University of Maryland, pp. 117-142.

Burns, M. C., Cladera, J. R., Bergadà, M. M. & Seguí, M. U. (2009). El sistema metropolitano de la macrorregión de Madrid. Urban, (14), 72-79.

Concha, C., Errázuriz, T., Letelier, F., Micheletti, S., Rasse, A., & Salcedo, R. (2012) ¿Urbano o rural? Repensando territorios, discursos y prácticas al margen de la metrópolis. In Congreso Asociación Latinoamericana de Sociología (ALAS), Santiago de Chile.

COP22 UN Climate Change Conference. Green Zone Side Event 16 November 2016. Urban and Rural Areas. Resilience Programme Oasis Cities.

Da Rocha, A. L., Zimmermann, C., Nunes, M. F., Kuhn Jr, N. & Pedde, V. (2016) Apresentação do dossiê. Revista Gestão e Desenvolvimento, 13(1), 4-6.

Delgado, J.; Ángeles, G & Galindo, C. (2003) La interfase sociedad-naturaleza, un enfoque territorial a la fragmentación espacial de la urbanización difusa. Contribution to Annual Meeting of the International Geographic Union (IGU), Slovenia.

De Mattos, C. A. (2010). Globalización y metamorfosis metropolitana en América Latina: de la ciudad a lo urbano generalizado. Revista de Geografía Norte Grande, (47), pp.81-104.

Díaz Carrasco, M. (2011) Sociedad abigarrada. Repensando la democracia multicultural en Bolivia. Entrevista a Luis Tapia Mealla. Available at: https://relacso.flacso.edu.mx/sites/default/files/docs/01/sociedad-abigarrada.pdf. Accesed 29 November 2019.

Estevez, X. (2012) Desde las Franjas. En Nogué, Puigbert, Bretcha & Losantos (2012) Franges. Els paisatges de la perifèria. Observatori del Paisatge de Catalunya. Olot., pp. 302-303.

Galindo, C. & Delgado, J. (2006) Los espacios emergentes de la dinámica rural-urbana. Problemas del desarrollo, 37(147), pp. 187-216.

García Canclini, N. (1989) Culturas híbridas: estrategias para entrar y salir de la modernidad. México: Grijalbo

Górgolas, P. (2018) El reto de compactar la periferia residencial contemporánea: densificación eficaz, centralidades selectivas y diversidad funcional. ACE: Architecture, City and Environment, vol. 13, num. 38, p. 57-80 DOI10.5821/ace.13.38.5211 Accesed 06 February 2020

Harrison, J. & Heley, J. (2014) Governing beyond the metropolis: Placing the rural in city-region development. Urban Studies, 52(6), 1113–1133.doi:10.1177/0042098014532853

Kropf, K. (1996) Urban tissue and the character of towns. Urban Design International, 1(3), 247-263.

Nogué, J. (2007) La construcción social del paisaje. Madrid: Biblioteca Nueva.

Pemberton, S. & Shaw, D. (2012) New Forms of Sub-regional Governance and Implications for Rural Areas: Evidence from England. Planning Practice and Research, 27(4), 441–458. doi:10.1080/02697459.2012.682476

Ramírez, J. B. (2011) El establecimiento natural de una región transfronteriza en el área metropolitana binacional de Cúcuta y San Cristóbal. En Sandoval, J.; Álvarez, R. & Saavedra, L. Integración geoestratégica, seguridad, fronteras y migración en América Latina. Quito. [accessed 23 february 2019]

Rincón, C. E. (2011) La metrópolis en la historia: apuntes para la comprensión del hábitat metropolitano contemporáneo. Arquetipo, (2), 55-70. Pereira: Universidad Católica de Pereira.

Roy, A. (2013) Las metrópolis del siglo XXI: nuevas geografías de la teoría. Andamios, 10(22), 149-182. Available at: http://www.scielo.org.mx/scielo.php?script=sci_arttext&pid=S1870-00632013000200009&lng=es&tlng=es. Accesed 23 February 2019.

Saravia, F., Letelier, F. & Micheletti, S. (2018) Ni urbanos, ni rurales: cambios intergeneracionales en adscripción territorial subjetiva en la región del Maule, Chile. Cuaderno urbano,24(24), 27-46.

Silva Pérez, R.; Fernández Salinas, V. (2008) El patrimonio y el territorio como activos para el desarrollo desde la perspectiva del ocio y del turismo. Investigaciones Geográficas. N. 46 pp. 69-88

Teubal, M. (2001) Globalización y nueva ruralidad en América Latina. En Giarraca (comp.) ¿Una nueva ruralidad en América Latina? Consejo Latinoamericano de Ciencias Sociales / CLACSO. pp 45-65.

Velho, G. (2010) Metrópole, cosmopolitismo e mediação. Horizontes antropológicos., Vol.16, no.33, pp.15-23.

Rules of metropolitan quality and beauty[72]

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Currently, the metropolitan issue is fragmented into sectorial visions. The new dimension of the city requires the creation of a new interdisciplinary field to integrate numerous facts and data from architecture, infrastructure, energy, economy, ecology, sociology, law and other disciplines. Since facing the Metropolitan problems is considered crucial for the future of the urban balance worldwide, we have to find a synthesis. We would like to investigate the “art” of shaping and re-shaping the metropolis focusing on spatial, social, productive and participatory innovations.

One of the questions of Metropolitan Architecture regards how it is possible that a building or an urban area is designated to sensitively respond to its physical content and at the same time, it is able to distinguish from it, because it is a global/local landmark. It is necessary to think about a new compositional language which refuses direct references to a pseudo –picturesque historicism. Thus, the public realm requires the construction of a narrativity, through our architecture, that is able to tell stories about who we are, and what a city wants to be. It introduces above all a symbolic dimension that brings the architectural project to the use of formal archetypes, which are able to evoke a new meaning in the global culture. The new project was born of course, wthin the local scale, but now it transcends the local towards a global one too.

So, “What is the role of Architecture role?” is the question of our research, and the goal is to be able to produce urbanity at the new metropolitan scale. The metropolis has the possibility to use the Arts (the muses) as a medium able to have a synthetic and not only functional vision about how to act as architects and urban designer inside the current city, that we named: The City of Muses.

We proposed an analogical approach that it’s possible if we interpret the city as the City of the Muses, where the arts, related to our senses, live and work. In fact, only if we refer to the Muses (the arts) we can understand the deep meanings of the space, transforming them in a value for the citizens. To refer to the muses means draw a world of words and figures that considers the image not purely tied to a consumer, but to a symbolic identity. Each image becomes a reactivating symbolic reference that allows us to build a wider scene for the Metropolis: the scene of a Baroque Theatre. This allows us to link, through a mental perception, a place to an event. This reactivated symbolic value of the image can be referred also to archaeology. It can finally regain a precise place in the construction of the urban scene. This is the traditional approach of the Milanese School.

The Practice of Metropolitan Discipline as tool in this direction, is a mapping project able to represent the new metropolitan dimension of the city, which is mandatory. Maps that can represent space

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composed by relevant points, with a deep knowledge of the metropolitan structure and the relationships that tie the points of the map to the instants of a temporal interval of the metropolitan life of citizens. Therefore, these new maps are able to show how every metropolitan phenomenon is constituted by a series of feelings related to the intense experience of a place. Therefore, Art is the key to build memorable places.

The metropolitan citizen is a reflective individual

The Metropolitan Architecture approach starts from a critique of the concept of the user as a normotype that must conform to a pre-established program, and continues by identifying which approaches can, on the contrary, produce an original appropriation of the project by a reflective subject who expresses her/his status as a person by inscribing the time-event marked by the Metropolitan Architecture project within her/his own wider individual narrative. The Metropolitan Architecture project is a catalyst for temporal events. It is an art and a technique informed by the relationship between the real and the mental map, and the relationship between the social and the individual space-temporal projects. The innovation introduced by our approach consist in placing the citizen at the centre of our concern in regard to the metropolitan transformation. Metropolitan citizens who supported today by new technologies, can plan their schedule and are always self-centred in all the sizes and territorial scales, so that they are becoming reflexive individuals (Giddens, 1991) with expectations that the contemporary city does not know how to please.

This process of appropriation requires the subjects to intervene directly as mediators between themself and their environment through activities of interpretation and imagination that, by slowing down perception, slow down also the consumption of the project and consequently these multiply its significance. Interpretation and imagination, as capabilities that draw on the personal sphere, are the instruments of a mediation that, freed from cultural and physiological schematism, applies directly to the environmental data provided by the Metropolitan Project, determining a restart of the subjects in the line of their individual trajectory.

In this way the project, through an operation at perceptional level, produces a leap of life form in the subject towards more reflective forms that allow metropolitan citizens to relate to the built environment in a critical way and, consequently, to make it their own. The project of Metropolitan Architecture becomes a processor of quality of place, and its inhabitants are who can choose the grahidient or tonality of that quality as the horizon towards which to make the events of their life happen.

The new technology issues

In particular, we are dealing with the new technology issue. In fact, new devices define a part of a city that has been designated such as a metaspace (Bunschoten, 2006). The Metropolis becomes an Urban Gallery, a fluid form of public realm that evolves in time, generating several definitions of public space and therefore several ways of participating in it. These definitions yield "floors" into the spatial structure of the urban gallery. Metaspaces make it possible to bring the dynamic structure of the scenarios into the flows of the second skin. A metaspace in the second skin is a public space, a public matrix, that we name Metacity (Shane, 2005).

We critically reflect on the exploitation of digital technologies and media as specific tools for the collection, organization and interpretation of data that converge into an architectural composition. But, on the other hand aesthetics is here proposed as a language across different disciplines, a tool

able to support creative and innovative ways of designing and ruling the future stages of development of the city. Metropolitan Architecture project within the other arts can be a way to configure a different vision of the contemporary metropolis and diverge society: it is a project instrument to reactivate some part of the city. The City of the Muses is the true “city as a museum” (Rowe, 1984) due to the fact that the museum is the place where the muses reign and inspire. The Muses mean re-activation and renewal of a profound identity, cluster of interactive poetical images, which create an invisible net of feelings and associations for the citizens, using new devices nowadays.

The aesthetic-affective dimension of the project

Each project of Metropolitan Architecture must accompany the trajectory of development of the reflective citizen through two possible types of project:

1. the "acted" project: which is the one suitable to the development of a person;
2. the “conditioning” project: which diverts the persons from their trajectory.

The approach is, therefore, not affirmative but open to doubt. The action of the metropolitan expert is placed primarily in a "in between zone", which while keeping in mind the main goals of the metropolitan action, keeps open a broad spectrum of values to share. We start from the hypothesis that the female vision is placed in the perspective of listening to the different instances, in the definition of a mode of "taking care" through an approach that identifies the leader in a guide and not in a boss. We want to pursue the idea of the metropolitan place as an “affective” place, so we want to promote the role of women in the training and implementation of the Metropolitan Discipline.

Metropolitan Architecture project is not anymore, the final product towards which the instruments – technology – are used as a means to an end, but it becomes a mean in itself. Eventually even architecture is not any longer made for durability, for remaining the same independently from whom produced and use it, to construct the World; architecture becomes part of the vital cycle, and it is planned according to the needs of the human being understood as individual subject. Thus, the ideal of usefulness permeating a society, of craftsmen like the ideal of comfort in a society of laborers, or the ideal of acquisition ruling commercial societies, is actually no longer a matter of utility but of meaning (Arendt, The Human Condition, 1998, p.154).

What are the instruments of conception and what are the indexes of measurement of an affective space (if possible)? It is a space of a reflective subject that can express what the situation requires. This is not a space that allows to normo-typise the subject. It cannot be measured with a hit map or simulation tools that usually identify the characteristics of the space that flatten citizens to a norm type, so we have to detect which tool allows to identify the characteristics of the space that stimulate our criticality and reflexivity. It is not possible to apply the normalizing model to a civic space because it is impossible to typify the reflective individual. It is not a question of requirements of a program but of range of qualities, and values.

From a formal point of view, the new plasticity of Metropolitan Architecture project has been appreciated for its immersive, intimate value, the architectural equivalent of the emotional turning point. In any case, not all affective approaches to architecture threaten the critical capacity of the subjects. The problem is not affection against cognition, because no representation can exist without sensation. The problem is whether the senses are the term of a direct experience or its intermediary to cognition, because in the first case, the subjects will be governed by external forces, while in the latter they will be able to critically evaluate them and act accordingly.

In this regard, the new Metropolitan Discipline raises the research question in placing the issue of values. The objective of Metropolitan Discipline is not to teach something but rather it is a support factor in learning how to integrate the point of view of several disciplines, of the different components,

scales and interests of a metropolis. Consequently, it enhances the quality of the comprehension of the potential of the local value in a long-term perspective. Therefore, the fundamental aspect of the negotiation rises from the theoretical and pragmatic processing.

In 1966 Vittorio Gregotti, brought up the issue of “architectural decadence”, taking into consideration a dual condition of crisis. On one hand, it is determined by discontinuity of the creative process as a linear complementary method between form/ function and analysis/synthesis. Such process is also defined in Architecture by the Modern Movement. On the other hand, he mentions an architectural “matter” that after the emergence of the post-war reconstruction, could no longer recognize itself into the simple building operation. Paul Ricoeur in 1961, recalled by Frampton in 1983, wrote about the question of a difficult whole between an ethical-mythical nucleus that formed the identity of the places and the phenomenon of universalization typical of the metropolitan explosion. Ultimately, Lynch in 1960 established the failure of the ecological city.

Gregotti, identifies two figures: the planner and the planning designer. The planner is a specialist of the location on the basis of policy objectives. The planning designer, meaning the professional able to define different spatial models, considered as physical reality, which must be organized according to a common goal, the form of the territory.

If the planners make decisions on their own about various urban disciplines, the designer will share the leadership with all the disciplines involved into the definition of the metropolitan form. Several disciplines in fact converge in determining this form, and these share a common goal. The disciplinary behaviour of the designer, according to Gregotti, is creative/inventive which means a more adaptive form producer, and he should generate “a figural -value- that is the structural aims within the spatial implementation of services in the context". We can reach, in fact, the goal of shaping the metropolitan dimension only if it gives meaning to the project. This meaning is the quality of living that must be conveyed through a figure/ image as aesthetic operation, which aims to create a significant landscape and therefore it’s memorable.

This is the role of the Metropolitan Architecture Project: at the scale of the geography and its geometric rationalization models, it detects the geographic support of the territory; at the local scale it shapes the context through a physical intervention related to the needs and values of the society.

Compared to the local scale, the task of the metro discipline is to make this meaningful intervention possible. Consequently, what is decided at the metropolitan scale, has to find its necessary figure at the local one. Because of this, it is crucial to define reading tools of the indices of transformation and the minimum operating unit at the Metro-scale (its field of action). This minimum digit is not an organizational technical element. In fact, according to Gregotti, it cannot be the product of a functional program definition, but it must take into account natural marks and history, - formal and circumscribed sets that we call Figural Unit of Landscape or Balanced Developed Unit (Ortiz, 2014), - as key elements for the definition of the structure of the typical image of the territory (E.N. Rogers, 1958). This can form landscape, identity and citizenship also at the metropolitan scale.

The city of muses

In the imaginary, therefore, there are two tracks for the project: a paradigmatic and syntactic one, linked to reality; and a figurative characterological one, which illustrates the way in which the several actors enter the space of the scene, which determines a certain situation.

In Metropolitan Architecture project, then, lies a sociological dimension and an anthropological one no longer linked to a subjective psychology, but to an interpretation of the spirit of time that passes from the objective subjectivity of the “artist.” The symbolic reacts to a precise place, specifies the sociological dimension, is linked to a city or theatral scene, and becomes a sign of the spirit of the times shared by an entire community. The symbolic image is therefore the appearance of a new

shared cosmopolitan image with which a world becomes visible, that is not linked only to the behaviour of the residents of a place and that prior to this had an obscure iconophany.

The symbolic image has its own time, its own story, which crosses the "facts" of the city, disrupting their sequence, organizing them in another sense, and in which the opposites can coexist. Like the mask, the great image of the metropolitan city not only hides, but also must reveal a face that is a complex and profound identity. It is a complex sign, an intersection, in which several images coexist. It is an image that has the capacity to refer to reality and to express a sense and a direction for the growth. It includes the difference, the metaphor and the heterogeneous, and it absorbs a plural and real temporality.

It is therefore necessary to recover some of those "neglected values", as Lynch defines them (Lynch, 1960), such as the quality of the symbolic or sensory experience of the city, but without descending back into the field of utopias and utopians (Fourier, Howard, Wright), who give modest attention to the physical and spatial dimension of the environment. Seeing it only as a background, they proposed a symbolic expression of the perfection of the new society, limiting their field of research to social relations and annulling the power of the physical dimension of the city.

However, this new ability to strike the senses through sensual and memorable images (Lynch,1960) should not be understood with the propagandistic spirit typical of the Baroque period, but as a creative image of multiple links and processes, social, economic, political, historical, affective.

