

# Chapter 1

## Introduction



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### 1.1 Cities as Breeding Grounds: What Answers to Global Challenges?

It is unquestionable that the global community is challenged by distressing crises (political, social, economic and environmental), which are sometimes referred to as “wicked problems” due to their idiosyncratic, and apparently impossible to tackle, nature. These problems often display a huge interconnectedness (they are reciprocally reinforcing) and may be generative of new issues (a sort of challenge-within-the-challenge mechanism), making their proper handling even harder and any adopted approach highly controversial. These crises are recurrent and similar from place to place, but their magnitude is growing in size and affecting people on a global scale, thus making the task of approaching them far too complex for any single stakeholder or territorial community alone. For these reasons, now more than ever, new individual behaviours and collective practices, innovative rules and norms, novel local and national policies and wider international cooperation agreements often occur and are widely experimented on, all over the world, bringing about sustainable solutions at multiple levels and scales.

Cities are directly affected by most of these crises and, at the same time, represent the place where the larger sustainability game is played. However, as most people think, the overwhelming challenges embedded in city life for individuals, families, civil societies and governments can, and must, be seen also as opportunities for innovation, diffused equity, more diligent foresight and, above all, pragmatism. In fact, it is not only due to the urbanization trends that we turn to cities when we look for solutions to the wicked problems that the world faces. Free from national and global politics, though always acting in its shadow, cities are,

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more and more, places where creative problem-solving flourishes (sometimes out of necessity, sometimes by purposeful construct) even when such issues as climate change, migration, and economic inequality are at the forefront of change makers. Cities know how to get things done, and they are doing just that all over the world (Brescia and Marshall 2016a).

Further to the above, cities provide crucial resources for our future (Brescia and Marshall 2016a). This is because they are not simply population aggregation centres: they are knowledge hubs and sustainable power plants; they serve as first shelters for immigrant people; they are fertile environments for old and new trading and innovation projects (Brescia and Marshall 2016b). It is hence there that intelligent, local answers to global challenges can be and are being identified and experimented.

For a long time, however, cities have been seen as passive participants to multilateral efforts for a more sustainable development. Now, it is clear and globally shared that they are key actors in this global and planetary battle: they are asked increasingly often to take charge of the necessary, often complex, transitions.

To this end, however, cities must become fully aware of being key environments for change, due to the huge density of resources, energies, knowledge and skills within (Dvir and Pasher 2004) and also due to their interconnected nature, which enables place-based interactions to materialize among different operators, organizations, initiatives, institutions, etc. In these systems of an urban nature, one finds the right breeding ground to stimulate the emergence or integration of innovative solutions, capable of contributing to ignite the necessary and urgent systemic changes and transitions in local and global communities.

However, envisioning, designing and governing transformations, while working in such complex environments, requires an intense dialogue between different, and sometimes distant, disciplines and practices, theories and applications, cultures and visions, acting as co-located forces, i.e. all being active in a same place.

In addition, capturing, designing, guiding and spreading out those transformations which can be relevant for the global challenges is also complex work, which requires aligning and synergizing differences and uniformities, immutability and instability, continuity and discontinuity. This work must also be carried out within environments that are often as complex as the problems themselves.

Within every city to some extent, this acknowledgment and instrumentalisation of transformations can effectively begin, as it is there that the networked nature of the individuals and resources involved can find accessible hubs to access the dynamic and creative flows of the necessary information, knowledge and practices. Yet, cities are not alike when it comes to triggering, generating, hosting, and scaling up systemic and sustainable change (Molinari and Concilio 2016). Indeed, they show very diverse political, infrastructural, organizational and societal conditions, which act in different ways to preserve the status quo or foster new value creation, to prevent or facilitate innovation and to impede or ensure that it has a broader impact (Puerari et al. 2017). Overall, these conditions can be said to belong to two main and distinct groups (Puerari 2016). The first group is related to the productivity and vitality of a city's cultural environment, including:

- Presence of physical spaces and opportunities for experimenting and learning (Concilio 2016; Karvonen and van Heur 2014; Nonaka et al. 2000);
- Density, diversity and richness of the experiments already taking place therein (Asheim and Coenen 2007; Rotmans and Loorbach 2009);
- Emergence of creative communities who co-design and incubate new, innovative initiatives (Meroni and Sangiorgi 2011).

