Urban Transformations towards an Integrated Intervention Design Framework

The case of Paris

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Abstract: This paper is based on the author's previous comparative research and evaluation of the theoretical context of existing city theories and models, that developed a systemic, four-dimensional approach regarding urban regeneration design. The current paper aspires to examine the city of Paris, as a test case study of this strategic approach. At the threshold of the 4th Industrial Revolution, the global city of Paris constitutes a dynamic field of continuous flows of matter, energy and knowledge through its geographic position.
In order to promote an agenda for a more global urban practice that affects the means for future transformation of urbanization and urban form, our research learns from the main principles extracted through this examination of the Paris case study and develops a methodological integrated and prospective design strategy for the French capital. The research employs urban data and analytical methods in order to explore the relational coordination between urban morphology and urban flows of all the city's components and where their thoughtful and innovative reformation can lead. Through an inter-scalar approach the research develops an outline for a more incremental and flexible design approach to urban intervention. Towards a moderately densified city, a unified framework for analyzing urban sustainability is thus being articulated. Variables concerning flow management, urban metabolism, cultural identity, adaptability and resilience to urban conditions will be used as indexes, while developing the urban tools necessary to measure an intervention's impact in the global cities of the 21st century.

1. Introduction

The city emerges as a dynamic field of probability at the threshold of the 4th Industrial Revolution and as a complex "organism" produced by humans through urban metabolism processes based on geographic resources and flows. This paper focuses on the role of the global city of the late-twentieth century and attempts to answer the question: *To what extend are globalisation, economic changes and the need for more sustainable solutions transforming the urban form?*

The paper uses the rise of the global city as a way to particularise the general conceptual apparatus that is developed to understand the transformation of international systems. The global city region is a striking visible manifestation of changes to urban morphology and the qualities

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of urban space and design approaches. Strategic connection to the world economy has reinvigorated their central business districts, and introduced unprecedented levels of density and verticality. These transformations appear in various urban patterns that alter the physical imprint of a city, stretching it horizontally, while creating new polycentric urban conglomerations.

Point of departure for our research has been the observation of the urban theoretical pluralism of terms developed over time to describe and define the city. Through a systemic analysis of the prevailing models and identification of conceptual overlaps of the theories, which involve and examine the term "city", the research reinterpreted the urban phenomenon and proposed a four-dimensional helical system. According to this, the concepts and models of urban development identified as the predominant ones are approached dynamically. The aim is to develop a dynamic vision of sustainable urban development, through urban regeneration and with the aim of urban intensification.

The paper builds upon this approach, as a newly constructed representation of the metropolis's structure, composition and interrelation of its elements. This new synthetic approach constitutes a flexible and adaptive development strategy for the modern metropolis, equipped for today's and future needs (*Integrated and Prospective Design Strategy*).

The paper aspires to use the four-dimensional helical approach and its strategy to develop a coherent urban vision that channel the unique dynamic of Bercy area and build upon its popular image as an exemplary urban fragment within the city of Paris. This entails negotiating the constraints and potentials of the site: its topography, building and street scale, public streets and internal circulation, in order to articulate its public space possibilities and connections to the greater Parisian urban network.

2. Methodology: towards an inter-scalar urbanism

Our theoretical approach, as described in this paper, is a work in progress that seeks to initiate an interesting discussion on the four-dimensional helical design tool-model and its relation to spatial patterns and socio-cultural logics. This will be carried out by a qualitative research followed by the proposal of a strategy that can simulate such a process and will be described in the present paper.

This research on the urban transformation of the city uses conjointly the four-dimensional helical approach and structural theory of the urban form to elaborate the existence of a non-trivial process of synthetic assemblage of elements and experiences for the realization of a dynamic urban regeneration design-strategy. The principle thesis of our work is the following: the city emerges as a complex adaptive system (CAS), which translates into the urgent need to determine the tools framing an intertwining, process-driven developmental perspective. Through spatial assemblage in both theoretical and physical level, the city becomes more flexible and user-friendly. The four-dimensional system proposed enables us to reconstitute the form of the city in general. Seen through the case study of our regeneration design proposal of Bercy district in Paris, the methodology is structured around three major steps.

2.1. *Recognizing the city, through critical observation- mapping*

This step will focus on determining the main characteristics of the Parisian urban fabric and development, through the examination of the prevailing Urban Patterns in the territorial scale.

2.2. *Comparative analysis and analogy to define, correlate the design elements – Fundamentals*

Forming a systematic approach to urban transformation in coordination with the four-dimensional helical approach, the Five City Models and the Urban Patterns identified, will contribute to the composition of a set of Project Components matching their main theoretical and physical principles.

2.3. *Translating the theory into solid objectives*

It will culminate in a proposal for an urban design intervention framework based on a phase-and-scale evolving transformation project, not just for Bercy in Paris, but for similar potential urban design project.

3. Dynamic reinterpretation of the models of urban development

The study began with the identification of the predominant concepts and forms of design, through 31 theories that respond to the complex urban phenomenon from an urban and architectural approach most efficiently. The first step of the inductive methodology pointed out important patterns and concepts, seeking similarities or motifs within the sample of 31 word-theories *(pattern recognition).* This resulted in identifying the five most prevalent urban development models: *the vertical city, the compact city, the horizontal city, the organic city,* and *the eco-polis*, as the most specific and distinct urban development models that meet 80% of the keywords reported.

The second step included the comparative analysis of these models outlining their distinctive elements that make their application efficient and sustainable. Moreover, it concluded the relation between theory and action, structure of the plan and execution of the strategic urban project, is neither hierarchical nor should it be understood as a sequence of linear phases. In fact, these two poles – with different scales and time frames – are in constant interaction.

It seems that understanding urbanization at local, regional or global scales is an exercise that goes beyond visible boundaries and structures, thus blurring polarities and fragmentation. To use the analogy of Deleuze and Guattari for the smooth and permeable space, the two opposing conditions must exist at the same time to develop a functional association and integration of the parts. The synthetic approach perceives the city not only as a derivative or resulting formation, but as an ongoing construction process as well.

The combination of urban planning strategies-theories seeks synergy and hybridization, with the need to develop dynamic and nonlinear models with predicted evolution over time. An intervention strategy must be responsive across the spatial scale (from local to metropolitan). The actors that contribute to the intervention, the impact on the wider urban environment (degree of influence) and of course the environment itself (its elements, its dimensions, etc.) are some of the elements that shape the intervention levels. We are distinguishing the following:

- Human-citizen _ *DIY interventions aiming at appropriation,*
- Community_ *Synergy, Coexistence,*
- Urban environment-building_ *Creative stratification, Individual intervention,*
- Urban area_ *Urban collage, Area integration, Axial intervention.*

Table 1. *Table of the comparative analysis the five urban development models.*

Sub-categories of urban field analysis based on the principle of sustainable development	*Vertical city*	*Compact city*	*Organic city*	*Eco-city*	*Horizontal city*
Urban form - Patterns of urban Growth: Compactness & Density Nodes / centers, connectivity patterns that define structure and organization	**Extremely compact urban morpholgy** leads to the **territorial economy** due to minimal physical footprint	**Compact urban core**: Urban densification and mixed use development	**Interconnected:** urban villages, separate centers determined by the topography and the location.	**Compact: urban villages**, separate centers determined by the topography and the location.	**Suburban connection** with the urban core
Society - Community: Diversity Public-Private-Public & Private Partnership	**Connectivity and social vitality** safety and satisfactory urban life.	**Social cohesion**, social capital, **community spirit**, security, and reduced crime	**Well-established social basis**, integral to living systems and design processes. Social justice	**Social ecology** Happiness, social inclusion, mixed use, **flexibility** with the built typologies, safe occupation, **diversity, integration** of a variety of economic and social cultural activities	Reduce travel distances **enhanced local independence**
System: Urban tissue system development Rigid - Flexible	**Rigid in cases** of high concentration of such units.	**Flexible if smart solutions** are implemented to exploit and develop even more unfavorable spaces.	**Flexible to a large extent,** up to the point it leads to the development of non-viable formations, out of control. (informal settlements)	Still **rigid** since the completion of such a development, it undergoes **specific conditions** and constraints	**Flexible in places**, with rigidness appearing due to natural and environmental characteristics.
Ecological design approach: Sustainability	**Conservation of resources**, reduction of waste and improvement of infrastructure development of abundant green space	**Protect biodiversity provided by green areas** and the ecosystem Management services	Universal dependence on renewable energy sources **Restoration and remodeling of the ecosystem**, Urban agriculture.	Renewable energy **Low integrated energy** Zero waste, food, water **reduction of heat islands**	High levels of energy conservation, complete dependence on renewable energy **Local energy production** **Urban agriculture**
Economy: Equity and local economy Process - Production	**Market economy**, Central government interference with justice	Market economy, **Central government interference** with justice	Market-based economy, **Strong local economy,** Ethical financing structures	Market-based economy, Vitality of the place **Local production and identity** Circular economy	Construction of a healthy hydrological equilibrium **development of short-chain food systems** Local production
Architecture: Intervention built environment Typology-Archetype-Catalyst Historical Urban Tissue - Intensification-New Structures TOD (Transient-Oriented Development)	**Multiprogrammed buildings** Excessive public space sense of well-being plenty of daylight, connection to the exterior and view	Keeping space and entertainment open, **rejuvenating existing areas of the city**, and enhancing the use of public transport, walking and cycling	In cases of informal development, **Planning involving the residents - locals** Structures for multiplication and **adaptation** (Transit-oriented development) The structured form responds to the needs of social exchange and the functioning of the ecosystem.	**Passive design** Easy circulation inside the center **(walkability)**, good relationship of the **ecosystem and its function**, architectural structures adapted to the local environment.	Revision of the regulatory aspects of design towards innovation **Wastelands** **Reduction, Reuse, Recycling** (Drosscapes, Terrain Vagues)
Design objective:	Improving urban life based on an holistic urban design methodology **Urban densification-intensification**	Creating vibrant, renewed centers Cohesion of elements **Compactness-Strong centers**	Proactive diagnosis Holistic perception **Repeatability of design processes**	Innovation & Creativity (Design & Planning) **Urban synthesis for the formation of a functional system**	Mitigation of urban fragmentation and polarization **Anti-Fragmentation & Connectivity**

The co-ordination of all four levels with rates that can be determined by the specific features and conditions of the region can provide a comprehensive and coordinated intervention that will cultivate a spirit of collectiveness among citizens. At the same time, it acts as an incentive for individual improvement by enhancing creativity, aesthetics and feeding the community with knowledge. Thus, sustainability acquires a new content when it attempts to integrate into the philosophy of modern urbanity and socio-political and economic reality. Making up the concept of sustainability, four key principles emerge: *Resiliency, Integration, Adaptability, Creativity and Innovation.*

4. The four-dimensional helical system

The ultimate goal of this qualitative study was to describe and extract a comprehensive model of association of the urban models through a series of conceptually defined categories. As a result, the research proposed the helical system of development, a mechanism for the development of cities based on a synthetic approach. Exploiting the functional axioms of pre-existing urban models, this system aims to offer:

a) a new productive conceptual understanding of the city, and b) the framework for action on it.

This mechanism analyzes the methodology of an intervention strategy through a four-dimensional framework of action that expresses the need to simultaneously satisfy the principles: *densification, complexity, connectivity and temporality.*

The helical system thus comes to recognize the endlessness in the process of developing and expanding cities, while emphasizing repeatability as the element that coordinates the action and constantly updates previous points and interventions. Change is the product of the con-

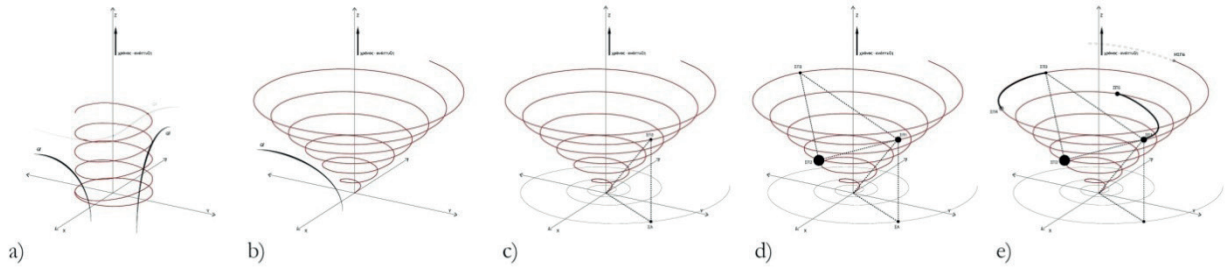

Diagram 1. *Diagrammatic presentation of the construction of the four-dimensional helical system, (figures a-e).*

stant conflict between the oppositions (synthesis and opposition) that arise from the internal contradictions inherent in the evolution of history, ideas and events. According to this perspective, conflict is the driving force of change.

The principles consistent with the implementation of the helical development strategy are as follows.

4.1. *Participatory Design process*

Intensive interaction in the design process with all shareholders and stakeholders is an important prerequisite. It is important to take into account the views of civilian users on what needs to be built and how to construct in an attempt to coordinate top-down and bottom-up design policies.

- Creating an environment that encourages open dialogue, research and self-expression, openness and creativity *(Open research and panels of public discourse)*
- To strengthen the local identity of communities and societies within urban boundaries, to enhance social cohesion *(Raising awareness and collecting feedback).*

4.2. *Data-Driven approach*

The prosperity of the whole will be protected by an annual diagnosis and recording of living and dead spaces, which will allow the identification of the next steps in planning at any given moment in the history of the community. Diagnostic planning is based on the repeatability and updating of the system with new data, for existing intervention points or for the next.

- Data collection methods for identifying future uses.
- Research, recording and mapping *(Analysis of the current situation).*

4.3. *Process & Project Oriented Approach*

Design and construction will be guided by a collection of common design principles that take into account conceptual overlaps and additions to create a common framework for action.

- Review regulatory aspects of design and design protocols, along with interfacing of scales of intervention.
- Guidelines to regulate attitudes and actions, in relation to environmental and material and technological management issues.

4.4. *Dynamic & Prospective Planning*

The design and construction will be guided by a process that allows the ensemble to gradually emerge from local operations, developed on different scales and with different proportions in space. The steady development of the whole will be ensured by a funding process that regulates the flow of individual projects submitted and ensures synergy between the private and public sectors, along with the planning.

- Assessment of the life cycle of investment costs, through SWOT analysis, Business Plan, in order to realistically plan the implementation and development stages of the project. *(Steps and timeline)*
- Projects with a long-term public benefit that have a political, economic and social impact. *(Conflicting or not, investments with long-term public benefits).*

4.5. *Catalyst-based design (Hybrid and mixed use developments)*

Form and program can become functional catalysts for the production of alternative ways of social and political practice.

- The emergence of new uses and design approaches to the reuse of existing buildings and the development of spaces of public interconnections.
- Buildings that support self-organization and self-provision, promoting sustainable and competitive growth, through integrated models that modify the processes of consumption and the production of materials and energy.

This approach to urban planning with an integrated and proactive design strategy develops opportunities and challenges in terms of:

- The synthetic approach, in which the most efficient elements of each development theory and individual intervention are assimilated, verifying the position *"City better than the sum of its parts"*.
- The smooth redefinition of the design framework, and the formation of socio-ecological cyclical links and economic interdependencies between sites with the aim of urban resilience and connectedness.
- Urban metabolism, conceiving the "construction" of an area in relation to the "deconstruction" of another, as a resultant system of their locations, societies and ecologies.
- Circular economy, both with physical geography and with the networks and systems of the urban fabric.
- The capture of structural elements as time systems, in continuous motion and evolution, aiming at long-term data restructuring, to achieve urban regeneration *(Urban morphogenesis).*

– The correlation of aesthetics and sustainability of intervention, which in turn are related to the idealistic dimension and concern innovation and creativity.

5. Territorial analysis: city of Paris _ Identifying urban patterns and objectives

The 20th century, marked by the Athens Charter drafted in 1933, introduced the modernist movement which sought to eradicate the physical complexity of traditional cities, setting the stage for automobile dependency and single-use functional zoning with socially, technically, and hygienically "controlled" urban structures (Hall 1996).The modernist urban design characterized by a top-down, simplified, rational approach towards utopian cities was the one that opened the road for theorizing on the contradictory concept of flexibility and bottom-up, organically structured, everyday urbanisms dependent on localized tacit knowledge (Jacobs 1961; Holston 1989).

Cities and other human settlements are complex systems that result from intricate demographic, social, economic, cultural, geographical and political dynamics and constraints (Hillier and Vaughan, 2007). Many theories and researchers have tried to understand those dynamics and the complexity of the cities by approaching it as a complex adaptive system (Batty and Marshall 2016, Portugalli et al 2012)and this means that the city's adaptation and resilience can be understood as one of its principle aims. The need for vibrant cities, the role of citizens and the local scale, attention to health, city upgrading, renewable energy and recycling, as well as sustainable forms of mobility are just a few of the issues that are being considered over time and progressively evolve over the years.

The territorial analysis of the Parisian region was pivotal in order to determine the elements that define and construct the urban imprint of the city, while formulating the aspects that shape everyday experience and urban design patterns. More particularly, it provides a qualitative framework organized around the principles of *densification, complexity, connectivity and temporality* that formed our helical four-dimensional approach.

The proposals for Grand Paris "La métropole du XXIème siècle de l'après Kyoto", was a way for the city to ultimately define the city character and future objectives. *The strength of Paris is also its greatest weakness: the center of the metropolis dominates the growth and balance of the periphery"*. (Rogers Stirk Harbor + Partners *et al.*, 2009b, p. 14). They recognized the radio-concentric structure of the transport network system and how it created an unequal relationship between central Paris and the secondary poles of the metropolis (Diagram 1,3). Moreover, Studio 09 Bernardo Secchi et Paola Viganò suggested an isotropic model in opposition to an hierarchical model based on centrality. It aimed to move from *"a vertical and hierarchical system to an isotropic and horizontal system"* (Studio 08 *et al.*, 2009, p. 129). Grand Paris promoted large-scale planning approaches that relied on infrastructural and environmental projects to redevelop and regenerate urban regions in pursuit to increase their attractiveness to residents, as well as to private investors.

Calls for the development of innovative projects the years to follow, as part of a plan of making Paris greener and the Olympic Games of 2024, raised a significant debate concerning the replacement of public actors accorded for the urban planning process, with private ones and how this shift translates progressively to urban transformation and integration. From the first, *"Réinventer Paris"* (2016), new types of partnerships, associating one or more private developers, architectural agencies and design offices, have been tasked with offering complex real estate programs. Later, with *"Inventons la Métropole du Grand Paris"* (2017 and 2018), the increase in the size of sites introduced to the competition has shifted the approach from the real estate projects

to urban regeneration megaprojects-strategies: with one or more private actors being responsible for the assembly and programming of urban functions-sectors, sometimes even the overall management of an operation (Orillard C., 2018).Such projects associate ZAC [1], SEM [2] and groups of developers and designers, by bringing together banks, promoters and architects, on the basis of integrating programming and financial arrangements in the proposals.

These theoretical concepts and the production of specific centralities with private involvement in the overall design of business districts, add up to the current pursuit to transform Paris into Europe's post-Brexit trading hub. These facts emphasize the need to better comprehend the forces that act upon the urban tissue and the morphogenetic process. Taking the analysis a step further, we develop our research hypothesis: different expressions of the *horizontal systems networks (ecology, circulation), the economical-production cycles(business cycles), the built and programmatic distribution (flexibility, scale and urban context)*might be able to interpret significant shifts that occurred in the urbanization of Paris. Additionally, these expressions will organize the intervention process more efficiently through a scale-and-phase evolving analysis-intervention and project-transformation. The research has revealed strong correlations between network system and characteristics of building environment such as density of commercial land uses, distribution of land values, distribution of employment density, distribution of building density (Batty, 2017;Peponis and Allen, 2006), and distribution of spatial form (Batty, 2017;Hillier and Vaughan, 2007).

The patterns identified as the most prevalent in the territorial analysis are: Constellation, Attractors, Urban gardens, Homogenous plane, Ring formation and Linear system, focusing on spatial and structural measures applicable to urban morphology.

- The onset of de-industrialisation in the twentieth century, the growth of middle-classes, and technological innovations such as the automobile, moved the industries to the suburbs. The concentration is no longer a criterion for urbanization in a world that heads towards the 4th Industrial Revolution. Urban expansion does not destroy the areas but produces new types of connectivity and connectedness, through intensified *linear systems*, between the integrated urban structures both in metropolitan and regional scale. Hence, mobility networks and accessibility expanded in a *radial and ring inducing formation*, being important features that ensure territorial coherence and the resulting social cohesion. (Diagram 1,5)
- Through multiple program and level aggregation, the main business districts compose the central functional nodes-neuralgic *urban poles*, serving different demographic groups, economic activities and social classes of the city, by introducing pedestrian permeability into the developed system. The urban gardens fluctuate in size and functionality (decorative urban greenery, parks, forests) yet their existence and systemic distribution facilitate the urban living by creating points of urban and social decompression. These two elements in relation to the 'foreground and background network' (Hillier, Vaughan, 2007) suggest that the regeneration of the city needs to work on both of these two networks at the same time, by activating macro-scale projects such as *la Defense* or *Île Seguin* but at the same time, developing a finer grain of community gardens, small clusters of activities and public squares, at the local scale. (Diagram 2,6)
- The observation of the modern urban fabric of Paris, shows there is a clear separation between the typical historic center and the typology of the industrial/warehouses, logistics zones of the suburbs. These two dominant types compose urbanization in Paris and beyond, each presenting a unique spatial organization and an integrated lifestyle. The mixed

use and dense compact development of the historical center in a concentrated *homogenous plane* highlights the dispersal of structures around the outer ring. (Diagram 3,6)

– In addition, as far as urban objects-attractors are concerned, they could be deciphered on two scales: on the one hand, as urban fragments that mediate spatial and programmatic relations with the city, on the other hand, on the larger scale, as systems that influence their location and the program, their daily lives and expression. The listed buildings forming a dispersed *constellation* formation and the infrastructural building complexes (airports, railways and the port) that enhance the *linear systems*, influence the programmatic composition and density of the urban tissue (Diagram 4,5).

6. Towards an integrated design framework – reinventing the site of Bercy – Charenton

The exploratory and binding nature of planning is of great importance both in the long-term intervention on a large scale (at a strategic level) and in the medium-term operational level of a particular project. In the first case, design can highlight various aspects and coordinate them in coherent future images. In the second case, planning is linked with spatial, programmatic and financial aspects, as all the parties get an insight into the consequences of social needs and desires. At the same time, the systemic theory suggests a non-linear weaving of systems *(circulation, new construction)* into and around existing structures. Thus, systemic design captures urban tissue as a dynamic network, instead of a collection of building masses.

This project is being developed at the boundary of the geographical center of Paris, in the Bercy area. It acts in the light of a single architectural gesture that aims at the coordination and urban cohesion of polarized urban densities. The project identifies and examines this gesture while addressing the challenges it presents through its spatial integration into a more general scenario of universal and sustainable urban regeneration planning based on the four – dimensional helical model already presented. It is a project that explores issues of flexibility, scale and urban context. The plan explores a new approach to urban regeneration that hybridises the collective urban network and individual urban objects, from which familiarity and life forms emerge to inform new urban bridges on different scales.

The choice of Bercy area as the objective of this analysis and proposal has been made according to the characteristics of Paris in relation to its region. Bercy accommodating the demands of large scale concrete manufacture is the embodiment of an urban, industrial edge which mediates the requirements of both production and recreation. Moreover, even if there is a growing exchange between the capital and the surrounding settlements, most conflicts and issues related to mobility, uneven urban development, de-industrialisation and social dynamics are centred on the outer ring of the city.

The ZAC de Bercy, launched in 1987 by the City of Paris. The realization of the residential development plans of the project is directly driven by SEMAEST, while the business district is entrusted to an ad hoc company called ZEUS (Urban Development Zone of the Seine), associated with BNP, Accor and Lyonnaise des Eaux (Orillard C. 2018). The ZAC for Bercy-Charenton region envisions an urban regeneration development, as an axial elongation of the CBD from La Defense and throughout the historical center. The project provides for the creation of a new living area, lively, ecological and attractive around a large green space and many public amenities. With 12,600 jobs and 4,000 new inhabitants, the project will help rebalance employment in

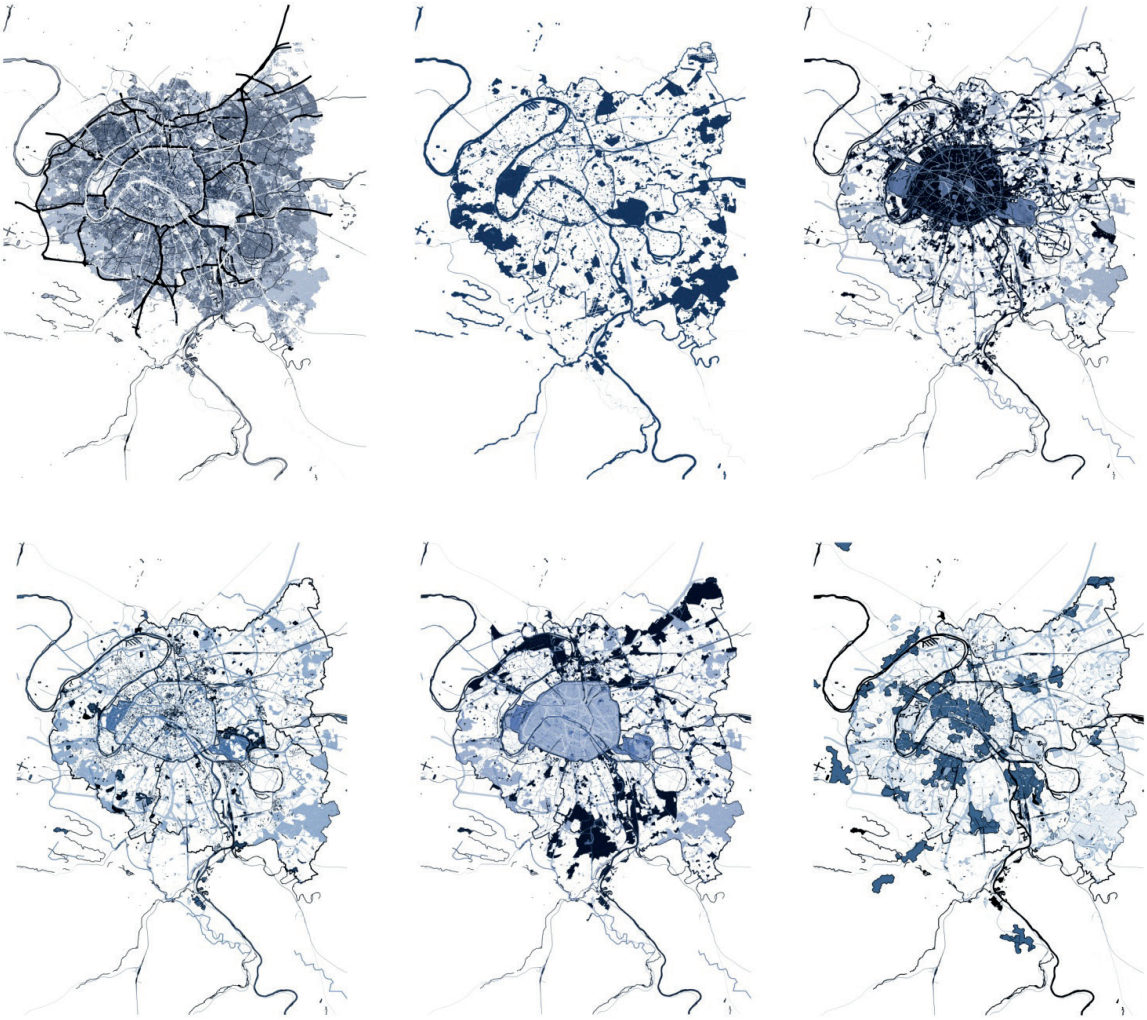

Figure 1. *Illustration of maps in relation to urbanization patters identified: Constellation, Attractors, Urban gardens, Homogenous plane, Ring formation and Linear system._ maps created by the author with the use of open data.*

eastern Paris and create urban and landscape continuity with Charenton-le-Pont (Rogers Stirk Harbour + Partners 2018).Some of the problematic characteristics of the area are:

- Urban fragmentation, due to the numerous roads and railways that cross and cut the urban fabric without actually serving it any longer,
- Heterogeneity, due to the inequality of forms and programs that co-exist independently,
- Inadequate public transport along the unused area,
- Visual, acoustic and operational nuisance from the road network and the railway network,
- Abandoning part of its current holdings, infrastructure, warehouses, etc.,
- The absence of urban fabric in which urban life could develop, and finally,
- The ubiquitous presence of the road system, which occupies a large area on the ground, hides the opening to the river, prevents pedestrian crossings

On the basis of these observations, the proposal examines the idea of matching the Spatial Patterns *(Constellation, Attractors, Urban gardens, Homogenous plane, Ring formation and Linear system)*

and their Strategic interpretation, to spatial representations of Project Components. These are elements that shape a tactical urban regeneration of the city and assist the urbanization process under an holistic vision for the development of cities. This set was composed based on the levels of intervention we developed earlier in this paper and in order to satisfy the needs of both social and environmental sustainability and the urban economy. The set of Project Components-elements includes: "Hard Spine", "Points of Reference", "Soft connective tissue", "Hard connective tissue", "Urban Field" and "Clusters". The *five* prevalent *urban development models (the vertical city, the compact city, the horizontal city, the organic city,* and *the eco-polis),* the Spatial Patterns and the Project Components are not in a linear relationship but in a dialogic-reciprocal relation with each other.

The compact city and the horizontal city for example, are not heterogeneous, mutually exclusive spatial structures in the political and design language but coexist under the agenda of urban intensification process. The need for densification and compactness shows its reflection on the composition of the program, the form and the urban ecology. Each one constitutes an heterogeneous spatial expression in the intervention's master-plan, that creates a continuous link between the city center and the fringes of the metropolitan area.

The evolutionary design framework for Bercy, corresponds to the four-dimensional helical system, allowing:

6.1. *Center – oriented intervention*

By creating buildings and complexes pertaining to the city as a whole, a diversified and open urban network will be established with the urban intervention being developed in different phases and areas. This constitutes the *"Hard Spine"* which will gradually stimulate the development of the surrounding urban network as it *aims at* creating vibrant and renewed centers, through densification, adaptation and urban integration into the existing urban fabric. Proactive diagnosis and an approach to interventions with regard to their influence and correlation with the urban fabric over-time and with each other can enhance the impact of the intervention as well as its meaning to the public.

6.2. *Design Social Magnets*

Urban anchors-catalysts with their density, scale, patterns, functions (programmatic synthesis) and plasticity, should offer new typologies and *"Points of Reference"* for the whole system. This form of hybridization, aims to urban integration through the merging of mixed uses, epochs, attitudes and technical solutions. This form of radical contextualism approaches the *adding-editing-transforming* theory of *Lacaton et Vassal. Priority should be given to the creation of an appealing design composition that perpetuates an aesthetic value for the existing elements-programs and the ones to come.*

6.3. *Local identity emplacement*

The interfacing of scales of organization comprehends and promotes the ways in which spatial configuration is inherently social, so that the identity of local places is enmeshed with metropolitan connectivity to identify and enhance the urban characteristics. The *"Soft connective tissue"* promotes innovation and creativity in design, alongside the pursuit of sustainability through bottom-up and top-down approaches.

6.4. *Connect to existing infrastructure*

As the shape of the network influences movement and co-presence (Hillier, Vaughan, 2007), an intervention on the existing network can improve the patterns of human interaction by resolving the issues in terms of flows and accessibility. Enhanced infrastructural systems that work as a living organism, adapting morphologically, geographically and programmatically to its environment. The *"Hard connective tissue"* corresponds to network connections that create a dynamic system invested in centrality, attraction and coordination of its components that *demonstrates as a primary concern of modern urban planning practices,* the mitigation of bits and polarities, the emergence of common sites and opportunities within the existing urban landscape and the coordination of the aesthetical aspect of the intervention with the functionality of the system.

6.5. *Open public spaces – urban ecology*

As Hillier (2007) explains, the open spaces of a city constitute a system of convex spaces and linear spaces, as people interact in convex spaces but also move in lines, movement itself has to be considered as a form of interaction. Emerging practices and themes of social sustainability should be included in the conceptual phases of the project. These are understood to include the cycles of urban subsistence played out within the built fabric and open spaces that make for a robust and vibrant urban life-ground with potential for regeneration. This can be encouraged by offering an *"Urban Field"* meticulously composed with intermediate spaces and areas for under-determined urban planning that promote flexibility of use, shared and temporary use with diverse ownership models and ecological sustainability.

6.6. *Re-organize the urban ground*

Approaching the project as an integrated planning issue requires long-term strategies with provisions for incremental development, phasing and flexibility that encourage alternative modes of organisation and production".*Clusters" aim at improving urban life based on* an holistic but at the same time punctual urban design methodology, based on interventions with high efficiency and impact on all scales of urban life. Social and Programmatic condensers that integrate all production cycles (distribution, waste and consumption).

7. Conclusion

The four-dimensional helical synthetic approach to the city's urban development is deeply critical of any kind of determinism, though it aspires to reveal the complexities between the elements that make up the urban ensemble.Urban interventionsin existing saturated tissues, based on the systemic, strategic approach can change and reorganize spatial discontinuities as they appear and grow exponentially in the urban fabric. They have long-term results that meet urban needs, face problems and have collective impact and action. Such interventionsare distinguished by their ability to change urban reality,as they aim to achieve a fundamental difference,

- in converting and modifying the spaceefficiently,
- to highlight the fundamental characteristics of a city *and*
- in a lasting and evolving way.

The need to satisfy these objectives, indicates the multiplicity of the intervention process and hence the need to formally predict its impact and performance. The research deems as the most prominent measures of the influence of interventions on the urban environment, the following: Relevance, Inspiration, Feasibility, Phasing, Implementation, Flexibility-Reversibility, Political viability, Resilience, Adaptability, Integration-Connectivity and Creativity-Innovation.

The power of the project lies in its multiplicity, to accommodate a variety of conditions and scales, such as those appearing at the level of programs and lifestyles, from the city to the buildings, meaning architecture, urban design and regional planning. In addition, this proposal acts as an urban experiment, exploring how it serves both as a spatial urban regeneration strategy and as a social framework for development and integration. Moreover, it seeks to balance the new parts in close connection with the pre-existing elements of the historical center of the city, taking into account the tangible and intangible dimensions of the city.

This project redesigns Bercy's urban fabric by allowing multiple identities to be expressed through a series of new typological strategies, that shape the framework that incorporates the ability to create an urban environment, that is constantly subject to scripting and reprocessing while always open in the next phases.

Notes

This paper draws upon work of the author published in: "*The Urban Phenomenon: Dynamic reinterpretation of the models of urban development*". Presentation of a new synthetic approach on the subject of urban intervention and the city's development process, the four-dimensional helical system. Proceedings of the 5th Panhellenic Conference on Planning and Regional Development

[1]"The zone d'aménagement concerté (ZAC) is an operational planning procedure that allows a public community or a public institution ... to develop or commission land development and equipment, that this community or this institution has acquired or will acquire with a view to assigning or subsequently granting to public or private users "(section L311-1 of the Urban Planning Code).

[2] The hierarchical configuration of urban planning, initially governed by the Land Guidance Act in 1967: a concerted development zone (ZAC) led by a public developer, was gradually replaced by semi-public company associations (SEM).

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