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Participatory tool for productive citizenship in a regional maker network

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Participatory tool for productive citizenship in a regional maker network

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Abtract: The various types of fab-labs and makerspaces distributed in the urban context can be recognised as an organism capable of optimizing resources, producing ideas and artefacts in a participatory culture, that is also a tool for citizen engagement and self-organisation. This contribution reports on a series of surveys aimed at identifying and evaluating the network of urban manufacturers and users across the maker culture in Italy's Lazio region. These actors are inserted in a framework of public and private initiatives, and they cover a social role within the urban fabric. Based on the regional context of inquiry, the ongoing research proposes a new platform, which should become a tool for coordinating digital manufacturing resources, thus improving their potential of acting as a diffused supply chain of services and products, stimulating social innovation, shared economies, and good practices of resilience.

Keywords: citizenship, community supported project, multi-sided platform, co-design, local manufacturing

1. Introduction

The Maker Community social response to the insufficient mass production and distribution of personal protective equipment during the COVID-19 sanitary emergency, characterized by global diffused bottom-up initiatives of volunteers' DIY production of sanitary supplies, has finally proved the role of maker practices in determination of local community resilience, already theorized in response to the 2009 economic crisis. Most of the scientific literature recognizes in maker practices, intended as the combination of digital fabrication technology and open design, a revolutionary potential to define more resilient development models, identifying the Maker Community social response phenomenon extended the awareness to the Public Administration (PA) that in some cases was participating to managing the distribution and mediating the acceptance of products.

Indeed, the present contribution stems from a previous collaboration with the Lazio Region administration on the Maker Network's potential in defining a new model of citizenship, based on renewed proximities.

A pre-pandemic overview on the maker economy was showing an extraordinary proliferation of the Maker Network. Referring to the Fablab Network sub-set, diffused in US thanks to the pioneering PA support received since 2011, the global number of Making Laboratories (MLs) was doubled in every one and a half year until 2017 (Gershenfeld et al., 2017). As described in previous studies (Monaco et al., 2021) the EU declination of the Maker Network model has been strongly characterized by PA support in top-down ML foundation and from a shift of perspective over the maker movement that, between 2016 and 2018, moved from the civic role of social technological empowerment and educational commitment to a local economic booster role. This institutionalization process has been followed by a global contraction of the Maker Network, visible in the decreasing number of Maker entities registered in the most representative platform (fablab.io and wiki.hackerspaces.org), measured in Europe since 2015 according to the JRC report on EU makerspaces (Rosa et al., 2017).

Subsequently the role developed by the Maker community in rebuilding proximities during the sanitary emergency has highlighted again the intrinsic social vocation of maker practices beyond the PA orientation, and how necessary they are to increase the resilient response of a territory. This renewed scenario covers new meaning to the investigation of the causes of the global crisis of the Maker Network, from resource improvement to which raises the research question: How are evolving Maker realities and which direction should they move? To this question, the paper responds with a territorial case study, focused on the Lazio Region.

Where the term "proximity" is intended both in the "horizontal" definition of geographical vicinity, necessary for resilient response, and in a "vertical" definition between multi stakeholder interaction, equally necessary to the resilience improvement (Zheng & Chan, 2013). As result of this, the emerging new kind of functional and relational proximity also generates communities along with new opportunities that will require to be sustained by proper service distribution (Manzini & Pais, 2021).

In response to the emerging insights, the Research hypothesizes that a new digital tool could stimulate sustainable development of the regional network. The redefinition of proximities can be seen as a dynamic process that is facilitated by a multi-sided platform that could be identified as a *hyperlocalist* mediator. Being part of a doctoral research, the definition of this hypothetical platform reaches the level of general requirements and guidelines, while the execution may be subject of a future project.

