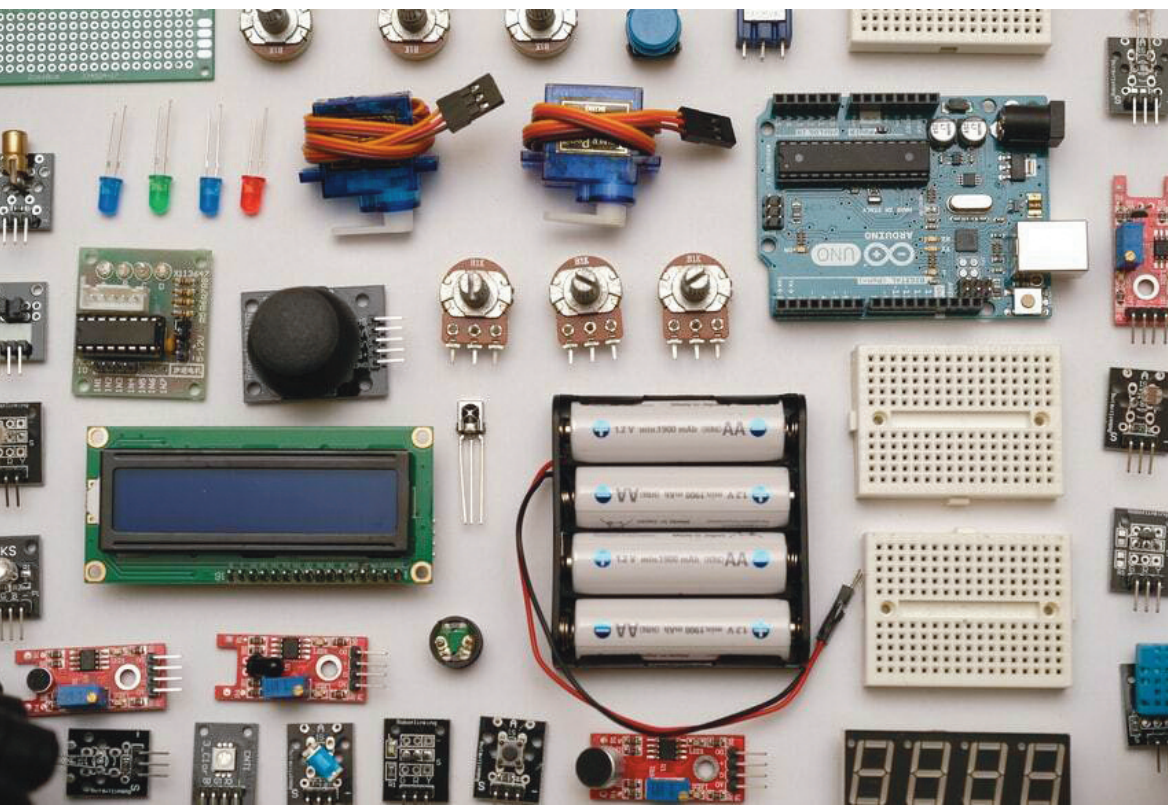
Samantha Cenere

MAKING IN THE MAKING

Performing new forms and spatialities of production



FrancoAngeli

Nuove Geografie. Strumenti di lavoro

Nuove Geografie. Strumenti di lavoro

PREMIO "NUOVE GEOGRAFIE"
PER LA MIGLIOR TESI DI DOTTORATO IN GEOGRAFIA 2021
III EDIZIONE

L'Editore e i membri del comitato scientifico della collana "Nuove Geografie. Strumenti di lavoro" hanno il piacere di pubblicare il testo vincitore della III edizione del Premio "Nuove Geografie".

L'opera è stata giudicata mediante apposita procedura double blind peer review, coordinata dalla Direzione di Collana e dal Comitato Scientifico, ed è risultata la più meritevole con la seguente motivazione:
La ricerca affronta un ambito innovativo, fortemente interdisciplinare, che offre sviluppi di sicuro interesse. La struttura del lavoro è ottimamente articolata e la trattazione risulta competente ed efficacemente comunicativa. Solida la metodologia adottata.

 ISBN 9788835131618

Copyright © 2021 by FrancoAngeli s.r.l., Milano, Italy. ISBN 9788835131618

Samantha Cenere

MAKING IN THE MAKING

Performing new forms and spatialities of production

FrancoAngeli

Nuove Geografie. Strumenti di lavoro

 ISBN 9788835131618

ISBN: 978-88-351-3161-8

Cover image: Photo by Robin Glauser
*(*https://unsplash.com/photos/zP7X_B86xOg)

Table of contents

List of figures

Introduction

'Fablab Torino is the continuation of the temporary Stazione Futuro project, the first Italian Fablab, that was closed on November 21st, 2011, and it is going to be one of the most innovative workplaces *in Italy. [...] What makes me so happy about the event is that, even if no national newspaper or TV show has ever spent a word about Arduino and Banzi, in the foggy and desolated landscape of* the Italian economy *it's still possible to find some hidden gems of* innovation*.'*
(February 17th, 2012).[1]

'In Turin, in a XX century ex-foundry*, there's a place in which* people fabricate the work of tomorrow. *It's Fablab Torino, an association and a space of encounter,* production*, and* creativity *linked with the world of* digital fabrication*'*
(Facebook Post of Ordine dei Consulenti del Lavoro Torino, September 2017).

'There are no projects [...] it has become a hangout where every now and then on Wednesday night there are 2-3 persons who chat, look at some websites, go eat pizza... I mean... it's not very productive'
(Interview with Vincenzo, male, Fablab Torino Maker, November 2017).

How do we pass from having 'one of the most innovative workplaces in Italy', which is depicted as home to people that 'fabricate the work of

[1] Retrieved from https://www.sharedesk.net/blog/2012/02/fablab-torino-the-revolution-of-the-makers/. Last access on 28th August 2018. Share desk is one of the most famous global coworking platforms.

tomorrow', to a place where 'there are no projects' and is actually 'not very productive'? How was this 'work of tomorrow' supposed to change Turin, a city populated by 'ex-foundries' and other abandoned buildings that make visible the heavy legacy of a former Fordist era? And, ultimately, what do words such as 'work', 'workplace', 'innovative', and 'productive' even mean now?

This is not a thesis about *the* changing economic geography of production and innovation of *the* (post-Fordist) city. Rather, what follows tells the story of *how* economic theories perform (or fail to perform) new forms and spaces of production and work and *how* new economic entities are (or fail to be) enacted.

***

Usually portrayed as a technological extension of a DIY (do-it-yourself) culture that praises 'any project done independently from professionals' (Davies, 2017, p. 22), Makers[2] could be broadly identified as those people who engage with small-manufacturing, mainly facilitated by digital fabrication tools, local workshops such as Makerspaces, Hackerspaces, and Fablabs, together with online tools for sharing that connect a global community of peers committed to openness. In these spaces, especially in the ones this book is about, you can find 3D printers and other machines for digital fabrications, but also smaller technological devices and other mundane tools too, such as a hammer. All these tools and machinery are shared, since all the members of these spaces can have access to them. There, people use these tools to fabricate autonomously disparate kinds of objects, learning how to code and experimenting with materials.

For more than ten years, the rise of Makers has been attracting interests from various sides. At the beginning of 2012, a local newspaper hosted an article with the headline 'Opening of Fablab and Launchpad: coworking and digital factory in Turin', celebrating the fact that 'the innovative and creative Turin [could] profit of two new spaces'.[3] That enthusiasm resonates with the national interest towards the 'creativity workshops [that] conquer Italy [to]

[2] Makers, Making, and to Make will be used always with the capital letter throughout the chapters in order to clearly distinguish them. This decision aims at signalling that 'to Make' is understood – as will be extensively explained in Chapter 1 – exclusively as a form of material production that has at its core an emphasis on DIY, the use of digital fabrication machines and other technological devices, and the importance of sharing.

[3] Retrieved from: https://www.quotidianopiemontese.it/2012/02/18/linaugurazione-di-fablab-e-di-launchpad-coworking-e-fabbrica-digitale-a-torino-fotogallery/ Last access: 20 February 2019.

build the future with a 3D printer'.[4] In line with these narratives, browsing newspapers and online magazines, a great hype seems to pervade everything that is connected to the world of Makers and Fablabs, the latter understood as 'innovative laboratories'.[5] 'Incubators, competence centres, coworking spaces, Fablabs: the common denominator of all these realms is sharing. [Sharing] of spaces, ideas, competences, tools. The world of innovation includes an infinite variety of actors'.[6]

Policy makers too have been expressing interest towards those practices variously labelled as 'Making'. This interest has resulted in numerous projects and just as many publications which praise the advent of Makers as harbingers of a positive transformation in the economy.[7] Various research outputs published by EU institutions frame the Maker Movement as: 1) part of the variegated realm of collaborative economy; 2) representative of a new form of work; 3) significant for the introduction of an ethos of openness in innovation processes; and 4) crucial for transforming manufacturing and igniting an urban-centred industrial renaissance. Notably, this discourse maps onto a rhetoric that sees cities as the natural site for Fablabs and Makerspaces, considered 'the laboratories for macro-scale urban experimentation, potentially helping forge a new public procurement model. The movement is also working to reverse the urban decline in non-capital cities. Makerspaces help to grow the skill base of local populations, bring state-of-the-art manufacturing back to city centres and offer people the novel opportunity to make the items they consume in situ'.[8]

Summing up, Makers represent an interesting phenomenon for socioeconomic analyses, since they stay at the crossroad of various trends that are characterising the present time. First, their reliance on shared assets (such as

[4] Retrieved from https://ricerca.repubblica.it/repubblica/archivio/repubblica/2013/04/26/le-officine-delle-creativita-conquistano-litalia-costruiamo.html Last access: 22 February 2019.

[5] Retrieved from https://www.lastampa.it/2012/05/17/cronaca/fablab-per-i-cervelli-che-restano-Fo1Zk6NTfsRhri7KjwnAVJ/pagina.html Last access: 24 February 2019.

[6] Retrieved from https://www.repubblica.it/economia/affari-e-finanza/2017/02/13/news/acceleratori_e_fablab_cos_si_crea_il_futuro-158265876/ Last access: 20 February 2019.

[7] For what concerns the European Union, see for example: the projects *European Maker Week* (https://europeanmakerweek.eu/) and *Urban Manufacturing Project* (https://www.interregeurope.eu/urbanm/); publications such as Rosa et al., 2017. *Overview of the Maker Movement in the European Union*; Rosa et al., 2018. *Futures of Work: Perspectives from the Maker Movement*; Martelloni et al., 2017. *Universities, Enterprises and Maker Communities in Open Design & Manufacturing across Europe An exploratory study.* Probst et al., 2015. *Collaborative economy. Collaborative production and the Maker Movement.*

[8] Retrieved from https://www.weforum.org/agenda/2018/03/makerspaces-smart-sustainable-cities-thomas-ermacora/ Last access 23 February 2019.

Fablabs, Makerspaces, online platforms, etc.) situates them in the broader realm of collaborative or sharing economy. Second, the rising of Fablabs and Makerspaces resonates with a general transformation in how work is practised and what is considered work, after all (cf. Lange & Bürkner, 2017). Third, Makers epitomise the crucial position that digital technologies have been gaining in different realms of social life, from consumption to production, from information to art, etc. Fourth, the role of Fablabs is framed within a broader discourse of great transformations in the urban landscape of work and production. Lastly, Makers intercept the diffuse desire expressed by lay people for more participation in various realms of social life and a corresponding loss of significance of expertise, which translates into general claims for a more participative society such as the ultimate plea for direct democracy with regard to the political realm. In line with this perspective, the advent of Makers is usually framed as the *democratisation of production* at the basis of a *third industrial revolution* (cf. Anderson, 2012; Rifkin, 2011).

***

This kind of framework is suggested by cheerleaders of the Maker Movement, who also argue that the online infrastructure for sharing developed by and for Makers would make geography a negligible dimension, since everyone would be able to profit of knowledge exchange, opportunities for collaboration, and a homogeneous set of tools available everywhere (e.g., Anderson, 2012; Rifkin, 2014). However, - as evidenced regarding the policy makers approach to the topic - due to the high concentration of Fablabs (and other analogous spaces of collaborative work) in cities, the rising of Makers and Fablabs has recently been put under the lenses of scholars interested in either the spatial or the urban dimensions of the phenomenon. What these works usually investigate is the potential of Makers to be part of a new wave of urban growth, thus identifying Fablabs as exemplary organisations in this transformation. These analyses cut across various traditions in the study of urban economies. On the one hand, both mainstream and critical literature have looked at cities as the elected locus for post-Fordist economies highly pivoting on creativity and innovation. On the other, a distinct geographical attention towards space has fed research that looks at the locational advantages of some sites rather than others, in a context of global competitiveness where cities are crucial nodes of the world economy.

These works situate in a long tradition in economic geography and urban studies that has identified in cities a crucial spatial organisation for economic prosperity. Going from the interrelation of industrialisation processes and

urbanisation to more recent analyses of the urban dimension of the knowledge economy, the relationship between cities and economy has been variously explored. Claims on the long tail of post-Fordist transformation and on the potential for knowledge circulation favoured by agglomeration and proximity effects have been followed by a more recent focus on the role of cities as sites where diversity is experienced and innovative, creative, and entrepreneurial efforts would find the perfect terrain to flourish (cf. Florida, 2002). Literature addressed to policy makers in giving them positive advice for boosting urban development and critical works situating cities at the core of strategies of capital accumulation seem to find common ground in a sort of 'new localism' that both embody, since they agree on 'two major territorial assumptions: first, that urban agglomeration sustains international competitiveness; and second, that cities are the resource base for a new knowledge capitalism' (Amin & Thrift, 2002, p. 56).

Recently, both the same theoretical divide and conceptual agreement have been proposed anew in the debate over Fablabs as either examples of coworking practices or crucial spaces for the re-urbanisation of production. The city has been identified as the principal spatial formation through which understanding the phenomenon (cf. Vicari et al., 2015). One of the interpretative keys of the relationship between either coworking spaces or Fablabs and the urban sees the firsts as lenses through which analysing the role of cities in changing patterns of production and work (e.g., Armondi & Bruzzese, 2017). In addition, the link between Makers and cities has been traced also in the high technological content of urban contexts (e.g., Mariotti et al., 2017; Morandi et al., 2016). These analyses, stressing Fablabs' belonging to the broader category of coworking spaces, emphasise how they respond to the need of a changing urban workforce, born from the ashes of Fordist organisation and become entrenched after the 2008 economic crisis; a workforce made of individuals more and more casualised, precarious, entrepreneurial, and in need of few material assets to support a highly immaterial work (e.g., Moriset, 2014).

Following the path of those economic geographers and urban scholars who argue for the tight link between cities and innovation, the settlement of Fablabs (together with incubators, coworking spaces, and business accelerators) in cities has been explained recurring to the three '*forces of agglomeration*: thick labour markets [...], the presence of specialised service providers, and, most important, knowledge spillovers' (Moretti, 2012: "If San Francisco Does Not Like Walmart", para. 3). Notably, Moretti praises geographical proximity as a trigger of knowledge circulation not only at the urban scale, but even at the level of a building, celebrating positive examples of workplaces that host within the same walls 'a high-tech incubator, a school

of digital filmmaking, an art gallery, a tool workshop for "inventors, makers, hackers, tinkerers," and hundreds of engineers, scientists, artists, and social entrepreneurs' (Moretti, 2012: "Advantage 3", para. 12). Thus, the (few) studies that have been engaging the topic with a clear focus on the spatial dimension of the phenomenon somehow assume that the primary way in which space is related to the rising of Makers consists in either proximity and agglomeration effects typical of urban contexts (e.g., Doussard et al., 2017; Schmidt & Brinks, 2017) or the capacity of certain cities to plug into 'global pipelines' of knowledge that foster local economic growth (e.g., Capdevila, 2018). Moreover, there seems to be a sort of schizophrenic approach towards the relationship between cities and Fablabs: to be sure, while claiming the relevance of the *distributional* effect that ICTs (Information and Communication Technologies) have been exercising on the organisation of work and production, nonetheless research in both urban studies and economic geography still situates the core of the spatial organisation of a Maker economy in cities as *bounded spaces*.

This perspective seems to disregard the fact that the rising of Makers and Fablabs hinges strongly on *individual practices*, which decenter processes of production (cf. Richardson, 2016) and thus should not be overlooked in talking about the spatial dimension of the phenomenon too. Indeed, in both academic and public discourse, we are currently experiencing a sort of clustering around two apparently distinct but interlinked poles. On the one hand, practices of *collaboration and sharing* have been upsurged as a new paradigm for the organisation of social life. On the other, the *individual* has been gaining prime importance, as an increasingly critical level of social, economic, cultural, and political action. As highlighted by Rossi (2017, p. 179), 'the start-up and sharing economy phenomena [...] are a powerful illustration of how the individualisation of economic agency has produced an idealisation of community in different ways: from the energising meet-ups organised by start-up entrepreneurs to the web-based opportunities for socialisation offered by the sharing economy, to the grassroots practices of 'commoning''. Stuck between these poles, the role and actual relevance of the urban dimension – with cities considered as centres of power, whose features of density and diversity have been considered crucial in fostering socio-economic development – needs to be reconsidered. Along with this project, the academic debate in both the variegated field of urban studies and geography could offer new conceptualisations of the urban to grasp these transformations. While claims for epistemological renewal have accompanied the scientific production in the disciplines for the last two decades (e.g., Brenner & Schmid, 2015), the above-mentioned issues add substance to this quest.

A particular fruitful body of work in the reconceptualisation of the city has built on epistemological and ontological novelties coming from both the theoretical corpora that inform precisely the understanding of economic entities sustaining this research – that is, Actor-Network Theory (ANT) and Science and Technology Studies (STS) – and on the concept of 'assemblage' derived from the work of Deleuze and Guattari. This approach denies any bounded and homogeneous nature of the city, 'decentering' the object of study and focusing on how the urban 'is differently enacted at multiple sites. Space, time and the city itself are produced or, better, emerge [...] in ways conditioned by the types and extensions of the actor-networks operating at these local sites. In this manner, ANT destabilises the autonomy and explanatory priority attributed to space in urban studies, substituting the key notion of sites in plural for it' (Farías, 2010, p. 6). Within this framework, works such as the pioneering one of Amin and Thrift (2002) offer alternative conceptualisations of the spatiality of urban economies, in contrast with theories pivoting on a vocabulary of agglomeration and clustering. Their conceptualisation gets rid of cities as a unitary economic agent, proposing instead to look at them in terms of sites, 'as assemblages of more or less distanciated economic relations' (Amin & Thrift, 2002, p. 52; see also Amin & Thrift, 2007). However, what the authors retain in claiming the economic relevance of cities is their thickness in regard to both informal and formal institutions, which variously support the urban economic life (ibid: 63). Fablabs and Makerspaces could thus be seen – I claim – as light institutions that, although not being conceived as the result of some special effect generated by the spatiality of cities, still represent crucial sites in investigating current transformations in urban economies.

As will be discussed in the first chapter, the academic debate over Fablabs and Makers as relevant phenomena with regard to the spatial dimension of the economy seems to be polarised between, on the one hand, the acknowledgement of the urban scale as preeminent dimension when it comes to the impact of space and, on the other, few considerations over the global infrastructure connecting Makers worldwide via online instruments. Partially trying to go beyond this dichotomy and drawing on suggestions coming from post-structuralist analyses within geography and urban studies, the present work is committed to not taking for granted the relevance that relations of proximity within the city context have for the production and reproduction of Making, being instead an effort in unpacking the various spatialities of Making in Turin, assuming as starting point and main focus of the analysis the organisation Fablab Torino. What I argue is that an appreciation of the various spatialities of a specific Fablab and 'Maker scene' could reveal more

on current transformations in work and production and on how these transformations are enacted.

***

Regarding the economic dimension of the phenomenon under investigation, usually the literature concerning Fablabs, Makerspaces, and the resurgence of making mobilises a diverse set of concepts: open innovation, open knowledge, new forms of work, sharing, prosumption, peer-production, new workplaces, DIY culture are just some of the concepts used to frame the analysis. However, these frameworks partially overlook the broader and deeper transformation that contemporary changes in production may entail also on a conceptual level. Paraphrasing Michel Callon (who talked about the market instead of Makers and Fablabs), the present work pivots around the following consideration; that both mainstream and critical literature 'take the notion of a [Fablab/Maker] for granted, seeing it as unproblematic. In other words, they know what a [Fablab/Maker] is, even if they disagree on its effects' (Callon, 2016, p. 18). The present work engages instead in the *problematization* (cf. Farías, 2011) of this assumption, claiming that an effort in opening the 'black box' (Callon, 1986b; Latour, 1987) of Fablabs and other sociomaterial arrangements for Making is a necessary achievement to pursue. This endeavour aims at addressing 'the paradox [represented by the fact] that the economic practices and dimensions of Open Workshops are on the one hand extremely underconceptualised and on the other hand overrated and overestimated, especially regarding their potentials for wider economic change' (Lange & Bürkner, 2017, p. 97).

In order to do this, the research mobilises a post-stracturalist approach recently developed in economic geography, adopting an anti-essentialist stance towards the study of economies and their spatial configurations that consider them as contingently and heterogeneously constituted through the entanglement of discourses, practices, and sociotechnical arrangements. In particular, the work draws from a theoretical approach informed by the 'performativity programme' pursued by a strand of economic sociology and geography that draws on the ontological and epistemological insights of Actor-Network Theory (ANT) and Science and Technology Studies (STS). At the core of this approach lies the claim that economic theories *perform* the economy, rather than being mere descriptions of it (Callon, 1998). This performative actualisation of the world contained in economic discourses is enabled by the construction of socio-technical arrangements in which those discourses are made true. This process consists in the constant creation of sociomaterial relations among various entities, which are (tentatively and

contingently) aligned, (provisionally) stabilised, and made act together in line with specific economic discourses. Indeed, according to ANT, an actor has a certain power to act that depends on the network which it is part of. This approach values process and transformation over stasis, since stability is a (precarious) effect of a constant association work.

Borrowing from that, the research follows those investigations in economic geography whose focus is on socioeconomic *practices and processes* and on how they 'constitute and reproduce economic space' (Jones & Murphy, 2010, p. 367). To be sure, economic geography has been flirting with various insights coming from ANT (cf. Müller, 2015a), deriving from this 'sensibility' (cf. Latour, 2005) a conceptual toolkit that opens up the space of the economy in its very ontology. While of course geographical investigations have been always engaged with the study of specific sites, the ANT tradition provides analyses of the economy like the present one with further tools to show the relevance of case studies and empirical approach. This kind of analysis materialises into works that 'investigate the formation of economic realities through contingent, heterogeneous, and local processes' (Barry & Slater, 2002a, p. 180).

This stance on the topic, rather than assuming as given the features usually attributed to Fablabs and Makers in claiming their economic relevance, allows to look at a Fablab and other arrangements for Making as relational and performative effects, where economies are contingently produced (or not) through the enactment of provisional orderings. Thus, the research investigates both Fablabs and Makers as emergent economic actors, inasmuch as they are situated within a network that performs specific economic discourses through the establishment of enduring relations among different entities.

***

Summing up, the present work engages in a qualitative investigation of an object - a Fablab and an urban 'Maker scene' - that is usually identified as part of a broader economic transformation affecting work and production and whose urban dimension is considered a crucial feature. However, the research, instead of assuming this framework as a starting point and being committed to avoiding any form of grand narrative, adopts a post-structuralist perspective strongly informed by ANT and STS traditions in order to unpack *how* Fablab Torino, the Maker scene in Turin, and Making as part of a broader economic transformation regarding work and production are *performatively* enacted. Notably, the research situates within a pragmatic tradition in economic sociology and economic geography that looks at the

performative role of economic discourses and at how they actualise the worlds they describe through the entanglement of these discourses with specific socio-technical arrangements. Investigating the topic through this lens allows showing how the economy is actually *made* (Mitchell, 2008) - leaving also the door open for cases of failure in performing an economic discourse. Moreover, it allows also: on the one hand, to unearth how new geographies of work and production are concurrently enacted, thus focusing on geographies of economic performativity; and, on the other, to appreciate how the actualisation of a Maker economy as innovative and democratised production is also contingent upon specific sociospatial practices.

