Innovation and Design

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DOI
10.1007/978-3-030-00123-0_4

Publication date
2019

Document Version
Final published version

Published in
Innovation capacity and the city

Citation (APA)
Concilio, G., De Götzen, A., Molinari, F., Morelli, N., Mulder, I., Simeone, L., Tosoni, I., & Van Dam, K. (2019). Innovation and Design. In G. Concilio, & I. Tosoni (Eds.), *Innovation capacity and the city: The enabling role of design* (pp. 61-83). (SpringerBriefs in Applied Sciences and Technology). Springer. https://doi.org/10.1007/978-3-030-00123-0_4

Chapter 4
Innovation and Design

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4.1 Characterising Design Agency

4.1.1 Types of Design Agencies

As already highlighted in Chap. 3, design is about creating value for users through specific activities. However, value creation activities can be very different and can involve different actors in relation to the specific context in which the design action takes place. In the old industrial production perspective, the focus was on the production process where value was created, with a clear distinction between production and use phase. In this perspective, the value creation process was independent from its context. This is still true when services are considered in a product dominant logic, where users are (passively) served by the service personnel, who are fully in charge of the service quality. The responsibility for the design and the value creation process of such service is mostly, if not entirely, in the hands of the service provider.

However, within business, marketing, communication and design studies, the last decades have seen a substantial shift from a product-centric perspective to a perspective which focuses on the interaction between the consumer and the service context (Service Dominant logic), in which value is defined by and co-created with

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G. Concilio and I. Tosoni (eds.), *Innovation Capacity and the City*,
PoliMI SpringerBriefs, https://doi.org/10.1007/978-3-030-00123-0_4

the consumer, rather than embedded in output (Vargo and Lusch 2004: 6). The fundamental change in this approach is illustrated by the Vargo and Lusch statement that the enterprise cannot deliver value, but only offers value propositions, which means it cannot create and/or deliver value independently (Vargo and Lusch 2008).

Along a similar line of thinking, Normann and Ramirez (1994) shift the focus of the value creation activity from the production phase, to the use phase. The co-production of value is manifested in the offer to which several actors contribute by performing specific activities; the offer is, therefore, the result of myriad activities performed by many people dispersed throughout time and space. Assets and resources (material objects, technologies, knowledge) available in an offer are combined in a systematic way thus ensuring access for users. Ultimately, whether customers buy a product or a 'service', they are really buying access to resources (Ibid.: 48). Normann and Ramirez use the case of IKEA to explain the way users can be considered as an active and crucial part of the value production process.

This perspective of design, strictly related to value creation processes, enriches the recurrent definition of design coming from the work of Herbert Simon, who describes design as "[devising] courses of action aimed at changing existing situations into preferred ones" (Simon 1969/1982: 129). This definition reflects a vision where the design process is articulated into two distinct phases of planning ("devising courses of action") and implementation ("changing existing situations into preferred ones"). Operationally, design can be seen as an everyday problem-solving capability. Ezio Manzini labels this capability as *diffuse design*. In his words, design is the outcome of combining three human gifts:

> Critical sense (the ability to look at the state of things and recognize what cannot, or should not be, acceptable), creativity (the ability to imagine something that does not yet exist), and practical sense (the ability to recognize feasible ways of getting things to happen). Integrating the three makes it possible to imagine something that is not there, but which could be if appropriate actions were taken (Manzini 2015: 31).

Design, the process through which possibilities are consciously created (Metcalf 2014: vii), is a "natural capacity" (Manzini 2015: 47) that is largely diffused and that is widely applied to solve everyday problems. Besides being oriented toward problem-solving, design—the very activity of devising and testing courses of action—also helps in framing problems and, more generally, making sense of things (Manzini 2015; Krippendorff 2006, Schön 1987).[1]

While diffuse design is a general human capacity and activity, some people study and practice design at an expert level. This is what Manzini refers to as *expert design* and this is how he introduces it:

[1]Along this line of thinking, Donald Schön's idea of design as a process where doing and thinking are complementary has been influential. Schön states that "doing extends thinking in the tests, moves, and probes of experimental action, and reflection feeds on doing it and its results. Each feeds the other, and each sets boundaries for the other" (Schön 1987: 280).

> Let's start with the following statement: every human talent may evolve into a skill and sometimes into a discipline (meaning a culture, tools, and professional practice): everybody can run, but not everybody takes part in the marathon and few become professional athletes; everybody can tap out the beat with a tambourine, but not everybody plays in a group and few make a living playing it professionally. Similarly, everybody is endowed with the ability to design, but not everybody is a competent designer and few become professional designers (Manzini 2015: 37).

The relevance and functioning of *diffuse design* agency is shown by several pieces of evidence. Among them, the most important are related to the growing number of people who, pushed by the global financial crisis of 2008–2013, have engaged in innovative activities, or what Castells and Hlebik (in Castells et al. 2017) define as alternative economics practices. These are related to production, consumption, exchange, payment, and credit. They are all to be intended as innovative and at the same time viable alternatives to solve problems that global challenges create with regards to everyday life. In fact, it is in daily life that diffuse design competences appear with their operational capacity: by imagining, shaping and creating alternative local futures in which they can live *with* rather than *against*.

Expert design emerges from the work of design professionals, "of those subjects whose field of interest, of research, and ultimately of work is the practice and culture of design" (Manzini 2015: 1).

The characterisation of diffuse and expert design makes design a practical problem-solving epistemology (Metcalf 2014: 92), a necessary human capacity (Bánáthy 1996; Cross 2011). It builds upon a purposeful polarisation. As Manzini also states:

> These two poles with their corresponding profiles are an abstraction: what interests us is the extent of the field of possibility they indicate, the infinite variations that may appear within them, and especially their sociocultural dynamics (Manzini 2015: 37).