The second group of conditions refers to the institutional capacity and infrastructure of a city, notably:

- Existence of *ad hoc* policy frameworks, such as norms, contracts and informal agreements, which allow both experimentation and stabilization of certain improvements (Chesbrough et al. 2006; Murray et al. 2010; Puerari 2016);
- Institutional and business ability to capture and align existing innovation “niches” that might be relevant for systemic change (Geels 2011; Puerari et al. 2013);
- Availability of specific strategies for activating or hosting innovation (Huxham and Vangen 2000; Marsh et al. 2013);
- Existence of creative and suggestive places whereby innovative solutions to public problems are developed through the creation of networks, partnerships and events (Manzini 2015).

The various possible combinations of these characteristics give rise to a wide, rich and diversified scenario of global cities that differ from each other in terms of how they organize themselves, aggregate existing resources and respond to the challenges they are ready, able, or sensitive enough to explore, experiment on and deal with (Puerari et al. 2017).

## 1.2 How Can We Accompany Transition Processes?

Innovation is considered to be the panacea shelter under which responses to the planetary struggle must be identified and through which urban societies can accomplish their difficult and complex tasks; this is asserted at any level, by expert observers as well as local, regional, national and international authorities; this is the main target of any agency or actor, public or private; this appears crucial at any scale. “Innovation is the answer” and everyone needs to look for it, make it real and achieve it in any domain and action sphere.

Considering the breadth and relevance of the problems at hand, however, any innovation process needs to be framed in terms of the wider impacts targeted, determining the level at which innovation itself is engaged in the sustainability game. The search for radical, game-changing and at the same time sustainable tools, solutions and ideas is widespread all over the globe and mobilizes both researchers and practitioners to look for new answers inside the dominant, market-centred growth model, as well as those looking for universally original “new economic

models". The latter range across very diverse thoughts: from models of low- or no-growth, to various qualitative and quantitative models of the post-growth and de-growth literature (Castells et al. 2017).

We share with den Ouden (2012) the idea that building innovations responding to societal challenges requires us to consider a large number of aspects at the same time; this usually crosses the borders of a single decision maker's skill set, or individual discipline, organization or community. In fact, imagining, creating and developing these innovations requires the simultaneous consideration of different perspectives: of the user who may potentially adopt the new solution, of the organisation that will convey the product/service to the market, of the marketplace/ecosystem that will link the various products and services to their users and other stakeholders, and finally of the entire society, which will take benefit from the established solution.

Although such problems appear to be insoluble, the global challenges provide tremendous opportunities for innovators targeting shared values (Porter and Kramer 2011). Now more than ever, innovators can find collaborative allies in policy makers dealing with urban crises, leading to a situation where profit is only one possible outcome of a specific innovation, which is often instrumental to a wider set of aims than mere monetary success.

But there is more. According to den Ouden (2012), this is a prosperous moment for a growing and widespread sense of awareness with regards to the political, societal, economic and environmental issues we face. Such awareness is creating favourable conditions for a mass adoption of the solutions providing clear answers to those issues. In turn, this trend is bringing us out of the era of knowledge economy (Powell and Snellman 2004) towards the era of transformative economy (Mermiri 2009; den Ouden 2012; Megens et al. 2013). In this new situation, innovation is asked to address global challenges and at the same time deliver solutions that people would love to use, which also ensures a greater market success to related products and services. The transformative economy generates solutions to the big collective issues giving priority the collective rather than the individual interests and needs, thus leading to a mass, rather than limited, change in behaviour (Megens et al. 2013).