Drawing on this approach, the following chapters aim at: 1) unpacking how Fablabs and other socio-technical arrangements for Making act as devices that enact a certain transformation in production as described by economic theories on open innovation, peer-production, and sharing economy; 2) looking at the work of 'making a Fablab', understanding this as a needed effort to problematise the phenomenon; 3) highlighting how new forms of work and production associated with the idea of a Maker economy represent a sociotechnical project that may or may not actualise; and 4) looking into the various spatialities of Making, understanding economic performativity as passing also through the production of specific geographies. Unpacking these issues is a timely critical effort, since 'there is now social value, and increasingly actual money, attached to the idea of hacking and of the maker movement. [...] There is a sense of being in tune with the zeitgeist that comes from opening a Makerspace' (Davies, 2017, p. 151).

Overview of the book

In order to introduce the topic, Chapter 1 sets the scene for the investigation of the phenomenon as one of interest for both economic geographers and urban scholars. Notably, after a general introduction to the advent of the so-called Maker Movement and the rising of Fablabs, Makerspaces, and Hackerspaces, the chapter unpacks various issues that have been related to the phenomenon under investigation when considered as one of economic relevance. More in detail, Making is usually related to theoretical debates over: 1) the advent of a new productive paradigm, which pivots on: peer-to-peer exchanges; strong participation of consumers to production; and reliance on processes of innovation increasingly open; 2) the changing urban workscape, which is both punctuated of shared spaces for work (i.e., coworking spaces) and envisioned as site for the relocation of manufacturing; and 3) the renaissance of craft, together with its merging with digital technologies.

Even if crucial for situating the phenomenon, the literature reviewed in the first chapter is framed as leaving some sort of discomfort, since it fits only partially the case under investigation. This mismatch is identified as the crucial trigger of different questions on the case, notably questions that, rather than assuming theories on the economic relevance of Makers and Fablabs as starting point for their investigation both in an economic geography perspective and as relevant urban phenomena, consider those theories as part of the object they investigate. Thus, Chapter 2 introduces the theoretical framework of the research, which pivots on theories of *performativity* developed within economic sociology and, more recently, adopted by some economic geographers too. This stream of literature is discussed also in its relationship with Science and Technology Studies (STS) and Actor-Network Theory (ANT), indulging on the novelties that they have introduced in the conceptualisation of the social. The conceptualisation of space and the urban on which this work hinges draws on the same theoretical premises; thus, the chapter closes with, on the one hand, a discussion of how this performativity approach and ANT ontologies have affected the conceptualisation of space and, on the other, a brief introduction to the so-called 'assemblage urbanism' stream in urban studies. Concluding, the chapter stresses how this theoretical approach offers alternative tools for the investigation of 'Makers geographies', in that it allows to investigate *how* they come into being through the performative and contingent entanglement of economic discourses on Making and specific sociotechnical arrangements. This, rather than being an optional question, opens up the space for: 1) grasping the role of economic theories in actualising Making through their entanglement with various sites and devices; 2) appreciating the processual and relational nature of Fablabs and other arrangements for Making as economic entities; and 3) retaining failure as a possible outcome which still holds analytical value.

Given these theoretical premises, Chapter 3 discusses the methodological choice of a qualitative analysis highly based on an ethnographic approach. After a general introduction on the use of qualitative methods in geography research, issues specifically related to the epistemological and ontological premises to the present work are explored. Besides delineating the case study – that is, Fablab Torino and the wider 'Maker scene' in Turin, Italy –, the chapter indulges on the uneven path of (any) research, stressing the processual and performative nature of social investigations. In line with these considerations, ANT and STS traditions are identified as offering key contributions to the methodological approach too. In order to appreciate the role of the researcher, issues of reflexivity and positionality are discussed, thus highlighting the fact that the researcher could never maintain her innocence, acknowledging instead her active role in performing specific realities.

Chapters from 4 to 6 constitute the second part of this work, which aims at speaking to the debates revolving on Making discussed in Chapter 1, while offering an alternative framework. Notably, the case study is read in light of the theories exposed in Chapter 2 and the research questions thereby identified, unpacking the empirical findings into three (different but interconnected) conceptual foci – *knowledge*, *materiality*, and *work*.

Appreciating both the position that is granted to Fablabs as part of wider geographies of a knowledge-based economy and the relevance that mainstream literature attributes to the openness and sharing of information, Chapter 4 investigates how knowledge contributes to the constitution of Fablab Torino and other spatialities of Making. This focus allows tracing a connection with the economic geography preoccupation over the relationship between economic growth and the spatial forms of knowledge production and circulation. Besides that, the chapter indulges also on 'knowledge about Making', understood as those economic theories that performatively enact Making as an economic change, paying particular attention to how this knowledge contributes to the creation of Fablab Torino as an innovative space that participates in wider transformations of work and production.

Given the relevance that performativity approaches and ANT attribute to non-human actants and sociotechnical devices in assembling the social and actualising what economic theories describe, Chapter 5 identifies materiality as a crucial dimension in the investigation of the phenomenon. Rather than reducing the topic to mere claims about the potentials of Fablabs' digital fabrication machines in 'transforming bits into atoms' (Gershenfeld, 2005), the various sections of the chapter unpack the multiple ways through which a focus on materiality can shed light on Making. Highly informed by ANT's material semiotics, the first part investigates how: 1) a Fablab is a provisional stabilisation of various sociomaterial relations that may or may not perform as an innovative space for work and production; and 2) a Maker agency emerges as distributed among different human and non-human actants. Moreover, the ANT-informed approach to the role of non-humans leaves the door open to acknowledge the possibility of failures, as both partial performances and outcomes of a failed stabilisation of the relations among the entities of the actor-network. Attention is devoted also to sociomaterial practices of inscribing and displaying that materialise representation of Fablab and Makers, thus contributing to reproducing the economic knowledge that performs them.

Combining the debates in which Fablabs and Makers are usually situated when approached within urban studies and economic geography, Chapter 6 tackles the issue through the conceptual lens of 'work'. Notably, the chapter considers work as a fluid category, claiming for an appreciation of how

various spatialities and sociotechnical systems intimately intertwine with the forms of work that unfold through Makers' practices. The chapter opens with the discussion of three 'archetypes of work' that circulate in economic theories on Making – that is, projects as main spatiotemporal organisation, platforms as sociotechnical arrangement, and creativity as the ethos of work. Following a performativity approach, the second part of the chapter is devoted to investigating how different forms of labour emerge through the contingent entanglement of these tropes with various sociomaterial arrangements. Notably, the doing of affective, digital, and material labour and their geographies are investigated as specific forms of distributed agency. This perspective allows also to identify a complex Maker workscape, made of urban assemblages of production in which various online and offline spaces percolate and through which different forms of Maker work come into being. Concluding remarks follow.

1. Setting the scene. The rising of Makers and Fablabs

Laboratory, *c. 1600, "room or building set apart for scientific experiments," from Medieval Latin* laboratorium *"a place for labor or work," from Latin* laboratus, *past participle of* laborare *"to work", from* labor *"toil, work, exertion".*[1]

1.1 Introduction

After the 2008 economic crisis, the global economy has undergone deep transformative changes. In these transformations, an important role is played by digital technologies and the related diffusion, on the one hand, of sharing practices and, on the other, of heterogeneous forms of autonomous production of value. Indeed, the shift of patterns of knowledge circulation towards increasing openness (Ettlinger 2014), the spreading of collaboration (Richardson 2015), a reliance on forms of self-organization (Ritzer and Jurgenson 2010), and increasing digitalization that enforces new working practices (Richardson 2017; Richardson and Bissell 2019; Schmidt 2019) have brought to the fore spatiotemporal configurations of economic activities alternative to the ones of traditional organizations, namely factories and offices.

These changes have been accompanied by socispatial reconfigurations of how work and production are organised in urban contexts. Fablabs and Makerspaces are usually considered considered a typical example of this phenomenon, since they are shared workshops where either professionals or amateurs can use digital fabrication machines to produce physical artefacts.

[1] Retrieved from https://www.etymonline.com/word/laboratory

According to this understanding of the role of these spaces, 'sharing economy, peer production, collaborative consumption, maker-spaces are all terms that pertain to a new collaborative economy that is emerging out of the crisis of corporate capitalism in its neoliberal version' (Vicari et al., 2015, p. 10).

However, this interpretation, albeit rightly pointing at the urgence of research that looks at this phenomenon not as an isolated one but as part of a broader transformation in the economy that presents some common elements, lacks a more nuanced understanding of how Fablabs come into being in multiple, heterogenous, and ambiguous forms. As previously stated, the present research considers Fablabs and Makers not as the natural outcome of some large-scale transformation, rather as the result of always contingent and enacted performances (Richardson, 2015). Leaving aside for a moment this theoretical approach adopted by the research (which will be discussed in Chapter 2), the present chapter aims at setting the scene for the empirical work to be discussed, delineating an exhaustive framework. On the backdrop of this, Fablabs and the rising of Makers will be situated as phenomena that have been rising at the crossroad of a variety of economic, cultural, and technological changes.

A review of the literature on Makers and Fablabs will be provided, in order both to let the reader understand what we talk about when we talk about Makers and to introduce the topics that are usually mobilised in the literature in talking about the diffusion of spaces related to the so-called Maker Movement. Thus, the present chapter will 'set the scene', providing an overview of the main strands of conceptualisation[2] that have informed the debate around Fablabs and Makers. These debates will function as a compass for the present research, which will make them intersect with the three main conceptual pillars employed for the discussion of the case in analysis, that is, materiality, knowledge, and work.

After a brief overview on what Makers and Fablabs are, the chapter proceeds with a discussion of the literature concerning the broader transformation of which Fablabs are considered part, that is, the rise of a new way of organising production, the so-called commons-based peer production. Second, Fablabs are investigated as new collaborative spaces for production, mainly situated in urban contexts. In the third and last section, the stream of literature looking at Makers through the lenses of a resurgence of craft and handmade production is introduced, both to highlight the role played by

[2] The chapter, however, does not deal with the literature on Making and Fablabs from an education studies perspective, especially dealing with how Making contributes in boosting STEM subjects. Even if this strand of literature has become rich in contributions, the latter would be rather distant from the focus of the present research - that is, new practices and spaces for work and production.

technology in this new form of making and to look at how human geographers have been dealing with the resurgence of 'maker cultures' in general. These three cornerstones act as three different analytical layers that allow taking into account both the role of Makers as new economic subjects and the spaces devoted to making as part of new urban geographies of work and production.

1.1.1 Makers and Fablabs: An overview

Fablabs, together with Makerspaces and Hackerspaces, are part of a broad ecosystem of 'open workshops' (Lange and Bürkner 2018b; Schmidt 2019) devoted to personal fabrication and accessible to everyone disregarding their skills and jobs, under the payment of a small fee.. Being either institutional or grassroots, these spaces provide tools for digital fabrication, such as 3D printers, laser cutter, Arduino microcontrollers, and other CNC (computer numerical control) pieces of machinery, while offering their members a range of courses to learn how to use these tools. A further pivotal element is the sharing dimension, evident from Makers' reliance on various online tools and practices that connect a global community of peers committed to openness.

The first Fablab opened in 2001 at the Centre for Bits and Atoms of Boston MIT, out of a course named 'How to make (almost) everything' taught by Neil Gershenfeld, professor of digital fabrication and computer science. The idea at the core of the project is clearly defined by the same professor, who sees the digital fabrication machines provided in a Fablab as powerful tools to unleash the creativity of everyone, while paving the way for personal fabrication to spread (Gershenfeld, 2005).

During the same years, another US institution embarked on this new 'digital revolution'. In 2005, *O'Reilly Media* launched the magazine *Make*, now considered a sort of Bible for Makers all around the world. Due to the great success of the magazine, one year later the same company organised the first Maker Faire at San Mateo, California. Both the magazine and the fair are designed to be the two main institutional references for Makers, providing both a showcase for new projects and inventions to be shared, and a useful learning tool. They celebrate the culture of DIY (do-it-yourself) that meets the most recent technological developments. These events, together with some mainstream publications (Anderson, 2012; Dougherty, 2012; Hatch, 2013; Rifkin, 2011), have set the scene for the 'technomyth' (Braybrooke & Jordan, 2017) on the so-called Maker Movement to rise and spread worldwide. The former director of *Wired* magazine Chris Anderson has been one

of the prophets of Makers, publishing in 2012 a book entitled *Makers: the new industrial revolution*. In this publication, he praises for the birth of Makers as a new generation of inventors whose entrepreneurial efforts would ignite the third industrial revolution thanks to a new approach towards manufacturing. From their birth, Fablabs and Makerspaces have now spread worldwide, being considered both a powerful empowerment tool for the Global South and an instrument for reimagining manufacturing in those areas of the Global North still affected by the aftermaths of the 2008 economic and financial collapse.

The ideological dimension that underpins the spreading of Makers worldwide being primarily concerned, on the one hand, with the disruption of mass production through a democratisation of tools, machinery, and skills, and on the other, with the connection between knowledge and innovation, research on Makers has been spanning both issues of sustainability (Kohtala, 2017; Ratto & Boler, 2014) and broader concerns about the changing role of consumers (see next section).

Figure 1. Exhibition California. Designing Freedom, the Design Museum, London, August 2017. Author's photo.

While mainly centred on material production, the Maker Movement has strong ties with the hacker subculture that had been spreading in Europe since the 1980s, borrowing from it ethical principles such as direct engagement with (material or immaterial) objects, sharing and collaboration (Grenzfurthner & Schneider, 2009; Himanen, 2001). Given the recent birth of the phenomenon under investigation and due also to the deliberate use of the term

'make' to define it,[3] a general agreement on the definition of the Maker Movement is still missing (see, for example, Voigt et al., 2016 on the complex taxonomy of the Movement). The present research shares an understanding of Makers as 'the growing number of people who are engaged in the creative production of artefacts in their daily lives, and who find physical and digital forms to share their processes and products with others' (Halverson & Sheridan, 2014, p. 496; in Braybrooke & Jordan, 2017, p. 26).

Makers have been attracting the interest of policy makers worldwide. After the endorsement received by the former US President Barack Obama,[4] the EU has introduced the Maker Movement in various agendas too.[5] For what concerns Italy, Makers (usually named *artigiani digitali*[6]) have received major attention under the government of the former Prime Minister Matteo Renzi (PM from February 2014 to December 2016).[7] Some recent publications coming from within the Italian branch of the Movement have been starting mapping the phenomenon at the national level (Bianchini et al., 2015; Menichinelli et al., 2017). These studies reveal the inconsistent nature of the Italian Maker scene, where the plurality of interpretations of what a Maker is obstructs a thorough investigation of the whole phenomenon (Menichinelli et al., 2017). To be sure, the *Makers' Inquiry* conducted in 2014 (Bianchini et al., 2015) encompasses under the Maker umbrella a variety of subjects that go from tech-enthusiasts to independent designers, passing through the more official figure of the Lab manager. These two figures render the mapping of the Italian Maker scene particularly ambiguous for what concerns the economic dimensions of the phenomenon and its relevance as example of new form of work, being the ones allegedly more prone to take part in the research.

[3] Dale Dougherty, CEO of Maker Media, explains the choice of 'make' instead of 'hack' as a suggestion coming from his daughter. While he was 'planning to start a magazine, he called it initially Hack, but his daughter suggested he call it Make, because everyone likes to make stuff and it sounds a lot more positive, so he called it Make.' Retrieved from: http://www.technoport.no/content/423/Introducing-Trondheims-Maker-Movement. Last access: 9 May 2018.

[4] https://www.whitehouse.gov/blog/2014/05/15/challenging-mayors-help-make-difference

[5] The interest of the EU institutions towards the Maker Movement is also proven by some exploratory publications, as for example Rosa, P. et al. (2017) and Martelloni et al. (2017).

[6] The Italian discourse on Makers will be analysed in details in Chapter 3.

[7] See for example: https://twitter.com/matteorenzi/status/932579037712670720

Figure 2. Rome Maker Faire. The European Edition, 2017. Author's photo.

The specific relevance of Fablabs and Makerspaces at the urban level has been framed within strategies for creative and innovative cities. Recent research explicitly tackling the relationship between the rising of Makers and the city at best adopts the innovative character of these spaces, thus employing as framework for the investigation theories on urban agglomeration economies (d'Ovidio & Rabbiosi, 2017; Doussard et al., 2017; Vicari et al., 2015); at worst, it fosters a managerial, Florida's 'creative city' approach that sees in these spaces the newest innovative boost for urban economies to grow (Capdevila, 2013)[8]. However, the relationship between cities and the Maker Movement could and should be read in the other way around, that is, investigating to what extent Makers are an urban phenomenon (Beauregard, 2014) and how a specific urban context impinges on the way a Fablab is performatively enacted.

[8] For a more general overview of the relationship between the urban and Fablabs as both new spaces for production and part of the wider phenomenon known under the umbrella of 'sharing economy', see section 1.3.

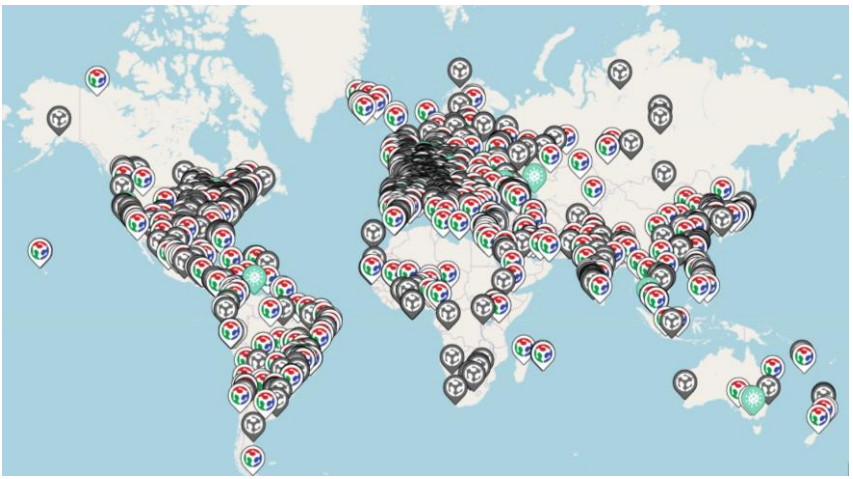


Figure 3. Global distribution of Fablabs (2021). The grey ones are those laboratories that are either no longer/not yet active or that are no longer affiliated to the international Fab Foundation. Source: Fablabs.io. Copyright: Fablabs.io

Figure 4. Distribution of Fablabs in Italy (2021). The grey ones are those laboratories that are either no longer/not yet active or that are no longer affiliated to the international Fab Foundation. Source: Fablabs.io. Copyright: Fablabs.io

Even within the movement itself, the contradictory nature of Makers' practices have been questioned (Troxler & maxigas, 2014): Fablabs and Makerspaces positioning themselves within the wider framework of a new industrial revolution coexist with others more connected to the commercial version of making propelled by the *Make Media* ecosystem, while some independent labs seem to pursue the politically engaged path traced back in the 90s by the hacker subculture. That is to say that any unified nature of Makers is no more than a slogan, while 'many observers today are even unsure of what to call what' (Kubitschko et al., 2017, p. 191). It is precisely this inconsistency that leaves the door open for qualitative, empirically grounded studies that aim at unearthing the relevance of the sociomaterial context in which a Fablab rises.

1.2 Making a new productive paradigm

As briefly anticipated in the previous section, the rise of Makers and the online and offline infrastructure sustaining their practices is usually framed within a broader picture of economic transformation, characterised by a more horizontal organisation of production and distribution, mainly enabled by the culture of sharing and collaboration spread by digital technologies.

The relevance gained in many fields by specific technological innovations, such as Artificial Intelligence, the Internet of Thing, 3D printers, smart sensors, and the like have led to theorise the arrival of a Fourth Industrial Revolution (Schwab, 2014). When referred to the economy, the discourse over the Fourth Industrial Revolution claims that we are currently experiencing one of those major turning points in the history of capitalism, in which the diffusion of specific technologies disrupts the form of economic organisation that used to be dominating. According to this narrative, the production of physical objects, digital contents, and biological materials is deeply affected and transformed by Key Enabling Technologies (Lazzeroni & Morazzoni, 2020). At the same time, this shift brings with it cultural, social, and political effects that cannot be ignored and whose place-specificities need to be investigated. Indeed, critical understandings of the pervasiveness of these technologies in value production highlight how the processes identified with the label of the Fourth Industrial Revolution and similar ones correspond to the shift of capitalism towards an increasing reliance on data as raw material. According to these analyses of the phenomenon, these technologies enable the sort of digital labour needed to extract value from data within an organisational system that hinges on the platform as main intermediary infrastructure to connect different groups of users (Srnicek, 2017).

Fablabs and Makers are sometimes mobilised as examples of the micro-transformations that this shift in the economic paradigm has been bringing to the fore at the level of individuals and in the organisation of the urban space. Notably, robotics and automation technologies are considered not only disruptive with regards to industry but also able to '(re)shape the logics, materialities, practices, processes and affects of the urban context' (Macrorie et al., 2019, p. 198). Within this framework, Fablabs could be considered urban nodes of this complex infrastructure that participates in the way digital technologies facilitate individual forms of innovation and production and enable processes of sharing[9].

The following section situates Makers and Fablabs within this debate, putting the emphasis on the way digital technologies (especially Web 2.0[10]) are said to be facilitating an epochal transformation in the organisation of the economy[11], giving birth to what has been variously named Wikinomics (Tapscott & Williams, 2006), commons-based peer-production (Benkler, 2006), or prosumer capitalism (Ritzer, 2014). At the core of these changes lies a shift away from the clearcut Fordist separation between consumers and producers, accompanied by the blurring of the boundaries between amateur endeavours and professional work, thanks to a culture of openness that enlarges the plethora of innovative subjects.

1.2.1 Organising: peer production

The way economic exchange is organised has been undergoing a deep transformation. The platform-metaphor is now largely employed to describe the spreading of organisational structures that substitute a vertical and centralised model with one based on a distributed, horizontal, decentralised, and collaborative system. At the core of this alleged revolution, there is a dramatic downsizing of costs in information circulation due to the spreading of digital technologies and the increasing reliance of material production on information (Rifkin, 2011).

The main proponent of the peer production paradigm, Yochai Benkler, law professor at Harvard University, defines peer production as «a form of

[9] https://www.weforum.org/agenda/2018/03/makerspaces-smart-sustainable-cities-thomas-ermacora

[10] The phrase 'Web 2.0' was invented precisely by the same O'Reilly publisher that launched Make magazine (Braybrooke & Jordan, 2017: 38).

[11] The task of counterbalancing both this rather technological deterministic interpretation and the univocal and essentialist view of the economy will be tackled in the second part of this book.

open creation and sharing performed by groups online that: set and execute goals in a decentralized manner; harness a diverse range of participant motivations, particularly non-monetary motivations; and separate governance and management relations from exclusive forms of property and relational contracts» (Benkler et al., 2015, p. 176). The common examples deployed to illustrate this kind of economic organisation are the online encyclopedia Wikipedia and the universe of FLOSS (i.e., Free Libre Open Source Software). According to Benkler, the main role of this new mode of production has been to capitalise on already existing features of the human nature, since «the material conditions of production in the networked information economy have changed in ways that increase the relative salience of social sharing and exchange as a modality of economic production. That is, behaviours and motivation patterns familiar to us from social relations generally continue to cohere in their own patterns. What has changed is that now these patterns of behaviour have become effective beyond the domains of building social relations of mutual interest and fulfilling our emotional and psychological needs of companionship and mutual recognition. They have come to play a substantial role as modes of motivating, informing, and organizing productive behaviour at the very core of the information economy» (Benkler, 2006, p. 92). It is the Internet architecture, he argues, that enables these individual inputs to be transformed from dispersed contribution into a modularly integrated outcome.

As will be further examined in the next section, this mode of production rests on the idea that expertise does not lie in the organisational forms typical of the Fordist era, rather is diffused in society as a whole and emerges thanks to the force of aggregated crowds of independent individuals (Tapscott & Williams, 2006). Thus, the rise of this new mode of production is premised on a spatial imaginary that identifies in networks its main topological form. Bauwens (2005) extends this transformation to embrace not only the future mode of production but also the realms of ownership and governance, all of them being like to rest on the labour of equipotential individuals. However, this autonomous and equipotential individual is never really questioned, thus becoming an unrealistic premise of the peer production narrative that needs to be counterbalanced by empirical research.

Even if it is depicted as a revolution in the modes of production, peer production is not considered by necessity an alternative to capitalism. According to Bauwens (2005), the two are actually interconnected, each of them relying on the other.[12] However, different commentators have variously depicted the relationship between capitalism and peer production, both

[12] A key example is the rise of open source software industry.

highlighting the role of the latter in tracing the path for overcoming the first and identifying the relationship connecting peer production to capital as one of immanence (see Kostakis et al., 2015a for an overview).