Within the framework described in Chap. 3, and within the four different dynamics that are there described (transformation, de-alignment and re-alignment, technological substitution and reconfiguration pathway), we can identify different design agencies, both human and non-human.

Table 4.1 captures the nuances of design processes that might be not only 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. The table details how, within the Service Dominant logic, users (or customers, or citizens) actively select and aggregate resources according to their wants and needs; it summarises some key elements that allow us to characterise human and non-human design agency while taking into account the prevailing activity of design related to value creation. In the table diffuse and expert design are identified as human design agencies and are described through the capabilities and roles they can play; also, regime and scape are identified as design agencies due to their contextual influence and role in shaping conditions for design activities and opportunities. Considering scape and regime as "design agencies", in fact, allows us to take into consideration the fact that design processes are affected by the social, economic, technologic and cultural

Table 4.1 Characterisation of design agency

Type of agent	Design agency	Characterization
Human	Diffuse design	Design as the inherent individual capabilities to generate new solutions. This builds upon the notion of diffuse design as general human capacity and activity. Users select and aggregate resources in light of their wants and needs (e.g., through processes of mediation, interpretation and articulation—Björgvinsson et al. 2012)
	Expert design	Expert design emerges from the work of design professionals, "of those subjects whose field of interest, of research, and ultimately of work is the practice and culture of design" (Manzini 2015: 1). These subjects are well versed in the use of design approaches and tools and they have a design knowledge that allows them to maintain a critical and constructive attitude. Expert design generates infrastructures (e.g., products/services) for value creation. This is also the way in which expert design triggers diffuse design. This happens when users aggregate resources that come already pre-structured (by expert designers) in form of products and/or services (e.g., through processes such as adaptation, appropriation, tailoring, re-design, and maintenance—Björgvinsson et al. 2012)
Non-human	Scape as a designer	The cultural, economic, and societal paradigmatic framework which, when experiencing crises, may activate change processes. The scape is an unintentional designer.
	Regime as a designer	The social, economic, technologic and cultural context—expressed through institutional structures (e.g., authorities, law, the marketplace)—creates frameworks that influence the design activity, often shaping design principles and specifications. The regime is a (more or less aware) intentional designer

contexts in which they unfold. As non-human agencies expressed through institutional structures (e.g., authorities, law, the marketplace), they create frameworks which influence the design activity at various degrees of intensity, oftentimes even affecting the very definition of design principles and specifications.

Both diffuse and expert design work as enablers at different stages of the change process and at different levels of the socio-technical structures—from localised and context-anchored projects to projects which specifically frame the embedding of the design product into the social and political realm; they act either in niches or in regimes.

Stories of diffuse and expert design

#1 Diffuse design

DIY design-driven movements. WikiBlock is an open-source library for DIY urban furniture which enables everyone to become an urban designer. Frustrated by his own neighbourhood, the founder of Wikiblock was triggered to change it and looked for ways to revitalise lifeless urban areas and help neighbourhoods and communities. The open-source library WikiBlock therefore offers a wide selection of urban furniture. Benches, chairs, planters, mini stages, beer garden fences, kiosks—only, they are not for sale. Users and citizens can select and design and make it by themselves, depending on their own needs and wishes. Designs, construction plans and files can be downloaded for free. Taken to a local CNC workshop, the individual parts can be simply whipped out of plywood. Just like an ordinary IKEA product, the components can be easily assembled without the use of glue, nails or complex tools.

#2 Expert design

Within the IKEA system the value (a furnished home) is in fact created by users, who imagine how to furnish their home, measure their home space, visit IKEA, pick up and transport the disassembled furniture and mount it. However IKEA supported the value creation process by designing every aspect from the service to support this value creation process, from the catalogue (pictures of different home interiors help non-expert users to figure out how the space is shaped by different pieces of furniture, materials and colours), to the structure of the furniture items (that are disassembled and can easily be reassembled) to the exhibition, in which, after leaving the kids to play in the playground, customers can test the furniture (they can sit on a sofa/chair), figure out how they fit in suggested home interiors, pick up what they need in compact and transportable packages and read the assembly instructions.

Diffuse design can be characterized as an activity of selecting and aggregating resources to change existing situations into preferred ones (Simon 1969/1982). Users look at existing resources from their own viewpoint, pull resources from various sources and aggregate these resources in light of their specific problems, needs or wants (through processes of interpretation, mediation and articulation). This activity of aggregating and integrating existing resources is part of everyday life, it may concern the decisions about the most common and repetitive actions (which mostly rely on standard procedures and conventional ways of aggregating resources, for example the everyday commuting activity to work) or may refer to the solution of crucial individual or social problems that require a creative effort to generate new aggregations, also using new tools and infrastructure. For example (referred to a niches scale), in the DIY movement, users can get their own 3D

printer (or build it using open hardware and open source software components), download some 3D renders from Internet (e.g., licensed as Creative Commons objects) and create their own product, for example a series of custom-made action figures representing a new species of aliens. Users aggregate existing resources to create something—the 3D-printed action figures—meaningful for them. Another example (referred to the regime scale) comes from the alderman of Milan in charge of sport activities and infrastructure. In order to respond to the growing request for free public spaces by practitioners of new urban sports (parkour, skating…) the alderman has implemented an existing procedure (for the temporary use of public land) available for private actors, as to have the right to assign specific spaces for free without compelling the users to pay for them. A new aggregation of existing resources made on the basis of daily life experience at the regime level and without the specific intervention of a design expert.

