

Exploring the impact of Maker initiatives on cities and regions with a research through design approach

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ABSTRACT

During the last decades, economic, social and technological phenomena have influenced the role, importance and perception of cities and regions. Cities and rural areas are increasingly divided because of manufacturing and its globalization; digital technologies in manufacturing are introducing more automation in factories, reducing thus the workforce and aggravating these phenomena. But at the same time, the Maker Movement connects these two opposites by adopting such digital technologies with an open approach, enabling a distributed manufacturing ecosystem based on individuals and communities such as Fab Labs, Makerspaces and Hackerspaces that work locally but that are connected globally. How can we measure the impact of Maker initiatives over cities and regions? This article addresses this issue with a research through design strategy that connects both design research and practice focusing on a) a theoretical context that connects peer production, manufacturing and cities and regions, b) a model for measuring Maker initiatives and their impact on cities and regions and c) a tool for the visualization and exploration of such impact. In this way designers, makers and researchers can actively participate in intentionally building the future of the Maker Movement in cities and regions instead of only analysing its present and past.

Keywords: Impact Assessment; Maker Movement; Peer Production; Research Through Design; Urban Manufacturing.

INTRODUCTION

During the last decades, economic, social and technological phenomena have influenced the role, importance and perception of localities, and especially cities. On one side, the processes related to urbanization have moved masses towards cities: the United Nations estimates that, in 2018, 55% of the global population live in cities, corresponding to 4.2 billion of people (United Nations, 2018). Cities are increasingly the place for work, participation and influence on society and the economy. On another side, the processes related to globalization have moved established manufacturing activities outside countries where they were

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previously located with the growth of multinational firms or “firms that make over 30% of their sales outside their home region” (The Economist, 2017) and with the growth of offshoring, “a business’s decision to replace domestically supplied service functions with imported services produced offshore” (OECD, 2013). Globalization and multinationals have been widely criticized for many years and with different perspectives and both have been considered one of the causes of rising inequality (Bourguignon, 2015; Janssen, 2017). But while urbanization seems to be a process with a clear direction and without any changes in sight, the processes of globalization have experienced also several backlashes and signs of change in the economy, society, politics and technology.

Several cases of reshoring have appeared, bringing back a fraction of manufacturing to the countries where it was outsourced from. Changes in the price of energy, rise of shipping costs, labor productivity, automation and development of less labor-intensive methods and the rise of wages in China are among the reasons for this phenomenon. Furthermore, a geographically closer production and shorter supply-chains provide less risk and the opportunity to improve knowledge, experience and innovation in design and production (Fishman, 2012; Koerner, 2011; Sirkin, 2016). Manufacturing might come back, even if to a smaller scale, but it is increasingly a different activity: the increasing automation of manufacturing is already starting to redistribute the location of factories but not of jobs.

Recent political events have shown how rural (or “left behind”) areas are increasingly reclaiming manufacturing and rejecting globalization. Furthermore, multinational firms are already shrinking due to several reasons and this is a process that started before the rise of current anti-globalization parties. According to the Economist, after the boom of the early 1990s, in the last five years the profits of multinationals have dropped by 25% and their share of global profits has fallen from 35% a decade ago to 30% now (The Economist, 2017). Simply put, multinationals, beside losing political support, are no longer achieving superior performance as both the advantages of scale and those of arbitrage are not relevant any longer. The idea of “global firms, run by global managers and owned by global shareholders, should sell global products to global customers” is slowly decreasing in feasibility and popularity, giving place to “a more fragmented and parochial kind of capitalism, and quite possibly a less efficient one—but also, perhaps, one with wider public support” (The Economist, 2017).

During the 18th century the process of enclosure of common land created larger farming areas and created a landless working class that moved to cities and became part of the Industrial Revolution by working in the first urban factories. Centuries later, cities and rural