2. Innovation for and with communities

Design acts as a strategic tool in triggering, supporting, and enhancing social innovation, while putting designers as infrastructures to support initiatives for autonomous and self-established communities (Morelli & Sbordone, 2018). This approach to design discipline opens to a much broader disciplinary field that goes beyond production, technology, and market (Meroni, 2007; Villari, 2012) presenting a relatively new combination of methods and introducing a range of tools across many areas of design. A co-design focused on communities for the design of relationships, strategies, products, and services, based on the enhancement of

both human and territorial capital. This dynamic place sees the citizen at the centre, who autonomously finds solutions through bottom-up interventions, starting an innovation process that no longer passes through institutions or authorities (top-down). In a broader perspective, therefore, design supports communities by proposing solutions to problems that, according to Manzini (2014), neither the market nor the state have solved. In a highly self-organized context, design becomes a useful tool for understanding and developing social innovation by mediating public and private needs.

The impact that those empowered citizens had on public affairs has attracted the attention of PA, pushing towards the establishment of new governance models and new generations of urban entrepreneurs, which are active "for" and "with" the local community to collaboratively achieve common goals useful to the society itself (Smith et al., 2016). Indeed, the European policies, that hoped for a growth of local realities in more inclusive and sustainable contexts for 2020, conceived those factors of well-being as a union of social, environmental and economic capital (Stiglitz et al., 2009), opening up to collective scenarios such as those implemented by Commons policies (Rifkin, 2011), where makerspaces play a crucial role as social driven tool in supporting thematic exploration, accessing to technology, citizen empowerment (Taylor et al., 2016). This civic role becomes a determining element for those municipalities that compete to create environments and attract innovation (Hoyler et al., 2018).

However, there is a critical need for stable policies and practical solutions to the challenges posed by the organization of work, which, according to the Science for Policy JRC, have been treated in an increasingly marginal way both at a media and political level (Rosa et al., 2018). This process should seek inclusive methodologies that would allow the society to envision a participatory future, where studies, experiments and dialogues can promote the co-creation of the necessary knowledge addressing more important social problems.

2.1 Regional scale and virtuous examples

The evolution of Hackerspaces, from places of diffusion of an active technological culture to Makerspaces as potential places of widespread production in the territory (Menichinelli, 2016) has brought the traditionally informal spaces of design and production at the centre of a new debate on the resilient city.

Taking in example the case of Dwarka (Ghawana & Zlatanova, 2013), a *subcity* of Delhi, where 3d printing technologies and a Geographic Information System (GIS) approach has been applied to the overall urban planning structure, in order to let the PA and designers involved understand and redesign specific methods and services for the targets highlighted. The example showed that it was possible to adopt 3D printing applications for local scale urban planning even in big metro cities like Delhi. Depending on the need for discussions and area coverage to be considered, it could advocate a participatory approach for urban / city planning.

Other virtuous examples such as the one by Vicente Guallart, city planning councillor of the city of Barcelona (Spain), who in 2011 founded the first European Fab Lab in response to a crisis scenario that saw youth unemployment exceed 50%, proposing a new model of the city. Production based on digital manufacturing of the "data-in, data-out" type, to be contrasted with the traditional idea of the city as a place of consumption "products-in, thrashout" (Gershenfeld et al., 2017).