"People learn to know what surrounds them through their senses and to perceive places through actions [...]. Other arts - theatre, poetry, music, sculpture - refine this consciousness and make the landscape sound. Stories and poems develop the meaning of a place; paintings and photographs make people see it in new ways [...]. We intervene on light, movement, sound, and odours to make places permeate the senses". (Lynch,1960)

At the scale of the space of flows, Roger Simmonds and Alan Reeve (2000) introduced the idea of the public sphere (public realm) as a movie set for the representation of the figures of multiple self-actors in the different circumstances. Within these they appear in the execution of different programs conceived in the era of the artificial space of flows. The theme of this constitutive situation of belonging to the metropolitan city is the identification of places as fitting to the different gradients of scale from the largest of the networks of the metropolitan infrastructure, to the smallest armatures of the local space. The inner space of these new spaces is like a set that emphasizes in the very use of the term, the visual dramaturgy of the theatricality of an event, which keeps strong the suggestion that the monument is not only the scaffolding that carries cultural artifacts, but it also frames the crowd and its processions, rituals and behaviours: it is the place of the body, construction of the conditions of life and citizens' agenda, and creates room for wonder and imagination. The tectonic figuration of these places determines the concrete possibility of rituals and encounters, revealing the simultaneity of internal and external spaces and in a very different way from post-modern scenography, does not consider architecture only as a sign or a text (Hartoonian, 1997).

In a set the consumption is very rapid. The consumption of scenarios, of metropolitan sets that Shane called Heterotopias of Illusion (Shane, 2005), means being able to meet and choose different lifestyles in a short period of time, being able to become a citizen everywhere without necessarily having to have assimilated all the deepest traditions (genius loci). It is a condition determinate by the mass use of new media of representation such as photography and television, which transforms into icons all the significant images of a known place, but also the lifestyle that is determined there. This in the era of globalization is a chance and a problem.

In this regard, it should be noted that the identification of metropolitan citizens with a place happens on the basis of the interaction between at least four ways of determining the character of a place: the name, the icon, the location in a mental map or temporal space and in a cartographic representation.

This theatrical vision determines a city full of inspiration for those who live and enjoy it, a new metropolitan city, the kingdom of the Muses. We are obviously referring to Hesiod who in his Theogony lists nine of them, also considering Muses the repositories of memory and knowledge as daughters of Zeus.

The metropolis as a diffuse museum

With the new social behaviours and with the perceptive changes linked to the development of metropolitan mobility, many places and facilities of the historical city are emptied of functions and meaning, while other spaces in which the greatest flows converge, become much more significant.

In the spirit of the new character of heterotopic metropolitan space, born from a process that develops in parallel in other urban institutions, we see the fall of barriers and the general tendency to conform to a total availability of the territory to transformation, indifferent to the danger of a uniforming globalization. The consequences for architecture are notable in that the need for correspondence between architecture and the character and needs of places is abolished, and a new "general" architecture is born: an undifferentiated space open to all uses and a liberation of form that affirms itself as an autonomous, autopoietic value. Metropolitan Architecture project, which has as its deep structure the geographical-historical armour, that we called green-grey infrastructure, considers the protection of scarce resources of the environment its most important objective. Against the homologating globalization, then, it recovers at the metropolitan scale the value of places, which for this purpose must not be dispersers. The ground, then, ceases to be a background and is also considered an element intimately linked to the morphological process of architecture that no longer invests only in a point but also into the vast field. The city is contaminated by art. The nine Muses of Heraclitus are transformed into many occasions for the poetic appropriation of the metropolitan city as shared design objects:

Erato_ singing: aesthetics and beauty
Polymnia_pantomime: space and soil
Urania_astronomy: visual plan and city skyline
Talia_ theatre: stage, urban green
Melpomene_tragedy: new celebration spaces
Tersicore_ dance: space, movement and musicality
Euterpe_ music: sounds of places
Calliope_ epic poetry: memory of the city
Clio_ history of the city.

References

Arendt, H., (1958), The Human condition, Chicago: The University of Chicago Press.

Bunschoten, R., (2006), From Matter to Metaspace: Cave, Ground, Horizon, Wind, Vienna: Springer.

Giddens A (1991), Modernity and self-identity: Self and society in the late-modern age, Cambridge: Polity Press.

Gregotti V., (1966), Il Territorio dell'Architettura, Milano: Feltrinelli.

Hartoonian, G., (1997), Ontology of Construction: On Nihilism of Technology in Theories of Modern Architecture, Cambridge: Cambridge University Press.

Lynch, K., (1960), The image of the city. Cambridge Massachusetts: MIT Press.

Ortiz Castano P.B., (2014), The art of Shaping the Metropolis, New York: Mc Graw Hill.

Shane G. D., (2005) Recombinant urbanism. Conceptual Modelling in Architecture, Urban Design, and City Theory, West Sussex: Wiley-Academy.

Reeve A., Simmonds R., (2000) ‘Hyperreality’ in the shire: Bicester Village and the village of Bicester, URBAN DESIGN International 5, 141–154; Joint Centre for Urban Design, Oxford: Oxford Brookes University.

Ricoeur, P. (1961), Civilisation universele et cultures nationales, Seuil, Paris. Cit. in Frampton K., (1983), Towards a Critical Regionalism: Six Points for an Architecture of Resistance, in The Anti-Aesthetic: Essays on Postmodern Culture, edited by Hal Foster, Bay Press, Port Townsen.

Rogers, E.N. (1958) L’esperienza della Architettura, Torino: Einaudi.

Rowe C., Koetter F. (1984), Collage city, Cambridge: MIT press.

Chapter two

Metropolitan innovative economy

Metropolitan wealth and prosperity[73]

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Introduction

Wealth in the metropolitan context describes the accessibility of a wide range of infrastructures for the metropolitan population and even for the individual metropolitan inhabitant. The aim of the Tellme project is to address the possible mechanisms that can ensure prosperity for the metropolitan population and at the same time ensuring environmental sustainability.

When dealing with wealth in the metropolitan ecosystem, it is important to consider all underlying and overarching scales and contexts, from the effects of global economic trends to the solution of individual existential needs.

In contrast to the analysis of income distribution, which can be efficiently mapped, or to the Gross-Metropolitan Product (GMP)[74] related values, which represent economic growth, wealth should not be expressed as a monetary value, as proposed by the methodology of the Tellme Project. The reason for this is that the project focuses on metropolitan systemic sustainability and environmental preservation. As with the Inclusive Wealth Index (IWI), the sustainability context brings a slightly different perspective on the quality and value of observed economic systems. The increase in economic activity often means/causes depletion of natural resources and degradation of the environment.

Since economic activity generally creates a higher level of prosperity (Jiménez-Domínguez & López Aguilar, 2002, p. 99), the contradiction between economic activity and the conservation of natural resources is extended to the contradiction between increasing wealth and prosperity and decrease in natural capital. In order to overcome the conflicts described above, a new approach to

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74 https://en.wikipedia.org/wiki/List_of_metropolitan_areas_in_the_European_Union_by_GDP.

development is required, which will partially replace the existing paradigms of urban economic development, but which will also produce a new model of development for the metropolis.

The criticism of different approaches to development has common roots with temporary debates on the end of post-Keynesian urbanism (Hodson & Marvin, 2009, p. 194; Sassen, 2008, p. 94), as the model of open competition between cities and, more recently, between global metropolises has failed to prove its long-term viability, leading to unprecedented wealth inequality and negative environmental impacts.

In search of a new paradigm for economic development, we turn to a number of possible approaches and developments that could change the game, such as redefining sustainable public goods and accessibility, treating land and housing ownership through advanced public and financial mechanisms, investing in sustainable technologies such as sustainable energy production, using waste recycling as a public asset (DEFRA, 2011, p. 9), addressing migration and demographic changes, and finally adopting new approaches to metropolitan planning.

As an alternative to monetary values such as GDP, GMP, income distribution and other monetary valuations, a new comparable and interdisciplinary valuation approach is required if a comparison is to be achieved between different locations within the metropolis or between different metropolitan regions (Hoekstra, 2019). In addition, a new methodology must be developed that takes into account the dynamics of metropolitan areas as a basic principle of all developments, of which the distribution of wealth is only one part.

The second challenge addressed by the Tellme project is the geolocalised mapping of the wealth of the metropolises. In order to enable the production of map proposals, a new approach to modelling metropolitan economic and wealth systems is required. An approach that differs from the usual urban economics computational models that use isolated values and economic indicators. The spatial mapping approach is of central importance as a communication tool accessible to civil servants, stakeholders and academics (Contin, 2015). The proposed methodology is based on the study of Latin American cities and stakeholder workshops held in 2019 in the cities of Guadalajara (Mexico) and Mendoza (Argentina). Development vectors of metropolitan centres of Latin America.

In order to achieve sustainability, the contemporary metropolis must adopt a multipronged approach to solving challenges related to external changes such as climate change, migration, demographic shifts and technology-driven economic globalisation, and manage internal systemic sustainability in the light of existing finite resources and the existing environmental situation. Based on the case studies and workshops in Seville, Guadalajara and Mendoza, a general connexion between economic prosperity and the existing environmental situation was identified. The relevance of the areas linking the metropolis and the rural hinterland is underlined by the fact that these are the parts of the metropolis where the changes are most intense in terms of demographic change, economic disparity, but also spatial (albeit informal) development.

In the observed metropolitan areas there still exist important economic agricultural production activity (Aranibar, 2015, p. 6; Harner, 2007, p. 49; Heimlich, 1989, p. 458). To varying degrees, food production meets local needs or is export-oriented. These two models differ in their impact on the environment. Large metropolitan areas use global supply chains to export produced goods, so that a network of metropolitan centres exists in the form of a food supply network of the order of magnitude that leads to intensive food production and high prices for soil and water pollution.

Other non-agricultural exchanges include products of advanced industrial production and the provision of centralized services. Contemporary trends of sustainable development are present in the observed metropolitan areas, as shown by circular economy studies in Guadalajara (Cordova-Pizarro et al., 2019, p. 2) and sustainability projects in Mendoza (Arboit et al., 2008, p. 2).

As a process of temporal and geographically uneven development, the spatial concentration of wealth emerges, and as a consequence the poor become poorer and the rich richer, simply from the

perspective of access to services and infrastructure. According to a World Bank study, the richest decile of the population of Latin America generates 48% of total income, while the poorest 10% of the population earns only 1.6% of income (De Ferranti, 2004, p. 2). Economic globalization could be the appropriate framework for resolving these contradictions, but it is not. In this context, it can be said that the associated ecological degradation of the South can be better explained by the international division of labour than by poverty itself (Jiménez-Domínguez & López Aguilar, 2002, p. 99).

Wealth can be perceived as a threat to the environment. In a metropolitan context, this means that unequal income and wealth leads to poverty and poverty leads to environmental degradation. Therefore, the appropriate approach to greater prosperity should be growth and redistribution and not just development.

Two important dynamics influencing prosperity of Latin American cities were identified:

1. Demographic change has a considerable impact on the megacities of the region. The changing age structure of the population poses increasing challenges for the Latin American societies, as it produces a growing dependency index. Meanwhile, the last decades are characterised by a high proportion of economically active age groups. This demographic advantage is likely to be lost soon (in some countries by 2015-2020) in the main Latin American countries (Jordán et al., 2010, p. 13).
2. The old urban-rural dichotomy is increasingly disappearing. Despite its characterization as highly urbanized, Latin America is still characterized by rural areas in territorial, economic and socio-cultural terms. Nevertheless, recent trends show an increasing specialization of rural areas and the integration of agricultural production into global production chains through increasing functional links with the dominant cities. Moreover, due to extensive peri-urban areas, clear boundaries between urban and rural "hinterland" are disappearing.

In the case of Chile and Peru, almost half of the economic activities are concentrated in the capital, in the case of Argentina and Colombia about a quarter.

Lessons from Mendoza

The city of Mendoza is geographically located in a region that is not rich in natural resources, along the transport link Buenos Aires-Santiago de Chile. The population growth of the metropolis of Mendoza does not reflect the available natural resources. Quite the contrary. The resources were scarce from the time before the contemporary urban and metropolitan development and are therefore part of the DNA of Mendoza. Moreover, recent economic practices have pushed urbanization and economic use models beyond sustainability considerations (Aranibar, 2015, p. 2).

Due to the traditional scarcity of resources and geographical isolation, Mendoza is in many respects predestined to implement a sustainable development strategy. However, the extent to which and the way in which issues of prosperity are addressed in the process of transition to a more sustainable economic model is still open. Examples of existing approaches to sustainable development include the 18th century government policy to improve water catchment and distribution systems (Ponte, 2006, p. 8), but also a cultural and legally enforced convention on the responsible use of water.

Mendoza was one of the first cities in the country to install a sewage treatment system in 1976, which came from a simple precipitation pond. Today the city has a wastewater treatment plant that treats 4,200,000 m3 of wastewater per month. The treated water is used for the irrigation of more than 6,000 hectares of direct irrigation and 24,700 hectares of agricultural land, which is used indirectly for the production of crops, wood, wine and fruit (Aranibar, 2015, p. 5). Today, Mendoza is an oasis with an elaborate network of irrigation channels used to irrigate the vegetation in public spaces.

Other notes related to economic development include the fact that Mendoza has an annual average of 330 days of sunshine, which offers various opportunities for the sustainable use of solar energy. One of the motors of Mendoza's economy is tourism, which accounts for about 18% of the city's annual budget. As "sustainable tourism" develops in Mendoza, the demand for natural and unaltered spaces is increasing. A low value is attributed to ecosystem services, which are depleted by resource extraction and affected by the waste of Mendoza's informal settlements. Illegal open air dumps are increasingly polluting the water resources of Mendoza's arid areas (MDZ, 2013), which has a direct impact on the development of the peripheral metropolitan areas.

Lessons from Guadalajara

Jalisco is one of the states with the greatest biodiversity in Mexico, and the metropolitan region of Guadalajara is the biologically most diverse region of Jalisco. This rich biodiversity is mainly due to Guadalajara's location at the confluence of the mountain ranges Sierra Madre Occidental, Sierra Madre del Sur and Eje Neovolcánico.

In addition, the metropolitan system is located in the extensive and productive valleys with moderate topographic inclination at an altitude of about 1560 meters above sea level. It is flanked to the northeast by Santiago River Canyon and to the west by the 30,000 hectares of La Primavera forest. This means that the metropolitan area includes more natural ecosystems than many countries in the world.

Several issues dominate the Guadalajara sustainability narrative and are related to the prosperity of its inhabitants. In the last decade, urban sprawl has intensified in Greater Guadalajara, motivated by people seeking cheap land to build affordable housing. The result of this dynamic is a fragmented suburb where some houses are empty due to remoteness, lack of urban facilities and public transport (Perez, 2013, p. 36). State policies promote compact cities as a measure to ensure the sustainability of urban infrastructure. However, this does not solve the general problem of migration and the emergence of informal settlements. In this context, the future of dispersed settlements on the periphery is becoming increasingly bleak and it is unlikely that they will one day be integrated into the metropolitan system.

The reality of the economic dependence of dispersed settlements and the possibility of these areas to sustain themselves in an orderly manner requires a different response. The described administrative limitation of the growth of large cities has no effect on the urban sprawl and expansion of informal and illegal use of natural space. There are alternative scenarios for the integration of these settlements into a semi-rural environment that promote the use of fertile land in an organized and more profitable way, with technically advanced organic crops and with an emerging agro-industry that provides jobs at walking or cycling distances. Such developments require private investment, but also incentives from the central government, which are not currently available. In contrast, technology and manufacturing sectors in the metropolitan region do receive similar support.

Chapala Lake supplies the greater Guadalajara area with 60 percent of its drinking water and is an important natural asset for the metropolis. The existing efforts to ensure the sustainable use of the lake are an important economic development in connexion with sustainable tourism and a possible expansion of the use of ecoservices. The implementation of the sustainable development strategy for Lake Chapala could also boost social and economic development and involve local stakeholders to help solve the current problems of pollution from agricultural activities and food production in the region (Perez, 2013, p. 40).

In addition, rainwater infiltration and soil retention are existing priorities, as rainwater infiltration in the underground retention areas is part of the spatial development plans. A more localized treatment and reuse of wastewater should be planned and implemented, as large metropolitan water treatment plants do not support localized water reuse cycles.

Semantic definition of metropolitan prosperity

According to the Tellme project, the main objective of the metropolis is sustainability in its four dimensions: territory, society, governance and wealth. In the case of the wealth dimension, the semantic definition of the system is loosely based on the workshop analysis of the Metropolitan Gaps Workshop of the initiative MIT Metro Lab (Lanfranchi & Gomez-Alvarez, 2017). According to the results of the Metropolitan Gap Analysis, the wealth dimension consists of three components, namely assets, wealth creators, human capital, and in addition six identified gaps - access to land, efficiency, labour market, job distribution, education and wealth distribution. In the context of the gap analysis methodology, relevant measures are defined to close the identified gaps.

The Tellme project proposes a modified definition based on the identified metropolitan dynamics and on the objective of sustainable prosperity. In a first step, four basic principles for the realisation of prosperity in the metropolitan system are identified: value creation, access to land, access to infrastructure and services, and five capitals.