Expert design unfolds through the description of a change, through the production of a blueprint and the plan of future visions. It is based on technical competences and it is domain specific. It creates the structure in which value creation can happen. Expert designers are well versed in the use of design approaches and tools and have a design knowledge that allows them to maintain a critical and constructive/creative attitude. While framing problems and devising courses of actions, design experts can rely upon their experience and refer, for example, to repertoires of already developed design projects, to guidelines, heuristics, criticism.

Our framework of design agencies—in particular, the two categories of human and non-human and their additional articulation into diffuse/expert design and scape/regime as designer—require further articulation of the notion of design thinking. Design thinking posits itself as a critique of traditional, hyper-rational ways of problem solving. In contrast to analytic thinking, it puts openness and a radical focus on creativity at the centre of business productivity.

Considering the diverse design agencies, it is clear that there is no single design thinking, there is no single way of thinking in a designer-like way. Rather, different forms of design thinking can be connected to different types of design agencies:

- In *diffuse* design, design thinking can be seen as the general human capacity to look at the state of things and recognise what cannot, or should not, be acceptable, to imagine something that does not exist yet and to recognise feasible ways of getting things to happen (Manzini 2015). It is worth noticing that this capacity does not include specific design methodologies, but rather employs intrinsic cognitive resources.
- In *expert* design, specific design methods and design knowledge (e.g., repertoires of already developed design projects, guidelines, heuristics, criticism) help in identifying and framing problems and proposing solutions. Here design thinking is anchored to the practice and the culture of design professionals. Design methods and approaches can enhance the general human skills related to diffuse design and provide a specific way of looking at the state of things, of imagining and deploying new courses of actions.

As also illustrated in Table 4.1, different types of design agencies emerge from wider contexts at the level of scapes and regimes. This has also an impact on the characterization of design thinking, which in both forms is influenced by:

- *Scapes* as sort of meta designers: by crises that affect a scape (see Chap. 3) different change processes are activated that require design actions at different levels. Design thinking in this case is related to the creation of evidences at global cultural and ideological reflexive level that novelties are needed to deal and tackle with the causes of the scape crises; regime and niches then are activated.
- The conditions of *regimes*: solicited by crises in the scape, regime is in charge of the creation of conditions at the level of niches to produce novelties as well as of the re-shaping of the regime structures, functions, roles and goals.

Design thinking at the level of diffuse and expert design operates in a way that both affects and is affected by specific conditions of scapes, regimes and niches.

4.1.2 The Infrastructuring Role of the Design Agency

Individuals create value by aggregating resources. The term infrastructuring can describe the expert design intervention in resource aggregation -and therefore in value-creation. There are two ways to aggregate resources:

- the first is related to the production of novel solutions the interpretation, adoption and use of which represent the value creation moment; for example, people use their diffuse design capability to aggregate and/or re-adapt existing products or services to address their needs: people organise spontaneous car sharing initiatives or solidarity purchasing groups, thus aggregating existing resources (cars, booking systems, online groups on social networks) into new solutions. In respect to this way of aggregating resources, infrastructuring happens when an expert designer supports diffuse design by triggering, inspiring or facilitating people's creativity, or engaging them in value co-creation.
- the second way of creating resources is related to the production of products and services which create conditions for value to be generated. In this case the activity of infrastructuring includes the most common design activities, consisting in aggregating technical knowledge, professional experience, existing products and technologies, to generate products and services which users will use to produce value that addresses their own needs. In operative terms, infrastructuring refers to "a priori" activities: selection, design, development and deployment of resources.

Infrastructure may also consist of digital platforms, physical spaces, public innovation spaces, information and logistic services (Manzini 2015) which support an ongoing alignment between contexts, cultures, attitudes and routines and the interaction among the several actors involved (including customers). In this sense,

infrastructure is also related to activities of mediation, interpretation and further articulation of resources as proposed by Björgvinsson et al. (2010). According to this perspective, coherent with the Service Dominant Logic, designers propose the interface or the contextual conditions for the interaction to happen, and design the infrastructure, i.e. the processes supporting the interaction (Secomandi and Snelders 2011), but they cannot exactly control the outcome of the interaction happening through, as it happen in several services, in which value is essentially created by customers.

While the activity in the value-creation phase aims at facilitating or supporting interaction, the activity of expert designers, that create the ground for the interaction is often based on a more "traditional" planning activity, which includes the analysis of the context, the definition of blueprints, the coordination of time sequences and technological infrastructures and the design of products. Platforms such as Amazon.com or eBay or Netflix derive from the work of expert designers but their value emerges only when the final users perform operations such as creating and sharing personal lists, curating and maintaining personal repositories, creating personalized distribution channels, etc. It is through these operations that value emerges when the users adapt, appropriate and tailor these platforms in light of their own needs and wants.

Within the broad design field, a good number of scholars and practitioners have framed their design activities in terms of creating and maintaining 'infrastructures' for collaboration (Binder et al. 2011; Björgvinsson et al. 2012; Ehn et al. 2014; Le Dantec and Di Salvo 2013; Star and Bowker 2002; Simeone 2016). An infrastructure can be a physical space where various stakeholders (e.g., government officials, companies, citizens) are invited to participate in sessions where problems of common interest are defined and where solutions are imagined, tested and implemented. For example, a physical space containing equipment such as laser cutters, 3D printers, CNC milling machines and other tools (such as a FabLab or other kinds of makerspaces or innovation spaces) can be considered as an open infrastructure which can host various people and organisations interested in developing and prototyping their ideas, concepts for new products or services, social and cultural interventions. Such infrastructure could, for example, host a hackathon where various stakeholders are involved in exploring issues of common interest and, together, contribute to frame problems and prototype possible solutions. An infrastructure does not necessarily need a physical space, though. Thematically-linked participatory sessions can be organised in multiple spaces (Binder et al. 2011), for example using the premises of the various stakeholders involved and/or through a series of interlinked participatory activities to be carried out via Internet. An infrastructure could also be a logical space for interaction, this is the case of interaction platforms for social networking (in which users create value by exchanging knowledge, ideas or their own feelings) or for mutual value exchange (where users create value by offering or receiving hospitality, car lifts, used objects). Within design research, projects based upon infrastructure have been extensively carried out and analysed, particularly as a way in which to work with different and multiple stakeholders (Karasti 2014; Star and Bowker 2002; Star and

Ruhleder 1996; Le Dantec and Di Salvo 2013; Hillgren et al. 2011, 2013; Lukens 2013).

In particular, the characterisation of design agencies as distributed across diffuse design and expert design allows for the infrastructuring process to be articulated into two approaches:

- The *consultant* approach. In this approach, expert designers generate new formal structures (i.e., products/services platforms) for value creation. These structures can support changes within niches or regime. An example of this approach is crowdfunding services and platforms, such as Indiegogo (www.indiegogo.com) and Kickstarter (www.kickstarter.com). Kickstarter started as a service where independent artists, filmmakers, tinkerers, and entrepreneurs could raise money for worthwhile ideas, but has changed from fundraising crowd-based financing to community building. Within this approach, although focussed on the "energy" of the crowd, the value creation process is exclusively based on expert design.
- The *activist* approach. In this approach, diffuse design is ignited and sustained through infrastructures for collaboration. An example of this approach is a project called Precious Plastics, which is a design for a recycling centre of open source machines, tools and infrastructures (a collaborative platform) to fight *plastic* pollution from the bottom up. It is open source and supports people's own capability to recycle factories and further develop the design (www.preciousplastic.com).

4.2 A 3D Design-Based Innovation Space

Starting from the seminal work of Verganti (2009), design driven innovation can be defined as a process of value production, creation, and development that adds radically new meanings to current functions (incremental innovation) or to new and possibly disruptive functions (radical innovation).

In his discourse, Verganti mostly refers to innovation in the industrial design field, and the examples he makes are mainly related to products (objects, however complex), which have been successful in the consumer market.

An implicit assumption of Verganti's work seems to be that the definition of design is limited to the valuable ability of skilled and creative people, those that in daily life are called designers by profession, to expert designers. It is mostly due to their initiative, and to the success of their value propositions within the consumers (specifically) or customers (more generally), that new and radical meanings are added, perceived, and developed. According to this vision, designers act as a kind of interpreter: of popular values, environmental contexts, and collective needs. And design-driven innovation is a process (or strategy, as the figure above is labelled) delivering its outputs in the creation, integration, and production of value (through the radical change of meanings).

Therefore, according to Verganti, the value added by design to innovation continues to enable the radical change of meaning and the related value system. In many examples from Verganti's book, innovation derives from the integration of a product's functional value (capacity to respond to a need) with other sources of value such as emotion, fitness, etc.

However, in his discourse, technology is also relevant and, along with meaning, defines the space of innovation as two-dimensional, like in the figure above.

The above representation suggests an important consideration: despite the fact that design is strictly and uniquely related to radical changes in meaning, its role can be as important for incremental innovation as it is for radical innovation. If for instance, we think of the traditional (old fashioned but still valid) definition of design, as the "Purpose or planning that exists behind an action, fact, or object" (Oxford dictionary), design is the ability that allows anybody to envision a new artefact (be it a fork, a service or an entire city) and to plan how to make it. This can also be applicable to incremental innovation examples, where the role of design, although still interpretative, can be more limited, purely technical, or problem solving related.

This view on the design activity is not considered in Verganti's perspective, which instead focuses on the activity carried out by creative and skilled professional, rather than on the design activity suggested above. No doubt creativity is crucial for design: this is a shared idea among scientists exploring ways and conditions to push innovation. A recent article exploring statistics of creative jobs and positions in public and private organisations assigns a critical value to creativity in design for innovation (Dvir and Pasher 2004). Still designers are not only skilled professionals—or no longer so. We are familiar with more and more cases where interpreters of contexts and/or creators of new meanings are ordinary people (Castells 2017), not just designers, who collaboratively work together with the technical or domain experts to generate innovation.

In conclusion we can say that innovation and design are strictly connected: innovation, either incremental or radical, needs design! To make room for this statement, we added a third dimension to Verganti's model of design driven innovation in Fig. 4.1. This dimension focuses on the design competences, drawing the distinction—for us, crucial—between "expert" and "diffuse" design (Fig. 4.2), while still keeping the value assigned by Verganti to the dynamics of meaning and value creation.

By so doing, alongside the contribution of technical experts, as in the traditional design concept, we will consider the role of creative people as well as the making of complex, distributed, interactive environments of crowdsourced creativity: a collective mind of creators (Castells 2017), the diffuse design agency. Introducing diffuse design as a relevant innovation factor implies that we capture opportunities for co-creation and co-creativity within the networks which are active or potentially activated in a specific context. In this view Design becomes a tool with which to envision the innovative potential to change practices and behaviours through new products, services, and platforms.

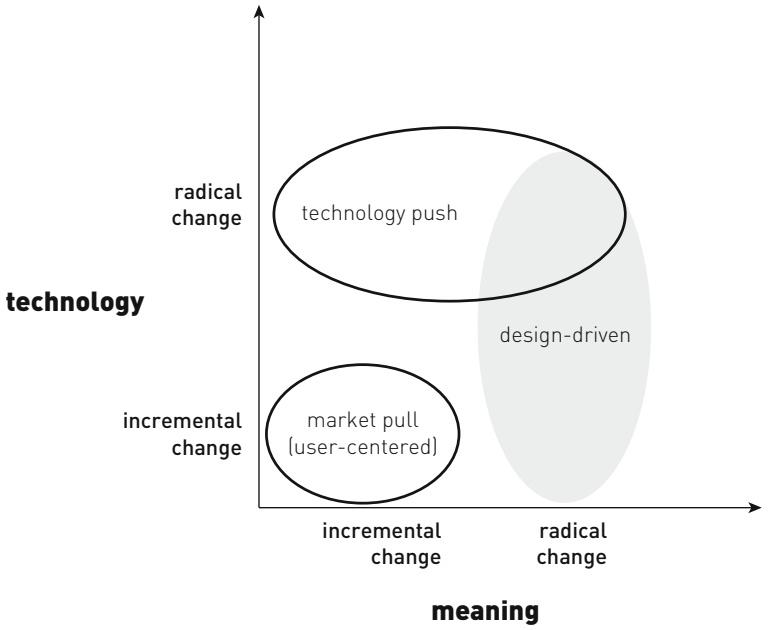

Fig. 4.1 Verganti's model of design-driven innovation (2009)

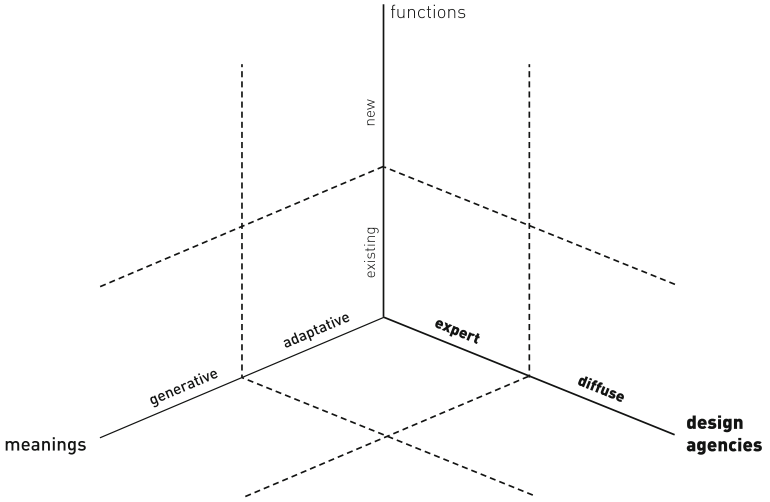

Fig. 4.2 The 3D innovation space

This model, by focussing on functions rather than on technologies, considers that technological change has an incessant, endogenous, dynamic in modern societies. It reduces, though not abolish, the role of technology in being the prime movers in innovation processes and adds in the role of change agency as assigning actors an equally important role in defining innovation paths (Grin et al. 2010: 13). This is not only true at the scale of niches but also at that of regime. The socio-technical perspective borrowed from Grin et al. (2010) is based on a contextual understanding of technology. This implies the creation of knowledge and prototypes, but also the mobilization of resources, the creation of social networks (e.g. sponsors, potential users, firms), the development of visions, the construction of markets, as well as new regulatory frameworks. Hughes (1986, quoted in Grin et al 2010) adopted the metaphor of building a "seamless web", to signify that technological change requires the combination of physical artefacts, organisations, natural resources, scientific evidences as well as legislative artefacts and governance models (Grin et al. 2010: 12)

The 3D model of Design Enabled Innovation is based on two persuasions. The first considers there to be no innovation without design: however generative or adaptive the production of meanings may be, design keeps its innovation-enabling role by combining meanings with existing or new functions in order to develop conditions for value creation. This persuasion considers that many design activities take place in and for innovation, but we tend to ignore it when innovation is not disruptive or when its ability to conquer a wide large market is weak. When the creation of novelties does not achieve a large success, it is not due to the lack of design work in it rather for the huge, uncontrolled uncertainty and for the large amount of unpredictable factors. It is not possible to assert that design is involved only when innovation achieves a successful scale without incurring in a logical mistake of its definition.

The second persuasion takes into account what has been discussed in the previous paragraph: creativity is not (only) an extraordinary moment of an exceptional break-out but a "way of life". Creativity can be considered the current practice for millions of people: it includes survival strategies, copying, pasting and adding activities, enacted by students across the world, and even the remix approach to music creation. Creativity is a surprising resource of the "crowd" considered in terms of its ability to produce new knowledge and new meanings with and for the cognitive, information and practice networks (Castells 2017). The concept of diffuse design embodies the networking ability of individuals and their potential creative contribution to innovation inside the networked structure of society. See the following URL: https://designscapes.eu/city-snapshots/ for a mapping exercise of several innovation examples.

In this 3D model some known forms of innovation can be represented that articulate the space (Fig. 4.3).

As already discussed, Verganti's book does not clearly state that design-driven innovation is exclusively referred to design professionals but the several examples he produces, all coming from the industrial design domain, are referred to design activities by professionals (Fig. 4.4).