This model of "self-sufficiency 4.0" promoted for the Barcelona Smart City plan in 2014, although it was superseded by subsequent city administrations, had a double effect by recognizing the civic role of digital manufacturing laboratories, that has been compared to services such as public libraries, and by placing the bases for the "Fab City Pledge", a transnational program that is proposed as a natural evolution of the Smart City towards a more resilient and decentralized model of sustainable development of the city itself. The distribution of makerspaces (*ateneu digital*) in each district was included ten years later in the current plan of "Barcelona Ciudad Digital", implementing the transformation of an informal network of self-managed bottom-up spaces to a new top-down cultural infrastructure (Capdevila, 2014). Those virtuous examples demonstrated the role of MLs transcends mere production for self-consumption, as well as local production, opening to the involvement of citizens in public affairs to "manufacture" more resilient cities (Menichinelli & Schmidt, 2019). From the PA perspective, Zaragoza municipality and Aragon Region (Spain) constitute an interesting, undervalued case study, of top-down approach in favour of open innovation and social technologic empowerment. The urban and social context is characterized by only 3 open Maker laboratories, facing a community strongly committed to the principles of maker culture. Zaragoza's PA have been promoting since 2016 a series of calls for community-based initiatives with hybrid crowdfunding and public funding, aimed supporting bottom-up initiatives of social innovation based on maker practices. Among the virtuous and successful projects, the project "*Como esta el patio?*" represents an efficient case under different aspects: an association of parents committed to learn CNC machining techniques for the construction of structures for the reconditioning of their neighbourhoods' school patio. This experience, becoming a format for schools called "*Imagina tu patio*" has proved how social innovation does not reside exclusively in the use of technology but more in the new relationship generated between PA and citizens. The latter recognize in the practice of community action and self-construction applied to public space a potential field of action for social innovation, guiding citizens beyond social appropriation to res publica.

Among various international experiences, also in Italy new forms of making have been identified (Maffei et al., 2015) which have gradually opened to new policies in favor of hybridization or the shift between professional and productive activity, looking at the dual nature of independent innovators and manufacturers (Maffei & Bianchini, 2014).

The Distributed Design Market Platform project, a broad European collaboration with two partners also in Italy (Milan), intends to position manufacturers in well-defined market areas thanks to a Design Driven approach, resumes intentions similar to the examples cited above.

In the Italian panorama there are extremely different realities, from Milan where makerspaces are complementary to a rich cultural fabric and widespread design culture, to much less urbanized regions where the spontaneous birth of makerspaces is more difficult, and innovation is a cultural challenge.

Local, provincial, and regional PAs therefore take on a driving role in this economy of experiences by intervening with policies and programs aimed at strengthening existing communities, as in the case of the MakER network of Emilia Romagna and the FabLab network of the Lazio Region. MakER was a network of private laboratories and self-organized makerspaces which created a widespread factory in which the technical equipment of each laboratory was complementary to the others in favour of a more responsive production chain (Cattabriga, 2019). Another example is Lazio Region's "Spazi Attivi" network of 10 spaces that in 2015, thanks to the joint intervention of citizens, PA and companies, distributed across various urban areas as a single widespread Fablab, whose hybrid functions between business incubator, living lab and educational space, have been declined in individual structures according to local conditions. These two examples represent two overlapping approaches to the independent culture of fabricating citizens: the makerspace as a widespread factory, and a space of co-creation as cultural forge.

3. Making entities and potential community

The reflection on the methods and approaches that design can trigger a virtuous circle of social planning and policy making, in a set of various experiences that produce a radical change in the system in which they operate (Transit, 2017). Consequently, designers are transformed into politicized agents of change (Fry, 2010) to overturn many deeply rooted political, economic, ideological, and technological foundations. Self-generated movements provide practices and models that, with a view to preserving their social identity, must be able to be protected and cultivated by generating public services or even public policy (Selloni, 2018). Design and Research are called upon to build a co-design path intended to produce different outputs depending on the reference context, in a form of social activism that develops a counter-narrative for social innovation (Fuad-Luke, 2009). Lazio urban centres such as Rome's one, with its satellite centres dotted with "self-productions" (Cellamare, 2014), constitute interesting research contexts to develop reflections on redevelopment processes and forms of self-organization seen as a structural fact of contemporary cities.

Technologies has assumed a social role through time in supporting the births of hybrid communities in physical spaces, that therefore requires a deeper thought on re-placing those technologies "that re-create or reinforce the connections between people and physical places thanks to digital spaces" versus displacing ones "that moves people and their relationships out of physical places towards only digital spaces" (Manzini & Menichinelli, 2021). Approaching then the case study of the Lazio Region territory, the Research includes in its investigations several different productive realities, questioning their proximity with the PA

and local community in order to address the role played by the enabling technologies as social mediator in which it is possible to recognize new ways of networking, transfer knowledge, developing competences even within a global crisis.