(1) Value creation is the basis of every entrepreneurial activity. The purpose of a business organisation is to create and deliver value in a way that is efficient enough to generate a profit after costs. Value can be perceived as an economic proposition, but it can also be perceived in various other contexts that have nothing to do with profit. An important segment of economic activity that creates alternative value is the social economy and social entrepreneurship. Next, there are economic activities and technologies related to environmental protection and sustainability that create value outside of proven profitability. The creation of alternative value is the key to the transition to sustainability and, at later stages, to maintaining it.

(2) Access to land and related access to affordable housing is a fundamental principle of wealth creation for the metropolitan population with numerous links to general sustainability. Access to land partially refers to the economically weakest groups of metropolitan population in order to enable partial self-sufficiency. It refers to opportunities to address the challenges posed by the growth of informal settlements. It refers to the aforementioned agricultural activities in the metropolitan areas and to the need to maintain the rural-urban links. It also refers to the provision of housing as an important economic and spatial dynamic that influences the general metropolitan economic development and land use.

(3) Ensuring access to infrastructure and services is considered to be one of the central tasks of the metropolitan government and as such a predisposition for economic as well as social activities. This principle covers both grey and green infrastructure, and on the services side, it includes access to education. Accessibility of infrastructure can only be guaranteed if it is built and managed according to the principles of sustainability. Progressive investment in infrastructure is necessary to ensure social justice. The infrastructural integration of marginalized locations within the metropolitan region is of central importance.

Another related principle is the development of new commons, their role in the production of wealth and the protection of the environment. New commons appear in a seemingly limitless variety. From the perspective of Latin America, new commons can be identified as a contemporary revolutionary socio-ecological movement in Mexico, they refer to the movement of the second enclosure on intellectual and knowledge property or to various grassroots movements and principles of community organization. The rise of the new commons is a response to a series of developments close to the metropolitan dimension, such as increasing commodification, privatization and corporatization, uncontrolled globalization and unresponsive governments (Hess, 2011, p. 3).

(4) Five capitals as the principle of prosperity form the basis for wealth creation, as economies are built on the exchange of capital. They cover a number of related categories of capital and refer to investable assets we hold, but they go far beyond the concepts of money and finance.

The five capitals model is equity based framework of sustainability (Tuazon et al., 2013, p. 41). It is a further elaboration of the triple bottom line concept coined by John Elkington that defines the notion of sustainability as the balance of its three constituent equities: (1) Economic Equity (or prosperity), (2) Environmental Equity and (3) Social Equity.

Similarly, inclusive wealth index (IWI) framework as a further elaboration of the capitals model defines tree capitals that indicate sustainable development: human, manufactured and natural capital (Muñoz, 2015, p. 3). Inclusive wealth approach has some important advantages as a metric of sustainable development. It captures expectations about the flow of current and future benefits and it is built on a solid theoretical economic foundation (Polasky et al., 2015, p. 4).

Since we are dealing with composite systems with several categories that influence the sustainability of an economic system, there are two possible positions of internal dependencies. Strong sustainability implies that all kinds of equity are mutually exclusive, and to achieve sustainability, the level of each type of equity can only be either stable or increasing. In contrast, the weak sustainability approach represents the principle of the possible compensation between different categories of equity.

As multiple concepts and indexes are covering various similar capital-frameworks as a part of the perceived metropolitan sustainability it is important to implement and exploit all capitals and assets to provide sustainable prosperity.

On the next semantic level, related activities are defined on the basis of the 4 key principles of metropolitan prosperity described above. Activities are defined as: the labour market, entrepreneurship, education and social services, research and development, investment in public infrastructure and productivity. These activities describe economic development measures that lead to economic prosperity of metropolitan residents. They aim to create the necessary processes and feedback loops to ensure the self-correction of the system. The neoliberal economy defines the market and demand-supply dynamics as a central principle of self-regulation. However, with the end of the post-Kensian city and the emergence of more holistic approaches to environmental sustainability, neoliberal economic oversimplification is no longer applicable. Therefore, six declared activities are selected to represent a new perspective and new priorities.

Finally, desired outcomes based on the core principles, actions and related dynamics are defined in the proposed semantic system definition. The sustainability as a predicate for all defined outcomes is a logical consequence of described semantic model. The outcomes are defined as the (sustainable) economic growth, economic development, wealth distribution and social mobility. These four core outcomes together with all defined principles and economic frameworks represent semantic model of sustainable metropolitan economic prosperity.

Leveraging the value of ecosystem services

Ecosystem services are defined as various forms of benefits that humans derive from the natural environment, alternatively referred to as natural ecosystems. Apart from the financial benefits that we derive from the sale of the products of natural ecosystems, a number of direct and, perhaps more importantly, indirect values and benefits must be taken into account if the economy and society are to move towards a sustainable modus operandi. Sustainable development in the 21st century requires explicit recognition that social and economic development is part of and depends on a stable and resilient biosphere (Guerry et al., 2015, p. 7349).

Ecosystem services are closely related to natural capital. They represent complex processes based on natural capital and are presented in the form of services for human beneficiaries. Consequently, a shrinking of natural capital means a reduction in potential ecosystem services and vice versa. There are a number of methods for determining the value of ecosystem services that can be easily

implemented in the regulatory and policy framework (DEFRA, 2007). However, recent reports show only sporadic use of the valuation methodologies to leverage the real costs of preserving the ecosystem services (Ling, M. A. et al., 2018, p. 35).

An example of assessing ecosystem services to achieve sustainability goals is described by van Wilgen et al (1998) in the case study of South Africa's Working for Water programme, which maximizes an ecosystem service (the supply of water), improves sustainability by eliminating invasive alien plants, and promotes social equity through jobs and education for economically marginalized people. The basis for implementing the project was the calculation of the ecosystem services value and all the financial benefits that the project will generate by focusing on sustainability. An accurate calculation was achieved by applying the mapping approach.

In Latin America and the Caribbean, biodiversity and ecosystems are among the most valuable assets of the region and are of strategic importance for achieving long-term sustainable development. The future of the ecosystem services paradigm in Latin America will largely depend on the ability to demonstrate effectiveness in meeting conservation and development objectives and to form effective environmental policy initiatives (Balvanera et al., 2012, p. 67).

Mapping of prosperity

Finally, we will look at the Tellme project's goal of understanding the sustainable creation of wealth in the metropolis by using open data and GIS. Two common geolocalized representations of wealth in the metropolis can be observed, firstly the maps of income inequality as in the example of the ESRI project "Wealth Divides" and the associated GIS mapping tool[75]. The second type of visualisation used is the map of estimated land value (Longhofer & Redfearn, 2009, p. 19). Both approaches are important and relevant for understanding metropolitan wealth; however, they do not reveal the underlying metropolitan dynamics and do not relate to sustainability factors.

It is therefore generally proposed to complement the existing visualisations with additional analytical maps depicting metropolitan dynamic processes, as well as with maps showing the main infrastructures (natural, built, social, educational, etc.) and their proximity to the metropolitan population centres. The infrastructure proximity is used as an intermediary for indicating existing wealth projected onto the territory and is not directly connected to the value of the land. This method of visualising wealth is related to the concept of the 5 capitals of the IWI and at the same time addresses one of the main concerns of the metropolitan population, namely access to metropolitan infrastructures.

By using described semantic system definition of the prosperity dimension and collected open data, described maps are generated automatically and are available for further analysis on the Tellme Hub platform.

References

Aranibar, M. (2015). Opportunities and Limitations for sustainable development in the city of Mendoza, Argentina. 1–16.

Arboit, M., Diblasi, A., Fernández Llano, J. C., & de Rosa, C. (2008). Assessing the solar potential of low-density urban environments in Andean cities with desert climates: The case of the city of Mendoza, in Argentina. Renewable Energy, 33(8), 1733–1748. https://doi.org/10.1016/j.renene.2007.11.007

Balvanera, P., Uriarte, M., Almeida-Leñero, L., Altesor, A., DeClerck, F., Gardner, T., Hall, J., Lara, A., Laterra, P., Peña-Claros, M., Silva Matos, D. M., Vogl, A. L., Romero-Duque, L. P., Arreola, L. F., Caro-Borrero, Á. P., Gallego, F., Jain, M., Little, C., de Oliveira

75 Source: https://storymaps.esri.com/stories/2016/wealth-divides/index.html, accessed on 30.12.2019.

Xavier, R., … Vallejos, M. (2012). Ecosystem services research in Latin America: The state of the art. Ecosystem Services, 2(March 2018), 56–70. https://doi.org/10.1016/j.ecoser.2012.09.006

Contin, A. (2015). The mapping desiring. A project of a new cartography: patterns of use, spatial experiences and perceptions of the urban environment in the ICT era. 1–16.

Cordova-Pizarro, D., Aguilar-Barajas, I., Romero, D., & Rodriguez, C. A. (2019). Circular economy in the electronic products sector: Material flow analysis and economic impact of cellphone e-waste in Mexico. Sustainability (Switzerland), 11(5). https://doi.org/10.3390/su11051361

De Ferranti, D. M. (2004). Inequality in Latin America: breaking with history? World Bank.

DEFRA. (2007). An introductory guide to valuing ecosystem services. http://www.defra.gov.uk/environment/policy/natural-environ/documents/eco-valuing.pdf

DEFRA. (2011). The Economics of Waste and Waste Policy (Issue June).

Guerry, A. D., Polasky, S., Lubchenco, J., Chaplin-Kramer, R., Daily, G. C., Griffin, R., Ruckelshaus, M., Bateman, I. J., Duraiappah, A., Elmqvist, T., Feldman, M. W., Folke, C., Hoekstra, J., Kareiva, P. M., Keeler, B. L., Li, S., McKenzie, E., Ouyang, Z., Reyers, B., … Vira, B. (2015). Natural capital and ecosystem services informing decisions: From promise to practice. Proceedings of the National Academy of Sciences of the United States of America, 112(24), 7348–7355. https://doi.org/10.1073/pnas.1503751112

Harner, J. (2007). Globalization of Food Retailing in Guadalajara, Mexico: Changes in Access Equity and Social Engagement. In Journal of Latin American Geography (Vol. 6, pp. 33–53). University of Texas Press. https://doi.org/10.2307/25765177

Heimlich, R. E. (1989). Metropolitan Agriculture: Farming in the City's Shadow. Journal of the American Planning Association, 55(4), 457–466. https://doi.org/10.1080/01944368908975434

Hess, C. (2011). Mapping the New Commons. SSRN Electronic Journal, July. https://doi.org/10.2139/ssrn.1356835

Hodson, M., & Marvin, S. (2009). "Urban ecological security": A new urban paradigm? International Journal of Urban and Regional Research, 33(1), 193–215. https://doi.org/10.1111/j.1468-2427.2009.00832.x

Hoekstra, R. (2019). Replacing GDP by 2030. Replacing GDP by 2030, June, 2019–2020. https://doi.org/10.1017/9781108608558

Jiménez-Domínguez, B., & López Aguilar, R. M. (2002). Identity and sustainability in two neighborhoods of Guadalajara, Mexico. Environment and Behavior, 34(1), 97–110. https://doi.org/10.1177/0013916502034001007

Jordán, R., Rehner, J., & Samaniego, J. (2010). Regional Panorama, Latin America Megacities and Sustainability. United Nations.

Lanfranchi, G., & Gomez-Alvarez, D. (2017). Metro Lab 2017, Shaping The Metro Gaps.

Ling, M. A., King, S., Mapendembe, A., & Brown, C. (2018). A review of ecosystem service valuation progress and approaches by the member states of the European Union.

Longhofer, S. D., & Redfearn, C. L. (2009). Estimating Land Values using Residential Sales Data. 1–28.

MDZ. (2013). Argentina. - Mendoza, detectan contaminación agua subterránea. https://blogdelagua.com/actualidad/internacional/argentina-en-mendoza-detectan-contaminacion-en-el-agua-subterranea/

Muñoz, P. (2015). Methodological Considerations in the Measurement of Inclusive Wealth. 18. https://www.researchgate.net/publication/280444258

Perez, F. (2013). Planning for a Strategic Guadalajara: Towards a Sustainable and Competitive Metropolis. FOCUS.

Polasky, S., Bryant, B., Hawthorne, P., Johnson, J., Keeler, B., & Pennington, D. (2015). Inclusive Wealth as a Metric of Sustainable Development. Ssrn, November. https://doi.org/10.1146/annurev-environ-101813-013253

Ponte, J. (2006). Historia del regadío. Las acequias de Mendoza, Argentina. Scripta Nova: Revista Electrónica de Geografía y Ciencias Sociales, 10, 7. https://doi.org/10.1344/sn2006.10.1215

Sassen, S. (2008). Cities in Today's Global Age, An exploration of the new economic role of cities and the networks they form in an increasingly global world" in Connecting Cities Networks.

Tuazon, D., Corder, G., & McLellan, B. (2013). Sustainable Development: A Review of Theoretical Contributions. International Journal of Sustainable Future for Human Security, 1(1), 40–48. https://doi.org/10.24910/jsustain/1.1/4048

van Wilgen, B.., Le Maitre, D.., & Cowling, R. (1998). sustainability and equity: South Africa' s Working for Water programme. Tree, 13(9), 378.

The circular economy[76]

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The circular economy

According to the Ellen Mac Arthur Foundation the circular economy is a model of production, circulation, consumption of goods and management of related waste, oriented by the principle of conservation of the social and economic value of objects and achieved through the design of tendentially closed economic systems in which the use of renewable energy is preferred

Preserving the value of goods generally means minimising the entropy of the material of which the goods are made, in order to maintain their usefulness and price, reduce their rates and times of transformation into waste, and promote ways of recycling waste. The temporal conservation of the socio-economic value therefore influences the environmental conservation, reducing the production of pollutants, solids, liquids and gases.

Circularity (or a system that tends to be closed) is the specific operating mode that best satisfies the principle of preserving economic value by putting waste back into the production cycle.

The existence of services of reuse, repair, regeneration of goods reinforces the preservation of the social and economic value of goods, preventing the formation of waste.

The possibility of carrying out the above operations is strongly influenced by the design of the goods themselves in terms of the materials used, their scheduled duration and the ease of reuse and/or recycling of their parts.

The inclusion of circular economic systems within defined political-spatial spheres and on a local scale allows greater collective control both over the management methods of the entire cycle, over the whole of the economic, social and environmental costs (favouring the minimisation of the monetary and environmental costs linked to transport), and over the destination and use of the values produced.

The circular economy in the metropolitan area

The circular economy distinguishes waste into two categories: biological and non-biological.

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Cities and their peri-urban areas have been identified both by the Ellen Mac Arthur Foundation and by researchers in industrial technologies related to waste recovery as a space within which circular economy strategies can act effectively with regard to types of goods and waste[77] belonging to both categories. The choice of metropolitan space as a privileged area is due to a series of reasons that will be briefly listed here.

First of all, cities are highly parasitic areas in terms of economic and environmental relations compared to the non-urban areas in which they are located. The city depends on the outside:

- for enormous daily quantities of food flows, primarily from the countryside and the seas, intended for human consumption and for the now not insignificant proportion of domestic animals;
- for enormous quantities of non-renewable energy: oil (first and foremost) for the supply of means of transport and for economic production; natural gas for heating; electricity, coming from a mix of resources, usually including coal, for a variety of uses;
- for a wide range of materials and products used to meet the most varied needs, starting with those related to the construction industry and housing in particular.

But cities, as well as being highly dependent on input flows, are also highly dependent on the outside world for their output flows and, in particular, for the location of the gigantic quantities of urban waste produced. A city like Milan, in this not unlike other similar centres, produces almost 700,000 tons of household waste annually (ie from families only, not considering those from economic activities). Ninety per cent of these are: putrescible organic waste (just under half) as well as paper, cardboard, plastic, glass and metals. A clear majority of this waste is related to the consumption of food (e.g. about 2/3 of the plastic comes from all food and drink packaging). The amount of waste that cities are able to dispose of within their metropolitan area depends on a number of variables, and often on the inhabitants' opposition to the location of treatment and recycling plants within the metropolitan area. The results vary from city to city and from type of flow to type of flow, but today there is some worrying evidence both on a global scale (plastic waste produced by European cities is ultimately taken to some Asian countries and now mainly to Turkey and Malaysia), and on a local scale (in Milan, waste from food consumption is not recycled within the metropolitan area).

Given this reality, the logistical flows that accompany the supply of inputs and the placement of outputs inside and outside cities are proportionally massive, with a further intensification, in recent years, due to the spread of e-commerce. In almost all cases, logistics are entrusted to fleets fuelled by fossil energy, in particular diesel, the most polluting fuel in existence, yet used in a practically hegemonic manner for road freight transport.

Rethinking flows and priorities

Cities and their urban areas cannot be seen as self-sufficient economic units, nor would this make sense for natural, economic and cultural reasons. From an economic point of view, the production of many goods of industrial origin becomes more convenient if located outside urban areas, expensive in terms of rents and not very functional in terms of space and related services; from a cultural point of view, exchanges relating to goods or services of a cultural-artistic or artisanal nature are useful, even if they take place on a wide territorial scale, in order to promote knowledge and an enriching confrontation with diversity.