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areas are increasingly divided because of manufacturing and its globalization; digital technologies in manufacturing are introducing more automation in factories, reducing thus the workforce. But at the same time, the Maker Movement is adopting such digital technologies with an open approach, that could often be considered as the peer production of physical artifacts, enabling a distributed manufacturing ecosystem based on individuals, communities and several typologies of workshops such as Fab Labs, Makerspaces and Hackerspaces that work locally (in both cities and rural areas) but that are connected globally. Thanks also to the Maker Movement but not only, several cities have recently experienced an unexpected growth of manufacturing activities. All these phenomena show that cities, manufacturing and global networks are under redefining by several different actors and towards several different directions. Makers and their laboratories might not only impact city manufacturing for the production of material goods and the related jobs and businesses. They might also have an impact over cities because the projects they develop and deploy, even if not completely changing production and supply chain systems, they influence several other dimensions of cities: they might engage in the development of material goods that further enable the grassroots or more participative production of food, development and delivery of services, digital infrastructures and so on. Makers might not only improve the recycling and up-cycling of goods, they could also design and manufacture goods and services that empower citizens and communities in making their cities more resilient and sustainable, even if with less manufacturing. This article tries to bring a contribution on understanding the impact of the Maker Movement on cities, and especially on how to measure it and on how to scale and share best practices, especially with a focus on the digital platforms of the Maker Movement and with a research through design approach. The main research question of the article is: how can we measure the impact of Maker initiatives on cities and regions with a strategic design approach?

This will ultimately contribute further understanding on the impact of the Maker Movement (and therefore design as well) not only on cities but also on society and the economy. This contribution is a reflection upon the practice of developing a first prototype for visualizing the impact of Maker initiatives over cities, a design-driven research based on prototypes instead of a full theoretical framework based on literature to be later developed with a design approach. This article elaborates this practice into a research through design process (Figure 2) for building a preliminary framework for understanding and visualizing the relationships between the Maker Movement and cities, based on three dimensions: the Context (part 2), the Tool (part 3), the Model (part 4). The Conclusions (part 5) summarizes

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the experience into a preliminary a framework (Figure 5) while suggesting potential future work.

1. CONTEXT: PEER PRODUCTION, MANUFACTURING AND CITIES

This section elaborates the coordinates of the context of the first prototype and then the framework emerging from it for understanding the impact of Maker initiatives along the following topics: 1) city and peer production: the city as commons, 2) peer production and manufacturing: the Maker Movement, 3) the Maker Movement and city manufacturing: the Maker and Fab City frameworks.

A first connection between cities and peer production is through the commons; cities and commons have been explored by several researchers and this article considers especially the framework developed by Foster and Iaione who state that

“the city is a commons in the sense that it is a shared resource that belongs to all of its inhabitants. As such, the commons claim is importantly aligned with the idea behind the “right to the city”—the right to be part of the creation of the city, the right to be part of the decision making processes shaping the lives of city inhabitants, and the power of inhabitants to shape decisions about the collective resource in which we all have a stake.” (Foster & Iaione, 2016, p. 288).

According to them, the issues of the commons (and therefore, also of the urban commons) is a question of resource characterization and a question of governance, and model their framework upon these two directions. Their vision of governance is particularly interesting for the scope of this research, since it is based on investigating how to bring more collaborative governance tools to decisions about how city space and common goods are used, who has access to them, and how they are shared. Such a vision see the government more as a facilitator or an enabling state of co-design processes of multiple actors:

“the role of the public authority, which becomes that of coordinator and mediator in co-design processes. [...] The governance output that emerges from this collaborative process is the co-design of particular urban commons, and neighborhoods, as well as the coproduction of community services at the city and neighborhood level.” (Foster & Iaione, 2016, pp. 337–388).

This framework is therefore useful for providing guidelines about the relationships between peer production and cities, and how to facilitate them, even if it mainly considers urban spaces and infrastructure as the entities of urban commons. In order to connect this with manufacturing initiatives, it is then important to consider the contributions that worked on understanding how commons-based peer-production can be related to the design, production and distribution of physical goods instead of digital goods (more commonly

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adopted in peer-production practices). Makers have been traditionally defined in a broad way, here we adopt Chris Anderson's definition that characterize them by 1) the use of digital desktop tools to design and prototype artifacts, 2) a cultural norm to share these designs with communities and collaborative processes and 3) the use of digital manufacturing technologies, spaces and services to produce such artifacts (Anderson, 2012). These three elements also points out which are connections with digital goods, practices and norms also present in peer production activities. Open Design and Open Hardware approaches are relevant approaches in the Maker Movement, even if not all participants always adopt them, and the network of workshops such as Fab Labs, Makerspaces and Hackerspaces provide a place and technology for their collaborative development and fabrication.