Indeed, transformation takes place

At societal level, through large numbers of individuals willingly contributing to it (...); global challenges are guiding and aligning intentions and availabilities of world citizens as never before and this is making more and more the intended transformation possible. This current alignment represents a great opportunity for the market to use it for the targeted business and for the benefit of the global society at the same time (den Ouden 2012: 9).

In other words, the two impacts—societal and business—coexist and reciprocally influence each other, as also witnessed by a plethora of innovative initiatives around the world that are entirely and exclusively committed to sustainability, equity and on solving global challenges as well as being rather indifferent to the goals of economic growth and market success.

According to Castells et al. (2017), however, this new way of reasoning is not enough to produce the proclaimed results; it is only yet another attempt of a persistent capitalist culture and economic and market-based model to survive cyclical crises with formal set-ups. In the very end, what we can expect is that the goal of succeeding in the market will always prevail over the ambition to provide effective societal problem solving. A radically different perspective would therefore be needed, which starts to look at innovations, especially those driven by the business community, as irredeemably weak and ineffective with respect to the changes required by the global scenario.

Indeed, these authors believe that the only effective responses to global challenges can come from solutions that are sensitive to the bigger issues but also narrowly focused on the innovators' potential for revenue, solutions that are inspired and at the same time enabled by the necessity to survive on a daily basis, thus guaranteeing a broader and more democratic access to future opportunities—in brief, solutions that explore and put new and disruptive economic models to the test, finding workable answers for the many rather than the few.

This alternative perspective is nowadays supported, according to Castells et al. (2017), by a global team of researchers including not only environmental, institutional, or political economists, but also geographers, ecologists and sociologists. Indeed, their working agenda is transdisciplinary and not at all oriented to introduce new mathematics or statistics as theoretical foundations, but to give birth to an entirely “new economic model”, grounded on the emergent micro practices that are already challenging the dominant capitalistic logic: driven by sharing economic principles, using virtual currencies or local monies, leading to subsidiarity in action and not only in concept, etc.

We can see two normative—if not ideological—visions facing one another here.

The supporters of the first vision believe that innovative solutions responding to global challenges are hardly successful when disruptive, or have more chances of surviving if only incremental. This is due to the need for any sustainable innovation to overcome two big obstacles: the first refers to the resistance that the dominant culture or the prevailing economic model put in place against any attempt at challenging their basic principles and mechanisms; the second obstacle refers to the hard and diffused changes in users' or citizens' behaviour that many disruptive solutions demand to scale up and ultimately be adopted. In this view, the effectiveness of an innovation in responding to global challenges is highest when the value of the solution is clearly recognized by a majority of people, so that its adoption does not require too complicated changes and, consequently, the new behaviours and practices can be more easily spread and scaled up.

The supporters of the second vision take the opposite stance: global challenges can only be faced by innovative solutions emerging outside the dominant market economy culture, thus being disruptive by definition, as well as supportive of a wholly reversed view of the world. Community or sharing economies, street level initiatives, local currencies, grassroot innovations: all these and other examples somehow challenge the existing model, although some researchers may consider them only as refurbishing approaches and not real alternatives to the market-based

model. These are the outputs of either a voluntary search for a paradigm shift or insurgent energies looking for solutions to local, small scale problems which are unchallenged by the market; they often do not have the ability to scale up singularly but their diffusion is phenomenally growing (Concilio and Molinari 2015) and the global scenario displays a complex and diversified geography of very similar looking cases.

To sum up, innovation forces are not entirely and homogeneously committed to a single way to deal with global challenges; however, available experiences increasingly converge towards societal aims and this makes them perfectly aligned with a transitioning and problem-solving approach. In any case, cities play a crucial role in innovation: they may act as testbed environments for new solutions to be commercially exploited at a later stage, in accordance with the first vision; or they may be the cradles of emerging practices, suggesting alternative ways to grow and challenge the market-based model, as suggested by the second vision.

### 1.3 What Role Can Design Play?

Whatever vision one adheres to when dealing with global challenges through local innovation, the need to activate values and meanings that are crucial for the transition processes is unquestionable. For us, this is the main role design should play.