A series of entry and exit flows, on the other hand, should follow principles of circularity on a local scale, for environmental, social and economic reasons. For this reason, the distinction between flows with a circular-local orientation and flows involving different territorial scales is an operation that

77 The choice of the term "good" or of the term "waste" is not always unambiguous because, depending on the regulations and their changes, as well as on its stage of life, the same object can be classified as belonging to one or the other category.

avoids autarkic or simplified approaches and offers a key of interpretation towards which to direct the relative political choices.

The local circular economy makes sense where production, reuse and recycling are more economically, socially and/or environmentally effective than different options. This happens in a part of the daily supply flows, i.e. in the field of food and energy. Some of the food, at least the food that is compatible with the nature of the land, can be provided by producers on a local scale: the possibility of direct contact with consumers, the use of cultivation and breeding techniques that respect nature and the incentive to produce goods of better quality than those coming from global flows and channelled into large organised distribution are elements that play in favour of a local choice, generating, moreover, a greater number of employees than industrial farming and breeding systems. This local choice can become a circular one where urban food waste is treated in aerobic digestion plants (composting) present in the same territorial area and transferred in the form of soil improvers and fertilisers to peri-urban and urban soils. By extending the perimeter from the mere waste of food consumption to the entire flow of biological waste in a city, the possibilities of recovering material that serves not only agricultural uses (soil improvers, phosphorus), but also construction uses (material for the production of cement) and in fields currently under research (recovery of cellulose and chemicals) are receiving increasing attention, including at the level of European policies. In particular, since 2015, the Bioeconomy Directorate of the European Commission's Directorate-General for Research and Innovation has been conducting research and policy activities to identify the main potential of the value chain related to municipal bio-waste products. In 2018, the European Commission published its Communication "Updated bioeconomy strategy". Following this, DG Research and Innovation proposed for discussion the concept of "circular urban economy based on bioeconomy". The concept refers to the processes of valorisation of the resources of urban organic waste through the production of goods that use this waste as a raw material, together with wastewater sludge.

A similar discourse crossed by the principles of the circular economy on a local and urban scale is valid today, and was not valid until a few years ago, for energy. The production of electricity and heat directly from the sun (through photovoltaic systems or solar thermal systems) meets a general objective of absolute priority: only with the transition from the use of energy from fossil fuels to energy from renewable sources will it be possible to avoid global warming of more than 1.5 ° between 1880 and 2100, disastrous for human life on the planet. It is not only the quality of the source that makes the difference, the location of the power plant is also important. The fact that each location has plants for on-site production optimises the synchronisation between the needs of the energy consumer and the system that produce it; today, the major and rapid technological improvements in the field of storage (lithium batteries, hydrogen accumulators) allow the design of local systems for production, storage and consumption designed to operate without dependence on either sources, or external networks. From the point of view of circularity, the most interesting experiments on an urban scale are concerning electric energy storage batteries, the value of which encourages their direct recovery at a local level. One example is the stadium in Amsterdam, which is partly lit up by lithium batteries, which were taken out of the city's electric buses and recovered for this purpose.

Another example of a circular urban economy, less developed than the previous ones, but subject to increasing research, is the construction sector. There are significant cases of buildings built with a mix of circularity techniques that involve both the reuse of existing materials and - a key element of the circular economy - the design of materials and structures that can be reused even after the life of the macrostructure that contains them. Again, the circularity and the location on a local scale of the process complement each other[78]. Knowing the needs for materials and structures within an urban area makes the process of reusing specimens much simpler and more effective.

This last consideration allows to connect to the theme of reuse services (the same device with the same function, is used again thanks to a repair or a transfer of possession), and reconditioning (a

78 For example, the Amsterdam CIRCL pavilion.

high value-added good is regenerated in its functionalities), two support services to the circular economy that tend to operate on a local scale and environmentally and economically more useful than recycling services. As one of the noble fathers of the circular economy, Walter Stahel, recalls: "the value in use of an object is greater than the sum of the value of the materials that compose it; reusing goods by extending their life cycle is more profitable than recovering molecules (recycling materials); reusing glass bottles is more convenient and ecological than recycling glass to produce new bottles". (Stahel, 2019, p. 49)

The evaluation of the circular economy

To date, there is no universally recognised system for evaluating the results of the circular economy in general, let alone the circular urban economy.

Anders Wijkman and Kristian Skanberg studied in 2016 the economic impact of a national industrial circular economy in the Czech Republic, Finland, France, the Netherlands, Poland, Spain and Sweden, concluding that there would be a 66% reduction in greenhouse gas emissions compared to the current linear economy model, a great help to achieve the decarbonisation targets agreed in Paris in 2015.

It is also possible, from a social point of view, to estimate quantitatively or qualitatively a series of advantages of the circular economy compared to the linear economy, advantages which are realised both on a large scale and on a local scale. The study by Wijkman and Skanberg mentioned above, estimates a 4% increase in the national level of employment as a result of the introduction of an advanced industrial circular economy. As an empirical example it could be added that the Italian consortium of plastic packaging recyclers estimates that a recycling plant, compared to an incineration plant, creates at least three times the employment, for the same volumes treated.

On the socio-economic level, an indirect effect that is little considered in macroeconomic studies is the range of benefits for the consumer. Preserving over time the functions of use of an object, designing it for this purpose and then repairing and regenerating it, decreases the frequency of purchases, lowering the related cash disbursements. A significant limitation of disbursements also occurs when, according to another mechanism of the local circular economy, disused but still reusable goods are made available to purchasers: from furnishing items, to technological devices, to clothes, to food surpluses.

To date, however, it is difficult to estimate the overall economic impact, in terms of increasing the added value produced, of the introduction of a system of widespread circular economy. At the same time, the influence of a series of variables should be considered, often of different signs, such as: the reduction in the purchase of new goods; the production of goods with greater added value; the development of recovery services (*latu sensu*), some of which could lead to the extraction of chemicals or the development of waste treatment processes with high added value, which are still difficult to evaluate today; the presence or absence of barriers of different types so that some developments can take place or not (e.g. regulatory barriers on the use of end of waste goods).

All these considerations show that the transition to a widespread circular economy would bring a series of advantages related to the public interest (environmental and social advantages) and would offer a series of potentials, directly related to the private interest and indirectly to the public interest (possible increase in GDP, at least in some sectors), which undoubtedly makes the new paradigm of great interest also for institutional decision-makers, both at national and at local level.

References

Ellen Mac Arthur Foundation (eds.) (2012) Toward a circular economy. Cowes: Ellen Mac Arthur Foundation.

Stahel, W. (2019) The circular Economy. A user's guide. Cowes: Ellen Mac Arthur Foundation.

Social infrastructures and impact economy[79]

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Metropolitan challenges as market opportunities

A strong dichotomy characterizes the context of metropolitan areas. On the one hand, metropolises can be a stage for high growth, on the other hand they can entrench poverty, social segregation, congestion, crime, pollution, urban sprawl and, as a result, emerging challenges in economic development, social inclusion, and sustainable urbanism.

Any response to these challenges could generate a deep, widespread and transversal social and environmental impact throughout the territory and communities. For this reason, such implications must be at the core of any decision process, as urban planning and development. In the absence of a taxonomy, SDGs lead the path being the only common framework expressly referring to the generation of social and environmental impact.[80] At the same time, one shall not relegate urban planning only under the hat of SDG 11 - which focuses on making cities and human settlements inclusive, safe, resilient and sustainable. Indeed, about 65% of the 169 targets under the 17 SDGs (no poverty, zero hunger, gender equality, good health and well-being, decent work and economic growth…) depends on a proper engagement of and coordination with local and regional governments in urban developing.[81]

As further evidence that cities and regions have a crucial role to play in all SDGs achievement - although the 2030 Agenda is not designed specifically for or by them - the OECD launched the programme A Territorial Approach to the SDGs.[82] It has three primary objectives: i) measuring where cities and regions stand on the SDGs vis-à-vis their respective national average and their peers; ii) analysing how cities and regions use the SDGs to rethink sustainable development from the ground

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80 UN Division for Sustainable Development Goals, Department of Economic and Social Affairs [Online].
81 UN Sustainable Development Solution Network. (2016) Getting Started with the SDGs in Cities. A Guide for Stakeholders [Online].
82 Marta S. (2018) A Territorial Approach to the SDGs [Online].

up as well as facilitate a dialogue between lower and upper levels of government; iii) sharing best practice and lessons from international experiences. Despite some progress, OECD itself stresses that it remains a priority to improve the coordination and vertical dialogue between administrations, the engagement of citizens and other stakeholders, the involvement of the private sector in public policies and the use of public resources to leverage private investment. Above all, a comparable localized indicator framework for measuring and sharing progress is yet missing.

Alongside SDGs, megatrends perfectly photograph - through the design of the trajectory undertaken by the current economic system - that social challenges related to phenomena such as climate change, resource scarcity, population growth or urbanization, represent also an opportunity for economic growth.[83] As for urbanization, every week about 1.5 million people are added to the urban population, among migration and births.[84] On one side, such increasing brings with it inevitable risks (spread of diseases, negative impact on the environment, cultural, religious and ethnic discrimination, economic inequality, educational deficit, early school leaving). On the other side, it is an opportunity for welfare and economic growth, individual and community empowerment, sharing of knowledge and ideas, facilitating services, revolutionising learning, health and living. However, for risks to be averted and opportunities to be maximized, urban planning and development must necessarily consider the evolving scenario (megatrends) and each global challenge (SDGs) within the metropolitan context.

The demand for social infrastructures is dramatically growing.[85] As an example, cities in the next decade of New York, Beijing, Shanghai, and London will need - also due to the welfare state crisis - about $8 trillion in infrastructure investments.[86] To face such demand, a truly disruptive approach would be one built on the following two main considerations: global challenges can be opportunities for market growth; for this to be possible, the implementation of innovative and sustainable models of intervention is required, under a partnership between public and private sector. Nonetheless, it is uncertain whether local economies are ready to respond to those needs, and capitalize the related social and economic value, through appropriate financial and business instruments.

The impact economy at support of social infrastructures

The growing demand for social infrastructure is precisely one of the elements on which the Impact Economy is taking hold. This innovative and revolutionary economic model moves its steps from the premise that a capitalism based solely on profit maximisation is no longer sustainable. The objective is to tie the pursuit of a positive social impact to profit, through a real paradigm shift at the entrepreneurial and financial level.[87]

The European Union seems to catch the need and the opportunity of this change, starting with the social infrastructure sector, which has always been at the core of the European Pillar of Social

83 PWC. (2016) Five Megatrends And Their Implications for Global Defense & Security [Online].

84 UN Department of Economic and Social Affairs. (2018) Revision of World Urbanization Prospects [Online].

85 Fransen L., Del Bufalo G., Reviglio E. (2018) Boosting Investment in Social Infrastructure in Europe. Report of the High-Level Task Force on Investing in Social Infrastructure in Europe [Online]. Social infrastructures are understood as long-term physical assets in the social sectors - education and lifelong learning, health and long-term care and affordable, accessible energy-efficient housing.

86 UN Human Settlements Programme. (2013) State of the World's Cities Report 2012/2013: Prosperity of Cities [Online].

87 Fine D., Pandit V., Hickson H., Tuinenburg P. (2018) McKinsey & Company, Private Equity & Principal Investors Practice Catalyzing the growth of the impact economy [Online]; see also the Open Letter: Global Leadership Covid-19 Response, Cross-sector Collaboration for a Purpose-first Economy, from the Fourth Sector Group and Leaders on Purpose, August 2020 [Online]; Final Recommendations for a EU Taxonomy on Sustainable Finance, Technical Expert Group (TEG), March 2020 [Online]; Purpose of a Corporation to Promote 'An Economy That Serves All Americans', Business Roundtable, August 2019 [Online]; or the Davos Manifesto 2020: The Universal Purpose of a Company in the Fourth Industrial Revolution, World Economic Forum, December 2019 [Online].

Rights.[88] In line with the paradigm shift mentioned above, the High-Level Taskforce on Investing in Social Infrastructure in Europe has recognised the value of Impact Investing as a tool to revitalise the social infrastructure sector.[89]

Even if there is no single legal definition that is broadly shared, Impact Investing can be understood as *"investments made into companies or organizations with the intent to contribute to measurable positive social and environmental impact alongside financial returns"*.[90] This innovative form of investment comes from the need to optimize an alignment between risk, return and impact for the benefit of stakeholders and in line with the principles of sustainability. The debate moved its first steps within the 2013 G8 Social Impact Investment Taskforce under the UK Presidency, followed by the Global Steering Group for Impact Investing established as an independent organisation in 2015. The academy as well plays a key role in developing impact investing knowledge, converging towards three basic concepts:[91]

- Intentionality - social impact is targeted intentionally and the investment is explicitly made to achieve a positive benefit for the society. This means an explicit statement ex-ante and a proactive search of initiatives clearly pursuing a social goal.
- Measurability - social impact is measured. The social goals must be set in the decision-making process and also their relative targets. Furthermore, they must be verified ex-post through social impact measurement (quantitatively and qualitatively).
- Additionality - investment is made in undercapitalized areas, where the activities would have been excluded by any other investors, looking whether social impact would have occurred without investment.

So far, many initiatives have been implemented. In 2012 the British Government launched Big Society Capital, Europe's largest fund, with GBP 600m to promote the impact investing market. In 2015 the EIB set up the Social Impact Accelerator, a similar fund of funds, which is currently managed by the European Investment Fund (EIF). In 2016, "Fondo Innovazione Salute" was launched for the Italian social welfare sector, characterized by a limited supply and a strong growth trend in demand - with an estimated value of 30 billion euros. Through synergies between institutional investors and service providers this fund aims to create an ecosystem of infrastructures and social services focus on individuals in situations of fragility, thus balancing social impact and economic return.[92] Born as a phenomenon capable of overcoming traditional forms of philanthropy, the global impact investing market is now expanding.[93]

Within the scope of impact investing, a particularly successful tool is the social impact bond, designed to raise private capital to finance innovative solutions in welfare services and to encourage an approach based on outcomes. Its particularly innovative character is linked to its formula "payment by result" or "payment for success", as it enables government to link payment for the service provided to the community to the results achieved. An independent third party is responsible for measuring the project impact and only if set outcomes are achieved by a private service provider the public authority pays the investors. Indeed, despite their denomination, SIBs are not ordinary bonds, as there is no necessarily guarantee that the investor will be reimbursed. However, if the project is successful, the economic results are (i) translated into a cut in public spending, (ii) used to repay the initial investment, (iii) used to provide the investors with a return as a reward for the risk. After the UK launched in 2010 the first SIB with the aim of reducing re-offending rates, other states

88 For instance, principle 19 states "access to social housing or housing assistance of good quality shall be provided for those in need"; principle 20 states "everyone has the right to access essential services of good quality, including water, sanitation, energy, transport, financial services and digital communications. Support for access to such services shall be available for those in need" [Online].

89 See note 6.

90 Adapted from the Global Impact Investing Network (GIIN) (2020) [Online].

91 Nicholls A., Paton R., Emerson J. (2015) Social Finance. Oxford University Press.

92 Cooperativa Sociale Coopselios plays a key role in the initiative as a leading operator in the provision of social-health, welfare and educational services.

93 Mudaliar A., Bass R., Dithrich H., Nova N. (2019) Annual Impact Investor Survey. Global Impact Investing Network (GIIN) [Online]. Regarding Italy see Tiresia. 2019 Tiresia Impact Outlook [Online].

as New Zealand are following the same path.[94] In June 2017, Finland announced a new SIB co-financed by EFSI and Epiqus, the private fund manager, to support migrants' integration. Today there are over 89 SIBs globally, with a total value of around GBP 300m.

Impact Investing has potential for funding social infrastructures, but its efficiency and feasibility depends on a parallel transformation of the entrepreneurial ecosystem.[95] It is an ongoing process, consisting in a growing number of business models capable of matching profit with the achievement of a positive social impact. However, despite the common goal of pursuing an impact, such hybrid companies tend to differ according to each jurisdiction and depending on the typical legal form. It can be understood as a cluster of very different entities (for-profit and non-profit) having the common boundary of pursuing social purposes through income-generating activity, regardless of the legal nature.

At first glance, there exist Social ventures that carry out entrepreneurial, trading or commercial activities as a way to deliver their social mission. Under a legal perspective, these entities are defined by partial or full restrictions on the use of assets/profits[96]. This set includes the Impresa Sociale - Italy, the Social Purpose Company - France, the Sociétè d'Impact Sociétal - Luxemburg, but also the Community Interest Company - UK and the Low Profit Limited Liability Corporation - USA. The impact purpose of these entities is expressly regulated by Law - according to different definitions that, at least, seem to converge towards a common ground.[97]

Furthermore, there are Profit with Purpose Businesses - that have neither an asset nor a profit lock and represent a perfect junction between impact and investibility.[98] Notably, the B Corps and Benefit Corporations are associated to this category, although they distinguish for the latter being formally regulated by Law.