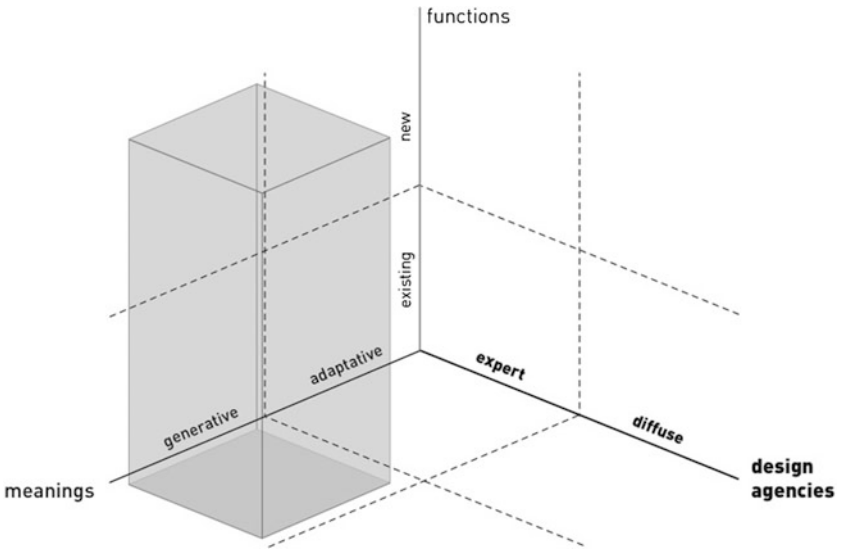

Fig. 4.3 Verganti's design driven 3D innovation space

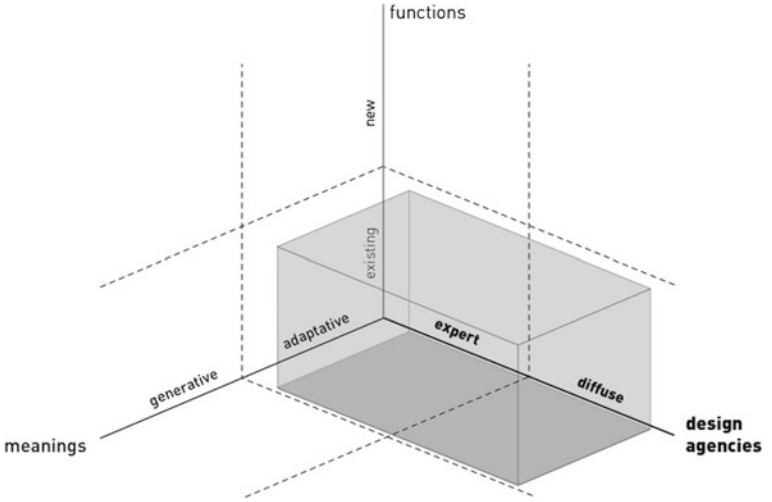

Fig. 4.4 Incremental 3D innovation space

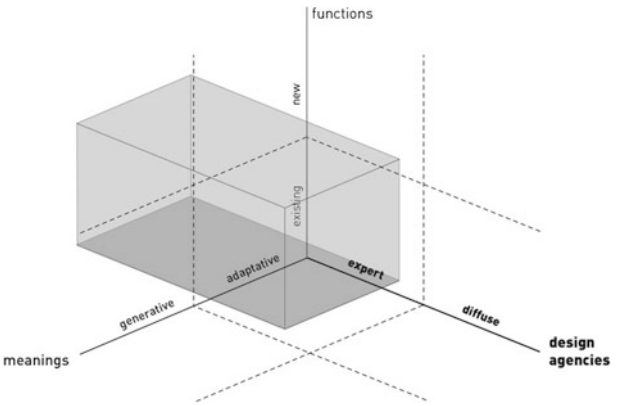

Fig. 4.5 Disruptive 3D innovation space

Incremental innovation is the one that clearly contemplates the role of diffuse design. This is possible for two reasons: everyday life problem solving and design capacity are easily activated/adopted by already existing "functions" and combined with and adaptive development of meanings (Fig. 4.5).

Some writers use open and disruptive innovation in an ambiguous way. Looking at the 3D space we consider that open innovation can be supportive of disruptive innovation but it does not guarantee its occurrence. The openness in fact guarantees the introduction of potential innovation forces which may in turn introduce opportunities for innovation to be disruptive. Such innovation forces do not only contemplate expert design but also diffuse design agencies (Fig. 4.6).

The 3D model of Design Enabled Innovation will be used in the next chapter in order to represent innovation processes throughout different maturity levels.

4.3 Design Enabled Innovation: Towards the Notion of Design for Scape

In the literature, different concepts support the understanding of the interplay between design and innovation, thus underlying their reciprocity. This reciprocity is not only evident in the academic discussion but also in several public initiatives promoting design adoption in companies and institutions for guiding and supporting innovation (Table 4.2).

Various design agencies—diffuse design, expert design—support innovation across the different levels of innovation maturity (ignition, development, transition towards systemic change). Different design goals correspond to each innovation maturity level, as shown in the Table 4.3.

Diffuse design and expert design can support the preliminary activities of discovering opportunities and challenges, generating ideas and developing and testing.