Some commentators have extended peer production to embrace also the physical realm, arguing that the rise of the Maker Movement and the spread of Maker laboratories infrastructure echo the organisational model that underpins peer production (see for example Menichinelli et al., 2017; Moilanen, 2012; Ratto & Ree, 2012). Some of the same principles underpinning peer production projects, together with an analogous governance structure, have been found within physical communities of Makers and Hackers; however, the specific challenges posed by the fact of dealing with material production stand as obstacles for an immediate transfer of the immaterial peer production model (Kostakis et al., 2015a).

Focusing on the Italian context, Menichinelli et al. (2017) mobilise the peer production framework to analyse the way Makerspaces and Fablabs foster a transformation in how work is organised. Through a review of the literature and an online survey, the Authors investigate the Italian Maker ecosystem, focusing in particular on its relationship with changing dimensions of work and on how peer production is taking place through the work of Makers on physical goods. The movement of peer production models from the digital realm to the production of physical artefacts is ascribed to the fact that many so-called physical objects are now by a great extent made of digital parts. According to Menichinelli and colleagues (2017), another dimension that locates the Labs in the peer production ecosystem is the relevance for Makers to share their projects and knowledge online.

However, the same contradictions evident in the conceptualisation of the peer production architecture have been traced also in its application to Making; indeed, «shared machine shops figure as the occupied factories of peer production theory - worker-owned production units which often look like the perfect illustration of the revolutionary theory on first sight, yet on closer look exhibit all its contradictions. Of the phenomena customarily examined under the rubric of peer production, they are probably as close as we got to an image of a peer-produced social fabric - a society of peers» (Troxler & maxigas, 2014: n.p.).

Critiques to the enthusiastic accounts of peer production have pointed to the alleged revolutionising scope of it. Kreiss et al. (2011) question the narrative of revolutionising transformation that usually imbues discourses concerning peer-production, analysing the positive claims made around it on the backdrop of an alleged progression from the previous industrial era. Contesting the two main theorists of peer production – i.e., Yochai Benkler and Henry Jenkins –, Kreiss and colleagues argue that the always enthusiastic

tones in which digital collaboration is depicted are obfuscating the fact that these narratives are based on the idea that collaboration has an inherent positive value *per se*, thus framing it as the harbinger for a deep transformation of society as a whole. Drawing on Weber and du Gay, the Authors question the politics of peer production, by challenging some of the celebratory core principles of its proponents: that pursuing psychologically gratifying labour in peer production is an unqualified good; that peer networks are egalitarian and efficient means of producing information goods; that peer production necessarily realises ethical relationships between collaborators; that peer production is equally suited to all domains of social activity; and that peer production is non-market and non-proprietary. All these alleged positive outcomes of a shift towards peer production are compared with the bureaucratic structure of the industrial society, which seems to undermine those very principles by guaranteeing better performances in all of them. In particular, the alleged non-market nature of peer production is questioned, stressing the fact that the very efficiency of networks could make them attractive for industrial organisations too; this is indeed what seems to be going on for Makers, when considering their role in projects such as Industry 4.0 or similar strategies for urban manufacturing (see Chapter 2).

The theoretical discussion of peer production made by Kreiss and colleagues (2011) is particularly useful in that it warns against an easy echoing of the very enthusiastic portray of peer production, thus asking for investigations of the topic that bracket its alleged revolutionary potential to embrace new questions on the features of peer production.

1.2.2 Producing versus consuming: the third wave of DIY and the rising of prosumers

Recent sociological literature has emphasised the changing role of consumers in the production of value. Thanks to digital technologies, consumers are now able to contribute to both material and immaterial production, either for themselves or for big corporations. Makers are usually associated with this phenomenon, through what has been called the Third Wave of DIY (do-it-yourself). DIY practices encompass a diverse range of activities in which the consumer supply by him/herself for the production of something usually bought on the market. It is to Alvin Toffler (1980) that we owe a periodization of DIY into three waves – subsistence DIY, industrial DIY, and post-industrial DIY (see also Fox, 2014). What characterises the latest form of DIY is the great availability of information that could be found online, together with the relevance of being part of a community of peers devoted to

similar projects - an aspect, the latter, that blurs the lines between contemporary forms of DIY and more do-it-together-oriented (DIT) practices (Ratto & Boler, 2014).

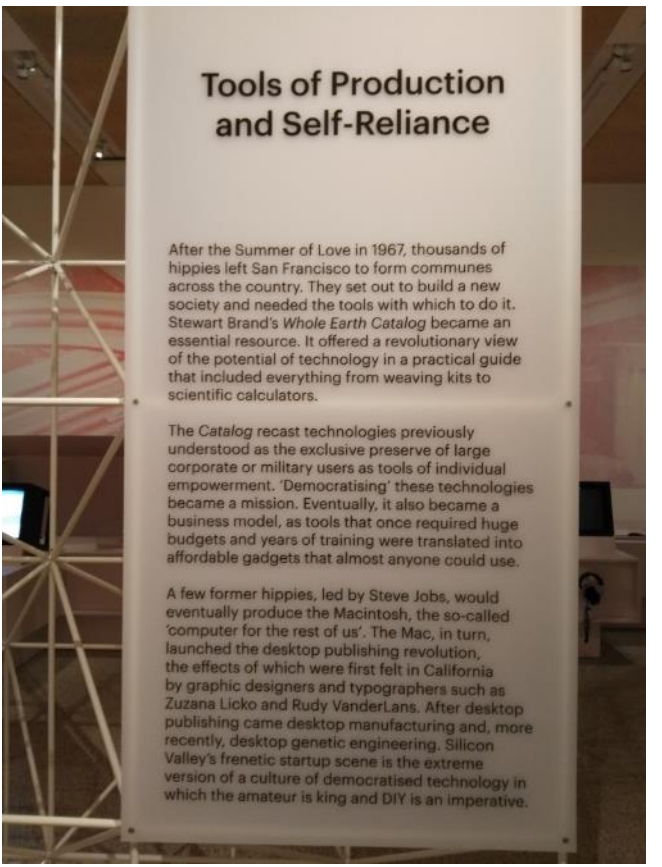


Figure 5. Exhibition California. Designing Freedom, the Design Museum, London, August 2017. Author's photo.

Together with DIY, another concept that is frequently mobilised in talking about the empowering potentialities of a Maker culture is the one of *prosumption*. This portmanteau word too was invented by Toffler in his book *The Third Wave* (1980), but it has been recently rediscovered by a stream of sociological literature that draws on the work of George Ritzer (Ritzer, 2014; 2015; Ritzer & Jurgenson, 2010). What is at stake when talking about prosumption is the changing role of consumers in the production process, who are said to be now more and more engaged in it thanks mainly to the tools provided by Web 2.0. Different conceptualisations have been given of

this phenomenon, variously labelled as the rise of the Pro-Am, i.e., professional amateur (Leadbeater & Miller, 2004), value co-creation (Humphreys & Grayson, 2008; Prahalad & Ramaswamy, 2002), craft consumption (Campbell, 2005), or produsage (Bruns, 2008). All of these analyses describe a participatory culture (Jenkins, 2006) that has been extending from the production of immaterial online contents (such as, Youtube videos, Facebook contents, etc.) to the hacking and making of material artefacts. The possibility for prosumption has increased with the advent of the Internet, specifically in its Web 2.0 version, which is considered «currently both the most prevalent location of prosumption and its most important facilitator as a 'means of prosumption'» (Ritzer & Jurgenson, 2010, p. 20). These changes have been strongly affecting consumers' subjectivity, engendering a blurring of the boundaries not only between producers and consumers but also between the expertise of professionals and amateurs' endeavours. The Pro-Ams theorised by an economics and managerial discourse such as the one traced by Leadbeater and Miller (2004) are precisely new economic subjects, «knowledgeable, educated, committed, and networked, by new technology [...] creating new, distributed organisational models that will be innovative, adaptive and low-cost» (Leadbeater & Miller, 2004, p. 12). Counterbalancing this discourse, critical sociologists have been drawing on both Neo-Marxist analyses and Foucauldian framework of governmentality to theorise prosumption as an exploitative mechanism that represents the last evolution of capitalism, in particular for what concerns the use of digital platforms for sharing (Fuchs, 2014; Ritzer, 2015; Zwick et al., 2008). However, this critique risks adopting precisely the same homogenised and overarching image proposed by the economics literature on consumers' work.

Contra Ritzer, Toffler (1980) conceptualises prosumption as consumers' production for their own use and the third wave of prosumption as the passage from a 'production for exchange' to a 'production for use' strongly technology-mediated. In this passage, what Toffler emphasises is the changing relationship between the amateur and the professional, and the consequent change in the time, space, and conceptualisation of work; «the old distinction between work and leisure falls apart. The question is not work versus leisure, but paid work for Sector B [the market] versus unpaid, self-directed, and self-monitored work for Sector A [people's production for their own use]» (Toffler, 1980, p. 277). Almost prefiguring the advent of Fablabs, Toffler reports the words of Robert H. Anderson, head of the Information Services Department at the RAND Corporation: «The most creative thing a person will do 20 years from now is to be a very creative consumer [...] Namely, you'll be sitting there doing things like designing a suit of clothes for yourself or making modifications to a standard design, so the computers can cut one for you

by laser and sew it together for you by numerically controlled machine» (Toffler, 1980, p. 274).

What a narrative about prosumption *à la* Ritzer implies instead is a linear evolution of capitalism, which goes from a pre-industrial era of mixing between production and consumption to the clear separation between the two brought about by the Industrial Revolution. Ritzer's take on prosumption is peculiar for the fact that it stretches the practices of user-generated contents to encompass an epochal transformation of capitalism, a sort of 'new spirit of capitalism' (Boltanski & Chiapello, 1999), in which value production will lie more and more in prosumption practices. This implies the co-option of prosumers' activities by the market, thus denying any possibility for individuals' agency and awareness (Dusi, 2018). This grand narrative risks also flattening down the great variety of the phenomenon, while overlooking the co-presence and contradictory relationship of prosumption with forms of production and consumption more attuned with an industrial mode of production. Moreover, a subtle technological determinism is permeating this vision, given its strong emphasis on the role of Web 2.0 and other Internet-mediated forms of interaction. In order to avoid these pitfalls, a more nuanced mobilisation of prosumption as an analytical tool could allow grasping the diverse practices of consumers' engagement in production processes. Following this approach, Dujarier (2015) proposes a tripartite scheme, distinguishing among directed self-production, collaborative co-production, and militant collaboration, situating Fablabs under the last category.

According to Fox (2014), the rise of infrastructure for digital-enabled DIY has been providing the tools for Making, such as online repositories, new machinery such as 3D printers, hands-on high-tech tools such as Arduino[13] (see sections 3.4.2 and 5.2.1.3), and workshops such as Fablabs, Makerspaces, and Techshops. In general, the device that enables a great part of Makers' works is the spreading of the openness paradigm characterising the open-source movement from software to hardware production (d'Ovidio, 2017). The availability of open repositories online and the distribution of projects under a common creative license or analogous ones create the infrastructure that enables lay people to allegedly obtain both the information and the skills needed to develop their own projects. Fablabs and Makerspaces added to this online infrastructure a physical one that provides the opportunity for face-to-face exchange of information and knowledge between amateurs and experts (Chappini & Anselmi, 2017). Moreover, the practices of

[13] Arduino is the single-board open-source and open-hardware microcontroller renowned among Makers for its potentials in IoT (i.e., Internet of Things) projects development. The project born in Ivrea, a town located approximately 50km from Turin, while now the headquarter of the company is in the United States.

making - inasmuch as they are related to their precursor hacker subculture - imply an active interaction with products, which goes beyond the plain use of them (Magaudda, 2012).[14]

The discourse on prosumption has been incorporated into the mainstream narrative concerning the empowering and democratising potentials of making, depicting a present in which – echoing a Marxist discourse – the means of production are finally in the hands of creative consumers (Braybrooke & Jordan, 2017; Maxigas & Troxler, 2014).

Summing up, both the concepts of DIY and prosumption have been used beyond the scope of their actual utility, risking losing their explanatory power. If what is at stake in these analyses is the role of the consumer in value production, there is a need for conceptual tools that let the door open for acknowledging the mixing of consumer activities with new production practices, while avoiding the pitfalls of a too broad concept that does not account for the nuances and differences in this process. Indeed, «the interplay of production and consumption in everyday practices could be addressed by employing, for instance, a practice-theoretical perspective able to consider production and consumption as moments in practice» (Dusi, 2018, p. 667). The variety of consumers engagement with some products goes from almost accidental production of value via content provision (such as for Facebook) to material modification of an artefact as in making and hacking. Therefore, rather than assuming an *a priori* exceptionality of the scenarios recently disclosed by ICT, consumers role in production should be better understood as context-specific, individual performances where «meanings, objects and embodied activities are arranged in specific configurations of "practices"» (Magaudda, 2010).

To be sure, a long tradition in consumption studies both in sociology and geography have adopted a practice-oriented approach to the analysis of DIY and consumers' engagement with products, thus constituting a useful analytical framework to embrace the variegated nature of it (Gregson et al., 2009; Watson & Shove, 2008). Indeed, if we want to avoid a grand narrative of capitalism' transformation in a 'prosumer capitalism' while preserving the relevance of new productive practices and the consumers' engagement in them, we should probably look for new ways to conceptualise *valuation* processes and their variety.

[14] However, an extended literature in both sociology and geography of consumption highlights that the relationship between consumers and products has never been a univocal one, being rather always contingent and variable.

1.2.3 Innovating: from open source to open innovation

As stated in the previous section, underpinning the increasing engagement in production processes of lay people there is a general 'culture of openness', which mainly derives from the hacker subculture and the open-source movement. Recently, the ethos of openness has been encapsulated into the economic discourse about innovation, becoming the newest buzzword. While proponents of open source stress the relevance of sharing and collaboration in the production of value, the open innovation paradigm embeds it into the business process, thus still focusing on the importance of value capture.

One of the main theorists of open innovation, Henry Chesbrough, argues the importance for companies to open up the innovation process by incorporating external knowledge.[15] Indeed, 'Open Innovation assumes that useful knowledge is widely distributed and that even the most capable R&D organisations must identify, connect to, and leverage external knowledge sources as a core process in innovation. Ideas that once germinated only in large companies now may be growing in a variety of settings - from the individual inventor or high-tech start-up in Silicon Valley, to the research facilities of academic institutions, to spin-offs from large, established firms' (Chesbrough et al., 2006; see also Chesbrough, 2006; Von Hippel, 2005).

Figure 6. Rome Maker Faire 2017. Author's photo.

[15] Indeed, knowledge will be one of the three conceptual dimensions employed in the second part of this work.

The rising of collaborative spaces for making has been interpreted also as part of this broader transformation in innovation processes and creativity. The added value that Fablabs, Makerspaces, and in general 'open creative labs' (Schmidt & Brinks, 2017) bring to the process of value production lies in the ability to open up new possibilities for innovation through an extension of knowledge production to users, consumers, and lay people in general. Fablabs, thanks both to the provision of machinery usually employed only at the industrial level and to the mixture of professionals with amateurs, foster the process of innovation by multiplying the opportunities for new products to be developed. Lange and Bürkner (2018) list Fablabs and Makerspaces under the general category of 'open workshops', precisely emphasising their role in fostering an open innovation paradigm by laying on their peculiar features such as open access, flexible value creation forms, and an experimental attitude.

This narrative of Fablabs as spaces for open innovation totters on the thin border between 'openness' as a synonym of 'grassroots' and open innovation as a business strategy. The first understanding of Makerspaces' openness stems from discourses around the democratisation of innovation that frame Makers' attitude towards products as a positive sustainable strategy of growth; a sort of alternative development paradigm, based on bottom-up solutions that are more attuned with the needs of local communities (Smith et al., 2017a). In particular, openness is here emphasised in its relationship to access, in that it allows to empower a large number of individuals and groups (Smith et al., 2017b).

The discourse concerning spaces for open innovation has proved to influence also recent urban development strategies. Hubs devoted to open innovation are now employed by policymakers as flagship projects, being part of a general understanding of cities as laboratories (Karvonen & Van Heur, 2014). A recent policy publication realised by an Italian organisation extremely dynamic in the field of Makerspaces and coworking spaces stresses the relevance of open innovation spaces for urban development (Montanari & Mizzau, 2016), drawing on the literature that links innovation processes and geography (Moretti, 2012). In this and similar frameworks, the open innovation paradigm goes beyond the boundaries of for-profit enterprises, stretched out to overlap the previous emphasis on citizens' participation.

These enthusiastic narratives are counterbalanced by critical approaches that see in the praise of open innovation a bridgehead for new forms of free labour.[16] Critical scholars have looked at the role of consumers in

[16] A specialised literature focuses on the kind of labour involved in spreading hackathons; see for example Gregg, 2015; Irani, 2015; Lodato & DiSalvo, 2016; Zukin & Papadantonakis, 2017.

prosumption practices as a new way of capitalist value extraction, particularly framing their labour as 'free' (Terranova, 2000). Drawing on the work of Marx in his *Grundrisse*, these Authors identify in digital forms of labour performed by consumers, users, and amateurs, the unpaid labour of the General Intellect, that is, a «collective intelligence [...] an assemblage of humans and machines at the heart of postindustrial production» (Terranova, 2000, p. 45). The literature on free labour stems from Italian Autonomist tradition that theorises immaterial labour as both the informational and the communicational contents of a commodity (Lazzarato, 1996); going beyond the old Marxian division of class, immaterial labour is «a form of activity of every productive subject within postindustrial societies» (Terranova, 2000, p. 41). The massive use of digital technologies, together with a call for participation, open up the space for engaging in both digital and material labour for free, thus leading to «the production of subjectivities that accept leisure time as an occasion for productivity» (Gregg, 2015, p. 191).

Terranova conceptualises the digital economy drawing on the Autonomist tradition of the 'social factory' (Gill & Pratt, 2008), that is «a process whereby "work processes have shifted from the factory to society, thereby setting in motion a truly complex machine"» (Terranova, 2000, p. 33). In contrast with both the managerial discourse on open innovation and a mainstream economic geography that praises the innovative capacity naturally embedded into offline and online communities, Terranova claims that the latter is actually the outcome of the declining Fordist production and the corresponding upsurge of Post-Fordist cultural consumption; «free labour is the moment where this knowledgeable consumption of culture is translated into productive activities that are pleasurably embraced and at the same time often shamelessly exploited» (Terranova, 2000, p. 37)[17].

1.3 Making urban workplaces: between co-working and manufacturing

One of the main values attributed to Makerspaces and Fablabs is strictly linked to their role as agent of reconfiguration in what working in an urban context means. On one side, they are considered as nodes of a new local, mainly urban, and distributed network of manufacturing; on the other side, they are also seen on the backdrop of the diffusion of coworking spaces as preferred sites to work for freelancers. In this section, the literature concerning coworking spaces will be discussed in order to situate the debate on

[17] These debates will be tackled in Chapter 6.

Fablabs in the wider transformations constituted by the rise of the sharing economy and collaborative spaces for work. After that, the second section will be devoted to the specific role of Fablabs and Makerspaces in transforming the manufacturing sector, and the consequent re-urbanisation of the latter.

1.3.1. Sharing spaces for Making: the rise of co-working spaces

Considering more the spaces *per se* than the practices of making performed within them, the rise of Makerspaces and Fablabs is usually interpreted through the lenses of a broader transformation that has been affecting the urban workplace scenario. Collaborative forms of working, variously conceived 'innovative' enterprises, and the wider impact of the sharing economy at the urban level constitute the backdrop that urban studies' scholars and sociologists usually employ to frame the advent of urban spaces for making. Now globally spread in various organisational arrangements, «coworking spaces are shared workplaces utilised by different sorts of knowledge professionals, mostly freelancers, working in various degrees of specialisation in the vast domain of the knowledge industry» (Gandini, 2015, p. 194). Critical scholars read the rising of shared spaces for work as the outcome of a neoliberal strategy employed by digital self-entrepreneurs, and cultural workers in general, to cope with the aftermath of a crisis that struggles to leave the knowledge economy (Gill and Pratt, 2008).

In 2017, the *Journal of Urban Technology* published a special issue on Innovative Workplaces and Urban Space, whose contributions variously tease out how new forms and spaces for work bear upon urban life. The urban is conceived as the site where a synergy of various practices and thick relationality could become the objects of valuation processes, thus growing into the privileged context for the transformation of work. Urban coworking spaces enhance the ability of cities in acting as sites of encounter (Merkel, 2015), thus enabling the coming together of strangers and the alleged serendipitous mixture of competences. Indeed, «the interpretation of coworking spaces in the contemporary urban knowledge economy suggests that coworking practices may effectively provide the potential for a physical reterritorialisation of 'nomad' working practices [since this] more general rethinking of work has its roots in the shared and highly networked forms of collaborative production embedded in the urban territory» (Gandini, 2015, p. 201). Moreover, the increase in ICT-mediated jobs has generated the need for a physical infrastructure that helps these workers in coping with the backlash

of working through information and communication technologies (Merkel, 2015).

The literature on coworking spaces usually emphasises their innovative character drawing on the collaborative and communitarian ethos that informs them, while highlighting their role in sustaining knowledge economy and digital workers (Gandini, 2015; Mazali, 2016; Merkel, 2015; Spinuzzi, 2012). The high individualisation of the labour market and the need to cope with the aftermaths of the economic crisis have coalesced in bringing to the fore these new self-organised and collaborative forms of work. These transformations in the organisation of work are part of the variegated phenomenon known as 'sharing economy', whose diffused effects have driven some commentators to consider it the harbinger of a new mode of production. What is emphasised in these analyses is the supposed re-embedding of market exchange into society; «an indication of a broader process of resocialization of economic exchange that shares a resemblance with the Great Transformation described by Karl Polanyi» (Arcidiacono et al., 2018, p. 278).

Similar to the way Fablabs and Makerspaces draw on the experience of the hacker communities in the 90s, the first coworking spaces were born out of an ethos of collaboration that was less related to business than to the values of open-source communities (Gandini, 2015, p. 196). A recent monographic volume of *The Sociological Review* (2018) interrogates precisely this wide and contradictory 'sharing' dimension that underpins all these experiences, drawing on this aspect to unpack how different phenomena (from Fablabs to coworking spaces, from Airbnb to electronic bazaars) deploy sharing as a key resource. In particular, these spaces are considered innovative inasmuch as they foster new forms of sociality that impinge on a different production of value. Indeed, there is a sort of «'compulsory' nature of sociality that such sharing practices demand» (Arcidiacono et al., 2018, p. 279). Due to this enhanced sociality, these spaces are commonly depicted as 'third places' (Brown, 2017; Gandini, 2015; on Fablabs and Makerspaces as third places see Davies, 2017); that is, places that are devoted to work but where the interaction among people, the relaxed environment, and the mixture of working practices with mundane ones such as eating together contribute to blurring the boundaries between private/leisure spaces and spaces for the production of value. The 'community' is identified as the core pillar of these spaces, acting as the common ground for both more business-oriented coworking spaces and grassroots Fablabs (Davies, 2017; Schmidt & Brinks, 2017). However, even if all inspired by the same ideology that identifies in communities and informal encounters the blueprint for these spaces, those 'forms of sociality' are very much connected to the context in which they arise. Therefore, there is a need to take into account the context specificity

of these experiences; the literature that investigates the importance of sociality in the re-organisation of work has to be balanced by a concern with the role of space in affecting the way people interact, intertwining with this very endorsement towards more intimate forms of interaction in the production of value.

The engagement with the relational dimension of coworking seems to be also a mandatory requirement for a new creative class that identifies reputation as a key resource to capitalise on (Gandini, 2015). However, the fact of sharing a new infrastructure of work does not automatically result into forms of work that actually produce value capitalising on the informal and spontaneous collaboration among peers; rather, these collaborations are usually temporary and the very individualised nature of the neoliberal self-entrepreneur is strengthened (Spinuzzi, 2012). Coworkers could be interested in locating their working activities in these spaces simply because of financial reasons; indeed, another dimension that usually underpins the diverse range of sharing practices is represented by the access to common resources[18], which offers a financially convenient alternative to the difficulties of ownership. Finally, a key role is also played by the host, whose activity strongly impacts on the shape taken by the coworking environment, facilitating the encounters among coworkers and engaging them into the various practices of what being a coworker means (see for example Merkel, 2015; Toombs et al., 2015).