Sometimes characterized by profit restrictions, Cooperatives certainly fall within the perimeter of the Impact ecosystem. The mutual purpose of their shareholders - the workers - is to benefit from goods, services or job opportunities at more advantageous conditions than the market and through a democratic governance ("one head one vote"). Another case to be mentioned is the Italian Social Cooperative which exercises social utility and public interest activities. In particular, Social Cooperatives are devoted to the integration of disadvantaged people into the labour market or the implementation of specific activities in a subsidiary form with respect to the public sector.

Finally, outside the perimeter of the hybrids, but somehow traceable back to the impact ecosystem, there are the so-called Socially Responsible Businesses, that set a social outcome objective, without locking it in their mission. They generate profits as well as a positive impact on a pure voluntary basis, and not according to a specific legal form, status or constituent document.

The combination of impact investments and hybrid companies can be an extraordinary lever for the development of social infrastructure in metropolitan areas. It would address the problem of public spending - which blocks any intervention - and channel considerable private economic resources to the pursuit of the same objectives set out in Agenda 2030. These goals would be pursued without

94 Government Outcomes Lab. (2020) [Online].

95 Another great example of how investments can meet social needs intervening on the social infrastructures is the MIND- Milano Innovation District project [Online]. Also through the creation of a social impact fund to support responsible commercialization of research results, as well as the engagement of local social enterprises and SMEs, the vision of the project is "to enhance quality of life locally and promote the country's sustainable economic development and international growth, through an infrastructural platform which will enable scientific, economic and social innovation" [Online].

96 Asset lock requires in case of winding up to transfer to a legal form with the same restrictions/purposes the assets remaining after all debts have been settled. Profit restrictions are the limited capacity of the business to distribute profits, either during the life of the company or upon liquidation.

97 For instance, see the 2018 EU Parliament recommendation to the EU Commission for adoption of a Statute for Social and Solidarity-based Enterprises [Online].

98 With no restriction on their assets and profit distribution, they raise more easily investments. These companies are set up primarily to run a business and distribute dividends to shareholders, with an alignment between core business and the pursuit of collective benefits. Benefit Corporations are impact organizations expressively regulated by the Law and firstly introduced, since 2010, in 36 States in the US. This legal model is now legally recognized also in Italy (first non-US Country to adopt a specific legislation, in 2016), Colombia (2018), Puerto Rico (2018), British Columbia - Canada (2019) and on a similar basis France (2019). Similarly, more than 12 Countries have ongoing legislative processes aimed at such recognition (i.e. Australia, Argentina, Peru, Chile, Taiwan, Korea, Spain, Uruguay).

renouncing profit, but rather making possible that the moment of the production of economic value coincides with the social and environmental ones.

It is essential in the urban planning of metropolises to consider the impact ecosystem of financial tools and business models, as a response to the growing market demand for social needs, with innovative, inclusive, sustainable, scalable and long-term solutions that do not sacrifice economic growth - but encourage it.

Part IV

Tools and training

Chapter one
Metropolitan data needs

Cartography and open data[99]

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Introduction

Importance of open data and cartography for metropolitan management

Large urban agglomerations are characterized by multiple spatial connections and interdependencies, which are often not reflected in the way they are governed. Not one of the 275 OECD metropolitan regions - functional urban areas with populations in excess of 500,000 - is governed by a single local government. The metropolitan area of Paris, which consists of 1,375 municipalities, could be an extreme case of governance fragmentation, with more than 10 local

99 To cite this article: Tagliolato Acquaviva d'Aragona, P., Galiulo, V., Žižek, A. and Oggioni, A. (2021). Cartography and open data. In: Contin, A., Giordano, P. and Nacke, M. (eds.). (2021). Training for education, learning and leadership towards a new metropolitan discipline. Inaugural book. Buenos Aires: CIPPEC.

governments in more than 200 metro areas, of which more than 60 combine more than 100 municipalities within their borders.

The large number of municipalities building metropolitan areas can make policy coordination between local authorities difficult. A possible solution to this coordination problem could be to merge municipalities within a metropolitan area. Amalgamation reforms are often motivated by the argument that larger municipalities are able to provide local public services at lower unit costs due to economies of scale. Studies show that such restructuring is associated with considerable political tensions (Tavares, 2018). The second proposed solution is to create an organization dedicated to the coordination of policy in metropolitan regions: a metropolitan government body. Whatever the chosen (re)organisational approach to solving the problems of effective governance is, many issues can also be addressed through adoption of progressive open data initiatives supporting strategic data-driven planning, smart governance, government transparency, as well as supporting public involvement and new forms of public participation (Pogačar and Žižek, 2016, 2018). Smart governance based on open data and the progressive use of ICTs to improve decision-making through better cooperation with stakeholders can be closely linked to the vision of effective metropolitan governance. Several authors recognize the role that open data plays in the emergence of new models of smart governance (Chun, Shulman, Sandoval and Hovy, 2010; Mellouli, Luna-Reyes and Zhang, 2014; Pereira, Parycek, Falco, and Kleinhans, 2018).

The availability of open data has increased significantly, with pressure on all types of public organizations to release their raw data. The release of data creates a new situation where the public can use and create information through collaborative networking. The public becomes part of the data processing system, which provides a feedback loop by processing and enriching data, combining it with other sources and even collecting its own data (Chun et al., 2010). The term 'feedback loop' is important in open systems and refers to the situation where activity within one system is the result of the influence of one element on another (Janssen, Charalabidis and Zuiderwijk, 2012).

The collaborative use of open data affects both the vertical and horizontal integration of stakeholders and public officials in the decision-making process. Horizontal integration is presented as improved collaboration between several government sectors, but it can also influence collaboration between different municipalities in a metropolitan environment. It is therefore understood that the adoption of open data is central to achieving effective metropolitan governance.

Additional mechanisms come into play when opening the data to the public. Public managers and public representatives find themselves in a situation where the loss of control by providing the data can help them to achieve previously unattainable goals. General command and control mechanisms cannot be applied outside the boundaries of municipal organizational structures. Thus, public servants find themselves confronted with having to deal with a variety of stakeholders who can help them to reap the benefits of open data, but who can also be disruptive if not handled properly. In the world of open data, the allocation of roles of provider, processor, and owner complicates the issue of accountability (Janssen et al., 2012).

The Tellme project deals with open data adaptation concepts related to metropolitan governance in two main ways. First, it identifies, on the basis of open data and stakeholder involvement, the main metropolitan dynamics related to the metropolitan environmental, social and economic sustainability. Semantic modelling is used in the form of semantic packages to define elements of the identified metropolitan dynamics and identify relevant open data. Secondly, descriptive maps of existing situations in metropolitan areas and of the identified dynamics are produced to facilitate the key processes required to find sustainable solutions. The maps are used as an intermediate medium to make open data accessible to stakeholders and public officials and to facilitate cooperation in the form of open workshops. Two successful open data-based workshops were held in Guadalajara, Mexico, and Mendoza, Argentina, in 2018 and 2019, respectively, and demonstrated in practice the possible impact of an open and collaborative governance model and the process of using open data.

During the implementation phases of the Tellme project, additional challenges in the use of open data were identified. One of the key issues is the quality of open data in relation to local challenges and the local context, as most available data is still sourced at the country level. According to the ICT-driven transformation of metropolitan centres that we are witnessing today (Castelnovo, Misuraca and Savoldelli, 2016; Gómez-Álvarez, Rajack, López-Moreno and Lanfranchi, 2017; Pereira et al., 2018), the responsibility for providing open data needed to achieve the sustainability of metropolitan areas lies in the hands of metropolitan governments working hand in hand with local communities.

The TELLme methodology – theory (from concepts to data)

Streamlining the TELLme discipline Keywords and Related Concepts to semantic maps

For each thematics, the TELLme metropolitan discipline methodologically defines sets of keywords and related concepts. These keywords and related concepts are collected by the involved partners and community of experts through the project software devoted to the composition of the TELLme-Glossary (http://www.tellme.polimi.it/tellme_apps/tellme/login) and are made publicly available as Linked Data (http://rdfdata.get-it.it/TELLmeGlossary).

Thematics definition converges into Semantic Packages (SP), i.e. sets of related concepts, and then to maps. One type of SP is called “Protocol” (thematics applicable to any metropolis). The protocol map is a composition of layers. Each layer is representative of one of the related concepts constituting the protocol. Many of these layers have been identified among globally available geospatial data. Some related concepts, instead, must be collected from local sources. TELLme project partners are called to contribute open local data in those cases. Moreover, tools provided by the project can grant standard interoperable availability of these data through geographic web services and semantic technologies. In the case of new local data provided for the project, a specific tool has been developed in order to facilitate the data call and the automation of its management, as described later in this chapter.

Methodology for identifying data sources. Global and local data. When data are not available at global scale

The purpose of the TELLme research is the definition of a sharable, free, participatory and replicable methodology in different changing metropolitan contexts. The practical intention of TELLme research aims at the collaborative use of technological products (Ratti, 2014) that tent to reach a transparent, open and repeatable design of the resource. The aim is to communicate the need for a metropolitan spatial vision that moves away from functional and efficient practice to consider the quality of life of the citizen who lives in the metropolitan area or in those isolated from rapidly developing contexts. The fundamental reason for the research, developed over the three years, is to generate a system of new theoretical concepts related to Metropolitan Discipline which can be made immediately representable and understandable through the spatialisation of Open Data in their mutual interaction, through Metropolitan Cartography (MC) maps. The target of the map is to highlight and organize the potential of the Open Data, in order to generate a support tool in the Decision-Making process in the context of Urban and Architectural Planning.

The ability to use Open Data is today a matter of primary importance for civil servants in order to build maps that are necessary to visualize the Metropolitan Existing Situation Analysis (MESA). The cartography aims to define a methodology that allow new skills and mapping capabilities to meet the specific needs of the metropolitan context. Another MC objective is to generate Open-Source maps that are able to define an immediate image of the territory in order to remodel it (Contin et al, 2017). According to Metro-dology setting phase into *Problem Finding, Problem Setting and Problem Solving*, Metropolitan Cartography is a transversal methodological tool across the three phases. The MC works to interpret the narrative of a territory; the maps are instrumental in the search for the cause of the phenomena of territorial impact on the metropolitan scale. They are maps that work in a synthetic way to guarantee the organization and the geographic disposition of the relations between spatializable elements, accordingly with the alphanumeric attributes of the historical, geographic and social data.

For this reason, the definition of Problem Finding is preliminary to that of the Problem Setting and data ordering in Data Indexical Chart, through the unique correspondence between the concept of the Semantic Package and the level of information.

The choice: from the concept to the information level

The Semantic Package is a set of possible globally applicable concepts to identify current scenarios or changes in a metropolitan territory. The Semantic Package of Protocol Maps includes some categories organized in order to connect each concept to another, declining the spatial relationship through territorial dimension. Metropolitan Cartography methodology is a synthetic – analysis-based approach that starts from a mental map disposition to a space-map projection.

Therefore, the theoretical and practical process that links a Semantic Package concept to an informative level, through a logical sequence of choices, is based on:

- Information: translatable content of a thought. It consists essentially of one or more original correspondences between a finite set of variation concepts.
- Invariants: all matches of spatial elements must correspond to a definition of invariable line of force (e.g Rivers, mountainous relief and valley). The identification of synthetic analysis- based approach means knowing how to manage the logical framework of research and use of global and local open data. It is necessary to consider global data in their complexity in relation to the map field of action. This is one of the parameters that determines the choice in the representation of a data in the Protocol maps and maps of Dynamics.

For this reason, the perceptive properties (Bertin, 1967) of the visual variables are related to actions as:

- Selection: that allows you to isolate all the elements that belong to the same category.
- Association: groups all the elements that distinguish this variable.
- Ordered: when the visual classification of their categories, or their steps, is immediate and universal.
- Quantification: when the visual distance between two categories of an ordered component can be expressed immediately by a numerical relation (Bertin, 1967).

As a result of the discriminatory process of the variables belonging to a choice, the connection between Keywords, Related Concept and levels of information allows us to define that the Semantic Package will not necessarily coincide with the legend of an interdisciplinary Protocol Map, since, for example, all relative concepts may include in itself one or more layers of information or its processing in one.

Furthermore, the preliminary step for the selective process, is the definition of a Metropolitan Issue. It comes from the Narrative of Metropolitan dynamics in order to extract the spatializable keywords linked to Semantic Packages. This is an important research phase for the early investigation of Data Mining and Data Collection phases. The explicit expression of an issue rooted in the territorial narrative allows to activate a selective process by which the choice of global information, rather than a local one, is linked to the relationship between Metropolitan Issue (from TELLme MGIP software Glossary) expressed through categories and concepts and spatial data, according to physical dimensions (size XL - L - M) on the MC's maps. For this reason, the Metropolitan Cartography is based on the basic principle of the open-connectable experimentation with real (Corner, 2011) through constructive dialogue with the inhabitant's, multidisciplinary experts' and local agents' point of view.

Data Mining: from Global to Local Open Data

The following methodological step is to apply a Spatial Data Mining Approach (Perumal, et al, 2015): it is a criteria of extracting the implicit knowledge of data or computer patterns that have not been explicitly associated with certain spatial conditions. It is therefore necessary to define spatial rules through which it is possible to establish the usefulness of a global data or a local one for the cartographic representation. Spatial analysis of data is particularly relevant for scanning information about to its location; therefore, the analysis requires the mapping of the spatial attributes of the spatialized and non-spatialized data (such as the statistical or economic ones) in order to guarantee a communicative clarity of the information in the Decision Making process.

The process for the choice of global information rather than a local one is, in the first place, linked to the relationship between spatial data definition and size (size XL - L - M) of the map. But, as previously described, the aim of the Metropolitan Cartography is to generate a package of maps that can allow a comparison process of the cities; for this reason, the need arises to seek equivalent global coverage open data for all cities and subject to experimentation.

Data Collection: Data Indexical Chart

The Data Collection phase follows through the construction of the Data Indexical Chart, it is a table in which each selected information level is catalogued according to Keywords and Related Concept relation, and it is based on: global or local, format, weight, original web resource (to ensure that the data is Open and coming from a reliable quality source) and spatial attributes.

Moreover, it is important to consider the spatial relationships of the data by representing it in the GIS (Geographic Information System) software, without which it would not be possible understand the spatial relationships of the information level with respect to the area and context in which they must act.

Considering the topological relationship of the data and the distance relationship of the information levels is a relevant process both in the Spatial Data Mining approach and in the phase of manipulation and representation of the data through Semiologie Graphique. This allows you to proceed through imageability actions (Lynch, 1960) of each layer, within the cartographic project, in order to make the visual classification of the categories unambiguously understandable.

Therefore, Data Mining and Data Collecting phases determine a great potential of the methodology. They allow to understand the inter-dimensional and tran-scalar dynamic relations between global and local data. The choosing process, from global to local data, is also defined by the design vision that the map; it is important in order to guarantee the understanding of peculiar aspects to the metropolitan city through the classification by category of the level of information. For this reason, the Metropolitan Cartography map project can be considered as an act of spatial design composition because through it is possible to define the relationship between spatial data and territorial.

The Metropolitan Cartography experiment-use, through digital technologies, allows to exploit information on a global scale that follows a temporal catalogue through the identification of a chronological evidence threshold of the geographic, historical or environmental phenomenon linked to the Urban Biography of the project area. So there is a need to direct research towards the achievement of local and open data that can ensure an adequate quality of expression of the level of information by position (relative to its altitude, latitude, longitude coordinates), shape (shape defining a polygon, line and point), size (relative to the state, supra-regional or regional size) and orientation of the data related to the field of action reference system.

Currently, the use and production of local data is carried out by private institutions or public administrations that produce open data for specific purposes of managing their territory. Many national and regional, public and private bodies, also with the support of EU funding, can provide a high-potential and reliable service for the research of data with high spatial detail. They are entities that, through the participatory collaboration of local institutions, allow the totally open and accessible exchange of geo-referenced data in space. Therefore, the mission of the MC practical-theoretical methodology, through the analytical and strategic lens of sustainability, is to maximize the use of open and shareable data in the academic and professional field, collaborating with government agencies, non-profit organizations, private enterprise research units and researchers who are not only data and map providers but also local agents as citizens of the future. In addition, through the construction of IT tools, the TELLme Metropolitan Cartography aims to develop strategies for sharing and exchanging data by making them publicly available developing codes that promote the use of government data and public-private and public-public collaboration sharing of them.

The TELLme methodology in practice - The local data call workflow

Beside the definition of global open data, when data are not available or when they are not at the desired scale or accuracy, the project practice suggested the need for local data provision by partners. Such provision can be formalized in “local data calls”. The operational workflow for managing such calls has been defined in the project and supported by the development of a computer assisted practice here described.

Each call is defined by a list of Protocol-related Semantic Packages. (Each protocol can be declined in one or more scale in dependence of the required dimension of the thematics - e.g. "XL" means that data must include a more vast area than the whole metropolis, while "XS" could regard very specific thematics focusing for example on neighbourhoods). The SP concepts which require local data are then the subject of the data call.