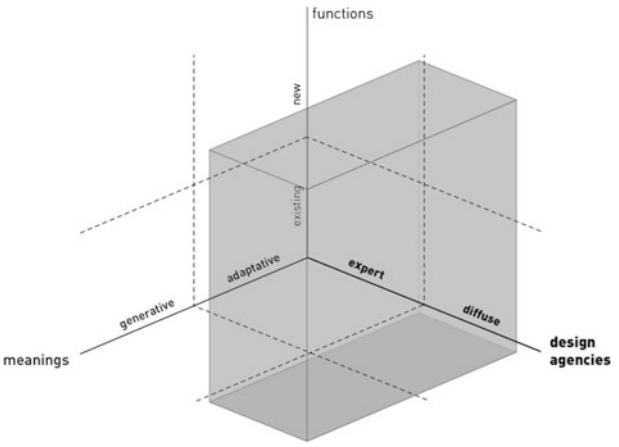

Fig. 4.6 Open 3D innovation space

Table 4.2 Design and innovation in combined definitions

Design for user-centred innovation	Design for user-centred innovation is the activity of conceiving and developing a plan for a new or significantly improved product, service or system which ensures the best interface with user needs, aspirations and abilities, and which allows for aspects of economic, social and environmental sustainability to be taken into account[a]
Design and open innovation	Chesbrough (2003) introduced open innovation and described it in this manner: "open innovation is a paradigm which assumes that firms can and should use external ideas as well as internal ideas, and internal and external paths to the market, as the firms look to advance their technology." In fact, open innovation is the flow of knowledge, information and collaboration which helps accelerate design, innovation, creating value and sustainability
Design-driven innovation	Design-driven innovation is defined in this way: "Design-driven innovation is an approach to innovation based on the observation that people do not just purchase products, or services, they buy 'meaning'—where users' needs are not only satisfied by form and function, but also through experience (meaning)[b]
Business models design	A business model is a strategy or plan which has to not only create value but also capture the value in a meaningful way so that it can beat or compete with other ideas, methods, products, services, things, items, processes, tools or technology as well as capture unmet needs and opportunities in the market (Chesbrough 2007). The function of a business model includes: value proposition, value creation, market segment, the structure of the value chain, revenue generation/return on investment, cost structure, its network value, key partners, activities, channels, competitive strategy to find potential collaborators, alliances, joint ventures and competitors

[a]EC Staff Working Document, 2009, Design a driver of user-centred innovation. http://ec.europa.eu/DocsRoom/documents/2583/attachments/1/translations/en/renditions/native

The Commission Staff Working Document (2013) states that: "user-centred design thinking drives business model innovation, organisational innovation and other forms of non-technological innovation"

[b]http://www.designforeurope.eu/what-design-driven-innovation

Table 4.3 Linking design-centred activities with levels of innovation maturity

Levels of innovation maturity	Design goals
Inception	Capturing opportunities and challenges; generating ideas
Development	Developing and testing; making the case; delivering and implementing
Transition	Growing and scaling, organisational setting, activating public debates and discussions

Expert design is then needed to further the innovation process through the activities of making the case and delivering and implementing. Finally, the perspective offered when design operates in a broader context helps for the activities to grow, scale and ensure their organisational adaptation/adjustment.

The different agencies of design could be exemplified by a case of local, insurgent innovation, started as a spontaneous aggregation of a group of citizens:

STORY #3 The waste oil collection

No residential collection for organic oil waste is carried out in Milan by the waste management agency. Still the organic oil waste has to be conveyed to dedicated waste collection centres in the city. In order to reduce the number of conferring activities, one family starts collecting organic oil waste in a bottle to be conferred less frequently. During a condominium meeting, the family suggests the collection be made for the condominium and a common decision is made to have a 5-liter pot used for oil collection. When the pot is full and one of the residents in the condominium goes to the waste collection centres, the pot is emptied and brought back and the cycle starts again. A small, local change which represents an innovation epiphany is achieved. This small, local change is fostered by diffuse design in the form of the ability of this group of families inhabiting this condominium to identify problems, generate ideas and prototype a solution.

A further step could be made, for example, when one of the inhabitants of the condominium—a design student in her fourth year—thinks that she could offer this service to other buildings of the area. She then talks to a couple of fellow students at her university and together they carry out some preliminary user research to check whether their idea can be of interest, they brainstorm on possible ideas and solutions ("Should we buy a cargo bike? Or a used small truck?"), they elaborate service walkthroughs and blueprints and, finally, they decide to try out their offering. To do this, they could organise the first condominium as an initial prototype and later on represent and communicate the concept to other buildings, in order to transfer it. They create a website where buildings and families can schedule services related to organic oil collection and disposal. They also prepare some flyers and a Facebook page to advertise their service. Way of

thinking and methods of expert design helped these students to get their idea off the ground.

After a few months, things go well to a point that they are able to expand a bit and serve about 100 buildings in their neighbourhood. At this macro level, things are much more complex. They need a different perspective that takes into consideration organisational, logistics and economic factors. They need to take into consideration potential regulations in the city, look for emerging competitors, deal with administrative authorizations. Perhaps, they need to think how they can differentiate and further expand their offering ("Should we also have a dedicated service for restaurants? Can we propose our service to other cities?"). The broader view of design for scapes here is helpful in order to operate at the level of complex systems of cities and beyond. At this level, the initial idea of this group of students needs to be systematically organised and communicated to the municipal authorities, in order to scale up the service to a broader urban scale.

The table below provides a summary on how design agencies can support various innovation activities in the *Waste Collection* story illustrated in the above box, which is mapped onto the three levels of innovation maturity (Table 4.4).

As a further articulation of the above discussion, we distinguish various dimensions of innovation in relation to the impact achieved:

Table 4.4 How design agencies can support various innovation activities

Innovation maturity level	Situation described in the waste oil case	Diffuse design	Expert design
Inception	"I don't want to be bothered". Citizens in the condominium find it problematic to take the used organic oil to the deposit	General human ability to look at the state of things and recognize what cannot, or should not, be acceptable (Manzini 2015)	Discovering and framing the problem (e.g., through user research based upon ethnographic observations, interviews, etc.)
	"We put a container in the basement" Someone comes out with a solution	General human ability to imagine something that does not exist yet (Manzini 2015)	Generating ideas through methods such as scenarios, creative techniques, brainstorming sessions, participatory design

(continued)

Table 4.4 (continued)

Innovation maturity level	Situation described in the waste oil case	Diffuse design	Expert design
Development	"Let's try it" A small "prototype" is created, to check how the idea works	General human ability to recognise feasible ways of getting things to happen (Manzini 2015)	Prototyping or developing through methods such as service walkthrough, business model canvas, etc
	The service is thoroughly assessed in the context of its use	Testing in daily life and assessing	Creating proofs of concept
	The service is organized at a level that can be fully operationally deployed	Small local adaptations in service adoption	Using a design approach for final delivery by, for example, organising, blueprinting and managing implementation processes
Transition	The service offer expands to other buildings, to other cities, to other waste materials towards more aware behaviours and practices	Adaptation to a broader scale with regards to service adoption	Design multiple dimensions by mapping the specific system and the stakeholders, by supporting the creation of the ecosystem and transferring the concepts to other contexts and to other products by taking into consideration organisational, economic, cultural and social implications for scaling up to complex systems of cities and beyond, behavioural change, communication

- Local—at this level innovation can be insurgent i.e. pushed by problems experienced by individuals in daily life, which are drivers of a change as a modification of current conditions towards an improvement;
- Structured—at this level innovation is guaranteed by a dedicated design activity which is necessary to create a structure for the idea to be prototyped, tested and implemented; the innovation achieves a change which is substantial at a local scale (the development scale in the niches) but does not reach the regime;

- Eco-systemic—at this level innovation is guaranteed by an important and long-lasting design strategy; the innovation achieves a change which is radical at the regime scale.

The discussion carried out up to this point has focused on the enabling role of design in innovative processes as an activity that is able to target value creation. As described in Chap. 3 (mainly quoting den Ouden 2012), it is crucial that innovation processes are able to target value creation at different levels of a socio-technical system at the same time. Using the categories addressed by den Ouden, design should work simultaneously for value creation at the level of users, of organisations, of the ecosystem and of Society. The role of Society in den Ouden's discussion is clearly described as the mass payer of the global problems' costs i.e. the owner of the current global societal challenges. In some sense society is the operational, daily life, touch point of the landscape. Her idea is that the urgency in the current global situation for societal challenges to find a response requires innovation to target the four levels at the same time, i.e. to *design for scapes*.

Design for scapes attains at two different modes of design:

(1) to act simultaneously in niches and regimes for a synergic value creation of users, organisations and ecosystems;
(2) to act with the precise intention to develop solutions responding to societal challenges, by developing and targeting the embedment of new values, this intentionality being included in several definitions of design-related concepts like the "transition design" one by Carnegie Mellon (2015).

The first mode just focuses the attention on the simultaneousness of the design action and orientation to the different levels of socio-technical systems, which has been discussed above.

The second is pivoted on the activation of mediation and negotiation mechanisms with regards to values. This second mode asks for a more strategic goal for design, i.e. conceiving the value creation dynamics and processes as functional to larger, global scale behavioural changes (activated by value creation), able to embed new values into a society.

Small-scale and locally anchored innovation projects can be carried out by individuals or groups and their capacity to look at things from a critical perspective, to frame problems and imagine solutions (diffuse design). At this level, they select and aggregate resources in light of their wishes and needs and value emerges from their situated actions in the context of use.

As we have already discussed, expert design can bring innovation a few steps forward. Expert design can create infrastructures by pre-aggregating resources that come already structured in the form of products and/or services and, as such, it deploys resources that can be re-adapted, appropriated and tailored by individuals

and groups. Innovation projects need design competences for a wider impact of the innovation itself, since design abilities are effective in reducing the gap between the development and the adoption of a solution by targeting the value creation process.

Design for scapes pushes the discussion further, by suggesting a new conceptual framework to innovation: the scaling up of innovation is functional to the embedment of new values in the socio-technical context, the "global why" becomes relevant. When operating in the *design for scapes* mode a systemic, paradigmatic perspective is introduced to bring the innovation to respond to signals transmitted by the scape through an intentional guide of the value creation process.

Design for scapes embraces a multi-level perspective and addresses shifts in dimension and scale and aims for an expanded long-lasting impact of the design action across wider contexts of application in response to global societal challenges. *Design for scapes* asks for 'a new, expanded way of designing that is orientated by better future images and back casting, and that looks to cultivate niches that can challenge regimes' (Mulder and Loorbach 2016). Opening up to scape perspectives, design actions need a comprehensive approach that allows systematic and strategic experimentation with new ways of thinking, organising, and working in and with design. The diffusion of value creation across the various dimensions of scale in socio-technical systems needs the joint forces of transdisciplinary groups of experts and diffuse design.

Finally, the term *design for scapes* refers to those design interventions which aim at contributing to both situated and limited problem spheres, to broader phenomena of innovation, which configure large transitions of societies, urban environments and political governances: 'design for scapes' represents the whole set of design activities oriented to guarantee a dialogue between niches and regime within the framework of the different change processes activated by scape crises,[2] i.e. targeting global challenges which are embedded in such crises.

Furthermore, when considering the shifts in dimension and scale of *design for scapes*, a broader outlook is needed to consider the systemic implications of design actions. Design actions are seen as strictly interlinked to wider organisational, social, cultural and economic dimensions. Design artefacts are complex socio-technical systems which are affected by the interplay of multiple stakeholders —possibly with their own needs and wants. At this level, design thinking is much more concerned about bigger pictures, about complexity and uncertainty, about what Dan Hill identifies as the dark matter of design—the context, the organisational culture, policy environments, market mechanisms, legislation, finance models and other incentives, governance structures, tradition and habits, local culture and national identity, the habitats, situations and events that influence the design process (Hill 2012).

[2]See the discussion in Sect. 3.2.1.

Design for scapes raises innovative initiatives out of the scale of small changes within defined niches to the scale of socio-technical regimes (Geels and Schot 2007) in coherence with the needs of systemic changes; it also implies a change in practices, norms and routines, which makes the institutional frame for value co-creation processes (Vargo and Lusch 2015).

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