In this scenario, Fablabs and Makerspaces are considered as a peculiar form of coworking space, devoted to digital fabrication and, consequently, targeted at a segment of digital workers that is wider than the one usually encompassed by the notion of 'knowledge economy'. According to this literature, spaces for making are the result also of the spreading of coworking practices, the latter having spread into other community-based spaces (Merkel, 2015) that have identified in collaboration and sharing a useful way to organise work. «Fab labs and makerspaces, often mixed with co-working spaces and other forms of workspace (craft and creative ateliers, manufacturing or innovation hubs), are leading to a radical reconsideration of the role of urban space in connection with complex processes of technological and organizational innovation in economic activities and in urban management» (Armondi & Bruzzese, 2017, p. 28).

In this framework, the role of policymakers is usually highlighted as crucial in pursuing a regeneration strategy that is grounded in «the connection between these innovative technologies, new workspaces, governmental

[18] The access dimension is crucial also for the consumption side of the sharing economy; see Bardhi & Eckhardt, 2012; Botsman & Rogers, 2010.

policies and urban space» (Armondi & Di Vita, 2017, p. 2). Fablabs, together with coworking spaces, are thus framed as 'innovative workplaces' that have significant spatial and socioeconomic effects on the urban environment (Armondi & Di Vita, 2017). Within urban economies, the way coworking spaces enable collaboration among peers is seen as a key factor of productivity in a Post-Fordist economy, a factor that autonomous Marxist scholars usually frame as an extension of exploitation mechanisms to other domains of life.

However, the core of this literature draws on a geography of coworking spaces which risks of reproducing the same bias that underpins the mainstream enthusiasm for these practices; Milan, London, New York, Berlin are the common sites of investigation for these new practices of work (Armondi & Di Vita, 2017; Arvidsson et al., 2016; Brinks & Schmidt, 2015; d'Ovidio & Rabbiosi, 2017; Gandini, 2015; Mariotti et al., 2017; Merkel, 2015; Schmidt & Brinks, 2017). Indeed, drawing on Moriset (2014), Gandini highlights how «coworking is largely diffused in the so-called 'creative cities' of advanced economies» (Gandini, 2015, p. 196). Concerning in particular Fablabs and Makerspaces, the risk is assuming, rather than questioning, an understanding of their meaning, role, and potential that derives from the very peculiarity of the case study investigated (for what concerns the Italian debate, usually Milan). This creates a problematic relationship between the empirics and the theoretical framework employed, the latter being too much influenced by the very empirical context investigated (cf. Brenner & Schmid, 2015). For what concerns the Italian debate, Milan is usually deployed as a fruitful case to be investigated precisely because of its unquestionable position as the most important 'knowledge-economy oriented city' in Italy, which «maintains a specific socioeconomic geography and spatial dynamic where urban change can stem both from the public and the private sector» (Armondi & Bruzzese, 2017, p. 30). Moreover, the policy agenda of the centre-left Municipality has been strongly supporting these initiatives, thus contributing to making the Milanese case more of an exception rather than the rule.[19] These choices raise an interesting issue for scholars investigating these phenomena: what happens when we switch the focus to less representative cases, in which the scope of the phenomenon is not that evident? Concerning the urban dimension of these practices, we should also question the taken-for-granted way these spaces are assumed to impinge on urban regeneration and revitalisation processes. The spillovers resulting from the settlement of these spaces are usually read through the lenses of research on

[19] The Municipality of Milan started to invest on Makers in 2013, with the Bando Creative Makers 2013, available at https://www.comune.milano.it/dseserver/webcity/garecontratti.nsf/51607b595b240841c1256c4500569c90/8d3b6a258e2d2804c1257b980040c31e/$FILE/Bando%20CREATIVE%20MAKERS.pdf. Last accesa: 23 April 2018.

creative industries, thus limiting them either to negative gentrification processes or to the positive boosting of innovative practices. It is almost taken for granted the fact that these new spaces are going to have an impact of some sort, rather than questioning the broad and complex network of actors that cooperate in making it possible.

It also seems to be presumed the 'productive' nature of these 'new productive centralities' (Armondi & Bruzzese, 2017). The focus is on how local policymakers and private actors depict these new spaces, thus the kind of production fostered by these places going unnoticed. In sum, what this literature fails to ask is: what is new in this new production? And, what is produced, and how? In short, what has been changing in how we conceptualise production today?

1.3.2 New urban manufacturing

Spaces for making have been recently considered also as harbingers of a new form of manufacturing. This renewal of manufacturing, on one side, is an answer to the recent economic crisis, and, on the other, is mainly characterised by the fact that it is informed by what has been usually considered distinctive traits of the knowledge economy. This mixture between manufacturing and knowledge economy is the response to the crisis of productivity affecting the Global North, leading to a «shift from centralised models of resource management in industrial societies (from large-scale production centres to small-scale individual consumers) to distributed models in information society (connecting people with people, objects with objects, buildings with buildings, or communities with communities) [...] Within this context, Makerspaces like fabrication laboratories (Fab-Labs) transform digital data into physical objects (and vice versa) through their digital fabrication machines, favouring both the development of specialised productions (locally oriented) and the empowerment of users» (Mariotti et al., 2017, p. 4).

The impact of the Maker Movement on the forms, practices, and infrastructures for manufacturing partially follows the portrait made by the main proponents of Makers. Chris Anderson's (2012) claim for the revolutionary capacity of the Movement leads him to foresee a future in which manufacturing as we knew it - with the Fordist factory at the core - will be substituted by a new Web-like model, driven by «the energy and creativity of entrepreneurs and individual inventors [that can] reinvent manufacturing, and create jobs along the way» (Anderson, 2012, p. 16).

Indeed, desktop-manufacturing, that is, the specific type of manufacturing allowed by the very machines available in a Fablab, is considered crucial

for rethinking how manufacture should be organised. The availability of small, more affordable, digital types of machinery opens up the possibility to reconceptualise the spatial relations underpinning material production processes. Prophecies on the advent of a new Industrial Revolution (Anderson, 2011; Rifkin, 2011) draw on economics discourse concerning the advent of 'widely distributed manufacturing systems', propelled by the fact that «do-it-yourself, collaborative and small-scale manufacturing might become economic, if designs can be downloaded for free, machinery becomes as cheap and easy to use as a computer and raw materials can be easily obtained» (Leadbeater, 2009: n.p.). What these Authors preconceive is a manufacturing system that takes from the Internet a platform configuration. The literature dealing not as much with *spaces* for a new form of manufacturing, rather with new manufacturing *per se*, focuses more on both the role of amateurs in the production process and the technologies enabling it (Kostakis, 2015). Far from the mass industrial production typical of Fordism, what is at the core of contemporary manufacture is the possibility to customise products, thus making «the customer's involvement in the production process [...] necessarily grow» (Toffler, 1980, p. 274), as previously said. This is allowed by the flexibility of digital tools for designing, prototyping, and producing artefacts.

Referring mainly to the literature on economic clusters and agglomeration strategies, a key role is attributed to the different kind of local infrastructure that a manufacturing sector relying on Makerspaces would need. The institutional ecosystem in which Makers are embedded is identified as a crucial factor for their ability of scaling-up, in order for these new producers to overcome the financial and distributional barriers that Fordist firms would deal with in an easier way (Doussard et al., 2017).

As in the case of coworking spaces, studies on new urban manufacturing usually take into account cities whose business infrastructure, policy agendas, and cultural milieu contribute in making them exceptions rather than the most likeable scenarios. Milan (Bianchini & Maffei, 2013; Vicari et al., 2015), Barcelona (d'Ovidio & Rabbiosi, 2017), New York, Portland, Chicago (Doussard et al., 2017) are the main sites chosen to investigate a phenomenon whose nuances are probably more revelatory than its best performances within particularly well-equipped environments. As acknowledged by Doussard and colleagues, this kind of selection 'comes at the cost of evaluating the growth of maker enterprises in smaller, less industrially diversified cities that provide makers with fewer resources for design, production and distribution' (Doussard et al., 2017: 6).

The Italian debate is particularly rich in contributions that frame Makers as the bearers of a revolution inside manufacturing and its relationship with

design (Micelli, 2011). These authors stress the relationship between Making as a transformation within design-driven innovation, and the relocation of production in urban areas. This union propels the birth of a 'City Making' (Bianchini & Maffei, 2014), a new system of production based on technological developments in the field of production, distribution, and consumption of products, together with the diffusion of sharing practices. The most extreme scenario is the one depicted by the proponents of the FabCity project. Developed by the IAAC (Institut d'Arquitectura Avançada de Catalunya) in partnership with the MIT, the project aims to develop a network of productive, self-sufficient cities.[20]

Rather than being the independent outcome of individual innovative triggers, the role of policymakers is crucial in fostering Makers as urban driving forces for both restructuring the manufacturing sector and opening the path to social innovation projects (Grodach et al., 2017). The Municipality of Milan, for example, has coopted Makerspaces and Fablabs as part of two urban regeneration strategies, aiming respectively at building a more inclusive smart city and at capitalising on the numerous grassroots experiences born under the sharing economy umbrella (Di Vita, 2017). In 2018, the same Municipality has launched the project 'Manifattura Milano', which involves institutional actors, together with the managers of all the Milanese Fablabs and Makerspaces, and some scholars conducting research on Makers. Cristina Tajani, Council Member for Work's Policies, endorsing the project's goal of transforming Milan in 'an ecosystem that fosters the birth, settlement, and growth of enterprises working in the field of digital manufacturing and new craft', claimed: 'We were used to thinking about the city as the place in which tackling and managing the de-industrialisation. Today, we want to be promoters of the transformation of unproductive spaces into spaces of production'.[21]

However, policy-oriented literature usually understands Makers mainly as entrepreneurs running a one-man manufacturing business, usually coming from the design sector. This lack of questioning of the broad range of what is considered as Making leads to limit the analysis to Makers whose activities are explicitly market-oriented, thus failing in acknowledging the kind of peer-production in which some Makers are involved, as shown in the

[20] The project is not limited to the manufacturing sector, since it extends the idea of self-sufficiency to other fields, such as energy provision, currency, food production, etc. Retrieved from: http://fab.city/about/. Last access: 22 April 2018

[21] Interview extract from: Cancellato, F. (2017) *Manifattura Milano è l'idea politica più ambiziosa che c'è oggi in Italia*. Retrieved from: http://www.linkiesta.it/it/article/2017/04/14/manifattura-milano-e-lidea-politica-piu-ambiziosa-che-ce-oggi-in-itali/33867/. Last access: 22 April 2018

previous section. In particular, the Italian academic debate, strongly influenced by design - both as an economic sector and as a branch of academic knowledge - seems to overlook the role of amateurs in being part of this new manufacturing system, the focus being more on the innovative infrastructure represented by labs for making.

1.4 (Re)making craft and handmade production

Broadly speaking, when we talk about making we think about an activity that involves the material production of something: a cake, a pot, a belt, an IoT (Internet of Things) DIY device, all of them are the outcomes of individual engagement with some sort of materials. Sociological but more and more also geographical literature have been engaging with the complexity and variety of 'Maker cultures' (Carr & Gibson, 2016) as the recovery of material production. Thus, this kind of debates is far from the ones discussed in the previous sections, inasmuch as it generally disregards both the strong technological focus connected to the Fablabs' ecosystem and their participation to a collaborative, peer-to-peer economy. However - and as it will become more evident in the second part of this research -, this approach is useful for its emphasis on the material engagement with objects and the performative enactment of always contingent geographies of making.

1.4.1 Geographies of Making

The rising literature on the new geographies of making is mainly inspired by both debates on creativity and by an anthropological tradition that deals with the practical human engagement with materiality (Ingold, 2013). By consequence, human geographers dealing with making look at a variegated range of activities conceptually held together by their reconfiguration of craftsmanship and by an underpinning communal embodied practice of material transformation.

What is at stake in this literature is a rediscovery of makers' practices that resonates with some of the current and more pressing debates in the discipline; concerns on materiality, embodiment, and practice pave the way for an empirical engagement with the topic that looks more at the labour of Makers in their always contingent and situated interaction with the matter. Making becomes here not so much a new mode of production that hinges on a different economic organisation as a process of material creation, which encompasses a broad spectrum of 'Maker cultures' (Carr & Gibson, 2016). A

cultural geography focus on the material and embodied labour of Makers becomes, therefore, an interesting methodological tool inasmuch as it allows for producing more fine-grained analyses, being able to account for the failures and the inconsistencies of making, for the cultural and material production of spaces and forms of work; «for the pleasures, trials, and possibilities present in those manual tasks are a central part of the unfolding complexity of worker agency, identities, and politics as manifest in concrete spaces of work» (Carr & Gibson, 2017, p. 4).

These conceptual concerns blend with social and economic research on creativity, thus offering an understanding of making that flattens down the differences among those practices; asking «'what do we mean by making?' is to be greeted with the unfurling of sites and practices» (Price & Hawkins, 2018, p. 3). This certainly deflects the focus of analysis from the specificity of 'the' Maker Movement understood as the universe of tech-enthusiasts allegedly empowered by the diffusion of new technologies of production, sharing information online, and inspired by a narrative of (global) community belonging. However, this broader understanding of making could become a useful analytical tool inasmuch as it allows going beyond the apparent contradictions and inconsistencies that still hold true for the techy version of Makers. Besides the lack of definition of the term 'making', it actually «provides a more multivalent point of entry. [...] Focusing on making means being able to consider who is doing the making, as well as materials, their skilled manipulation, circulation, redeployment, and their agency, simultaneously across a much wider set of spaces and circumstances. Heterogeneous cultures and sites of making emerge into clearer view» (Carr & Gibson, 2016, p. 302).

Moreover, understanding making as a sociomaterial practice opens up the space for both a more in-depth understanding of how skills and matter interact and an overcoming of the distinction between craft and manufacturing (Carr & Gibson, 2016), thus being useful also in tackling the complex relationship existing among amateur labour, the profession of designer, and manufacturing reorganisation. Making as a practice is the connection point, it «emerges from the threads of empirical material and conceptual discussion as an embodied, material, relational and situated practice that spins connections between corporeal practices and formal, institutional and political spaces, between governance and policy practices and practices of resistance, and between highly professionalised practices as well as amateur, vernacular and mundane practices» (Price & Hawkins, 2018, p. 2).

Geographers interested in making have been tackling the spatial dimension of these practices both through a concern with their entanglement with public space and with making as a distributed practice that allows

overcoming the conceptual divide between spaces usually conceived as merely domestic – therefore, linked to the reproductive sphere – and spaces of production. In both cases, making is understood as a practice that proves to be useful in reframing the relationship between material production and urban fabric. On the one hand, mundane practices of making and craft are seen as a potential tool in negotiating how the urban space is used, produced, and experienced (Price, 2015); on the other, material skills are conceptualised as legacy of an industrial past that could constitute an original entry point in analysing the geographies of production in former industrial cities (Carr, 2017).

Moreover, geographers have been usually concerned with mundane practices of making, such as maintenance and repair (Carr, 2017; Graham & Thrift, 2007; Gregson et al., 2009). In these analyses, the primary concern seems to be one that frames making as a relevant social and cultural practice, while economic concerns seem marginal. The focus here is on how the embodied engagement with materiality could be conceptualised as a form of labour that, despite usually going unnoticed, is instead crucial in keeping the society together. This practice-oriented approach adopted by some geographers in investigating making proved its analytical potential in providing a shared ontological backbone to the study of how different spaces are materially constructed through situated, processual, and embodied practices. Thus, cities (Graham & Thrift, 2007), households (Gregson et al., 2009), and the relational space constituted by the skills acquired in a shop-floor and applied in one's own garage (Carr, 2017) are all held together by the material labour entailed in making those spaces.

Geographers more interested in making as an economically relevant phenomenon have framed the topic as the revival of the craft industry, investigating the role of specific craft-based sectors and their connection with the former industrial production of a region, to which these practices seem to add new cultural content (Gibson, 2016; Fox Miller 2017). In sketching the main spatial features of contemporary craft-based production, Fox Miller (2017) identifies spatial agglomeration, strong place-embeddedness, and the rising of new workspaces as the three main analytical foci through which investigating the phenomenon.

For its concern with making as a social practice deeply characterised by direct engagement with materiality, this stream of literature speaks to the analytical path traced by Richard Sennett, with his book *The Craftsman* (2008). This publication has contributed to paving the way for a new appreciation of crafting as a meaningful social, economic, and political act. Sennett's account particularly underlines the pleasure within, and the distinctive nature of, the craft labour, unfolding an innovative history of craft that goes from a

medieval workshop to the open-source community of Linux Torvald, passing from Diderot's *Encyclopedia*. Arguing with his mentor Hannah Arendt, he questions the distinction between *animal laborans* and *homo faber*, elevating material practices to the status of an act of good citizenship. However, Sennett's romantic view of the craftsmen - not to mention his underlying gender bias - leads him to an understanding of the social organisation of making as positive *per se*.

Partially contesting this romanticised vision, Authors locating the debate on making within a broader investigation of creativity and cultural production usually deal with maker practices such as knitting, pottery, and other forms of handmade production or 'indie craft', which have spread also thanks to dedicated urban handmade markets and online peer-to-peer e-commerce platforms such as Etsy (Dawkins, 2011; Jakob, 2012; Luckman, 2015; Shultz, 2015). Maker production is framed as a new form of independent cultural production emerging from the ashes of the recent economic crisis and oriented to an audience made of 'hipster' customers seeking for authenticity. This leads to questioning the kind of labour performed by these people, which, far from being an empowering, elevating, and self-expressing activity *à la* Sennett, could produce self-entrepreneurial and precarious subjects. Indeed, the very same values that are at the core of Makers DIY attitude could resonate with neoliberal foundations such as autonomy, individual freedom, and self-fulfillment (Davies, 2017; Dawkins, 2011).

1.4.2 Crafting technology

More attuned with the mainstream version of what a Maker is, recent sociological and anthropological research, together with literature coming from the HCI (Human-Computer Interaction) field, have investigated the material engagement with technology as one of the main features identifying Makers as new productive subjects. The focus of these studies are precisely those «high-tech do-it-yourselfers, who are democratising access to the modern means to make things» (Gershenfeld, 2015, p. 48; in Troxler & Wolf, 2017, p. 807). This way of understanding the so-called Maker culture traces a genealogical path that leads to the birth of the hacker subculture, thus usually blending the two drawing on both their shared interest in technology and relevance of sharing.[22]

[22] A rich tradition of literature analyses hackers' attitude towards technology. See for example Coleman, 2012; Levy, 1984; Turner, 2006.

As explained in the opening of this chapter, particularly the Maker ecosystem revolving around the Fablab network emphasises the role of digital fabrication, thus preferring tools such as 3D printers and CNC machines, together with the wide range of digital tools offered by dedicated websites and apps. One of the main claims made by the Maker movement's enthusiasts is that the rise of Making corresponds to a sort of natural continuation of the 'digital revolution' started with the diffusion of personal computers and become more evident with the advent of the Internet. In a rather technological deterministic view, Internet and Web 2.0 are considered the triggers for the democratisation of the production of both material and immaterial artefacts.

However, these shared tools do not result in countless mimics of the first MIT Fablab; rather, there are always contingent ways in which «social relations, digital technologies and workshop practices co-produce different socio-technical configurations of digital fabrication» (Hielscher, 2017, p. 51). Following this path, Braybrooke and Jordan (2017) argue that the global narrative on the Maker Movement acts as a homogenising tool, circulating a discourse on a large-scale transformation that is imbued with technological determinism and a neoliberal ethos. Investigating three different practices of technological making in three areas not directly connected with the mainstream narrative on Makers (i.e., Peru, China, and India), they show how research on Hackerspaces and Fablabs in unusual sites could provide a more nuanced understanding of the phenomenon, thus questioning the Western Maker Movement narrative. Appreciating the diversity of technological Making is a necessary effort to argue against «the proponents of the Maker Movement [who] neglect similar cultures of technological use in a way that subsequently positions Western making practices as revolutionary innovations» (Braybrooke & Jordan, 2017, p. 34). Sharing this commitment towards accounting for the heterogeneity of the Maker scene, Silvia Lindtner's work on Chinese Maker culture is exemplary in drawing attention to how also the specific industrial history of a place influences the way people construct their subject positions as Maker through the appropriation of technology (Lindtner, 2014; 2015). Notably, she shows how the *shanzhai*[23] culture born out of the high-tech manufacturing Chinese industry as a result of workers expertise has been joining the government's project of creating an innovative and creative society. Chinese Making thus emerges «from the hardware workshops on the streets and from factories that produce for the world» (Lindtner, 2014, p. 156), but responds to the politico-economic project of the

[23] The word *shanzhai* denotes counterfeit products made in China that imitate branded ones and are sold for a lower price.

government, thus positioning Chinese Makers neither as corporate culture nor as counterculture, rather as a 'parasitic' one.

The kind of Maker cultures more directly connected with their hacker predecessors locates in the material engagement with tools, software, and other more or less high-tech devices the relevant site for understanding Maker practices. This engagement is crucial in the construction of a Maker subjectivity (Toombs et al., 2015), together with the politico-economic context in which Makers are situated. The nitty-gritty of the way people become familiar with tools, and eventually build their own, is crucial in understanding the skills acquired by Makers and their knowledge of technology, which usually results in a distinctive 'ad-hocist' attitude and material sensibility (Toombs et al., 2015); indeed, the Maker portrayed by Toombs resembles Sennett's craftsman, in her passion, commitment, and love for the material labour performed.

1.5 Conclusions

The present chapter has introduced the topic, framing the advent of Makers and Fablabs as an important transformation in production. As anticipated, Fablabs and Makers could be read a, respectively, new spaces and new subjects charcaterising the organisation of urban economies in this phase of capitalism. Starting from the changes that have been affecting the realm of production more generally, the literature discussed in the first section identifies the increasing role of lay people and consumers in the production of value through the autonomous creation of material artefacts and immaterial contents. The inclusion of new subjects in production is largely sustained by peer-to-peer forms of organisation in both knowledge exchange and labour, eventually leading to including new subjects in the innovation process. While these transformations have firstly flourished within online realms, they have matched also with the advent of collaborative spaces for work and production, to which Fablabs are usually related. Thus, Fablabs are seen as the materialisation of collaborative practices and of an ethos of sharing, whereas they are also framed as harbingers of an epochal shift in the organisation of the manufacturing sector towards a self-organised and distributed model. Besides the expectations on the way material production is organised, Making has been investigated as a form of material practice, an array of embodied engagements with matter that result in the performance of different 'Maker cultures'.

Summing up, the chapter has offered an overview of the main streams of scientific literature that deal with Makers as a relevant socioeconomic

phenomenon, based on its transformative potential in how material production is sociospatially organised, how work is performed, and how innovation comes about. However, the possible frameworks discussed (e.g., collaborative workplaces, open innovation, prosumption, peer-to-peer production, etc.) take for granted that Fablabs should be understood as new urban infrastructures for work and production and that Makers constitute a new economic subject, rather than questioning if and how these descriptions are true. Notably, albeit offering a needed sociospatial lens through which investigating a phenomenon largely depicted as just global, research on Makers as part of a shift in the relationship between work, production, and cities falls short in providing more nuanced accounts. First, research that looks at the relationship between Fablabs and their urban contexts does not question «the binary framings of such spaces […], as either discursively charged sites of entrepreneurial design innovation on the one hand or anti-capitalist networked spaces on the other» (Smith, 2020, p. 594). Second, these works are over reliant on either self-descriptions and categorizations mainly coming from Fablabs' managers or on the understanding of Makers provided by mainstream literature (Schmidt, 2019). Third, much of this literature conceptualises the city as a bounded entity, a theoretical pitfall that emerges from the mobilization of spatial proximity as explanatory category to understand the innovative potential of Making, lacking «a critical perspective on the locale, in particular on urban localities, as a point of conceptualization where older myths of proximity are increasingly challenged» (Bürkner & Lange, 2020, p. 67). Fourth, as stressed in previous sections, a problematic relationship between the empirics and the theoretical conclusions reached by many analyses of the urban dimension of Making emerges, since those studies usually focus on typical cities, thus generalising some features of Makers and Fablabs that seem to be idiosyncratic of the ecosystem in which they are inserted. Finally, those few studies that adopt a micro-level spatial perspective treat «makerspaces and Fablabs as homogeneous in scope and operation, and [are] insensitive to the everyday place-based practices upon which they are based» (Johns & Hall, 2020, p. 6).