The study has been developed on 2 layers of investigation:

- by collecting public data in order to map making entities and obtain a picture of the Maker Network and maker practices in Lazio, considering its numbers, locations, accessibility and specializations;

- by conducting interviews in order to understand the digital manufacturer's community necessity and evaluate their proximity relationships.
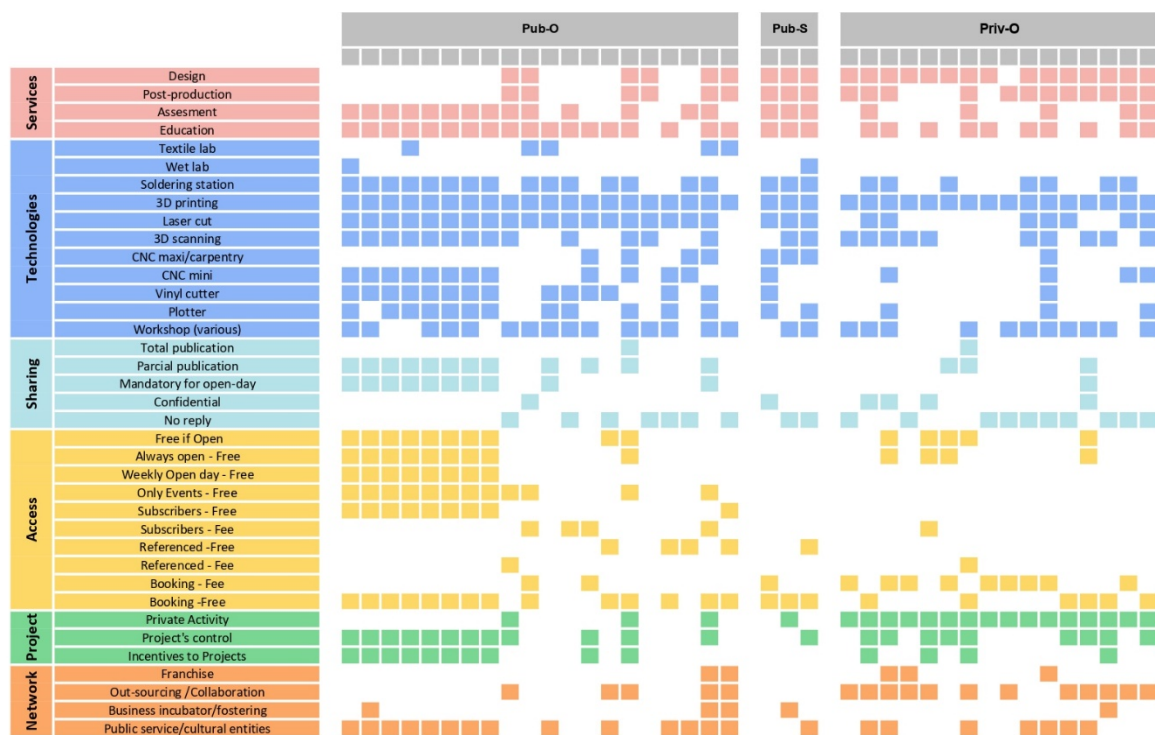

Figure 1. The table above shows the preliminary information retrieved from the internet and the feedback given to the specific questions made via phone calls by the laboratories which have been divided by their assets in three main columns: Pub-O(pen), Pub-S(elective) and Priv-O(pen). Squares represent positive answers given to the questions reported on the left side bar.

3.1 Mapping making entities

More than 50 entities have been catalogued and profiled (as shown in figure 1) depending on equipment, sharing and access policies, activities. Starting from the analysis of the information available online, direct interviews have been conducted with each entity, by mail and phone calls (prioritizing interviews instead of surveys). This first screening brought to the definition of 3 categories: Public Open laboratories, Public with Selected Access laboratories,

Private Open laboratories. Then, "somatic traits" have been reported as such: services provided, technological equipment, openness of the projects initiated at the lab, customer care, original projects developed, inclusion or relationship with a specific business network (including outsourcing). A visual map (Figure 2) has been therefore developed in order to link data collected by each ML in relation with their reciprocal proximities.

The network of Fablabs maintained by the regional innovation agency works as a unique diffuse workshop, with complementary equipment but similar services. Apart from the similarities within this network (the first 8 columns of the table), there are no strong differentiating factors among private and public entities, suggesting that there is a migration from public to private models.

Figure 2. Graphical output of the mapping step.

Focusing on the services offered, education is transversally offered in public and private structures, while the private ones are more interested in offering design consultancy. Another observation is that there are several realities which are "isolated" from the maker community, not participating or proposing innovative projects on their own but only providing fabrication services. Many laboratories responded negatively to the question about sharing policies – i.e. they do not require or promote the sharing of design files – which suggests

that there is a room for improvement of the open innovation culture in the examined context.

3.2 Focus on relevant cases

After the mapping activity, 6 entities, covering private and public sector, were selected which seemed to best represent the digital fabrication laboratories across the Lazio region and adequate to evaluate its social value, skills, and local impact. Those entities were: a national foundation, a regional network of MLs, a local Fablab, a startup related to digital fabrication, a 3D printing filament producer, and a 3D printing service. A campaign of low structured interviews has been conducted, according to a ground theory approach - giving the opportunity to reach a topic throughout conversations - and holistic evaluation. The interviews gradually led the responders to tackle some aspects of their activities, the perception they have regarding the relationship with PA and above all questioning their role within the social and economic context they profile into. From those interviews it has been possible to have an overall understanding on topics such as their economic model, user profiling, openness, PA involvement.

The economic models of public MLs are shifting their cultural objective in favour of financial booster and project incubator, with an increased focus on intellectual property. This led the latter to be more selective with their audience, shifting from direct alphabetization to mentoring programs and research support offers. Instead, private MLs, that were founded with educational purposes, have been forced to shift to service practice for economic sustainability (also due pandemic restrictions). Furthermore, despite the differing opinions on the issue of the role covered as a "digital manufacturer", they commonly seem to be still economically indecipherable: that is, digital manufacturing has not yet found a stable and consolidated economic model within these spaces.

Within private MLs, networking activities as well as interactions with the users are carried on mainly via traditional channels such as direct contact meeting, events, or door to door activities for SMEs. Regardless their proximity relations, there is a robust community characterized by strong, interdependent personal and professional relationships that do not correspond to a synergic vision of a new production/distribution short chain model. In fact, among all the interviewed MLs, digital manufacturing is still not considered as a relevant alternative for mass production. Regarding their audience, public MLs profile their audience under 35 years old users with an academic background, while private MLs seem to be not actually interested to profile their customers by age.

The Open concept, as well as for sharing activities, has revealed a diffuse miss-use of characteristic Open-Source design sharing platforms, especially for SMEs. Public MLs affirmed that they do not open the design, sometimes justifying the practice with the necessity of protection of possible patents, while private MLs recognize open innovation as a necessity to allow SME development, but don't usually share design anyway for third party interests. Regarding this, there is a widespread misalignment between digital and physical identities: person to

person design development is not corresponding with Open-Source design and sharing practices. It is not possible to define a proximity client's environment, even if the commercial network is mostly based on door-to-door relationships.

The PA role has been reported to be simultaneously fundamental for the development of a sustainable management model, but unclear in giving guidelines to calls and funding opportunities in supporting Maker Network challenges. To sustain MLs as spaces in which the sharing and co-design practices of the consolidated digital community come physically, new governance models should be then considered as undoubtedly necessary.

It has been acknowledged the condition of the evolution of Open projects among the Lazio population - it is therefore assumed that the respect due to NDAs or business secret in place within these spaces can instead become a stimulating key to the establishment of projects: not looking specifically at the products developed and the consultancy offered (which therefore characterize the laboratories by competence and qualify them by specialization), it is possible to classify the individual laboratories by topics of interest that can open to connections based on their "disciplinary areas", rather than on the equipment and skills.