Design is not a new profession and is traditionally related to “creative problem-solving”, whereas it is clear that conventional problem-solving is not effective or powerful enough. As a creative problem-solving ability, i.e. capable of mobilizing meanings and values (Verganti 2009; den Ouden 2012), design appears to be the way to achieve societal transformation by localizing change (making a transition concrete), questioning it (reflecting on its quality), and opening it up (expanding its sense) (Sennett 2008).

Remaining loyal to the distinction introduced by Buchanan (1992, 1995, 1998) as quoted by Scupelli (2015), four orders of design can be identified: “first order as symbolic and visual communication (signs and symbols), usually understood as communication design; second order as material objects, usually understood as the realm of industrial product design; third order as activities and services, usually understood as service design and logistics; and the fourth order as complex systems and environments for living, working, playing, and learning, usually understood as systems engineering, architecture, and urban planning” (Scupelli 2015: 80).

To contribute to transition, design outputs, effects and impacts should intersect the four orders above. Scupelli considers that to be a consequence of a design intention, which he calls “transition design”<sup>1</sup>; still it is evident that other design

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<sup>1</sup>Transition Design is an area of design research, practice and study that was conceived at the School of Design at Carnegie Mellon University in 2012 and integrated into new programs and curricula launched in Fall 2014. More at: [https://design.cmu.edu/sites/default/files/Transition\\_Design\\_Monograph\\_final.pdf](https://design.cmu.edu/sites/default/files/Transition_Design_Monograph_final.pdf) (last accessed: December 2017).

intentions, maybe less strategic and less aware of the different orders and levels of change needed for transition, can achieve similar results. In this latter case, however, a certain design ability is still necessary in order to capture these achievements and connect them to—or value them for—the complex phenomena involved in transition. This in turn obviously integrates several trajectories of change, all being driven by a more or less aware and forward-looking design intention. A significant aspect here is the strong emphasis given by a common use of binomials such as design and transition (Scupelli 2015), design and sustainability (Manzini 2007; Crocker and Lehmann 2013), design and systemic changes (Brown 2009), all revealing a shared view among researchers of design being fundamental to drive, support, enable and value the specific innovations needed to tackle global challenges.

*Design-for* is thus widening its importance with respect to *design-of* and this further expands the expectations towards design: no longer only a way to produce innovation, but in many respects a key approach to embedding innovation in complex socio-technical contexts, “the” way to work effectively in the perspective of transitioning.

Policy design, design for better governance of innovation processes, design for supporting innovation ecosystems: these concepts reveal a theoretical and practical shift that makes it extremely promising to introduce an additional binomial: city and design.

Cities are in fact very stimulating and productive environments for design: not only are they arenas for global crises, they are also places where transition opportunities emerge and mature with the highest density, hence innovations need to be aligned and synergized towards transition. Thus, design can be considered the way for innovation processes to be embedded within cities; cities, on the other hand, can prove to be rich and proactive hosts wherein design processes can effectively be adopted.

## 1.4 About This Book

Adopting design as a way to embed innovation within urban environments, in order to conceptualize feasible answers to complex global challenges, is the core topic of this book. In particular, our line of reasoning tries to reduce the conflict between those innovators who, despite targeting societal change and sustainability, adhere to the classical economic model and therefore look for market success and profitability and those who, otherwise and in opposition to such mindsets, do not focus on the potential for revenue from their innovations and promote alternative ideas and economies. To that end, this book explores the conditions for innovation to be disruptive of values yet, at the same time, gradual during the dynamics of change. For us, disruptiveness, with regards to values, is the best guarantee for establishing an effective path to sustainability, while the gradual aspect is crucial to reduce the risk of a dull resistance of the predominant socio-economic system.