In so doing, the economic relevance of the phenomenon is mainly assumed as a starting point by adopting the same frameworks proposed by the mainstream literature on Making. This approach leaves open the question of how this economic relevance is eventually gained. At the same time, this question pairs with the need to investigate also ordinary cases, rather than looking exclusively to examples derived from the investigation of Makers and Fablabs in cities that hold a primary relevance as drivers of economic transformation.

To conclude, the examined literature lacks a critical engagement with the actual possibility to look at Fablabs and Makers as always part of broader transformations in urban economies. On the other hand, even if not engaging with the fact that mainstream literature and policy documents usually frame Makers as relevant economic novelties, literature looking at Making as a practice mobilises useful theoretical and methodological approaches. Notably, the review of the literature reveals the need to combine a perspective that looks at Makers and Fablabs as economic phenomena with a fine-grained, practice-oriented analytical sensibility aimed at unearthing if, how, and to what extent specific Fablab and Maker practices come into being as part of new economic organisations.

For these reasons, the present research resonates with recent claims to go beyond understandings of Fablabs and Makers as homogeneous subjects of increasingly digitalised, collaborative, and innovative urban economies. On the contrary, what follows aims to conceptually engage with the heterogeneous and ambiguous nature of Makers' practices and to overcome «the paucity of empirical ethnographic research» (Johns & Hall, 2020, p. 6). To pursue this goal, the analytical focus shifts on individual acts of Making, the spatialities of Makers' *practices*, and specific socio-technical arrangements as analytical starting points (Bürkner & Lange, 2020), at the same time without losing sight of Making as collaborative, digitally mediated forms of value production (Johns & Hall, 2020; Schmidt, 2019; Smith, 2020).

2. Performing, enacting, practising. How do we account for new urban economic objects?

2.1 Introduction. A confession of sorts

The previous chapter has closed with a partial discomfort with the current dominant discourse on Fablabs and Makers in urban studies and economic geography. On the one hand, we face the proliferation of narrative concerning the revolutionising power of Makers and Fablabs in changing the world of production and how innovation comes about; on the other, we stay with accounts that usually assume that these very narratives always travel the path of embeddedness smoothly, thus employing a certain positivist framework. This discomfort could be summarised in one question: what happens *in between*? That is, how do a Fablab and/or a Maker scene are 'put together'? This, rather than being an optional question, is indeed crucial since it allows going beyond an understanding of the phenomenon that takes for granted the truthfulness of their representations, to look instead at how realities and representations are co-enacted. This perspective acknowledges that the features, agency, and spatialities of a phenomenon are not given; rather, they *emerge* from the *doing* of the heterogeneous relations that constitute that specific reality.

As the previous chapter aimed at showing, the role of Makers as new economic subjects on the one hand and of Fablabs and Makerspaces on the other is not univocally interpreted by scholars. Seen as an instantiation of wider socioeconomic transformations, the practices performed *within* the wall of a Fablab are rarely investigated by urban scholars, who seem more interested in broader macro analyses. In line with this remark, the present research aims at offering an alternative perspective on the phenomenon with regards to both its urban and spatial dimensions. First, the case under investigation offers an alternative politico-economic context to the one characterising the 'creative

cities' usually examined. This triggers the need for an investigation of a specific place and the practices performed in and through it, in order to account for the performed and constituted nature, the provisionality, and the contingency that characterise every sociomaterial reality. Second, the work draws attention to the complex spatiality of Making, claiming for analyses that, on the one hand, go beyond the mere observation of Makers as harbingers of economic transformation 'in the city'; and, on the other, employ theoretical tools that allow appreciating the diverse spatialization of Makers' practices. Therefore, as a second pillar, this chapter gravitates around the following questions: What can an interest towards places say to the debates on peer-production, prosumption, open innovation, and the like, which we have seen to be generally connected to the investigation of Makers? Which different questions can we ask when focusing on a specific place? Indeed, how do different conceptions of the economy shape sociospatial practices and arrangements? Summing up, what all these questions assume is an analytical relevance of how the relationship between *discourses* and *practices*, *representations* and *realities* occurs through a specific place, which they contribute to performing.

Given the kinds of debates that are usually associated with Makers and Fablabs, the present research tackles the issue as one that bears relevance from an economic point of view. It argues, however, that the scope and nature of this relevance should become objects of investigation too, rather than being simply assumed to be the ones the mainstream discourse purports to be.

In other words, the review of the literature has evidenced a gap between accounts of Makers and Fablabs that draw on the representation of them provided by mainstream literature and policy makers – i.e., one of alleged revolutionising potential with regards to the economy in driving towards the democratisation of production and innovation – and analyses that simply dismiss these representations as not responding to the actual scope of Makers' practices and the meanings most of the people ascribe to this high-tech form of DIY. However, given that there is still a great hype around the topic, we need to blend an orientation to practice with a still urgent need to critically investigate the economic dimension of Makers and Fablabs. That is to say, research on Makers has to take up the challenge of more in-depth and *in situ* research thrown down by some scholars (e.g., Lange & Bürkner, 2018; Smith et al., 2013) in order not to investigate Makers and Fablabs as new socioeconomic phenomena that could be analysed through the lenses provided by economic theorisations on that (that is, as open innovation, sharing economy, commons-based peer production, etc.), but rather to *question* if and how

those practices and organisations could possibly respond to those representations.

In this chapter, I will, therefore, argue for the use of a post-structuralist cultural economy approach in researching the Maker scene in the city under investigation, that is, Turin, Italy.[1] In particular, I will make the case for the use of a theoretical approach strongly informed by the eclectic traditions of Science and Technology Studies (STS) and Actor-Network Theory (ANT), as will be further explained in the methodological chapter too. The conceptual and theoretical take of the present research tries to blend the growing literature on performativity in economic geography into a broader relevance attributed to the role of sociomaterial practices. The aim of this conceptual move is to account for both the performative effect of the economics' theories and for the always contingent, relational, practical, but also fragile and precarious realisation of economic entities.

The present chapter is positioned before the discussion of the empirical findings, but a *caveat* is needed. Even if purely theoretical, the content of the chapter could be considered part of the empirical findings as well; or, better, the result of the encounter between the theoretical literature that I was exploring during the first phase of my research and the messy, puzzling experience of being 'in the field'. In particular – as will be explained more in details in the next chapter –, the field made me feel uncomfortable with the implicit presumption of the 'efficacy' of the Fablab model, an assumption made by both the critical and the mainstream literature. Indeed, I had to face the following question: how could I account for the role of a Fablab and of Makers in changing the organisation of production, the forms and experience of work, and the innovation process *in the event of a lack or, at least, a seemingly negligible relevance of the case in this respect?* Reframing the question, what I was struggling with was precisely the *performative* nature of those supposed-to-be descriptions; the assumption of Makers and Fablabs' role in these processes as *given* rather than as something *constituted*; and the assumption of this phenomenon as homogeneous, from the side of critical scholars interested in its economic implications too. That puzzling feeling was caused by the hybridity of the case I was looking at, to my eyes so far away from the purity of the *descriptions* I got used to – descriptions of Makers as either innovative, path-breaking inventors or alienated dupes playing the neoliberal role of self-entrepreneurs; of Fablabs as empowering nodes of an infrastructure that makes production more democratic and horizontal; descriptions of sharing as the dominant principle of the time, now

[1] The decision of focusing the analysis mainly on a particular Fablab will be motivated in Chapter 3.

revolutionising manufacturing too. What I needed were conceptual and theoretical tools that allowed me to account for this 'lack' not as a dead end caused by the poor fitting of the case into the given theories. What I needed were conceptual and theoretical tools that allowed me to take those theories and consider them as *part of* the investigated object, rather than its explanations. What I needed were also conceptual and theoretical tools that allowed me to account for this relationship in all its contingency and situatedness, instead of looking at realities as the product of some epochal episteme (cf. Foucault, 2008)[2].

Therefore, in what follows I will introduce the theoretical framework of this research. I will argue that a performativity-based approach and theoretical insights coming more generally from ANT and STS traditions allow appreciating the always practical and contingent way in which economies come into being. Thus, the investigation of Makers and Fablabs as economic phenomena will keep together discourses and representations of them with an acknowledgement of the contingent, situated, sociomaterial practices and relations that constitute a specific Fablab and/or Maker scene.

The chapter will firstly introduce the so-called performativity programme, developed within economic sociology and recently adopted by some poststructuralist economic geographers too. In order to better appreciate the novelty of this approach in the analysis of the economy, the first section will illustrate also how its epistemological and ontological premises trace back to ANT sensibility and broader STS concerns. The discussion will highlight the potential of this tradition in making sense of the way (economic) discourses and knowledge are practically realised through the creation of specific socio-technical arrangements. This opens the path, on the one hand, to investigate specific sites of enactment, in which practices and socio-technical arrangements are enmeshed in performing economic discourses and 'making the economy' through the creation of new orderings whose stability has to be constantly guaranteed by the entities involved and questioned by the researcher. On the other hand, due to the contingent and situated form of this process, the analytical framework proposed leaves the door open to acknowledging the possibility of failed performances too, that is, of cases in which socio-technical arrangements do not enact the economic discourse they were supposed to perform.

The same epistemological and ontological premises mobilised to conceptualise economic entities will inform the conceptualisation of space too. The research will mobilise a poststructuralist approach to economic geography, notably one that conceives space as relational, practiced, and performed and

[2] On this last aspect, cf. section 2.2.3.

identifies in sites – i.e., the contingent entanglements of practices and socio-material arrangements – a crucial analytical lens for the investigation of the spatial organization of the economy. To conclude, this approach maps onto an understanding of 'the urban' that could not help but sharing the ontological and methodological premises I draw on for the conceptualisation of Fablabs and Makers' practices.

2.2 The performative turn in cultural economy

How do economies come into being? And, what do we mean when we talk about economies? These are the main theoretical questions that underpin the present section, tracing the framework for the present research to investigate the topic from a different analytical angle. In particular, it sets the scene for the specific cultural economy strand that informs this research and that will be discussed in the next section, that is, STS-informed works on the performativity of economics.

Since the 1990s, social sciences have been dealing with the so-called 'cultural turn', which introduces in the analysis of the object of study specific attention towards its cultural dimensions. In particular, economic objects are no longer considered as entities that behave in a peculiar way, responding only to the internal logic and laws of economy, as a neoclassical economics' account would claim. Rather, the entanglements of economies with social and cultural aspects of life have been more and more recognised, thus opening the path for a variegated body of research where studies of the embeddedness of markets into society, research on the enmeshment of gender performances with embodied work practices, analyses of the relevance of cultural aspects in the constitution of economic subjects, and many others flourish. That is, economies are not bounded, quasi-natural entities. They are the result of the intersection of knowledge and action.

Notably, a recent strand of economic sociology (and, lately, economic geography) that gravitates around the path breaking work of Michel Callon (1998) in *The Laws of the Market* has developed an approach that pivots on the idea of *performativity*, stressing the primary role of economic knowledge (theories, models, formula, etc.) in building the economy. This shift confers a preeminent role to economic theory in the analysis of economies, suggesting that 'economic discourses – not simply or primarily academic 'economics', but those 'hybrid' disciplines such as accounting, marketing, finance, and so forth – format and frame markets and economic and organisational relations, «making them up' rather than simply observing and describing them» (du Gay & Pryke, 2002, p. 2). The concept of 'performativity' as used

by this strand of literature is indebted with STS, since the latter made evident how «science and techniques "explicate" reality by constructing it and construct reality by "explicating" it» (Callon, 2009, p. 18).

This approach draws on epistemological and ontological principles developed within STS and ANT traditions that pays attention to the enacted and performed nature of the economy. What is being asked is no more concerned with the relationship between 'the economy' and 'the culture' in which the former is embedded, as two sorts of essential and bounded entities. Rather, the question has now affected the very notion of 'the economy', asking how an economy and economic entities are brought into being and what is the role of economic discourses in the process. The question, thus, is one that concerns first and foremost the *making* of the economy (Mitchell, 2008). This concern for the process of construction of economic entities resonates with the general STS interest in the creation of certain sociomaterial orderings and practices, which «may be understood as materially heterogeneous relations [...] enacted or performed» (Law, 2002a, p. 23).

The following section introduces the relevance of the notion of 'performance' within a cultural study of new economic entities. After an overview of, first, key concepts in both ANT and STS, and, second, the works on economic performativity, the section continues stressing the peculiar relevance conferred to both the practical dimension and the specific sociomaterial arrangements that constitute an essential element for the analysis. This final claim is situated within the wider theoretical premises shared with the field of STS and ANT studies.

2.2.1 Material semiotics, scientific facts, and technology: an overview of ANT and STS

Even if it has been developed as a univocal stream of research only for the last 20 years, the performativity paradigm in the study of economy benefits from the revolutionary approach that both Science and Technology Studies and Actor-Network Theory have been developing with regards to the investigation of the social world. Notably, while the interdisciplinary field of STS exerted its influence through its peculiar take on the study of *scientific knowledge* and *technological innovation*, ANT offered a new ontological repertoire in the traditional sociological approach to its various objects of investigation, understanding everything as a *relational effect* and putting an emphasis on the *material and non-human* components of the social.

Starting from STS, the most fruitful insights offered by research in the field correspond to the appreciation of the way scientific knowledge, rather

than being neutral, objective, and merely descriptive, is instead both participant in the construction of the world and produced through the specific practices of the laboratory (see, for example, Knorr-Cetina, 1981; 1999; Latour, 1987; Latour & Woolgar, 1979). STS works pay particular attention to the study of technology, unearthing the social nature of technology itself as both a product of cultural and societal drives and an active contributor in making the social world (see, for example, Bijker & Law, 1992; de Laet & Mol, 2000; Latour, 1996; Law, 1991; MacKenzie & Wajcman, 1985). Of particular importance for the development of STS was the work of Thomas Kuhn, *The Structure of Scientific Revolutions* (1962), which introduced in the field: an approach to science as *culture*; an interest towards the *practice* of science; and an argumentative structure based on the investigation of *case studies* (cf. Law, 2008).

In other words, paraphrasing Judy Wajcman, what STS emphasises is that «while it is important to understand the technical properties and material power of [any technology], the 'technical' and the 'social' are not separate spheres, but one and the same» (Wajcman, 2006, p. 773). This kind of approach allows, on the one hand, to avoid any deterministic view of technology and technological innovation, and, on the other, to include in the scope of the analysis the cultural and social elements that take part into the development of technologies and that *shape* them.

The study of science and technology has been influenced by its mingling with another – separate but now strongly interconnected – body of research, that is, Actor-Network Theory. While the bridge between the two fields could be identified in the common interest towards the sociotechnical analysis of technology, ANT provides the researcher with a peculiar sensibility that goes beyond any object of study. Notably, what ANT introduces in STS research is a peculiar understanding of the relationship between society and technology. While former STS research used to investigate the relationship between society and technology holding them as separate spheres, 'the metaphor of a 'heterogeneous network' [coming from ANT] conveys the view that technology and society are mutually constitutive' (Wajcman, 2006, p. 775). John Law summarises as follows the relationship between the two traditions: «Actor-network theory is what resulted when a non-humanist and post-structuralist sensibility to relationality, materiality, process, enactment and the possibility of alternative epistemic framings bumped into the theoretically informed, materially-grounded, practice-oriented empirical case-study tradition of English language STS» (Law, 2008, p. 632).

Notwithstanding the general warning against considering ANT as a theory, that is, as a set of fixed categories and precepts, we could define ANT as «a disparate family of material-semiotics tools, sensibilities, and methods

of analysis that treat everything in the social and natural worlds as a continuously generated effect of the webs of relations within which they are located. It assumes that nothing has reality or form outside the enactment of those relations» (Law, 2009, p. 141). In contrast with the kind of grand narratives and all-encompassing concepts usually employed in sociology (the first of these being the very concept of 'society'; see Latour, 2005), proponents of ANT such as Bruno Latour, Michel Callon, Annemarie Mol, and John Law argued, instead, that everything should be understood in *relational* terms, that is, as the result (provisional, contingent, non-essential, and always uncertain) of the way an entity is connected with other entities. Through these relations, the network is able to act, thus becoming an actor, endowed with a specific, *distributed* agency that derives from the patterns of relations among the entities involved. That is, 'actors are network effects. They take the attributes of the entities they include' (Law, 1999). In other words, what ANT insists on is the «*performative* character of relations» (Law, 1999, p. 7; emphasis added), looking at *how* these relations assemble (or fail to).

In claiming that everything should be understood in relational terms, ANT opens the path to the introduction of non-human actors as entities that need to be investigated not as ontologically different from the human ones. With this strong emphasis on *materiality* per se, ANT argues for a 'flat ontology' (cf. Latour, 2005) and a radical symmetry among the entities that populate the world. This approach could be summarised using one of the many names that have been attributed to ANT, that is, 'material semiotics' (Law, 2009). In order to pursue this research path, Latour and colleagues suggested also to get rid of the humanist notion of 'actor', to embrace instead a vocabulary populated by 'actants'. The one of 'actant' is a concept that aims at stressing precisely how the only interest of the researcher should be on action, rather than assuming before the investigation that only some entities (i.e., the human ones) are endowed with agency. While a reference to materiality allows appreciating the agential capacity of the intrinsic properties of objects, technologies, and other non-human actants, from an ANT perspective we could talk about sociomaterial arrangements and practices to stress how realities emerge from relations between heterogeneous entities. That is, there is no social in contrast with the material or the natural. Rather, there are only sociomaterial patterns and practices that are made up by human and non-human actants.

An alternative way in which ANT works have been labelled is the locution 'sociology of translation'. The concept of *translation* is indeed at the core of many studies in ANT (see, for example, Callon, 1986a; 1987; Latour, 1996), that is «the processes of enrolling heterogeneous actants into an actor-network» (Müller, 2015, p. 70) that assign roles to the entities involved, the

kind of association existing among them, and the agency capacity of the actor-network. In these studies, the analysis of the construction of a specific system is based on the investigation of how one of the actants involved gains relational power among the others and becomes able to align them with its own interest, thus stabilising the network around it. According to ANT, each social phenomenon results from the contingent, always provisional ordering of sociomaterial networks which are enacted in multiple ways. The concept of *translation* – and the family of concepts related to it (see section 4.3) – is employed in order to understand how complex systems hang together or not, thus unpacking the relations behind social objects usually treated as 'black boxes' (Callon 1986b), due to the invisibilization of their internal functioning and the work needed to make them.

While the above-mentioned issues and concepts pertain all to the ANT tradition, their proponents stress also the fact that ANT is *not* a homogeneous and stable theory. ANT is instead a way to look at the world and to formulate some sorts of questions rather than others. It is never stable, never fixed once and for all, as all the other entities that populate the world. In the words of John Law, 'this means that there is no *credo* (Law, 1999).

To conclude, it has to be remarked that, despite claims on associations and radical symmetry, ANT has been accused to fall short of engaging with culture (Entwistle & Slater, 2014). In pursuing the unveiling of culture as part of a false dichotomy (i.e., Culture vs Nature) that is constructed rather than actually existing, ANT has equated the cultural aspects of any phenomena with false explanations. Instead, the extension of an ANT sensibility to the field of culture would allow to trace the pattern of associations through which actors both assemble and make sense of cultural objects. While these critiques could certainly open new interesting line of inquiry, the present work does not draw on these remarks, since the research places itself in those works on Makers that look at their practices as part of an economic transformation.

2.2.2 On the performativity of economics

As briefly mentioned in the introduction of this chapter, the relation between economy and culture have been evolving within social sciences. Recently, a growing body of literature has been drawing attention towards this relationship mobilising theoretical frameworks and methodological tools coming from the multidisciplinary field of STS and the peculiar sensibility of ANT. In the words of Ash Amin and Nigel Thrift, this is a «hybrid model in which the two terms, culture and economy, are dispensed with, and

instead, following actor-network theory and similar approaches, attention focuses on different kinds of orderings» (Amin & Thrift, 2004, p. xiv). These works have been emphasising how «economies, markets, and organisations, far from being independent of descriptions of them, were constituted through such descriptions» (Cooper & McFall, 2017, p. 3); or, as stated in its most common formulation, how economics *performs* the economy.

The concept of 'performance' has been widely mobilised within social sciences as a conceptual tool useful in unearthing the contingent, constructed, and enacted nature of social phenomena. From the dramaturgical approach *à la* Goffman to the linguistic understanding of performance deployed by Judith Butler in her studies on gender and sex, performative approaches to the study of the social world have been mainly used to tackle the constructedness of various social phenomena. Broadly speaking, «performance means that the very act itself creates the reality that it describes [...] Specifically, the emphasis on performance focuses attention, first, on practice, that is, what people do rather than what they say they do [...] Second, it stresses [...] that performance occurs at specific sites and at specific times, and that both matter» (Barnes, 2002, p. 508).

Recently, drawing on ANT's appreciation of the performative nature of relations, an STS focus on sociotechnical change, and John Austin's theory of the performativity of language,[3] authors such as Michel Callon, Donald MacKenzie, Fabian Muniesa, and others have introduced the concept of *performativity* within the realm of economic sociology. This move has the effect of rethinking the relationship between economics (as both social science and a general discourse on the economy) and the economy itself. Abandoning the previous critique made by economic sociologists to economics (that is, the falseness and too abstract nature of its premises, in favour, on the contrary, of theses on the embeddedness of economies into society[4]), these authors stress the relevance of economics in making the very reality it claims to describe. It is evident, here, how the approach proposed by the performativity paradigm to the study of economy draws on the long tradition of studies in STS traced in the previous section, which were committed to investigating how scientific knowledge is actively involved in producing the entities and facts that populate the world. These theoretical assumptions emphasise the

[3] The linguistic philosopher John Austin elaborated a theory of language that introduced, beside the descriptive function of language, a performative one. That is, through illocutionary and perlocutionary statements, language does not describe the world, rather it brings a specific state of the world into being. The two most common examples are the official pronouncing the formula 'I now pronounce you husband and wife' or the claim 'I baptise this ship Queen Elisabeth', pronounced while breaking a bottle of fine on the ship.

[4] See Granovetter, 1985; Polanyi, 1944.

fact that «economies are performed and enacted by the very discourses of which they are supposedly the cause» (du Gay & Pryke, 2002, p. 6). Therefore, assuming a performativity approach within the social sciences means first and foremost thinking about *effects* (Butler, 2010).

Since the seminal work of Michel Callon, *The Laws of the Markets* (1998), authors inspired by his approach have been engaging in demonstrating how markets are the outcome of the rules, formula, and descriptions given of them by economics. As stated in a famous Callon's sentence, «economics, in the broad sense of the term, performs, shapes, and formats the economy, rather than observing how it functions» (Callon, 1998, p. 2). Thus, drawing on his previous work within the field of STS, Callon engages with the relationship between another body of science – economics – and those entities populating the real world that are usually considered as mere objects of economics' description. Extending Austin's theory on the performativity of language, Callon claims that it is possible to appreciate how scientific theories and models too «are performative, that is, actively engaged in the constitution of the reality that they describe» (Callon, 2007b, p. 318). Since this seminal work, research on the performativity of economics has been spreading, finding in the constitution of markets and finance rich terrains to explore (for an overview, see for example Callon et al., 2007; MacKenzie et al., 2007).

The performativity programme in the study of the economy, thus, focuses on the very *making* of the economy (Mitchell, 2005; 2008), which means making specific economic entities and economic agents emerge. According to Callon, the latter comes into being thanks to a process of *disentanglement* and *framing* (Callon, 1999). Using the ANT vocabulary, framing could be said to consist in a particular process of *translation*, through which specific subjects, processes, actions, and objects are put into brackets through discourses and material devices that demarcate them.

While stressing the performative capacity of the specific kind of economic knowledge usually embodied by academic economics, Callon makes a plea for acknowledging the same role to what he calls 'economics at large' – meaning with the latter the «vast and heterogeneous population engaged in reflection, conceptual elaboration, and socio-technical design of the economy in all its forms», such as practitioners, marketing institutions, accounting, etc. (Callon, 2009, p. 20). Thus, talking about 'economics' means taking into account all the forms of knowledge and technologies involved in equipping economic actors in the way those economic statements and devices refer to.