After connecting cities with peer production and peer production with manufacturing, the third conceptual connection of this section is the integration of peer production and manufacturing (with the Maker Movement) with the context and frameworks of urban or city manufacturing, especially in relation to the Maker Movement. During the recent years USA and European cities have witnessed a re-emergence of manufacturing initiatives, after the closing of almost all factories in the last decades of the 20th century. This phenomenon has especially attracted attention as a sign of recover from the Great Recession and, at the same time, a potential strategic direction for improving such recover with specific policies. It has noted how these new urban manufacturing initiatives are very different from the ones that ended decades earlier: they are more small, specialized, networked, collaborative, interdependent, with the goal of building stronger and more adaptable urban economies (Mistry & Byron, 2011). According to Bianchini and Maffei there are three reasons for this: 1) the recent reinvention of creative professions with the integration of different profiles or of manual activities, 2) the digitalization of manufacturing processes and its democratization and distribution thanks to Maker workshops and 3) the growth of critical consumption attitudes that prefer, together with other strategies, on-demand production and shorter supply chains (Bianchini & Maffei, 2015). Furthermore, together with Arquilla and Carelli they identify several activities that constitute urban manufacturing such as:

“i) higher degrees of specialisation of artisan productions and sophisticated customisation, echoing the growing culture of custom made; ii) production activities based on advanced forms of upcycling and recycling, reflecting a pragmatic demand for goods that are environmentally and socially sustainable; iii) businesses with service facilities equipped for basic forms of on-site production and repair; iv) forms of self-production promoted in the field of creative industries, working mainly on the innovation of products and processes; v) experimental production activities carried out

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by universities and research centres working mainly on technological innovation.” (Arquilla, Bianchini, Maffei, & Carelli, 2014).

Beside research and policymaking efforts, there are two contributions toward integrating and improving the connection between the Maker Movement, urban manufacturing and cities that work towards the involvement of Makers: the Fab City (Diez, 2016) and the Maker City (Hirshberg, Dougherty, & Kadanoff, 2016) frameworks. The Maker City proposal is based on the Maker Movement and the Fab City one is based on the Fab Lab network; interestingly, the same polarization Maker – Fab Lab has been observed also in the connections among Fab Labs, Makerspaces and Hackerspaces on Twitter (Menichinelli, 2016). Both aims at improving the integration and impact of Maker initiatives within urban manufacturing or generic city initiatives by getting involved also other stakeholders, with the common objective of improving both the Maker Movement and cities in becoming resilient and becoming ready for future changes.

Overall, these three perspectives constitute the structure of the context of the preliminary framework presented here: 1) the perspective of city as commons and collaborative governance together with the Maker Movement, Open Design, Open Hardware and the Urban / City Manufacturing perspectives constitute the main research axes of the framework while 2) the Maker City and Fab City proposals represent the experimentation and strategic development dimension (Figure 1).

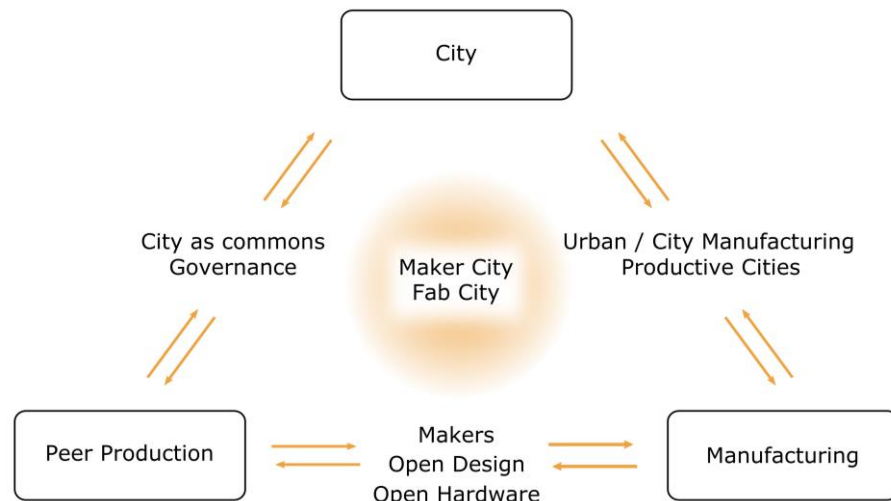


Figure 1: The structure of the context of the preliminary framework

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2. TOOL: VISUALIZING THE IMPACT OF MAKER INITIATIVES

The previous section presented the overall context for this research; this section documents how the research emerged – thanks to the development of a prototype – and its approach – a research through design approach. This research started when a workshop structured as 9 days hackathon provided the possibility for the development of a data visualization dashboard prototype for measuring the impact of Maker initiatives over cities, initially over their resilience ('Fab City Dashboard v.0.1', 2016; Medialab Prado, 2016; Menichinelli, Quintero, & Paris, 2016). Such workshop represented thus the first moment for translating some previous rough and simple concepts, ideas and discussions about a dashboard for Maker initiatives into a first rough prototype. This article represents a further step in the process by elaborating a first preliminary framework for measuring and visualizing the impact of Maker initiatives with a reflection upon the first prototype and its process, pointing out potential suggestions for refining both the prototype and the framework (Figure 2).