With such an intent in mind, the book puts together three key concept domains rarely considered in a unitary fashion. They are: *innovation*, the only possible response to global crises, aiming at transforming behaviours and practices towards systemic changes and transition; *design*, a way of creatively conceiving, developing and driving forward new practices for undertaking large scale transitions; and *cities*, seen as the environments where problems present themselves in the most socially relevant way and at the same time as key opportunities for testing and adopting forms of innovation which target global challenges.

Therefore, given the setup and aims of our reasoning, we interrogate how the interplay between design and the urban dimension can contribute to sparking or fastening the various pathways of the innovation process. The book discusses these issues moving from some key research hypotheses.

*H1. The application of design approaches and tools can facilitate the generation of innovations in urban contexts both as an endogenous process relating to local resources and as a result of embedding innovations from other contexts with similar, or even dissimilar conditions.*

*H2. The application of design approaches and tools may help propagate local innovation skills and capacities within urban contexts not having previously been exposed, to the required extent, to other innovation facilitating conditions.*

*H3. The application of design approaches and tools can facilitate the scaling, embedding and/or transferring, of innovations born from some urban contexts into other contexts having similar, or even dissimilar conditions.*

Operationally, what we will be looking at are multiple (sub)processes, including:

- The dynamics of innovation pathways and their interactions with the urban dimensions and resources;
- The skill and capacity building processes, enabled by design, leading to those relevant dynamics;
- The creation of the conditions for scaling innovation in a generative dialogue with the city;
- The creation of the conditions for distributing innovations “born elsewhere” and the generation of local “hubs” of actors dealing specifically with such innovations, and/or the transformation of those innovations into something else, more tailored to the local situation, or even dramatically different.

The last point alludes to Jacobs’ belief in a powerful multiplier effect of the “two interlocking reciprocating systems” leading to “explosive city growth”.

As per our second caveat, we do not intend to follow such a line of thought to the point of considering a massive take up and a diffused emergence of innovations as the inevitable outcome of adding design tools, methods and instruments to a supposedly non-design-enabled process. More modestly, we will be satisfied if an “appropriate” injection of those methods and tools, combined with critical awareness for the role of urban dimensions and networks, will “increase” the creative capacity and/or encourage the relevant innovation to be judiciously adopted and put into practice in a certain community or environment.



The book chapters follow this reasoning starting from the exploration of key concepts and then introducing the main research findings.

Chapter 2 positions the three key concepts of cities, design and innovation, as introduced above, in relation to the most relevant academic references. It unfolds them by affirming that a new stance towards innovation is needed. As already argued, innovation (be it technical, societal, institutional, etc.) is essential to tackling the global crises of today (climate change, social exclusion, inequality, food distribution, mass migrations...) which are generated or reinforced by the persistence of systemic (“wicked”) problems. The chapter hence explores several definitions of innovation, which are presented and discussed in order to identify the main features of related processes. In the authors’ perspective, innovation should be considered as a complex and dynamic multi-phase and multi-level process. The conceptual framework provided by Geels (2002), Grin et al. (2010) describes it as the interplay of transition patterns running at three distinct levels: innovative practices (niche experiments), structure (the so-called regime), and long-term, exogenous trends (the landscape). The conception of a heterogeneous and multi-dimensional process (Grin et al. 2010) brings the reasoning to look at innovation no longer in terms of phases of a linear process, but of stages of maturity in relation to the different patterns of transition. A key finding of the chapter is the conclusion that, in this perspective, there is no use in opposing radical and incremental innovation: different types of innovation need to act at the same time in order to enable successful change to occur (Cruickshank 2014).

Creativity is another key element of innovation that is explored by this book. Usually creativity is associated with specific people and skills, still some authors consider creativity as a relevant human capacity, which is inspired and magnified by plural and multifaceted environments where it is considered a sort of “phenomenon of the multitude”, embedded in diversity and interactive behaviours. Here rests the link between (this new way of looking at) innovation and design, the second key concept explored in Chap. 3. As for innovation, in fact, the initial point of view regarding design has shifted from a traditional focus from products to services and then to the design of product-service systems, combining both tangible and intangible elements. Methods, tools and approaches have changed accordingly, gradually moving towards a greater user involvement in the creative process; the chapter offers an overview of the most relevant achievements, focusing on their interaction with the components of innovation processes.