This plethora of subjects that 'make the economy' seems even broader nowadays, since «the debates over [economic and technological] innovations

involve non-economists as well as economists, and take place in public forums, as well as within firms and regulatory institutions. It is surely significant that the voices which count in these circumstances include *Wired* magazine as much as academic economists» (Barry and Slater, 2002a, pp. 189-190). This seems indeed to be the case for an economic change – such as the one purports by the Maker economy – where even one of the leading Italian companies of 3D printers wants to have a say in defining it.[5] Moreover – and anticipating what will become more clear in Chapter 4 –, *Wired* magazine had a preeminent role in the case investigated in the present research too, due to the role played by the former director of its Italian edition, Riccardo Luna, in establishing a Fablab in Turin and in importing the Maker culture in the country. The same performativity approach thus could be valid also in accounting for how the whole *Make* media has been influencing the enactment of a Maker economy. Moreover, thinking about the birth of the Fablab model, on one side, and the invention of Arduino, on the other, one cannot but acknowledge the role of academic designers in this process, which actively contribute in shaping the economy for what concerns processes of production and technological innovation. A role which is even more influential if we consider the preeminent position that some exponents of the Italian Design have in the debate on Makers and Fablabs (see Chapter 1).

The influence of STS on this new approach towards economic sociology and anthropology lies also in the way these authors deal with the relationship between economy and technological change. Pursuing a path that steps back from previous accounts inspired by technological determinism, the performativity programme stresses the fact that there is no 'social' as an outside realm that either acts upon or is affected by technological change. The two go hand by hand, and this different understanding of the issue leads towards a new methodological approach in the study of the economic. Rather than focusing on the conventional structural analysis of the economic, these works «investigate the formation of economic realities through contingent, heterogeneous and local processes» (Barry & Slater, 2002a, p. 180). This approach draws on the ANT sensibility towards *how* relations among heterogeneous entities assemble, understanding (economic) entities as *effects*, rather than given. Thus, the contingency of the sociotechnical arrangements that time by time are investigated prevails, leaving on the background overarching concepts such as capitalism or other macro-entities: «The focus is entirely on

[5] The company is WASP, which provides its definition of a Maker economy: 'Maker economy is a new model where everything can be produced by yourself, where there is the chance of not depending on some unsurmountable entity that holds the productive monopoly.' Retrieved from: http://www.wasproject.it/w/en/about-us/ Last access: 29 June 2018.

instability, diversity emergence and specificity» (Barry & Slater, 2002a, p. 184).

This approach thus holds an interest in the *processual* nature of what are usually considered static and well-defined economic entities. Performativity approaches applied to the economy allow analysing economic objects in their *coming into being*, thus according importance to «the processes of social and cultural relations that go to make up what we conventionally term the economic» (Amin & Thrift, 2004, p. xviii). Indeed, it is through their enactment that these economic entities acquire form, features and agency. It is precisely by acknowledging that economic objects are (discursively but also materially) 'put together' that we can move away from an understanding of them as «pre-existing reality that can be simply revealed and acted upon» (Çalışkan and Callon, 2009, p. 370).

Thanks to the relevance granted to both the processual and constructed nature of the economy on the one hand and the sociomaterial arrangements underpinning economic realities on the other, performativity approaches enable also to go beyond a framing of changes and transformations as always epochal transitions (cf. Barry & Slater, 2002a). This is particularly useful in the investigation of a phenomenon such as the spreading of Fablabs and the birth of Makers, given the fact that it is usually portrayed – as seen in the previous chapter – as part and parcel of a wider change in production.

Concluding, what is relevant in this approach is also the role that material things play in their contingency, thus stressing the role of the bare *matters* of economic organisation in performing the economic. Indeed, economics cannot perform without using specific technologies, specific tools which constitute the material grip for an economic agency to be deployed[6], as will be discussed in the following section.

2.2.3 From theories to matter: devices and other 'things'

Though it borrows its main concept from a linguistic theory, the performativity programme in economic sociology strongly pivots on *devices* and *sociomaterial arrangements*. The interest towards sociomaterial relations derived from ANT and STS translates into a plea for a close investigation of how technical and other non-human actants take part in the performative enactment of economic discourses. In other words, the added value of STS in theorising performativity consists in the fact that they have

[6] For a detailed discussion of the role of materiality in performativity approaches and the criticisms moved to it, see Chapter 4.

«completed and enriched the concept, by showing that the signification and effectiveness of scientific statements cannot be dissociated from the socio-technical arrangements […] involved in the production of the facts that these statements refer to» (Callon, 2009, p. 18).

In particular, the concept of performativity as theorised within economic sociology and economic geography allows acknowledging that the power of science and discourse to produce worlds lies in the construction of contexts in which their statements are true. These contexts are what Callon calls socio-technical *agencements*, «arrangements endowed with the capacity of acting in different ways depending on their configuration» (Callon, 2007b, p. 320). In order for an economic statement to function not only on paper, an actualization process is needed through which the world described by theories comes into being. Callon calls this process *performation*, that is, the process through which the socio-technical *agencements* inscribed in specific economic theories are (or fail to be) realised. Indeed, «economics performs the real world if and only if sociotechnical devices exist that make the performation possible» (Dumez & Jeunemaitre, 2010, p. 29), through which an economic knowledge is enacted. They intervene in the construction of economic entities by means of their power of «assembl(ing) and arrang(ing) the world in specific social and material patterns» (Law & Ruppert, 2013, p. 230) that give an economic shape to the agency performed. There is no structure, no context outside the *agencements* to drive the subjects' actions; all their agential capacity is an emergent property of their internal configuration. It is evident, here, how the conceptualisation of agency at the core of the performativity programme is heavily indebted with the notion of distributed agency as developed by ANT. Indeed, Callon stresses how «action […] takes place in hybrid collectives comprising human beings as well as material and technical devices, texts, etc.», thus defining agencies as «made up of human bodies but also prostheses, tools, equipment, technical devices, algorithms, etc.»(Callon, 2005, p. 4).

Thus, what this specific take on performativity highlights is that the power of discourses to perform the world they describe should be tested against the *practices* that intertwine with those statements. Indeed, the analytical advantage of work on the performativity of economics lies in the preeminent role accorded to the *practical realisation* of theories and models, leading to consider each economic object as «a contingent assemblage of practices built up from parts that are economic and non-economic» (du Gay & Pryke, 2002, p. 4). This translates, for example, into analyses of something as a strawberries market (Garcia-Parpet, 1986/2007) that show how theories of perfect competition in the market are practically brought into being acting on both the social dimension and material investments and transformations,

thus stressing the fact that each 'practical realisation' should be accounted for in all its specificities. This approach represents a strong endorsement towards the analysis of the sociomaterial actions involved in the enactment of the economy, which draws on a broader pragmatist tradition within social sciences (cf. MacKenzie et al., 2007). Thus, the performative understanding of economically relevant activities entails «an investigation of practice. It becomes an investigation of the ordering of materially heterogeneous sociotechnical economically relevant relations, their enactment and performance» (Law, 2002a, pp. 25-26).

Drawing on both the socio-technical approach to the analysis of technology used by STS scholars and ANT's appreciation for the role of non-human entities in distributing agency, the performativity programme to the study of the economy focuses on various kinds of *devices*. Technical devices, usually conceived as simply neutral instruments employed by human actors in heterogeneous social phenomena, are instead investigated in the performative role that they play in enacting the economy[7]. Generally speaking, each device is entangled in «a set of heterogeneous elements all of which are performing in producing relations» (Law, 2002a, p. 27). This corresponds, as seen before, to ANT's understanding of non-human things: not as passive tools employed by an active human agent, but something that co-acts with the person involved in the performance to produce some kind of effect. Thus, drawing on those works that look at the social and the technical as parts of a common realm rather than as separate ontological domains, the performativity approach to the study of economic activities understands the technologies involved in various enactments of the economy – such as machineries, online tools, portable devices, models, software, etc. – as devices in which economics is *inscribed* (cf. Akrich, 1992)[8]. For example, a smartphone app becomes the device that gives an ethical form to consumption practices (Fuentes & Sörum, 2018) or modern arbitrage is rendered possible by the combination of computing tools, network connectivity, and mathematical formulae (Beunza & Stark, 2004).

The concept of device is borrowed from Foucault's *dispositif*, but it diverges from the latter since a *dispositif* is a «formation which has as its major function *at a given historical moment* that of responding to an urgent need» (Foucault, 1980, p. 195; in Dumez & Jeunemaitre, 2010, p. 30, emphasis added). Indeed, what Foucault stresses is mainly the historical dimension of devices, whereas STS approaches focus on the contingency of specific arrangements. In other words, «whereas Foucault identified paradigmatic

[7] For an overview of studies on market devices, see Berndt & Boeckler, 2011
[8] The concept of 'inscription' will be introduced in Chapter 4.

historical forms of apparatus, Callon and others were always interested in the specificity of particular socio-technical arrangements. Moreover, whereas Foucault's approach bracketed the question of the contestability and mutability of particular apparatuses, actor-network theory put the question of the stability or instability of the network to the fore» (Barry & Slater, 2002a, p. 178).

An approach to sociotechnical devices that pays attention to their contingent and processual nature allows maintaining the idea of *homo economicus* as a subject who does not exist exclusively within academic economics. On the contrary, *homo economicus* exists as the product of a performation process that has at its core the practical *equipping* of the actor with the kind of economic devices that turn her into an economic actor, whose agency is therefore configured by the *agencement* she is part of (cf. Callon, 2007b). Thus, the material and technical equipment are not optional supports to the agency of a pre-existing economic actor; rather, they represent a constitutive part of the *enactment of an economic agency*. While the social world is populated by a myriad of devices, a device turns into an economic one inasmuch as it reconfigures in an economic way the arrangements in which it is deployed[9]. An economic device is, therefore, a device that 'renders things, behaviours and processes economic. [...] The meaning of what it is to be «economic' is precisely the outcome of a process of 'economisation', a process that is historical, contingent and disputable» (Callon et al., 2007, p. 3). Indeed, what Callon and colleagues urge to focus on are *economisation* processes rather than 'the economy' per se, that is, how «behaviours, institutions, *agencements*, and rules of the game [are] economised» (Callon, 2009: 22), how they are performed as pertaining to what is considered 'the economy'.

While emphasising the role of economic theory, models, and formula, the school of economic anthropology and economic sociology that streamed from Callon's work on performativity had followed down the road of devices investigation more thoroughly, thus partially deflecting from an interest in the role of economic statements and discourses in performing the economy. Indeed, some works have focused their attention on what Franck Cochoy (2007) has called a 'sociology of market-things', highlighting the unmediated way in which materiality affects the shape of an *agencement*. For example, in his work on the role of supermarkets' matters in driving consumers' decisions, Cochoy (2008) highlights how material things too impinge on the

[9] Focusing on a specific type of economic devices, Muniesa, Millo and Callon (2007) identify as 'market devices' those devices through which not only a specific market comes into being as a socio-technical *agencement*, but also the specific form of subjectivity associated with that market that is enacted.

kind of agency deployed, showing how a shopping cart is directly involved in shaping the agency of the human actor involved.

The proposed understanding of the objects involved in a specific economic practice through the ANT's lenses of non-human actants comparable to human ones (rather than as inscriptions of economic theories) allows appreciating the very contingent and situated way in which materiality affects and shapes the agency performed. This approach is more attuned with a general understanding of 'performance' as an effect produced (Pahk, 2017). Indeed, «the spatial/material properties of market operations may be even more crucial than their calculative dimension» (Cochoy, 2007, p. 110), inasmuch as economic practices are always entangled in complex sociomaterial patterns that result in performances of the economy and its spaces not necessarily associated with pre-existing discourses and theories. In other words, what these works stress is the role of non-human actants *per se* on economic practices and agency, by giving them shape in a way that is more connected to the situated practices in which those material things are entangled and which do not necessarily speaks to some *ex-ante* theory. An investigation of the bare 'things' could, therefore, open up the space for understanding the kind of relations performed through them, thus allowing a study of the agency of new economic entities, such as, for example, a Fablab or other Maker *agencements*. This peculiar take on the analysis of material entities involved in economic practices offers also an additional way to emphasise the relevance that the investigation of a specific place entails. Indeed, it opens up the space for an appreciation of other material entities besides sociotechnical devices and of how, on the one hand, the material constituents of a specific place 'act back' on the situated practices there performed and, on the other, economic practices are always sociomaterial practices that result into the production and consumption of space and specific spatial experiences[10].

Concluding, an approach that stresses the relevance of technologies and other material actants in enacting the economy – as both socio-technical devices that actualise economic theories and bare 'things' that configure the agency performed in a contingent and situated way – allows for a more nuanced appreciation of Makers' 'things' and devices. In particular, a performative and sociomaterial understanding of Makers' practices leaves the door open for investigating, on the one hand, how Maker devices shape Makers practices in a way that corresponds to the actualisation of specific economic theories (i.e., the ones discussed in Chapter 1, variously belonging to the idea of a democratisation in production and innovation) and, on the other,

[10] The topic will be developed in Chapter 5.

how other non-human actants play a role in the emergence of a specific agency.

2.3 Interlude: on failure

How can we account for something that seems to lack coherence and stability? Is it possible to investigate something that has not (or, that has only partially) enacted the kind of effects expected?

As previously said, theories on performativity come from the womb of STS and ANT traditions. A further strength traceable in this body of work is represented by those fine-grained analyses of the relations intertwining various actors that enable to «describe socially and materially heterogeneous systems in all their *fragility* and *obduracy*» (Law, 2009, p. 143; emphases added). Since the first ANT works (see for example Callon, 1986a; 1986b; Latour, 1996), emphasis has been put on the fact that success and failure are always contingent upon some 'conditions of felicity', thus shifting attention to the (more or less) successfully hanging together of the elements relationally connected. Adopting this perspective leads to never take for granted the successful outcome of the work of assembling, the reason of that being precisely an epistemological stance that identifies in the way heterogeneous networks stabilise the path for understanding social phenomena.

Notwithstanding their origins in STS and ANT, one of the critiques that are usually moved to studies on economic performativity concerns their apparently exclusive interest towards *successful* cases, due to a sort of implicit assumption of the efficacy of economic knowledge in actualising the world it refers to. This body of works is accused to focus on examples of theories, models, and formula that, being elaborated within economics fora, then become part of socio-technical arrangements through which they successfully perform, that is, where they bring into being the content of their statements.

So, is there no room in these theories for unsuccessful cases, that is, cases where the performation process fails? Different answers have been given. In a special issue of the *Journal of Cultural Economy*, Judith Butler engages in an interesting debate with Michel Callon over the role bestowed on breakdowns in performances. Butler raises an issue on the efficacy of the performative process, drawing attention to the fact that «errancy and failure can and do enter into these performative circuits that we find in economic theory, popular discourse, journalism, and public policy. As a result, when we recognise that it is these repeated and sometimes errant processes that constitute the market as 'existing' in its autonomy, it follows that if those processes become too errant, the very existence of those entities can be called into

question» (Butler, 2010, p. 148). She suggests, therefore, to restore the theory of the 'founding father' of performativity, the linguistic philosopher John Austin, and to focus more on the other role his speech acts theory attributes to performative enunciations – that is, *perlocution*, speech acts whose effects depend upon other kinds of conditions.

Callon, in his exchange with Butler and trying to dilute the strength of his theory on economic performativity, introduces the concepts of *performation* and *co-performation*, which give room to the possibility that the enactment of economic ideas and techniques do not succeed. Drawing himself too on Austin's theory of utterances, Callon emphasises how «a successful illocution, as a successful performation, implies the active presence of appropriate socio-technical *agencements*. As such an adjustment is always fragile and rare, the general rule is a misfire» (Callon, 2010, p. 164). Thus, it is again in the way human beings, texts, material artefacts, and other elements hang together that we should look at in order to understand the degree of enactment of theories and discourses. By saying that what the performation process reaches is generally a 'misfire', Callon highlights the constitutive, rather than contingent, nature of failure in the process, partially weakening the role of economic knowledge in the process. Indeed, social performance is always open to failings, inasmuch as «the risk an expected action and the production of a relevant subject may fail is not just a contingent characteristic of the situation but a constitutive feature of the performative operations» (Licoppe, 2010, p. 181). Performative failures thus are better accounted for if paying closer attention to the device, rather than to science and theory. It is possible that a market device – e.g., a truck – eventually shifts in provoking the failing performance of an apparently stable market - e.g., street food (Pahk, 2017). Or, that an electric vehicle never comes to light because the actor-network world that should sustain its creation fails to be constructed (Callon, 1986b).

These arguments call for attention to be paid to the processual nature of the making of economies. Economic entities are never produced once and for all, rather they are subjected to an ongoing constitution, which at best could reach moments of *stabilisation*. Indeed, Butler's argument could be matched with the conceptualisation of failure that is provided by ANT studies, with their claim that failure and success are attributions of an assembling process of a certain entity. If something fails, in an ANT perspective this means simply that its patterns of relations do not get to 'hang together'. Whereas for Butler a failure occurs when a break occurs in the reiteration of the citational work of a norm, for ANT there is no norm to be cited. The failure is, so to speak, at a deeper level, since the network does not become an actor, the translation process being impeded by some of the entities involved. «As long as those elements [forming the network] can be persuaded

to continue performing together - ANT uses the vocabulary of enrolment - the new entity is stable. But if elements start bulking [...] then there is trouble» (Barnes, 2008, p. 1434).

2.4 Performing economies and spaces

As seen in the previous chapter, the advent of Makers and Fablabs is framed within discourses and theories on a new economic paradigm based on the efforts of creative and innovative amateurs and the ultimate dismantling of the Fordist manufacturing production. This discourse relies on a conceptualisation of production that entails spatial metaphors; production and innovation are now represented as *open*, *distributed*, *decentralised*. This immediately speaks to debates in economic geography on the role of distance in the production of value, which have variously identified in relations of proximity and global connections the core spatial concepts for the analysis of economic practices. Indeed, as seen in the Introduction, geographical works dealing with topics related to the one tackled by this book usually emphasise the relevance of spatial proximity in processes of technological innovation. Moreover, literature that addresses in various ways the geographical dimension of 'Maker economies' highlights exclusively their concentration in urban contexts, thus echoing theories on either the agglomeration effects that cities exert on innovation processes and the rise of creative enterprises or the relevance of cities as crucial nodes in an unavoidably globalised economy.

However, the epistemological and ontological pillars of the present work defy any essentialist understanding of either the economy or its socio-spatial configuration. In particular, I argue for an extension of post-structuralist approaches to the field of economic geography, which has been poorly touched by those reflections. The attention towards processes, practices, performances, and relations paid by post-structuralist thinking in human geography seems to clash with more conventional approaches to economic geography that still pivot on theoretical tools whose usefulness in reading contemporary phenomena seems weakening. When categories we were used to (such as work, manufacturing, consumption, production, etc.) seem to fade away, economic geography needs to tool up for investigating alternative geographies of production and work. Thus, we should ask not only how geography matters to economic phenomena, but also how we conceptualise the co-constitutive relationship between economy and geography. Post-structuralist approaches and ANT-inspired ones in particular (Müller, 2015a; Murdoch, 2006) allow to investigate the relationship between geography and economy

substituting an essentialist approach to both space and economy with one that looks at social phenomena as contingently produced and always in becoming, at the same time stressing the performative role of theories and discourses in producing them. They mobilise spatialities that do not correspond anymore to the ones of place, scale, or territory, but are more frequently conceptualised in terms of networks and relations.

Therefore, the following subsections will elaborate on, firstly, the alternative conceptualisations of the economy that economic geography agenda has been profiting from and, secondly, how the insights from poststructuralist theorisations (especially one informed by ANT) have been changing the way space itself is conceptualised. Thus, the section starts by introducing the innovative approach to economic geography advances by recent works that mobilise post-structuralist arguments. Following these premises and, therefore, acknowledging the relevance that the ontologies of both space and the economy have for the research outcome, the section proceeds with discussing the specific take on space employed, emphasising the innovative potentials constituted by ANT in thinking about space. The same epistemological and ontological foundations drive to unfold a conceptualisation of the urban that cannot help but being shaped by the same premises, thus making a plea for a geography of urban sites and assemblages.

2.4.1 Post-structuralist approaches to economic geography

As Chapter 1 has shown, Makers and Fablabs are trapped in the same ambiguity that affects the broader field of the sharing economy (Richardson, 2015). On the one hand, they are seen as a new, typically urban example of digital capitalism, characterised by the empowerment of individuals *qua* entrepreneurs and, at the same time, by an emphasis on the community dimension. On the other hand, they are read as alternative to technocapitalism and as a form of resistance that will eventually substitute capitalism as the dominant organizing principle of the economy.

However, as research inspired by the work of Michel Callon and as the cultural economy approach more generally stress, economies and their spatial configurations are better conceived as *constituted*. This antiessentialist move towards the study of economic entities and their geographies has been recently introduced in economic geography by theoretical and empirical works that investigate contemporary forms of economic organizations, strongly characterised by ambiguous and blurred contours. These works stress that the economy does not have an essential nature, rather it is

constituted by multiple, hetereogeneous arrangements that both discourses and practices contribute to bring into being.

Various, entangled approaches have been used by this recently born stream of economic geography to go beyond the question of the actual transformative capacity of new forms of production, consumption, and exchange. To offer alternative analytical lenses through which studying new forms and spatialities of economic life, the focus is shifted to an investigation of *how* these transformations emerge as the performative, contingent outcome of theories, discourses, and processes of sociomaterial ordering. In so doing, these works pursue the program of 'rethinking the economy' (Mitchell, 2008), paying attention to how economics tries «to organize agents […], setting them in play as producers, consumers, owners, or investors» (Mitchell, 2005, p. 298). On the one hand, they acknowledge an historical dimension through which 'the economy' as we now know it – that is, as «the structure or totality of relations of production, distribution and consumption of goods and services within a given country or region» (Mitchell, 1998, p. 84) – comes into being in specific forms at each moment of history. For example, as Mitchell explains, the economy as we have known it until the end of the 20th century, was the outcome of a sociospatial process of restructuring made in an effort to reimagine both the nation-state and the international order after the Second World War. On the other hand, while theories and discourses have a performative capacity to enact economies, the latter are always plural, since they are the product of contingent and situated socio-technical practices.

This antiessentialist approach is particularly useful for the investigation of the abiguity and the fuzziness that characterise contemporary economic entities and organizations. The pervasiveness of the digital as the core mediator of many economic practices, the increasing relevance of individuals as self-sufficient producers of value, the emphasis on the sharing dimension, and a diffuse informality constitute the ingredients of an ongoing transformation that could not be understood through a binary analytical lens. Rather, post-structuralist economic geographers claim for leaving the door open to understand how economies and their geographies are «assembled through sociotechnical processes that intersect with specific, place-based contexts» (Langley, 2016, p. 304).

Adopting a post-structuralist stence towards the analysis of new economic geographies leads to questioning the very existence of epocal shifts and broader mechanisms in the way production, consumption, and exchange are organised. This approach enables to acknowledge the relevant role of local arrangements in bringing into being economic entities and organizations that present specificities not immediately ascribable to any overarching

dynamic of capital accumulation (Pollio, 2019, p. 2020). The emphasis is therefore put on the processes and the elements that participate in specific arrangements and practices of value production, without losing sight of aspects usually not acknowledged by economic geographers, such as the importance of non-economic element in processes of subject formation related to new forms of value production, as in the case of affective work (Cockayne, 2016a).

Albeit acknowledging the growing importance of technological innovation, these works do not fall into the trap of technological determinism. Instead, they stress how technologies and other non-humans, on the one hand, and human subjects, on the other, are co-constitutive in complex arrangements that sustain economic agency as distributed among all the entities involved, and thus shape flexible spatialities (Richardson, 2020; Richardson & Bissell, 2019). In so doing, post-structuralist approaches to economic geography put into question the very meaning of some of the most used economic concepts, such as value (Cockayne, 2016b) and work (Richardson, 2018). For all these reasons, from a methodological point of view, works that adopts a post-structuralist stance towards economic geography frequently hinge on the use of ethnographic methods (cf. Chapter 3), more suitable for investigations of the micro dimension and the nitty-gritty of economic transformations.

The conceptualization of space and geography employed is therefore one that draws consistently on the so-called relational turn and mobilises a practical and performative understanding of the spaces of economies. Relational thinking, on the one hand, has helped to overcome a scalar or territorial understanding of sociospatial dynamics (cf. Amin, 2002) and, on the other, has introduced more dynamic understandings of space as performed and practiced, based on the «openness and fluidity of the spatial» (Massey et al., 1999, p. 15). A relational approach in economic geography enables to account for the intertwinement of the social and the economic (Bathelt & Glücker, 2003; Yeung, 2005) and the microdynamics that constitute socioeconomic phenomena (Boggs & Rantisi, 2003; Ettlinger, 2003), often overlooked in previous accounts.

A focus on the micro level entails a new emphasis on the role of practices and performances, in lieu of structural forces (Berndt & Boeckler, 2009; Müller, 2015b). To grasp the inherent contingency and complexity of economies, the analytical focus has to be put on socioeconomic practices as «the stabilised, routinised, or improvised social actions that constitute and reproduce economic space, and through and within which diverse actors (e.g. entrepreneurs, workers, caregivers, consumers, firms) and communities (e.g. industries, places, markets, cultural groups) organise materials, produce,

consume, and/or derive meaning from the economic world» (Jones & Murphy, 2010, p. 367). The spatial dimension of economies too is therefore a practiced and performed one. According to this aapproach, space is not pregiven, but it is emergent from myriads and heterogeneous performances. Thus, geographies are always enacted (Dewsbury et al., 2002), since the spatialities of specific practices come into being as 'a doing'.

These alternative understandings of space and geography resonates with the ones introduced by the encounter of the discipline with Actor-Network Theory for an overview, see Müller & Schurr, 2016; Murdoch, 1997; 1998; 2006). Indeed, the crucial tenet of an ANT-informed understanding of spatiality is that «*space is made*. It is a creation. It is a material outcome. […] it is an *effect*. It does not exist outside its performance» (Law & Herington, 2000, p. 43). The processes of network constitution, stabilisation, and disarrangement at the core of this sociology of associations bring into being not only agency but also specific spatialities. What ANT contends is that relations of proximity and distance are not the only meaningful ones when it comes to the spatial dimension of a phenomenon, rather 'network spaces', 'relational spaces' could reveal more significant features of the object of research (Hetherington & Law, 2000). This is a '*geography of topologies*' (Murdoch, 1998), which does not insist on actors' position on a map or in a space-container, since material semiotics pivots on the idea that space and objects are materially co-constituted (Law, 2002b); to be sure, since every object is a network-effect, topological spatial relations are constituted alongside objects. Therefore, there is no single characterisation of space; spatialities are *multiple*, in that «spatiality is an aspect of network stability» (Law & Mol, 2001, p. 611), which can be performed in various ways.

Concluding, post-structuralist approaches to economic geography focus on specific sites and micro-geographies of economic actions. At the same time, looking at these particularities makes room for «a different urban geography […], one that acknowledges the microscopic singularities within seemingly overdetermined neoliberal experiments of entrepreneurial citizenship» (Pollio, 2019, p. 13).

2.4.2 Assembling the urban

Given these theoretical premises, the conceptualisation of the urban this work hinges on is more a research outcome than a presumption, more a collateral line of thought than a core focus of investigation. This is actually in line with a feeling of a sort of 'epistemological crisis' (cf. Brenner & Schmid, 2015; Governa, 2017) that was affecting the urban studies and that seems has

not left yet. Facing the complexity of the (contemporary) life in cities, urban scholars are struggling with finding new tools to cope with it, abandoning a conceptualisation of the city that has cornered the object of study into a static and essentialist definition.

One of the solutions that have been developed goes under the label of 'assemblage urbanism' and constitutes the application of ANT and other theoretical insights coming from the work of Deleuze and Guattari to the investigation of cities and urban life (for an overview, see Farías & Bender, 2010 and the special issue of *City*, 2011. For a critique of this approach see, for example, Brenner et al., 2011). This diverse body of works has engaged with the urban as a field of complexity that constantly escapes from fixed representations. Since the seminal work of Amin and Thrift (2002), alternative topologies of the city have been mobilised that grasp the urban as emerging from a variety of practices and assemblages, always unfolding at the crossroad of disciplinary efforts and spontaneous actions. «The notion of urban assemblages understands that the urban is an emergent quality of the multiple assemblage process, which is not pre-existent in the streets, the buildings, the people, the maps, etc. The city is thus not an out-there reality, but is literally made of urban assemblages, through which it comes into being in multiple ways» (Farías & Bender, 2010, p. 15). In other words, 'the urban' becomes an emergent property of complex sociomaterial arrangements that make up a city as a space that is constantly made and re-made through their functioning. Once more, what this approach pays attention to are heterogeneous relations among different entities that, becoming enrolled in the same network, return the city as a multiplicity of sociotechnical systems thanks to the internal co-functioning of those entities. Thus, we witness the emergence of the city as a creative and innovative milieu, a transport system, a tourist destination, a consumption space, a festival, etc. (cf. Farías & Bender, 2010).

Through this ontological reconceptualization of cities, attention has been accorded to the *practical, processual* and *enacted* dimension of city life and its infrastructures, avoiding the risks associated with either structuralist approaches or territorial understandings of cities. Adopting an ANT ontology, the city itself is conceived as «produced […] in ways conditioned by the types and extension of the actor-networks operating at local sites. In this manner, ANT destabilizes the autonomy and explanatory priority attributed to space in urban studies, substituting the key notion of *sites* in plural for it» (Farías, 2010, p. 6). In other words, rather than approaching the investigation of cities in their alleged totality and unity, an epistemological take for urban assemblages allows to account for various urban phenomena as different *sites of enactments*, where the urban is practised rather than represented, where networks of objects, human bodies, materialities and technologies

come into being and perform different urban realities (Farìas, 2010). Thus, each urban assemblage corresponds to a particular enactment of the city. This opens the path to conceive the urban as a collage of sites, in which «a mesh of practices and material arrangements» (Schatzki, 2005, p. 472; in Kear, 2018, p. 308) of experimentation and production unfold.

Notably, this approach proves to be useful also for the analysis of one particular aspect of urban life, that is, urban economies. Indeed, from what just said descends that ANT dismisses also those understandings of the urban as an economic unit, in which the city acts as one politico-economic actor endowed with a uniform and stable agency. Besides that, an assemblage urbanism approach is explicitly at odds with critical readings of cities as mainly the product of a logic of capital accumulation (Farías, 2011). Following this path, the economic practices occurring in a city are reconceptualised too, as soon as we abandon both the idea of a city as a bounded region that acts like a unit in unfolding strategies for economic development and a theoretical approach to urban economies based on a 'new localism' that identifies in agglomeration and proximity their key dimensions (Amin & Thrift, 2002, p. 56). Rather, Amin and Thrift acknowledge the fact that urban economies increasingly involve *distanciated economic relations* that have the effect of distributing economic organization. Thus, assuming «an understanding of cities as sites in spatially stretched economic relations, a rich ecology of urban economic life opens up for consideration. This ecology [...] is supported by varying urban institutions and circulatory flows, which, however, never quite return the city as an economic unit» (Amin & Thrift, 2002, p. 63).

Stretching the argument further, an engagement with DIY practices of production as the ones performed by Makers challenges the researcher in reconceptualising the relationship between cities and economic action going beyond the institutional dimension too, to account for the role of individuals. The ontological turn towards multiplicity of the urban discussed above allows also to grasp in a more nuanced way how a particular practice – i.e., Making – is enacted through different sites, being the emergent outcome of the encounter with different urban assemblages. Rather than being interpreted as a product of somehow general deep urban dynamics or features, Making could thus be conceived as differently enacted at multiple sites, which coalesce in tracing different geographies of associations. Once more, an ANT focus on *relations* rather than actors, together with a sensibility to performativity, could allow appreciating how and to what extent a 'Maker economy' comes into being as an 'urban economy'. In other words, when an 'urban Maker scene' comes into being, we should ask what contributes to the stability of the scene (or, to its instability) and which kinds of spatiality are

co-constituted with this process of stabilization (or, destabilization) (cf. Tironi, 2010).

2.5 Epilogue: a plea for a performative approach

Summing up, the present chapter has paved the way for an investigation of Fablabs and Makers from a different theoretical angle, one broadly informed by STS approaches and performativity studies. Mobilising an STS- and ANT-informed cultural economy and economic geography, the present work claims that we need to look at new economic entities not with an essentialist gaze, but rather considering economic discourses and practices as productive of a diverse set of spaces. What the concept of performativity allows to do is: to consider Fablabs and Makers to be a *performative enactment* of theories on the democratisation, self-organisation, and decentralisation of production, rather than an object of representation that should be read *through* those theories; and, to account for the diversity emerging from the specific arrangements in which those theories materialise, from the entanglements of arrangements and practices.

The present work and the challenges encountered during the fieldwork drive towards embracing the Latourian quest for opening up the 'black boxes' of socio-technical, and - in this case - economic realms (cf. Latour, 1987). This approach asks to look at the object under investigation as «a contingent assemblage of practices built up from parts that are economic and non-economic» (du Gay & Pryke, 2002, p. 4), thus sharing an epistemological belief in the relevance of the 'making up' of economic realities, instead of the engagement with them as always stabilised and coherent entities. As stressed by the STS tradition and the strands of economic sociology and geography drawing on that, looking at how socioeconomic entities are brought into being not only proves to be crucial in understanding their role and agency, but it also opens up a space for the political, pointing out a path for intervention.

The analysis of both the urban studies and geography literature on Makers presented in Chapter 1 has resulted in the identification of the need for theoretical and methodological tools that allow investigating in a more nuanced and in-depth way the practices of Making and the socio-technical arrangement of a Fablab, while not dismissing a focus on the alleged relevance of Makers and Fablabs in transforming the economy. Therefore, the present chapter has introduced the performativity programme in economic sociology and the ontological tenets derived from ANT as core theoretical pillars of this research that allow investigating *how* (and *if*) Makers and Fablabs come

into being as the practical realisation of an economic discourse, namely, one that describes digital fabrication machines and sharing practices as part of an economic revolution, pivoting on the entrepreneurialization of the individual and the diffusion of collaborative spaces for work and production in cities.

With regards to the theoretical debates in which the present research situates, performativity-inspired theoretical approaches have usually been applied to the analysis of markets (both of goods and financial ones). However, the upsurge of economic theorisations on changes in production – i.e.,, the rising of peer-production, the spreading of an open innovation model, the coming into being of the prosumer; in other words, the acquired relevance of independent producers and lay people in the production of artefacts – asks to try and extend the approach to the realm of production too, thus calling into question how these theories perform alternative forms of production, innovation, and work.

Moreover, the emphasis on the contingency and situatedness of performation processes leads to recognise the importance of *in situ* analyses that, on the one hand, look at sites in and through which economies are performed and, on the other, acknowledge that space is always a practical and relational outcome. Thus, rather than either dismissing the importance of a geographical dimension in the study of Makers or assuming *a priori* that some spatial dimensions – i.e., the city – are the most relevant for the phenomenon under investigation, the theoretical approach proposed argues that various spatialities are enacted through processes of orderings that aim at creating various socio-technical arrangements for Making as democratisation of production.

From this discussion and from the challenges that the encounter with the field posed to the effort of theoretically framing this research derived three main questions on which Chapters 4, 5 and 6 will pivot. After a discussion of the methodological approach employed, the chapters will answer the following research questions: How does a space for Making (Fablab and urban 'Maker scene') come into being as the practical enactment of economic knowledge? How does a Fablab act (or fail to act) as a socio-technical arrangement that enables the performance of Making, framing particular practices as new economic phenomena (i.e., democratisation of production, open innovation, new manufacturing, etc.)? How are Maker practices both spatialized and spatializing, and which spatialities come into being alongside the enactment of a Maker economy? Through answering these questions, the chapters that follow aim at accounting for the 'Maker economy' in Turin as a socio-technical project that may or may not actualised, that could stabilise at certain times and sites, but that can also be subjected to failure. Investigating how this happens is the core of the second part of the present work, which will be developed through three different conceptual foci that bridge the

theoretical framework discussed in the present chapter and the literature review on Makers and Fablabs contained in the previous one – *knowledge, materiality* and *work*.

Rather than each one answering to a specific research question, the three chapters discussing the results of this research are organised according to a conceptual logic. Each chapter pivots on a concept – that is, knowledge, materiality, and work – that, on the one hand, has proved to be relevant in the literature on Makers and Fablabs and, on the other hand, bears importance in the theoretical framework adopted by this research. Firstly, the allegedly easier access to knowledge is usually identified as one of the main triggers of the raising of Makers, while knowledge is also a crucial dimension of the performativity programme in economic sociology for its emphasis on the role of theorisations and discourses coming from economics. Secondly, materiality is implicitly mobilised by both mainstream discourse and analyses that highlight the relevance of Makers in reorganising the production of material artefacts. However, as it has been discussed in this chapter, more nuanced understandings of the phenomenon could emerge from a micro analysis that recognises the relevance of heterogeneous non-human entities in bringing into being a Fablab and other socio-technical arrangements for Making through contingent sociomaterial practices. Lastly, Makers and Fablabs have been also framed as part of broader transformations in how work is performed and sociospatially organised. Rather than following this approach, the research draws on the economic performativity literature and a post-structural understanding of space in tracing how practices in general and performation process in particular bring into being various spatialities of Making. Notably, it showed how the relationship between the phenomenon and each of the mobilised concepts could be considered as an emergent and performative outcome that never returns a 'Maker economy' as a unity.

3. Methodology

3.1 Introduction

'Method is an ordering that makes otherness. [...] this suggests the need for a methodological humility. If the world is messy we cannot know it by insisting that is clear'
(Law & Singleton, 2005, pp. 349-350).

'We need to be wary of stories about consistency and coherence. Instead, it might be better to cultivate a sensibility for mess'
(Law, 2015).

Paraphrasing a famous sentence[1] and borrowing from Law's quote, we could say that research is what happens to you while you are busy disentangling yourself from the mess of reality. The previous chapter has introduced the theoretical framework that informs the present work and the research questions that drive the unfolding of the empirical data collected. However, like much of qualitative research, the final outcome does not mirror the uneven path that has driven to this polished version. Rather than following a linear trajectory, both the theoretical reflection and the fieldwork were traversed by cyclical changes, which made the research path fragmented.

The following sections will describe and unpack this process, both describing the field and illustrating the epistemological and methodological reasons that stay behind the decision of adopting certain qualitative methods for the analysis. First, a brief introduction on the relevance of qualitative research within geography will be provided, with a special focus on ethnographic methods. Attention will be devoted to how ANT's principles

[1] The original one is 'Life is what happens to you while you're busy making other plans', sometimes ascribed to John Lennon but whose origin is questioned.

informed methodology too. The chapter will proceed with a section on the essential task of analysing the researcher's role, fleshed out by reflections on the positionality of the researcher and the importance of reflexivity in research. This section will tackle also the relevance of failure from a methodological point of view, stressing the importance of acknowledging both the limits of the research and the shifts in conceptualisation that came from the very engagement with the field. Concluding, an extended description of the fieldwork will be given.

3.2 The choice of a methodology

> '*In the social sciences the lore of objectivity relies on the separation of the intellectual project from its process of production. The false paths, the endless labors, the turns now this way and now that, the theories abandoned, and the data collected but never presented – all lie concealed behind the finished product. The article, the book, the text is evaluated on its own merits, independent of how it emerged. We are taught not to confound the process of discovery with the process of justification*' *(Burawoy, 1991, p. 8; in England, 1994, p. 244).*

> '*Methodology is not just a matter of practicalities and techniques, it is a matter of marrying up theory with practice*' *(Shurmer-Smith, 2002a, p. 95).*

The so-called 'cultural turn' in geography represented a turning point from a methodological point of view too. The changing perspective on the investigation of social life and space brought with it a need for more attuned methods of investigation, able to grasp the variety of meanings, values, identities, and representations that constitute social life (see Shurmer-Smith, 2002). This change in perspective has led to an increased use of qualitative methods, such as interviews and ethnographic research, recognising as a strength of qualitative methods the fact that they «offer the opportunity "to convey the inner life and texture of the diverse social enclaves and personal circumstances of societies" (Jackson, 1985, 157)» (England, 1994, p. 244).

This section will explain the reasons behind the methodological choices I made. After a brief introduction to the way theoretical changes have been accompanied also by a shift in methodological approaches in economic geography, the advantages of ethnographic research will be discussed. In particular, emphasis will be put on the dialectics between empirical research and

construction of the theoretical framework. Concluding, an excursus on methodological principles drawn from Actor-Network Theory will trace a strong connection with the theoretical framework exposed in the previous chapter.

3.2.1 Practising new economic geography

As seen in the previous chapter, the 1990s marked the rising of an urgency for «new kinds of economic geography that can supplement or even replace the older forms of economic geography» (Thrift & Olds, 1996, p. 313). This theoretical move was accompanied by a corresponding shift in methodology, which underwent a strong change in order to answer new economic geography's questions regarding the contextual, cultural, and relational nature of the economy. The decentralisation of both the economic as a theoretical category and the firm as the core site for the production of value has brought with it a quest for not only different research methods but also a very reconceptualisation of the doing of research, that is, of the research process itself (Yeung, 2003).

Notably, Yeung (2003) argues for a 'process-based methodological framework' for new economic geographies, primarily reliant on in situ research and actor-networks tracing. Starting from the latter, ANT has been adopted in new economic geography thanks to its ability to unearth the relational nature of both subjects and objects, tracing heterogeneous associations among actors (see also Müller, 2015a). The doing of research inspired by ANT principles does not necessarily lead to highly replaceable results, but it derives its strength from the methodological focus on reflexivity and validity. Quoting Yeung (2003) at length: «As noted by Thrift (1999b, p. 57), the purpose of understanding actor networks is about "emphasising the contingency of the world and the many possibilities that are open at any point." Thus, a fundamental methodological requirement of tracing actor networks should be to acknowledge three critical dimensions of these networks: (1) the autonomous power of actors; (2) the role of intermediaries; and (3) the interconnections of nodes» (Yeung, 2003, p. 450). These principles redefine research practice in economic geography as the tracing of the heterogeneous associations that stand behind the economic, entailing the abandonment of a pre-given universe of subjects and objects worth investigating. This feature is particularly useful when approaching supposedly new sociotechnical systems, such as the one represented by Fablabs and Makerspaces, and supposedly new subjects, such as Makers. Indeed, both their high internal diversity and their variably portrayed economic role ask for a methodological

approach that stays with these ambiguities and commits to the task of making this very complexity its object of study.

From these ANT-inspired methodological precepts descends another implication, which consists of privileging *in situ* research. Indeed, the complexity and uniqueness of each case are valued and research from a distance of homogeneous and rather flat entities is substituted by a strong empirical commitment toward the different economic entities researched. Again, in investigating Makers and the sociospatial transformations that the spreading of Making practices perform, an *in situ* research guarantees avoiding a flattening perspective which indulges on monolithic, standardised conceptions and allows to appreciate the diversity and processual nature of both economic realities and their spatialities.

The methodological choices of this work not only draw on some of the most recent theoretical shifts that economic geography has been experiencing, but they also descend from reflections within the discipline that are entirely methodological. Notably, economic geographers had usually stayed away from engaging directly with what people *do*, preferring instead to build their theoretical reflections on empirical data derived from interviews (Dunn, 2007). Therefore, there is an urgent need to acknowledge that interviews, while being a useful instrument, constitute representations of economic organisations and practices. In contrast with this approach and in order to understand the 'entire lifeworld' of the economic subjects involved in the research, we have to acknowledge that «economies appear less as the structural residues of rational action, more outcomes of particular sets of practices that remain inchoate, unspoken and *sub rosa*» (Dunn, 2007, p. 84). Moreover, relying exclusively on the voice of experts, managers, and elites, qualitative research in economic geography risks to be seriously biased. Shifting the focus on who actually perform the practices we are looking at is a necessary endeavour when it comes to hybrid and heterogeneous spaces and practices such as Fablabs and Making, whose analytical relevance lies precisely in their alleged ability to reconfigure both the organisation of economies and the role of economic subjects.

3.2.2 Fieldwork, ethnography, and participant observation

Acknowledging the lack of agreement on the application of the 'ethnography' label on a piece of research and the common interchange between 'ethnography', 'fieldwork', and 'participant observation' (Herbert, 2000), it is necessary to make a premise on how the present research understands these terms and on what was the primary method employed to collect data. The

present work shares an understanding of ethnography as a heterogeneous research approach that consists in engaging in a close involvement and long-term commitment with the people the researcher is working with and of participant observation as its main method, employed to grasp the lives of participants 'from the inside'. Ethnographic research has been widely employed by geographers committed to understanding the social world of a particular group of people, how they make sense of that world, how they construct it, and how they build an identity for themselves and others. According to Kate Swanson, while sometimes not being faithful to more strict versions of ethnography coming from anthropology, «what makes [...] ethnographies geographic is that they cut across scales to explore complex local-global interconnections» (Swanson, 2014, p. 57).

The preliminary work on the literature dealing with Makers from both a social sciences perspective and a more design-oriented one left me with a basic understanding of: (1) Makers as a new socioeconomic group, apparently global (the Maker Movement) but with also a very strong local and communitarian dimension; and (2) Fablabs and Makerspaces as crucial spaces for both the discursive and practical construction of Maker subjects and economies. Therefore, - and following the previously mentioned methodological shift in economic geography - I decided that the investigation of the Maker phenomenon as part of a broader transformation in the forms and spatialities of work and production should have been approached through qualitative, in-depth research. This choice would have hopefully enabled me to make sense of the discourse and practices concerning Makers while acknowledging the way an alleged new spatialization of production is entangled with the spreading of Making. Indeed, agreeing with Smith and colleagues (2013), «a research methodology that studies Makerspaces must attend to the interrelations between narratives about these spaces and material practices displayed in them. Framings of social processes and technologies form over time and are influenced by the way people engage materially with digital fabrication, as these practices shape, enable and underpin the formation, validation or unsettling of different narratives» (Smith et al., 2013, p. 12).

However, ethnography has made a long path from the first work of anthropologists who used to leave their countries of origin to travel towards distant places for the investigation of the culture of people and groups that they approached as 'others'. The encounter with post-structuralism has led ethnography to abandon the presumption of understanding and interpreting the meaning of people's acts, acknowledging that there is no stable meaning to reveal and no homogeneous culture to describe (Hammersley & Atkinson, 2007). Therefore, drawing on post-structuralist theories, I approached the

field sharing: an understanding of the subject as decentered, the acknowledgement of the role of knowledge in constituting the subject, an interest towards materiality as a significant element in the construction of the social world, and of space as constituted through heterogeneous relations (Murdoch, 2006). Moreover, post-structuralist thought methodologically informed my research also through an engagement with the field that did not see me as an omniscient outsider ready to investigate some external 'others' picked out as object of research; rather, I acknowledged the very constitution of reality and the way the relations between researcher and researched contribute too to this process. However, as will be shortly explained, this post-structuralist stance against the possibility of unmediated representations of any 'real' objects was something that I did not easily really espouse at the beginning, experiencing some resistances towards admitting that I was not supposed to say the final word on some sort of stand-alone, immutable, and re-presentable object.

One of the main assets of sustained qualitative research based on participant observation and interviews consists of the fact that the researcher is constantly engaged in a dialectical revision of both fieldwork and theoretical framework. Indeed, the original research design rarely holds stable and at each encounter with the field, a questioning of the first project and concepts is urged. The empirical research and the conceptualisation of the topic under scrutiny never cease to circularly play with each other, thus making evident «the actual *making* of geography» (England, 1994, p. 244). When I entered the field, I (thought I) had a somehow clear picture of what I was about to investigate: an organisation that represented the urban spatial form of wider transformations in the economy and populated by people engaged in productive activities, whose work outcomes could be framed as example of the evolution of consumers into innovative and collaborative producers.

As explained in the previous chapters, both the review of the literature on Makers and Fablabs and the public discourse on them drove me towards constructing the empirical part of the research around a general concern with Makers as part of the so-called collaborative or sharing economy and with Fablabs as representative examples of a new urban infrastructure of workplaces and collaborative-oriented organisations (cf. Merkel, 2015). Therefore, I entered the field with questions mainly oriented to: 1) understanding how Makers as new economic subjects emerge; 2) investigating a Fablab as a new type of organisation belonging to changing urban economies; 3) unearthing the specific geographies emerging from the rising of Fablabs and Maker practices; and 4) understanding the reasons behind the choice of engaging with Making and the meaning attributed to that activity (see section 3.4.1).