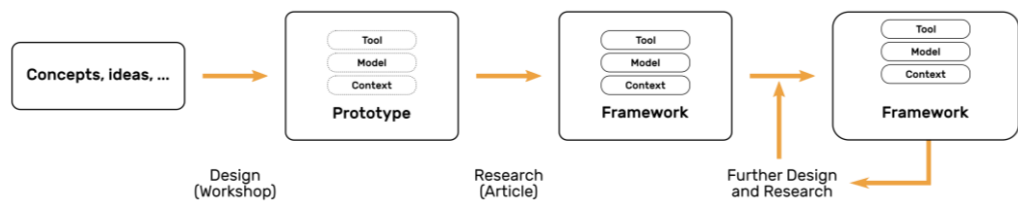


Figure 2: The process of the development of the prototype and framework

This process, prototype and framework could be considered as strategic design along two directions: 1) the visualization tool as a strategic design approach for improving Maker initiatives by measuring their impact and 2) the reflection upon the process as a further contribution to understanding the possibilities of a research through design approach, and its connection to strategic design.

Along the first direction, understanding the impact of Maker initiative is a sign of maturity of the Maker Movement if it becomes able to understand its own impact and therefore its own strategic importance, being thus also able to modify it and adapt it if necessary. If Makers understand their impact better, they a) can reorient their activities in order to strengthen it wherever and whenever necessary, b) can further communicate it and improve it (and this, hopefully, would bring to a larger impact by getting more stakeholders involved) and c) can become a more self-aware community that can provide evidence of its role in shaping society.

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Along the second direction, this experience could provide a starting point for connecting the research through design approach to strategic design. The impact of Maker initiatives (and especially over cities) is a recent and therefore under-researched topic: therefore, such research through design approach might have a role in order to build the foundations for future research. After an extensive literature review of research through design, Godin and Zahedi define research through design as “an approach to scientific inquiry that takes advantage of the unique insights gained through design practice to provide a better understanding of complex and future-oriented issues in the design field” (Godin & Zahedi, 2014, p. 1). Furthermore, they stress the fact that the artifact is not the goal of research through design; knowledge and understanding is. According to Zimmerman and Forlizzi, in research through design:

“researchers make prototypes, products, and models to codify their own understanding of a particular situation and to provide a concrete framing of the problem and a description of a proposed, preferred state [...] By practicing research through design, design researchers can explore new materials and actively participate in intentionally constructing the future, in the form of disciplined imagination, instead of limiting their research to an analysis of the present and the past” (p.42) (Zimmerman & Forlizzi, 2008, p. 42).

Furthermore, we need to specify the difference between research through design and practice-based research (PbR): the goal of research through design is to gain knowledge by exploring a phenomenon, with an artifact as a side effect; the goal of practice-based research is an artifact, and insight is a spin-off (Horváth, 2007; Stappers, Visser, & Keller, 2015). The preliminary framework presented here emerged thanks to the development of a prototype, but it is also tightly connected to it conceptually and operationally: it is not just a visualization tool developed after the framework, it is a visualization tool that enabled the development of the framework. The idea behind the prototype was to design a dashboard that can help cities and citizens to understand how citizens design and produce in urban spaces within networks of suppliers, manufacturers, craftsmen, Fab Labs, Makerspaces, Hackerspaces, and so on. The first prototype of the dashboard was developed as a tool for answering these questions: 1) what is the resilience of a city regarding its manufacturing, distribution and consumption of goods? 2) what is the role of citizens in changing the existing networks with open, distributed and collaborative projects and making activities in the city?

During the last decades, dashboards have increasingly introduced into companies and cities as visualization tools for informing decision-making processes with data-driven methodologies. As a tool, the metaphor of a dashboard is the driving (managing) of a

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machine, since its main definition is of “the panel facing the driver of a vehicle or the pilot of an aircraft, containing instruments and controls”, which originated from the “board of wood or leather in front of a carriage, to keep out mud”: we therefore have now “a graphical summary of various pieces of important information, typically used to give an overview of a business” considered as a machine or vehicle to be manually driven with the help of the provided information (Oxford Dictionaries, 2017a). Dashboards have been used extensively for monitoring cities and especially the implementation of smart city technologies, be them digital and web-based dashboards or physical places, rooms with several displays. Dashboards normally use several city indicators (Kitchin, Lauriault, & McArdle, 2015), for single cities or for benchmarking cities against each other, be them single (measuring one phenomenon) or composite (deriving a measurement by balancing several phenomena), and are usually designed as:

1. descriptive or contextual indicators (providing key insights);
2. diagnostic, performance and target indicators (providing assessment of a performance);
3. predictive and conditional indicators (providing simulations and predictions).

The strategic (design) importance of dashboards is explained well by Kitchin, Lauriault and McArdle:

“rather than making grand but limited claims to showing cities as they really are, openly recognize and acknowledge: (1) the multiple, complex, interdependent nature of cities that means they cannot be simply disassembled into a collection of facts; (2) they do not merely reflect cities, but actively frame and produce them; and (3) they are not toolkits but data assemblages – complex socio-technical systems infused with politics and context” (Kitchin et al., 2015, pp. 24–25).

Dashboard visualizations should not be then considered as neutral, apolitical tools, since they “express a normative notion about what should be measured, for what reasons, and what they should tell us, and are full of values and judgements shaped by a range of views and contexts” (Kitchin *et al.*, 2015, p. 18); therefore, the strategic importance of dashboards for the Maker Movement can be found then in their ability to both measure, visualize and actively improve and promote its current conditions.

The prototype of the dashboard developed during the hackathon is a proof-of-concept visualization tool that provides a first experimentation for understanding the resilience of cities and the impact of Maker initiatives over it (Figure 3). Its model consists in 1)

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understanding and visualizing the resilience of a city, its region and country according to a list of indicators and 2) simulating the impact of Maker initiatives on city resilience according to such indicators, and with the potential multiplication of installations or production of the initiatives, a potential multiplication in its available budget and a potential multiplication of the number of people participating in it. At this stage of development, indicators should be considered only as descriptive or contextual regarding city, region and country resilience; the impact of Maker initiatives on city resilience should be considered as a proof-of-concept of predictive and conditional indicators, that needs more robust models in order to become more realistic. Once both will be developed into a stable framework and connected with continuously update sources of data, diagnostic indicators might be added. The visualization of city, region and country resilience indicators is a static one; conversely, the visualization of the impact of Maker initiatives is a simple simulation that enables users to add more installations or production of a Maker initiative, more budget or more participants to it in order to dynamically see how these changes might affect the city, region and country resilience.

The prototype was developed in a 9-days hackathon, and not enough data sources were found for all the desired dimensions, and therefore some relevant simplifications were made in order to develop a proof-of-concept rather than a realistic and complete tool. More specifically, no complete, openly available and globally coherent source of data was found for city resilience, and therefore it was reconstructed by adopting the common elements of the OECD national (OECD, 2011) and regional (OECD, 2014) well-being indexes as the closest datasets available to existing frameworks for measuring city resilience. City resilience was calculated by multiplying regional well-being with the averaged ratio of city over region for GDP and population (as this was pragmatically found to be a very rough but acceptable simulation for delivering the tool on time and also conceptually related to the fact that cities have always been interconnected with surrounding regions and countries). The impact of Maker initiatives over all the resilience indicators is simulated by the user and it is calculated with hypothetical factors that would require robust research. These choices were taken in order to finalize the prototype on time and to provide a first rough reflection about its possibilities; the emerging model has been elaborated afterwards based on this experience and it is depicted in the following section.

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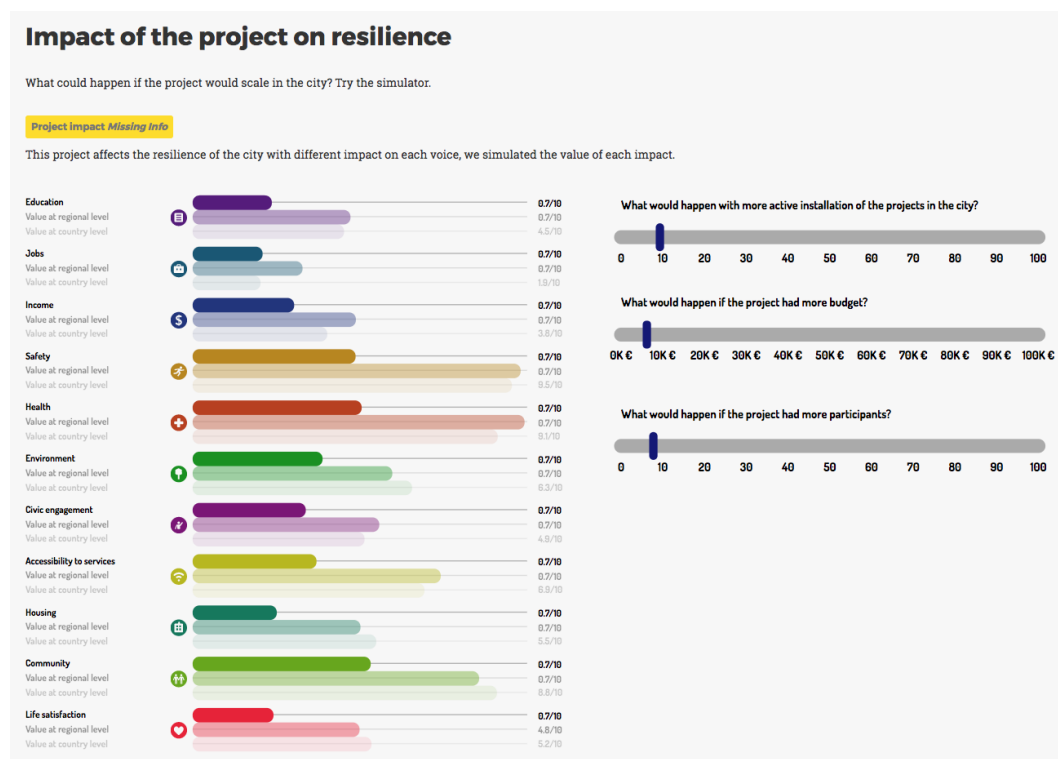


Figure 3: Simulation of the impact of a Maker initiative on a city resilience

3. MODEL: MEASURING MAKER INITIATIVES AND THEIR IMPACT

This section presents an overview of the potential perspectives and approaches for measuring Maker initiatives and their impact over cities and regions, in order to contribute a model for their assessment and communication. Developing models is a critical task in order to enable the research, visualization and improvements of the concepts of the whole framework, and their structure and features have a strong influence on the whole process and its complexity. Such models need to be carefully thought in order to document and communicate the concepts of the framework, taking into consideration the trade-off between complexity of the model and its usefulness for the framework and its users. Models are defined as a “[...] representation of a person or thing or of a proposed structure, typically on a smaller scale than the original” or a “simplified description, especially a mathematical one, of a system or process, to assist calculations and predictions” (Oxford Dictionaries, 2017b). They are therefore simplified descriptions that cannot comprise whole phenomena, they are abstractions that are not what they describe but just a way to interpret them, hence the popular quotes that “a map is not the territory” (Korzybski, 1958) and that “all models are wrong but some are useful” (Box, 1976). Therefore, the goal of this section is to point to the

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most strategically promising ways for modeling Maker initiatives and their impact over cities and regions rather than to create the most advanced, elaborate and complete model.

One of the most important features of the Maker Movement is the process like-minded but distributed and disconnected actors, whom are not always connected and interacting among each and that are slowly building a global community. This difficulty in perceiving and measuring such vast and scattered phenomena can be seen in both the Maker Movement; this can be considered a consequence of itself distributed nature and also a sign of the importance of studying it in order to better understand other social distributed systems as well. This section explores then 1) contributions towards modeling and measuring Maker initiatives 2) contributions towards modeling and measuring city resilience and wellbeing.

Maker initiatives can be identified as organizations (businesses, no-profit, social businesses, informal initiatives, and so on) that work within the Maker Movement in order to create, promote, network individual makers, and example are businesses (production of tools for makers), workshops (offering the access to tools and spaces), associations and foundations (promoting makers). This article focuses on Maker initiatives as a proxy of Makers and the Maker Movement, since they are relatively easier to identify, model and measure compared to individual makers. A first step in modeling Maker initiatives is therefore to consider them on the basis of their purpose, for example the creation of social innovations, design processes, educational activities, production of artifacts, delivery of services. This would give a more nuanced perspective about Maker initiatives, recognizing the different goals and identities that are part of the movement; these dimensions could be explored in order to understand more the Maker Movement, but also in order to focus on its specific impact (for understanding it and for improving it). However, this approach barely add a first structure to the still complex model of Maker initiatives, and each dimension can be explored with several assessment methods and frameworks and would require more dedicated research. For example, the first dimension of social innovations could be modeled and measured with Social Impact Assessment methods, but there are at least 76 different approaches that can fit in 4 different categories (Grieco, Michelini, & Iasevoli, 2015). Furthermore, a complete and highly relevant approach in this context is the socio-economical, environmental and political impact self-assessment methodology for digital social innovation initiatives developed within the IA4SI Horizon 2020 project (Bellini, Passani, Kiitsi, & Vanobberghen, 2016). Design activities can be assessed in several ways, and several researches have been done on their ROI considering them as an economic factor of production (€ Design | Measuring Design Value, 2014) or measuring its potential in generating innovations (Millot & Galindo-

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Rueda, 2015). Regarding the educational dimension, special attention should be given to methods and framework for assessing learning initiatives tailored to maker education or makered initiatives and not to education in general (Blikstein, Libow Martinez, & Allen Pang, 2015; Peppler, Halverson, & Kafai, 2016a, 2016b). The emerging model of Maker initiatives is still quite complex and yet not defined, pointing to the fact that further dedicated research based on these notes is necessary.

The first work on this model was done during the development of the prototype described in the previous section: the starting point was the concept of resilience, and especially of city resilience (and therefore of the impact of Maker initiatives over it). Resilience is particularly important in psychology, where it is carefully assessed with several methods (Windle, Bennett, & Noyes, 2011). Regarding local communities and cities, an important definition comes from Magis who sees community resilience as “the existence, development, and engagement of community resources by community members to thrive in an environment characterized by change, uncertainty, unpredictability, and surprise. Members of resilient communities intentionally develop personal and collective capacity that they engage to respond to and influence change, to sustain and renew the community, and to develop new trajectories for the communities’ future.” (Magis, 2010, p. 402). Communities can therefore develop resilience by actively building the capacity to face change and respond to stress, and this is an indicator of social sustainability. Community resilience is often also associated with disaster or emergence risk management, and a systematic literature review by Ostadtaghizadeh *et al.* found that there is no clear definition for this topic and that only 2.52% of the publications found attempt to measure it and with mostly qualitative methods (Ostadtaghizadeh, Ardalan, Paton, Jabbari, & Khankeh, 2015). This suggests the need to identify a set of predictors that can be translated for use within a specific culture for its assessment and for the development of a common framework. Moving towards a more specific focus on cities and resilience, an important framework is the one developed by Arup with support from the Rockefeller Foundation: the City Resilience Framework and the City Resilience Index (da Silva & Morera, 2014). This effort provides a practical definition of urban resilience, based on four dimensions: 1) people, 2) organization, 3) place and 4) knowledge. The framework and index is based on 52 indicators assessed through 156 questions, both qualitative and quantitative. It is therefore a complex and well elaborated framework, but its downsides are that it has been applied to only five cities so far, and the data is not openly accessible, becoming thus not viable for the development of the prototype. In the context of the 9-days hackathon where the prototype was developed, there was the need to find a complete enough framework in order to have ready-available (or easily

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computable) datasets. For this reason, another similar framework was studied and adopted; not only it provided openly available datasets at global scale (even if they don't cover all countries), but it was developed at national and regional level. This contribution was developed by OECD in order to measure national (OECD, 2011) and regional (OECD, 2014) well-being indexes: this concept is not directly linked to resilience (but might be to the psychological perspective), but in its structure it is partially similar to the Arup framework; this approach did not provide data for cities but for country and regions, and this limitation was considered relevant but for the sake of the prototype development it proved to be viable for simulations and experimentations. OECD developed this framework based on a tradition of working with social indicators and quality of life with the objective to understand human progress beyond the simple measurement of GDP.

No complete definition, framework, openly available datasets were then found for understanding and measuring city resilience. Even the modeling of Maker initiatives needs more effort in terms of concepts, methods and datasets. However, this preliminary exploration found that the concept, datasets and approaches of country and regional well-being done by OECD made possible the development of a prototype and a first structure of the model of the framework. Furthermore, the concept of well-being is broader than the one of resilience, and possibly even more apt for understanding the impact of Maker initiatives over city well-being as a proxy of the impact of the Maker Movements over society, the environment and the economy. This article argue that a help in the task of further defining this model might come from the models and assessment methods and frameworks dedicated to city and region well-being. In this way, the two models would have a common interface that enables not just an easier development of the Maker initiatives model, but also the measurement of the impact of them over the city and region well-being model. In this case, just as the model of Maker initiatives would be a proxy for the whole Maker Movement, the model of city and region well-being would be a proxy for society, environment and the economy, and this preliminary framework would measure their relationships as the proxy of the impact of the Maker Movement. The adoption of city and region well-being as a proxy would also enable us to understand the impact of the Maker Movement not globally and in a broad way, but localised in the cities and regions where the Maker initiatives are present (figure 4).

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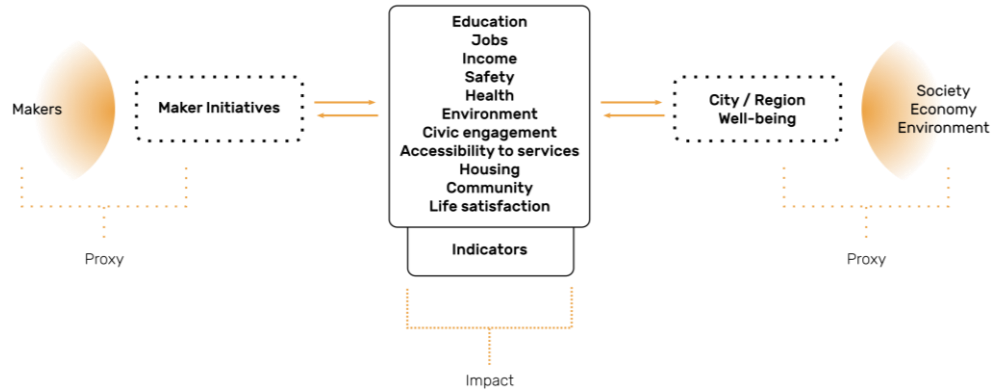


Figure 4: Model of the framework

4. CONCLUSIONS

The Maker Movement might be a promising connection between peer production and urban manufacturing, with positive social, economic and environmental impact. However, in order to both understand this connection and if its impact is positive and in order to improve it, a complete framework with theoretical context, models and visualizations tools is necessary, and this article proposes a preliminary framework that emerged from a 9-days hackathon prototype with a research through design approach. Such preliminary framework is based on a theoretical context (that provides concepts, ideas, frameworks, and so on), on a model (that describes Maker initiatives and their impact) and a data visualization tool (that connect the models and the context with specific Maker initiatives and cities) (Figure 5).

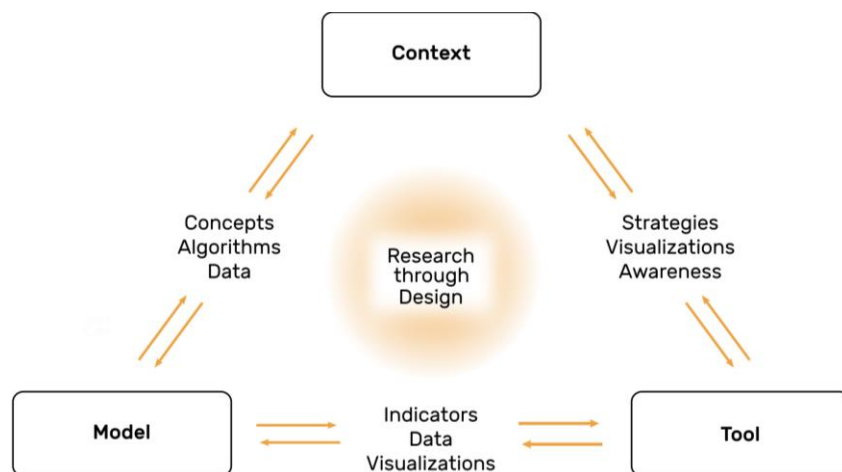


Figure 5: The structure of the preliminary framework

The context, models and tool are interconnected, and this article shows how they need further research, and at the same time it outlines a structure and strategies for doing this. The context should be further explored; the models should be fully elaborated with an

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extensive literature review of methods and frameworks; the tool should be updated to reflect both and act as an experimentation for their improvement as well. Furthermore, the framework should also be validated with the participation of Makers, researchers and other stakeholders in order to understand if it is understood, what experiences it provides to different stakeholders and what is its impact over them. The prototype currently answers only partially to the questions it aimed to, but it provides instead an experimental opportunity for developing a more structured framework for researching and building a more complete and stable tool in the future. This article aims at contributing a small step towards measuring the impact of Maker initiatives and hopefully improve it, especially in the context of cities. One of the main insights generated in the experience here documented is that urban manufacturing is, more than resilience, also well-being of citizens and we can actively design it and research it through these designing activities.

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