4. A tool for participatory making

Considering the information gathered, we have identified the need for a systemic intervention in order to stimulate interconnection and promote open innovation within the regional network of MLs. Such aim requires a significant effort of mediation, which at the moment cannot happen through the existing channels of physical or virtual communication, nonetheless the existing platforms such as fablabs.io, make.works. As reported by the interviews, existing platforms are characterized by a wide variety of information that, most of the time, lead the user to get lost, or in some other cases implement off-topic updates unrelated to the main interest of the research. This approach is in contrast with the needs identified through interviews, which suggest a need for a platform that should be able to frame a set of projects, tools, services capable of active fruitful interactions between Maker Laboratories and their community of proximity and with the PA.

Several studies have been recently developed under a wide range of European call topics, ascribable to the European Commission's challenge to boost more inclusive practices for policy making made by non-experts' inputs by means of citizen science and Maker practices (Figueiredo Do Nascimento et al., 2017). The thrive of new tools for policies' co-design has been one of the effects, having maker laboratories, in the living labs declination, as native environment of mediation between community maker practices, territory, experts and PA Some examples of these are the UrbanM toolkit (Malakuczi et al., 2020), designed to improve public laboratories audience; the SISCODE toolkit designed to help the living labs as well as PA respectively in develop and establishing good practices and policies; the Urban Social Innovation Index developed by the DSI4EU project for Urban policies evaluation. Based on these experiences, the present study suggests a set of guidelines for a mediation tool between citizens and PA. Therefore, the Research foresees some aspects for a multi-

sided platform, context-aware and geographically limited, that could be possibly led to practical responses to the critical points emerged above by:

- providing a publicly available and comprehensive mapping of MLs in the Lazio region;
- providing information about the available tools, services and production equipment;
- providing advanced search capabilities among MLs according to a wide range of filters;
- improving synergies between those MLs that struggle in structuring good partnership that could go beyond the mutual offering of products and services;
- stimulating the birth of community supported projects;
- providing a new participatory media for citizens and PA.

Even though a sophisticated way of connections seems necessary, it is important to avoid the burden of managing an additional complex system, therefore social media like messaging or posting functionalities are not foreseen, if not by automatic API integration. This tool would then act as a multi-sided platform for comparison and visualization of collected data, a map with individual nodes representing georeferenced MLs within the area, linking to each of these one of the values investigated and reported at the end of the map. The platform would therefore act as a seeder of community supported projects, where the degree of openness of each single project is defined by proposer or proposing community. Possibly this would lead to put the basis for the birth of a set of community supported projects that would hopefully generate a response on two levels:

- bottom-up: for which the community can express specific needs and ask other MLs to participate in the development of a specific project;
- top-down: for which the PA, having a clear picture of the potential and the "project trends", will be able to realize its initiatives in proposals that can respond in a timely manner to the needs of the community itself.

5. Ethical considerations and further challenges

The ethical constraints of the guidelines suggested act on three frontiers:

- the non-inclusiveness determined by the proximity definition;
- the real participation issue and the tokenistic practices of exclusion;
- the open innovation mandatory approach and the exclusion of professional profiles;

The first is related to the proximity definition and affects the general public participation by the boundary definition of a territory and its community. For such definition is crucial the

role of involvement of PA, that on the one hand automatically defines a maximum "territorial proximity" limit, and on the other hand inserts the "vertical proximity" potential that transforms the platform from a thematic social network, into an instrument of real participation in territorial resilient development. For example, the proximity definition process is specifically difficult in the territory analysed in this contribution. Lazio Region is strongly characterized from the Rome's attractive pole witch metropolitan area overcome the regional boundaries. In this kind of context proximity definition need to become a dynamic parameter, customizable on the territory and on different scales, action by action basing on the community definition.

The second considers the ideal condition of real participation as limits of the PA power of action's proposition. The dichotomous user's constraints of PA and Citizens (extended to non-professional Makers) is based on citizen empowerment, characterized by partnership, power delegation and citizen's control, in opposition to the tokenism of informing and placation practices (Arnstein, 1969). Such conditions founding on bottom-up initiative a "sine qua non" condition in calls for community supported project propositions, delegates to citizens the power of project's limit's definition and users. For example, to perform a citizens' empowerment participation mechanism PA should not propose top-down enquiries, consultation or call for specific issue but observe the bottom-up activity and support them by assessment to bottom-up action development and call for good practice replication. Assessment intervention should be aimed at going beyond the grey zone between res publica definition and social appropriation, promoting and guiding community supported actions on the territory. Funding for replication should aim at capitalising good practices that could become models of social innovation actions "readymade" for citizenships.

The third is proportional with the open innovation policies and could determine the exclusion of parts of citizen categories as experts and professionals. As we learned from the interviews campaign, Lazio Maker entities' digital presence is proportionally inverse to their territorial routing. This phenomenon in countertrend with the Glocal paradigm (Bauman, 2005) needs a reflection on causes and missed opportunity to renew the digital community paradigm beyond glocalism toward a new hyperlocalist mediation. In our interpretation this phenomenon in the Lazio region is deeply connected with open-source practices. On the one hand Experts' involvement defines the openness constraint, and on the other hand, if pioneering open source and open design experience referred to globally diffuse but relatively small, and strong intent-cohesive community, the new scenario has to refer to a local community to find similar cohesion beyond common necessity, in person-to-person relationship and identification with territory. In that definition the open source and sharing politics of the platform cover the role of discriminant parameters in users' access and Experts' involvement. Meanwhile some limitations are necessary to re-boost open innovation practices that, despite the scientific community's support, is perceived in our case study as an economically unsustainable model. We believe that the local declination for the Lazio scenario should act

through a system of policies aimed to boost open innovation by a progressive filter to incentives and support access that is directly proportional with the demonstrated sharing practices.

6. Conclusions

This ongoing Research deals with the potential contribution of maker practices and community in the resilient response improvement of a territory. Moving from post-crisis' scenarios it has afforded how to capitalize the Maker's social response to sanitary emergency experience and evolve the whole bottom-up reaction in a new model of citizenship. Such citizenship should be underpinned by three pillars: firstly, the maker practice, including digital fabrication technologies and Open-Source sharing practices, secondly two renewed concepts of proximities, a "hyperlocal" physical proximity, condition imposed during the pandemic and defined as a mediation process, and a "vertical" proximity between multi stakeholders and PA defined as citizen's empowerment in participation process.

Two levels of investigation have been conducted: one on Maker's entities census, focusing on the distribution and quality of the Maker Network; a second one by deepening the Maker community evolution. The Interview campaign has underlined a set of necessities, potentials, and missed opportunities that has become fixed points in the multi-sided platform model's design outcome. Parallelly to this, a methodological reflection has been developed on the ethical constraints of this digital tool.

We have outlined the requirements and general guidelines for a hypothetical new multi-sided platform. At its current state, this research is part of a doctoral research in the Design field and as such, the software development resources have not yet been secured, for which the research team plans to apply for in the near future, likely from a regional research and development funding. Naturally, the extent to which a digital tool can suffice to stimulate open innovation, is still an open question, to be answered through intense experimentation and community involvement action.

Imaging a general replicable model of citizenship interaction between PA and territory, involving Citizens, Makers, and Experts in the proposition, development, and actuation of projects, it is necessary to define a customizable constraint system able to respond dynamically to *hyperlocalism*, and act in support to the bottom-up initiatives. Operating on a distributed and (still) open field of Research, nevertheless, carries with it the social responsibility of an empowerment that has long declared its potential and still opens up to new ways of synergizing spontaneous and autonomous communities.

(paragraph 4,5 and 6) as well as responsible for the geographical representation of the data. Viktor Malakuczi was responsible for the writing supervision.

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