A data call needs, in its definition:

1. the set of triples <RC, the specification for its expected layer of its semantics, its technical specification (e.g. kind of geometries)>.
2. operationally, the RC are organized in a tree folder structure, where each partner is invited to publish its data (or the reference to an OGC WMS/WFS service already providing it); the semantics and technical specification of the expected layers are provided in project reports (while the semantics of the concepts themselves are described within the TELLme Glossary).

Figure 1. Folder structure for archiving data in a data-call

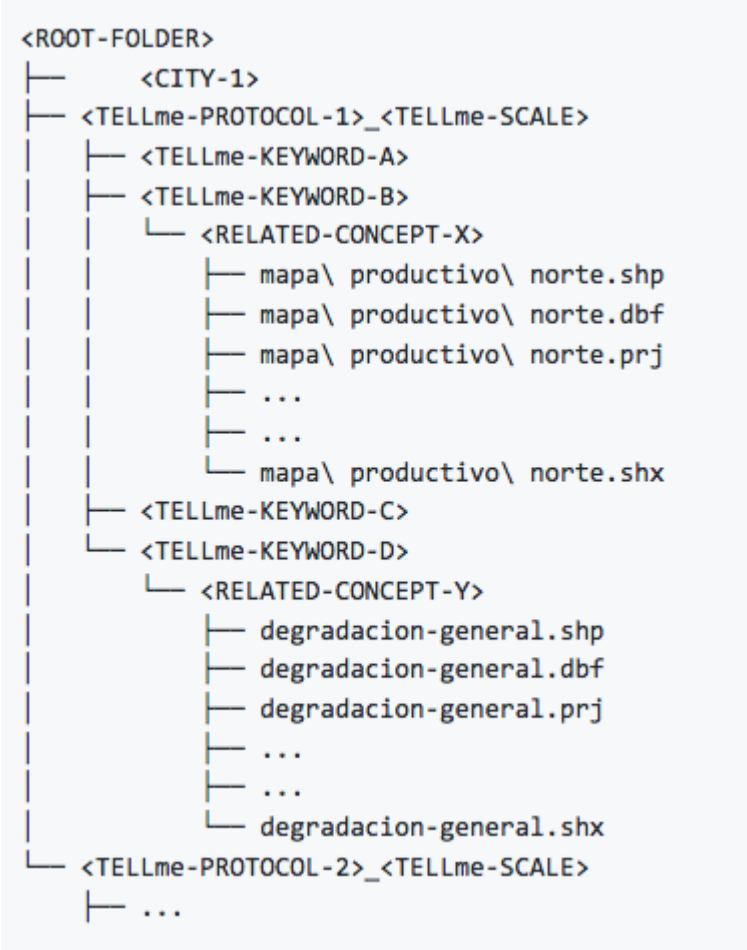

Figure 1 presents the schema of a folder structure set up for the contribution of data from the partners. In the schema <CITY-1> is the name of the city the layer are provided for (e.g. "MILAN" or "GUADALAJARA"); <TELLme-PROTOCOL-1>_<TELLme-SCALE> is the composition of the name of the TELLme protocol map name with the scale (e.g. "GREEN_GREY_INFRASTRUCTURE_L"); <TELLme-KEYWORD-A> is the capitalized label of one of the TELLme keywords (e.g. "GREEN_INFRASTRUCTURE"); <RELATED-CONCEPT-X> is the capitalized label of one of the TELLme related concepts to the preceding keyword (e.g. "AGRICOLTURAL_TYPE").

The ingestion in the project infrastructure, the TELLme Hub, has been planned in a workflow consisting in the following steps:

- Read a folder structure containing layer files in shp format.
- Preprocess file names in order to correct OS issues (spaces, accented characters).
- Compose a report, via ogrinfo, containing information about the actual geometry type of each shapefile.
- Compose statements for importing layers within the TELLme-Hub GET-IT instance.
- Compose post-import statements invoking, via curl program, geoserver API in order to associate each layer with the appropriate style for TELLme cartography.

The workflow has been implemented by a set of configurable and reproducible scripts, and a docker image has been published in order for the workflow to be available and easily exploitable in the future.

All the materials, instructions and the software itself are available as Free Open-Source Software at the repository (Tagliolato and Oggioni, 2020a).

Table 1. Outcome of the local data call for selected TELLme keywords and related concepts in terms of published informative layers in the TELLme Hub

			Available in TELLmeHub WFS					
SCALE	KEYWORD	RELATED CONCEPT	BUENOS AIRES	MARIBOR	MENDOZA	MEXICO CITY	MILAN	SEVILLE
XL	BORDERS_CATEGORISATION	ADMINISTRATIVE_BOUNDARIES		YES	YES	YES	YES	YES
XL	BORDERS_CATEGORISATION	WATER_AUTHORITY		YES		YES	YES	YES
XL	BLUE_INFRASTRUCTURE	GROUND_WATER		YES	YES	YES		YES
XL	GREY_INFRASTRUCTURE	BUILT_AREA	YES			YES	YES	YES
XL	GREY_INFRASTRUCTURE	DOCKS	YES	YES			YES	YES
L	BLUE_INFRASTRUCTURE	FLOOD_AREAS		YES		YES		
L	PHYSIOGRAPHY	LITHOLOGY-SOIL_DEGRADATION		YES	YES	YES	YES	YES
L	GREEN_ INFRASTRUCTURE	AGRICOLTURAL_TYPE		YES	YES	YES	YES	YES
L	HERITAGE	BELVEDERE	YES			YES	YES	YES
L	HERITAGE	ARCHEOLOGICAL_SITES	YES			YES	YES	YES

Conclusions

Within the TELLme two ways were covered in order to collect local data: using open data from collaborative project to create a free editable map of the world (OSM, Open Street Map - https://wiki.openstreetmap.org) and through a formalized “local data calls”. In the first case a dedicated software are developed (Tagliolato and Oggioni, 2020b) for let the user to select and download data from OSM on the basis of the TELLme framework. In the second case local data have been deposited by different partners in a project repository. Table 1 accounts for the results of this example data call: the outcome of this project activity, which was accompained by the software tools described earlier, led to the publication of local data through the TELLme Hub portal (http://tellmehub.get-it.it), available both through the graphical user interface and through OGC compliant geospatial web services enabled by the portal.

In the TELLme projects comes to realize a real virtuous cycle where different stakeholders (citizen, municipality and other) provide, create and use municipality data through collaborative networking giving one added value through the link with semantic concepts.

It would be desirable for data, in particular local data, to be provided for example by municipalities with open licences, so that the cartography resulting from processes such as those described and promoted by the TELLme framework were sufficiently detailed and could give the best possible results. Waiting for this breakthrough it can however be affirmed that to construct maps that describe existing metropolitan situations and identifying the dynamics of the metropolis is possible through the use of Open Data and semantic enrichment.

References

Bertin J., (1967), Semiologie Graphique, EHEES: Paris.

Castelnovo, W., Misuraca, G. and Savoldelli, A. (2016) 'Smart Cities Governance: The Need for a Holistic Approach to Assessing Urban Participatory Policy Making', Social Science Computer Review, 34(6), pp. 724–739. doi: 10.1177/0894439315611103.

Chun, S. A., Shulman, S., Sandoval, R. and Hovy, E. (2010) 'Government 2.0: Making connections between citizens, data and government', Information Polity, 15(1–2), pp. 1–9. doi: 10.3233/IP-2010-0205.

Contin A., Kim S., Musetta A., Manfredini F., (2017), Metropolitan Cartography as a tool for the metropolitan approach to complexity: the Ugandan Key Study, Convegno Internazionale / International Conference Un futuro affidabile per la città Apertura al cambiamento e rischio accettabile nel governo del territorio XIV EDIZIONE PROGETTO PAESE / Triennale di Milano, 21 novembre 2017.

Gómez-Álvarez, D., Rajack, R. M., López-Moreno, E. and Lanfranchi, G. (Ed.) (2017) Steering the Metropolis: Metropolitan Governance for Sustainable Urban Development. Available at: https://publications.iadb.org/handle/11319/8596.

Janssen, M., Charalabidis, Y. and Zuiderwijk, A. (2012) 'Benefits, Adoption Barriers and Myths of Open Data and Open Government', Information Systems Management. Taylor & Francis Group, 29(4), pp. 258–268. doi: 10.1080/10580530.2012.716740.

Mellouli, S., Luna-Reyes, L. F. and Zhang, J. (2014) 'Smart government, citizen participation and open data', Information Polity, 19(1–2), pp. 1–4. doi: 10.3233/IP-140334.

Pereira, G. V., Parycek, P., Falco, E. and Kleinhans, R. (2018) 'Smart governance in the context of smart cities: A literature review', Information Polity, 23(2), pp. 143–162. doi: 10.3233/IP-170067.

Perumal M., Velumani B., Sadhasivam A., Ramaswamy K. (2015) Spatial Data Mining Approach for GIS – A Brief Review, Springer.

Pogačar, K. and Žižek, A. (2016) 'Urban Hackathon - Alternative Information Based and Participatory Approach to Urban Development', Procedia Engineering, 161. doi: 10.1016/j.proeng.2016.08.788.

Pogačar, K. and Žižek, A. (2018) 'Innovative Approaches to Management of Public Spaces: The Potential of Citizen Participation in the Context of Smart Cities', in Challenges Of Applied Business And Social Studies. Maribor: DOBA Fakulteta, pp. 71–83.

Ratti C. (2014), Architettura Open Source, Einaudi Editore: Torino.

Tagliolato, P. & Oggioni A. (2020a, April 6). ptagliolato/tellme_datacall_importworkflow: First release (Version v1.0). Zenodo. http://doi.org/10.5281/zenodo.3741890.

Tagliolato, P. & Oggioni A. (2020b, April 6). ptagliolato/TELLme-vlab-OSMDataFromRelatedConcept: First release (Version v1.0). Zenodo. http://doi.org/10.5281/zenodo.3741896.

Tavares, A. F. (2018) 'Municipal amalgamations and their effects: A literature review', Miscellanea Geographica, 22(1), pp. 5–15. doi: 10.2478/mgrsd-2018-0005.

Metropolitan training[100]

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Introduction

A central component of *TELLme – Training for Education, Learning and Leadership towards a new Metropolitan discipline* projects is the development and testing of an innovative training programme that addresses the spatial, social, economic and management challenges in the metropolitan dimension.

The TELLme project aims to contribute to the development of the practise of Metropolitan Discipline with the creation of the Metropolitan Training Lab. As part of the training lab's development processes two workshops were held in 2019 in Guadalajara, Mexico, and Mendoza, Argentina, with the participation of local officials, NGOs, academics and interested citizens. These introductory workshops, together with the development of innovative metropolitan analysis tools represent the basis for the development of the main training programme, the transversal competence framework and of the TELLme digital tools. The training programme covers all three areas as separate but complementary themes, as described in this chapter, and is designed as a multi-stage learning and knowledge sharing process.

The main training programme

The training programme is initiated trough the introduction of the relevant topics from the key knowledge domains, such as metropolitan economy, sustainable development, metropolitan regeneration, spatial and landscape planning and metropolitan governance among others. The topics are addressed from the perspective of the relevant knowledge domain as case studies in the form of an existing metropolitan situation analysis and presented by local and international experts as introductory lectures in the framework of the TELLme project's international partnerships as the TELLme Training Lab.

In the initial testing phase, the existing metropolitan situation analysis for Guadalajara and Mendoza were presented, as well as case studies of partnered metropolitan areas of Spain, Italy, Mexico, Argentina and Slovenia. The initial case studies include the exploration and presentation of available

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geospatial and open data from observed metropolitan areas, which will be used as the basis for the analysis tools of the TELLme Hub in the later phases.

The emphasized interdisciplinarity of the training programme is in line with the challenges posed by the complexity of metropolitan areas (Carlucci et al., 2019; Contin et al., 2017), as the challenge of achieving sustainability of metropolitan areas is an explicitly interdisciplinary one.

According to the survey answered by the participants of the TELLme Training Workshops of Mendoza, which focused on the perceived necessary competences for effective sustainable metropolitan development and on the perceived existing competence gap, formal expertise in key knowledge domains, such as public administration, urban economy, sustainable development, urban revitalisation, spatial and landscape planning, was identified as very important, in line with the described initial phase of the metropolitan training programmes. The identified competences and skill gaps related to the issues of effective management of metropolitan areas were complex system management, strategic thinking and problem solving, strategic networking and partner communication, project management and impact evaluation skills and negotiation skills. The results of the first two TELLme Training Workshops show that enabling participation and consensus is a key competence for effective implementation of the metropolitan project due to the many different stakeholders involved. Therefore, flexibility, interdisciplinary cooperation and systemic thinking are crucial skills to change the problem-solving approach from the outdated disciplinary separation to a more open and productive knowledge-sharing process.

Facilitating the knowledge exchange

The interdisciplinary knowledge exchange process, which enables the participation of a large number of actors and resources, is facilitated by the creation of the metropolitan glossary and the adaptation of the corresponding semantic mapping methodology. The function of the glossary is to strengthen the metropolitan discipline by defining and thus clarifying the meaning of fundamental ideas of the new knowledge domain. Furthermore, by introducing universal glossary terms, it provides a basis for the knowledge exchange between several disciplines. The TELLme Metropolitan Glossary tool[101] is conceived as a bridge connecting the theoretical framework and the project's analytical digital tools, which is a digital platform the project built for producing and analysing maps. The glossary tool has therefore been developed for adding a transversal tool that is linking all the TELLme outputs and is therefore crucial for the training activities (Giordano and Contin, 2019).

Semantic definitions of metropolitan dynamics

The identification of metropolitan dynamics in the form of a narrative is the next important stage of the training programme. Each metropolis has its own unique set of complex dynamic interdependencies, some of which are related to the set of shared phenomena, such as suburbanization, urban deconcentration, or counterurbanization, but also demographic changes, economic globalisation and many others (Forrester, 1969; García Docampo, 2014). To enable the identification and exploration of relevant metropolitan dynamics, metropolitan training developed a methodology of semantic mapping, combining the concepts into semantic packages using perceived relationships. In the training process, this methodology enables open discussion between the participants, the exchange of perceived causal interdependencies and thus a deeper understanding of metropolitan dynamics. Once the semantic packages are formalised through participatory efforts, they form the basis for the algorithmic mapping of open data, the associated data analysis and

101 http://tellme.test.polimi.it/tellme_apps/tellme.

visualisations. The proposed methodology provides an experience of translating theoretical knowledge into possible solutions through problem analysis.

Semantic mapping and open data visualisation as the groundwork tool

The metropolitan training process is directly linked to the understanding of the territory as the cognitive link with the local context and local challenges. In the training process, the TELLme cartography tool, which is accessible through TELLme The Virtual Lab (VLAB), is the groundwork tool. Each map is designed from a pre-defined semantic package that links the theoretical framework to the relevant datasets. In this context, the maps produced are the tool to understand and read the territory according to the theoretical principles and concepts.

The produced maps are divided into two groups. The first group presents the existing topographic situation of the metropolis, the continuous green and blue infrastructures, and the key elements of the existing metropolitan situation, such as land use, industrial agglomerations, or settlement concentrations. The second group of maps and visualisations identifies and presents the metropolitan dynamics based on the semantic packages and predefined visualisation styles.

A valuable experience is shared with participants by providing deeper understanding of various maps and related data, expanding the existing imagination capabilities, expanding personal mental mappings of metropolitan physical and symbolic space and related metropolitan dynamic.

Metropolitan planning and the metropolitan management challenge

Metropolitan development has reached a peak, as cities are developing at an enormous speed. However, this growth places a heavy burden on metropolitan planners, developers, managers and policy makers, as their focus is usually limited to the development of the specific part of the metropolitan context, thus limiting other key influencing factors. This segmented problem-solving approach is not able to provide sustainable solutions for parts of the metropolitan system and even more so for the whole metropolitan system. In this context, the role of the metropolitan management is to ensure horizontal integration of actors, to enable knowledge sharing and to develop a common strategic vision.

In order to improve the capacity of public servants and managers of metropolitan areas to prepare them for the necessary transition process of decentralization, particular attention is paid to the training of their human capital through capacity building programs. This should introduce greater cross-sectoral and inter-institutional cooperation, joint leadership and shared responsibility (Gómez-Álvarez et al., 2017).

Metropolitan planning and management is the art of controlling a process that deals with the development and design of land use and the built environment, including the air, water and infrastructure leading in and out of large cities, such as transport, communication and distribution networks. In addition, all other metropolitan dimensions such as economy, sociology and administration must be considered on the basis of relevant data sources. Those who can provide solutions to avoid the pitfalls of pollution, high maintenance costs, congestion and financial sustainability are the ones who are in high demand. Learning the techniques of sustainable metropolitan development will therefore not only increase students' knowledge but also provide a solid foundation for their professional development.

Skills, attitudes, and values at the core of the learning process

Next to transversal competences identified in the introductory survey of the Mendoza TELLme workshops including the perceived gaps in the delivery related, strategic and interpersonal competences, 3 key competence groups are at the centre of the TELLme Metropolitan training programmes: the systems-thinking competence, the anticipatory competence and the normative competence. These competences relate directly to understanding and utilizing of the metropolitan complexity and dynamics in the development and management process, at the same time these competences are considered a prerequisite for achieving metropolitan sustainability. According to Wiek (2016), sustainability science can roughly be differentiated into two distinct research areas – a *descriptive-analytical* and the transformational one. These two areas correspond to the two stages of Metropolitan training: the knowledge and the action. Such strategies aim at transforming metropolitan socio-ecological systems from unsustainable trajectories toward a sustainable future state. To achieve the sustainability goals, the current state, past developments and future trends of the metropolis must be analysed systematically. The most important points of intervention in the metropolitan system must be identified. This approach requires a high degree of systems-thinking competence combined with the ability to assess these points against sustainability criteria, and is related to the next group of normative competences (Porter and Córdoba, 2009; Wiek et al., 2011), representing the collectively mapping, specifying and negotiating the community based sustainability values, goals and targets (Grunwald, 2007).

The systems thinking competence is the key to developing, testing and implementing strategies for sustainable metropolitan development. Together with the necessary digital skills of data collection and data analysis, transversal systems-thinking competence, which includes the understanding of complex systems theory, is at the heart of managing the metropolitan complexity. If the sustainability of legacy urban environments can still be achieved through integrated management approaches, the issue of the systemic complexity of the metropolitan dimension can only be addressed by embracing the challenges posed by the dynamic, multi-scale and multi-domain nature of the metropolis, which requires the introduction of the system-thinking competence.

For the final design of the TELLme Metropolitan training frameworks an expanded metropolitan competence and skills framework is proposed (Table 1) by combining the key OECD and ESCO competences under the proposed general sustainability competence categories (OECD, 2014).

Table 2. Proposed Metropolitan Competence and Skills Framework combining the OECD and ESCO competences in the proposed sustainability competence cathegories

SYSTEMS-THINKING COMPETENCE (SYSTEMIC THINKING, INTERCONECTED THINKING, HOLISTIC THINKING) Systems-thinking competence is the ability to collectively analyse complex systems across different domains (society, environment, economy) and across different scales (local to global), thereby considering cascading effects, inertia, feedback loops and other systemic features related to sustainability issues and sustainability problem-solving frameworks.	**ANTICIPATORY COMPETENCE** (ANTICIPATORY THINKING, FUTURE THINKING, FORESIGHTED THINKING, TRANS-GENERATIONAL THINKING) Anticipatory competence is the ability to collectively analyse, evaluate, and craft rich ‘‘pictures’’ of the future related to sustainability issues and sustainability problem-solving frameworks.	**NORMATIVE COMPETENCE** (VALUE-FOCUSED THINKING, ORIENTATION THINKING/KNOWLEDGE, ETHICAL THINKING) Normative competence is the ability to collectively map, specify, apply, reconcile, and negotiate sustainability values, principles, goals, and targets. This capacity is based on acquired normative knowledge including concepts of justice, equity, social-ecological integrity, and ethics.	**STRATEGIC COMPETENCE** (ACTION-ORIENTED COMPETENCE, TRANSFORMATIVE COMPETENCE, IMPLEMENTATION SKILLS) Strategic competence is the ability to collectively design and implement interventions, transitions, and transformative governance strategies toward sustainability. In simple terms, this competence is about being able to ‘‘get things done’’.	**INTERPERSONAL COMPETENCE** (COLLABORATIVE, PARTICIPATORY, INTERDISCIPLINARY, CIVIC COMPETENCE) Interpersonal competence is the ability to motivate, enable, and facilitate collaborative and participatory sustainability research and problem solving. This capacity includes advanced skills in communicating, deliberating and negotiating, collaborating, leadership, pluralistic and trans-cultural thinking and empathy.
ANALYTICAL THINKING is the ability to identify patterns across situations that are not obviously related, and to identify key or underlying issues in complex situations.	**INITIATIVE** Look beyond the current and visualise what the future can bring to those with initiative. Take initiatives to come up with improvements.	**ORGANISATIONAL ALIGNMENT** is the ability and willingness to align one’s own behaviour with the needs, priorities, and goals of the organisation, and to act in ways that promote the organisation’s goals or meet organisational needs.	**ACHIEVEMENT FOCUS** is generating results by assuming responsibility for one's performance and the correctness of one's interventions and recognising opportunities and acting efficiently at the appropriate moment and within the given deadlines.	**DRAFTING SKILLS** are based on the ability to respectfully communicate ideas and information (often technical) in writing to ensure that information and messages are understood and have the desired impact.
CLIENT FOCUS is based on the ability to understand internal/external clients’ (e.g. Committees, working groups, country representatives) needs and concerns in the short to long-term and to provide sound recommendations and/or solutions.	**CREATIVITY/INNOVATION** Generate new ideas or combine existing ones to develop innovative, novel solutions.	**CONTINUOUS IMPROVEMENT** Realise possible improvements for processes to increase productivity, improve efficiency, increase quality, and streamline procedures.	**MANAGING RESOURCES** is about understanding human, financial, and operational resource issues to make decisions aimed at building and planning efficient project workflows, and at improving overall organisational performance.	**TEAMWORK AND TEAM LEADERSHIP** implies working co-operatively with others, being a part of a team, and assuming the role of leader of a team.
ORGANISATIONAL KNOWLEDGE is the ability to understand the power relationships within the Organisation and with other organisations. It includes the ability to understand the formal rules and structures including the ability to identify who the real decision-makers are as well as the individuals who can influence them.	**CURIOSITY** Show a lively interest in novelty, an openness to experience, find subjects and topics fascinating, actively explore and discover new areas.	**INTEGRITY/ETHICS** Carry out workplace activities according to accepted principles of right and wrong, including fairness, transparency and impartiality in work practices and conduct towards other people.	**STRATEGIC NETWORKING** involves working to build and maintain friendly, trustworthy and open internal and external relationships and networks with people who are, or might become, important actors in achieving strategic-related goals	**DIPLOMATIC SENSITIVITY** implies understanding other people. It includes the ability to hear accurately and understand unspoken, partly expressed thoughts, feelings and concerns of others.
FLEXIBLE THINKING involves the ability to effectively adapt to a variety of situations, individuals or groups. It is based on the ability to understand and appreciate different and opposing perspectives on an issue, to adapt an approach as the requirements of a situation change, and to change or easily accept changes in one’s own organisational or job requirements.		**COMMITMENT TO THE CONSERVATION OF THE ENVIRONMENT** Apply principles, policies and regulations aimed at environmental sustainability in the workplace.	**STRATEGIC THINKING** is the ability to develop a broad, big-picture view of the Organisation and its mission.	**INFLUENCING** implies an intention to convince others in an honest, respectful and sensitive manner in order to get them to go along with one’s objectives. It can also be the desire to have a specific impact or effect on others.
CRITICAL THINKING Identify the strengths and weaknesses of various abstract, rational concepts, such as issues, opinions, and approaches related to a specific problematic situation in order to formulate solutions and alternative methods of tackling the situation.		**RESPONSIBILITY** Perform one's tasks in a self-disciplined, reliable and goal-oriented manner. Accept responsibility and be accountable for professional decisions of yourself or others as part of a job or one's role.	**ABILITY TO PLAN AND MANAGE TIME** Plan the time sequence of our own events, programmes and activities, as well as the work of others.	**NEGOTIATING** involves the ability to work towards win-win outcomes.

Anticipated training results

The training process involves learning the approaches related to the competences described in order to make participants aware of the need to understand the challenges of metropolitan sustainability and to develop skills and the ability to operate in the complexity associated with the size of today's metropolis. This "metropolitan" competence is acquired by integrating management skills with architectural and urban skills capable of extracting the metropolitan gaps and needs of each metropolis and defining the metropolitan operations that each metropolis needs to overcome the gaps and respond to its needs.

Expected intangible results are:

1. Awareness on Metropolitan planning, urban design and architectural approaches (new metropolitan discipline of practice);
2. Increased dissemination of information to partners and stakeholders;
3. Networking and sharing of ideas among partners;
4. Design concepts leading to more comprehensive metropolitan strategies;
5. Develop tools for priority settings and funds mobilization in metropolitan development;
6. Development of partnerships to tackle metropolitan discipline challenges at the international, national, regional and local levels.

The ultimate intangible result of the TELLme projects' will be educating the higher education staff to provide knowledge on the metropolitan complexity and sharing their knowledge with all the other metropolitan actors. The envisioned role of the future higher education staff will also include supporting the civil servants in the creation of possible sustainable metropolis (Giordano and Contin, 2019).

References

Carlucci, M., Zambon, I., Salvati, L., 2019. Diversification in urban functions as a measure of metropolitan complexity. Environ. Plan. B Urban Anal. City Sci. 1–17. https://doi.org/10.1177/2399808319828374.

Contin, A., Musetta, A., Kim, S.J., Manfredini, F., 2017. Metropolitan cartography as a tool for the metropolitan approach to complexity: the Ugandan key study, in: Un Futuro Affidabile per La Città, Apertura Al Cambiamento e Rischio Accettabile Nel Governo Del Territorio. Milano, pp. 11–21.

Giordano, P., Contin, A., 2019. TRAINING FOR KNOWLEDGE TO ACTION: TOOLS FOR THE METROPOLITAN ARCHITECTURE DISCIPLINE, in: Education, Design and Practice – Understanding Skills in a Complex World. New York.

Gómez-Álvarez, D., Rajack, R., López-Moreno, E., Lanfranchi, G., 2017. Steering the Metropolis: Metropolitan Governance for Sustainable Urban Development.

Grunwald, A., 2007. Working towards sustainable development in the face of uncertainty and incomplete knowledge. J. Environ. Policy Plan. 9, 245–262. https://doi.org/10.1080/15239080701622774.

OECD, 2014. Competency Framework.

Porter, T., Córdoba, J., 2009. Three views of systems theories and their implications for sustainability education. J. Manag. Educ. 33, 323–347. https://doi.org/10.1177/1052562908323192.

Wiek, A., Lang, D.J., 2016. Transformational Sustainability Research Methodology. Sustain. Sci. 31–41. https://doi.org/10.1007/978-94-017-7242-6_3.

Wiek, A., Withycombe, L., Redman, C.L., 2011. Key competencies in sustainability: A reference framework for academic program development. Sustain. Sci. https://doi.org/10.1007/s11625-011-0132-6.

Metropolitan tools: the TELLme Hub and the TELLme virtual lab[102]

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Introduction

For building a new Metropolitan Discipline (MD) with the approach of Collective Intelligence (Brown and Hug, 2000), the technological support is crucial. In order to provide digital competence to the Higher Education Institution (HEI) instructors for both communication and utilization of new tools, the TELLme HUB (HUB - http://tellmehub.get-it.it/, Tagliolato et al., 2020a) works as the digital platform of the MD. It does not only work as a sharing device of experiences amongst the participants but also promotes a new way of building the collective knowledge through digital tools. It is hosted in a CNR server during the project life, and then it will be stay in the same server during the maintenance phase.

The HUB is a Spatial Data Infrastructure (SDI) aimed at supporting the TELLme Training Labs and presenting the geospatial outcomes of the project in form of interactive maps. The activities developed in the TELLme Training Lab are being uploaded to the HUB to manage and publish spatial data and interpretive maps. Moreover, the HUB can manage other files types (reports, statistical data, methodologies, etc.) linked to them, so as to extend spatial resources information.

Metadata defined in the HUB follow an ISO19115/19139 profile tailored to suit the MD needs (e.g. license, metropolis to refer to, scale according with theoretical and practical framework, etc.). They provide all the information needed to interpret and manage the data in accordance with the emerging MD. Partners are supplying the data populating the catalogue. Whatever the source, these data loaded onto the HUB and appropriately described become part of the design.

The HUB provides also the functionality to straightforwardly import data from already existing data access services compliant with Open Geospatial Consortium (OGC) standards. Spatial data can be queried and modified using the HUB to facilitate the sharing of updates with all the actors (teachers, students, civil servants).

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Materials are accessible to stakeholders through OGC web services, facilitating the interaction with the data contained in the HUB, and making them directly usable by popular GIS software, common tools at all the institutions dealing with urban and territorial management.

Hence, the HUB gathers quality information on metropolitan planning, urban design and architecture from all over the world. Then it will be feasible to study, under the perspective offered by the MD, the impacts of the territorial changes at different scales, thus forming an open and accessible support system to planning. The HUB can provide a single access point for international, regional and national experts on information related to metropolitan issues, integrating and systematizing existing information to better inform and provide knowledge-based assistance to academics, policy-makers, stakeholders in metropolitan planning, etc.

On the top of the more advanced best practices in spatial data management and SDI, the HUB organises materials in accordance with the theoretical framework of the MD and exposes search functionalities (in its user interface, metadata catalogue and custom REST APIs) to let the retrieval of information on the basis of concepts defined in the Metropolitan Glossary (MG). Semantic vocabularies defined by the agreement among partners, and assisted by the MG Software, are processed by the HUB through a dedicated integration layer which structures them as semantic web resources and makes them available both through linked data access and through a W3C compliant SPARQL endpoint. The HUB ISO compliant metadata, exposed through OGC Catalog Service for the Web, contain terms from these semantic vocabularies, enhancing discovery and access to geospatial information in the hub.

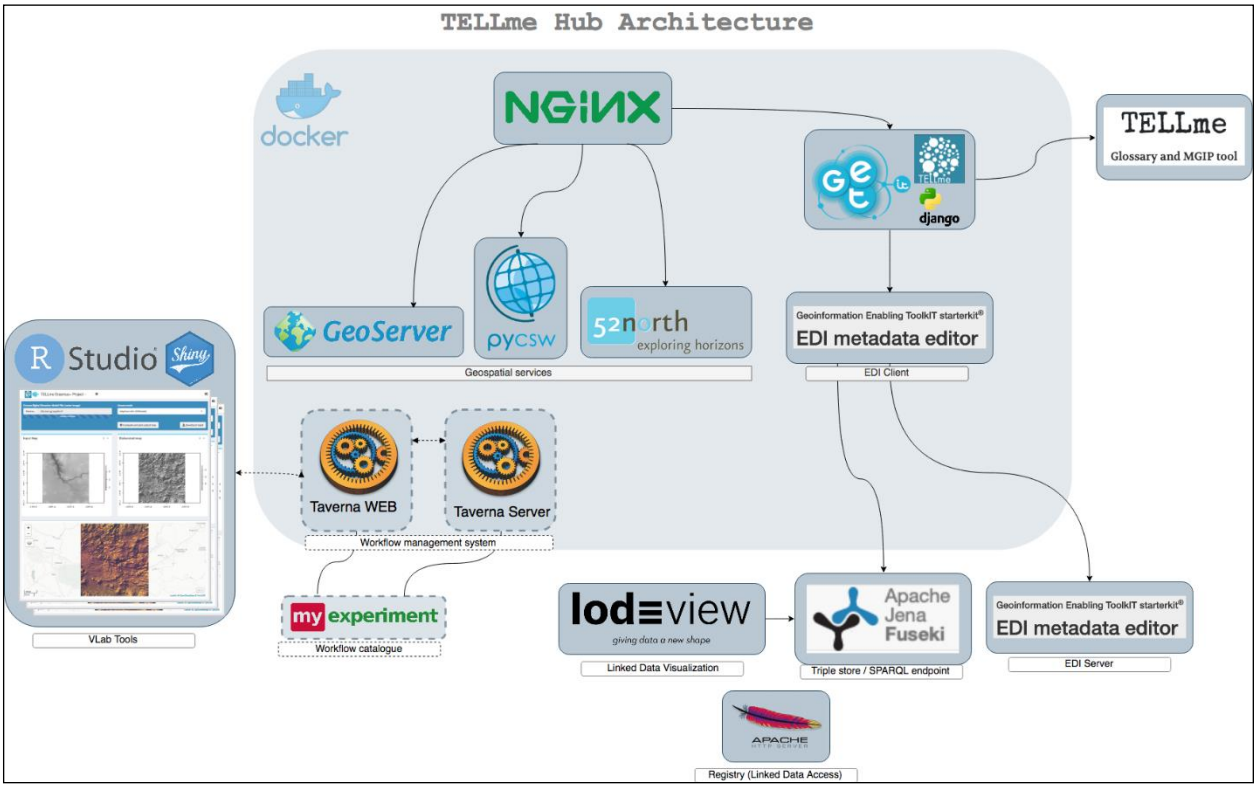
The HUB is moreover the point of access for its virtual lab tools, interactive web applications for the assisted production, by processing existing geospatial information, of added value data, and for the assisted composition of maps, according to the needs and practices designed by the TELLme project.

Exploring the TELLme HUB

TELLme Hub is the (spatial) data infrastructure for the TELLme project. Its functionalities are realized by several modules deployed on different servers, joined together following the Service Oriented Architecture paradigm.

The overall picture of the involved components is represented in Figure 1. The following paragraphs detail the main functionalities of the SDI, relating them to the software components depicted in the Figure.

Figure 1. TELLme Hub Architecture. Components of the TELLme Hub



Geographic information management

The infrastructure stores and serves geographical layers according to the best practices and standards of the geographic community. Once stored in the GET-IT component, they are served by OGC standard web services as Web Feature Service (WFS), Web Map Service (WMS) and Web Coverage Service (WCS).

The GET-IT component of TELLme HUB offers functionalities for uploading data, editing their metadata according to TELLme project-specific metadata profile (see later), and composing and visualizing maps. Moreover, the TELLme project version of GET-IT organizes geographic information in accordance to the TELLme Glossary semantics, letting contributors to annotate their layers with Concepts defined in the glossary, and offering users the possibility to navigate layers by those annotations.

Layers can be discovered through the Web Graphical User Interface exposing faceted search functionalities everyone can filter data by: TELLme Glossary keywords, geographical regions, geographic extent, temporal extent, data publishers or through web services and APIs (by standard CSW service - http://tellmehub.get-it.it:80/catalogue/csw - or by REST APIs offered by the GET-IT component - http://tellmehub.get-it.it/api).

Once discovered, layers can be combined in order to create maps. In the TELLme Hub this is possible by selecting layers of interest, adding them to a “shopping cart” and finally “checking-out” in order to create a map. A specific URL is associated to the newly created map composition, in order to easily share it with others.

Online documentation and tutorials (web pages and videos) are available starting from http://tellmehub.get-it.it/help/

Metadata

Metadata are of fundamental importance in SDI to let the discovery of data within the infrastructure and among different external infrastructures. Within Intellectual Output 4 a metadata profile has been defined for the TELLme project. It lets to merge the actual spatial infromation with the TELLme conceptual framework, and in particular with the TELLme Glossary.

The TELLme metadata profile is based on ISO 19115/19139 metadata schema. It exploits among others, semantic resources derived from the Intellectual Output 2. Specifically, the profile exploits the keyword element, referring not only the textual values, but also the Uniform Resource Identifiers of the semantic resources they are represented by, so as to unambiguously identify terms. In this sense we exploit the capability of ISO/OGC metadata standard and in particular the Geographic Metadata XML (GMX) XSD Schema, following the lesson of its adoption from other international profiles such as INSPIRE. In the case of TELLme profile, resources are mapped from the semantic web technology version of the TELLme metropolitan Glossary (see the next section).

Metadata editing is eased by the EDI software (Pavesi et al., 2016; Pavesi, Oggioni, Tagliolato and Fugazza, 2018), which implements the TELLme metadata profile.

Semantic web resources (TELLme Glossary software integration)

The terminology that is being defined within the project, in the Intellectual Output 2 with the help of the Metropolitan Glossary software (http://tellme.test.polimi.it/tellme_apps/tellme), is subject of an integration with the HUB. To this aim a novel software module within the HUB has been developed, which acts as the manager of the integration, taking care of the synchronization of three distinct software platforms exploiting the same terminology: the Glossary software (a composition tool developed by Politecnico di Milano), the triple store with SPARQL endpoint that makes the RDF representation of the glossary available, and the TELLme GET-IT component in which the glossary keywords are used as hierarchical “tags”.

The integration manager module (https://github.com/IREA-CNR-MI/TELLme-Hub/tree/TELLme/geosk/tellme) consists of different parts:

- Routines for the retrieval of the terminology from the Glossary software APIs and their translation in Simple Knowledge Organization System (SKOS) RDF resources.
- Publication of the resulting SKOS thesaurus in a public location within the TELLme HUB (available at the URL http://tellmehub.get-it.it/static/tellme/TELLmeGlossary.ttl).
- Periodical job for the retrieval of the RDF published document in the SPARQL endpoint http://fuseki1.get-it.it/TELLmeGlossary/query103.
- Import of the same resources as predefined hierarchically organized tags, for web user interface and custom API retrieval of tagged geospatial data. The software module takes care in particular to update the entities according to possible changes of the source (the Glossary being a “living” resource, which is subject to modifications in accordance with the Intellectual Output 2 output activities).
- Integration within the metadata editor application of the SPARQL resources.

103 The URL is the endpoint for SPARQL queries directed to the server following HTTP content negotiation. For a human readable response example, the reader can follow the link: http://rdfdata.get-it.it/TELLmeGlossary/keyword_4.
Please note that the link is also the persistent identifier (URI) of the keyword and that it will redirect, according to standard HTTP content negotiation, to an appropriate version of the semantic resource. If used in a web browser it will redirect to a software for the visualization of semantic resources, deployed within a IREA-CNR server.

- Automated tagging of uploaded layers with Glossary tags corresponding to keywords indicated within metadata.

Virtual Lab (VLAB)

The Virtual Lab (VLAB) is intended as a set of interactive web applications for the assisted production, by processing existing geospatial information, of added value data, and for the assisted composition of maps, according to the needs and practices designed by the TELLme project. VLAB is integrated into HUB by a menu item in the home page.

The VLAB is a system of different components, with several services contributing to its functionalities. Web applications for processing data are served by Shiny Server. The first of TELLme VLAB tools is the shiny web application for processing Digital Elevation Models (DEM) in order to obtain a hillshade image, baptized “Elephant skin” map in TELLme terminology. The obtained layer is in use by the TELLme metropolitan cartography for interpretation of geographic areas of interest. The application can also process DEM in order to produce slope images, or “Golden maps” in TELLme terminology.

The most recent version of the Shiny web application is available at http://processing.get-it.it/shiny/public/TELLme-vlab-elephantSkin/ (Tagliolato and Oggioni, 2020b).

The second TELLme VLAB tool is a shiny web application that lets the user to select and download data from Open Street Map (OSM) on the basis of the TELLme framework (Tagliolato and Oggioni, 2020c). Concepts expressed in the TELLme Glossary are associated to specific OSM Features. The tool facilitates the operations for obtaining TELLme-framework-related data used to compose maps in the project. A bounding box allows to select the area of interest to obtain OSM data. A matching work between the concepts (tags) defined by the OSM and the concepts defined by the TELLme metropolitan Glossary has been done.

The plan for the development of the Virtual Lab previews the exploitation of other components (taverna server, Taverna Web, MyExperiment depicted in figure 1) whose integration in the TELLme HUB have already been tested (see the branch “Taverna” in the source code repository https://github.com/IREA-CNR-MI/TELLme-Hub/tree/taverna), but that are not currently deployed in the actual “production” system: the VLAB development follows the needs of the evolving discipline and hence it is itself a work-in-progress.

In fact, for the need to assist the data collection by partners, a software layer has been developed which is described in the chapter “Cartography and Open Data”.

Conclusions

VLAB at the end of the project will be enriched with a tool (Tagliolato and Oggioni, 2020d) that will allow to compose both protocols and dynamics maps, for the different metropolises, starting from the data uploaded in the TELLme Hub, according to the concepts defined in the TELLme glossary, following what defined in the keywords (e.g. Grey_Infrastructure) and in concepts (e.g. railways). The tool is not to be intended as an automated actor, on the contrary it represents a facilitator for showing in form of a map what the participants to the the TELLme program and workshops will discover by collaborating each other and with the informatic materials shared by the Hub.

Tellme HUB allows to support the metropolitan discipline in a complete way both through the functionalities of the HUB and the operations carried out by the tools of the VLAB. Users can upload their HUB data, or use the facilities provided in the VLAB to search for data of interest in open map repository (OSM) or find elevation data, they can enrich the data with information (metadata), and

finally create maps suitable for what the user wants to describe, also using the styles made conventional by the project for each of the concepts.

Annexes

Source code repositories

TELLme HUB on GIT-HUB: https://github.com/IREA-CNR-MI/TELLme-Hub

TELLme HUB development branch (integrating Other Vlab services): https://github.com/IREA-CNR-MI/TELLme-Hub/tree/taverna

Virtual Lab tool “Elephant Skin” on GIT-HUB: https://github.com/ptagliolato/TELLme-vlab-elephantSkin

Virtual Lab tool “TELLme2OSM” on GIT-HUB: https://github.com/ptagliolato/TELLme-vlab-OSMDataFromRelatedConcept

Accessing the TELLme HUB: URLs of deployed services

TELLme HUB GET-IT component:

http://tellmehub.get-it.it

OGC services (e.g. for accessing with QGIS):

WMS: http://tellmehub.get-it.it:80/geoserver/wms

WFS: http://tellmehub.get-it.it:80/geoserver/wfs

WCS: http://tellmehub.get-it.it:80/geoserver/wcs

CSW: http://tellmehub.get-it.it:80/catalogue/csw

REST APIs:

main endpoint: http://tellmehub.get-it.it/api/

Virtual Lab “Elephant Skin” application:

http://140.164.11.125/app/TELLmeElephantSkin

Virtual Lab “TELLme2OSM” application:

http://140.164.11.125/app/TELLme2OSM

SPARQL endpoint:

http://fuseki1.get-it.it/TELLmeGlossary/sparql

Linked data access visualization (follow the URI to experience the redirection through the registry and to visualize the resource through LODView software)

http://rdfdata.get-it.it/TELLmeGlossary

Metadata profile – EDI template

The TELLme metadata profile is available as an EDI Template document at the URL: http://tellmehub.get-it.it/static/EDI-NG_client/templates/INSPIRE_dataset_TELLme_v1.01.xml

Example tellme glossary as SKOS-RDF resource

```
@prefix owl:   <http://www.w3.org/2002/07/owl#> .
@prefix dcterms: <http://purl.org/dc/terms/> .
@prefix skos:  <http://www.w3.org/2004/02/skos/core#> .
@prefix tellme: <http://rdfdata.get-it.it/TELLmeGlossary/> .
@prefix dc:    <http://purl.org/dc/elements/1.1/> .

{ <http://rdfdata.get-it.it/TELLmeGlossary>
      tellme:keyword_4  a       tellme:keyword , skos:Concept ;
      dc:creator        <http://tellmehub.get-it.it> ;
      dc:date           "2019-04-18T16:30:44" ;
      owl:deprecated    "false"@en ;
      owl:versionInfo   "1"@en ;
      skos:altLabel                  "Grey_Infrastructure"@en     ,     "Grey_Infrastructure"@it     ,
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meanings:it is a place of specialisation, a man-made structure that fulfils precise functions (i.e.
circulation) and obvious roles (i.e. connection);it is a public space, a succession of places where
different practices take place, a place of social interaction. It carries out implicit roles among
which the redistribution of wealth and real estate values;it is a tool for reconstructing territories
through integrated territorial projects. (Pucci, n.d.)"@en , "In urban planning, grey infrastructure
can have the three following meanings:it is a place of specialisation, a man-made structure that
fulfils precise functions (i.e. circulation) and obvious roles (i.e. connection);it is a public space, a
succession of places where different practices take place, a place of social interaction. It carries
out implicit roles among which the redistribution of wealth and real estate values;it is a tool for
reconstructing territories through integrated territorial projects. (Pucci, n.d.)"@it , "In urban
planning, grey infrastructure can have the three following meanings:it is a place of
specialisation, a man-made structure that fulfils precise functions (i.e. circulation) and obvious
roles (i.e. connection);it is a public space, a succession of places where different practices take
place, a place of social interaction. It carries out implicit roles among which the redistribution of
wealth and real estate values;it is a tool for reconstructing territories through integrated territorial
projects. (Pucci, n.d.)"@es ;
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"Grey_Infrastructure"@es ;
      skos:scopeNote    ""@en .
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References

Brown, Philip; Lauder, Hugh (2000). "Collective intelligence". In S. Baron; J. Field; T Schuller (eds.). Social Capital: Critical Perspectives. New York: Oxford University Press. ISBN 9780191583247.

Pavesi, F., Oggioni, A., Tagliolato, P. and Fugazza, C. 2018. EDI NG Client [Online]. Available: https://github.com/SP7-Ritmare/EDI-NG_client DOI: 10.5281/zenodo.59105.

Pavesi, F., Basoni, A., Fugazza, C., Menegon, S., Oggioni, A., Pepe, M., Tagliolato, P. and Carrara, P., 2016. EDI – A Template-Driven Metadata Editor for Research Data. Journal of Open Research Software, 4(1), p.e40. DOI: 10.5334/jors.106.

Paolo Tagliolato, Alessandro Oggioni, Cristiano Fugazza, Stefano Menegon, Simone Lanucara, Martina Zilioli, & Paola Carrara. (2020a, April 9). IREA-CNR-MI/TELLme-Hub: TELLme-HUB release 1.2 (Version TELLme-HUB.v.1.2). Zenodo. DOI: 10.5281/zenodo.3746435.

Paolo Tagliolato, & Alessandro Oggioni. (2020b, April 6). ptagliolato/TELLme-vlab-elephantSkin: First release (Version v1.0). Zenodo. DOI: 10.5281/zenodo.3741898.

Paolo Tagliolato, & Alessandro Oggioni. (2020c, April 6). ptagliolato/TELLme-vlab-OSMDataFromRelatedConcept: First release (Version v1.0). Zenodo. DOI: 10.5281/zenodo.3741896.

Paolo Tagliolato, & Alessandro Oggioni. (2020d, October 20). oggioniale/TELLme-mapComposer: First release of TELLme-mapComposer (Version 1.0). Zenodo. http://doi.org/10.5281/zenodo.4108650.

About the partners

Politecnico di Milano - DAStU - MSLab

The Measures and Scales of the contemporary city Lab (MSLab) is a Research Unit in the Department of Architecture and Urban Studies (DAStU) at the Politecnico di Milano. The MSLab has been developing and sharing the idea of ‘Metropolitan Approach to Complexity’ and ‘Practice of the Metropolitan Discipline’, emphasizing the methodology and process of constructing novel urban and architectural forms that shape the territory at the metropolitan dimension.

Fondazione Politecnico di Milano

Fondazione Politecnico di Milano (FPM) is the University Foundation of Politecnico di Milano. FPM supports innovation processes in education and training and promotes continuous skill and competence development as essential to build a knowledge-based economy enabling critical professional and organizational changes.

Universidad de Sevilla

Universidad de Sevilla is a public university established in 1505 in Seville (Spain). It currently has more than 70,900 students. It is structured in 32 university centres and 134 departments. The Higher Technical School of Architecture (ETSA) was founded in 1960 and is the third-largest architecture school in Spain. The TELLme team originates from the Master in Sustainable City and Architecture, an official postgraduate degree distinguished by transdisciplinary training in sustainability, its cultural and reflective framework and a pioneering technical offer.

DOBA

DOBA Faculty of Applied Business and Social Studies is a private business school in Maribor, Slovenia. Founded in 2003, DOBA Faculty offers undergraduate and graduate programmes in economics, business management, marketing, and lifelong education management. While educational programmes and certifications are constantly expanding, DOBA offers four Bachelor's programmes and four Master's programmes, including the Smart City Management programme and a doctoral school on innovation and sustainable business in the digital society. A 15-year tradition in online learning makes DOBA one of the leading online business schools in Europe.

Universidad Nacional de Cuyo

Universidad Nacional de Cuyo (UNCuyo) is a national public university which provides teaching services, research activities and transfers its services to the community. Founded in 1939, it attends more than 47.900 students with an academic staff of 4.030 professors. It offers 117 undergraduate and graduate careers and 94 postgraduate courses in humanities, social sciences, engineering, basic sciences, medical and fine arts fields. About research, 624 projects are developed.

Universidad Autónoma Metropolitana

The Universidad Autónoma Metropolitana (UAM) is a Mexican public university founded in 1974. Born with the idea of innovation and social commitment, it arises from establishing a new university in the metropolitan area of Mexico City and it currently consists of five decentralized academic units. For the quality of its programmes, the UAM is ranked among the best Higher Education Institutions in Mexico and Latin America.

Universidad de Guadalajara

The Universidad de Guadalajara (UdeG) is a public institution of upper-middle and higher education that is based in the Metropolitan Area of Guadalajara and one of the oldest universities in the Americas. Since 1994, UdeG operates through a network made up of 15 university centres (campuses), a Virtual University System, a Higher Secondary Education System and the General Administration of the institution.

CNR-IREA

The mission of the Institute for Electromagnetic Sensing of the Environment at the Italian National Research Council (CNR-IREA) is the development, in the fields of optical and microwave remote sensing and in situ diagnostics of methodologies and technologies for acquisition, processing, fusion and interpretation of images and data obtained by electromagnetic sensors and the dissemination of the extracted information for monitoring the environment and the territory. Methodologies and technologies are also developed for the construction of infrastructures for geospatial data and biomedical applications of electromagnetic fields.

ESt à

Economia e Sostenibilità (Economy and Sustainability, ESt à) is an independent non-profit research, training and consultancy centre that acts as a bridge between scientific knowledge, public and private policies and active citizenship. ESt à promotes innovation in environmental, socio-economic and cultural systems to imagine and create a more sustainable and inclusive society.

CIPPEC

CIPPEC is an independent non-profit organization that works on building better public policies. We promote policies that would make Argentina more developed, more equal, with the same opportunities for all and solid and efficient public institutions. We want a fair, democratic and inclusive society, where everyone has the possibility to grow.

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