However, as introduced in Chapter 2, the very first data collected through the fieldwork brought out some inconsistencies with the theoretical framework built through the literature review. More specifically, the marginality of Fablab Torino as clearly identifiable actor of a new urban economy together with the references (in both some members' memory and online sources of data) to a mythological past in which not only the Fablab was more crowded but it was also explicitly devoted to bring innovation within both the organisation of production and work practices led to shift the focus of the empirical research towards - and to use the data collected so far through - an alternative analytical angle. I therefore questioned the very possibility for a Fablab and for Makers' practices in general to be framed as part of a transformation in (urban) economies. Thus, on the one hand, I looked for further data on the genealogy of Fablab Torino and the kind of economic discourse and imaginaries contextually mobilised. On the other hand, I analysed the data explicitly aiming at: 1) tracing associations among the heterogeneous entities involved in the coming into being of a Fablab and other socio-technical arrangements for Making; 2) unpacking processes of translation through which Makers' practices became (or not) framed as part of an economic transformation; 3) substituting the city as main spatial category for the analysis with an interest towards the heterogeneous spatialities that emerged through Makers' practices. These questions allowed me to look more at the *process*, rather than searching for clearly discernible outcomes to interpret in light of some sort of strong theory. I could almost echo Reid-Henry when he claims: «Research is sometimes making a virtue of necessity, and this empirically-driven conceptual shift has become the crux of my thesis as it now stands. What now seems to have happened is that I arrived at this point through various diffuse, seemingly unrelated processes that were part of *doing* the research, but which all seeped into the way I was *conceptualising* my research. [...] as Massey and Wield (1992, p. 411) have pointed out, "conceptualisation is a process which goes on through the research – one rarely gets it exactly right at the beginning, and it must always be open to revision"» (Reid-Henry, 2003, pp. 193-195).

Moreover, adopting an understanding of the field as 'expanded' (Katz, 1994; see also Hyndman, 2001; Katz, 1992) and employing ANT's methodological principles to the analysis of the actor-networks I was *enrolled* into (see also sections 3.2.3 and 3.3.4), a turning point in the conceptualisation of my research 'object' happened outside the field sites. At the beginning of my third year of the PhD, I spent a period as visiting PhD researcher in the Department of Geography, Durham University, which strongly contributed in transforming the theoretical framework I ended up adopting. The literature I was exposed to, the conversations I had there with various scholars, the way

I reported my discomfort with the field, and the information I provided on that, opened the door to a reframing of the topic, one in which the data I had gathered became meaningful instead of poorly fitting the theory. This is to stress the fact that theoretical and empirical work feed each other in sometimes unpredictable ways, but the whole research process reveals unexpected outcomes that affect the final product.

3.2.3 STS and ANT methodological contributions

Besides these general post-structuralist principles, the STS and ANT traditions that inform my research have played a role also in the way I undertook both the research practice and the interpretation of the data collected. Indeed, as highlighted by other commentators and Latour himself, ANT is not a uniform set of theoretical principles, rather it is more a 'methodological sensibility' (Latour, 2005; Nimmo, 2011; Sayes, 2014). In comparison with other approaches, what ANT drives attention to consists in: the role of non-humans; the relevance of good descriptions, in place of strong theoretically informed explanations; a commitment towards 'following the actors', that is, tracing the patterns of associations among entities (see, for example, Latour, 2005). As will become clearer in the following chapters, this sensibility in tracing associations was crucial in acknowledging the very constructedness of both Makers practices and their spatialities, allowing for a more nuanced understanding of the complex sociomaterial arrangements that enable the performance of Making.

As seen in the previous chapter, ANT research offers powerful instruments to account for 'failed cases' too. This methodological interest in failure will be explored in detail in the empirical chapters. Here it suffices to notice how moments of crisis and failure have been promoted by this body of research as unique in providing some crucial insights on the construction, stability, and functioning of complex sociotechnical systems. While I was conducting my research and analysing data, the acknowledgement of failure as a possible object of research and source of meaningful analyses opened up the space for making sense of *what was not going on* too, rather than wiping it away (see section 3.3.5).

This body of work has informed the very conceptualisation of research too. Drawing on the performative understanding of social sciences discussed in the previous chapter, I share an understanding of social science research as a *device*, something that produces the world rather than describing it (Law & Ruppert, 2013). Different research devices produce different realities, thus situating research as an exercise in 'ontological politics' (Mol, 1999), that is,

considering research practices as part of the multiple worlds of practices that perform the social. There is no reality *per se*, which however does not mean that there is no reality at all. Espousing an «empiricist version of realism» (Law & Urry, 2004, p. 393), this perspective acknowledges the fact that how we, as social scientists, approach the investigation of any object contributes to creating different social worlds. Social sciences are themselves *performative*; and their methods are *devices*, inevitably connected to the kind of analytical framework adopted and thus setting the boundaries of our questions and agendas, opening up some worlds and closing off some others (Law & Ruppert, 2013; Law & Singleton, 2005). Therefore, the adoption of a certain theoretical angle and of a particular methodological approach brings with it a responsibility towards the world we contribute to creating. As anticipated in the previous chapter, the current shape of this work comes from a discomfort with both the field and the theory, or better, a discomfort with how the two (did not) fit together. Framing my research as shown in the previous chapter and conducting the research looking at the point of *translations*, aiming at emphasising the performative and contingent nature of the way new socioeconomic entities come into being, I have been intending to contribute to performing a world where Makers are seen neither as some revolutionary subjects transforming the productive system nor merely as the last outcomes of an always mutable capitalism.

Notably, extending ANT's theories to the research process it is possible to conceptualise the latter as a process of translation and enrolment too, through which some actants are enrolled into the creation of a new actor-network. As Ruming (2009) emphasises, «all research findings are the product of networks created by the researcher through, first, the objectives and framing of a research project and, second, the methods used to create and follow the research network» (Ruming, 2009, p. 452). Espousing this perspective, the present book is nothing but one of the infinite modes of ordering that could have possibly risen from a research project on Making as a new form and spatiality of work and production. Thus, the research practice of tracing associations should be extended from the object of research to the relationship between researcher and researched, and the research process itself, acknowledging how the 'research translation' gets to be achieved. This commitment asks for a reflective effort from the side of the researcher.

3.3 The importance of reflexivity and researcher's positionalities

'Adriano laughs at me. "How do you explain this *for your research?!" '*
(Fieldnote, B.E.L.F.A.G.O.R. night, December 2016).

'But how can you do your thesis on this stuff??? [...] I hope I've not destroyed you everything...'
(Interview with Toolbox Coworking project manager).

3.3.1 Talking about reflexivity

One of the most powerful weapons usually deployed by qualitative researchers is the heavy reliance on reflexivity. Reflexivity has become a common word in much of social scientists' research engaging with the use of qualitative methods, an attitude toward the research process that consists in social researchers' acknowledgement that they are «part of the social world they study» (Hammersley & Atkinson, 2007, p. 14). Instead of espousing a positivist pretension of knowing and describing the objects of research as if they were inhabiting different worlds, a reflexive ethos means considering the researcher both deeply involved in the research process and part of the very social world she is trying to investigate. Being reflexive allows the researcher to search for and acknowledge her positionality, reflexivity consisting in «the capacity of the research practice to allow the researcher to reflect upon his/her own situatedness in the research process» (Yeung, 2003, p. 446).

Feminist researchers have particularly emphasised the importance of reflexivity, inviting to avoid the 'god-trick' aspiration of a view from nowhere (Haraway, 1991). The invitation is to dismiss an idea of social investigation as the encounter of a disembodied researcher who looks at social phenomena from the outside with the social world, to rather substitute this false objectivity with the real objectivity made of different situated and embodied knowledges (Haraway, 1988). In making a plea for a geography that bestows greater importance to reflexivity and intersubjectivity, England argues against a dismiss of reflexivity as simply a narcissistic effort, claiming that it is rather the «self-critical sympathetic introspection and the self-conscious *analytical* scrutiny of the self as researcher. [...] A more reflexive and flexible approach to fieldwork allows the researcher to be more open to any challenges to their theoretical position that fieldwork inevitably raises» (England, 1994, p. 244).

However, this very leaning on reflexivity as the ultimate rescue for the value of social research has been increasingly questioned from within social sciences themselves. While different forms of reflexivity have been explored, there is always a need to stay aware of the trap of self-indulgence (Lynch, 2000). As Gillian Rose encouraged to do more than twenty years

ago, we should avoid falling into a 'goddess-trick' too, leaning on the reassuring precepts of «transparent reflexivity' that 'depends on certain notions of agency (as conscious) and power (as context), and assumes that both are knowable» (Rose, 1997, p. 311). Therefore, on the one hand, it is doubtful the extent to which a conscious process of self-reflection could completely unveil the way a specific knowledge is situated. On the other hand, the more ANT-oriented conception of agency my research eventually drew on invites to open up the conceptualisation of researcher's subjectivity, acknowledging the way researcher's positionality is continuously constituted by the socio-material arrangements of the field too (see below).

Talking about positionality in qualitative research corresponds to acknowledging the fact that each researcher is different, carrying with her a particular wealth of experiences, a body, a gender, biases, different academic approaches and seniority, and also particular psychological and emotional traits. In other words, talking about positionality allows rendering visible *how* the researcher has influenced the research. How me as Samantha – PhD student with a multidisciplinary background, whose only previous experience in urban studies and geography was informed by political economy perspectives, young woman, born in a small village in Northern Italy, coming from a working-class family, generally insecure, not at ease in group situations, almost completely unfamiliar with the geek vocabulary used by Makers, rarely prone to engage with manual activities but familiar with more traditional craft techniques, etc. – have affected the way my research came about. «We are differently positioned subjects with different biographies; we are not dematerialised, disembodied entities» (England, 1994, p. 248). Hence, we interact differently with the field, producing different fieldworks and, thus, different research.

3.3.2 Feeling the field

Many ethnographic accounts and more theoretical works on the doing of fieldwork have been emphasising the struggles that researchers engaging with ethnographic investigation inevitably have to face. The experience of uncertainty and even failure are common among researchers of different seniority, and acknowledging those feelings is not only an important endeavour to bring down to earth the expectations on how fieldwork should be going but also a crucial part of the reflexivity process (England, 1994; Harrowell et al., 2018; Rose, 1997).

Sometimes, these feelings are the relational outcome of the very encounter between the researcher and the field: the fact of being thrown in an

unfamiliar context, experiencing the awkward, embodied condition of being both 'inside' and 'outside', and being exposed to constant changes are particularly challenging for any researcher. But the field can elicit feelings of self-doubt and insecurity also in ways that are peculiar to the specific pattern of power relations that unfolds in it (Hume & Mulcock, 2004; Swanson, 2014).

The elephant in the room in my case is certainly the fact that I was frequently the only woman there and that I was usually younger than the research participants. This was especially true during the Wednesday night meetings (see Chapter 4), which were attended by another woman only towards the end of my fieldwork. As discussed by other female social scientists who happened to conduct research in an almost male-only environment, this condition could be intimidating but it can sometimes turn into an unexpected vantage point for gaining access to information. As Linda McDowell emphasises, women could be considered by their male respondents as «unthreatening or not 'official', [...] difficult issues [could be] broached relatively freely» (McDowell, 1988, p. 167; in England, 1994, pp. 248-249). Indeed, being completely unfamiliar with most of the practices that Making entails, I often put myself into the position of the one who had to be taught, facilitating a sort of tech-version of the so-called 'mansplaining'. Moreover, being outside the internal dynamics and willing to be a good listener made me become for some of them a sort of confident, to whom they complain about what was not working. This was actually crucial in shaping my research, allowing me to ask different questions on the topic, notably questions concerning the coming into being of sociomaterial arrangements for Making and the work that performing Making entails.

As Kim England puts it, this is a specific feminist approach to fieldwork, which she called 'supplicant': «Supplicant involves exposing and exploiting weakness regarding dependence on whoever is being researched for information or guidance. [...] Fieldwork for the researcher-as-supplicant is predicated upon an unequivocal acceptance that the knowledge of the person being researched (at least regarding the particular questions being asked) is greater than that of the researcher. Essentially, the appeal of supplication lies in its potential for dealing with asymmetrical and potentially exploitative power relations by shifting a lot of power over the researche*d*» (England, 1994, p. 243). Indeed, most of the time I felt that the power position that I was supposed to experience being 'the researcher' was submerged by the more pressing feeling of being a young woman among a group of older men. I was frequently provided with unsolicited advice on my future (*'listen to me, you should leave this country, there is no future for research in Italy'*), I was psychoanalysed (*'yes, I got you figured out, you're like that, always*

insecure'), I was given more or less polite recommendations on how to conduct my research, I was kindly approached with cheek kisses and waist hugs, and I was also 'accidentally' portrayed next to a laptop screen showing a Word document with the sentence 'TOUCH ME'.

Besides this general difficulty, there were also moments in which self-doubt and constant questioning of how I was conducting myself in the field were provoked by the way in which I was reminded about my role as a researcher, as someone whose presence was sometimes heavily perceived. I was portrayed: as a psychiatrist taking notes; as the main character of *Confessions of a dangerous mind*; and as a kind of detective, a description supplied by conjectures on some sort of wall in my flat dedicated to the research, where I had pictures of all of them connected by red strings. These comments, together with a sometimes distrustful behaviour by some of them undermined my confidence even more:

'Today, when Giorgio came in, I greeted him and he just laughed in my face. He said that by now by the very 'hello' he feels observed. I tried to explain that he shouldn't... He makes me nervous, I am so tired of this schizophrenic attitude towards me' (Field diary, February 2017).

'Nicola and Silvano came in. I understand that a meeting is scheduled. Giorgio goes with them in the other room and immediately locks the door. I can't believe it!! I explicitly asked him to take part in any meetings when I got in this morning..! This is so annoying... It's cold, I can't do anything, I'm just wasting my time! I feel stupid, cause I wasn't able to uphold my needs or to simply knock the door and enter... but on the other side, I think it's crazy that after a year I still have to ask for permission for every single thing!' (Fieldnotes, December 2017).

Recognising methodological relevance to the feelings experienced during the fieldwork is a powerful instrument to acknowledge both the positionality of the researcher and the immanent messiness of the field itself. Indeed, «more often [fieldwork] is a curious mixture of humiliations and intimidations mazed with moments of insight and even enjoyment» (Thrift, 2003, p. 106; in Crang, 2005, p. 231).

3.3.3 A researcher, not a Maker

Those comments were sometimes accompanied with some jokes on me not being able to use, for example, a laser cutter after all the time I spent

there. I was also often asked why, after more than a year spent there and having attended various workshops, I was still reluctant to make something. After those questions, I started thinking about that. One of the reasons is that I did feel that I lacked some backgrounds knowledge before approaching Making. As they say, it is true that online you can find all the information you need and that there are people you can ask for advice at Fablab. However, something was holding me back. Looking for information online and engaging in the trial-and-error process typical of Making are time-consuming activities. Moreover, you need to be very passionate about it (cf. Chapter 6). My lack of interest in Making from a hands-on point of view was at odds with the goals of the space. This was a first-hand experience of the kind of difficulties people go through if they approach the Fablab not having a project in their mind and/or not having skills and knowledge to share (cf. Chapter 6). Methodologically, this resulted also in not having the kind of embodied experience through '*working* participant observation' suggested as a useful tool to practice workplace geographies in an innovative way (McMorran, 2012).

On the other hand, the fact that I was almost the only one with a background in social sciences among a group of people who were principally familiar with technical subjects and hands-on activities alternatively made some of them curious about my work (and somehow flattered by my interest toward what for some of them was very trivial) and put me in the position of someone who was just dillydallying. This double relationship was explicitly spoken out by one female Maker I met just once, who was also doing her PhD and were among the first members of Fablab Torino but does no longer hang out at:

'Samantha: ...the first phase [of my fieldwork], I've been settling down, trying to explain to them what I've been doing...

Paola: ...and they don't understand... cause they don't understand a shit! They still don't understand that I've been doing a PhD [in architecture; N/A] and it's a year and a half that I've been telling them, and I'm friend with many of them!

[...] We talk again about my difficulty in the observation, the problems due to the very architecture of the space, which sometimes makes the observation difficult because the machines are situated in another room.

Paola: Yeah, you don't know where to put yourself...

Samantha: Yes, I have the feeling that things happen in the other room... and I still feel intrusive in following people...

Paola: Don't be! This always happens even when one's not doing a research [...] So, it's not your problem justifying your presence here. I assure

you...that maybe they ask you, yes, cause they're curious, they want to know if maybe you know something that they don't know, if you're up to something cool that interests them... But if you say them "I'm a geographer", then stop!' (Fieldnotes, December 2016).

My positionality as 'the researcher' was mobilised from time to time by the research participants, as either a way to establish a bond or as a recognition of my work there and the information that I was collecting. Concerning the first case, two people more connected with academic research in design frequently approached me as part of a common world which both I and they belong to. My role as someone who was engaged in a research project on Fablab Torino was particularly recognised by people in the management. On one occasion, I was asked by one of the board members both to provide him with more precise information on the differentiation between Fablabs, Makerspaces, Hackerspaces and if I was willing to give him the information I had collected on the use of the space by the members (which I refused to do). On another occasion, the manager of the coworking space explicitly asked me information on what *'was going on in there'*, because he had lost the pulse of the situation.

However, this very researcher positionality evolved during the fieldwork too, having been enrolled in other research actor-networks before (see Ruming, 2009). So, for example, during the hours that I spent at Fablab Torino after coming back from my visiting period at Durham University (see section 3.3.5) and for the last interviews that I made at that time I was more confident both of my role as researcher and of the data that I needed to collect.

3.3.4 An ANT-informed positionality?

As stressed in the previous section, positionality is also relationally constituted by the very social relations that are experienced in the field, and the assumption of the radical indeterminacy of the actor claimed by ANT allows to grasp how my positionality changed through the enrolment in different actor-networks. Few vignettes from my fieldwork will prove the point.

'Luca to me: "You should have already downloaded the Arduino IDE[2]!". It wasn't written among the information on the workshop, but anyway... I ask Luca about the version of the IDE I have to download. He replies in a very

[2] See section 5.2.1.3.

abrupt and paternalistic way. Then he goes check on the others, while I download it. When he comes back, he says to me: "I assume you didn't manage to do it...", but I actually got it' (Fieldnotes, Arduino workshop, October 2017).

'It's Tuesday afternoon, open day. Two Chinese girls from the school of Architecture come in, they ask for information. Nobody is around for the open day. I call Stefania, who's upstairs working, so she asked me to give them the usual information about the Fablab. I try to remember all the info they usually give about membership and use of the space. The girls look disappointed because they just want to print something with the 3D printers and they need someone to explain to them how to do it. I explain to them that this is not possible, because now there's no one that can help them and because the idea is that you become a member of the association, is not just a service...' (Fieldnotes, May 2017).

'On the forum, there was this guy asking for information on soldering [...] at a certain point, he started talking to me in the plural. So I realised that probably this guy, super sexist, couldn't believe that I wasn't sitting next to a man with a soldering iron in his hand and a driller in the other, that it was only me! [...] Women are very rare in this field [...] Some of them, they don't want *to believe there are women too...you get it, right?' (Interview with Valeria, Fablab Torino Maker, January 2018).*

In all these cases, I leveraged in different ways on my changing positionality, becoming entrenched in (and getting data from) different actor-networks (Sheehan, 2011), such as the management one, the one of learning Making through my laptop and my very body, the one of women in an almost all-male environment, the one of Fablab's regulars. Concluding, when we apply ANT principles to methodology, as seen in the previous section, it is possible to account for the research process as the entrenchment with specific actor-worlds. Espousing this perspective means considering research itself as a process of translation (Ruming, 2009; Sheehan, 2011). Being the translator the one who comes to have the power to speak for the other actors, I as the researcher in the field eventually gained the powerful position of enrolling all the research participants-actants in the actor-world of this work.

3.3.5 On the importance of failure as a research device

'I feel again a little bit concerned about the fact that there's nobody here. I try to manage my anxiety and to let go the obsession of control. Being here is depressing, and even writing this stuff seems a nonsense effort. I should simply admit that I've failed, that my research is not going anywhere... The 'ethnography of the empty space' sounds freaky. It could have been done in a day, it's not necessary to stay in the empty space over and over again!' (Field diary, October 2017)

I was wrong. I started speculating on failure during my visiting period at Durham University (January-April 2018), where many people I told about the difficulties of my fieldwork and my concerns about having nothing to say encouraged me to reflect on the possibility of introducing this concept in the research. This suggestion proved to be extremely useful, as will become clearer in the following chapters. Here, I want to stress how 'failure' is a powerful concept also when we talk about methodology. In my research, the methodological importance of failure derives from the encounter between, on the one hand, a feminist take on reflexive efforts in acknowledging what (inevitably) goes wrong in a research (England, 1994; Harrowell et al., 2018; Rose, 1997) and, on the other, the emphasis Actor-Network Theory puts on the stability of sociotechnical systems and thus the relevance of failure as an analytical concept that drives the enquiry. In this concluding part of the discussion on reflexivity, I want to unpack the topic through three different perspectives: (1) failure as a diffuse reaction of social scientists to the messiness and complexity of the world (Law, 2004); (2) failure as an unavoidable side effect of fieldwork; and, (3) failure as a concept specifically employed by STS and ANT researchers, which allows performing a certain kind of research. Indeed, these three aspects are tied together and they push towards an endorsement for a «research practice that is messy and heterogeneous, primarily because that is just how research tends to be, but more importantly because that is the inherent nature of the world itself: messy (Law, 2003, 2004)» (Ruming, 2009, p. 453).

Drawing on Law, the messiness of reality is an ontological premise that I share. As soon as I entered the field, I realised that my understanding of Makers partially differed from the one my informants shared (when not being ignored at all). Images of a new form of DIY were accompanied by a vision of Making as a revolution in the profession of designers, people stressing the importance of sharing knowledge and projects were balanced by others who considered a Maker anyone who makes anything by herself. How could I unravel this knot? Echoing the same perplexity experienced by John Law

and Vicky Singleton when facing the extreme variety of accounts in their research on alcoholic liver disease, «perhaps the problem was that we simply were not doing good research. If we could not identify a typical trajectory, or our interviews slid off into different topics, then perhaps we were being vague and imprecise, did not have a proper methodological grasp of our investigation or were not asking the right questions and being focused enough» (Law & Singleton, 2005, pp. 332-333). The strategy that the two researchers suggest in order to cope with this messiness is to consider research not as an epistemological endeavour (knowing something out there) but as an ontological one (performing realities while we get to know them). The invitation is to stop trying to know messy realities as definite; rather, we should adapt our methods, looking to *enactments*. For the case I investigated, this meant looking at Makers and Making as the outcome of various performances, which entail different forms of Making. This approach allows taking into account what does not fit into the model too, considering these as an integral part of the fragment of the social world we are busy investigating.

In addition to (but also because of) the messiness of reality, as previously discussed «fear, self-doubt, and feelings of failure can haunt us throughout our entire stay in the field» (Hume & Mulcock, 2004, p. xxiii). Besides a perceived sense of failure, a stream of thought has been growing in human geography that urges to acknowledge the moments of actual failure too (Harrowell et al., 2018). Doing fieldwork is indeed something that cannot always be successful, especially in the early stages of research, and acknowledging what inevitably goes wrong is not only an ethical and political commitment but also a useful productive strategy. Among the cases of 'fieldwork failure' listed by Harrowell et al. (2018), I certainly experienced «denied or rescinded access to field sites [...] failure to build rapport with participants [and] significant divergence from [...] planned research activities» (Harrowell et al., 2018, p. 231). The most evident failure in my research concerns the lack of expertise (and interest) in tinkering with technology. In a way similar to the one shared by Elly Harrowell in the story of her fieldwork in Kyrgyzstan and her difficulties with the local language (Harrowell et al., 2018, pp. 233-234), I experienced sometimes a distance from the research participants, since I didn't share their 'inner language' made of very geek and technical references, this preventing me to follow all the conversations properly. Another difficulty encountered concerns the *timing* of the research. The great independence and sometimes loneliness of Maker practices represented a partial limit to my access to the field, given the difficulty in planning my observation. Moreover, since right after my fieldwork ended, Fablab Torino seems to have taken a different direction, mainly due to the changing of the association board. Regarding in particular this last consideration, I share an

understanding of failures in fieldwork as «important opportunity for critical reflection» (Harrowell et al., 2018, p. 232); indeed, the transformations that the organisation has been undergoing after the appointment of a new board – which, potentially, would provide me with more data on the very *practices* of Making, since it seems to guide the Fablab out of its crisis – prove once more the relational and contingent nature of these organisations and their activities.

Concluding, I want to move from considerations on failure *in* doing research to failure as a device *for* doing research, that is, as something to look for, a productive instrument for unpacking the messiness and constructedness of social life. As various ANT works have shown, the analysis of sociotechnical systems in moments of crisis could open up interesting insights on the ordering of those systems (Callon, 1986b; 1987; de Laet & Mol, 2000; Latour, 1992). In the case I investigated, the need for facing the fact that something was *not* going on and the perception that it was instead falling apart forced me to ask different questions. Instead of assuming these lacks as the evidence that what I was looking for was missing, that crisis and those lacks eventually drove me in the analysis of the data, pushing me to look for the processes of translation, the way Fablab and other sociomaterial arrangements perform Making or fail in it, thus trying to unearth the work that it entails. