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Corridors and Arcs.

Questioning territorial (re)articulation on the edge between networks and isolations

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Abstract

In the apparently existing dichotomy between the increasing need and apprehension for being connected and the growing feelings of nationalism and regionalism, do corridors and arcs still represent the matrix figures to strengthen the (inter)dependencies between communities in cities and regions within the broader form of the network? By enhancing kinésis, exchange, use, and occupation as privileged places of mobility, connectivity and continuity, corridors and arcs detonate the explosion of territory in multiple scales of rearticulation.

As this would probably be the last attempt to make administrative borders survive – up to the stage of nations –, the thesis goes through ongoing studies and design experiences dealing with building new urbanity and scaling systems under shrinkage in some of the existing elements shaping regional processes: corridors as *conduits*, and arcs as *circuits*. The powerful tools they hold can extract the materiality of spaces and flows beyond the limits of tangible and intangible boundaries, fitting perfectly into the system of relations occurring in the age of networks.

The aim is to demonstrate the broader impact of a local reflection on regional spatialised politics, according to a physically and digitally connected society. The reconfiguration of the territory and the landscape, strengthened through corridors and arcs of cities as communities, produces impacts in the trans-scale perspective of the network, knowing that the current planetary stage of the Urban is the more comprehensive lens through which to observe the subregional dimensions where societies live and which should not be forgotten.

Resumo

Na dicotomia aparentemente existente entre a crescente necessidade e apreensão por estar conectados e os sentimentos crescentes de nacionalismo e regionalismo, os corredores e arcos ainda representam as figuras matrizes para fortalecer as (inter)dependências entre as comunidades nas cidades e regiões dentro da forma mais ampla da rede? Ao melhorar a cinesia, o intercâmbio, o uso e a ocupação como lugares privilegiados de mobilidade, conectividade e continuidade, os corredores e arcos detonam a explosão do território em múltiplas escalas de rearticulação.

Como esta seria provavelmente a última tentativa de fazer sobreviver as fronteiras administrativas – até o nível das nações –, a tese cruza estudos e experiências de projeto em andamento que lidam com a construção de nova urbanidade e a redução de escala de sistemas em contração em alguns dos elementos existentes moldando processos regionais: corredores como *condutos*, e arcos como *circuitos*. As ferramentas poderosas que eles possuem são capazes de extrair materialidade de espaços e fluxos além da limitação de fronteiras tangíveis e intangíveis, encaixando-se perfeitamente no sistema de relações que ocorrem na era das redes.

O objetivo é demonstrar o impacto mais amplo de uma reflexão local sobre a política espacializada regional, de acordo com uma sociedade conectada fisicamente e digitalmente. A reconfiguração do território e da paisagem, fortalecida através de corredores e arcos de cidades como comunidades, produz impactos na perspectiva transescalar da rede, sabendo que a atual etapa planetária do Urbano é a lente mais ampla através da qual observar as dimensões sub-regionais onde as sociedades vivem e que não devem ser esquecidas.

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0 /// INTRODUCTION

Preliminary reflections

This work starts from two observations about the forces that shape our broader planetary chains of systems and flows, as well as communities' bonds with territories. First, thicker urban patterns and multiplying channels of (inter)dependencies, joining neighbouring centres and far-reaching productive economies, stabilise while creating further links beyond governance boundaries; nevertheless, the conflicts through uneven urban developments, spatial segregations and expanding operational landscapes get exacerbated by obsolete planning and design paradigms. Second, the more the interactions between places grow across scales, the more economic and political separations gain strength: in the idea to preserve local identity, they intend to get communities out of global supply models, or save it from the national consequences of disproportionate regional developments, to acquire decisional independence for growth and competitiveness.

The resulting reflection moving this work is that such trends provide opposite transformation scenarios in a time marked by mobility and connectivity as impetus moulding urban space and territorial junctures. Therefore, it is difficult to inquire about the emerging transitory articulations across geographies and landscapes without understanding the places where the contrasts between networks and isolations manifest the most. Moreover, the urgency of such a reflection rises by the need to define the means and skills to channel and prepare unprecedented urbanisation as a sure but temporary process and by the increasingly rapid changes and ever shorter cycles set by technological revolutions. **Within this framework, spatial forms within mega- up to subregional systems try to accommodate permanent instability while moving away from the City's traditional roles, frames, and details and their relation with the Territory**[1].

The epochal shift from the *space of places* to the *space of flows* together with the current out-of-hand urban-driven transformation of the planet (Perulli, 2017) leads this study to focus on figures and concepts concerned with urbanisation along favoured routes of movement and exchange. As persistent territorial traces, they form today's complex networked clusters from linear-shaped (in)tangible connections. While building privileged places of transit, exchange and communication, such models create new infrastructure and settlements or re-shape existing ones on edge between territorial continuity and spatial exclusion. Sure enough, their implementation depends on technology evolution, both as paradigm and design beyond transport concerns.

On the one hand, infrastructure offers the static and dynamic basis for an incrementally mobile and connected society, both in its individual and collective perspectives, shaping the

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1   The use of the capital or lowercase letter for the same term refers respectively to the concept (e.g. City) and its materiality as a figure and phenomenon (e.g. city)

forms, flows and relations within the planetary Urban. On the other hand, it carries a form of capitalism that adopts maximisation strategies and builds new operational geographies of (im)material platforms and systems to support trans-territorial production strings, managed by large functional actors as drivers of the urban explosion. Thence, there is a worldwide matrix of transport, energy and communication infrastructure systems that forms a primary "functional geography", different from the transitory political geography: these connections overcome the natural and legal subdivision of spaces, making them manifest in urbanisation (Khanna, 2016). Accordingly, urban archipelagos represent the new centres of global gravity, increasing their importance over national and regional power. Also, (inter)dependencies between smaller centres define spatiality restructuring by creating clusters of new economic and strategic interests. Besides, the mobility-connectivity value chain carried by the images and structures of linearity and connection includes some thematic intersections, tangents and latent continuities: (1) the ecosystemic resilience and preservation, and the understanding of landscape as a dynamic entity; (2) the need for a clarified synergy between an unbounded urban and the territory as a palimpsest; (3) the redesign of energy landscapes and the equitable access to resources and benefits; (4) the spatial practices behind logistics and their relation with the persistent logic of sprawling; (5) the right to the city and citizenship, by setting up new urban configurations to accommodate the demand for affordable housing or downsizing existing urban systems; (6) the role of knowledge and technology in re-establishing a possible return to the territory. In compliance with the attention to the priorities and values defined by networks and boundaries, infrastructure investments can turn into city partnering for prosperity and community integration axes, otherwise into *urban hunters* by territorial appropriation, exploitation and degradation.

Concerning the need to define a theoretical-phenomenal study, this work gives greater attention to the elements that accommodate mobilities and interactions while questioning boundaries, articulating and stratifying themselves, and the urbanity built around privileged places of movement and exchange.

The Corridor and the Arc: building knowledge about the City and the Territory

Since its coming into existence, the corridor has been a tool of modernisation, related first and foremost to speed, then to power, then to the regimentation of maleness, then to the emergence of the social structures of the Victorian era, and finally to hygiene, industrialisation and the corporate organisation of life in the 20th century.
(Mark Jarzombek, *Corridor Space* in Guida, 2015: 120)

Certain processes of urban (re)definition and development might be applied to nuclear attractor schemes, aimed at articulating evolutionary strategies, in the short, medium and long term, based upon sequences between foci/areas of activity, discontinuous, interconnected by linkage and routing channels. These sequences form "arches of development": they are not in themselves continuous axes or lengths, but rather circuits of interaction,

syncopated and intermittent, between "bound landscapes" (understanding the term 'land-scape' in its more plural sense, at once a place/scenario and field of activity).

Their effective planning allows us to define basic operative trajectories as "horizons of certainty" or "islands of consensus", localised in the global territorial system under consideration.

(Manuel Gausa, *Arches of development* in Gausa et al., 2003: 55)

The corridor is a matrix figure for disciplines dealing with space, a paradigm, a real place, an apparatus of spatial appropriation and a metaphor of increasing consistency over time. As marked by a dual architectural and territorial nature since its origins, it periodically emerges in planners and designers' discourses to interpret works and infrastructure, environmental conservation and biodiversity. Generally understood as a network of cities linked by linear surface transport lines, the Corridor remains a partially specified concept: its development produced meanings and iconographies covering diverse scientific interpretations, hardly discernible without applying an analytical or political-programmatic approach. However, its historically stratified complexity has fed a large body of literature, migrating and crossing distant fields of knowledge dealing with the City and the Territory – particularly geography, economics and management sciences –, making it one of the Western thought's original figures.

The Corridor's etymology dates back to the 14th century when the meaning of *corridore* in Vulgar Italian described by extension both an individual with military duties – like delivering messages, scouting enemy lines, or defending walls – and his space of movement. Thus, the first explanation of the corridor refers to the pure sequential action of running as a performative space and physical separation since it builds limits, proximities and distances. Therefore, it defines *subjectivity* as a territory; it is a boundary space that marks the border between inner and outer space, making it accessible as a place to be controlled. As an analogy, the Corridor presents recurrent meanings, including its selectivity, definition, separation and specialisation of functions, and its ability to arrange space and time, thus introducing discontinuities while using connective (a)biotic fluxes. As a figure, it bonds to the idea of a time-space sequence, of covering or travelling along a single direction while developing rhythms of inclusion, exclusion, and segregation along its path; its success as an ordering device depends on its power to reduce and simplify space.

Nevertheless, the natural corridor's function is not to isolate but to neutralise divisions and increase exchange if considering its character of privileged place of connection. It is crucial for ecosystemic resilience since extreme hierarchic and single-function divisions jeopardise (bio)diversity and shape fragile environments. Thence, the corridor's ambiguity as a device lies in its simultaneous capacity to join and divide flows and spaces to become a pure extension. Thus, it introduced the idea of "infinite measuring" possibilities in the history of representation and iconography of Western thought (Guida, 2015).

The Corridor's case demonstrates the close relationship between the spatial and cognitive
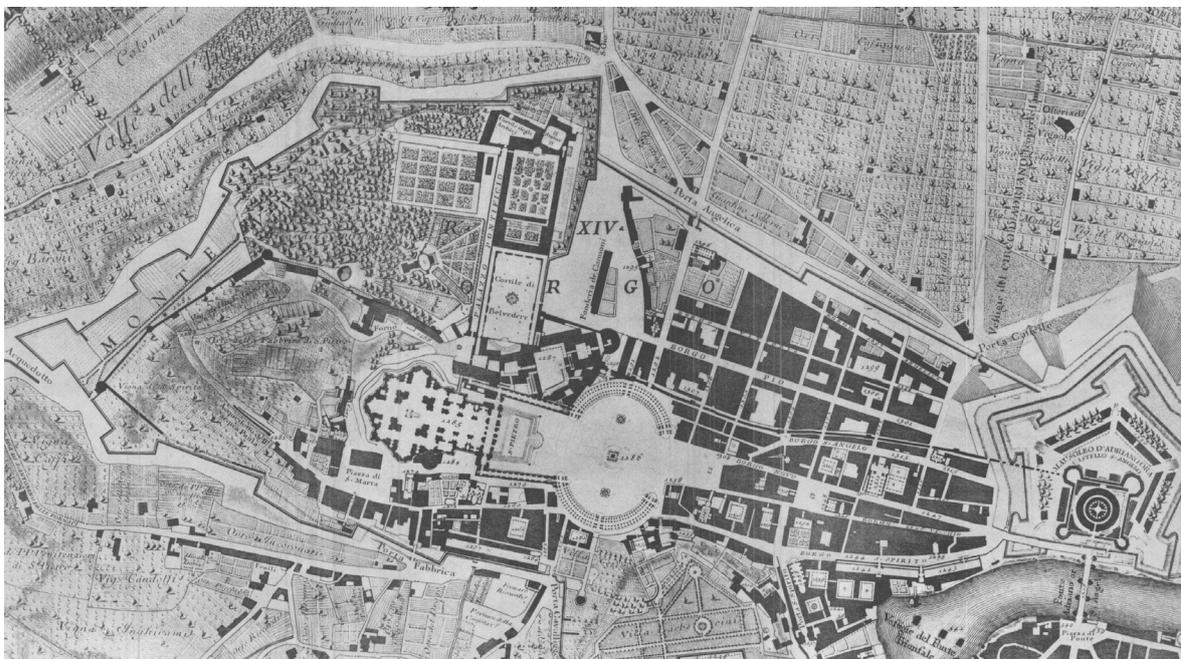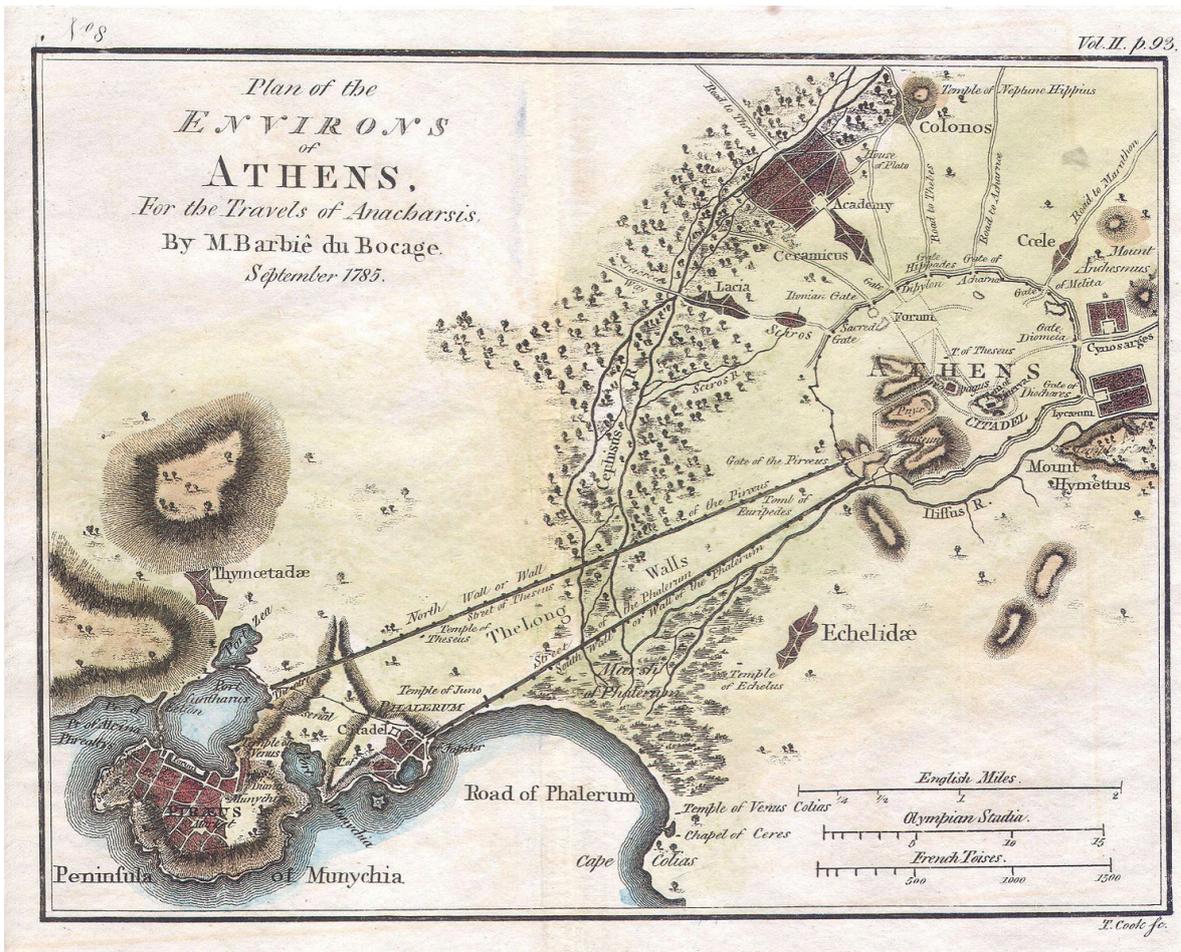
(Top) Jean-Denis Barbié du Bocage, Athens and the 'Long Walls' corridor to Pireus (Source: Geographicus Rare Antique Maps, https://www.geographicus.com/P/AntiqueMap/AthensPlan2-white-1793)

Giambattista Nolli, Map of Rome (Source: 1748-Earth Sciences & Map Library University of California, Berkeley, https://www.lib.berkeley.edu/EART/maps/nolli.html)

reductionism that could follow the instrumental use or distortion of figures and concepts and the consequential structuring of thoughts about space and the city. If the Corridor has taken on a historical role in understanding measuring and socio-spatial organisation – including classes –, the network is a fundamental metaphor of interaction for the access society, dissolving into pure virtuality. This work assumes the paradoxes of connectivity to interpret urban changes. The corridor is the essential device of networks without antinomy, and the network can be considered the new corridor: the more the interconnections, the more the network's spatial topology becomes a corridor.

By crossing the transient rearticulation of territories and the emerging highly connected urban constellations, the corridor progressively loses its original selectivity and hierarchy as multiplying and conceptually fading within the more desired and resilient network model. The corridor, as a metaphor, dissolves into its opposite. At the same time, its content reaches its full realisation through increasingly performing devices. Therefore, the corridor-room opposition is substituted by the corridor as a device of continuity. It becomes part of an "isotropic magma[2] where multiple directions announce a freedom of individual and collective choice" (Viganò, 2015: 7-8). Even if flows cross, decompose, fragment and penetrate it, the corridor remains an influential apparatus defining the contemporary urban and social space where our "freedom degrees" are stated, starting from movement (*ibid.*). So, the corridor's understanding implies permeability and porosity, isotropy and horizontality, democracy and equality. Such thinking is consistent with the paradoxical character of a simple figure, a powerful image with significant implications in contemporary society's (in)capacity to imagine space.

Unlike the concepts of Megacity and City-Region, the Corridor has not yet received the same attention in the scientific literature until growing interests in recent years. Although its significance relies on the function, views and scales of observation and design, from local to transnational, the corridor's origins as a planning and design tool lie in the idea of linearity in urban utopias – in some cases to continuity –, and the infrastructure domain. Thus, the corridor both links and represents urbanity. However, its evolution matches parallel discourses on transport systems (as intermodality, sustainability, integrated management, public-private partnership) and landscape ecology patterns, while governance progressively integrated it as a tool for network policies.

The transport field describes it as a collection of infrastructures whose layout and function can determine a sectoral vocation, frequently regardless of territorial socio-economic features. Likewise, the corridor is a cross-scale figure describing linear urban systems of neighbouring cities, held together by an efficient inter- or multimodal connection, whose spatial patterns result from a complex interweaving of economic, political, and socio-demographic developments. Geographical studies emphasise the importance of accessibility to significant transport infrastructure and the positive effects of the corridor's proximity on local econo-

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2   A set of expansive forces and matter, behaving uniformly in all directions.

mies and urban development. Similarly, economists look at corridors as strategic axes, infrastructure investments designated by institutions or governments with different scopes to develop a territory or economic integration between cities and regions, core and periphery. Finally, landscape ecology conceptualises the corridor as an ecosystemic mitigation tool. Still, it is also a region of space functional to the (de)territorialisation of individuals, communities and resources.

Therefore, it does exist a Corridor "polysemy" in the everyday language since the term refers to different functions and features, to key-concepts of crossing, interconnection, and linearity as a space of flows (Garavaglia & Pennati, 2016; Balducci et al., 2017; Perulli et al., 2017). It assumes biopolitical and transversal importance for environmental conservation and restoration, urban design and planning disciplines. As seen, the link between the Corridor and its various contemporary meanings depends on a few characters: a linear spatial development, the presence of flows, and clear alterity to the outside. Likewise, the corridor is historically a path of market distribution, territorial conquests, economic and human resources, information and culture, being a vector to the speed of changes. At the same time, it represents a place of pacification between territories, location of continuities or ruptures, an axis of conflict. **Therefore, the question is if the corridor persists as a compelling figure today, considering its increasing mobility-connectivity capacity and enhancement, although to the detriment of in-depth design elaboration when proposed in broader development or regional integration strategies regardless of territorial features.** Consequently, the character of the places they shape and the boundaries with the territories they cross both become particularly relevant, knowing the current dominant role of cities.

As fundamental as the Corridor to define and understand space, the Arc (or Arch)[3] was developed from figure to construction to bridge space physically in the arch's shape. It is known to follow the evolution of techniques, practices, and cultures as a design component. It is progressively modified, replaced and recalled by adaptation to functional requirements, monumental celebration, formal perfection and ideological coherence within a project.

Besides the architectural/engineering application, the Arc finds notional application as an ideogrammatic artifice joining non-aligned places sharing distinctive features into a curve. Above all, it is a clear spatial identification for collective imaginary as geometry and a load-bearing structure. It makes urban planning strategies or visions communicative and easy to understand as it ideally shapes an element made up of joint forces to stand. Thus, it formulates an idea of (in)tangible continuity and unity when applied as a notional arc to a territory. Its term can have a geographic meaning by detecting natural, topographic and geomorphological continuities or an anthropological connotation referring to a single cultural or biogeographical entity, bringing similar influences on the shape and definition of settlements in the same territory. Also, it can refer to areas conceived by planning tools as elements stitching fragmented regions, recovering forgotten land to increase density – such as indus-

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3   The research uses only the term Arc to avoid confusion, but both terms are valid.

trial brownfield sites along railways –, or finding space in an urban containment logic. Likewise, the Arc can refer to growth strategies on structural axes of intra- or inter-urban relations. It can define territorial perspectives holding together developments around structuring urban components, such as ecological connections or transport infrastructure. It can refer to places connected by a productive industry as an urban-economic backbone shaping a nuclear axis. It can anticipate transformation scenarios by altering an existing development paradigm, be a projection of latent possibilities and represent the continuity of resources, relations and ecosystems along strips between neighbouring and connected cities and regions – therefore mobilities and agreements –, beyond political boundaries up to pure virtuality. Thence, the Arc poses conditions to reflect on (inter)dependencies as centripetal-centrifugal forces of explosion and re-centralisation of functions, production-distribution routes bypassing congested centres, or exodus 'belts' of cities.

Although it does (apparently) find a universal definition neither in Urbanism literature nor in urban studies, the Arc is understood as a methodological tool for this research. It allows to question the distance between both tangible and underlying interrelationships in a territory – as ecosystemic connections –, and the actual existence of a corridor in experiential terms, either suggesting or not the need to create privileged structures to connect places and resources. Like corridors, those strategies defined as arcs have different meanings and scopes according to scale, from clusters of small- and medium-sized cities linked to a political or economic capital city (between centripetal and centrifugal forces) up to trans-territorial cooperation strategies linking greater urban archipelagos or global cities beyond regional and national borders. Therefore, the Arc can be both an alternative definition for an existing corridor or anticipate its implementation. Such an understanding allows considering policies and projects working for development or coevolution strategies, proposing new corridors or transforming the developing model of existing ones, and using the figure of the arc to enhance links between landscapes, hubs, urban areas and related commons. If political separations prevail, the arc becomes a watershed providing both the possibility of continuity and interruption.

Sharing a dual architectural and territorial character, both the Corridor and the Arc have their dignity as concepts, figures and processes rearranging articulations between cities and landscapes inside the broader phenomena of planetary urbanisation and competitiveness. Both terms gain significance according to the scale of observation and build knowledge about a territory through the variables involved in their design, implementation and transformation. Consequently, Corridors and Arcs are crucial to understanding the (in)tangible character of links and boundaries within their territorialisation processes.

The corridor is the etymological result of stratified movements and interactions along favourable paths and routes, making it valuable to describe and project fruitful links between resource-rich areas. The arc is a visual reference to foresee a physical and symbolic link of places, not necessarily to imply an existing functional connection, continuous axes or lengths, but anticipating mutual relations among territories and here used as a conceptu-
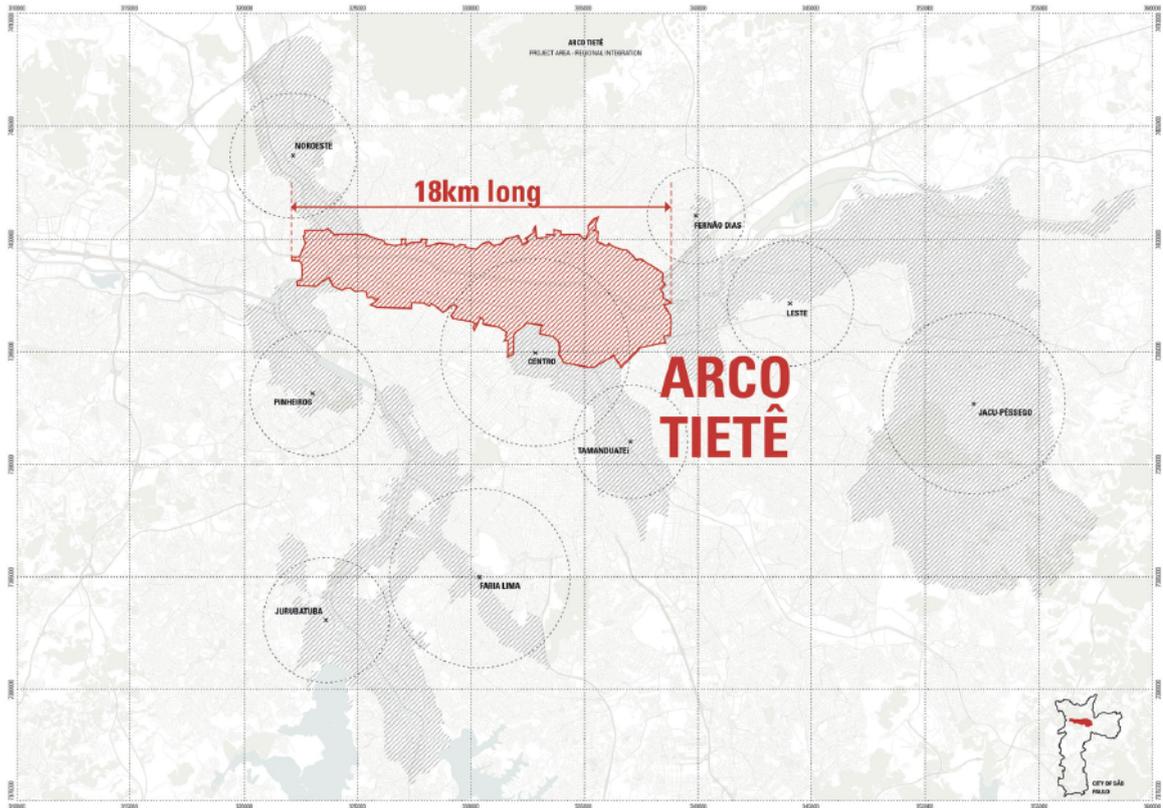
Arco Tietê's territory geography (red pattern) within the Metropolitan Structuring Macro-area (grey pattern) (Source: ht-tps://triptyque.com/en/project/arco-tiete/)

al integration. Together, they represent some favoured ways of urban development, deeply bonded to technology revolutions, ecological continuity and political-administrative control. As a primary reference within a cross-disciplinary migration, Corridors demonstrated to be a relevant element of discussion due to the expectations that they historically carry in directing urban growth, making places closer and facilitating socio-economic relations. In their development, they changed role, relevance, qualities, up to being questioned again in the last decade as a surviving component of urban and regional structures, even if the network has been gaining space for discussion and planning. At the same time, corridors have been used as a tool to provide a common ground of exchange between populations and economies, a shared infrastructure for development and vectors of prosperity, reaching supranational levels of strategic planning. Together with the corridor as a physical stratification of movements, the strategic idea to enhance regions or territories embedding great potential introduced the shape of the arc as an ideogrammatic reference suggesting connection and spatial continuity. Nevertheless, corridors and arcs remain a double-edged sword. Both refer to areas of expected growth and investments, although the risks of building speculation when trying to secure affordable housing, jobs, infrastructure, and services are high. Also, they should enhance territorial cohesion and active cooperation between and within communities. Still, they can intensify selectivity, hierarchy and inequality of access to city and citizenship, therefore stressing separations. Physical continuity does not necessarily connect territories involved, and the identification of commons is not the guarantee of continuity and union. Sure enough, the presence of (im)material political and administrative boundaries obstacles flows and capacities of intervention in the territory in a cooperative and coordinated way, questioning the relative tools and skills of integrated and participatory design. What will be the last point undermining the *conduit-border* relationship and favouring cooperation between communities and places?

The interdependencies created by these figures become even more necessary in a time of obsessive-compulsive dependence on networks where economic-political power systems determine isolations through the selectivity of boundaries. It is an apparent dichotomy[4] showing the most significant issues in any condition of systemic stillness (conflicts, environmental crises or endemic diffusions), making the flows visible as presence in their total absence. In a direction in which contemporary society cannot maintain its shape and course for long enough to consolidate itself, corridors and arcs emerge after a long development period – especially in peripheral countries and regions – and detonate the explosion of territory in multiple scales of rearticulation. Nevertheless, they already carry the conditions of their temporariness. In this framework, the (im)material but tangible relations between places and territories gain a privileged level of discussion: corridors and arcs are structures and phenomena that question the limits designed by the administration of resources, spaces and flows to build interconnected urbanities favouring a more balanced territorial perspective.

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4   Such understanding of the network-isolation relationship is the background assumption for the primary question of corridors and arcs as matrices of territorial structuring, being open to further investigations.

Within polycentric urbanised (inter)dependencies expanding worldwide, corridors and arcs are crucial figures of mobility, connectivity and continuity to question territorial rearticulation through the (im)materiality of networks and boundaries, therefore to imagine the urbanity of the 21ˢᵗ century in a resilient and rightsizing perspective.

Purposes and expected outcomes

The overall interest of the thesis lies in the evolution of concepts and figures describing the Urban, mainly concerned with the (inter)dependencies linking places, communities and systems through a critical study of their networked agents, flows and patterns. They are crucial features of the *zeitgeist*, thus of planning and design perspectives, from the room to the territory. Among them, Corridors and Arcs are privileged cases to discuss which variables make urban dynamics move towards stretched profit-oriented environments or resilient and rightsizing ecosystems, especially when ambitions of regional prosperity and competitiveness have to deal with urbanisation pressures. **By framing the hypothesis that Corridors and Arcs can still represent the matrix of territorial restructuring through (inter)dependencies, the thesis produces a theoretical-phenomenic study on these two figures as a dialectic between thicker networks and counteracting isolations. The aim is to verify the Corridors and Arcs' capacity to question the boundaries defined by the administration of resources, spaces and flows, and shape intertwined urbanities around a new territorial consciousness.** Nevertheless, it is not a matter of building a manual nor a global mapping. It is about a possible interpretation of how these figures represent (as dynamics) and influence (through planning and design) the directions taken by planetary urbanisation, the growing functional geography of platforms and the gravity built around archipelagos and clusters of competitive cities. As the research object is the building of knowledge about territorial rearticulations through variables of corridors and arcs, the thesis sets more specific objectives [(sOBJ1), (sOBJ2), (sOBJ3), (sOBJ4)]:

(sOBJ1) To highlight their power of (re)defining spaces and territories, therefore their role within regional processes and structures
Outcome(s): **(r.1.1.)** the recognition of constant and dominant factors, variables and paradoxes enabling corridors to spatialise and territorialise by objectivating relations according to paradigms differently, and the complementary function of arcs to stress latent continuities also where experiential corridors do not exist; **(r.1.2.)** a review of corridors and arcs applied as trans-scale figures within policy, programs, plans and design solutions to define levels and patterns of mobility, connectivity and continuity (and their implications) for the prosperity of regional interdependencies;

(sOBJ2) To demonstrate their greater significance and effectiveness when conceived by joining the perspectives of process, project and policy

Outcome(s): **(r.2.1.)** a review of the corridor's taxonomies and term appropriation by institutional, entrepreneurial and academic discourse, emphasising the weakness of approaches taking intervention, (spatial and relational) codes and practices, operation and transformation as individual matters; **(r.2.2.)** a qualitative collection of experiences (as international miscellanea) distinguishing cases according to the complexity of variables and their ability to overcome sectoral perspectives;

(sOBJ3) To enhance their understanding as conduits and links able to overcome boundaries, shape (eco)systemic complexity and preserve a "granular approach"[5]
Outcome(s): **(r.3.1.)** a discussion of (positive and negative) factors making corridors and arcs necessary components of an expanding and multiplying networked geography linking places, communities and resources at different levels, across scales and beyond administrative borders; **(r.3.2.)** the interpretation of systemic interconnections and interdependencies as the result of geographies of needs, landscape instances and site-specific analysis and responses, overcoming the 'One Size Fits All' logic;

(sOBJ4) To identify the impacts of their elaboration, transformation and adaptation on territorial equilibria
Outcome(s): **(r.4.1.)** the recognition of critical aspects influencing the dialogue of corridors and arcs (as of designation, design and implementation) with the places and territories they cross, according to the criteria of permeability, porosity and horizontality; **(r.4.2.)** the identification of experiences that applied the corridor/arc figure as a means to reduce differences, exploitation and segregation, and to overcome the centre-periphery perspective.

Methodology

Approach(es)

By observing the existing networks-isolations dichotomy as a combination of opposite forces shaping the Urban, the research defines a dialectic between them using Corridors and Arcs as their juncture: they are privileged places of connection and selection, mediation and conflict, able to extract the materiality of spaces and flows through tangible and intangible limits. **Corridors and Arcs are the research agents to understand the significance and issues of polycentric urban (inter)dependencies – from megaregional phenomena to localised experiences at the subregional scale –, thus the directions of urbanity for the 21st century.** The question is to address how the dualism of networks and isolations rearticulates

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5 Expression used by 5th Studio in the study for the Oxford-Cambridge Arc, referring to a planning and design approach starting from the particular conditions of places to encourage diverse responses (5th Studio & SQW, 2017).

territories through the theoretical, phenomenal and design value of the Corridor, integrated by the ideogrammatic and figurative capacity of the Arc. First of all, it demands understanding the multiple interpretations of both concepts and figures to highlight the heterogeneity of study and the existence of any cataloguing methodology, comparison or overlap with other concepts, and their incidence in the reference context.

The theoretical breadth of coverage, the historical-geographical extension and the multiple levels of discussion demanded by the topic oblige to limit the reflection to the Western world of capitalist economies in Europe and the Americas, specifically facing the Atlantic Ocean. This choice allows understanding the influences of reciprocal cultural contamination through corridors and arcs' development. Likewise, this work limits the investigation to urban forms, processes, and territorial structures, leaving aside the purely architectural nature in the subject's duplicity. Accordingly, it focuses on mobility, connectivity, and continuity while maintaining a transdisciplinary approach and Urbanism viewpoint. In fact, this research proposes itself as a transversal theoretical-critical path, which creates connections between different fields of knowledge[6], leaving a 'technocratic' perspective aside. Also, the absence of unbiased criteria to construct a global map of their identification and spatial delimitation (an issue demanding independent research) leads to investigate the various applications and interpretations across scales and the reasons that have led to a given urban growth or territorial form. This reading applies within the broader framework of historical trends that have influenced the origin and development of these terms, also contemplating unimplemented programmatic or planning proposals. Consequently, the recognition of archetypes and presence within historically established networks carry greater weight, especially within current planetary urbanisation and regionalisation processes. The complex approach resulting from these considerations required to intersect three following theoretical-analytical frames of reference [(a1), (a2), (a3)]:

(a1) Corridors and Arcs as 'lines' of socio-spatial understanding in the Western thought
The reconstruction of the Corridor paradigm as frequency and analogy in the City-Territory debates – through an "archaeology" of its ecological, physical and linguistic significance (Guida, 2015) – highlights two aspects: its ambiguity as a spatial device of union and separation; its paradoxical dissolution as a metaphor. The tree-like connectivity makes way for the network resilience through increasingly efficient corridors materialising as pure extension up to fading into the pure virtuality of networks. If questioning order as form implies investigating Function, understanding the nature of corridors – hence doorways/thresholds – means comprehending the nature of networks – hence connectivity –, from ecosystemic resilience to individual interactions. It highlights how the interiority-exteriority distinction blurs in a globalised world. Therefore, studying the corridor as

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a device of subjectification means understanding how it transforms a region of space into a territory through boundaries and access. Thence, the corridor is a place of heterotopy as *région passage* (*ibid.*): space which orients, arranges and defines the interior differently from the exterior, objectifying territories through deterritorialisation processes.

Intersecting the network isotropy and its definition of spatial transitions, the Arc stresses the persistence of centripetal-centrifugal relations in urban explosion/implosion with a centre, a natural or anthropic boundary. At the same time, dynamic foci of human activity and their territorial discontinuity between sequences of "bound landscape" emphasise the possibility to apply processes of urban (re)definition and development as "nuclear attractor schemes" (Gausa, 2003). The Arc demands to shift the focus from radial expansive and extractive dependencies to latent territorial continuities as spatial systems that support transversal interactions. It means understanding the in-between space of planetary urbanisation as a substantial space, the empty-full relationship as the outcome of the fractal character of current urban typologies, and the systems of "(inter)linked fingers", "interfingers", or osmotic connectors (*ibid.*).

(a2) The Corridor and Arc's taxonomies shaping (and scaling) the 'flow city'
From a focus-based or holistic perspective, the literature organises the multiple qualities and functions assumed by the Corridor into taxonomies, differently declined in political, institutional and scientific discourse according to the diversity of the places it crosses. Currently, no comparable critical review emerges for the multiple meanings that the Arc can assume. However, it is possible to trace different levels of meaning from the reading of the Corridor and the latent interdependence and continuity relations that this figure can highlight. Likewise, a broader understanding of both terms detects their application as urban growth devices and emerging urban forms, which can be investigated in the (inter) dependencies – as intensities – across territories and scales, within and between systems. Assuming the *Making Room Paradigm* as the acceptance of a planetary transformation process to be prepared and channelled (for this historical period), the understanding of corridor and arc strategies demands further consideration. The great functional drivers of urban expansion apply their accumulation strategies regardless of broader systemic changes, while the urban and regional planning trends are often limited to following the expansive currents of "platform capitalism" (Perulli, 2017). Besides, local economies are being increasingly integrated into regionally configured territorial units. Concurrently, a postmetropolitan explosion of urban forms and functions continues to scale up by taking over wilderness for more operational landscapes, and territories try to accommodate a rapidly changing socio-economic organisation of the *space of places* and the *space of flows*. Together, Corridors and Arcs lead to reflect on the competitive advantages of growing urban archipelagos, the development perspectives for clusters of small- and medium-sized centres and the emerging forms of city-space interaction that overcome traditional urban/non-urban distinctions and (im)material but tangible boundaries.

(a3) The conduit, the system and the territorial principle: a coevolutionary consciousness
If corridors are stratified flows linking people, places and interests, both their positive evolution and other projection into arcs of development against fragmentation is jeopardised by the persistence of resource-intensive and sprawl-oriented development models. Moreover, both elitist forms of planning and trends of diversified regionalism, or territorial nationalism[7], risk exacerbating spatial and socio-economic differences to the advantage of the more prosperous regions. In a *system-based* perspective, understanding the Corridor as a *conduit* and the Arc as a *circuit* beyond artificial boundaries allows overcoming sectorial meanings and monocultures to create multifunctional linear systems (beyond transport concerns), supporting interdependencies' geographies. Likewise, assembling active networks brings benefits to the whole territory as a complex ecosystem and (im)material heritage. Thus, corridors and arcs are an opportunity to challenge design intelligence by reviewing the distorted centre-periphery and humankind-nature relationships produced by the civilisation of machines, economic globalisation and financial capitalism. They are some possible figures to reinterpret the territory as a human environment and common good in a coevolution and cooperation perspective between places and communities for a new anthropic civilisation and a "return to the territory" (Magnaghi, 2020). Such reterritorialisation as enhancement of "place consciousness" and bottom-up relations between places and flows, human settlement and environment, concrete community and institutions is a possible solution to technological, functional optimism (*ibid.*). It is already shaping an autonomous, artificial, hyper-centralised second nature towards the re-appropriation of control over community life by finalising innovation.

Structure and Methods

In compliance with a dialectical (qualitative) approach, the research focuses on evolving understandings of connections and separations shaped by urban interdependencies to demonstrate that Corridors and Arcs are nothing but the reinvention of the same over time. The Corridor is the sharper lens through which to read changes in territorial articulations, moving from mobility- and connectivity-driven study paths to see how they influence systemic equilibria. Besides, introducing the Arc allows integrating the discourse with hidden spatial and territorial continuities and interventions that overlap or question the presence of a corridor. According to the research hypothesis, this combination is the extreme place to verify the strengthening of (inter)dependencies within networks and isolations. Because of this reasoning, the research stresses the existence of underlying spatial/territorial relations between cities and communities as a structural feature in corridors or arcs develop-

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7   As a work developed in the field of Architecture and Urbanism, this research does not explore the ideologic, conceptual, and economic question of nationalism(s) and regionalism(s). However, it is important to highlight their existence as the basis of transformation processes of space, place and territory to understand the contrasts generated by corridors and arches and the pushes that drive their formation.

ment, especially when considered a partnering strategy for growth. By employing both figures as research agents, the study revolves around corridors and arcs' persistence – whether making them able to reduce or extreme differences – through a deductive-inductive, illustrative and criteria-based methodology and according to interdependent study understandings: (1) the significance of corridors and arcs as processes, structures and impacts on territorial rearticulation; (2) the evolution of the theoretical-practical consistency of the corridor as the primary reference; (3) the practice and flexibility of both figures as tools for territorial balances; (4) the intrinsic questioning of networks and boundaries' (im)materiality. Therefore, the research structure organises its contents as follows:

(p1) Framework: the Corridor's debate and introduction of the Arc as a methodological tool
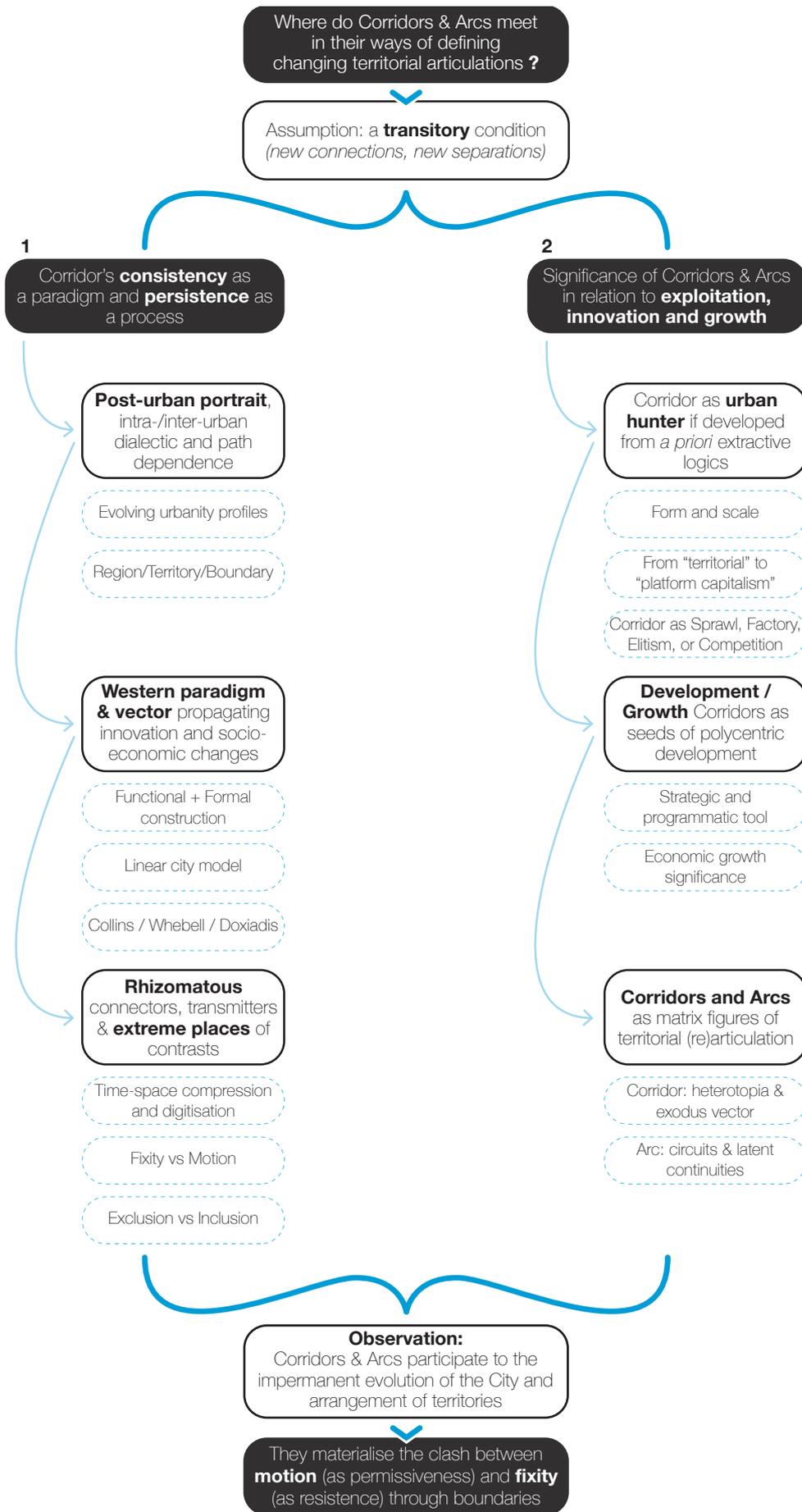The first part of the research assumes a deductive rationale to understand how the corridor's phenomena, historicity and interpretations materialise in localised experiences and how the term arc can integrate other perspectives on urban processes. This combination aims to identify the values behind the corridors and arcs' elaboration and functioning. Supported by historiographic, cartographic and iconographic analysis, the study unfolds as a focused literature review on the role of corridors and arcs in planetary urbanisation and the 'city of flows'. Essential for this research are 'development', 'growth' or 're-structuring' versions of corridors and arcs as crucial processes, policies and projects in (re)defining territorial futures, where each level of (inter)dependencies is a backbone of transformation processes. The purpose is to show the reciprocity between creating and interpreting Corridors and Arcs in Western thought, including the evolution of different meanings as part of the process.

(p2) Collection: a trans-scale illustrative selection of transformation processes
The second part of the study follows an inductive path, producing an illustrative and selective collection of corridors and arcs as research-and-practice 'episodes' that exemplify their presence across different scales. Each case is observed as a specific landscape of study, geography of needs and project of interactions across the multiple boundaries of the planetary body. By organising the (im)material presence of corridors and arcs according to a parameter of territorial extension [(XXL: > 2000 km - S: < 50 km)], the research chooses some places on the planet between Europe and the Americas where these elements appear as megaregional and subregional study, project, and policy experiences. This shift in scale makes it possible to understand the construction of complex systems of urbanity from the (inter)dependencies of large urban agglomerations to chains of small and medium-sized centres. In contrast to a classic case study research, the research uses the collection of cases as a whole to argue Corridors and Arcs as a repetition of the need for interactions between places in human history, highlighting the different ways and problems in which this occurs today.

Constraints and valuable aspects

Compared to the breadth of available references and data to understand the relationship between networks and isolations across multiple themes and scales, an accurate reconstruction of the Corridor and the Arc as meaning to question the rearticulation of territories in the 21st century presents theoretical and practical obstacles. First, the conceptual ambiguity and the absence of a 'consecrated' definition of the Corridor is acknowledged. The multiplicity of interpretations, approaches and criteria results in multiple taxonomic levels of reading and intervention on the territory. Second, the fragmentary nature of possible databases and the absence of common indexes impede a complete classification and mapping based on location and geographical extension, which remains arbitrarily defined. Complications arise from the availability, quality and quantity of data compared to the spatial extension of corridors, which cross different government boundaries and levels, apart from involving a wide range of actors in their study, construction and transformation. These problems have repercussions on introducing the Arc as a methodological tool and on the aspects to consider for an accurate reading of experiences internationally underway. However, the materialisation of corridors and arcs as figures, processes and practices makes evident a series of variables and contradictions compared with the thematic readings of networks and isolations. Such perspective provides the basis for a possible qualitative reading of their presence as pathways to imagine the urbanity of the 21st century.

Where do Corridors & Arcs meet
in their ways of defining
changing territorial articulations **?**

Assumption: a **transitory** condition
(new connections, new separations)

1

Corridor's **consistency** as
a paradigm and **persistence** as
a process

Post-urban portrait,
intra-/inter-urban
dialectic and path
dependence

Evolving urbanity profiles

Region/Territory/Boundary

**Western paradigm
& vector** propagating
innovation and socio-
economic changes

Functional + Formal
construction

Linear city model

Collins / Whebell / Doxiadis

Rhizomatous
connectors, transmitters
& **extreme places** of
contrasts

Time-space compression
and digitisation

Fixity vs Motion

Exclusion vs Inclusion

2

Significance of Corridors & Arcs
in relation to **exploitation,
innovation and growth**

Corridor as **urban
hunter** if developed
from *a priori* extractive
logics

Form and scale

From "territorial" to
"platform capitalism"

Corridor as Sprawl, Factory,
Elitism, or Competition

**Development /
Growth** Corridors as
seeds of polycentric
development

Strategic and
programmatic tool

Economic growth
significance

Corridors and Arcs
as matrix figures of
territorial (re)articulation

Corridor: heterotopia &
exodus vector

Arc: circuits & latent
continuities

Observation:
Corridors & Arcs participate to the
impermanent evolution of the City and
arrangement of territories

They materialise the clash between
motion (as permissiveness) and **fixity**
(as resistence) through boundaries

Conceptual links to build the research framework (Author)

1 /// FRAME

Overview

The first part of the research explores the meanings of Corridor and Arc to detect where they meet as concept and space in their ways of defining the temporary articulations of territories. It starts from the Corridor as the most documented figure in literature to analyse the use of the term with the evolution of the City and the constant need to find adequate definitions for the changing configurations of the Urban. Bearing in mind its role in multiplying and expanding flows and the lack of a universal and univocal definition, the Corridor is investigated according to two perspectives suggested by the literature: an intra-urban and inter-urban dialectic as a process of densification and polycentric development; and path-persistence as the result of the historical stratification of movements and exchanges along privileged routes. Furthermore, the corridor's inheritance from the linear city model and its assertion as the frontier of urban expansion are analysed. Crucial is the comparison with the perspectives of Collins, Whebell and Doxiadis to understand how the corridor unfolds as a qualitative modular model, economic landscape and transitional form, and its nature of historical paradigm and evolutionary concept. Thence, the research reads the corridor as an urbanisation and regionalisation process that develops from the impulses of mobility and connectivity. This perspective highlights the clash between growing polycentric interdependencies and physical, institutional, social and identity resistances; thus, the corridor manifests as a primary connector and a place of intense contrasts while building spatial continuity.

Including the opposition between movements and resistances, the taxonomic levels of the Corridor – infrastructure, economy, urbanisation, institution – are analysed to understand the influence of its term and image ambiguity on its practical application. If a functional interpretation of platform capitalism prevails, the corridor takes obsolete land appropriation, exploitation and consumption paradigms to extremes, becoming an urban hunter. Particular attention is paid to corridors appointed as development (or growth) from investment in significant constructions regardless of the territory's needs or broader cohesion projects. In order to understand the historical shift from analytical to strategic-programmatic purpose, the research compares the corridor in the American and European experiences. It focuses on the different approaches to the integration of infrastructures in territorial planning and transport policies. Thence, the research introduces the Arc as a methodological tool to include in the discussion territorial articulations developed from centripetal and centrifugal urban relations and evident or latent continuities between places, not necessarily connected by an operative corridor. Consequently, the research analyses Corridors and Arcs from the City-Territory and City-Region perspective as an ecosystem of interdependencies between societies' activities and their environment.

The research also analyses Corridors and Arcs with polycentric networks and growing trends

of isolations. First, considering the (im)materiality and selectivity of borders allows observing the meaning of both figures with the value, quality, and intensity of relationships within and between territories. It also enables highlighting the emergence of new differences and inequalities within the urban explosion. On the one hand, the territory's image as a context of community life is undermined by the processes of despatialisation and deterritorialisation of the urban exodus. On the other hand, populist and sovereign rhetoric overlaps the idea of preserving local identity from the 'city of flows', while nationalisms and differential regionalisms strengthen divisions between territories, especially for different levels of competitiveness. In this context, the research analyses the corridor as a double deterritorialisation process within the construction of regional urbanisation and isotropic magma of flows. As heterotopia, it marks the passage from one territory to another; as a vector of exodus, it gives access to the consumption of the planet by human activity to the point of breaking the relationship between humanity and the environment. Also, the centrifugal and centripetal tensions of the arcs move attention from the boundaries of urban and territorial control to circuits of dynamic places and the intensity of latent relationships. The aim is to highlight the growing simplification of spatial geography as a full-emptiness system in which metropolitan nodes emerge as functional attractors. They lead to the detriment of small local realities, which move towards a progressive shrinking as peripheral and marginal locations in the space of flows. This understanding allows reinterpreting Corridors and Arcs as possible 'lifelines' rather than tools for organising urban regions according to production-circulation logics and redefining the link between communities and places, also in terms of spatial contraction.

1.1 /
From mobility to continuity through connectivity (...)

As a reorganisation of spatial arrangements and hierarchies through crumbling demarcations, exploding dimensions and striking juxtapositions, the evolution of new urbanity profiles destabilises the traditional understandings of the City and the Urban by erasing old differences and producing new inequalities. Since the City (apparently) died somewhen in the 20th century – not leaving its palimpsest and ruins as lifeless remains, but changing nature (Friedmann, 2002) –, the need for accurate portraits of transient blurring urban configurations proposes tentative interpretations from different perspectives and archetypes. Nevertheless, they maintain shared themes such as polycentric urban forms, trans-scale city connections and the rise of "ever-larger urban regions embedded in thicker global networks" (Smith, 2016). **Within such uncertainty in describing the Urban, the corridor affirms itself as a pervasive urban profile grown from ever more intense flows within territorial reciprocities reinvented over time.** Its definition refers to a city model evolution that welds and pervades expanded urban cores and takes over the rural environment in a boundless territorial system densely innervated by resource, commuting and digital connections. As a privileged place in the space of flows, the corridor's development is bonded to traffic and infrastructure, therefore technology, as the paradigm of modernity. Also, it is both the cause and the consequence of the socio-economic processes that agglomerate more extensive and ramified urban systems. Among the ongoing phenomena, the corridor represents a specific category of ambiguity that deserves further understanding as it represents a bearer of megaregional developments.

1.1.1 / The corridor: a portrait of post-urban territories in the 21st century

> The variety and complexity of current forms of urbanisation make it necessary to study phenomena that are organised on various scales and extremely dynamic, in order to understand on which axes the emerging trajectories of socio-spatial differentiation are based.
> (Brenner & Schmid, 2014 in Garavaglia, 2017a: 47)

Although occupying only 0.5% of the planet surface, the evidence of the literal and figurative presence of cities on the map is a global condition since the millennium's turn: such a growing and spreading results from unprecedented massive urbanisation, a multidimensional phenomenon running on average at twice the population growth rates (Burdett et al., 2018; Herrhausen, 2018). Such a presence relies on political-economic and socio-environ-

mental interdependencies across vast geographies and unbounded morphological configurations, depending on the pace and types of technological advances and cycles. Together, these trends produce the dramatic expansion of megacity regions and far-reaching worldwide socio-spatial transformations as "supersized, multicentred, networked urbanities" (Velikov & Thün, 2010: 364). Such emergent territorial and landscape articulations deal with constant instability and new plural urban questions, opened by recognising the multidimensional, liquid, and complex character of modernity (Bauman, 1999; Morin, 2012). Consequently, they take distances from the legacy of concepts, categories and methods more plausible to describe cities in the late 19th and early 20th centuries.

Notoriously, communications, traffic, and cultural features enabled the rising metropolis to penetrate the erstwhile countryside within an expanding urban-rural continuum. Since then, the sprawling process was fuelled by the city's promise of prosperity thanks to its concentration of income-generating activities, innovation and knowledge. In a few decades, Simmel's celebration of the *Metropolis* (1903) as the incubator of societal transformations, place of complexity, variety and discovery – not without conflicts with individualism and cultural alienation – turned into Mumford's criticism of the *Megalopolis* stage (1938) as an overlarge symbol of disorder and degradation in the city evolution process[1]. Thus, "a city suffering from gigantism that swallows up the surrounding space" became manifest as reaching vague distinctions and overcoming political-administrative borders while increasing local policy fragmentation and inner territorial competition (Garavaglia, 2017a: 32-33), supplanted by the term *Megaregion* in contemporary urban discourse for "continuously developed urban geographies" (Thün et al., 2015: 24). This process has changed the requirements for spatial regulation, planning and interconnection between increasingly mobile and hybrid urban populations, introducing the need for horizontal and vertical coordination of spatial governance bodies. The same term has marked the urbanisation of the American Northeast seaboard in Gottmann's studies (1961) – also known as *Northeastern Corridor* – as the complication of mono-centric geometry and expansion of the urban scale, exploding those traditional spatial boundaries against which the city "abruptly ends" (Brenner & Katsikis, 2014). If the new urban model saturated and overtook regional space, expanding trans-territorial interconnections and service- and knowledge-oriented production increased cities' economic role and induced further profound changes in urban form.

When territorial metropolisation started in the 20th century, the geographical contrasts distinguishing the City from the non-urban realm remained relatively stable. They were consistent with discreet, discreet, and universal territories, defined by major demographic and socio-economic shifts, thus socio-spatial differentiation. Nevertheless, these oppositions were preserved as urban sprawl represented the dispersion of the core city's constituent fea-

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1   In his *The Fourth Migration* essay (1925), Mumford argued that transport, energy and communication technologies would allow more dispersed urban forms and accelerate a massive migration of urban population into distributed urban regions. Some 30 years later, in *The City in History* (1961), he recognised the city explosion as a functional and organisation scattering "over the entire landscape" and a diffusion of its power structures and control (Thün et al., 2015).

tures outwards, extending the usual reading and judgment tools to different urban processes than before. From Burgess's "dartboard" model (1925) to Friedmann's "world city network" (1986), the Urban leaves the confined territory with a high concentration of populations in concentric rings to become the node of a global network of international investments and corporate control made of capital flows, while the non-urban, the hinterland continues to be a void functionally and geographically disconnected from the urban condition. The inherited in-out binary labels only became obsolete ideological projections when understood as the image of a vanished pre-industrial geohistorical formation, no more representative of an ambiguous object requiring new cognitive maps and lexicon to express socio-spatial divisions. The city flattened differences. It eroded territorial and lifestyle boundaries and blended urban, suburban and rural urbanities, while de- and re-centralisation defined intra-metropolitan geographies and the emergence of an information-intensive, globalised and polynucleated city region. Following Lefebvre's intuition of the planetary urbanisation of society (1970), the extension of cities' features everywhere to human activities and the epistemological shift from form to process replaced the old dichotomy, focusing on the understanding of urban functions both as explosion beyond a critical threshold and as new evolutionary paths. Concurrently, the difficulty of isolating the Urban in stable and definitive labels leads to reasoning also in "postmetropolitan" terms (Soja, 2000). Urban regionalisation is overcoming traditional interpretations with the increase of environmental degradation and social polarisation, even questioning the persistence of a distinct field of 'urban' studies.

Still, the definition of Boundary remains an underlying aspiration – together with Centre and Hierarchy –, necessary for the City dialectic, the distinction between any system and its environment, and the understanding of space according to homogeneity, identity and belonging. By applying a physical or ideal artifice on the indistinct character of the earth's surface, the boundary reflects the action of society in defining a territory as a continuous reconfiguration of space and the uniformity of characters, functions or themes in delimiting a region (see paragraphs 1.2.1 and 1.2.2). If it does not adapt to the power of form and slow change of geography (which bends human action), the boundary reveals the restlessness of societies in the geometries resulting from clashes, conquests and claims to capitalise on land division control. With the Boundary, it emerges the difficulty of containing the urban explosion and the question of *rĕgĕre* (lat. = lead, direct, govern); in other words dividing land into institutional delimitations by superimposing the mesh of government – both by policies and projects – on the changing rearticulations of territory far beyond the relations of spatial proximity, including virtual space. Moreover, the distribution of the drivers of territorial change (and the related force fields) in the current liberal and (not always) democratic regime always maintain a margin of evasion from the control of political-administrative divisions (except for utopian capacities of absolute control).

On the one hand, the regional urban dimension seems to replace the city as a place of innovation and (de)generative power – with its conflicts in the expression of the right to the City and citizenship – in complex agglomerations overlapping and blurred urbanities (hori-

zontal boundaries). On the other hand, central-peripheral regional models apply a hierarchic organisation of the territory (vertical boundaries), leaving communities' bonds with places and their singularity at margins of significant flows, interests, and powers gathered in metropolitan nodes. This condition triggers isolations such as differentiated autonomy, ostracism from competitiveness, and barriers to cooperation, generally justified by identity discourses of regionalism and Territory understood (in an obsolete way) as a nation-state. Therefore, the boundary is confirmed as a dialectic place between urban processes and knowledge, spatialised presence and government. Crucial is the distinction between the City and urbanisation to understand the new dimensions assumed by the Urban and the difficulty in circumscribing and contextualising it. However, the City reaffirms itself as a conceptual presence and persistence resilient to every historical passage that influences urban theories, regardless of the shifts and changes in the value – therefore thickness, materiality, porosity and flexibility – of its tangible and intangible boundaries. It is not the contingency of the material city and the explosion of its boundaries that decrees or not the City's death as a concept. The post-urban scenarios themselves are dimensions that can coexist while being different and moving in various ways. The City does not apply to specific materiality; it overlooks it. Therefore, the introduction of the Urban's concept (moving towards the consolidation of post-urban profiles) does not deny the City, but it describes a contextualised transition (today) in the City's nature, which finds a constant need for attention in the uncertainty of its boundaries.

Assuming the Urban as a specific place and a global transformation process, disciplines concerned with space continue to investigate concepts, figures and criteria for a comprehensive, integrative, even complementary description. In this ongoing process, the nomadism and transmigration between different fields are necessary to respond to any reductionist approach for an interpretative knowledge and a long-term vision. As seen, the "prefix *mega-*" came into use to describe broader functional scales, their uneven distribution, incoherence and resistance to being unequivocally recognised (Thün et al., 2015), although being partially effective. Some terms have been neither adequately defined nor mapped sufficiently and consistently, producing a considerable meaning overlap and unspecific application of parameters, making any global comparison challenging due to different data sources, methods, and understandings. Also, aggregated interpretations using population density indexes and remote sensing imagery to describe megaregional processes are biased. In agreement with Garavaglia (2017a), their boundaries are imprecise and arbitrary according to the predetermined region for research while they satisfy a diachronic reading of urban growth at the macro scale[2]. The urban explosion in regional and virtual space inevitably broadened in-

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2   Such criticism is moved to studies like those developed by Florida on the *megalopolis* (2006), followed by Soja and Kanai on world urbanisation (2014), attempting to create a 'snapshot' of the Urban as a massive data collection per stock. In this regard, Brenner and Schmid argue against the interpretation of urbanisation processes by the *Urban Age* thesis as based on aggregate figures, a "flat, liquid urban domain, covered by an undifferentiated wave of building sedimentations, tending to be homogeneous and the same everywhere" (Brenner & Schmid, reference in Perrone et al., 2017: 32). Nevertheless, studies like the *Urban Age* project represent steps to achieve a complex understanding of urban dynamics starting from the most prominent features, enabling comparisons between the most significant urban concentrations. They provide facts on the urban presence to engage academic thinking, city governments and institutions to help deliver sustainable urban change.

terests from nodes, urban equipment stocks and macro-indicators for internal-external comparison to consider the city as a territorial relational system and social construct, considering multiple spatial contexts beyond the administrative subdivision of territorial data.

According to this perspective, the Corridor covers a crucial role in representing the explosion of urban boundaries through connective infrastructure, up to be read as an evolutionary stage of the City growing beyond its traditional 'thresholds'. Its concept refers to diverse realities, encouraging both conceptual and notional exchanges between institutions, economic operators, the civil society, and academic thinking. Likewise, it is subject to "misconceptions" as a spatial concept like the other terms of representation of urban growth, and it recalls the same "prophetic anxiety" announced by Hecksher for the dramatic power of Gottmann's *Megalopolis* – as a new phase of civilisation – compared to the rise of the megaregion (Pain, 2016: 1). Current studies aim to clarify the evolution of knowledge on its theory, construction, and governance from different perspectives, including the comparative analysis of experiences promoted and implemented either by public or private actors.

As a general definition, the Corridor refers to a space of performance, a system historically developed to connect resource-rich places and accommodate growth through the regulation of movements and connections. Having been introduced with a geographical meaning – as *territorial corridor* –, it brings together the intertwined meanings of engineering work, process and strategic choice, offering support to construct systems of urban (inter) dependencies. It embodies complex logics, defines new socio-economic assemblages and carries development dynamics shaping trans-territorial networks of centralities, therefore a reorganisation of planetary hierachies rather than merely building links between places or representing a fixed collection of infrastructures. Although a series of conceptual interpretations describe it as a distinct spatiality from the metropolitan and rural territory, the development dynamics of settlement and production systems along connective infrastructure demonstrate that the Corridor is bound to regionalisation, especially in advanced economies. Likewise, it cannot be linked anymore to the image of urban growth "frontier" into the *Wilderness* – as already occupied by sprawl and *operational landscapes*[3]– nor be considered a form of "generic periphery" (Garavaglia, 2017a). Moreover, the centrality of places today relies on connectivity, attractiveness (on people, knowledge, products and capital), and infrastructure role in local development processes, which triggers a competition between cities to make them nodes of main flow arteries. If the space of movement, exchange and communication organises settlement and community processes in the society of flows, the corridor has a "deterritorialisation" power on urban processes, namely to modify the relation of a portion of space with its regional context (Guida, 2015). Still, a synthesis approaching this figure as the result of sequential developments is weak, especially in transport and communication fields.

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3   See Brenner & Katsikis, 2020, "Operational Landscapes. Hinterlands of the Capitalocene" (in Wall, 2020) for a thematic insight on the hinterland.

Apart from the ambiguous use of the Corridor concept as a synonym for linear-shaped urban areas across scales, neither many studies, universal indicators, or systematic transferable approaches are available to delimitate and classify its multiple expressions, even if several qualitative case studies exist. They could only provide the tools to build global inventories as a rough approximation or a list of potential *urban corridors* (Georg et al., 2016a)[4]. Existing research reports the absence of specific spatial parameters, coherent and non-fragmented criteria and databases for a universal understanding of a global phenomenon. This condition leaves the concept application at the discretion of the individual study rather than a discipline, running the risk of reduced objectivity and fragile results. According to the framework – and the risks of providing a sectoral perspective –, some corridors could be omitted for lacking information apart from start and endpoints or spatial ratios. Likewise, the possible interpretations of the Corridor as a process, infrastructure, programme, and strategic tool for public policy and design highlights the distance between the device potential and the final result. However, their distribution reflects the link between human activities on the planetary surface, including the air space. In this sense, three main approaches contribute to a reliable mapping of corridor dynamics within planetary urbanisation [(x), (y), (z)]:

(x) The Boston-Washington region is the primary theoretical reference of comparison as the first metropolitan region historically recognised as a corridor, sparking off a debate on which parts of the earth's surface can be compared to this typology;

(y) Global infrastructure mappings provide the main (in)tangible routes through which (im)material networks are being built across territories, also accommodating corridor-like agglomerations in the most favourable places for urban prosperity, particularly along seaboard and water bodies;

(z) The identification of (mega)corridors as capital-producing factories highlights the most visible manifestations of extreme infrastructural development bringing the points of extraction and consumption closer in a space-time contraction.

As complementary perspectives, these approaches integrate macro-systemic readings and more consolidated theoretical references from intra-urban to inter-oceanic exchanges overcoming geographical constraints, including the Beijing-Pyongyang-Seoul-Tokyo system or *BESETO ecumenopolis*. Highlighting a greater concentration in Asia, North America and Europe, the distribution of these multiple forms of the corridor on the map mainly reflects the increase of exchange 'channels' between places from historically sedimented routes.

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4   In this sense, the research developed by Georg, Blaschke and Taubenböck as a conceptual spatial approach is exemplary of the issues to define, delimitate and map the new dimensions of urbanisation through what they define a 'common denominator'. The analysis includes large urban areas explicitly classified as *urban corridors* in the scientific literature summarising standard definitions and excluding interpretations only related to economic development or growth zones. Although the attempt to parametrise and identify the main features to distinguish corridors on a planetary level (through remote sensing data and methods, supported by the conceptual basis of literature review and the elaboration of a questionnaire), the authors are aware that the established thresholds may be artificial delimitations and risk to provide a subjective viewpoint on the question. Nevertheless, such difficulty depends on the lack of global and consistent free-of-charge data sources. Thus, the study provides a first rough map that the authors suggest to verify further and implement.

Likewise, they materialise cities' political – therefore, economic – decisions to advance infrastructure for increasingly seamless mobility and connectivity as a condition for growth. Thence, they became a dominant concern for urbanists, planners and landscape architects since the early 2000s. Despite efforts, these extreme mappings continue to clash with the absence of a univocal term and method to distinguish corridors as a process from the mega-region, urban agglomeration, or the megapolitan phenomena (*ibid.*).

The effectiveness of the corridor as a compelling figure for contemporaneity – in terms of linear model and front of urbanisation processes – is still being questioned (and should be explored further) in its capacity of explaining some urban development logics and overturning territorial marginality, when not creating large crossing structures as a threat of negative externalities. At the same time, corridors historically carry expectations in directing urban growth, making places closer and facilitating socio-economic relations, which have been questioned again in the last decade as a surviving component of urban and regional structures, even if the network has been gaining space for discussion and planning. **Given the need to clarify its significance concerning planetary urbanisation and regionalisation dynamics, the corridor should be framed in an "inter-urban and intra-urban dialectic" on spatial development as increasing metropolitan core density and polycentrism (Pennati et al., 2017). Likewise, it should be interpreted by highlighting its path persistence with the circular and cumulative character of its evolution as a spatial phenomenon, according to a "cause-action" logic (*ibid.*)[5].** Such an approach suggested by existing studies is crucial to understand corridors as flow, transformation, and definition of territory, given the clarification of their meaning, as the literature suggests. However, the thesis's necessary premise is a deep relation linking privileged connective paths to the ability to transmit a territory's change, the corridor to a transformation model.

1.1.2 / The transmitting power of technology

As a subject matter, the Corridor received significant contributions by geography, particularly in analysing urban systems and economies related to transport technologies. In this field, it is primarily interpreted as a multimodal entity, backbone of transport networks linking articulation nodes, and form of urban development associated with economic, infrastructural and technological processes between neighbouring centres (Rodrigue, 2017). Each city network concerns a market share depending on the regional geography, infrastructure investments, and flows involved in a metropolitan area. **Either a functional operational reality or a formal construction (or both in the most structured examples), the corridor usually lies at the intersection of economic, demographic and geographic processes, as it performs both market-serving and market-connecting functions.** It combines the physical

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5   Pennati, Garavaglia and Perulli (2017) call these questions (and study results) *'inside out + outside in'* and *'path dependence + innovation'* as part of the 2010-2011 *PRIN Postmetropolis* research on the forms of Italian urbanisation.

connective networks and facilities with the intangible infrastructure of capital, knowledge, labour, and resources applied to its substantial structure, including agreement, transfer and negotiation abilities within a specific political, financial, and legal context.

Thence, the Corridor's notion is contingent on the economic environment, infrastructure investments, technological changes and policies. The concept, boundaries and dynamism criteria are considered crucial in their studies from the transport perspective (Debrie & Comtois, 2010). First, the corridor gains conceptual significance from spatial analysis and topology to identify transport routes, describe processes of opening up the hinterland, justify access to resources, express a network of interdependent places, or describe cross-scale connections. Contextually, various methods define their geographical limits, i.e. gravity models, supply and demand studies, cost-benefit analysis, multi-criteria analysis, or approaches based on historical geography (Debrie & Comtois, 2010), albeit the arbitrary results according to the indicators). However, the most common way to analyse corridors examines their content – rather than the periphery – in compliance with cohesion, making comparisons between different regions. Concerning dynamism, abundant literature demonstrates that the corridor's vitality is a function of transport as a derived demand linked to market conditions, evolution, and mutual impact. The rationale underlying the corridor's success depends on its greater capacity in supporting trade volumes, better production-distribution integration as an intermodal supply chain, and a more reliable delivery due to better transport performance, collaborative governance and cross-border flows.

Therefore, the traffic-infrastructure combination is the cause and consequence of corridors' socio-economic processes (Priemus et Zonneveld, 2003) – especially for *logistic* or *trade corridors* – intended to connect places for "extraction" and production to points of "consumption" (Hildyard, 2017). In this system, the role of ports turned vital to support global exchanges in the last decades, and the increase in maritime traffic allowed by economies of scale and scope relies on a close interaction between gateways, intermodal structures, and hinterland connections. The evidence is "the pull of coastal areas for global trade" among spatial patterns (Smith, 2016). Alike, shippers, carriers, and terminal operators are decisive actors in an increasingly competitive commercial environment and the overcrowding of the main intermodal gateways and axes in world geography, enhancing corridor development while smoothing cross-border movements. **The general observation on operational-focused perspectives is that the more the corridor is intended as a seamless route for interaction, the more it assumes the pure character of an abstract functional model.** Even if more complex representations can describe corridors through the variable size and connectedness of their components – e.g. Batten's corridor city model (1995) –, primary morphologies can abstract the typical linear structure of corridors as dynamic network types, also able to change into one another: the *begin-end* (or *point-to-point*), the *line*, and the *trunk-feeder network*, where distance and transport modality influence nodes' and hubs' features (Trip, 2003a, 2003b).

Nevertheless, as the concentration of activities within their extension influences the shape and development of the urban and geographical space, corridors can be subject to disecono-

mies due to traffic congestion, real-estate pressures over land value, or lack of agreements' implementation and governance. Moreover, they tend to generate negative externalities – beyond those at the heart of the environmental question –, which can threaten the value of infrastructure and invested capital if they do not apply sustainable development strategies. The conjunction of these features makes the corridor a complex integrated set of activities, services, procedures, and policies supporting an urban region's operation and defining its urbanity. **It is a valuable topic for disciplines concerned with the City and the Territory up to questioning whether corridors are another type or part of the megaregion or the "megaregions of the future" (Georg et al., 2016b).** Actually, its introduction as a spatial development pattern – either physical or virtual – is at least as old as the 19th-century "linear city-region dream" by Soria y Mata (Albrechts & Tasan-Kok, 2020). At that time, the railway network should have represented a promise of closeness for social classes through an axis; and the urban development could have been adjusted to transport efficiency while contained by continuous countryside[6]. Today, the same pattern with different (evolving) technologies led to the rush for designing productive, efficient, and selective axes of a hyper-connected and hyper-privileged perspective.

The linear development is a natural and historically sedimented model of urban growth, a 'city-line' as the "immanent trace of a settlement morphology that has become the object of theoretical speculation for the production of city plans and models" (Orsini, 2012: 166-167). The Linear City inspired the territorial composition of 20th-century Urbanism in the industrial city prototypes with Taylor- and Fordian-inspired theories; the city crumbling through the landscape by Russian disurbanists, like Leonidov's design for Magnitogorsk (1930); the Modernist horizontal decentralisation, vertical organisation of flows and de-urbanisation in Neutra's *Rush City Reformed* (1925), Le Corbusier's *Cité linéaire industrielle* (1942-44), or Hilberseimer's *plan for Chicago* (1949); the regional landscape infrastructure or ecological networks in *Emscher Park and Landmark Art Route* (1989-99), or *Rhein-Main regional park* (1992), up to bioclimatic development models such as the *Fengchen Eco-Linear City* as Shanghai's satellite or Soleri's *Arterial Lean Linear City* as hyper-urban organism.

The first application of the linear city – the Soria y Mata's *Ciudad Lineal* – is the archetype of the artery (or series of arteries), an understanding of the urban form derived from locomotion designed to reach distant places beyond political boundaries. It is intended for potentially unlimited growth according to a repeatable development pattern with the possibility of direct contact between the city and nature at every point. As part of an 'anti-urban' coalition against the industrial metropolis and debtor of the Garden City and Regionalism idea (Farinella, 1997), the Linear City was born as a reflection on the relationship between

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6   Controversial opinions concern Soria y Mata's work since it is also understood as an exasperation of Hausmann's ideas for subordinating all urban functions to the street in a conduit-like organisation. According to Rykwert (1982), Soria mistakenly attributed a role it had not previously fulfilled to the street, overloading it to the breaking point as other colleagues did. Such domination of transport over urban functions translated into vertical and horizontal diagrams underlies every concept of zoning as "the taxonomic disease that has eroded every planning theory and all urban theories" (*ibid.*: 23).

collective and private space[7]; and a project for a new territorial socio-economic and political balance by incorporating transport and communication technologies. Although, Calabi (2000) stresses how the propaganda on Soria y Mata's project as the realisation of a utopia has made no effort to demonstrate the extent to which this idea was consistent with European Urbanism concerns of its years for the industrial city' diseases, i.e. congestion, pollution and inadequate hygienic conditions, being a project conceived for a particular historical moment. According to Tafuri and Dal Co, the linear city entered the Modernist experimentation when merged with the Garden City model, thanks to Bénoit-Lévy. Therefore, the linear theories belong to a regionalist culture where the urban development process overcomes Haussmann's planning legacy.

However, the last century's metropolitan studies had little affinity with the linear city model as its territorialisation of society and economy was considered overly abstract and simplistic to describe the growing urban agglomerations. It has been influential in regional plans with proposals of linear extension, more similar to 'beads on a string' as in the *Copenhagen Finger Plan* (1947), but the idea of linearity collides with that of compactness in urban form, ultimately leading to Mackaye and Mumford's idea of the *Townless Highway* (1938) (Zonneveld & Trip, 2003). It primarily evokes the small 'Far West frontier settlement' as a changeable space of passage – predisposed to growth, open to flows and contributions from the outside, including resources and knowledge – that explicitly links it to other places or the state community (Garavaglia, 2017a). In the progressive concentric radiating towards an expanding periphery, the linear model multiplies in communication routes between centralities (instead of being centralities themselves) and organises intra-urban processes and functions while losing its linear shape within a porous matrix of broader anthropic transformations and new mobility models. Thence, the corridor's image shift from West urbanisation outpost to middle-class myths. Later on, the rise of a hyperconnected and hyperkinetic society accelerates a fragmented polycentric development of the Urban besides a spatially mobile production, increasingly powerful logistics and globalisation phenomena within the growing importance of networks' reaching. Nevertheless, the resulting territorialisation into "cities of control" maintains autonomous linear fragments emerging from sprawl as coastal strips, economic development corridors, or "linear attractors" able to trigger functional specialisation by assembling heterogeneous building objects in linear sequences responding to local and spontaneous economic logics without planning perspectives (Orsini, 2012).

Even if it seems unsuited to make alone the narrative of a large part of Western historical urban forms, especially of the American cities since the late 19th century (Whebell, 1969), the 1950s and 1960s open up observations on the corridor as a device to form and develop urban processes in a period of widespread debate on metropolisation and functionalism. They

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7   The reports that in 1898 accompanied the purchase of land for the construction of the first section of the Ciudad Lineal present the following definition: "the linear city should not be understood as a block of holiday homes, or country houses, or workers' accommodation, but as a normal settlement located close to a capital city, inhabited by all social classes, with better organised, more hygienic houses, where life is more pleasant and quieter than in our Madrid" (Calabi, 2000: 47).

demonstrate the significant historical continuities with the city's development and Western culture, and the Corridor's interchangeability with the Linear City concept, highlighting different yet interconnected trends. The linear megastructure development is embraced – in Fumihiko Maki's words – as a sizeable artificial frame of landscape able to house urban functions by employing technology, not without negative criticism. Chambless is considered the pioneer of megastructures, enhancing Hénard's *Rue future* with the proposal of *Road-town* like a monorail farm machinery in progress that crosses the landscape by reiterating a constant three-story section, which also inspired the territorial structuring of Le Corbusier's *Plan Obus* (1930). Since then, the megastructure principles marked decades of worldwide declinations, like the linear structure as a monumental civic backbone of (im)material communication networks (i.e. Tange's plan for Tokyo Bay, based on *Metabolism 1960* resilient concerns), or the modular composition per high-density mixed-use clusters and open spaces structured along with integrated public/private and slow-mobility transport infrastructure (e.g. Bakema and van den Broek's *Pampus Plan*, 1965).

On the other hand, the new dimension of the city became a political and planning practice by focusing on an unprecedented, inter-urban, intermediate scale between State and Municipality based on urban expansion and the construction of new centres following main connecting routes. This tendency pushes in the direction of regionalism reflections started in the mid-1940s and continued in the atmosphere of the postwar renewal to direct uncontrolled migration towards the metropolises and provide for housing needs. From the representative experiences of the New Towns and the satellite centres in the Greater London Plan, regional spatial planning became a requirement for an approach to urban sprawl and territorial economic development, in close relation to infrastructural growth. Thus, the French urban framework takes shape from autonomous, uncongested units connected to the capital - *métropole d'équilibre* -, and from new centres - *Villes Nouvelles* - as an alternative to the propagation of suburbs (Calabi, 2000). Meanwhile, the City-Region appears in Italy from the reflections on functional decentralisation of regionalism started in the 1940s (e.g. CIAM's AR Plan for Milan), presenting itself as a "formal artifice" to address urban sprawl from an inter-urban perspective (*ibid.*). Later on, in the 1960s, De Carlo's *turbine* Intermunicipal Plan for Milan (1963) articulates the "hub" of the core municipality to the "blades" of towns projected towards the territory (Goldstein & Bonfantini, 2007). Contemporary in North America, the Regional Plan Association deals with the consequences of a massive suburb postwar explosion in the New York-New Jersey-Connecticut metropolitan region, searching for alternatives to the 'spread city'. In the same year as Mumford's *The City in History* (1961), Gottmann's *Megalopolis* presented an alternative perspective on cities as "better viewed not in isolation, as centres of a restricted area, but rather as parts of 'city systems', as participants in urban networks revolving in widening orbits"[8].

While the Urban turns into *Archigram's* expanding territorial grid of programmed

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8   Reference to Gottmann, *Megalopolis Revisited: 25 Years Later*, College Park, MD: The University of Maryland Institute for Urban Studies, 1987: 52, in Thün et al., 2015.

plug-in obsolescence, or *Superstudio's* "megalith" replacing environment regardless of any sense of scale or use **(Orsini, 2012), Gottmann's *megalopolis* appears as a corridor with the "evocative name of an entire urban mythology", a Western progressive development model with "a paradigm power" (Guida, 2015: 15).** Therefore, the Corridor concept moved from Europe to the Americas through the first linear theories – and their declinations –, dealing with the investigation of growing urban dimensions and modifying its meaning according to the cultural context.

In continental Europe, urban expansion disintegrates the historical forms of the mercantile city and the industrial metropolis, with a significant loss of residents and jobs towards an increasing regionalisation since the 1960s. It introduces a new form of city, policies to support its advancement and consolidation, new positions and roles from which medium-sized cities emerge (Secchi, 2015). In the agglomerations of the new millennium that span from London to the *North Western Metropolitan Area*, to the Ruhr, to the Po Valley, to Catalonia and northern Portugal, it builds cross-border megacities, sprawling urban functions in previously marginal territories. In contrast, the Americas have seen exponential urbanisation, with the construction of massive cities in a shorter time and the overlapping of European traditions, approaches and national identities brought by colonisation. Before the middle-age exchange economy development, communications between places were practically ubiquitous and justified by reduced mobility and connectivity capacity.

As trade and manufacturing grew, travel routes were more attractive for the traffic of goods and people, especially along river valleys, which were highly significant for cities and towns' prosperity. In the New World, such differential path-dependent selection tended to be more pronounced as colonisation was happening throughout a time of rapid technological innovation. The areas influenced overseas (mainly coastal) were receiving innovations faster than diffusion rates over inadequate transport systems. Here, the available communication lines that attained territorial dominance were apt to be the original colonisation routes, political conquest lines, or Europeans' commercial exploitation. Furthermore, the direction of paradigmatic changes in the New World is away from the primary locus of innovation, Western Europe, mostly inland from coastal points, with good harbour facilities and landward accessibility to desirable settlement lands.

As Modernism bonded the Corridor to the City, contemporary times enhanced an 'extreme dependence' (Viganò, 2015) as the symptom of an increasingly mobile and connected society. Such a perspective is enhanced by existing literature citing or comparing Collins (architectural history), Whebell (geography), and Doxiadis (urban planning and design) as three affirmed disciplinary viewpoints of the mid 20th century on the corridor as a device for urban growth. Their reflections respectively concern the consistency of the linear city model, the description of urban phenomena, and the tensions shaping urban forms.

By tracing his studies on the historical frequency, interpretations and contaminations of line-

ar planning within international dissemination of ideas (and recognising its narrow popularity)[9], Collins evaluates infrastructural axes as the natural spaces for regions' growth, and the linear urban arrangements as the spontaneous and disorderly result of historical and progressive processes that require to be duly regulated. Likewise, he recognises a profound impact of the Corridor concept – using the term interchangeably with the Linear City – in living and working areas, distribution, ranges and the trans-territorial arrangement of production chains linked to the technological progress of modernity.

> A linear city is formed – and grows – along a line. This line is usually its artery of transport for people, for goods, and for services: roads, rails, pipes, and wires. A city of this sort can grow freely – infinitely – in increments that are repetitive in character. Its internal circulatory system is planned for the utmost efficiency: all its parts are, presumably, of easy accessibility to each other and share the same urban amenities. Since the extensions of the growing city are narrow in width, all its points are in close confrontation with natural landscape, and the countryside in turn partakes of the advantages of modern city life, brought to it by the linear corridor.
> (Collins, 1968: 2)

In Collins' perspective, the corridor is a linear modular development model inspired by ideal plans, able to multiply as far as accessibility and a qualitative residential option are guaranteed against the alienation and marginality of the concentric model. However, this vision does not produce economic effects but an arrangement of urban forms to prevent sprawl. Moreover, his collection of experiences as categorisation of schemes and blueprints shows the way concepts and designs have been developed to support this linear development trend, acknowledging the very regional planning character of linear theories instead of a physical architecture one. Thus, Collins' approach combines the fear of forces governing the growth of great urban regions with the expectations for planned corridor development, concluding that "linear growth receives acceptance as a fact, but not as a theory" (Collins, 1968: 345, in Sap, n.d.).

Being inspired by Hilberseimer's studies on urban form, Whebell takes the Corridor's concept as an apparatus bringing the city modernity to the countryside to define his *corridor theory*: a linear evolutionary system of urban spaces based on geological, economic and infrastructure differences linked to the connective transport surface. In contrast to Collins' presentation of plans and designs following a unique way of growth and his understanding of efficiency and expenditure as crucial characteristics of linear planning, Whebell develops the *corridor theory* as an alternative to describe human spatial activity phenomenology, stressing the influence of trade-location relationship. As an empirical generalisation of a case study research – using the genotype and phenotype metaphor –, the study justifies the bonds between technological evolution and urban economies' growth as linked to the shape

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9   In his publications, Collins describes an exhaustive collection (as categorisation) of worldwide linear development concepts and designs. See also Collins, G. R., 1959, "Linear Planning throughout the world" in *Journal of the Society of Architectural Historians*, Vol. 18, n. 3 (Oct 1959), 74-93.

of the land with two relevant objectives. On the one hand, he aims to prove the historical persistence of the corridor (similarly to Collins) among the major types of urban systems in the New World to explain colonisation, territorial development processes and North American metropolisation. On the other hand, he seeks to achieve a sufficiently abstract model to present a set of variables and space-time relationships meaningful for other areas – like the more recent McGee's *Desakota* regions[10] –, thus maximising realism and generality at the expense of precision[11].

Therefore, Whebell illustrates Southern Ontario's urbanisation as a "corridor-centred economic landscape" (Whebell, 1969), whose development is based on transport infrastructure growth per aggregate historical stages – linked to technological milestones – as ideal types, each marked by the progressive strengthening of linear relationships[12]. Every paradigmatic 'passage' of society is marked by philosophical, organisational, and material innovations – diagnostic of changes in the economic system – which appear first in corridors to spread from the city core outwards in a sequential "culture gradient" (*ibid.*).

Even if Whebell's model identifies the corridor as the privileged space for economic development – both its cause and consequence –, it shares with Collins' perspective the idea of a long-term historical process and modality of growth and welding urban systems. Besides the geographical irregularity and uneven distribution of innovation, land-based transport infrastructures exercise both a spatial distortion – by contraction – and a magnetic power on the location choices of activities, peoples and governments: the long-term and high-degree inertial effects increase the attractiveness of areas adjacent to infrastructures to the detriment of the surrounding space. **Whebell's corridor overcomes the "intuitive dissatisfaction" with the excessive abstraction of Christaller-Lösch landscape models (ibid.) and their "ambiguous, even reactionary search for a perfect society", which required a severe distortion to explain the forms of American cities (Pennati et al., 2017: 274)[13].**
The importance of Whebell's contribution lies in recognising the corridor's primary role in settlement, social and economic development processes and its path-dependent trajectories,

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10   Traditionally marked by agricultural activities, the *Desakota* regions are profoundly reorganised community forms, economic relations, and land use on a territorial scale according to the location of intensive production, industry, and services and significant commuting flows along densely populated connections between metropolitan areas poles. They attract public and private investors to settle new production platforms as they offer lower costs of labour without the diseconomies of metropolitan cities with the advantages of the infrastructure presence.

11   Whebell's hypothesis postulates the irregularity of land surface, the dissemination of technological innovations from a few points at various speeds, and the human achievement as the net effect of the totality of choices taken according to the least effort and inertia principles which explain human decisions for survival or subsistence, concern for economic security and growth, and aesthetic.

12   His study uses time-slices for communication reasons (*initial occupancy, commercial agriculture, railway transport, motor transport,* and *metropolitanism*), while it was imagined portraying continuous changes regardless of their uniform character.

13   These models contemplate the favourable location of central places along traffic routes (e.g. Lösch came close to the corridor concept in his city-rich sectors to describe the Toledo and Indianapolis hinterlands), and they probably could have reached the same conclusions if pushing the traffic principle further. Nevertheless, Christaller regarded his market principle (homogeneous hierarchical structure) as paramount and any departure as a deviation since he was concerned with a rational explanation of hierarchies and distances in economic environments regardless of natural constraints. It is another crucial difference with Collins, as he recognised latent linearity in the *central place theory* due to transportation.

influenced by both natural and artificial factors. Such an intuition allows to equally apply the corridor concept to different scales of linear urban systems up to broader sequences of large cities connected by bundles of transport infrastructures. Unfortunately, it did not go so far in constructing corridors' geography, as Whebell's considerations on Southern Ontario stop at national and regional borders.

Concerning urban explosion, Doxiadis further contributes to the corridor's debate as he combines a Christaller-like growth model with the changes produced by mobility innovation dynamics to interpret urban forms. **Since the pre-industrial city had left the space to a diverse mode- and speed-of-travel system reorganising accessibility along arterial routes, Doxiadis highlights the apparent settlement disorder as the outcome of multiple, often inseparable (centripetal, linear and punctual) spatial tensions coexisting and intersecting in the urban and city-region scenario[14].** From this point of view, the author emphasises the impossibility for small, isolated centres to survive off the main transport axes as typical urban growth corridors as they help maximise contacts per less energy consumption (Doxiadis, 1963). Although considering modern urban forms, the result of interaction between historical forces and systems of flows as Whebell does, Doxiadis sees the urbanised corridor just as a transitory form – a necessary component of urban structuring processes – defined by linear forces that dominate the urban system "for a certain length only, and after a certain period" (Doxiadis, 1968: 311, in Garavaglia, 2017a). Furthermore, it cannot be as complete, autonomous, and pure-shaped an urban system as Collins' linear city/corridor model[15] – except under unique transient conditions–since the planetary forces counteract the possible creation of linear cities in all directions.

Leaving aside pure geometric forms and static models, Doxiadis proposes *Dynapolis* as a dynamic urban development around a backbone of centralities and corridors, derived from a unidirectional growth depending on centripetal, linear, aesthetic forces and territorial geography. By assuming parabolic forms as a response to congestion and rising land costs, the idea of *Dynapolis* is to highlight urban sprawl as the progressive and historical result of economically efficient land use and rational organisation of multiple-speed mobility systems. Considering restructuring as a temporary relief, Doxiadis looks at *Ecumenopolis'* creation as a vital future city structured on new networks (according to the needs for growth) to move pressures out of existing cities, avoiding its 'route to death' as a consequence of concentration.

In the representative approaches of Collins, Whebell and Doxiadis linked by the trans-

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14   In *The Emerging Great Lakes Megalopolis* (1968), Doxiadis recognised the emergence of a new type of human settlement, as other scholars did in the 1960s. Although at an early stage, the intensity of relationships in a combination of large high-density regional settlements was the distinguishing character of the *megalopolis*, promising significant differences in addition to their new demographic and spatial dimensions in the author's opinion (e.g. a great complexity of relationships between the constituent parts, and a different conception of both the function of life and the spatial configuration).

15   Doxiadis refers to Soria's *Ciudad Lineal* as a corridor-shaped expansion or connection of cities rather than a linear city since it does not have a central function (Doxiadis, 1967: 35).

mitting power of technology, the 1950s-1960s debates introduce the corridor's figure both as a historical urban pattern and expression of a Fordist-Modernist paradigm. Likewise, they give it the complexity of an evolutionary concept and process instead of a functional model to interpret and imagine new territorial articulations. Since then, the corridor's understanding as both a static and dynamic component of the Urban goes through an increasing time-space compression under the driving forces of technological revolutions and capitalism. Accordingly, the changes in (expanding) centres and centralities' location for accommodating growth gives food for thought on the corridor's validity compared to compact city models, urban shrinkage, territorial bonds and regionalisation. Later on, as a second turning point in the Corridor's debate, the 1980s and 1990s shifted the corridor's focus from an analytic-interpretive function to a mainly programme and planning scope projecting economic performance and competitiveness along infrastructure backbones, although using the concept in new ways and contexts without an unambiguous and shared definition (see paragraph 1.2.2.).

Initially debated and experimented with as urban form and process from Europe to the Americas, the Corridor met the 1980s' infrastructure discourse when moving back to the Old continent. By the end of the decade, this encounter produced changes in Corridors' meanings – therefore form – to assume an economic-programme nature for addressing regional development, which emphasised a transnational perspective. As it was observed that some highly developed and economically advanced territorial systems could be described as expanding (mega)corridors, the creation of massive infrastructure connecting more advanced regions with peripheral ones became a priority to improve the regional economic performance and enhance its development. The creation of up-to-date infrastructure – therefore, technologies – was confirmed as a crucial determinant for economic growth and spreading innovation through corridors. In contrast, location factors and specific geographical contexts explain path-dependent trade relations and regional development across their territories.

Although the programme component has become dominant in recent decades, there have been further evolutions of the corridor models as a spatial distribution introduced in the 1960s. They have occurred in response to a progressive decentralisation from the metropolitan core into peripheral areas or satellite cities and the formation of global macro-systems of urbanisation. Precisely, Garavaglia (2017a) reports the role of the *macro-corridor* in explaining historical urbanisation processes: a figure to which the organisation of large-scale economic and social processes can be associated as a device that distributes innovation in geographical space. In this sense, the author stresses how Tellier's *topodynamic corridor* (2009) takes to the extreme consequences of the *Dynapolis* perspective by considering the intensity and channelling of economic flows as the basis of economic development.

Assuming a Schumpeterian viewpoint, Tellier's model – made of three circular corridors around the globe – explains the historical structuring and evolution of urban networks through connectors (starting from river basins) according to space-time patterns influenced by political and economic changes. Actually, *topodynamic corridors* describe a system over-

coming taxonomies based on significant communication arteries, even to the macro dimension. They constitute macro-corridors made of historical and non-logistical flows joining several micro-corridors in spatial and temporal succession. They return a representation of global space beyond territorial continuity, thus adequate to describe urbanisation processes over decades and centuries rather than shorter periods, and closer to Taylor's *world city network* (2003). Therefore, Tellier's concept remains useful to understand corridor systems as changing spaces of social transformation and axes of exchange and conflict between places and cultures by highlighting different interconnection intensities at a given time. Mutual accessibility allows some nodes to receive activities, capital and human resources from decaying nodes, thus representing "privileged directions for the fluctuations of urban hierarchies and the reorganisation of economic networks" (Garavaglia, 2017a: 80).

By considering technological systems as a complex social construction (Marcuse, 1941)[16], the thesis understands the corridor as historically stratified persistence and evolution of interactions – maintaining an underlying influence and fighting with the Garden City principle – and a vector disseminating innovation and socio-economic changes. This perspective is consistent with the recognition of the urban overflow out of traditional boundaries also as the result of technological advances, industrial production and scientific achievements (as in medicine and agriculture) and the spatialisation of streams between places and communities as determined by the employment of territorial infrastructure, artefacts and practices.

1.1.3 / The dialectics and dualisms behind corridors as intensity

> Therefore, the third urban revolution does not generate a virtual city, immobile and introverted, but a city that moves and telecommunicates, constituted by new decisions of displacement of people, goods and information, animated by events that require co-presence, and in which the quality of places will mobilise all the senses, including touch, taste, smell.
>
> (Ascher, 2010, quote in *cidadeemmovimento.org*)

If the corridor is a transient condition receiving and spreading the innovation by which the society articulates territories, mobility and connectivity impulse its creation and development as mutual and opponent meta-patterns of contemporaneity. Under growing interdependencies where cities are (re)produced by flows rather than their fixed features, mobility and connectivity substitute infrastructure as a 20th-century buzzword while maintaining the influence of technical progress. Each stage of their evolution corresponds to a

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16   Marcuse understands technology as "a social process in which technics proper (that is, the technical apparatus of industry, transportation, communication) is but a partial factor… Technology, as a mode of production, as the totality of instruments, devices and contrivances which characterize the machine age is thus at the same time a mode of organizing and perpetuating (or changing) social relationships, a manifestation of prevalent thought and behaviour patterns, an instrument for control and domination." (Marcuse, 1941 in Mitchell, 1999: 158).

specific stage of urbanisation, construction of intra- and interurban interdependencies, and accessibilities for the mutable routines of individuals and communities. Sure enough, time-space compression and digitisation are considered – together with individualisation – the main processes causing human interactions and exchanges to become increasingly mobile and cosmopolitan.

Societies have always been on the move through displacement (influencing demographic changes, making discoveries and occupying territories), trade (exchanging goods and resources) and information (spreading knowledge, shaping political relations and contaminating cultures). They express the need for urban communities to come into contact - peacefully or oppressively - by following privileged paths of communication. Many of the existing and planned corridors use ancient ways carved out by geography, climate and culture; thus, travel routes and communication infrastructure have been developed through long-lasting accumulation and replacement processes. São Paulo's urban corridor of *Rua da Consolação*, starting from the metropolis downtown, develops from a stretch of the pre-Cabral, Indigenous trail *Peabiru*, used by the *Guarani* tribe to transit from Paraguayan villages to the Brazilian coast searching for abundant food supplies. The network of commercial, military and postal communication linking the provinces of the Roman Empire is the basis of contemporary European mobility and connectivity routes. Marco Polo's travels, the Lusitanian-Iberian navigations, or the Maritime Republics domain developed transport corridors and the most important cartographic representations of 'known land' from discovery and trade routes. The rail itinerary built atop the 1960s *Hippie Trail* from London to India, and on to Bangkok, followed ancient Silk Road routes across Eurasia. The American *Route 66* linking Chicago to Los Angeles, or the *Will Rogers Highway* today known as *Interstate 40* followed ancient trails of the Native Americans up to their reservations in Arizona, paving the way for Mid-West Americans' exodus towards the fast-growing South West after the Great Depression.

Nevertheless, with transport motorisation, mobility shifted from residual activity to ordinary experience – pervasive in the flexible but coercive character of *"auto-mobility"* – steering the *"mobiletic revolution"* and extensive urbanisation (Colleoni, 2019). Likewise, the rise of digital technologies and network society (Castells, 1996) introduced virtual and mediated mobilities through instantaneous, ubiquitous and delocalised connectivity systems, based on variable geometry and interfaces (like screens and sensors) where the physical *"meatspace"* meets the *"cyberspace"*[17] (Mitchell, 1999). Progressively redefining spatial delimitations by narrowing time and distance, the encounter of these forces started to feed ever broader and multiplied (but selective) networks – including energy and logistics –, where ICTs tend to thicken main routes by replying physical flows. Accordingly, contemporary urbanisa-

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17   The terms meatspace and cyberspace were used by William Gibson in *Neuromancer* (1984), defining an allegory of interactions between the analogic and digital environment. Later on, the investments in discovery, fabrication and spreading of digital technologies created the conditions for the flourishing of Pierre Levy's cyberculture (1999), as a conjunction of material and intellectual techniques, practices, attitudes, thoughts, and values joined to the idea of cyberspace, enhancing generalised connection globally.

tion follows "directionless, fluid and polymorphic systems in which new urban centralities and functions can be located anywhere", generating forms that are difficult to delimit, made up of "overlapping functional systems without unambiguous boundaries" (Garavaglia, 2017a: 47, reference to Diener et al., 2005; Schmid, 2006; Garavaglia, 2017b). Nevertheless, this process does not solely depend on the pervasive horizontal dilatation of mobility and connectivity beyond boundaries and borders, but also the opposition of territorial "physiographic matrices" such as physical, institutional, social and identity features, also defined as "roughness" (Perrone et al., 2017).

Inside the fluid functioning of networks, corridors remain primary connectors and transmitters housing the infrastructures, platforms, modalities and practices along which intra- and interurban relations are built and territorialities assembled. For the same reason, they are the extreme places of contrast between expansion and resistance, materialising as a non-linear and unstable nature. Assuming urban density as a social construct and political issue, the *PRIN Postmetropolis'* literature (2010-2011) presents three Foucauldian-inspired dialectics to define the 'stress vectors' of regionalisation and construct a "present-day ontology" of the urban phenomena as a historical-critical investigation (*ibid.*) [(x), (y), (z)]:

(x) The constructive forces bounding and protecting social and urban places (*banks*) meet the forces of connection, union and linkage (*flows*) (a reference to MacKaye's *levees* and *streams*, respectively openways and motorways);

(y) Territorial-institutional structures persist as *fixity*, whereas the urbanisation dynamics happen as *motion*[18];

(z) *Corridors* assemble actors and technologies, stocks and flows while crossing *places* as different scales and socio-material contexts.

Such conceptual oppositions presented by Perrone, Paba and Perulli embrace McFarlane's topological vision of urban *intensity* and *intensive heterogeneity* (2016)[19] to express the settlements explosion in an ever more indefinable space where urban and suburban densities converge by replacement, intensification and re-signification of the built environment. By recalling Ananya Roy's image of the city as a chameleon, the density is reinterpreted as an index of urbanity values and land-use intensity in topographic, relational, volumetric, experiential and perceptive spatiality. Moreover, the original integration of *moral density* carried by practices and relational dynamics helps the authors evaluate density changes and urbanity condensation in different aspects: the extension and thickening of settlement materiality; the release of (im)material furrows of flows, movements and connections as dilation of densi-

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18   Reference to Brenner and Schmid's planetary urbanisation and the legacy of Harvey's dialectics on the production of spatial structures.

19   McFarlane develops both concepts from Tonkiss' suggestions on the relationships defining urban density: "mobility as well as dwelling"; "non-economic uses as well as patterns of employment"; "spaces we pass through in less purposeful ways, as well as points A to B on the daily journey to work" (Perrone et al., 2017).

ties; the creation of Ingold's *Taskscapes* (1993) as the interweaving of connected, qualitative and heterogenous activities, events and happenings. This approach justifies the study of a progressive shifting from Stein's dinosaur cities (1925) or Williams-Ellis' dystopian octopus (1928) – as the images of still recognisable extensive conurbations – towards Soja's proposition of a non-linear, non-Euclidean, multidimensional and complex view of regional urbanisation. **The result is a polynucleated urban landscape where the availability of land to human activities and their changes (according to impact) is proportional to the permissiveness of territorial resistance.**

According to the authors, the same tension also governs the relationship between expanding the productive-circulatory system in the capitalist process and its unavoidable link to location and territory. This contradiction is evident in the reconfiguration of the *space of place*s (the physical expression of society) for commodity production as the *space of flows* (economic, political and symbolic processes) for circulation and consumption, creating conditions that substitute new (tendentially exogenous) elitist interests to local features (Castells, 1996; Albrechts & Coppens, 2003). In this process, the territory is both resource and obstacle, making institutions important for understanding the continuous and multiple networks that connect people, territory and wealth, and organising societies in cities and regions according to place-based approaches. Moreover, assuming the dynamics of implosion and explosion, urbanisation should be understood less as a product of nation-states and more as a multi-level, multi-actor process. Hence, this work assumes that territorial transformations result from the clash between *fixity* as path-dependence and cumulative legacy of territorial and cultural resources, and *motion* as fluidity and "creative destruction" of global capitalism over planetary urbanisation (Perrone et al., 2017).

The tensions produced by the encounter of flows with persistence underpin the Corridor's dual nature of continuity and discontinuity. The fluidity of connections is maintained by its ability to define movement, exchange and interaction paths as seamlessly as possible and its functional selectivity. The corridor simplifies space and time by segmenting it sequentially along linear trajectories by organising flow access, priorities and matter. However, contemporary metaphors of reality replace the modern legacy of "room-corridor" discontinuity by introducing the continuity of the network as "the new corridor" (Guida, 2014). As a figure and concept, the network dissolves the dialectics brought by the corridor into pure virtuality as its topology is inclusive, raising questions about the nature of connectivity, in-out separation, and the understanding of space and society. Nevertheless, paradoxes are unavoidable if adopting the corridor perspective to understand networks, first and foremost the increasing consolidation of networks as systems of increasingly performing corridors. As a consequence, the "constitutive dualism" of the corridor and its contribution to the strengthening of networks (Guida, 2015) influence the (in)stability of territories, contributing to the *fixity/motion* contrasts of contemporary urbanisation and materialising in the forms and

rhythms of exclusion and inclusion [(1), (2)][20].

(1) Vulnerabilities and privileges

Since humanity became sedentary (with some exceptions), the stages of mobility and connectivity evolution came along with the achievement of both new freedoms and immobilities, proportionally to the type of society. However, suitability, flexibility and acceleration to move are the expected qualities of contemporary lifestyles, according to which individuals and collectivity conversely define themselves. They are the expression of a "network capital" built on financial, cultural and social capacities to be mobile – thus changing social condition –, which distinguishes "kinetic elites" from the limited exercise of mobility and forms of "subaltern appropriations" (Sheller, 2018a). Also, it involves the "technoscapes" of a "software-embedded and digitally augmented urbanism", which demand employment and access to specific software systems to make particular mobilities take place (*ibid.*: 21).

While it gains value in degrees of freedom, mobility becomes "the main stratifying factor of our late-modern or postmodern time" as a perpetually scarce and unequally distributed commodity (Bauman, 1998: 2). Contextually, the connectivity to provide interfaces between spaces, people, resources, and activities follows preferential development patterns, usually where the significant political-economic interest concentrates. Namely, the conflict between the State and the real estate market finds its spatialisation between the imperatives of public policies and capitalist processes. Consequently, segregated and distant environments emerge where development does not meet demand, usually being marked by ecological, socio-economic and political pressures.

Mobility and connectivity become privileges whereby infrastructure is accessible according to location; otherwise, exclusion, place rejection and insecurity. With the urban explosion, the society assumed the form of a "globalising networked urbanism", which is not equally distributed, but made of "uneven constellations of people, devices, systems, code, laws, regulations and territoriality" (Sheller, 2018a: 19). Likewise, the current human condition of staying in transit links to belonging, which today is 'no longer just something bound to one's own space of residence or the territory of a nation, nor does it last an entire lifespan' (*After Belonging*, 2016: 14, in Self, 2017)[21]. **Dealing with corridors includes dealing with the concepts of freedom, opportunity, choice, therefore identity. If degrees of vulnerability and privileges define urban societies and conversely the directions of territorial transformation, corridors spatialise extreme possibilities and exclusion due to their predominant character of structuring mobility and connectivity.**

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20   These juxtapositions are a temporary methodological introduction and reflect the research perspective on the apparent dichotomy between networks and isolations.

21   The 2016 Oslo Architecture Triennale *After Belonging* fell between the UK's Brexit referendum and Trump's election, which could be considered in the future as a paradigmatic moment "at which the post-war globalist project of universal human rights, prosperity and peace was fatally wounded" (Self, 2017: 364).

(2) Functional geography and isolations

Under a long gestation period, successive re-engineering, and paradigm shifts, Connectivity (alongside Mobility) affirms itself as a historical idea like Freedom and Capitalism, giving impulse to constructing a global infrastructural matrix. The resulting "paramount functional geography" it underpins is the actual structure of urban (inter)dependencies as networks overcoming natural obstacles (Khanna, 2016), and it provides an alternative description of spatialities to the transitory political geography and legal subdivision of spaces, up to ban them (Freudendal-Pedersen & Kesselring, 2018). Development continues to be more intensely distributed across the major urban archipelagos, primarily concentrated along seaboards, feeding megaregions as polynuclear global magnets polarising human, environmental and economic resources. Likewise, existing and potential urban systems of small and medium-sized neighbouring cities linked by highly productive economies seek to compete with larger urban agglomerations as clusters of strategical interest by basing their progress on implementing connective infrastructures and multimodal mobility. The connectivity underlying this geography constitutes the physical foundation of globalisation, the pathways through which developmental influences (or trends) are projected, and the lucrative assets through which competition is released. Also, nationalism, differential regionalism or federalism have gained new strength in recent years, putting at risk both unity and solidarity up to exacerbate forms of xenophobia.

On the one hand, solid national groups in homogeneous territories (in some cases taking advantage of State weakness) make claims to governing prerogatives as a form of autonomy on merit. On the other, they oppose solidaristic forms of sharing with territories outside their productive capacity, often forgetting that their performance is supported by the participation in the broader space of flows and sustained by the indigence of the most disadvantaged territories. Even though nations are considered residual entities for the advent of the "urban-metropolitan polarity" with the transition to the city-region (Lanaro, 1991), the "legitimation of secession" becomes an "elegant form of territorial nationalism", in other words, "identity by exclusion" (Urbinati, 2020), influencing the construction of relations between neighbouring cities inside and outside national borders. **Therefore, it is necessary to reckon with a candy-colour perspective according to which the presence of corridors as a possible construction of polycentric interdependencies necessarily corresponds to a destiny of pacification and the construction of a "network civilisation" (Khanna, 2016).**

The suggested conceptual oppositions vulnerabilities-privileges, functional geographies-isolations open up the reflection on the corridor as an element of connection and order, support for the fluid circularity and horizontality of the network when working as positive interdependency, and a crucial point for the development of isolations. Furthermore, the literature review of the Corridor's meanings – such as urban and metropolitan device, transnational mega-corridor, ecosystem or political object – evidences common aspects. It is a space open to relationships and interactions with other places, exposed to the influence of exogenous dy-

namics, and continuously subject to processes of (re)defining the territory. Also, it transports energy in a physical and virtual, symbolic and political sense proportionally to the reference model. Within their structuring, the thesis considers the materialisation of intensities through corridors to investigate current hypothetical scenarios of territorial transformation between networks and isolations in the 21st century. **If the construction of the territory is the result of human interactions with their environment, the corridor is nothing but the rhizomatous repetition of the same process over time along with a privileged mobility, connectivity and continuity route.** It is a static and dynamic element stratified by interactions between places, economies and populations that accommodates new meanings and design practices at every stage of human development.

(Top). Demolition of the Morandi Bridge in Genoa after the collapse on 14 August 2018 (Source: Ponte Morandi, Divisare, 2019.Credits: Francesco Coniglione, https://divisare.com/projects/411043-francesco-coniglione-ponte-morandi).
Morandi Bridge reconstruction project by Renzo Piano Building Workshop (RPBW) and urban regeneration intervention in the Polcevera Quadrant by Stefano Boeri Architetti (Source: https://www.stefanoboeriarchitetti.net).

"The tragic event of the collapse of the Morandi Bridge in Genoa" has shown that "we must not only think about the improvement of the capacity, but also about the high quality of the corridor" thus trying to "create a resilient infrastructure." (Pawel Wojciechowski, EU coordinator of the Rhine-Alps corridor, at the Transport Committee of the European Parliament, Source: Ansa.it, https://www.ansa.it/europa/notizie/europarlamento/news/2021/05/10/ue-crollo-ponte-morandi-dimostra-importanza-qualita-opere_a02b8df8-6c12-46c1-8952-133bac5156ee.html).

1.2 /
Beyond transport concerns
(and what else?)

In the dialectic between exclusion and inclusion, persistence and movement, the corridor as a spatial figure, function, and symbol takes the collapse of the City-Territory relationship to the extreme from the explosion of a network of (inter)planetary dependencies. In this continuous, temporary process, its infrastructural-dependent presence is recognized as a natural vector of prosperity, survival and urban conflict from the strengthening or interruption of exchanges between more or less distant places and communities. With the explosion of the city's boundaries, the Corridor's definition has shifted from an analytical tool to a programmatic-planning apparatus, becoming instrumental to competitiveness as an economic landscape, urbanisation axis, and institutional structure. At the same time, the recognition of territories and landscapes in a centripetal-centrifugal connection with a centrality, sharing more often latent (often unexpressed) continuities rather than functional links, leads to recognise the figure of the Arc as a necessary counterpart, even a strengthening of the Corridor's meaning. It shifts the attention on understanding the distance between infrastructure connection and ecosystem of relations, between circuits of places and seeds of future urban development. **Combining the concepts of Corridor and Arc allows to observe the rearticulation of territories beyond a mere functional reading of transportation to accommodate the more comprehensive understanding of (inter)dependencies as systems of ecologies.**

1.2.1 / *Urban hunters* towards territory exploitation

Although the presence, accessibility and attractiveness of connective infrastructure is a requirement for its functioning – as product and trigger of economic and social processes –, the corridor provides different interpretations as a functional apparatus if considering form and scale as main reading criteria. Namely, the transport literature is plentiful with meanings of corridors as *infrastructure axis* ranging from a multi-centric or nodal connection to an infrastructure network grafted on a linear core axis, generally excluding fragmented systems without a predominant directional flow connection. Still, arcs, loops, networks of polycentric systems and dynamics define corridors on a larger scale, suggesting that form is not the primary measure to establish a corridor's value. On the upper level, the *megacorridors* represent linear "bundles of infrastructure" driving regional (inter)dependencies, planned to overcome the transport regimes and technologies' fragmentation and support local up to regional economies' competitiveness (Priemus & Zonneveld, 2003). From this viewpoint, the corridor is a programmatic device of centre-periphery integration to spread economic devel-

opment from the regional core outwards and regulate the growing (inter)dependencies that technological advances and new market arrangements have developed between transport, economic, and urban networks. Nevertheless, a single trans-national *megacorridor* section can be considered an individual corridor with distinctive features compared to the whole system. Therefore, neither categorising corridors per level in a tree-shaped structure matches the relevance of single arteries for their territories. If a *(mega)corridor* provides efficiency by different transport modes – in speeds, capacities, and levels –, some secondary arteries can have a more significant impact locally than main infrastructure links[1]. The same perspective suggests that neither a new infrastructure construction nor upgrade guarantees improved performance or impact on socio-economic models and urbanisation processes within the network, albeit in a logic of systemic reciprocity. Likewise, trans-territorial connections (whether autonomous or joining an existing network) may have partial or no influence on single corridor dynamics, if not threatening valuable territorial assets. Still, marginal transformations are sufficient to affect the spatial arrangements of the local economy and society, like the size of the labour market or the competition between services and businesses inside a macro-region.

Therefore, the infrastructure quality and transformations influence the corridors' value, taking into account the rigidity of the physical object to the pace of changes in mobility and its influence on connectivity, and always with regard to the context of intervention. In today's economy of stretching global networks, this aspect is crucial to territorial prosperity as a correlation between the infrastructure development (driving investments where people and capital concentrate) and economic growth to create zones of increasing density in economic activity and exchange. Such understanding underlies the corridor's hypothesis as an "economic system" (Trip, 2003) and influences the expansion of linear-shaped urbanisation processes to connect major urban centres and assemble new clusters. Thence, rather than form or scale, the corridor's importance or strength responds primarily to the intensity rationale, confirming the *fixity/motion* perspective (see paragraph 1.1.3). It establishes the quality of territorial bonds from the relation between human activity (including construction) and the environment, assuming a different value according to contextual variables. **However, contemporary society remains stuck in obsolete paradigms, while the world moves through overlapping and concurrent accelerations[2] centred on fluidity and Competitiveness' hegemony, taking the place of Development while losing a moral component (Santos, 1993).**

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1   E.g. In Northern Italy, corridor's dynamics remain structured around the highways as the national backbone since high-speed railways are still poorly accessible to medium-sized cities and incompatible with a large part of domestic flows (especially in terms of costs and small/medium enterprises distribution) while remaining the basis for European cross-border corridor systems.

2   Historically occurred as single significant disturbances, contemporary accelerations materialise – in the words of Santos (1993) – as multiple changes from the trivial character assumed by the invention, the premature perishing of capacities and their mind-blowing succession. The hegemonic times of economy, politics, and culture together with the technical-scientific transformation of space (as artificial techno-sphere and the psycho-sphere of beliefs, habits and desires) organise the world to productivity and exchange while providing a new basis to understand regionalisation. Moreover, the World Competitiveness Index turns into the new Bible, followed by the Smart City Index.

The corridor's persistence is defined by its path-dependence and the latent, cumulative continuity of territorial structures, places, actors and institutions. In contrast, it is subject to fluctuations – which demand the periodical redefinition of objectives, models and patterns –, today influenced by the space of flows, the shaping of networks, the pace of urbanisation dynamics, and technical progress. The crucial drivers of contemporary urbanisation remain prominent functional actors held together by an "infrastructure capitalism" adopting strategies of "corporate maximisation" (Perulli, 2017), which phagocyte the territory in a taming process. Including the oceans and upper atmosphere, planetary space has been permeated by infrastructural networks to make it operational to urban metabolism under capitalistic organisation, which dictates the requirements to control and deploy the economic potential on the available space and determines urban arrangements. Equally problematic is the leaning towards considering the innovation transmitted by the corridor as mere technical/technological progress (continues in paragraph 1.2.2). In this sense, there has been a shift from capitalism held by companies linked to the territory and land-consuming production systems to a landscape of new trans-territorial production chains, which replace the traditional relationships of proximity with equivalent networks of distant (im)material structures. At nodes of these flows, cities are emerging as smart strategies labs[3] supported by a system of distribution centres and remotely controlled operators. As part of the same process, digital technologies have contributed to the establishment of a "platform capitalism" (*ibid.*) – already introduced by mega-structures and hyper-places – represented on a territorial scale by corridors as its forerunners, backbones for the circulation of goods, services and information with increasing voluntary and compulsory mobility, infrastructure chains of extraction, production and consumptions centres across regions and continents. **In fact, the Corridor is 'in debt' to an infrastructural understanding of territories for a large part of its applications.**

In a world dominated by flows, places not contributing to the (re)production of the capitalist system – like historical areas – are reduced to an "accidental condition"; otherwise, they become points in a de-contextualised (inter)regional consumption chain (Magnaghi, 2018). **If the quality of infrastructure conception, implementation and management responds *a priori* to extractive logics and regardless of contextual instances, the corridor turns into an *urban hunter*[4] in the multiple phenomena of land appropriation, exploitation and degradation [(1), (2), (3), (4)]. As a consequence, it projects isolations as City's denial, place rejection, fragile urbanity, and impeded citizenship.** Accordingly, the corridor realises the network as selectivity and capitalistic production instead of horizontal integration, connection or cooperation between communities and regions.

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3   In the popular imagination, the idea of Smart City tends to be reduced to the sweetening vision of a technology application catalogue. Accordingly, it is imagined to shape the scene of a connected, illuminated environment, bombed by information through screens, while people live a frenetic life towards an uncertain destiny (Levy & Leite, 2020). This idea of a commercial display does not match the need to address urban challenges, and it is far from the meaning of intelligence and social scope that Smart Cities should carry with them.

4   The *urban hunter* is a temporary methodological tool introduced to understand the negative implications of the corridor as a device based on exploitation principles.

(1) Corridor as Sprawl

While materialising a hyper-mobile and hyper-connected society through stretching regional constellations, the Corridor collides with the idea of Compactness (Albrechts & Tasan-Kok, 2020) as it carries the stigma of dispersion and decentralisation since 1960s suburban sprawl. The emergence of cosmopolitan economies and lifestyles projected on optimistic unconditional growth – represented by the automobile's myth – has espoused an interpretation of the Corridor as unlimited linearity. Such understanding has led to the formation of ribbons of metropolitan deconcentration with varying densities of traffic access and fragmented by natural resistance or pre-existing urban fabric. Territories contiguous to the main arteries have profited from people, activities and capital's move to peripheral areas, satellite cities and functional hinterlands. The initial push to escape the pressures of housing, flow and costs of now regional urban overcrowding have been directed by economically accessible properties from the release of new land away from significant centralities, defining unlimited axes of expansion. Along alternating vectors of land degradation according to convenient resources supply (including land), linear-shaped sectoral urbanisation without integrated spatial and transport planning approaches corresponds to poor urban mixité, building quality and service distribution. On the one hand, the principle of unlocking land by acquiring added value from the design, construction and adaptation of inter-nodal transport, communication and logistics infrastructures is maintained as an efficiency artefact for a few influential functional actors, disconnected from territorial instances. On the other hand, large-scale design experiments projected towards the efficiency of (physical and virtual) flow as intelligent environments tell of the persistence of a car-centric legacy, often underestimating (or ignoring) the need to preserve the resilience of the territory by shaping balanced centralities also anticipating urban contraction, in an anti-fragile perspective. A trend to reduce regulatory barriers favours such corrosive dynamics, giving space to the freedom of construction while leaving little imagination and inappropriate perspectives for territorial development (Agostini, 2020).

(2) Corridor as Factory[5]

If organised around the pure production-circulation rationale, corridors tend towards intra- and trans-territorial (near-global) masterplans reorganising economic geography according to capital and technical progress, towards greater profitability, instead of mutual survival. Accordingly, "extreme infrastructure" – in constructive, extractive, financial and policy terms – gain unprecedented dimensions, providing intense mining and manufacture in areas previously safe from exploitation (Hildyard, 2020). Likewise, they move interests towards the cheapest labour markets or tax- and regulato-

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5   Reference to Olivetti's intuition of *concrete community* as a clear geographical space of integration between nature and history, city and countryside, factory and local society, and to the paradigm shift from the Fordist subordination of territory in the city-factory to the deterritorialisation provided by global economies and digital flows' hyperspace (Magnaghi, 2020).

ry-free environments and attract the extreme finance of hazardous assets, also helped by data monitoring to refine trans-territorial networks (including the 24h Amazon delivery):

> An explicit aim of the Almaty–Bishkek Corridor in Kazakhstan, for example, is the planned 'agglomeration' of 70 percent of the country's population into three planned megacities in order to provide an overflowing pool of labour for dedicated mining, agribusiness, manufacturing and logistics' hubs along the corridor route.
> (Hildyard, 2020: 10)

Particularly worrying is the new wave of large-scale projects – including logistics and energy – promoting *megacorridors* as links between increasingly distant primary extraction, production and consumption centres in capital-friendly "tradescapes"[6] (*ibid.*). Such environments are defined by (and for) prominent functional actors, usually at the expense of small/medium scale economies and the synergy between communities and territorial features. Through connections (wrongly) expected to solve the economic distance of transport, streams can move in geographical patterns subject to a neoliberal "trade culture matrix", considering the spillover of production out of the traditional factory and industrial areas and the imposition of new "logistics-based", "just-in-time" functioning (*ibid.*). Precisely, logistics understood as the modernist-influenced "art of reducing friction" emerges as an increasingly long-lived model that simplifies reality as a gigantic artefact to introduce order and control through circulation networks, thence territorial domestication, subjugation and reconfiguration (Otero Verzier, 2019: 119-120). It is no coincidence that the history of logistics represents the "backbone of wars, slave trade, indigenous dispossession, colonial legacies, regulatory frameworks, socio-ecological transformations and forms of extraction" (*ibid.*). Risks of creating extreme corridors emerge when the interests of businesses, institutions and governments come together at the regional level to create connective infrastructure between neighbouring cities as productive economies to not lose the productive potential from their (apparent) territorial union. By shaping corridors as continuous factories from regional powerhouses to international chains, logistics and labour, such processes encompass an infrastructural development proportioned to reaching distant resource-rich places ever. They create a solid base for productive efficiency and increasingly move goods and services out of the region itself, including human resources and knowledge.

(3) Corridor as Elitism

In addition to the creation of production chains disconnected from places, corridors can create extreme landscapes of undemocratic decision-making, built on opaque legal systems, selective in the choice of centralities – therefore share of citizens and city users – to be privileged, of land to be occupied, and of the parties to be involved.

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6   Cross border regions for the free movement of goods and services as defined by trade agreements, logistics technologies and transport infrastructure.

On the one hand, they manifest themselves as projects driven by the state and guided by private investment, justified by the rhetoric of the infrastructure gap for territorial prosperity understood as national growth. However, they are mainly aimed at speeding up production chains and exploiting cheap labour for their implementation. Of particular relevance are the forms of collision between urban entrepreneurs and local societies in "shareholder-city" models oriented towards the privatisation of urban planning (especially in the South and East as the centre of the third wave of the urban exodus), building corridors of real estate returns from the conversion of agricultural land along growth axes (Ribadeau-Dumas, 2020). On the other hand, candy-colour projects of intelligent connection chains privilege metropolitan nodes with a high production capacity; or create high-tech prototype cities, even the size of cross-border city-states in inhospitable regions, targeting high-income actors and social groups with an apparent idea of innovation (e.g. *NEOM*, a linear Smart city of 170 km crossing the Saudi Arabian desert). In both cases, people and communities are shifted to make new ways for transport axes if not transformed into pools of cheap labour for the activities that the corridors will service, while inequalities and the rejection of places extreme and expand where infrastructure lacks the most. Therefore, the concept of citizenship and the right to the city in elitist corridors is strongly jeopardised, together with the collective territorial heritage, while mobility and connectivity turn into a localised privilege.

(4) Corridor as Competition
While building increasingly high-performance networks of exchange and inter-action, corridors tend to consolidate as places of extreme competitiveness rather than balance, exacerbating marginality conditions in the territories uninfluenced by their passage. According to a centre-periphery model, their distribution affects different scales, orients the greatest concentration of wealth in central regions and metropolitan nodes as interconnected terminals. Chains of dependencies of varying extents depart from them, whether points of connection to the network, individual cities, or agglomerations of smaller centres, acting as resource extractors. Based on the prosperity potential offered by mobility and connectivity, corridors trigger an intra- and trans-territorial race to build production and innovation environments with a high capacity for return flow, enabling main urban centres to compete at higher scales. Likewise, they can help marginal territories and small/medium-sized centres break free from dependency relationships and exclusion from planetary flows between main urban hubs by creating autonomous development corridors. In some cases, a corridor project coincides with a proposal for a diversified economy in which a cluster of centres inserted in a territory perceived as a void is expected to be able of accommodating any solution, provided the connection between the main dynamic centres of the regional economy and always according to a production-distribution rationale linking resources, goods and capital. To this end, the corridor becomes a functional tool for economic performance rather than an axis for structuring a territory, the subject of contention between states, regions and municipalities over the decision of its route and

which cities can enjoy the appropriate infrastructure for this purpose as anchor points for networks and flows. The conflicts triggered by this competition race are proportional to the size and specific weight of political and administrative borders. For this reason, the differentiated concentration of wealth resulting from the corridors' distribution, quality of relations and intensity of flows also triggers tendencies towards political-administrative isolation and autonomy of government.

Through the extreme conditions of sprawl, factory, elitism and competition (among a broader range of possibilities), the contradictions of the corridor emerge as a double-edged sword. Its dependence on infrastructural implementation carries both expectations of growth from investment and trends of speculative construction. Its ability to organise space and time can strengthen territorial cohesion and active cooperation otherwise intensify selectivity, hierarchy, and unequal access to the city and citizenship. Therefore, the Corridor highlights the need for a new understanding of territorial design, holding together the ongoing transformations produced by infrastructural vectors with the existing damage to the territory and society produced by industrial obsolescence and building speculation. Likewise, the corridor itself demands to be reinterpreted as analytical, proactive and governance intervention overcoming the indefinite urban expansion model. **In this sense, the asymmetry between the corridor as construction and space of urbanity participates in the dialectic between** *cité* **and** *ville***, which explains the difference between building the designed territory and the broader sense of dwelling (Sennett, 2018).** Such understanding gives the basis for an alternative viewpoint centred on the character of urbanity and territorial equilibria, necessary to investigate the corridor's transition from mere infrastructure collection to development route joining places. Crucial is the case of corridors 'labelled' with *development* or *growth* adjectives, often identified as the productive powerhouse of a territory, potentially a driver of regional or national prosperity. Their success as an intervention is linked to the choice of the paradigm of spatial transformation, organisation and specialisation of their functions; to the evaluation of the temporal dimension of project implementation; to the shared management of the territory and landscape as a common good.

1.2.2 / A race for development and growth

Moving beyond analysis on the urban form to focus on trans-territorial relations due to unprecedented post-metropolitan arrangements, the Corridor enters the institutions and banks' discourse approximatively in the 1980s. It is used as designated strategic axis and infrastructure investments to assume an economic growth significance, although in a time already questioning the idea of a continuous positive trend as imprinted by capitalism. Crucial for this appropriation is also the combination of the infrastructural interpretations (*transport*

corridor) with urban processes (*urban corridor*), as suggested by the United Nations[7] (Fau, 2019). It creates multiple, intertwined variations – namely *development, trade,* and *growth corridors* – as primary operational tools orienting funding programs, shaping a new development model focusing on progress but challenging to combine with environmental sustainability. From the transnational viewpoint of megacorridor (as analysed by the *Corridesign* research[8]), it is possible to highlight at least a triple taxonomy of "transport network", "axis of economic development", and "urbanisation axis" up to more structured institutional purpose using local infrastructure as a common denominator (Priemus & Zonneveld, 2003; Zonneveld & Trip, 2003). From an evolutionary perspective distinguishing meanings and scope per stage, *development corridors* evolve as routes to facilitate social and economic activities around flows, including developing a particular economic sector (e.g. *agricultural corridors*) (Hope & Cox, 2015). Also, they can concentrate an impressive growth rate in a sub-national or cross-border region, gaining the character of *economic corridors* (*ibid.*). They can also be understood as "giant urban languages planned along with brand new roads in order to accelerate the industrialisation of the country" (Ribadeau-Dumas, 2020). From a cohesion and prosperity perspective, corridors can also be planned to promote the development of both primary structuring hubs and marginal ones. They gain significance beyond more efficient connectivity between cities to develop "a new multi-polar and transnational space that connects existing urban areas with emerging regions" (Fau, 2019: 1). Such corridors' function is to facilitate new productive activities by enhancing the accessibility of infrastructures to development processes and improving local production facilities' transformation capacity.

Nevertheless, a clear demarcation to determine how a corridor has progressed on different evolution stages from simple route to development is rare, and there is no universal terminology for them. Likewise, the infrastructure-economic growth correlation (and its direction means) is not yet verified, given the concentration on single case studies; the difficulty of comparing implementations between more advanced territories and underdeveloped regions, at margins of global flows; the effective measurability of impacts in the long run[9]. Its understanding demands a cohesive picture and experience comparison, given the different relations of transport and infrastructure dynamics with economic arrangements: extraction, production, logistics and labour costs; spatial arrangements of clusters and business chains; proximity against distance; trust networks supporting business and agreements. **According**

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7   The United Nations' project "Capacity building in developing interregional land and land-cum-sea transport linkages" (2002) aimed to identify interregional transport routes to improve integration and foster economic development.

8   The *Corridesign Interreg IIC* was coordinated by OTB Research Institute for Housing, Urban and Mobility Studies at TU Delft. It provides a European and regional-scale viewpoint on corridors, mainly concerned with the economic development linked to post-industrial urbanisation processes and the idea of a boundless Union. Likewise, it is a valuable investigation on the transnational *megacorridor* concept as the infrastructural backbone of the Western European Central Capital City-Region. Even if limited to Europe, it represents a necessary reflection element, as it opens to further meanings apart from transports.

9   Among the few measurable impacts, Corridesign examines the land value and logistic costs as the consequence of transport articulations on the spatial organisation of network economies (e.g. Randstad, Rhein/Ruhr, or Flanders).

to geographers and economists, the concept of *development* or *growth corridor* should be applied to a route involving, or facilitating, social development and economic growth in territory, and enhancing new forms of governance and spatial integration. Nevertheless, the possible notions remain discordant, partial, sometimes biased, making it necessary to enable trans-scale comparisons on common methodologies and analytical frameworks. They can be synthesised in the following approaches, as suggested by a geography review on projects and policies across Africa, Asia, Central America, and Europe [(a), (b), (c), (d)]:

(a) The investigation on the potential existence of a structured corridor along a given transport route, whether linked or not to any institutional region;

(b) The comparison between institutions, governments or funders' discourses, sometimes in an arbitrary way, as part of market integration and liberal deregulation policies, with national or local planning programs;

(c) The diachronic distinction between proposed, completed or pre-existing corridors to shed light on the evolution of debates, stakeholding, issues and events drawing "the geo-history of a technical route" (Debrie, 2007, in Fau, 2019);

(d) The comparison between institutional rhetoric and cross-disciplinary migration in academic research, stressing the difficulty in challenging the construction of corridors when their representation is highly loaded with positive values (particularly for desired links outside main urban concentrations).

Following opposite transformation scenarios towards more robust networks and increasing isolations within planetary urbanisation, a global 21st-century planning and design race for *development* or *growth corridors* crisscrosses the world through developing axes of connection, urbanisation and economic polarities waging on the idea of innovation. The privileged consolidation of this kind of corridor is explained by connections' consistency to infrastructure and access points proportional to demand, both deriving from path-dependent dynamics. Nevertheless, mobility and connectivity drive their conception and implementation as impetus more for the profit of a few powerful actors – from the link of centralities – in an endless growth perspective rather than balanced mutual interdependencies between settlements and their environments. In addition, several corridor projects embrace an idea of innovation as infrastructure efficiency or prosperity enhancement in highly specialised clusters (e.g. Silicon Valley, or Silicon Roundabout), superficially considered to be the places of wealth creation inertially distributed by the welfare state. It is not simply a matter of productivity and data, but the way societies define education, health, energy sources, cities, and citizenship as a process of collective value creation (Mazzucato, 2017), which influences planning and design.

Building a corridor means addressing the imperative of making space for urbanisation in a resilient and rightsizing perspective where innovation coincides with a new organisation and values of communities; therefore, territorial relationships spread through corridors as planned axes of urban transformation. Similarly, and at different scales, they can coincide

with infrastructural implementation between small and medium-sized cities around a regional centrality to emerge as a cluster economy or an attempt to overcome a centre-periphery dependency. However, corridor projects usually work from the postulate of an apparent link between infrastructure construction, territorial integration, participation in global connections or network creation, and economic development by promoting and facilitating transport and trade. By channelling both public and private investments, they can be established as a model crossing continents and adopted by individual states (like the *One Belt One Road* initiative). Also, they can be implemented independently from any supranational institutional framework but with the risk of creating fragile results, especially when incorporating cross-border routes. The absence of a shared perspective, comprehensive plan and corridor-wide institutional body can jeopardise their development into fragmented implementations, depending on significant territorial disparities between core regions and marginal areas if not for real estate development (e.g., India's *industrial corridors*) or political conflicts and lacking agreements. Their (expected) construction impacts on regions by impulsing territorial transformations and the emergence of new spatial structures (Fau, 2019) [(1-6)]:

(1) The implementation of seamless connections and the improvement of communities' living conditions create a fluidity/fecundity opposition in corridors' planning and design, which also reflects in the opposite approaches of logistics, focused on space-time contraction, and that of territorial instances, interested in spatial and social impacts;

(2) Corridors tend to consolidate existing economic centres and expand the force field of economically more vital regions, whereas peripheral areas (in relation to flows) usually remain neutral, or face shrinking processes from 'tunnel' effect consequences, namely when the corridor route crosses the territory as an impermeable conduit without evident economic effects (Graham & Marvin, 2001);

(3) If not applying mere extractive logic, corridors can lead to the rise of new polarities, contribute to the success of urban renewal projects, reverse the role of marginalities as new centres of trans-territorial communication networks (instead of raw material or labour suppliers), and contribute to minor cities' development (e.g., high-speed rail or BRT projects);

(5) The contamination between territorial economies and corridor's in-out flows offer opportunities for growth and functional specialisation, leading to concentrate economic activities according to accessibility conditions, often increasing the distance between regional economies' centrality and peripherality;

(6) Corridors' projects influence regional urban hierarchies with the emergence of end-nodes, border areas, and routes' intersections, especially in South-East Asia, provide changes in the built environment and economic sectors, with increased specialisation of spaces, the transformation of urban configurations, and rise of property prices (familiar as internationalisation markers and processes).

Acceleration, fluidity and continuity are the historical and operational characteristics making the corridor recognisable and holding together its infrastructure, economic, and urbanisation meanings. Also, they are the conditions marking the boundary between a vector of innovation and a vector of exploitation. Thence, development or growth corridors can be flagship projects or little-explored solutions if not associated with a specific territorial idea, based on interdependencies, cooperation models and place-making processes. Due to their role in establishing networks as geographies of power – hence territorial control –, corridors are increasingly asserting themselves as a tool of governance and financing, facing multiple criticalities.

As a political-programmatic structure, their implementation usually involves agreements between multiple actors and levels of interest. They operate preferably under an over-arching, cooperative spatial framework bridging different planning and governance areas and coordinating economic and territorial parties (Debrie & Comtois, 2010) to solve route design, funding model, management, and functioning arguments. It is an essential condition to avoid a sectoral and single-actor perspective, also influenced by administrative devolution. Nevertheless, creating a cooperative governance system is not a guarantee for the maintenance of design coalition throughout the corridor's construction, often turning into a fragmented project and partnerships pressures for the infrastructure alternative routes and features (Carrouet, 2019). In this sense, the intervention can be taken over by vertical governance interests in gaining a corridor node or point of access to networks or the proliferation of similar and competing projects close to infrastructure terminals regardless of territorial union, complementarity or integrated planning perspective. Thence, the corridor's governance becomes a theoretical concept, therefore an ineffective coalition, rather than a practical one.

Likewise, the effectiveness of corridors as territorial structuring can be jeopardised by bankruptcy or investments volatility as they demand a solid financial model and a proposal aligned to the instances of place (Médina, 2019). It is essential to define a long term planning and design perspective for the region before defining the best partnership and funding model. Moreover, changing regional hierarchies from corridors' implementation justifies a race for competitiveness to become an issue of national sovereignty affirmation, as the single project can be conceived as display and tool of political power. Also, it is crucial to reconcile the conflict between public and private interests and integrate the instances of all the actors involved for prosperity and design, including external parties. Besides these aspects and often neglected or unexpressed, the ability of corridors to transcend "administrative, technical, legal, or price-related" borders (Fau, 2019: 8) makes them privileged places to reduce discontinuities and intensify intra- and trans-territorial interdependencies, including economic integration projects (constructing a networked wealth system). Nevertheless, conflicts and negotiations for centre-peripheral, vertical, or differential autonomy threaten the organisation of corridor policies and projects. The competence is defined by hierarchic decisional structures and governance boundaries regardless of the parties and authorities involved in the actual territory of the corridor's influence, usually leaving place-making as a formality. While assuming an increasingly economic-political character and strengthening functional

networks of exchange and territorial order, the corridor exacerbates its separation from a space that differs from the space of flows. It loses materiality in its strategic elaboration, turning into missed design opportunities of transformational spatial planning and urban design, especially across borders and in areas suffering abandonment or consumption from corridors' passage. It increases distances between centrality and marginality by focusing its interests on a hub-and-spoke organisation. **In order to contextualise such criticalities in the relation between infrastructure, development, and equilibria, it is necessary to understand the infrastructure policy waves for territorial integration and competitiveness in Western thought.** Namely, the research refers to an analytical section of the *PRIN Postmetropolis* project (2010-2011)[10] which investigates corridors in the US (1) and Europe (2) as programme-planning tools, overcoming their original use in describing urban processes. Whereas previously there has been a shift from a linear model to a geographical interpretation in exporting the concept from Europe to the Americas, the second half of the century saw a process of further transformation, but in the opposite direction:

> Although the concept of the territorial corridor was born as a tool to interpret and explain the development of North American urban systems, it began to be also used for European regional economic development since the late 1980s [...] European thinking has arisen, however, concerning the increasing complexity of economic development associated with post-industrial urbanisation processes and the concept of the territorial corridor has been used more as a planning tool than as an analytical-interpretative one.
> (Pennati et al., 2017: 276)

Moreover, these two contexts show the difference in using corridors as development prospects by emphasising infrastructure and urban construction or programme implementation, and the degrees of sensitivity to the transformations they bring, beyond transport and economic significance.

(1) Corridors in the United States
Apart from geographical studies on the Megalopolis and thanks to the role of highways in North American urbanisation, the US recognise corridors as frontier spaces of urban change, territorial development tools integrating infrastructure policies with general spatial planning processes. The process begins with the *Lincoln Highway* (1913) and is promoted by Eisenhower's *Federal Highway Act* (1956), which maximises the systemic potential of the infrastructure by creating a dense national interstate network. As the "single most instrumental factor in structuring settlement patterns and economic development" of territory in the second half of the 20th century (Velikov & Thün, 2010: 364), highways emphasise vehicular traffic as the leading cause of environmental pollution with suburbanisation. **Namely, the "arterial corridors" – evolving from the union of villages in**

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10   Even if referred to the Italian regionalisation processes, it represents a valuable overview of international studies, policies, and projects on the postmetropolitan transition of the 21st century, including corridors as essential components.

the 19ᵗʰ century to Main Streets of early 20ᵗʰ-century downtowns and neighbour-hoods – prove to be the natural channels and icons of urban sprawl due to almost universal access to car (Dixon, 2011).

Although remaining broadly not applied and ineffective, the *Clean Air Act* (1955) declares the need for integrated transport planning and sustainable development principles in infrastructure design, integrated by environmental quality standards and state implementation plans. Also, it brings a tool of territorial impact management by coordinating the federal, state and regional planning. Close to the century's end, the *Intermodal Surface Transportation Efficiency Act* (ISTEA) strengthens this course in 1991[11] through a complex regulatory framework for infrastructure planning, including the metropolitan level with a 20-year Regional transportation plan and the respect of continuing, coordinated and comprehensive principles. The ISTEA structures a multiple-level planning system where a broader urban design answers local demand and approval. The new regulations consider identifying *High Priority Corridors* as national, regional and cross-border main flow axes by the Congress in the *National Highway System*. Also, they consider the institution of a *National Corridor Planning and Development Program*[12] financing integrated corridors between infrastructure and settlement to States and metropolitan areas (MPOs) for economic development and urban renewal, although mainly related to highways. In 2006, the Federal Highway Administration launched the *Corridors of the Future* program to boost interstate multi-mobility for less congested trade traffic and promotion of economic development. The choice of routes depends on connectivity, the ability to support economic growth, commercial and commuter flows, congestion, possible savings on travel time and costs, and the ability of local (including private) actors to integrate federal resources. By considering transport innovation crucial for the functional organisation of territory across scales, the ISTEA program aims to integrate infrastructure policy with settlement strategies, contributing to more sustainable urban and economic growth. Its tools include enhancing railway and car as mobility alternatives and abundant community-based transport planning experience (involving designers, planners, environmentalists and citizens).

The US also applies the corridor figure in regional planning with standardisation practices since the first decades of the last century, both in urban planning and zoning[13]. They also apply a cascade approach with a clear separation between the normative planning and descriptive stages. Supported by pressures in the community and technical environment, such as the American Planning Association, states adopt approaches of extensive participation of local actors and cooperation between levels of government culminating in the general reform *Growing smart* (1996) since the 1960s. It defines an integrated regulatory

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11   Integrated by the *Transportation Efficiency Act* for 2001 (TEA21) towards the greater inclusion of local actors in infrastructure design.

12   The corridor design includes economic analysis, the evaluation of environmental impact and an urban integration project.

13   Es. *Standard State zoning enabling act* (1922) and *Standard city planning enabling act* (1927).

framework between territorial and multi-level functions, in which the federal level assumes guiding and advisory functions. On the local level, states, regional agencies[14] (for urban growth areas) and participatory local planning define spatial planning and actions to promote development, including forms of Transit-Oriented Development influenced by New Urbanism. Among its applicative practices, corridor mapping (little used[15] compared to other urban development tools like *Transit Villages*) is functional to measures in areas with ongoing transformation dynamics on linear mobility infrastructure and settlement systems. With corridor preservation restriction, planning constraints are provided for a coherent development according to an overall design involving broad participation of stakeholders and civil society. Coordinated with superordinate[16] authorities and engaging the population, the local planning commissions draw up a corridor map as a participatory, bottom-up and integrated tool of the general plan for territorial and urban system development. It is a zoning act defining the mobility demand manages the infrastructure design and monitors the effects on the local socio-economic fabric. Besides, a joint intervention on the urban, territorial and infrastructural tools regulates the typical corridor dynamics. Thence, the US register a transition of the Corridor's figure from infrastructure to urban growth and territorial development. By building experience of integrated transport and spatial planning approaches combining multiple institutional levels, they often reinterpret the metropolisation processes from infrastructure. **Accordingly, the corridor is employed as means of urbanisation and industrialisation, leading to radical change and reorganising space with transport development. However, the high dependence on the individual vehicle and the highways' widespred extensiveness have made it the main vector of a low density, sprawl urbanism clashing with the emergence of new multicentric urbanities.**

(b) Corridors in Europe
Apart from the contribution on the linear city, the corridor is little tested in Europe in large-scale urban and regional planning, focusing mainly on interventions in the vicinity of local transport corridors, also due to territorial heterogeneity. Among the rare cases, Garavaglia (2017a) reports the freight macro-corridor scheme along the Rhine and Danube, the London-Bristol industrial corridor, as an escape of the manufacturing sector from the capital into the country's first high-tech hub[17], and the Frankfurt Rhine-Main

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14   Five possible forms established by *Growing smart*: regional planning commission; council of governments; regional advisory committee; regional allocation agency; special purpose regional agency.

15   Among the few experiences, the integrated design of the Alameda corridor project for the enhancement of the railway system between ports and the regulation of the infrastructure investments impact (in collaboration with the cities of Los Angeles and Long Beach by setting up the Alameda Corridor Transportation Authority with local governments, port and railway operators).

16   In the first place, the Federal Department of Transport, the Federal Highway Administration, and the regional agencies.

17   Reinforced by the war industry in the Second World War, this manufacturing corridor led to an infrastructural development due to economic, urban and mobility growth, creating the M4 motorway. Mainly studied in the 1980s (Hall et al., 1987), the London-Bristol corridor affirmed its prosperity in a country under a recession that tried in vain to extend the

urban-economic development in a hierarchy of infrastructure axes[18]. **On the other hand, concerning transport policies, the main contributions on corridors belong to the European Commission, which defines them as privileged axes of economic and social cooperation with the *Trans-European Transport Network* (TEN-T) programme in the framework of the Maastricht Treaty (1992).** It was an attempt to "reconcile economic growth, competitiveness and sustainable development" (Albrechts & Coppens, 2003: 216) that had already been attempted earlier but was held back by the lack of agreements on European infrastructure between member states[19]. By the 1980s, the growth of cross-border trade and supply chains revived the need for a transport system based on the free market and a continental network of transnational corridors to support economic unity[20]. Ten years later, the international debate of the *Pan-European Transport Conferences*[21] partially merges the concepts of *trans-European corridors*, as a connection between member countries, with *pan-European corridors*, as an extension of the network to Central and Eastern Europe (Garavaglia, 2017a).

Initially conceived as an infrastructural, supranational and interoperable interconnection, European corridors catalyse a massive programme of public works and test public-private partnerships in the production of collective goods. As the TEN-T programme requires unsustainable public investment from many European states at a time of recession and with a monetary and market unit still under construction, the priority projects needed for the transport network are defined based on the equitable territorial distribution of the corridors to guarantee future investment. However, the projects of the more prosperous and more advanced countries are favoured over the weaker economies, giving priority to the completion of short-term projects over several projects that will remain unfinished. Thus, the overall vision of the TEN-T becomes an effort to realise at least part of the idea of transcontinental corridors with more minor interventions, losing strength to the idea of intermodality and reduction of peripheral marginalisation. Despite the successive renewals of the TEN-T towards sustainability and reduction of environmental impact (e.g. Roadmap 2011), the approach remains focused on infrastructure without reviewing the strategic choices of mobility and connectivity.

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benefits of its development to neighbouring areas. The corridor managed to innovate its industrial structure as one of the first high-tech concentrations in the UK.

18   Spatial development planning has only been applied at the State and urban scale, ignoring the regional level and avoiding specific policies for corridor areas, imagining that their concentration of the economic heartland could create frictions with marginal areas given their economic and social criticalities.

19   Already included in the Treaty of Rome (1954) for a Common Transport Policy, the implementation of corridors was restrained by member countries' fear of creating market and institutional imbalances in a field of strong territorial and national competition, while a Community economic unit was still lacking and norms and standards in transport technology were being harmonised.

20   As part of a broader process of economic development of the Member States, the provisions of Title XII of the Maastricht Treaty made explicit the importance of trans-European networks that included Eastern Europe, Asia and the Mediterranean, providing for a system of multimodal and multifunctional corridors (contributing to the definition of TENs) capable of spreading the effects of the single market and the removal of borders with the Schengen Treaty.

21   Conferences of Prague (1991), Crete (1994), and Helsinki (1997).

Since the 1990s and parallel to transport programmes, the corridor is also used in EU spatial planning and urbanisation policies for polycentric development[22]. Studies on the reconfiguration of the European territory and informal meetings of ministers for spatial planning[23] lead to the concept of the *Eurocorridor* as a combination of high-flow connective infrastructures for welding together regional and transnational socio-economic networks. Different from development corridors as urbanisation axes and the basis for the socio-economic interest of *megacorridors* (Zonneveld & Trip, 2003), *Eurocorridors* overlap with the high-speed rail network, identifying vectors for spreading development and spaces at risk of congestion and saturation. As in transport policies, this corridor definition aims at greater competitiveness of the European economy, centre-periphery integration and a uniform and widespread infrastructure network for the barrier-free movement of goods and citizens. Thus, the European discourse shifts from simple economical and urban growth lines to places where new social issues are concentrated to develop cooperation policies between the supranational level and local actors. At the same time, the *European Spatial Development Perspective* (ESDP) defines corridors as infrastructure systems and development directions that strengthen polycentric interdependencies between central and internal areas for territorial cohesion; create an integrated transport and communication system for a common market; and protect and develop natural and cultural heritage to preserve local/regional identities and diversity.

The spatial concept of the *Eurocorridor* was supposed to contribute to linking infrastructure, environmental and competitiveness policy areas and to integrate marginal territories into the networked and polycentric model sought in the *Central Capital Region* through the implementation of TEN-T corridors. However, the absent identification of existing and planned *Eurocorridors* in the final draft of the strategy reduces their potential for spatial planning and urban design to more abstract international cooperation policies. On the one hand, this is due to the lack of agreements among member states on the areas to be defined and planned for this purpose (Priemus and Zonneveld, 2003); on the other hand, the lack of a politically shared perspective on the interpretation and representation of the concept prevents the production of a diagrammatic scheme capable of overcoming vertical governance perspectives (Pennati et al., 2017). Moreover, the strong orientation of EDSP towards spatial planning has led to exclude the Ministries of Transport and Public Works in the transnational policy-making phase. While considering mobility infrastructure as the backbone of cohesion and development of the European urban fabric, spatial planning, transport and infrastructure policies decide to travel on separate tracks. Also, the 21st century marks a paradigm shift from infrastructure investments and transport programmes to a territorial and social cohesion perspective. The budget for infrastructure projects remain relevant, while the theoretical relationship with transport policies and the

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22   The *Committee of Spatial Development* (CSD) launches a joint project for European spatial development. The realisation of the *Europe 2000* and *Europe 2000+* studies (as proposed by DG XVI) aims to a coherent framework reference for different planning levels.

23   They led to the drafting and approval of the European Spatial Development Perspective (EC, 1999).

TEN-T programme is less explicit.

In 2013, the TEN-T revision sought to re-establish the role of the corridor with a *Core Network* (CN) of 9 multimodal routes (recovering existing axes or those nearing completion) to overcome the fragmented approach by priority projects and to redesign a continental strategy 2015-2030 on the most strategic parts of the trans-European network. Spatial planning objectives influenced European regional policies in the early 2000s, with structural funds and regional development programmes (such as *Interreg Europe*[24]) increasing knowledge of spatial processes (through ESPON[25] research) and activating social and territorial cohesion projects. However, Eurocorridors remain a missed opportunity to integrate infrastructure planning and programming and deepen infrastructure-economic development links in EU competitiveness and cohesion strategies.

The downsizing of the operational concept of the *Eurocorridor* and the concentration of transport policies on infrastructure interventions leaves the management of the territorial effects of priority projects and their economic and social consequences to national and local levels. In addition to this, the European discourse does not find a synthesis between the interpretations of the Corridor as an infrastructure axis, urbanisation, economic development, connection or cooperation space. Therefore, the literature considers priority projects and CNCs as result of political choices rather than technical-scientific interpretations. According to Garavaglia (2017), the same dynamics described by Whebell – linear evolutionary systems and economic landscapes linked to the connective surface of transport – have been considered mechanisms to justify large infrastructure investment projects instead of a policy approach. The focus is on territorial systems with specific vocations, linking them to socio-economic growth and the process of territorial cohesion in a rather suggestive way. Moreover, the mere juxtaposition of different interpretations of corridors and the ESDP's attempt to hold them together seems to create ambiguity in European thinking. Corridors are backbones and infrastructure networks of supranational space, described at the regional level according to transitional urbanisation dynamics. In an attempt to hold two different points of view together, the evolution of the corridor has led to a progressive simplification and downgrading. From being a European development tool, it becomes a collateral political issue. Thus, it passes through a crucial moment of interchangeability between the negative interpretation of high-flow infrastructure externalities (as priority projects) and the positive connotation of economic development vector (as *Eurocorridor*) in the same figure. This overlap reveals the absence of relevant analytical-interpretative criteria in the identification of corridors by European policies. Moreover, the choice of location of priority projects is partially linked to their strategic importance for the completion of the network, which was initially dependent on national logic and on the correspondence with projects already started (or to be started) to meet the short TEN-T deadlines. Successive EU enlargements apply the same distributional logic

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24   *European Regional Development Fund* programme for cooperation between regions of the European Union.

25   *European Spatial Planning Observation Network.*

of identifying at least one priority project per Member State. Replacing them with NCCs is a simple reorganisation of ongoing work to make multimodal goals evident, without an actual identification of existing or developing territorial corridors. **Thus, the European corridors do not correspond to a real process because of the difficulty of comparing their economic effects in a planned horizontal system working as a centre-periphery scheme where interventions are unevenly distributed.**

Consequently, European *megacorridors* in territories that already absorb intense flows cannot be compared to infrastructure development in marginal and depressed regions, nor similar situations without homologous processes. The lack of agreement on the spatial extent of the corridor also prevents applying the same reading criterion or method of analysis at different scales. Moreover, despite the pre-existence of a consolidated urban fabric, the central government makes infrastructure choices with little regard for territorial characteristics, local authorities' geographical organisation, and the relevant ordinary planning criteria, usually resulting in new reorganisations with only a partial possibility of negotiation. **Therefore, the corridor remains a mere mobility investment if not integrated with local planning and design perspectives.**

Despite the difference in approaches to regulating expansion along major infrastructure arteries and building a framework of cross-boundary and political-economic order, the US and European experiences epitomise the same process. While seeming to dissolve within the network geometry of global economies, the Corridor retains its modern legacy of associating growth with a functional organisation of space. It constructs increasingly efficient devices according to directionality, sequence, simplification and selection, establishing itself as the means of ordering contemporary space par excellence. It should reduce differences as well as distances by building networks from enhancing exchanges. Nevertheless, this capacity is diminished by contemporary societies' need to redraw maps within a visual and conceptual order. They make corridors seamless conduits ensuring flows of trade and labour, domesticate territories, and strengthen the dominance of a few actors according to the logic of capital. **For this reason and the exact opposite, the Corridor should not be read as a simple point-to-point connection model but a system defining and being defined by interactions.**

1.2.3 / Matrix figures: Arcs giving shape to Corridors' complexity

The continuous and excessive hierarchical structuring of networks and spaces, the extreme specialisation of functions and places, the strong polarisation, and at the same time the abandonment of less efficient and accessible territories: the territory and society need ideas, figures, concepts and strategies that question this apparatus and the spatial devices that refer to it. Reflecting on the corridor takes us towards different concepts and figures, which have to do with permeability, connectivity, porosity; with isotropy and horizontality.

(Viganò, 2015: 8)

There are no natural political borders, because all political borders are artificial, in other words, created by human consciousness and will.

(Battisti & Salvemini, 1918)

As seen in the reconstruction of its evolution as a primordial connection figure, the corridor essentially orients and differentiates flows by linking spaces according to the nature and quality of its boundaries and 'gates'. It acts the same way as Foucault's *heterotopia*, a *région passage* applying a relative and never absolute deterritorialisation[26] (Guida, 2015), which is also associated to the rise of post-urban portraits and the rupture of bonds between communities and places. In other words, it separates its content from the outside, depriving it of the conditions of original territorial boundary and ownership and placing it in constant transition, continuously redefining its character. For the permeability of its thresholds – defining galleries or tunnels –, external space can also influence the corridor's configuration and what passes through it. As societies have historically designed spaces and marked territories in this way, recognising the corridor as a matrix figure of contemporaneity means embracing the idea of a permanent change, potential presence, and flow, as long as it is ensured the persistence of movement and continuity. Such observation matches the evolution of interactions between communities and places described so far. It also explains why this figure has earned multiple meanings through time, from a territorial/urban to an infrastructural, economic, and political sense[27].

With the transition to the network paradigm and the society of access, the conceptual dissolution of the Corridor as tree-shaped hierarchical connectivity introduces virtual, ubiquitous, instantaneous and delocalised relations, breaking down its presence as linearity. Such operation amplifies the corridor's mobility-connectivity potential inside a new spatial dimension where all (inter)dependencies come together and overcome in-out divisions, both in the physical world and its reflection in cyberspace. Accordingly, space is entirely internalised by the network – from urban commuting to air flows to data exchange –, setting the conditions for overcoming a two-dimensional perspective. At the same time, the corridor remains the main component of the functional networks feeding and organising cities. The scaling up of urban dimension and the need for interactions between continuously displacing and multiplying centralities led societies to overlap and merge these concepts (linearity vs network), always requiring new means of reducing the space-time distance.

Therefore, observing the development of 21st century polycentric urbanities from the connective capacity of corridors means understanding and confirming the materialisation of the

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26   The continuous objectification of new territories that the corridor implies distinguishes it from an absolute deterritorialisation, which means denying any further possibility of subjectification/stabilization of space according to property, rule or class (see the reference to Deleuze and Guattari's distinction between relative and absolute deterritorialization in Guida, 2015).

27   The meaning of the Corridor includes the ecological definition, which is deliberately not covered by this research given the specific interest in how this figure structures relations from a socio-economic and political perspective.

network paradigm, although through paradoxes. The more multiplying connections create an apparent "isotropic magma" (Viganò, 2015), the more its type of space becomes instead a corridor, whose unifying effectiveness depends on its capacity to separate regions. The assertion of the power and virtuality of the network remains unapplied, exacerbating selectivity rather than porosity and transversality. Thinking about geographies of mobility and connectivity along linear axes is still the 'best' way societies define, witness and force space despite being reductive, no longer effective in constructing or describing today's complexity while polarising exclusion and inclusion. An evocative image of such simplification is illustrated by the voluntary imprisonment inside the walled strip and functional zoning of Koolhaas, Zenghelis and Vriesendorp's *Exodus* (1972), where the corridor becomes an enclave, the destination of migration towards the offerings of society, in this case criticised for being increasingly driven by hedonism. In this exemplary configuration, the corridor shows its nature of relation between space and power, where accessibility, citizenship and urban experience as political action are 'decided'. The two-dimensional character of the corridor does not permit to fully realise the idea of polycentric urbanity as a social possibility to connect diversity and share wealth, allowing more dynamic relationships and equitable opportunities for various communities. However, the association of this figure to pure extension is not exhaustive of its very complexity as an ecosystem of relationships. The corridor can represent broader geography of needs and trigger new relations in its environs with different degrees of intensity according to the permeability of its boundaries.

Yet, the application of polycentrism as a design principle is not a promise of balance between places, networked societies and territorial pacification. It could lead to a full-emptiness scheme, centralise clusters' planning as optimisation for competitiveness, otherwise pulverise urban systems. Also, it tends to clash with the persistence of millenary cultures and historical patterns of movements and exchanges in the attempt to create territorial cohesion. Thus, efforts to build polycentric arrangements by using corridors swing between a universal remedy for unequal development and separation from areas that do not contribute to territorial competitiveness.

The race to attract human, energy and financial resources in cities through ever far reaching and (apparently) innovative links collides with the transition to exploding scales and increasing transformation speeds. It grows in-between the strengthening of urban centres as catalytic nuclei within planetary networks and the shrinkage of regions at the margins of the passage, demand and supply of tangible and intangible flows. The construction of aggregation economies from proximity territorial links tries to contrast such a trend that feeds regionalisation and deterritorialised relations. And while infrastructure projects, programmes, and plans continue to take shape as declarations of territorial control, ever more separations fragment the political geography for independence on local development and competitiveness against solidaristic sharing between communities and regions.

By crossing these processes, corridors multiply their interaction channels with increasingly performant networks, becoming selective and exclusive without respecting the features of

the territory and its needs. They connect urban supercentres and their influence areal as primary places of concentration of power, acquiring importance above regional and national governance bodies to an extent that calls their boundaries into question. They reinforce a centripetal polarisation as 'peaks' of infrastructural and functional investments concentration in a rising geography of connected city-states. At the same time, clusters of secondary centres are multiplying as places gathering new economic and strategic interests in (almost messianic) polycentric perspectives, as well as new concentration of urban exodus outside the large congested metropolitan areas. They find opportunities for more significant growth, optimisation of their resources, and affirmation of their position in networks of competitive regions by associating their functions in a specialised and cooperative system. However, they do not necessarily coincide with a corridor in terms of process underway, nor do they imply the presence of continuous infrastructure systems to hold them together; instead, they can highlight their weakness. Indeed, these centres either find themselves dependent from a metropolitan or regional centrality, or in a more marginal position to global flows, together with systems of hinterlands, small towns or villages linked to their economies. In both cases, they seek to acquire operational autonomy and efficient management of their possible mutual growth to build the prosperity of their communities, putting the space in between under pressure. Where not meeting the definition of a *development* or *growth* corridor, they can be identified with the image of Arc in a transformational perspective. The reason lies in the form and communicative immediacy of the term, rather than its association with a univocal concept by Urbanism, or a shared planning practice, referring instead to specific application cases from subregional to megaregional scale. What interests this research is to explore this figure's ideogrammatic and conceptual capacity to join points in a fragmented configuration and not geometrically aligned through a curve. **Within evolving and multiplying territorial rearticulations, the Arc shifts the attention from the continuity along an axis to the form of actual or potential interdependencies, from the intervention to the ecosystem. Supporting the reflection on the Corridor, it contributes to questioning the reduction of complexity, and it links to the City-Territory question (and integrates the City-Region one) through which it gains spatial dimension.**

With its roots in metropolitan decentralisation today moving towards clustering growth[28], the use of the Arc generally highlights a relational eccentricity; a centripetal-centrifugal force of resource extraction in favour of a locality, a place, a centrality or entire political geography building with it a subordination link; an articulation and region of passage between different territories, usually lacking connectivity within it. First, it is a visual and symbolic reference to anticipate physical connections between places, giving emphasis to syncopated, intermittent spatialities, or to (in)tangible flows between delimited or "bound" landscapes (in the sense of places, scenarios and field of action) (Gausa et al., 2003: 55); or to distinctive

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28   As food for thought, the research considers the historical reorganisation of urban systems and founding of satellite cities in the metropolitan space and the construction of the paradigm of the reticular city as processes that contain the figure of the Arc in embryo phase.

features, such as landscape and environmental continuities, a precise cultural identity, or a homogeneous natural geographical conformation. In turn, they can influence the character of human settlements, their activities, and thus the very definition of space and territory.

Concerning the idea of growth, arcs can be formed either by processes of (re)definition of existing configurations or by developing new connections, but always starting from the need to weld discontinuous sequences of attractive and productive urban spaces and nuclei within a single pattern. Their behaviour is, in fact, more akin to a "circuit" of contacts rather than continuous axes or pure extension, which can articulate shared evolutionary strategies between the centres involved, working on different time horizons (*ibid.*). Where held together by connections or channels that intercept and direct flows of exchange between places – overlapping in some cases with corridors – these sequences can also multiply and engage multiple, polyarchic systems, developing from a starting centrality.

Complementing the Corridor's capacity, the Arc focuses on the intermediate space and the presence of the void no longer understood as residual, negative (also thanks to the consolidation of networks). It is necessary for the "fractal – open and discontinuous" definition of contemporary urban topologies; it is linked to the dynamic processes of expansion and contraction of distances, occupation and appropriation of space, generation of separations or creation of channels of interaction (*ibid.*: 335), and to their design at all scales as an apparent dichotomy. In this way, the definition of space and osmotic interdependencies in an arc can (re)structure the obsolete expansive radiocentric structure from transversal structuring elements that give new meaning to the sequences of spaces and attractive cores of which it is composed.

Thus, the Arc identifies a region of high potential interest – an alternative to supercentres or metropolitan cores – that articulates different places where economic transformation processes, land use and occupation, the concentration of new waves of exodus between cities, and the creation of new centres take place. In the network dimension, they take on multi-scalarity, defining even very distant relationships. Their materialisation in response to expanding urban economies – increasingly in nuclear chains – requires defining the right qualitative, differentiated and democratic dimension to the occupation of space, the creation and use of infrastructures and the preservation of environmental systems; distributing forms of occupation proportionate to the 'absorption' capacities and values of the territory; foreseeing scenarios and designing change before defining its means of implementation.

Moreover, arcs construct sets of points that outline parts of cities or territories, pushing forward the boundaries of an urban region as centres of metropolitan expansion, albeit made up of elements whose latent interrelationships and continuities could overcome the governmental boundaries (such as municipalities) where they are contained. Such a condition is evidence of the contradictory capacity of contemporary societies to challenge the boundary as a necessary dynamism to define space of observation and action. They continuously cross and collide with more or less porous and flexible thresholds to operate, within and between cities. Yet, they are still unable to detach themselves from the definition of limits of governance order to deal with a territory and a region.

Given these points, the definition that can be given today of the Arc is a matrix of territorial organisation that identifies latent (inter)dependencies in space and territory. It contains the Corridor in potential without necessarily decreeing its construction. The Arc materialises it in space, both as a single element and in multiple connections, and can be grafted from it either as a single arc or in polyarchic systems. Having confirmed the matrix role of the Corridor in strengthening (inter)dependencies, the two figures can be considered complementary. More precisely, the Arc represents a further exploration of the space that has grown out of linear point-to-point connections and suggests new environments of relationship.

Likewise, it can be considered a concept in-between the two (de)territorialisation characters of the Corridor. It has the capacity to create corridors as constructors of real and virtual spatial appropriations, and to give them new and different meanings from the surrounding space by placing them in continuous transition. At the same time, it invites to observe the points within it as a system, rather than a simple sequence of functional spaces in a flow, to counteract a now customary operation that leads to the rupture of the relationship between communities and their environment. Under the current conditions of productive-distributive relations, it is evident that Corridors and Arcs today constitute both the matrices of articulation of spatial relations and the privileged paths of a planetary deterritorialisation in which space is constantly unstable. It is continually re-divided and -defined according to the pressure of urbanisation, transport and communication technologies, and the growth projects of capitalist economies.

If the territory depends on the definition of its limits and accesses, understanding the Corridor and the Arc means understanding how a region of space becomes a territory, and how a territory becomes space. Likewise, if understanding the nature of the Corridor serves to explore the nature of networks as a metaphor for interactions, understanding the Arcs allows a broader gaze at what happens outside the linear reduction of flows. Their combination is what affects our understanding of space, which is also measurement. **Reflecting on the Corridor leads to new concepts and figures. Among these, the Arc is nothing but the evolution of a two-dimensional paradigm of the 20th century defining territorial rearticulations in a three-dimensional perspective.** Such a transition introduces both a further spatial dimension and a new level of interpretation compared to the centrality-linearity relationship consolidated so far. It configures and strengthens the virtuality of the network, giving the (im)material organisation of flows the possibility of overcoming the boundaries established by simplified geometries of spatial control. As Corridors and Arcs' meaning is based on the quality, intensity and purpose of relations between and within territories – through the power systems of cities and (mega)regions –, they emerge as crucial figures on which interdependencies are being (re)defined between multicentric obsessions and growing isolations through the selectivity of boundaries.

2 /// COLLECTION

Selection criteria

By reading Corridors and Arcs through networks and (im)material boundaries that multiply in a post-urban scenario, the research shows how both concepts can embrace the infinite scales and geographies in which the City and Territory materialise. At the same time, their countless representations and applications produce as many hypotheses of urbanity for the 21st century, resulting from the multiple levels of interaction and observation of today's hyper-mobile and hyper-connected societies. Globally, the variety of forms, dimensions, and dynamics resulting from this combination and the absence of univocal reading criteria and indicators make it difficult to provide an unbiased and exhaustive mapping of Corridors and Arcs as (ongoing) planned or designed spatial phenomena strengthening or degrading territory.

Compared to the extension of an urban area, the degree of spatial coherence and the width-extension ratio – to which land use is linked – are the first gross identification criteria, complemented by the shape of the existing infrastructure system and the number of polarities. Bearing in mind the need to further investigate particularly fragmented, overlapping and intersecting cases, they allow identifying (mega)corridors and arcs as coherent urbanisation along functionally relevant spatial links, either result of intertwined economic, political and socio-demographic developments or latent landscape continuities. However, continuous urbanisation is not a necessary condition for a corridor (Georg et al., 2016), nor for an arc as a generally fragmented ecosystem of places. It is a potential outcome from infrastructure support to mobility and connectivity. Likewise, megaregions and metropolitan areas can take either the shape of corridors and arcs but be read as more compact 'patchy' configurations from a broader scale (e.g. the *Texas Triangle* or the *Randstad Holland*). Nevertheless, constructing a more expansive settlement with its own identity inside a network is not an obvious result of growth from the combination of individual corridors or arcs of cities (*ibid.*). Moreover, analytic criteria built on static data regardless of changes through time are insufficient to describe how these figures form from the clash between resistance and movement, network and isolation, especially from a planning perspective. The involvement of physical, socio-economic, ecological, identity, political, governance and communication factors implies that the transient materialisation of both figures is the product of an organic system of changing relationships. It is unevenly distributed across space on more or less malleable, tangible and intangible layers. They intersect, influence each other, create 'clippings', 'patchworks', and define the territory in ever-changing ways and to the rhythm of paradigm shifts. The change in the intensity and direction of links is proportional to the ability of flows dynamism to find the more flexible resistance between physiographic and anthropic matrices

influenced by time.

From the literature, historiographic, cartographic and iconographic review, it emerges that corridors and arcs are neither homogeneous nor stable conditions. However, they all share the need for societies, places and landscapes to build exchanges to benefit greater prosperity, although not necessarily balanced nor equally distributed. They periodically expand, decrease or restructure their capacities to organise space, place and territory once the limits of the previous system have been reached. Also, they are complementary figures forming new physical, productive arrangement units which reflect in the virtual space. **In a temporary form and within a precise space-time context, Corridors and Arcs repeat the impetus of communities and regions to be mobile and connected, being reinvented under different definitions or 'labels'.** This is visible in all their numerous manifestations on a global level, down to the intra-urban dimension. Today, they 'envelope' the planet in increasingly high-performance and selective networks; tomorrow, they will define new trajectories according to new paradigms, demanding societies to read and design spatialised and immaterial relationships in ever different ways. Therefore, Corridors and Arcs persist in the (re)articulation of territories (also degrading them) as they multiply, extend, create continuity and redefine themselves under the action of societies, either in balance or conflict with nature. They shift and consolidate their boundaries and those of the regions of space they crisscross through multiple physical and virtual scales. As a project of knowledge and process of change through maps and images, the Corridor and Arc' representation is part of the same issue and contributes to their conceptual definition.

Recognising that any collection of actual experiences would not be exhaustive of all possible combinations of relationships between communities and regions, the second part of the research presents an illustrative selection of cases among studies, policies and projects on corridors and arcs at different scales in the Western world. It focuses on the presence or absence of corridors and arcs as process and practice and the difference in meaning when applied as tools for territorial 'growth', 'development' and 'restructuring'. The selection of heterogeneous experiences aims to highlight variables and contradictions in how existing and planned corridors and arcs define space and territory across scales. All cases objectify (inter)dependencies between places according to obsolete or appropriate paradigms, with implications for the prosperity of cooperations within and between regions with different processes, structures and governance capacities. Particular attention is given to speculative designs and operative planning tools that apply Corridors and Arcs as reduction of differences, exploitation or segregation, overcoming sectoral approaches and the centre-periphery opposition. Instead of a classic case study research, the work constructs a collection of cases as 'rearguard' for the hypothesis, i.e. corridors and arcs continuing as the matrix figures that rearticulate territories by strengthening interdependencies in the broader form of the network. Not the single case, but the set of images and illustrations is the primary source to argue the thesis. Moreover, this work does not compare the cases nor consider them as

best practices. Instead, it engages a critical reading and investigation on whether researches, policies and projects confirm or ignore the role of corridors and arcs in building regional, subregional space and the territorialisation of communities.

By defining the cases for reflection from reading existing reports, inventories and case study research, this selective miscellany of examples aims to highlight the historically stratified presence of corridors and arcs in the planetary network of cities as the expression of needs for movement, exchange, communication, appropriation and defence of territories. It makes them both a long-lasting topic, as old as the world but extremely contemporary, welcoming the further unprecedented, immaterial dimension of flows in cyberspace at the millennium turn. Each case enhances thematic aspects from this common base (which could be further explored), providing a possible qualitative interpretation of the development of corridors and arcs in planetary urbanisation.

By imagining to divide the scales of territorial observation into infinite levels, the research organises the physical dimension that corridors and arcs can reach in illustrative scales, using the linear extension as territorial parameter [(XXL > 2000 km); (XL: 500-2000 km); (L: 150-500 km); (M: 50-150 km); (S < 50 km)] while considering each scale representative of geographies of variable geometry[1]. Beyond 2000 km (XXL), corridors and arcs explode and coincide with the planet, trans-continental travel, logistic, energy routes and immaterial communication, including cooperation networks. They materialise from 500 to 2000 km (XL) as trans-territorial productive-distributive chains and labour, desire, or emergency mobilities linking neighbouring megaregions. Below 500 km (L), they become tangible as a typical planetary process of urban (inter)dependencies for regional prosperity, down to 150 km where subregional bonds between metropoles and satellites, small and medium-sized centres, towns and hamlets starts to become more explicit (M). Under 50 km (S), corridors and arcs hold spatialised relations spanning conurbations and intra-urban structures. **Among these illustrative scales, the research focuses on the central band, selecting localised geographies – as different 'land descriptions' (Gr *geōgraphia*: *geō + graphein*) – from the megaregional to the subregional dimension.** This organisation does not correspond to an understanding of organic complexity as proportional to physical dimensions. It detects specific landscapes of study, distinct images of the dimensions, degrees and types of interactions that corridors and arcs convey across boundaries of varying nature in the planetary urban body. Thence, the observation of these figures through 'episodes' considers that their research or design intervention operates on the overlapping, intersection, and mutual exclusion of different geographies of instances and their respective lifetimes in the way territories are defined [(a), (b), (c), (d)]:

(a) Transport, communication, and energy infrastructures, related in-out flows and logisti-

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1   The measures considered are symbolic and simplify a complex system of relations that does not mathematically respond to dimensional discriminants for descriptive purposes. It is not the kilometric difference that defines the complexity of a territory nor the geometric surface extension of its relations, but rather their quality, their role in the construction of local geographies. Thence. the belonging of real cases to the simplifying categories is more clearly defined according to the texture of flows, the role of centres, the areas of influence, the landscape continuity and the administrative geometries.

cs define the constantly accelerating networks of (im)material and tangible relations that underlie the cities' functioning;

(b) The overlapping of historical traditions in the appropriation, use, and design of space and landscape by communities, their bonds with nature, and the contaminations with other cultures define an (in)tangible palimpsest of heritage;

(c) Political geography, jurisdictions and their normative and practical patterns identify maps of spatial control, whose boundaries adapt to natural geography, result from historical conflicts or are deliberately drawn by negotiations;

(d) Geomorphology and hydrography construct areas of flows, shift natural boundaries, and influence human settlements across geological timescales, biophysical cycles, and extreme events, providing ecosystem services and inhospitable areas for human activities according to an unevenly distributed range of permissiveness degrees;

Focusing on the Americas and Europe, the research selects specific geographies of interest as places where Corridors and Arcs affirmed their presence as a theorical 'line' of the Western thought and operative component of studies and projects under different definitions but comparable intentions. They prove that professionals across the world are exploring and designing corridors and arcs as elements merging in the space of flows. They are employed and restructured to develop not only structures of exploitation, but also polycentric and network arrangements of territories in a logic of systemic complementarity. At the same time, the cases respond to criteria of heterogeneity in terms of natural geography, historical-cultural landscape, urbanisation-regionalisation trends, and planning and design traditions, each influencing a different configuration of corridors and arcs as (inter) dependencies. Thence, each case highlights a different degree of discussion on Corridors and Arcs in urban policy as construction of competitive systems in the networks of global flows, cooperative in the realisation of resilient and rightsized transformation perspectives, even autonomous and alternative to the large metropolitan concentrations for the smaller scales of relations. Among the common questions linking these experiences is the need to make room for urbanisation while preserving territory from degradation and shrinkage; the interpretation of polycentrism as equal opportunities instead of a race for competitiveness; the participation of countryside in transformational processes. Together, the cases define a spectrum of reference experiences traversed throughout the research process.

The megaregional or macro-metropolitan perspectives (XL-L) present Corridors and Arcs as systemic interactions of large agglomerations and medium-sized centres, building the (inter)regional territory and scaling-up in extension and disputes through waves of urbanisation. Their current growth is borderline between concentrating flows in its supercentres and losing control of the urban dimension. As they disperse into a monocentric and suburban model, they exacerbate inequalities and segregation by maintaining an individualistic and productive-dissipative design paradigm. Greater interest is given to experiences in the Americas as relevant cases that emphasise the development-infrastructure relation of its cosmopolitan centres as the predominant trend of the 20th-century transforma-

tion strategies. They highlight the need to enhance diversity, proximity, and functional mix through systems of connectivity and continuity against Modernist-inspired monocultural urbanisation.

Alongside the large scale, where the employment of these figures as process and public policy is more established (especially the corridor), the subregional viewpoint (M) gains a privileged discussion level as an urban-regional interface and adherence to territory. It is transforming from strengthening mobilities and connectivities between small and medium-sized centres as new foci of interest and urban exodus, up to articulating secondary metropolises (for this historical period) and building urbanity between largest urban concentrations. Today, it is in need of discussion as suspended, often unaddressed between regional and intra-urban strategies, although more recent trends identify this scale as a crucial articulation of (mega)regional order and prosperity. Particular attention is given to experiences in the European urban framework for the fine grain of relations between neighbouring centres, seen by local and supranational policies as a way to build competitive agglomeration economies. Likewise, they stress the importance of the subregional space and its flows in shaping territorial identity microcosms, which seek for autonomy from greater metropolitan areas while being necessary to articulate interregional relations.

The interpretation that the research proposes of the images of the Corridor and the Arch derives, therefore, from the summation of an international mosaic, three empirical approximations (Ferrara-Bologna-Modena (M), Leiria-Coimbra-Aveiro-Viseu (M), São Paulo Macrometropolis (L)) and two cases of in-depth analysis, the characteristics of which support the conclusive considerations of the research. Concerning the empirical studies, the selected cases represented the place to verify the Corridor and the Arc's multifaceted character and the kind of relations they built (or are expected to build) across scales, by introducing elements 'disturbing' the Corridor's idea of linearity and verifying the spatial application of the Arc as a figure. In reading them, it had been necessary to move from the subregional to the higher scales in order to check the congruence of the concepts at different levels and to compare with other plans, projects or research on corridor or arc systems intersecting with the one assumed.

The two in-depth study experiences are chosen and explored as extremes of the selected range of spatial scales and extremes of observation of Corridor and Arc, i.e. *conduit* and *circuit*. They are respectively an academic, theoretical-design speculation projected towards the suggestion of a plausible urban future, and a report with recommendations for public policies. The first case – *Conduit Urbanism* study by RVTR for the Great Lakes Megaregion (XL) – investigates corridors as possible unifying tools linking infrastructure, ecology and logistics to restructure the traditional Fordist relations in the megalopolitan developments between the US-Canada border and define bases of territorial cooperation. The research emphasises the importance of reading the intertwined forces shaping geographies per interrogation areas and respective representation modes instead of separate layers. It focuses on the corridor as a vector of development - highlighting its historicity - and how its conversion

into an urban and social project constitutes a 'tile' for redefining the functioning model of contemporary societies. On the other hand, the second case looks at more recent experience, at the significance of an arc in a territory as a driver for constructing a new spatial balance. In England's heartland, the Cambridge-Milton Keynes-Oxford Arc identifies a cluster of specialised and dynamic centres, threatened in its growth by weak cross-connectivity, a lack of affordable housing, and environmental fragility. The need to make room for an intense prospected urbanisation have triggered strategic and design reflections on integrated spatial planning and form of growth, making the character of places an active part of the process.

The collection emphasises a typical trend of this century: redefining space, hence the city, and the organisation of the territory in networks of competitive centres with different degrees of autonomy, breaking monocentric schemes from the overlapping or intersection of polycentric schemes. The observation scale highlights a different description and approach to the project, what can be achieved, but dealing with the same need: to unite and strengthen cohesion in a global spirit that tends towards separation and segregation.

Within this illustrative selection of cases, the network-isolation clash changes along with the choice of study boundaries, therefore the quality and quantity of variables and values of interest. In this way, the research emphasises differences and similarities between Europe and the Americas in describing and building urbanity from the employment of Corridors and Arcs according to the spatial and cultural context. **By presenting real and speculative cases, it aims to clarify that the same theory is present, materialises and applies to various configurations; that Corridor and Arc, together with Centrality, Polycentrism, and Network, define the material and immaterial whole of urbanised (inter)dependencies of the 21st century.**
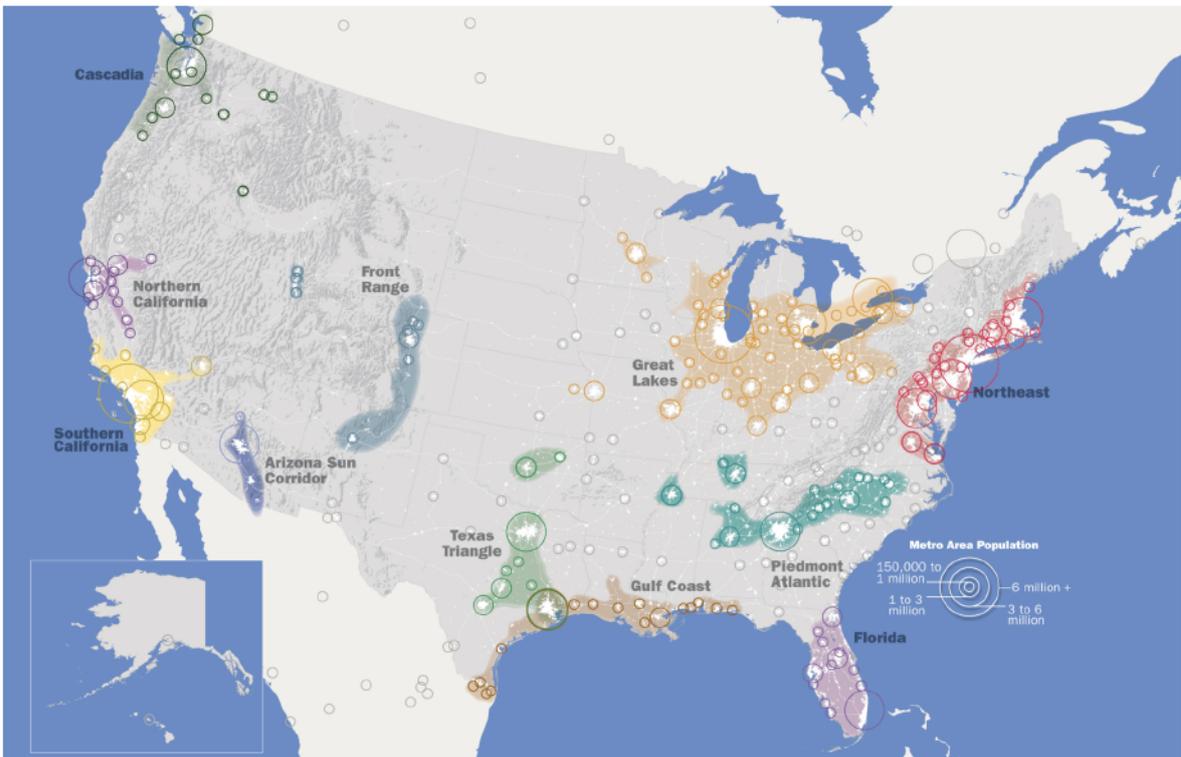
(Top) Emerging American-Canadian megaregions (Source: America 2050).

John Birknbine, Distribution of the iron ores mined in the Lake Superior Region in the year 1902 (Source: Thün et al., 2015: 14)

2.1 / XL
A *Conduit Urbanism* for the Great Lakes Megaregion[1]

By defining its growth from the combination of infrastructure and trade as a colonial outpost, the urban constellation of the Great Lakes Megaregion (GLM) asserts its presence by 'scaling up' its connective structure, spectacularly embodied in the highway assembly-line logic. At every economic and technological transition, the need for its cities to collect increasingly distant supplies, enlarge production and move their massive outcomes at ever broader scales leads its arteries to structure on the legacy of previous system crisis. With the Fordist model's failure and the new polarised global labour networks, the megaregion must redefine an expansive and energy-intensive development paradigm that imposed the growth of the settlements to follow the transport system without serving the whole territory in a balanced manner.

While urbanisation pressures and the need for interdependencies are becoming increasingly present, the GLM's operational and spatial structure continue to follow a (mono)functional logic. To address the dimension assumed by the Urban through explosion and contraction, the research *Conduit Urbanism* starts from the highways' legacy and the (inter)dependencies of space, flow, practices and leverage points to reason about territory as an ecosystem, exploring a possible historical alternative. **By recognising the corridor's character as the backbone of the megaregional transformation, this research-and-design experience makes it possible to reflect on mobility and connectivity from shaping *urban hunters*[2] to building a territorial common and space for citizenship.**

2.1.1 / The sizing of a megaregional prototype

With a chain of more than 1,800 km[3] of metropolitan, suburban and working landscapes along the fertile watersheds[4] of North America, the GLM is a 'specimen' of large-scale, cross-border, and horizontally merged polynuclear urban formations. Its collection of cities

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1 The illustration of this case is based on the review of the volume *Infra Eco Logi Urbanism* (Thün et al., 2015). It results from a research-and-design experience on the Great Lakes Megaregion developed between 2008 and 2013 by RVTR research team. The publication brings together the study methodology and synthesis of theoretical and design speculations. In the same publication, the essay by Robert Fishman is mentioned as main basis of observation on the US historical development.

2 Reference to the temporary research methodological tool (see paragraph 1.2.1).

3 Approximate distance linking the extreme megaregional poles from east to west and crossing the main metropolitan concentrations along the lakes.

4 Lakes Superior, Michigan, Huron, Erie, and Ontario.

follows major transport infrastructures and privileged access points, building territorial corridors of expansion from the Chicago-Milwaukee, Detroit and Cleveland-Pittsburgh clusters. Nevertheless, its core arms of urban development stretch from the Midwestern United States to Quebec within the broader Montreal-Pittsburgh-St. Louis-Minneapolis quadrangle, within a sparser network of towns linked to the lakes' urban backbone.

With more than 107 million inhabitants[5], its current size[6] follows a strong urbanisation trend registered in the 1950s-60s when a link to the New York metropolitan region was already foreseen through the Mohawk Valley or "Bridge" by the tentative projections of its expansion for the 2000s (Doxiadis, 1968). In a historical period starting to perceive a planetary movement of people towards a sprawling urbanisation (from which Ekistic studies began to rise), this condition led to question whether it was possible to speak of an emerging megalopolis like its East Coast neighbour (Boston-Washington). Its rise is older than the 20th century. It is historically marked by a continuous shifting and stratification of corridors as ways of spatial discovery, territorial appropriation and resource-rich paths feeding urban prosperity.

In a review of North American spatial development, Fishman (2015: 8-21) explains how the GLM sets the basis of its territorial influence at least from the earliest explorations of North America, which makes it a "proto-megaregion" refining over a century a "scaling up" capacity as a form of "art". From that watershed of anthropic expansion over *Wilderness*, each stage of its economic transition demands its growing cities networks to operate at a broader scale while collecting distant resources in a few places of production and exchange. Building on its regional significance between 1860 and 1960, the GLM expands by gathering resources from remote locations, achieving efficient manufacture at a vast scale, and efficiently exporting large quantities of goods. However, each 'golden age' paradigm builds on the legacy of the previous crisis – namely the end of a resource –, conveying the shift in economic interests, labour force, and urban systems' growth.

In an exponential accumulation, the GLM creates an increasingly structured, far-reaching, cross-scale productive machine of corridors redefining themselves over time by alternating expansion and decline. The same structures have perfected suburbanisation, joining technical production models with diffuse spatial systems (namely the automobile industry of the Model T) and abusing the logic of shopping malls as commercial cities to support peripheral and monocultural urban formations. This combination involves shifting cities' boundaries and operative landscapes further along their connective channels, and it is part of a thousand-year-old, controversial trajectory in North America. Here, the virgin character of the land and the human-nature bond (linked to the subsistence

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5   Source: Council of the Great Lakes Megaregion (https://councilgreatlakesregion.org/the-great-lakes-economy-the-growth-engine-of-north-america/).

6   Today, the megaregion comprises the metropolitan areas of Chicago, Detroit, Toronto, Montreal, Minneapolis, Buffalo, Toledo, Pittsburgh, Cincinnati, Milwaukee, Columbus, Indianapolis, and St. Louis, thus joining eight American states (Minnesota, Wisconsin, Illinois, Indiana, Michigan, New York, Ohio and Pennsylvania) and two Canadian provinces (Ontario and Quebec).

and adaptation behaviour of indigenous tribes) were lost under destructive economic and technological progress paradigms. According to McHarg (1969), only remoteness and poverty have been the great conservationist forces preserving native natural conditions in some parts of the continent against the consumption anthropocentric principles brought by colonisation.

Tracing critical historical transitions in North America, Fishman links the first connectivity routes and the megaregion's "archetype" with the 17th- and the 18th-century fur trade of colonies (Fishman, *ibid.*). It took advantage of the contact between French scientific mapping and different native tribes' experience of virgin land to provide a sufficient availability of a rare good, making the GLM's evolution of corridors – and their economy as a whole – an evident inheritance of exploration for commercial purposes. However, the author recalls two parallel legacies that better describe corridors' employment in shaping the geographies of the Northern continent. The knowledge gained from the fur economy provides New France the basis for exploiting the waterways as channels of spatial conquest and opens infrastructural expansion as a frontier of possibility, allowing locating new settlements in the most resource-rich places. On the other hand, New England remains tied to the rural community as a principle of local prosperity and sustained by the Pilgrims' Puritan culture towards spatial control and reluctant towards an outside void open to expansion, if not for providing new space in westward frontier settlements for a population oversized for local capacity.

However, the corridor becomes structural in the progression of the GLM's assemblage only with 19th-century canalisation. From natural highways to 'wheat pipes', it redesigned local economic geographies also in the more minor routes, stitching together a heterogeneous region through engineering. Notably, the connective power developed from creating a Chicago-Great Lakes-Erie Canal-New York corridor for agricultural exportation sets the functional territory of the emerging GLM. The competitive trade prices provided by the availability of large quantities of goods through an efficient transport system stimulates successive waves of infrastructure investment.

Since the Canal mania, the capacity to gather increasingly distant resources to the primary trading nodes at growing speeds and volumes makes the fortune of industrial development to the rhythm of technological advances, which supported the introduction of railways. Transport corridors' implementation in the 19th century makes coal, iron, and steel the new 'currency'. Their plentiful and profitable availability expands GLM's infrastructure influence and feeds the symbiosis between the city and industrial evolution, emblematically represented in the birth of skyscrapers. Later, applying the scaling up principle to the automobile industry allowed Fordism to associate the character of manufacturing sites with the factory assembly line and a car-centred transport system. It realises Taylor's dreams of *scientific management* within a 'productive' subdivision of space and time, materialising in American engineering. Since the Lincoln Highway (1913) and the relentless urban progress projected by *Futurama* and, within it, Norman Bel Geddes' *Highways-Horizons* (sponsored by Gener-

al Motors, at New York World's Fair in 1939), the Road becomes instrumental to the radical, industrialised and functional settlement patterns and economic development of North America in the second half of the 20th century. It is configured to optimise the logic and logistics of movement across the continent, making it systemic by Eisenhower's *Federal Aid Highway Act* (1956) within a mandatory short timeframe of state implementation to allow its systemic functioning (Velikov & Thün, 2010). **The following productive decentralisation from Detroit and its environs to the main cities of the Great Lakes and its secondary centres (towards South-West Michigan, Ohio, and Southern Ontario) combines the Corridor's figure with strategic territorialisation of production. In this phase, the modern idea of the City as the embodiment of capital accumulation reaches its maximum expression.**

After the great wealth developed in the optimistic post-war climate (1945-1960), the recession of the mid-1970s with the Toyotist conversion of production marked the obsolescence of the industrial metropolis in its techniques and proximity relations. Today, the articulation of the GLM's territories has (re)oriented its structure towards a knowledge economy, cross-sectoral application of high technology, and the strengthening of the Great Lakes as the traditional backbone of its growth (reaching today a megaregional GDP of $6 trillion for 51 million jobs)[7]. While the environmental resources and amenities of the watersheds support research development – water and soil monitoring, wetland restoration, and renewable energy –, the Great Lakes carry more than 50% of US-Canada bilateral trade (200 million tonnes of goods per year). Since 1929, the Ambassador Bridge (2.3 km linking Detroit and Windsor) and its flows (10,000 trucks a day for $500 million in international trade) embody this connective role while confirming corridors as persistence and path-dependent process. Likewise, the Great Lakes remained a historical asset of sharing, contention and negotiation as the control over its hydrogeological richness (chiefly for agriculture)[8] is continuously outlined by science, engineering and politics either for preservation[9] or exploitation, like the rest of the territory.

Besides the coexistence of multiple jurisdictions, serious setbacks menace the GLM's dispersed hub-and-spoke urban network to deal with future technological, geopolitical, demographic and environmental transitions. While the relocation of labour moves towards deterritorialised productive schemes, the persistence of an obsolete automobility-based model and its wasteland remains, besides abandoned manufacturing 'archaeology' and an unsustainable cycle of extraction, storage and consumption of resources in operatoinal landscapes (e.g. intensive agriculture). After almost a century of construction, a large part of the highway transportation system demands consistent restructuring interventions for being at the end of

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7   *Ibid.,* note 4.

8   The hydric capacity of the lakes Superior, Michigan, Huron, Erie, and Ontario, represents a dominant part of North America's physical and cultural heritage. In provides 84% of North American surface fresh water and 21% of planetary supply, feeding 25% and 7% respectively of Canadian and US agricultural production (Source: EPA).

9   Today, its waters are regulated by the *Clean Water Act* and complemented by water quality development (e.g. *Great Lakes Initiative Clearinghouse*) and pollution restoration (e.g. *Great Lakes Restoration Initiative and Great Lakes Legacy Act*) initiatives.

its life cycle and threatened by the oil resource crises and imminent breakdown. At the same time, transport-oriented urban development patterns risk exacerbating existing congestion along territorial arteries (e.g. Ontario's growth plan calls for 4 million new dwellers along highway 401 by 2030[10]) and pushing suburbanisation further, giving space to apparent urban shrinkage, stagnant or slow development (e.g. the Rust Belt is projected to materialise up to 30% of its growht out of urban cores by 2040 according to *America 2050*).

In the experience of the GLM, the corridor repeats through scales and stages by thickening, multiplying and changing in nature in an extraction-processing-distribution logic, today shaping longer chains of delocalised productivity. Compared to its relationship with the American highway, it has built both success and ruin for the megaregion, leaving urban wrecks, energy-intensive systems, and the maintenance of a polarised transport network linking the development of main regional hubs. Indeed, the prospect of urbanisation and territorial restructuring will require redefining the character of existing infrastructure before any equitable distribution of new one, besides housing, services, and new institutions to manage the multiple scales of governance and representation. Likewise, as the GLM demands to scale up again to take part in planetary chains of exchanges, it will need to bring closer communities scattered by urban explosion, increasing mobilities and the selectivity of digital access around a common good. The premise is to rethink the resource supporting the functioning of a newly expanding ecosystem far beyond material space.

> What if the substantial yield from the GLM's potential and as yet unexploited renewable energy resources could be harnessed, not in favour of maximum private profit, but as a common resource, which could be leveraged toward infrastructural renewal and public works within the megaregion?
>
> (Thün et al., 2015: 118)

From enquiring the transformational role of renewable energy, the multi-year body of design research *Conduit Urbanism* (2008-2013) by RVTR[11] provides an alternative approach to North American territorial complexity by applying a "layered and contingent" speculative urbanism (Thün et al., 2015) for an imaginary collective perspective moving corridors towards polycentrism. Informed by a deep study of ecological models and understanding urban forces, objects and ecosystems as interdependencies, the research group proposes a cross-scale analytical method and scenario-based project to reverse the traditional sprawl, degradation and centre-periphery model linked to the highway. From the urgency to redesign energy landscapes in our time, the experience focuses on one of the distinguishing aspects of the corridor (confirming its role in territorial articulations), that is its capacity to materialise

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10   Source: Ministry of Infrastructure, Ontario, 2006.

11   Created in 2007, RVTR is an experimental platform for Architecture and Urban design research at Taubman College, University of Michigan (Ann Arbor, MI). Its work spans visions for regional territories, high performance building design, prototype-based research and digital crafting as multiple operational scales in evolving ecologies.

communities' needs for exchange and communicate by redefining its paths over time. By designing a single, shared, cross-border structure stemming along the lakes towards suburbs, RVTR associates the reconfiguration of mobility and connectivity (including energy) with building spaces of efficient, open and multifunctional interaction as privileged places of citizenship.

Within an international debate on infrastructure as the primary place of public life and opportunistic location of people and activities according to flows[12], the project defines a possible polycentric economy by exploring the (im)material links between and within the GLM's urban clusters. It overcomes a mere juxtaposition of distinct geographies since they are a continuously developing tangle of uses, objects, and times, which defines the corridor's landscapes that cross them according to porosity. From the detected relations, RVTR redesigns and expands the physical platforms as development vectors of metabolic equilibria and areas of social connectivity following the historical determinant of the GLM's territorial dimension and the vector of its cyclical prosperity.

The thought-provoking character of this study is the attempt to produce an Architecture of connectivity as interface, influenced by the awareness on the interconnected and dynamic nature of all phenomena. Likewise, it understands megalomania as an unavoidable scale to challenge the megalopolis (which has already been passed) and the conduit as means to stress the distributive power of networks. It describes the Corridor as a multifaceted and cross-scale figure of spatial explosion and implosion. The work's fundamental question is whether their alternative landscapes can redefine megaregional metropolitanism and political subjectivities, giving infrastructure recovery the power to restructure urban systems and catalysing new urban formations. Also, it contemplates the social consequences that a megaregional conversion would entail, hence that a corridor has in articulating territories.

2.1.2 / Reading the territory from diverse conceptual geographies

The *Conduit Urbanism* study adheres to American and Anglo-Saxon culture (and its European influences) on the urban question. It moves from the interest in the megalopolis as the explosion of technology-driven migrations and the city's power structures (Mumford, 1925; 1961) to the consideration of the multi-centred character of urbanity. It assumes the current condition as a hybrid governed by flows, continuous urbanisation without correspondence between the physical landscape and the activities it contains and spreads (Branzi,

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12   RVTR addresses the challenge posed by Koolhaas on a large design scale, referring to OMA's Euralille project. The proposal started from the assumption that the European experience would be changed by infrastructural development in the London-Brussels-Paris triangle, placing Lille in a position of a future centre of flow. The idea that design programmes have become abstract, deterritorialised, gravitating towards sites with more and better connections justifies a 'megalomaniac' and hybrid project bringing peripheral activities close to the heart of the city.

2006). Likewise, it is aware that all the material 'species' this transitory construction involves – from the architecture of spectacle, symbol and consumerist fruition (Venturi et al., 1968) to the contemporary logistics- and data-driven environments – respond to a relational ecology linking communities, cultures and the built environment. **Corridors are the privileged place where the symbolic, political and physical conditions to move energy (in the broader sense of the term) can happen or be obstructed. Since their spatial organisation and arrangement defines the essence of flows, 'drawing' the route of corridors means representing geography of (im)material relations that sustain and reproduce the character of territories at multiple scales.**

Through the exemplary case of the GLM, RVTR wants to demonstrate the construction of cities interdependencies, their operational space and the interaction with their environment as a systemic complexity and developing process[13], where the corridor emerges as a functional backbone. For the same reason, the research divides reality into its components, dynamics and associations holding relationships between human and non-human agents, using the *Assemblage*, *Actor-Network* and *World System Theories* to inform the research framework. Such disaggregating approach is also applied to explore *fragmentary utopias* (see paragraph 2.2.3) as design inspirations. This choice reinforces an understanding of the world as an ecosystem rather than just the sum of its parts, as it proposes neither a parallel space nor an isolated 'bubble' to deal with the issues of contemporary urbanities, but a graft that contributes to its functioning and evolution.

Thence, both the systemic and dissecting viewpoints focus on emergence, in other words, the tipping points that usually lead a failing system to reorganise around a new order, considering the current condition of societies at a critical crossroad. Specifically, the work looks at the possible impacts of a post-carbon transition, acknowledging the association between political-economic fluctuations and the energy crisis and the role of complex systems' formation and form in any design solution. The dimensions and intensity of relationships involved in a megaregion lead to an inquiry into the notion of Common, its territorial links, the practices and the Resource and Power conceptions that it implies.

The creation of such a multifaceted viewpoint is consistent with a focus on the Corridor's capacity to imagine space and the social reproduction model that it entails as a system of territorial rearticulation. Therefore**,** for a more accurate understanding of this figure as reality and intervention within this framework, RVTR works through "four operational areas of interrogation" (Thün et al., *ibid.*) as conceptual geographies and respective representation modes [(1), (2), (3), (4)]:

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[13]   From the legacy of Patrick Geddes, the theoretical universe of the research group is marked by the influence of ecological studies, particularly the experience of the Regional Plan Association, including Benton MacKaye's contribution on the relationship between geography and the spatial construction of settlements, and Ian McHarg's causality perspective linking geological, biological and built systems.
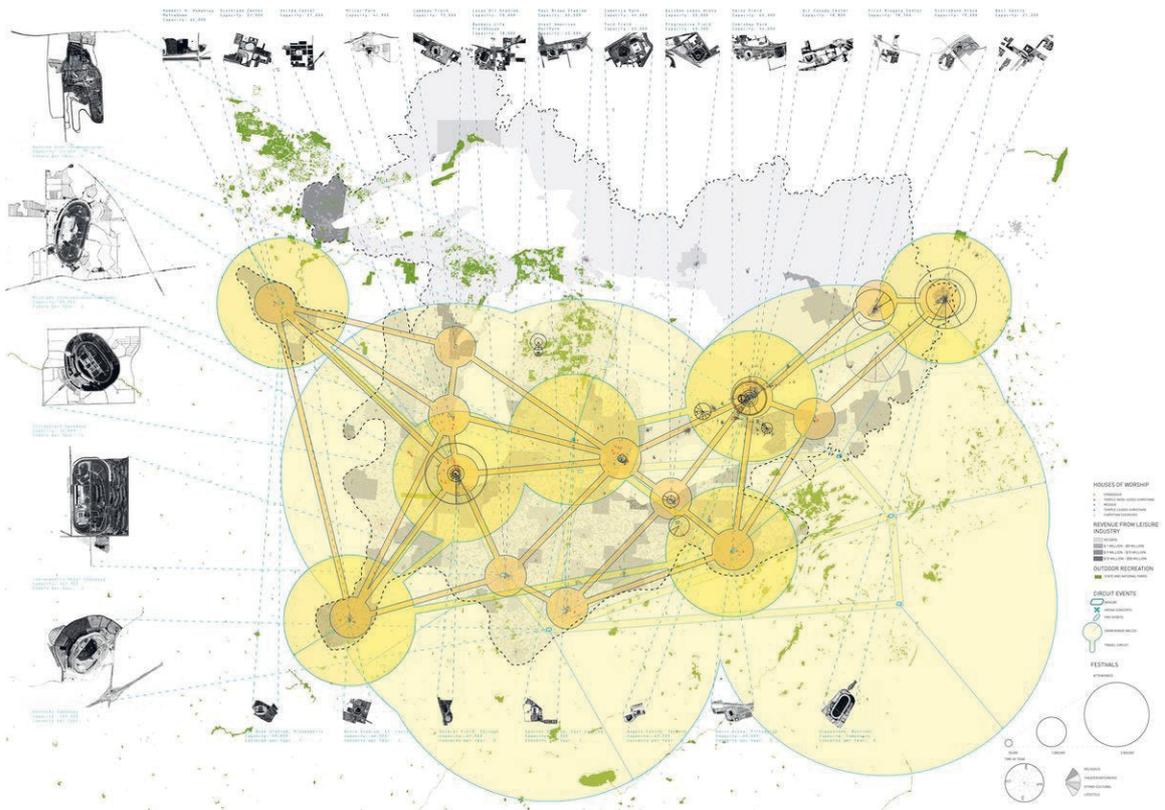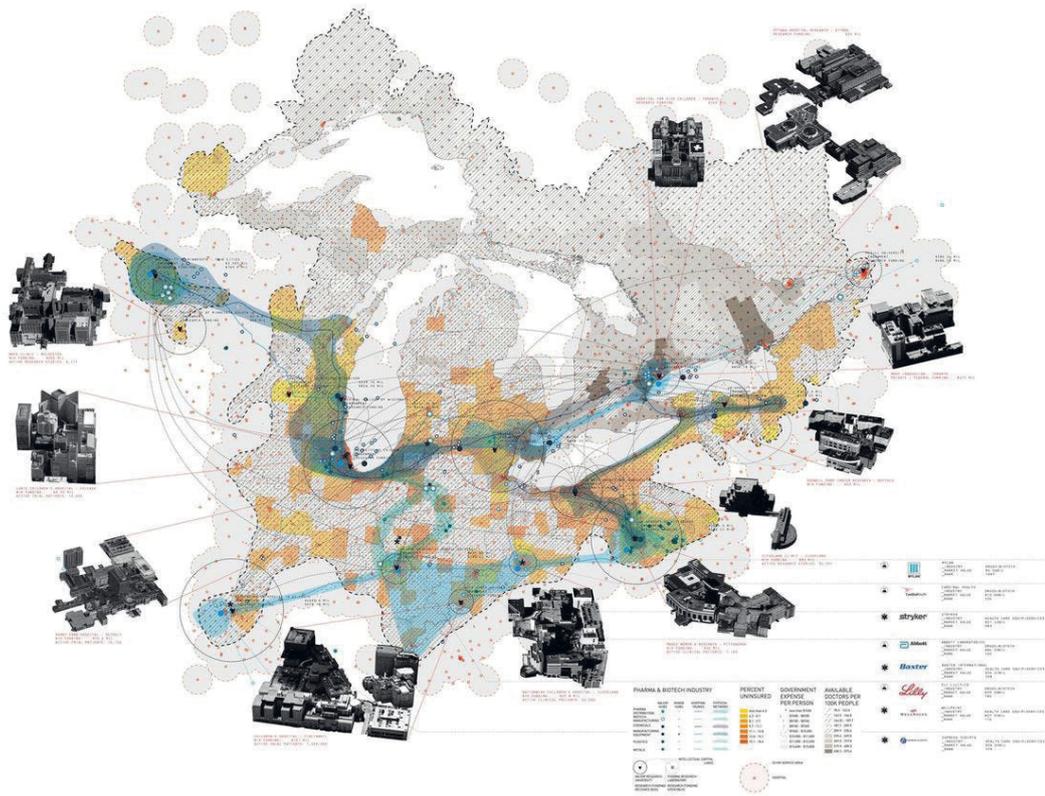
(Top) MediShed: health system, pharma and biotech industry (Source: Thün et al., 2015: 70)
EventShed: leisure activites and structures (Source: Thün et al., 2015: 62)

*(1) The 'System' of thematic relational fields for regional cartographies*

Through system-based thinking, the understanding of corridors as conduits overcoming artificial boundaries and part of networks and exchanges' geographies makes the region an emergent ecology and planning unit that prevails over administrative divisions of territory. By combining GIS-based datasets with thematic information, the study elaborates *Sheds* as geospatial areas containing highly interconnected systems that assemble active networks within the GLM. The regional interactions are read as hierarchical and reticular systems that respond to the self-organising principles of complexity (i.e. *Self-Organising Holarchic Open Systems*). These layers allow to 'filter' information on the (im)material landscapes according to productive and thematic clusters, including networks, training geographies, infrastructures, delocalised production, organisations, artefacts, and intangible (inter)dependencies supporting the GLM's dynamism. The spatialisation of flows and exchanges in material ecologies from the intersection of *Sheds* reveal the critical nodes, synergies and linkage of actors, highlighting that any choice of intervention impacts multiple systems of 'thematic relations'. **Thus, the cartographies' aggregation creates a new megaregional imaginary by exploring the conduit urbanism hypothesis and revealing the latent forces that challenge 'design intelligence' with alternative futures to reconfigure the *status quo*.**

(2) A literal vocabulary of objects as Urban language 'Structure'

Under the comprehensive meaning of large structures, infrastructures, landscapes, buildings and technologies that mobilise and realise them, constructions are inventoried as descriptive 'objects' of the Urban that shape its spatial relationships. They are classified by type or lexicographical order according to their physical and formal properties and deterritorialised to understand the architectural variables regardless of physical context. The aim is to develop a sensitivity and a language of forms, spaces, and signification of urban objects for understanding and proactively operating within the limits and opportunities of that dispersed typical infrastructure, logistics and suburbanisation. However marginal they may be, these elements constitute persistent patterns, everyday landscapes and forms for future urbanisms creating the contradictory order that defines the architecture of a place as an urban whole. Among the objects, the highways represent a network of flows and a space of variable surface morphologies. **The inventory of junctions – road surface, occupied land and orphan land – offers a vision of how a mobility paradigm shapes corridors as tangible structures and the development potential into the surrounding urbanisation as strategic interchanges in megaregional networks.**

(3) Policies, protocols and practices as a 'Code' over urban figurations, evolutions and dynamics

The collection of existing spatial and relational codes and practices in the region considers factors beyond the designer's control by analysing policies, protocols, economic frameworks, cultural and ethnic biases, and operational management. They define the socio-cultural and legal context in which the project operates, influencing the function-
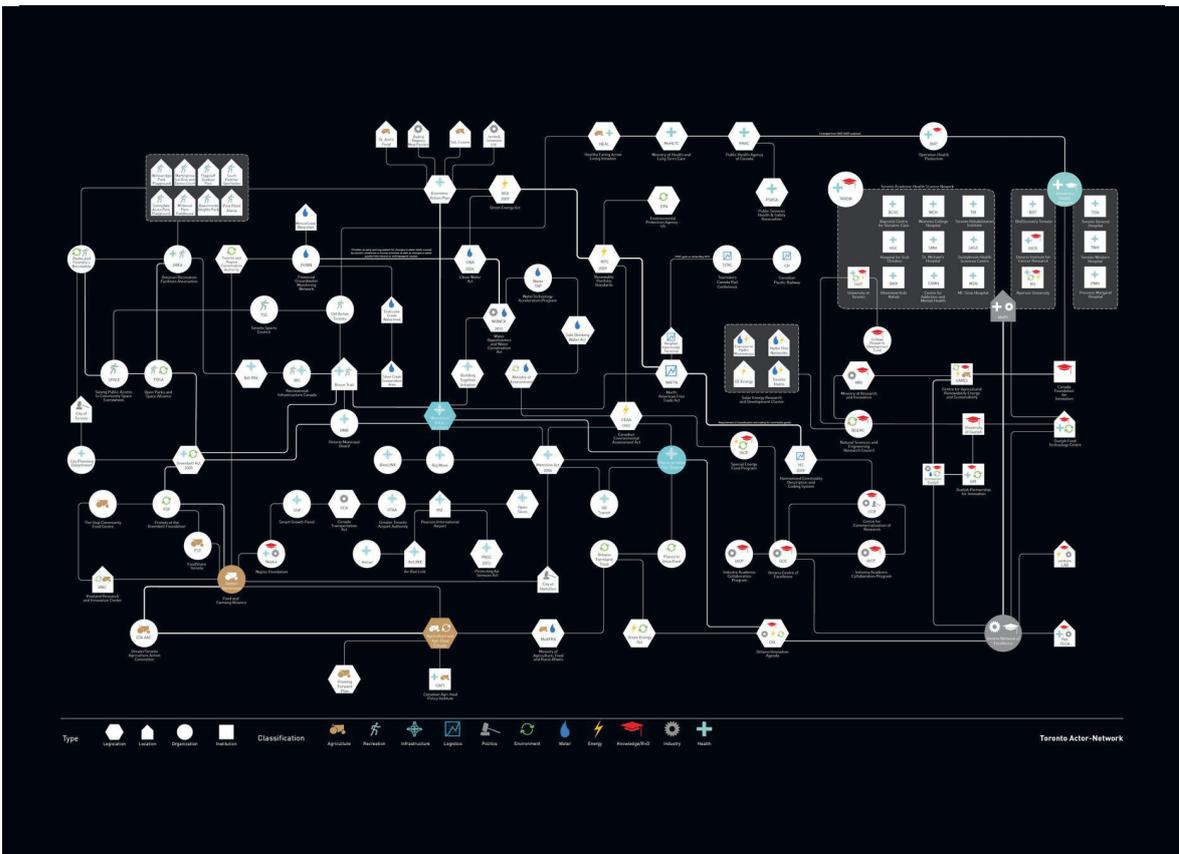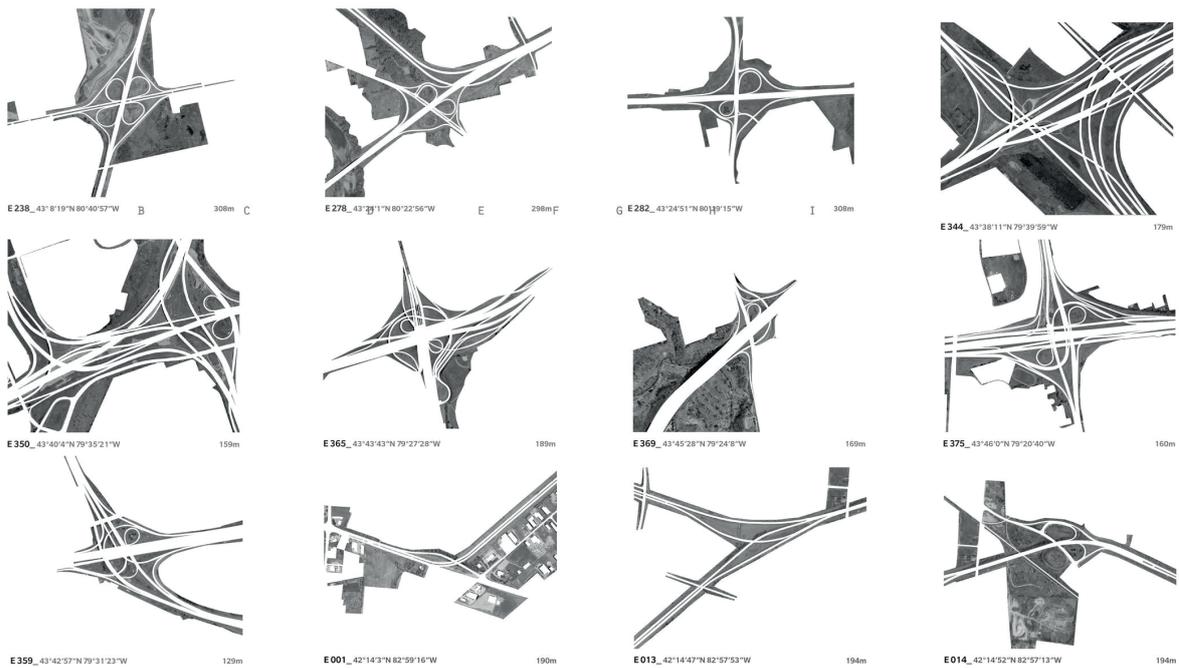
(Top) Structure: transport infrastructure and physical artifacts (http://www.rvtr.com/projects/conduit-urbanism)
Code: representation of policies, practices and protocols (Source: https://architizer.com/blog/practice/tools/infra-eco-lo-gi-urbanism/)

ing of (infra)structures and cities over time along with the form. They are expressions of operational interfaces and activities. For instance, it is recognisable in changes to zoning without a substantial transformation of built form or urban structure or the correspondence between urban development typology and economic and management policies. Diagrammatic and non-Euclidean representations show the links between broader governance tools and the actors' network in local interventions to make them visible, highlighting the assemblage of multiple agents and regulatory frameworks. Precisely, the research considers the unstable character of the form-signification-practice relationship in the construction of urban space. The 'code' materialised the pervasive highways and post-war urban sprawl in North America from "the economic, political, and social instrumentality of subdivision, as well as a product of planned distribution policies related to national defence" (Thün et al., *ibid.*). **At the same time, it suggests the framework where speculative corridor urbanities can be elaborated and allows reconsider the design, landscape, public image and rights of territories from alternative energies and co-evolutive productive capacity.**

(4) 'Intervention' as a strategic method based on system levers
Recalling Jacobs' idea on the "organised complexity" of cities (1961) and Meadows' *Leverage Points* manifesto on systemic dynamics (1999), the research defines a strategic approach to GLM's interdependencies. It refuses interventions in physical structures or comprehensive planning forms through distanced, all-encompassing viewpoints. On the contrary, it welcomes an understanding of disruptive systemic transformations (up to global spatial patterns) due to the interconnected nature of infrastructural ecologies, technological change, new performative or typological constructs, or the reorganisation of elements. Appreciating as most compelling the levers that redefine the goals and paradigms of systemic functioning, the research proposes a speculative project supported by the study of utopian experiments and their historical significance. **It encompasses possible political-economic narratives given the intense relationships between design and power, social and spatial norms in proposing urban alternatives.**

By intersection, the thematic readings in this survey overcome the reductive idea of the corridor as a vector of polarised development to become the constitutive element of complex and co-evolving geographies, between the spatial construction of the city and the economic, political and social systems that govern it. Thence, the resulting image of the megaregion shifts from an unprecedented scale of urbanisation to the complexity of interrelationships, stress, concentration and movement between its constituent parts. Corridors apply continuous (de)territorialisation processes within it, shifting or consolidating boundaries to the regions of space they cross.
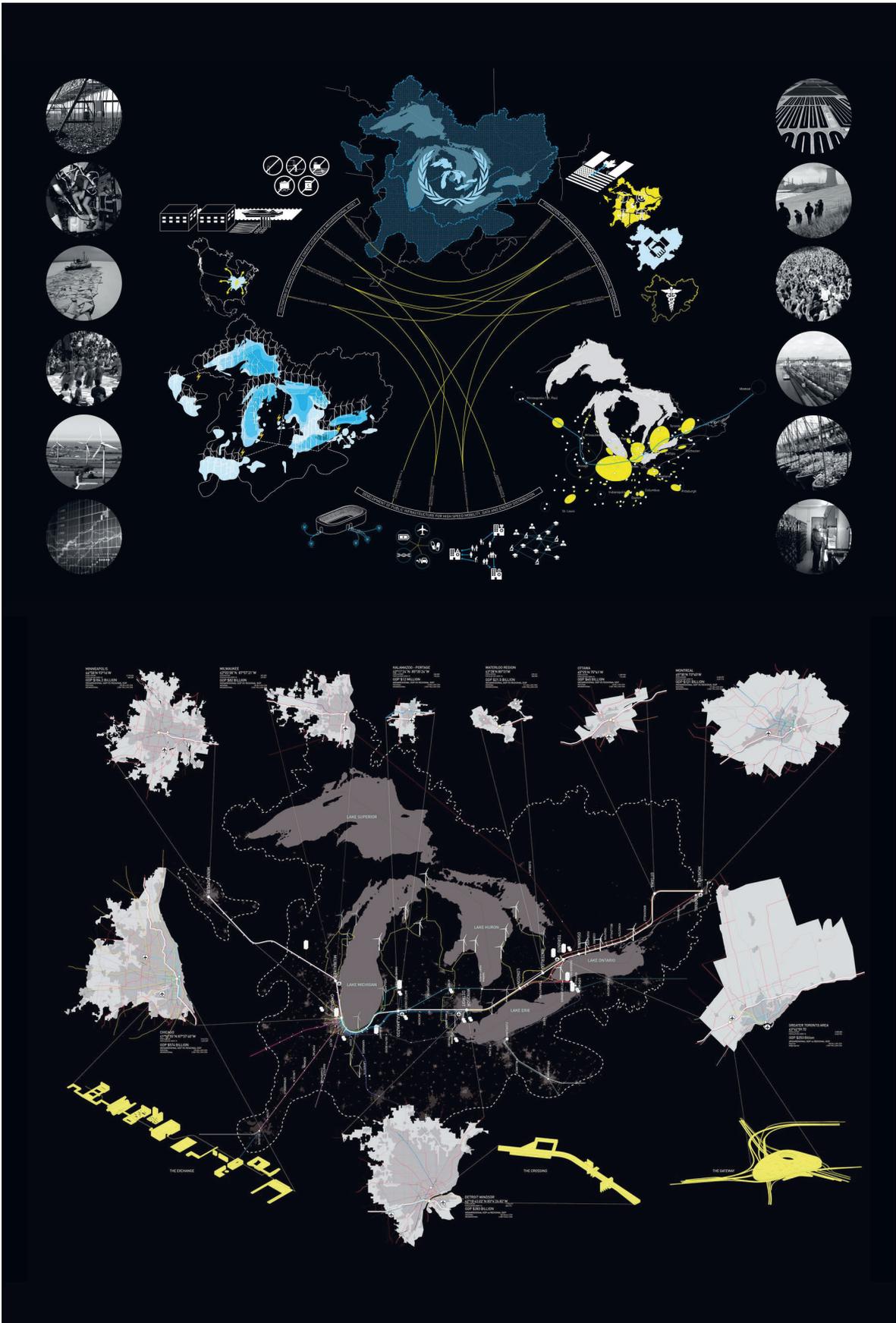
(Top) Megaregional socio-political unit and agreements (Source: http://www.rvtr.com/projects/conduit-urbanism)
Conduit Urbanism: Intraregional System Logics and Interchange Sites (Source: https://architizer.com/blog/practice/tools/
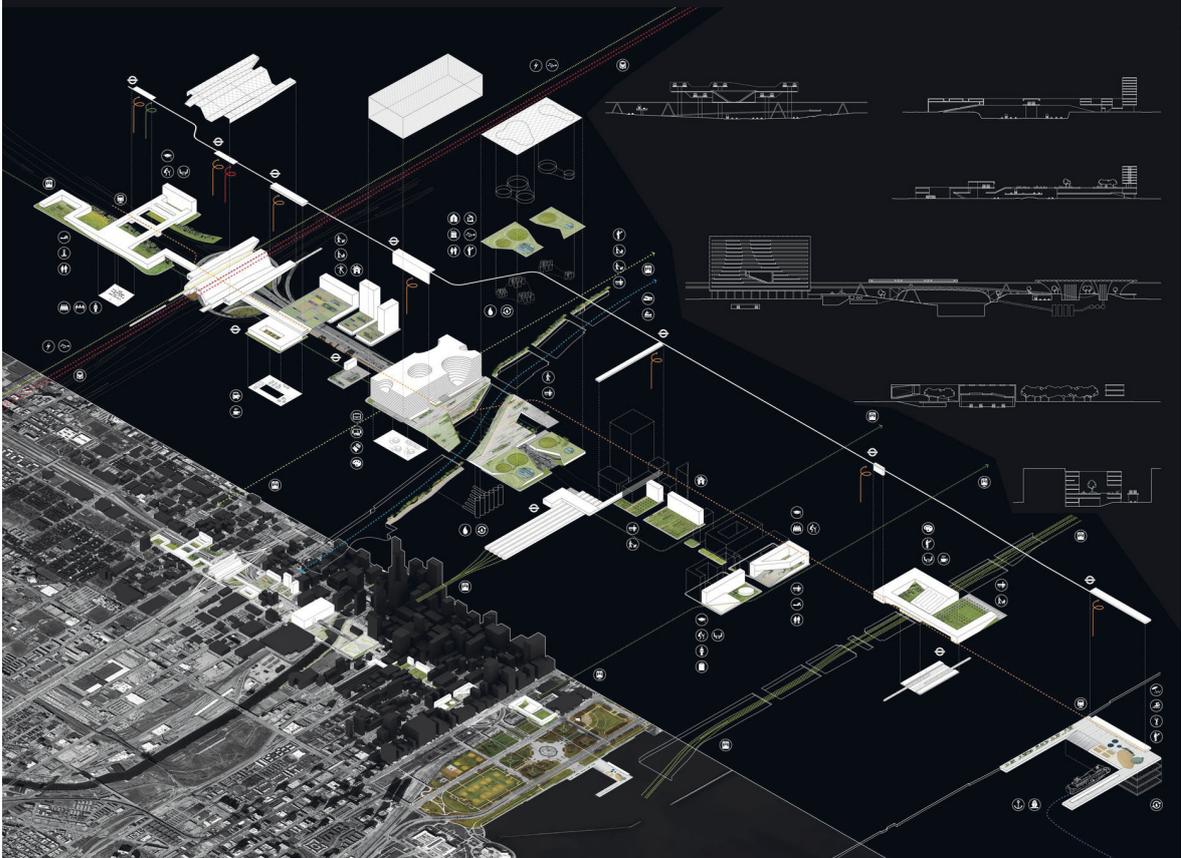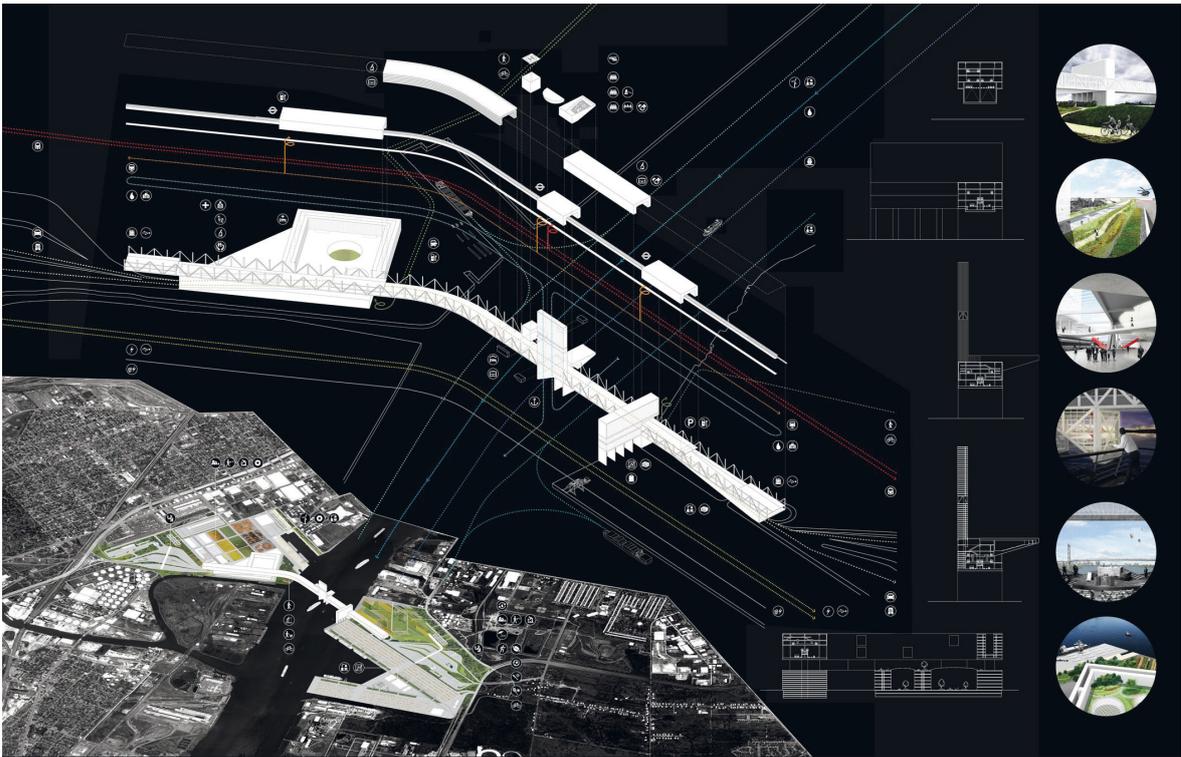infra-eco-logi-urbanism/)

2.1.3 / Corridors as Conduits, or linear alternatives

Utopistics is the serious assessment of historical alternatives, the exercise of our judge-ment as the substantive rationality of alternative possible historical analysis. It is the sober, rational, and realistic evaluation of human social systems, the constraints of what they can be, and the zones open to human creativity. Not the face of the perfect (and inev-itable) future, but the face of an alternative, credibly better, and historically possible (but far from certain) future.
(Wallerstein, 1998: 3)

Looking ahead to the next industrial revolution, RVTR suggests building an integrated phys-ical, ecological and social perspective on the GLM's historical strengths – including the success of highways – to meet the 21st century needs, while expanding its infrastructure capacity. **Thence, mobility, connectivity, and continuity can also be expressed through corridors as a conduit urbanism of multifunctional linear cities, here illustrated in a new "hybrid infrastructure ecology" and "multiplexed conduit" (Thün et al., *ibid.*).** The study proposal combines the transport, trade, energy, logistics, and communication systems between Chicago, Detroit, Toronto and Montreal into a single high-speed, multimodal linear network. It prioritises a MAGLEV[14] connection against a car-centred commuting system and overused short-distance air mobility. The intervention restructures single-use highway cor-ridors along the 401/I94/I90 inter-state Montreal-to-Minneapolis link, following the typical corridor's path-dependent process. It employs renewable energy sources for a new scaling up, reinvigorating old industries, promoting new networks of skills and specialised clusters, creating new metropolitan urbanisms along the line. Beyond the interest for the primary nodes, the project scope is to revitalise affordable satellite cities and secondary towns in between thanks to close and convenient links to a cosmopolitan city. Precisely, the infra-structural network is thought to support urban growth by bring diverse urbanities together through less energy-intensive corridor systems, observing infrastructure as everyday space. By supporting the spatial logics and logistics of agglomeration economies (Sassen, 2007), the polycentric network represents the possible bond for a paradigmatic transition linking strate-gically differentiated economic clusters to the megaregion itself as a "primary socio-political unit" (Velikov & Thün, 2010: 365). The postulate of the entire project is forming a bi-na-tional governance coalition as a collaborative structure to direct the profits from the exten-sive application of renewable energy in the whole territory towards the public infrastructure network. The critical locations to start redefining the GLM's metropolitan areas coincide with the enormous wasteland left by obsolete highways engineering in extensive infrastruc-ture, including 'spaghetti' junctions (detected in the conceptual geography of *Structures*). **By using central and symbolic places for design experimentation, the project develops three renewal interventions as typological interchange prototypes and urban artifacts aiming at a deeper consideration on the role of megaregional public institutions.** The

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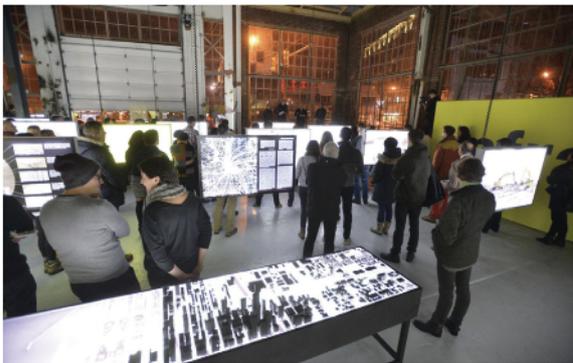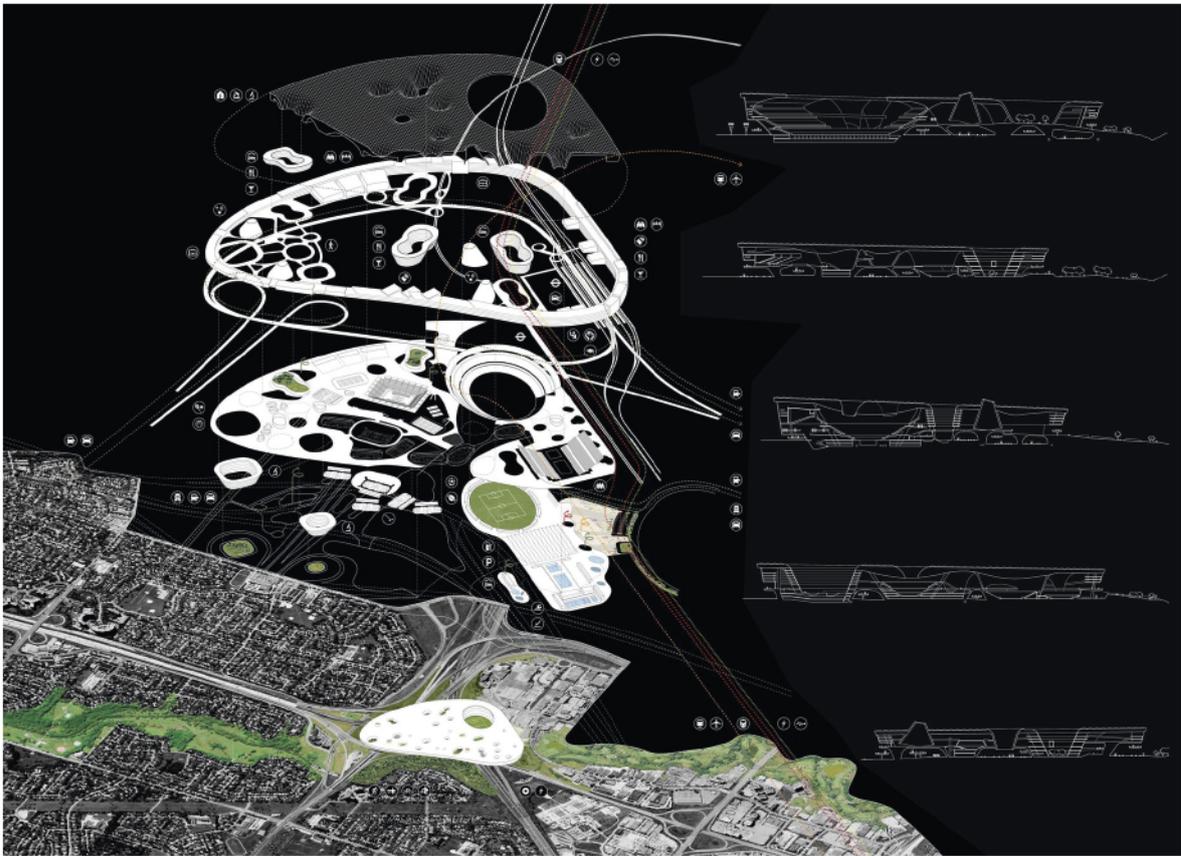14   Railway transportation based on MAGnetic LEVitation.

(Top) The Crossing (Source: https://architizer.com/blog/practice/tools/infra-eco-logi-urbanism/)
Chicago's Exchange (Source: https://architizer.com/blog/practice/tools/infra-eco-logi-urbanism/)

Toronto *Gateway* creates a regional think-tank on mobilities and migrations, collective citizenship and inclusion, and a monumental place for international events by interconnecting the massive flows of the 401 and 427 highways, the adjacent Toronto's Pearson International Airport, and the MAGLEV. Instead, Chicago's *Exchange* coincides with the central axis of Burnham and Bennett's plan (1909) for the largest of the *City Beautiful* Era's civic centres. With the same purpose, it creates a linear assemblage of mobility exchanges and cultural places from geographically central spaces but morphologically peripheral to the city, linking Lake Michigan to the University of Illinois. Nevertheless, RVTR's civic intent appears more explicit in *The Crossing*: a 2.4 km inhabitable bridge over the Detroit River defined as the heart of a free-trade zone across Detroit and Windsor to house a GLM's governance centre. **These interchanges symbolise forms of resistance to the hegemonic monopolisation and privatisation of the city – in its resources, economies and institutions – as driving forces articulating contemporary megaregions (Lopez Medina, 2015).**

In order to elaborate a critical proposal for contemporary urban conditions of American society, RVTR investigates the figure of the Corridor through the study of utopia as an urban and social project. By embracing Lefebvre's indication of its unrealisable but necessary character and Wallerstein's interpretation as a historical alternative to be deeply explored, the team makes reflections on utopia using three dominant, symbolic urban forms [(a), (b), (c)]. The research rejects a *bounded encampment* (a) or isolated design (e.g. Owen and Whitwell's *New Harmony*, Soleri's arcologies, but also the bourgeoise suburbs of 19th- and 20th-century), and a post-war inspired *parallel framework* (b) to the real city (e.g. Niewenhuys' *New Babylon* o Friedman's *Spatial Paris*) to consider three *grafted network* cases (c), or fragmentary utopias, as reference. They inspire the *Conduit Urbanism* project as alternative, incomplete and anticipatory urban and social visions for situated and porous places, linked with the world and the city while being clearly distinct. First, the tabula rasa's modernist principle is refused to give substance to a monumental construction of mobility and access network interwoven with the built environment. As in the post-war *Hauptstadt Berlin* design by Alison and Peter Smithson (1957-1958), the infrastructure emerges as a magnificent project that rests on the (destroyed) world below, anchoring to it without 'erasing' it. The other possibility offered by the corridor as a design tool is to make knowledge and the exchange of ideas accessible and democratic by balancing mobility, flexibility and accessibility, as inspired by *Potteries Think Belt* by Cedric Price (1964-1966). To transform education or provide open access to knowledge needs to start from its spatial apparatus, taking it out of the traditional enclaves of campuses and placing it within a flexible, mobile and nomadic infrastructure. Finally, the corridor's constructive and deconstructive capacity is considered, using *The City in the City, Berlin: A Green Archipelago* by Ungers and Koolhaas with Riemann, Kollhoff and Ovaska (1977) as reference. Either with a zero growth or degrowth perspective, it is possible to imagine a connective infrastructure through which some areas concentrate the social and political functions of the city in a few elements. At the same time, the rest slowly disappears in a deconstructive phenomenon. **Assuming the utopian elaboration in tracing**

(Top) Toronto's Gateway (Source: https://architizer.com/blog/practice/tools/infra-eco-logi-urbanism/)
Infra Eco Logi Urbanism exhibition, Ann Arbor (Source: http://www.rvtr.com/projects/infra-eco-logi-urbanism)
(Down) Study model of The Crossing (Source: https://architizer.com/blog/practice/tools/infra-eco-logi-urbanism/)

the Corridor as a profile of urbanity (in its possibilities of expansion and contraction) highlights its capacity to build a social and an urban project, from the intra-urban to the megaregional dimension. Thence, it is not limited to reasoning on the infrastructural work to optimise movement, but to a transformation project that evolves, modifies, thickens or vanishes according to the needs of the moment. It is no coincidence that one of the corridor's capacities is to territorialise communities both in the way it delimits space and introduces a specific human-environment link.

The topics of democracy and migration permeate the whole construction of RVTR's corridor-utopia, which is possible provided the communities' sharing and active participation to a new definition of Common: a wealth coming from environmental values and a social construction from the freedom of movement, communication and exchange. It allows a balance between the constantly redefined multiple publics, institutions, corporations and territorialities (both distinct and linked to the city, state and nation), destroying conventional notions of sovereignty and property for a society and urbanism in transition. It is strengthened by the corridors' (re)structuring and modifying as places where the traditional definitions (and delimitations) of the City and Territory are under discussion, providing an ideal space in which the Common can be activated and implemented.

By reflecting on the megaregional dimension, the exercise of *Conduit Urbanism* illustrates the corridor as a deep relationship between urbanisation-delocalisation and infrastructural growth, increase in scale and development of seamless connections. It shows its permanent transition, continuous reconfiguration of flows, and society's acceptance of a scale of relationships whereby it will be increasingly necessary to move and be connected and continually rethink the spaces' fluidity and flexibility. It emphasises the character of perennial transition along the corridor as an element of unification while crossing territories, and whose architectural form highlights it as a hyper-material filter, an intermediary, an ideal public meeting and sharing space. It requires redefining the figure by overcoming an extractive-distributive logic, highlighting the extreme consequences of its association with an idea of infinite growth, both in terms of spatial dispersion and metabolic degradation. *Conduit Urbanism* also speaks of the design extreme of the corridor as a conduit of networks, with the possibility of building a polycentrism within a predominantly linear system if finding in communities' closeness the very meaning of reducing distances. **By considering the substantial infrastructural and inter-connectivity vertex linked to the historical phase of its elaboration (the early 2000s), this case serves to illustrate the difference between** *two-dimensionality* – **reduction to a pure flow diagram and infrastructural efficiency between expansion and contraction – and** *construction* – **elaboration of a relational system, an artifact open to urban, social, but also political redefinition.** Even though at an embryonic stage, it already brings in the three-dimensional question by introducing new layers of interpretation, opening reflections to the future development of the Arc as a figure.
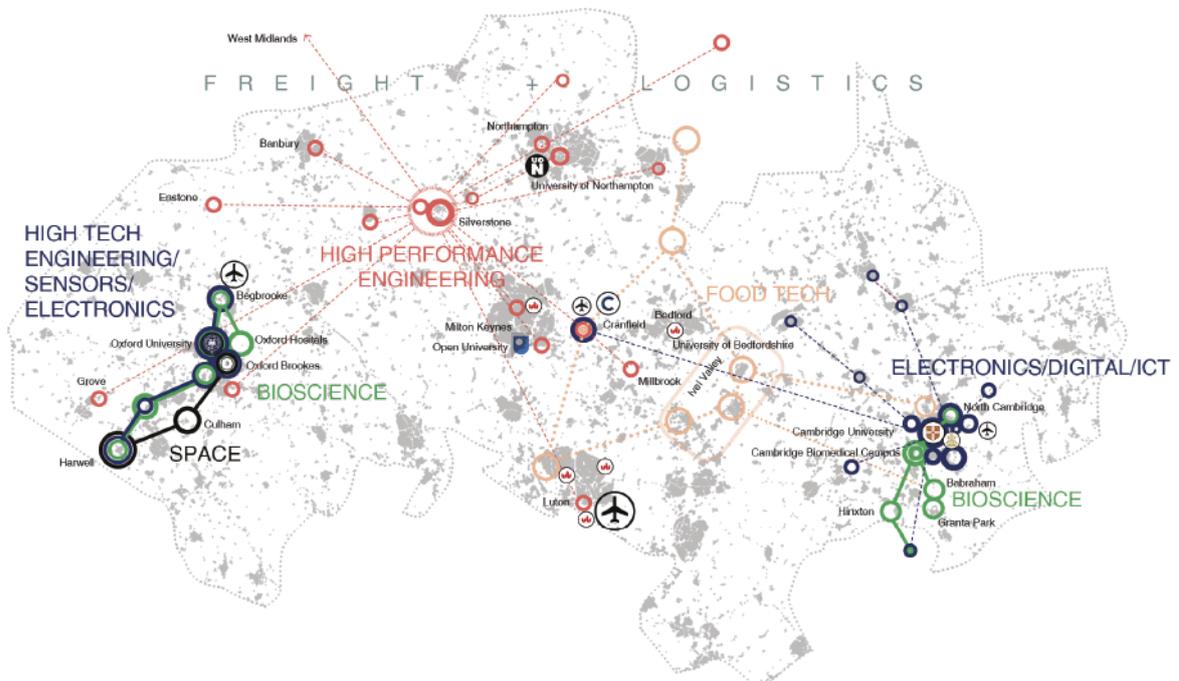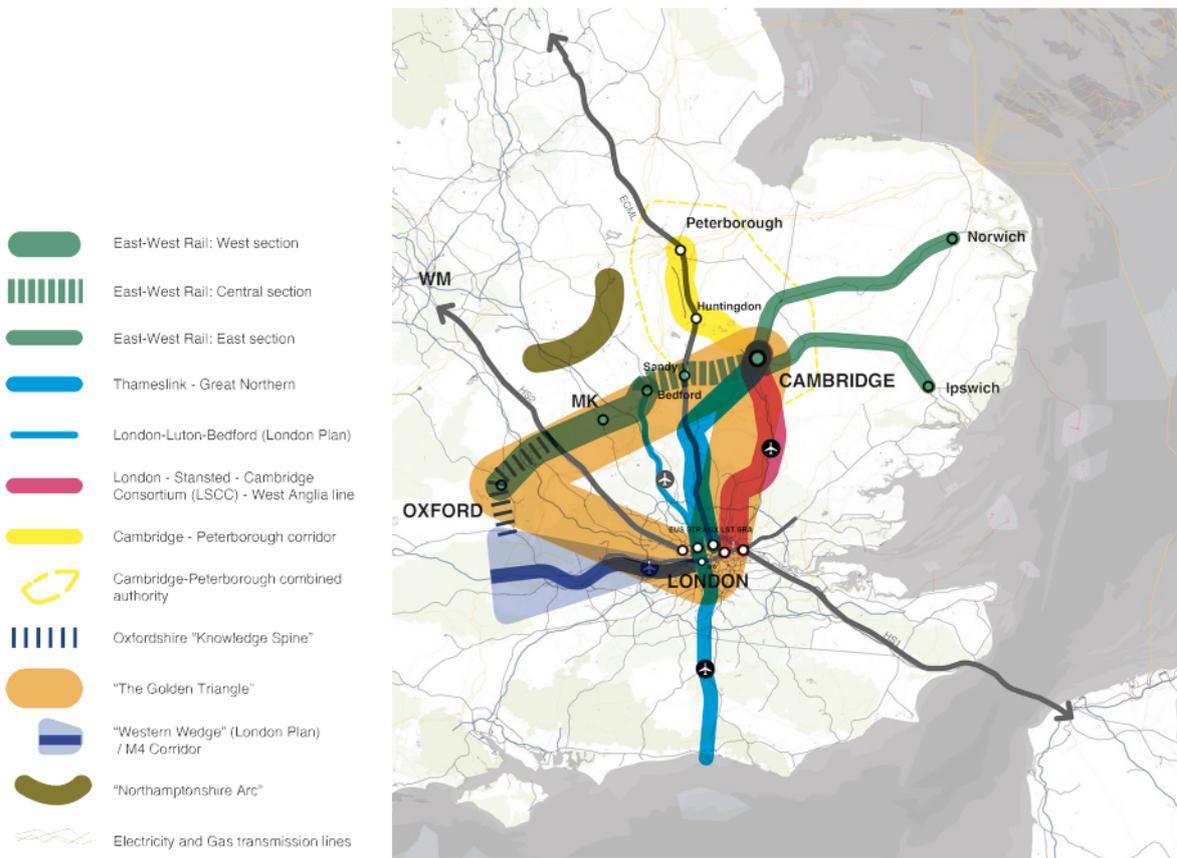
(Top) The O2C Arc in the context of multiple intersecting, cross-boundary growth corridor strategies/initiatives (Source: 5th Studio and SQW, 2017)

Driving sectors of economic growth in 4 macroareas of interest: Greater Oxford-Swindon, Greather Northampton, Milton Keynes/Luton/Bedford/Aylesbury Vale and Greater Cambridge-Northern Hertfordshire (Source: 5th Studio and SQW, 2017).

2.2 / M
Oxford-Milton Keynes-Cambridge: the right form of growth[1]

In a decade of significant infrastructure and housing projects delivery in the UK, challenging the city-countryside divide, the waste of resources and the test of time, the Oxford-Cambridge Arc[2] emerges as a territory of national concern. It hosts unprecedented economic development, labour and investments attractiveness, and (worrying) expected urbanisation. Within a highly debated spatial framework, its core spine of productive centres – some 80 km out of London – is linked to advanced education, research, and industry. It is historically shaped by a common clay watershed making a geomorphological, ecological and landscape continuity of towns and villages. Expectations for enhancing the economic potential of this strategic and valuable territory as a *development corridor* depends on forecasting the effects of the transformation pressures already underway and designing the Arc's response capacity in the long run. **Expressing the need to dissolve the centripetal influence of the capital, the envisaged transformational growth between Oxford, Milton Keynes and Cambridge raises questions about how to face urbanisation and rightsizing while respecting the uniqueness of places, the context's limits and values, and involving the natural and rural capital.** To answer this question, the recommendations suggested by 5th Studio shifts the focus from the central connection to the construction of a milieu by combining a matrix of site-specific solutions in the set of centres linked to a structure of connectivity conceived as flexible integrated. It is not a question of constructing unitary geography functional to productivity, but a collaborative system accommodating change proportionally to its possibilities.

2.2.1 / A design opportunity beyond an innovation incubator

Within a 'bunch' of centres developed from postwar suburbanisation and programmes for new and expanded towns as metropolitan "counter-magnets" (Baiocco, 2017), the notional arc linking Oxford to Cambridge (approx. 120 km) defines a regional, knowledge-driven

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1   This illustrative case is informed by the review of the *Cambridge, Milton Keynes and Oxford Future Planning Options Project* (5th Studio & SQW, 2017). This report results from the assessment and mapping of the Cambridge-Milton Keynes-Oxford Arc as committed by the National Infrastructure Commission. This publication presents the investigation in detail, including maps, design elaborations, collection of international references, and local case studies in which the design recommendations presented in the report are applied.

2   Only in this section, the use of capital letter for 'arc' also refers to the strategic initiatives, agreements, and policies identifying the Oxford-Cambridge urban system as a region of economic development interests.

network of high-tech clusters, hubs and science parks in the heart of England. This urban system is part of a broader region recognised by some studies as a transnational megacorridor crossing London and linking the West Midlands to the North West Metropolitan Area (NWMA). Its small and medium-sized cities aggregation represents a globally significant area encompassing five ceremonial counties (Oxfordshire, Bedfordshire, Buckinghamshire, Northamptonshire and Cambridgeshire) as a broad competitive economic landscape. Thanks to innovation centres like *Silverstone* or *AstraZeneca*, the Arc attracts highly skilled human capital and cutting-edge specialisms in medicine, life sciences, biotech, automotive, aerospace engineering and AI, with a critical mass of 3,7 million residents and 2,1 million jobs gaining momentum (Savills, 2019). By accounting the 7,1% of England's economic output (with a GVA p.a. of £111 billion, of which £13 billion from 10 universities), the Arc establishes a rising economic powerhouse in the Greater Southeast of the UK and a prospective primary driver of national prosperity. Such territorial potential leads the Government to consider the Arc a worthy place to invest and a viable alternative for living and working outside London, and a complex 'infrastructure' that can increase the country's growth and position in international innovation rankings. It is no coincidence that this system is confirmed as a priority in the UK's most recent public growth policies – *Build Back Better: our plan for growth* (2021) – as a high-profile infrastructure implementation corridor, led by the Ministry of Housing, Communities and Local Government (MHCLG), alongside other "pathfinder projects" (HM Treasury, 2021)[3]. Forecasts already suggest its annual output could rise by 2050 between £80,4 billion and £163 billion per annum with between 476,500 and 1,1 million additional jobs with the suitable investment, approximately doubling the growth expected without intervention (NIC, 2017; MHCLG, 2021).

These data highlight the twofold issue of territorial dimension that binds the connectivity projects of the Arc to continuity and intensification of productive flow. Also, it epitomises the subregional scale of secondary centres, which appears a new space of metropolisation (historically receiving part of the urban congestion as expansions or newly founded centres in England). On the one hand, it highlights a precise scale of interdependencies across local government boundaries that can be expanded. However, while it seeks to establish a condition of functional and spatial autonomy by asserting itself as a distinct reality, it wants to remain combined to longer chains of relations by taking advantage of the intangible space of networks. Considering the circumstance of the Brexit process (which puts temporarily on hold the Arc's discussion), such an intervention is emblematic. It represents a context that brings together some of the most internationally competitive industries and knowledge in Europe and wants to assert itself for its capacity for innovation. Nevertheless, its productive capacity is strongly linked to exchanges and flows with foreign countries, especially the EU. On the other hand, the exploitation of the place's potential puts both the territory in-between neighbouring centres and their hinterlands under tremendous pressure to accommodate

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3   In the elaboration of the previous 2017 Industrial Strategy (whose aims have been included in the 2021 Build Back Better and adapted to new scenarios), the government looked at the opportunities and threats of the Ruhr Valley, the Massachusetts Brain Train and the Silicon Valley cases to understand how to position the Arc as the top innovative economy in the world.

the minimum structural and functional dimension for the system to become independent and, at the same time, prepare to manage its explosion from the concentration of outside interests and exodus. **Thence, the subregional territorial dimension – epitomised in the experience of the English Arc – currently lives in a constant tension between the need for distinction as an independent (but connected) system and expansion towards larger scales.** One day this trend could be reversed by affirming a new model of the organisation of urban societies (and their economic and political systems), thus new directions of mobility and connectivity directed towards other places.

With increasing intensity since 2016, the investigations committed by the Government explore the potentials (and risks) of a more functional corridor for territorial growth, using infrastructure to link existing economic clusters as a unique complex system beyond administrative boundaries. Since then, it emerged that the Arc's financial health, productivity, competitiveness and unity is jeopardised by its consolidation as a fragmented ecosystem, still unable to secure homes, provide connectivity, and protect the area's high-quality environment in a way that builds continuity. **Here the second issue of the English case emerges, namely the parallel use of the term Corridor and Arc to describe a process, project and connecting space, even though the former refers to a spatial and functional continuity and the latter emphasises intermittencies between neighbouring places.** The issues identified by existing analyses help clarify this difference by revealing different geographies of need.

First, the limited supply of affordable housing does not meet the forecasts of intense urbanisation in the coming decades, following a population growth trend of 17% since 2000 (MHCLG, 2021). Likewise, the growing demand has led to an exponential increase in costs within an insufficient market supply (in terms of quantity and options). According to speculative logic[4], it wastes the land resource, pushing possible new residents further from job locations, which increases travel distances and congestion. Second, the absence of adequate cross-connecting infrastructure, amplified by stronger radial links from London to the Midlands and the North, weakens trade and fragments the Arc's economic landscape, hampers commuting flows and lead to extreme car dependency (already 67% of journeys to work, responsible for 46.8% of carbon dioxide emissions (EEH, 2020))[5]. The lack of metropolitan-scale and 'last 5 miles' connectivity to fit into the national infrastructure network exacerbates this condition.

Moreover, the 'unlocking' of the area's potential remains associated with extensive mo-

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4   The trend of increasing affordability ratios – between average house price and gross annual labour earnings – increases the difficulty of attracting skilled workers to the region's more developed areas (ratios up to 12.76 for Cambridge and 11.45 for Oxford over 20 years, and to 17.62 and 15.56 respectively for Chiltern and South Bucks, compared to the national average of 7.83) (ONS, 2019).

5   Arup's Transport Workstream observed the relative independence in the labour market between Swindon, Oxford, the Milton Keynes-Northampton-Bedford-Wellingborough constellation, and Cambridge – compared with the degree of interaction in relation to London – as a reflection of the qualities of inland transport that prevent the area from functioning as a corridor (5th Studio & SQW, 2017).

torway and railway projects, representing an intense argument between a few major functional players and civil society for their impact on natural environments and related historical traditions. Although it is difficult to experience the Arc as a single territory, its landscape is unified by a geological belt of gentle uplands. It contours the clay valley and feeds the main rivers, which cross the area horizontally towards the marshes to the north-east and the Goring Gap through the Chilterns into the Thames Valley to the south-west. The urban morphology and the traditional architecture materiality of the main settlements in influenced by the course and floodplains of these rivers, while the intersection of the valley watercourse and the slopes creates particular landscape configurations (e.g. at Oxford along the Thames Valley between Boars Hill and Shotover Hill). Such uniqueness of the territory's natural capital is threatened by urbanisation pressures, which risks the degradation of areas of high ecological value and the health of local communities. On the other hand, unplanned development risks overlapping with areas increasingly prone to extreme flooding[6] and natural land necessary for ecosystem services. **This aspect confirms that the idea of a corridor within a notional arc in this territory corresponds to an unpredictable possibility between growing urban centres rather than an existing phenomenon.** Moreover, the corridor/arc 'question' involves a broader network of (inter)dependencies made of centres of comparable size beyond the Oxford-Cambridge spine and crossing the north-south corridors stitching the region with the rest of the country (namely in Northampton, Luton, High Wycombe and Peterborough).

Today's conditions have mainly exacerbated two trends already underway in England's heartland: the desire (or apprehension) to establish a string of cities as a place of innovation for a stable, autonomous economy; the increase in isolation (to services, jobs, commerce or public space) where privileged routes or systems of mobility and connectivity are missing. While a stronger singular identity can unlock a series of benefits to support economic resilience, greater coherence needs to be balanced by strengthening the quality of each place and reducing inequalities within regions. Likewise, it will be crucial to integrate rural areas now accommodating the demographic overspill from neighbouring centres but unable to contribute to the Arc's knowledge-driven economy or enjoy the economic growth of the leading centres to which they are linked. **Considering the risks of designing a continuous factory focusing on a production-distribution perspective, any transformational development and environmental improvement will demand a holistic, long-term, and site-specific housing-work-infrastructure plan.** For this reason, local actors started to collaborate for a more coordinated and cross-border approach to planning growth and fund-and-raise finance for significant improvements[7], including the unification of local councils, city deals, and integrated projects for infrastructures. Considering the need to accommodate a large number

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6   Approximately 74,000 properties at an annual risk of 0.1% or more in floodplains (MHCLG, 2021).

7   MHCLG (2019), *Government ambition and joint declaration between Government and local partners* (Source: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/799993/OxCam_Arc_Ambition.pdf)

of new population in the territories of the Arc, also access of municipalities to funding from establishing New Town Development Corporations would be essential to address housing needs within a shared plan, besides the improvement of new subregional land use plans and investment strategies as part of a 50-year vision for the Arc as a whole. After its commitment at Budget 2020, the Government started developing a Spatial Framework with local partners to turn a common vision into public policies through wide public engagement, undertaking spatial analysis, option testing, impact assessments and stakeholder engagement to make it effective. The aim is to define long-term support to spatial planning and provide a more targeted public investment model. The Arc's serene transformation depends on the ability to nurture the existing public-private partnership, joining representatives of the knowledge community, companies, government and strategic alliances within this vast area[8]. The question that remains to be discussed – and which is also linked to the views of individual actors – is what spatial extent this intervention needs to consider, which geographies it involves and how each may respond to the expected transformation pressures.

Elaborated earlier than the current political and economic discussion framework, the 5th Studio's[9] report *Cambridge, Milton Keynes and Oxford Future Planning Options Project* (2017) is a symbolic experience in the public debate on the Arc. Developed with SQW[10] under the National Infrastructure Commission (NIC) commitment, this investigation aims to recommend suitable forms of housing development to fit the needs of priority infrastructure improvements while supporting jobs and growth. **In this case, the Arc is taken as an opportunity to experiment with how more functional corridor geography could rearticulate clustering effects to create a cohesive urban system and get out of London's centripetal force while strengthening the places diversity and their contributions to an overall design.** Notably, this work's methodology highlights the territorial dimension's dual character – scales of interdependencies and form of growth – to which the figures of Corridor and Arc are linked, in continuous tension between the demand for expansion and the minimum dimension for the system's autonomy.

2.2.2 / The 'price' of growth

The first premise of 5th Studio's investigation is to consider the appropriate scenario to examine the spatial and infrastructural impacts of the Arc's project. It leads to select a combined

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8   Currently, it involves 23 local planning authorities and a combined mayoral one, eight transport planning authorities, Local Enterprise Partnerships responsible for economic development, the sub-national transport body of England's Economic Heartland (which covers a slightly wider area), and a strong collaboration with Arc Universities Group thanks to the decisive contribution of education and research to the local economy.

9   5th Studio is a spatial design agency based in London, Cambridge and Oxford that works across architecture, urban design, infrastructure and landscape.

10   Based in the UK, SQW is an independent provider of research, analysis and advice in economic and social development for the public, private and voluntary sectors.

	rate	34 year totals (2016 to 2050)	
	house/year	number of new homes	corridor population increase (assuming 1.87 people per household)
Baseline Scenario	15,000	510,000	950,000
Incremental Scenario	20,000	680,000	1,272,000
Transformational Scenario	23,000	782,000	1,462,000
Development accommodated due to pressures from land-constrained markets	7,000	238,000	445,000
Study Brief Transformational ± Development accommodated due to pressures from land-constrained markets	23,000 - 30,000	782,000 to 1,020,000	c.1.45m to 1.90m

Interim Report Analysis Scope
- Swindon + Greater Oxford;
- Northampton;
- Aylesbury Vale/Milton Keynes/Bedfordshire;
- Cambridge and Northern Hertfordshire.

Governance
- Oxfordshire
- Buckinghamshire
- Luton
- Milton Keynes
- Northamptonshire
- Bedford
- Central Bedfordshire
- Peterborough
- Cambridgeshire

5th Studio Future Planning Study
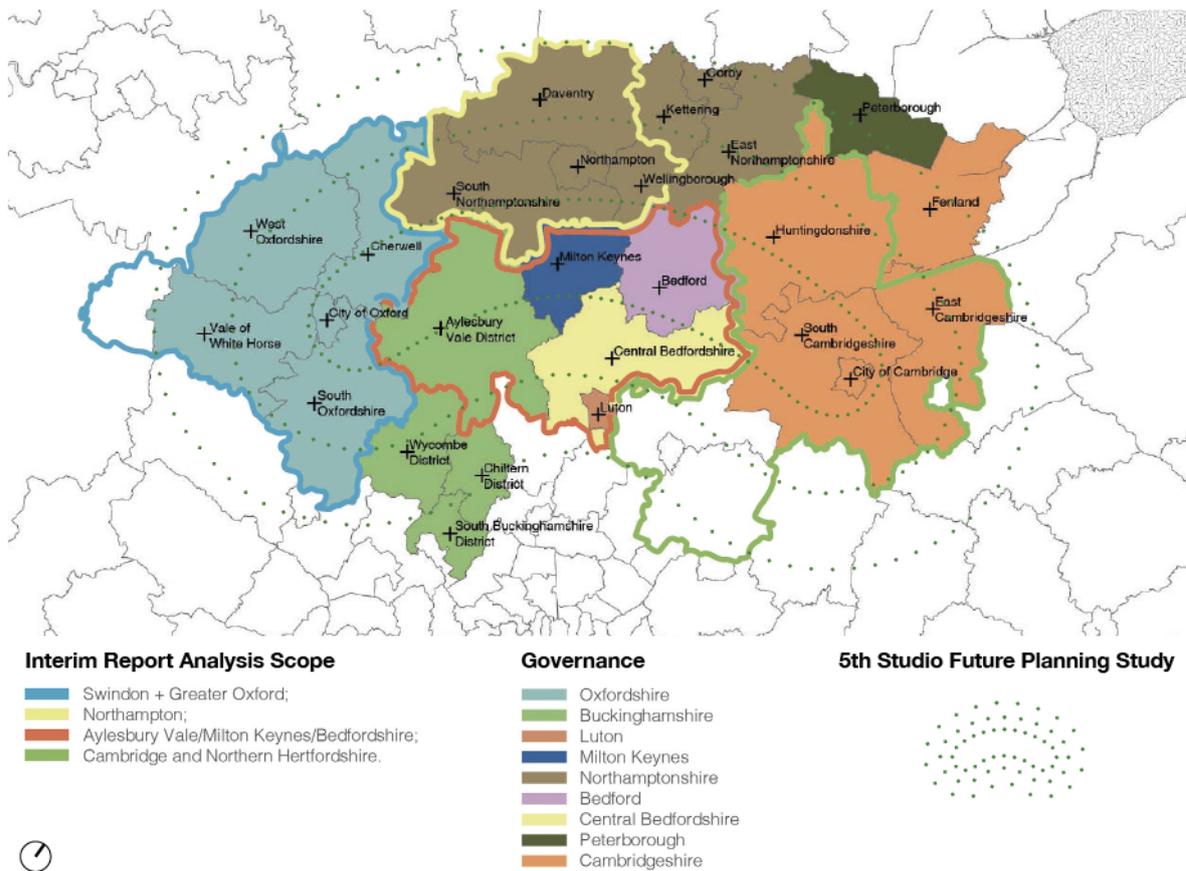
(Top) 5th Studio study brief (Source: 5th Studio & SQW, 2017: 9).
Arc's study geography (Author, adaptation from 5th Studio & SQW, 2017: 11).

study brief to detect the most critical conditions[11], i.e. a *Transformational scenario* based on an average response of 23,000 dwellings per year and the potential for incremental land-constrained market pressures (including London's housing demand). It results in an overall variable of 30,000 houses per year to accommodate a hypothetical population of 1.45-1.90 million people by 2050, which gives the scale of the challenge.

A second assumption is a less rigid spatial delimitation to analyse the Arc as a process and study geography focused on relations that overcomes any administrative limitation. Notably, it encompasses towns, cities and their hinterlands along the poorly developed transport backbone and the economic relationships with their environs, contributing to this complex dynamic urban system although out of the main East-West planned links. The argument on the Arc as a figure is that there is no actual single, correct definition for its study boundaries. They are influenced both by the availability and structure of spatial data and by the administrative authorities that govern the territory and may not coincide with the areas of statistical calculation. Until the definition of the Spatial Framework – now in the consultation phase –, the Arc's boundaries for study and intervention were defined differently according to competencies, sectoral analysis criteria and initiatives. Instead, a 'fuzzy' boundary approach allows the intensity of urban interdependencies and latent territorial features to be prioritised according to distance from the core spine, regardless of governance space.

Thus, 5th Studio's notional arc corresponds to an area of decreasing degrees of attention in proportion to the distance from the central alignment of cities. The combination of growth prospects and the spatial variables highlighted by flexible study geography informs "an initial (non-exhaustive) infrastructure and landscape-based opportunity assessment and mapping across the full corridor" to find a "representative spectrum" of most suitable sites for growth (5th Studio & SQW, 2017: 8). **By a research-and-design process in which Arc and Corridor's meanings integrate and overlap, 5th Studio demonstrates that the application of these figures should not correspond to a flat uniformity of landscape since their effectiveness is defined by complexity.**

The conceptual reduction of the Corridor's figure to a pure extension and flow diagram, where the Arc merely represents a future connectivity projection joining dimensionless points, tends to overshadow the different capacity of places to accommodate the transformation both figures entail. The underlying assumption of 5th Studio is the exact opposite. A single design solution – either concentrated or dispersed – is unrealistic to match the changes that a colossal housing demand can produce in a miscellaneous territory. Hitherto, it recognises that the diversity of places corresponds to shared concerns, such as the degree of urban accessibility, the uniqueness of sites, the correct scale of development, and the respect for landscape, environmental and ecological values. The issue that ties together the transversal, yet specific, instances for each context is the severe neglect and waste of scarce land resources

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11   Informed by: the NIC's Interim Report; the review of the submission to the NIC's Call for Evidence; the review of the outcomes of four thematic workstreams commissioned by the NIC (property market, transport, finance and investment and economics) involving SQW, Metro-Dynamics, Savills and ARUP.
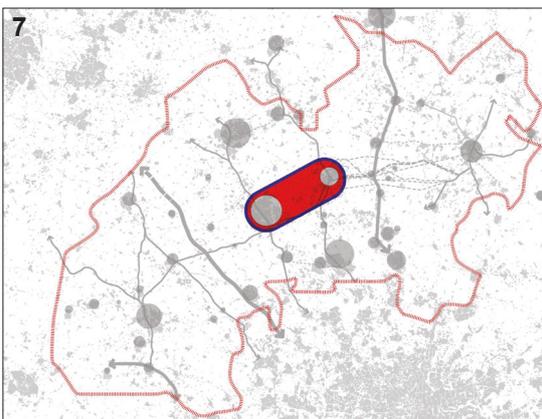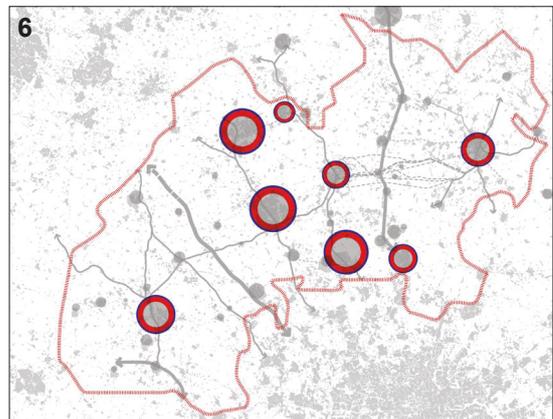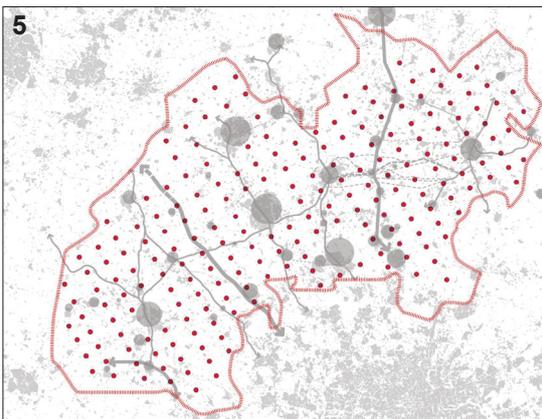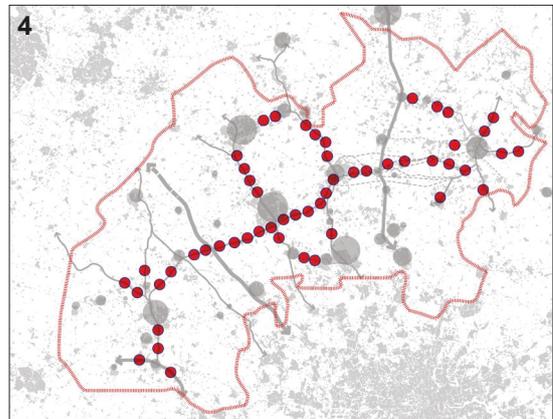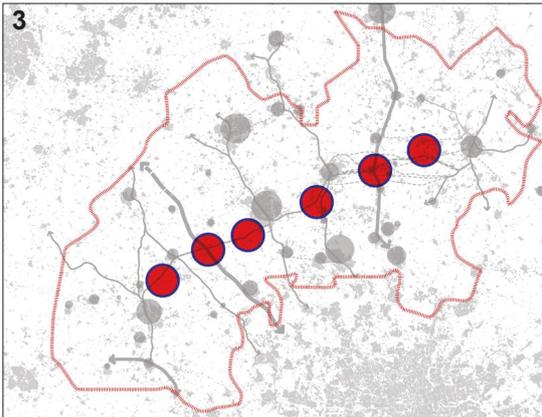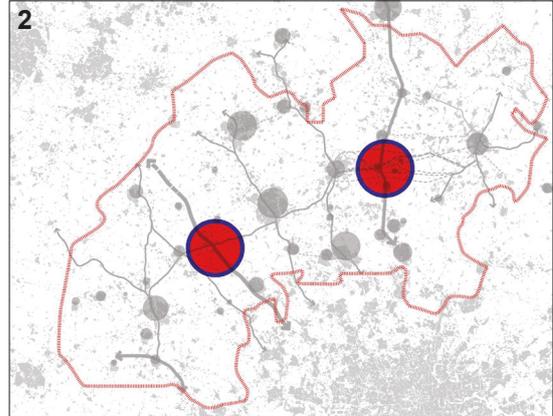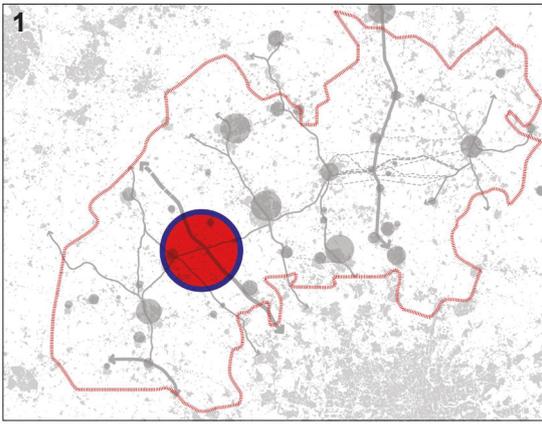
Transformational scenarios for the O2C Arc at 3,500 people/km^2: 1) 1 big city of 1,9 mln people, settlement radius of 13.1 km; 2) 2 medium cities of 950,000 people, settlement radius of 9.3 km; 3) 6 small cities of 320,000 people, settlement radius of 5.4 km; 4) 50 towns 38,000 people, settlement radius of 1.9 km; 5) 200 villages of 9,500 people, settlement radius of 900 m; 6) continuous concentric expansion, more than doubling the population of eight of the largest settlements within the corridor; 7) "Conurbia", concentrating development between two or more existing settlements to create a larger combined settlement (Source: 5th Studio & SQW, 2017: 23-26).

compared to a growing urbanisation pressure, fuelled by suburban development, speculative real estate logic and deteriorated by poor building quality.

The affirmation of the Oxford-Cambridge Arc as a vector of urban exodus makes urgent a non-dispersive land management capable of directing growth as an unstoppable process, but to which room can be given prioritising the extended access to the city, therefore citizenship, and healthy environments. Considering the diversity of spatial capital and capacity to accommodate new urbanisation according to place, the main recommendation brought forward by the 5th Studio is that a range of interventions in pattern and scale can better manage the size of instances to achieve a common, balanced and inclusive outcome for communities. **In this case, the corridor/arc does not represent a homogeneous solution but a combination of actions held together by mobility and connectivity as spatial cohesion. However, it remains crucial to understand what price(s) the territory is likely to pay.** As the expected growth may require larger new settlements to limit the cumulative cost of infrastructure and the impact on resources (mainly rural areas), the survey tests various approaches, typologies and case studies to assess the pros and cons of interventions according to environments. The result is an *Illustrative Scenario* that highlights the global scale of transformation as a plausible perspective applying the full spectrum of solutions provided their role is complementary and part of an integrated transport project on several scales (see section 2.3.3).

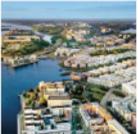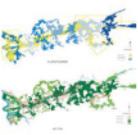Starting from boundless study geography, the study uses 7 *What-if* scenarios of hypothetical spatial concentration and dispersion as a temporary methodological tool to understand how and to what extent territorial characteristics can meet growth needs, building a geography of possibilities. As a basis, it applies an average density of 3,500 people/km^2 that typifies "mixed-age, mixed-use cities and towns across the corridor" (5th Studio & SQW, 2017: 23). This matrix of spatial occupation is applied in different articulations and combinations but homogeneously, regardless of local specificity, to stimulate an initial assessment of different development patterns. The aim is to highlight the diversity of responses by showing the effects of geometric (radial) extension and population increase, also from doubling and quadrupling the assumed ratio (referring to existing cases in the UK).

By outlining different possible landscapes from applying multiple approaches and typologies as simplified models, with their limitations and costs, the preliminary scenarios served to understand the appropriateness of development to circumstances, including infrastructure provision complementary to development forecasts. Each explored solution answers a specific issue, e.g. optimise the density-infrastructure proportion, minimise the impact of development, or create the critical mass for a dynamic place and reap the positive effects of agglomeration if connected to outer regions. All options being potentially valid, the *What-if* scenarios encourage diversity of new settlements so that no single solution applies to the whole territory, focusing instead on where this transformation could happen. Whatever the combination, the application of the abstract model must be subject to the landscape limits (including Green Belts) and consider densification opportunities in existing places (as in urban voids, fringes, or in the open layouts of existing New Towns). **The resulting 'suitabi-**

X-LARGE >	1 Clara Plan Australia	2 Stedenbaan Netherlands	3 Helsinki Finland	4 Stockholm Sweden	
LARGE >	5 Nieuwegein Netherlands	6 Letchworth UK	7 Sheffield City Region UK	8 Emscher Park Germany	
MEDIUM >	9 Hafencity Germany	10 Vastro Hamnen Sweden	11 Linear City Spain	12 Vathorst Netherlands	
SMALL >	13 Carlsberg District Denmark	14 Zuidas Netherlands	15 Euralille France	16 King's Cross London, UK · 17 Rieselfeld Germany	18 Southern Fringe Cambridge, UK

(Top) Existing and proposed infrastructure, land constraints and hydrogeological structure (Source: 5th Studio & SQW, 2017: 123)

Available land for urban development and proposed infrastructure (Source: 5th Studio & SQW, 2017: 125)

(Down) Matrix of best practice examples (Source: 5th Studio & SQW, 2017: 128)

lity mapping' for growth – irregular and fragmented – suggests different development typologies and related forms of proximity and long-distance interactions by which urbanities can build relationships with each other and with transversal infrastructure as flows backbone. Since space is not equally accessible to urbanisation, nor can cities alone take charge of it, it is the strength of the links between interventions distributed across the territory that will define the coherence of the intervention. The potential of individual typologies is further explored as detailed design and informed by a selection of 18 local and international good practices from intra-urban to regional scale (S-M-L-XL). Their experience helps define the character and location of case studies according to compact and mixed-use development around high-quality local facilities and accessible public transport; the association of housing with diverse and ecologically rich landscapes; and the minimum load on wider water, energy and waste networks. Although the cases are not exhaustive of the entirety of issues and factors in this territory, they epitomise its scale and diversity and a means of verifying comparable contexts, while the related proposals experiment regardless of local planning, and in some cases, even represent counter-policies.

At a time of intense arguments between mass transit and expressway route options to ensure productive power, broader accessibility and localise housing development in the east-west direction, what the 5th Studio suggests is the reverse process of using mobility and connectivity as an ordering principle for settlements. **In fact, emphasis is placed on the intermediate space, hinterlands and rural areas as active parts of a circuit rather than a simple crossing space. Specifically, the Arc provides the ecosystem in which the Corridor is repeated at multiple scales to ensure interdependencies between centres in a logic of sense of community and place. From here, the real meaning of freedom of movement, communication and exchange that these two figures suggest emerges.**

2.2.3 / The frame and the matrix

From the propaedeutic use of scenarios and exemplary practices, 5th Studio elaborates two complementary tools to outline the Oxford-Cambridge Arc as an ecosystem balancing growth with infrastructural implementation. A strategic spatial framework identifies the urban and rural interdependencies as the relational structure distributing development and reorganising governance on cooperation. Within it, a 3x3 typological matrix applies a range of punctual design solutions to build and strengthen this system. **Such combination supports the intention to definitively overcome a two-dimensional understanding of the Arc's spatiality as a mere seamless point-to-point sequence along a central axis to explore multiple scales of virtual interdependencies by design. The expected physical corridor is converted into a broader network of networks with different degrees of intensity, independence and flexibility of relations, enriching a simplified geometry of mobility and connectivity with the heterogeneous character of its environs.**
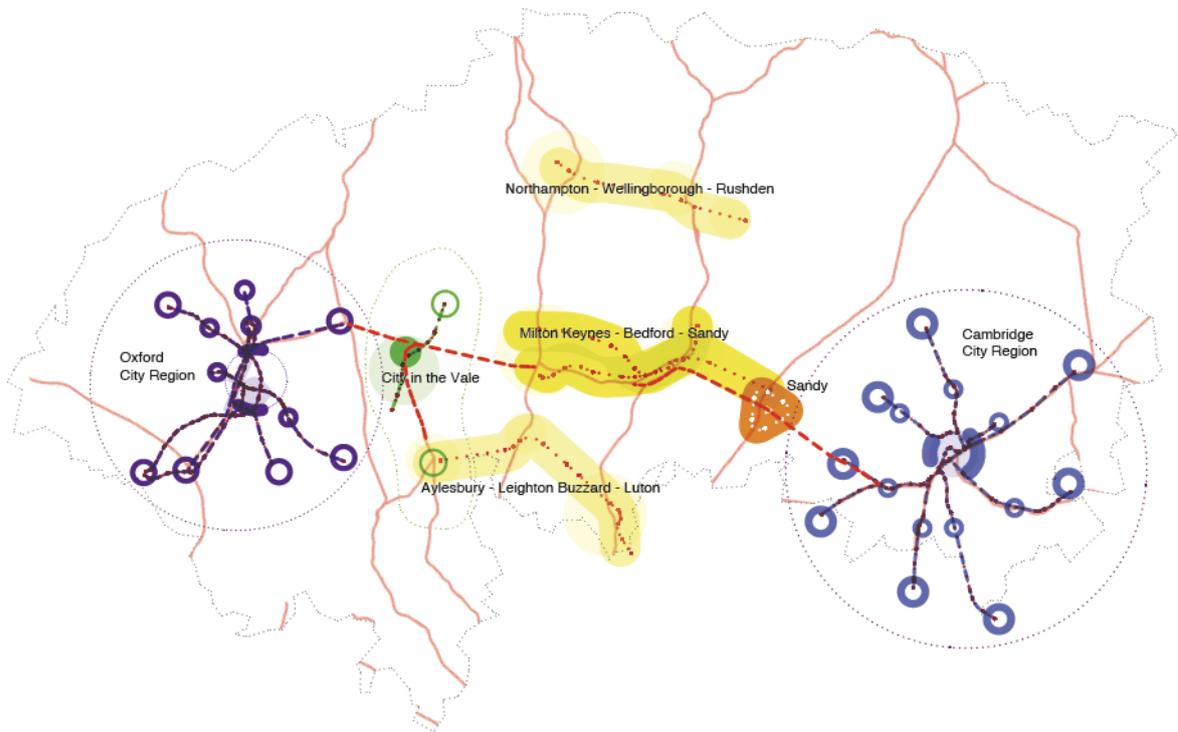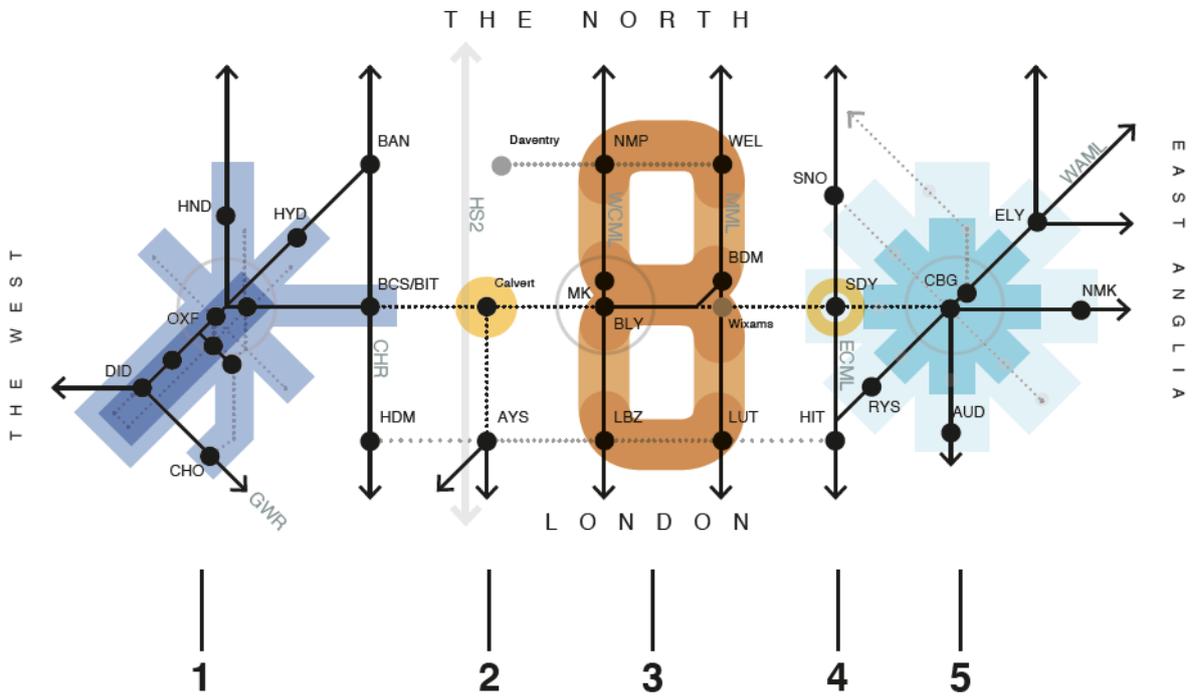
The integrated spatial and transport framework and the five subregional solutions (Source: 5th Studio & SQW, 2017: 33).

The spatial framework consists of five subregions as ideal territorial dimensions for spatially-specific response [(1-5)], structured in the forms of urban consolidation, compact new settlements and minor seams as three interdependent strategic approaches [(a), (b), (c)], being detailed as follows:

(a) (1) Oxford and (5) Cambridge City Regions
Strengthening Oxford and Cambridge's spatial and functional character as City Regions consolidates the edges of connection, preserving the historic urban core and countryside proximity with more intensive mixed uses in the existing fabric. Priority is given to densification in technology parks, industrial areas and suburbs, while the adaptation of Green Belts reinforces the integration of urban fringes with the wider city. At the same time, soft mobility systems and a readable, active and public transport network provide means of cohesion both for expanded or new compact satellites and further towns with their surrounding villages;

(2) Calvert (o City in the Vale) e (4) Sandy Randstad as new compact cities
New self-contained settlements are suggested between the main centres (Oxford and Milton Keynes, Bedford and Cambridge), at the intersection of areas with fewer landscape constraints and easy access to East-West and North-South transport infrastructure. As a long-term process, their construction should never leave the settlement with an unfinished character nor impact on existing networks and neighbouring communities;

(3) Three East-West development corridors building "eight town figure-of-eight".
The creation of minor corridors – Northampton-Wellingborough-Rushden, Milton Keynes-Bedford-Sandy, and Aylesbury-Leighton Buzzard-Luton – as transversal seams between the North-South secondary axes defines linear development concentrations by joining existing and new small-sized centres while maintaining a human scale. They aim for light, fast, continuous and complementary surface connections, adaptable to the demand of the peripheral areas to the main metropolitan flows. Their welding creates a new symmetrical geometry of interdependencies linking the transversal axes to the main route stretching between Oxford and Cambridge.

The chains of relations defined from various urban densities act as real constructors of the regional space, contrasting the polarisation of extensive infrastructure on main hubs or areas particularly attractive to investments as well as pulverisation from a widespread distribution of development. They are thought to build the basis for a diverse territory and guarantee communities an intense, widespread and equally distributed connection proportionally to the places' capacity to accommodate transformation. Their definition depends on the recognition of intermittent spatial relations within and between the subregions themselves – from undefined margin spaces, scarring, weak connections or absence of intermediate nodes –, becoming the real focus of design. The variety of needs detected along these physical and virtual structures of mobility and connectivity is supported by a comparable heterogeneity of tools to preserve complexity as the right form of growth. In this
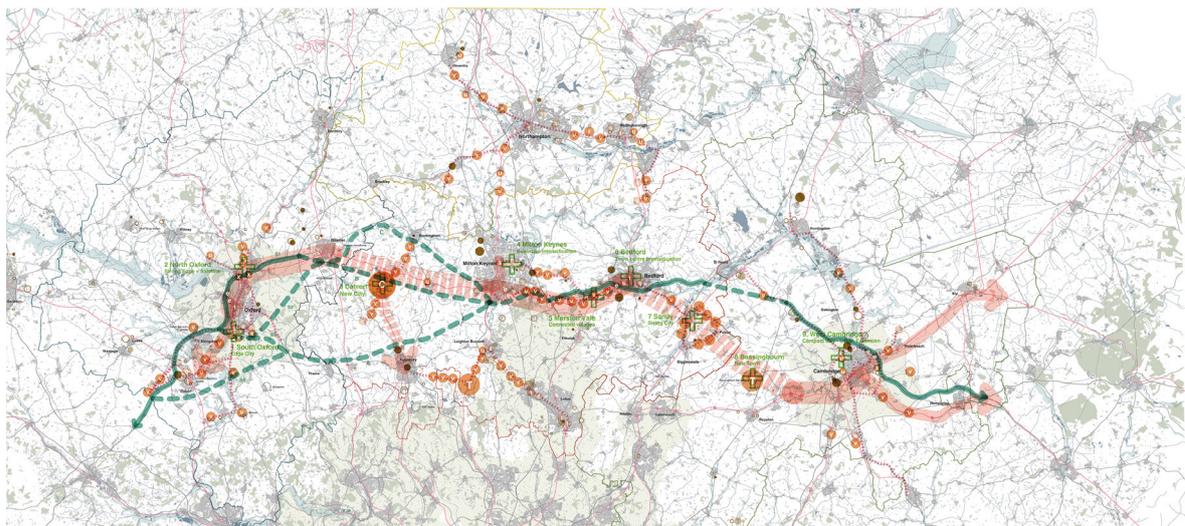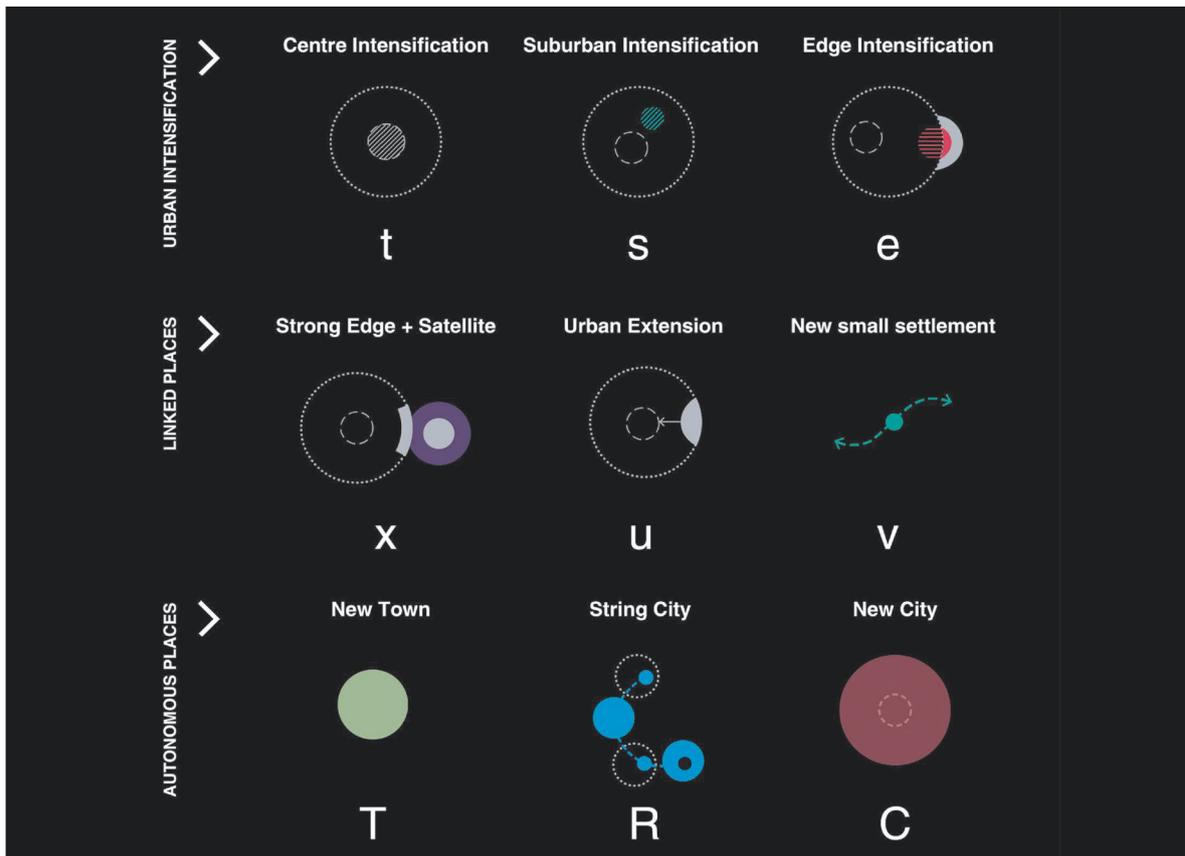
(Top) 3x3 typological matrix (Source: 5th Studio & SQW, 2017: 42)

Oxford-Cambridge Arc, Illustrative Scenario (https://www.5thstudio.co.uk/projects/oxford-milton-keynes-cambridge-corridor/)

sense, the typological matrix provides a design 'tool kit' of intensification, connection and autonomous places as main intervention types [(x), (y), (z)], experimented in 9 hypothetical and illustrative cases, both as existing settlements and new nuclei of different sizes:

(x) Urban intensification

Town Centre Intensification proportionally to the accessibility and sustainability of locations to existing infrastructure for new housing and new or expanded higher-order facilities and services (case study: Bedford);

Suburban Intensification in the pattern of widespread 20th-century suburbanisation, using the land from open-plan housing estates, underused areas and marginal green space around road infrastructure in New Towns (case study: Milton Keynes);

Edge intensification in low-density and monoculture areas for a more compact urban form with greater diversification, land-use efficiency and walkability, and revival of traditional mixed neighbourhoods in cities under decline such as Oxford and Cambridge (case study: South Oxford);

(y) Linked places with a nearby city

Strong edge and Satellite improving a primary link to critical locations in the host centre, and preserving the identity, sense of place and local services (appropriate to the scale) in the distinct secondary settlement within walking or cycling distance (case study: North Oxford);

Urban extension as the generation of a compact pattern integrated into the existing centre through soft mobility, reversing the character of contemporary urban extensions remote from the host site after successive waves of expansion and separated by stretches of impermeable suburban development (case study: West Cambridge);

New small settlement as a garden village directly linked to the countryside, sustained by an efficient public transport service for a heterogeneous population and taking advantage from the economies of scale to make good access to higher-order functions, also in the form of coordinated groups of small settlements on transport corridors linked to larger centres (case study: Stewartby);

(z) Autonomous places proportioned to scale

New Town as self-sufficient settlement (at least 40,000 inhabitants) with a relatively diversified economy, access to the strategic railway network and in a mutually supportive role with neighbouring towns, assuming a concentric structure around a multifunctional centre surrounded by mainly residential areas bounded by countryside (case study: Bassingbourn Barracks);

String City as a self-contained city from the ring or linear aggregation of small settlements highly connected along a transport network, which can vary in size and character, include existing and new places, its higher-order services and a greater degree of national connectivity than the New Town (case study: Sandy-Biggleswade);

New City as self-sufficient typology supporting urbanisation (at least 250,000 inhabitants) for a more extended period and faster without the initial support of pre-existing cities, affirming itself as a new regional centre and key transport node for regional/national rail and a range of local links (case study: City in the Vale).

As a large-scale systemic intervention, the matrix is introduced to prove solutions' effectiveness, adequacy or weakness and their most appropriate location under the strategic framework (chosen with the NIC), suggesting the possibility of creating configurations of 'neural networks' and different geometries clustering. While the final *Illustrative Scenario* only offers a plausible outcome combining the frame and the matrix, the territorial rearticulation suggested as a general approach creates a constellation of centres, types of urbanity and lifestyles with different roles as the very functional geography a corridor should create. Its systemic functioning requires intermediate scales of transversal connectivity, bridging the gap between national planning and regional/metropolitan networks (today oriented by *England's Economic Heartland* strategy), where City Regions can be primary integrated and coordinated agents of urban, transport and economic planning. In this way, according to the 5th Studio, the spatial framework would gain coherence by building a network between scattered and compact forms through infrastructures proportionate to the size of settlements and their links.

This experience underlines how articulating territories through the design of an Arc or a Corridor – here overlapping – means reading and reproducing complexity at multiple scales, exploding the delimitations of territorial order. Notably, it illustrates the role of the subregional scale in building the urbanity of the 21st century and the maximum expression of the virtuality of the Arc as construction of networks of places, extending the potential of an integrated development also to the areas marginal to the primary connection axes. **The Oxford-Cambridge Arc experience exemplifies the shift from the physical-territorial linearity of the bipolar corridor, which passes through the territorialised but multipolar arc to become polycentric spatial construction. The structure of a more functional corridor starting from the intensity of the secondary networks can be the principle by which it could begin to disappear as a matrix figure.**

Conclusions

Whatever the scale of observation, corridors and arcs manifest as a tangible process of the 21st century: they give structure and measure to the city and the territory, to the space and the region, reflecting from the physical to the virtual dimension. The first prevails as a tool of investigation, constructive process and design speculation due to its formation, extension and historical evolution as a mobility and connectivity performance space. The second introduces an alternative point of observation, a 'disturbance' to the linear productive-distributive domestication of the territory, giving substance to latent continuities and potential prosperity by linking neighbouring active places. Both crossing the need and apprehension to build increasing channels of interaction, in apparent dichotomy with the evolution of isolations as a counterpart, Corridors and Arcs are confirmed as matrix figures through which polycentric urbanised interdependencies are strengthened, expanded in material space and amplified in the immaterial one. Following a gradual process of intersection, overlapping and merging into larger systems, they are nothing but the repetition and transient expression of the essence of the millennial process of territorial organisation: exchange.

However, their nature is neither homogeneous nor stable as they follow communities' changing needs and desires to be mobile and connected through progressive accelerations. Accordingly, Corridor and Arc reinvent themselves under new definitions and representations over time by moving, consolidating and exploding their boundaries and those of the regions of space they cross, which place territories in a state of continuous transition. The assumption of the network paradigm and the advance of the Corridor's two-dimensional perspective into a three-dimensional one – although still territorialised by the figure of the Arc – already defines the gradual shift of rearticulations towards total virtuality and the strengthening of boundless relational ecosystems. The multiplication of this process into territorial scales, geographical descriptions and design configurations that increasingly less respond to a visual and conceptual organisation of maps through boundaries – up to the stage of nations – create the conditions for the future fading of Corridors and Arcs as distinct figures inside the network.

As they multiply routes, shift fulcrums and build connections through secondary centralities and expansion belts, corridors and arcs reinforce its presence as both an old idea and a variable chain of relationships where the privileges and vulnerabilities of being part of hyper-mobile and -connected societies are manifested. They highlight the historical stratified presence of the planetary network of cities as an expression of interdependent and competitive urban economies, attempts at cohesion and separation, forms of territorial sharing or appropriation. Within this context, the conjunctural issue of the COVID-19 pandemic has given a solid focus to the connection of territories, regions, cities and communities taken for granted and has accelerated structural changes in the direction of network hypertrophy being the catalyst for corridors and arcs as transformation processes. It appears as a novelty in terms of speed and width of action, confirming that the main vectors of diffusion are the

incremental, tangible and intangible links between territories. Contextually, the boundary itself has acquired a different depth, given that contemporary societies are accustomed to daily trans-territorial exchange and communication systems suddenly denied. For these reasons, the network's weaknesses as an impossibility of access have emerged, both in its dysfunction triggered by punctual events and in its difficulty to limit a process already in action, even if it is still under construction.

Beyond these critical emergencies, the reinforcement of networks in the 21st century will build unexpected forms compared to those recorded so far, while maintaining persistence. It will continue to shape for some time an 'arsenal' of works that permeate city agglomerations, overlap rural villages, invade the wilderness and materialise in cyberspace to provide the resources, labour and infrastructure needed to enable an urban economy to reach anywhere physically and digitally. Although they have just defined themselves as matrices of territorial structuring, corridors and arcs already incorporate the conditions for losing their materiality within this expanding 'magma', fuelling a post-urban transition that already demolished all traditional categorisations of theories and images, and moving towards changing territorial rearticulations.

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