By stressing on non-expert, creative and design competencies, the chapter draws the reader’s attention to socio-technical innovation processes. In this perspective, the urban dimension emerges as a key third factor in the process. Cities are cultural, social, economic and spatial entities interacting and participating in innovation processes with their own resources. Specifically, the chapter emphasizes the importance of social learning and the activation of networks in innovation processes and proposes an alternative policy perspective in line with this view.

Chapter 3 explores the interplay between innovation processes and the urban dimension. Cities are considered key environments for the emergence of generative interactions and innovation networks. Cities are therefore scanned thoroughly in

order to sense all potential cues for their ability to set the innovation cycles in motion. Furthermore, the relationship between cities and innovation in present times can also be regarded from a different perspective. As it is vital to rethink our development patterns, in order to contrast global warming and its ominous threats, cities are themselves concrete materials for innovation. As they are areas where problems related to unsustainable consumption of non-recoverable resources (soil, energy, water, food, ...) assume a critical dimension in terms of actual liveability—not to speak of traffic congestion, air pollution, migration, social exclusion etc.—cities challenge the very same concept of innovation by adding a feature of long-term positive effects to its social assessment framework. The city is therefore seen both as a hotbed of creativity and innovative culture and a place where different actors (policy makers, civil servants, NGOs, citizens, start-uppers, entrepreneurs, etc.) receive continuous stimuli to engage in innovations that fulfil specific needs (be they market, organisational or community related).

The chapter then focuses on the distinctive elements of what is urban, which can be considered relevant in the development processes of new ideas, products, services, etc. Each city presents a specific combination of those layers of attributes, which ultimately describe its unique identity and potential capability of establishing the conditions for creative innovation processes to be embedded. The chapter then analyses five features considered the most significant in relation to Design Enabled Innovation (DEI): 1. The City as a marketplace; 2. The City as a problems lab; 3. The City as an idearium; 4. The City as a resource pot; and 5. The City as a political arena. These five dimensions can be defined as “interfaces” through which a city interacts with innovation processes. Those processes in turn vary significantly, depending on the innovation’s stage of maturity and the way in which innovation processes enter the city through its networks.

Alongside interfaces, which intercept innovation processes at an operational level, another key concept introduced by the book is that of “Urbanscape”. The Urbanscape is described as the set of conditions making a city a prone or adverse environment towards innovation and innovation networks. The five components of the Urbanscape are presented and discussed.

Chapter 4 focuses on the relationship between innovation and design. It therefore acknowledges how the focus of design studies has shifted from a product-centric perspective to a perspective that is centred on the interaction between the consumer and service context (so called Service Dominant Logic), in which value is defined by and co-created with the consumer, rather than embedded in the output (Vargo and Lusch 2004: 6). The fundamental change in this approach is illustrated by Vargo and Lusch’s statement that the enterprise cannot deliver value, but only offer value propositions, which means that it cannot create or deliver value independently (Vargo and Lusch 2008). The chapter then elaborates on the key aspects of these processes of co-production of value as the result of a myriad of activities performed by many people dispersed in time and space. A definition of design is then proposed, as the process through which possibilities are consciously created (Metcalf 2014: vii).

The reasoning then goes on by identifying two distinct design competencies and agencies: diffuse and expert. Diffuse design is meant as a “natural capacity” (Manzini 2015: 47) that is largely distributed and widely applied to frame and solve everyday problems and, more generally, to make sense of things (Manzini 2015; Krippendorff 2006; Schön 1987). On the other hand, while diffuse design is a general human capacity and activity, some people study and practice design at an expert level. Furthermore, design processes might not only be driven by human agencies (e.g., diffuse or expert design), but can also be affected by other agencies, i.e. socio-technical, institutional or cultural factors. Both diffuse and expert design work as enablers at different stages of the change process and different levels of the socio-technical structures—from localized and context-anchored projects to projects that specifically frame the embedding of the design product into the social and political realm; staying within Geels’ (2002, 2011) framework, we can say that they act either in niches or in regimes.

Another key concept introduced in Chap. 5 is that of “infrastructuring”. The term describes the expert design intervention in resource aggregation and therefore value-creation. It describes how an expert designer can support diffuse design by triggering, inspiring or facilitating people’s creativity, or engaging with them in value-co-creation. Infrastructuring hence includes the most common design activities, consisting in aggregating technical knowledge, professional experience, existing tools and technologies, to generate products and services which users will use to produce value that addresses their own needs.

The reasoning then focuses on the interplay between innovation processes and design. Moving from Verganti’s (2009) conceptualization of design-driven innovation, the attempt is to define the space of interaction between the different components of the innovation process. Specifically, by adding the contribution of design in its two defined agencies (diffuse and expert) we can define a 3D space where deeply different innovation practices and experiences are to be located. In this way we can also try to cluster and name them while revealing the mechanisms and factors affecting the quality of innovation outputs. This exercise effectively empowers the book’s initial hypothesis: no innovation is possible without design.

In Chap. 5 we explore the dynamics of change in urban systems. Embedment is a key concept to understand those processes, which unfold mainly as co-evolution processes involving innovations development, use and adoption, their mutual adaptation and ultimate adjustment to institutional, organisational, regulative, social and practical contexts (Grin et al. 2010: 11). We are therefore observing spatialized learning processes: the spaces through which knowledge moves are not simply landscapes of learning, but constitutive of it. In urban spaces, learning produced by innovation operates as a form of ‘education of attention’ (Gibson 1969; Ingold 2000), a socio-political rooting of new values (activated by large scale creation of new value meanings and functions). This means that spatialized learning happens through intensive, haptic immersion, based on three key actions: “translation”, “coordination” and “dwelling” (McFarlane 2011). Translation is defined as the relational distribution through which learning is produced as a socio-material epistemology of displacement and change; coordination refers to the construction of

functional systems that enable learning as a means of coping with complexity and facilitating adaptation; lastly dwelling is regarded as a process of education of attention through which learning operates as a way of seeing and inhabiting urban worlds (McFarlane 2011).

Learning dynamics are the way innovation is ignited, at a very early stage of maturity, in a specific urban environment by contributing to, or being inspired by, the *urban interfaces* as described in Chap. 4. Relevant for innovation to capture the offered potentials is therefore the capacity to activate new connections with such forces while disconnecting others, i.e. to activate new modes for knowledge and value creation through the interaction with the provided interfaces. It is in these dynamics that design approaches can play at best their enabling role. Design can be seen as a social integrator and the enabler of the learning dynamics depicted above. In our perspective, design enables the possibility for solutions (at any innovation maturity stage) to be embedded within specific urban contexts and is able to develop and work with these solutions in order for to be relevant in other contexts. This act of embedding represents a (design) endeavour situated between meaning and function (see the 3D model), which shapes value by infrastructuring practices in real life, which are targeted by the innovation process.

Design Enabled Innovation in urban environments is therefore a non-linear, multi-causal, multilevel and networked process of change aimed at producing new functions, uses and meanings while empowering values derived from a shared view of key issues/challenges enabled by the action of design skills and approaches. In this perspective, creative processes create a dialogue with complexity-generating innovative solutions to urban problems. The urban thus produces DEI primarily in two ways: the city guarantees the existence of conditions (normative, economic, cognitive, informational and networking) for the activation of Design Enabled Innovation processes; however it also inspires ideas because it is the city that faces most of today's global challenges. Urban problems and challenges tend to nest in the *complexity zone* (Stacey 2002); therefore, they call for creative solutions developed through erratic (i.e. less structured and open) decision making.

The chapter then introduces a reflection on key features to sense innovation in urban environments as a way for policy makers, designers and firms to intercept innovation niches and processes in their context.

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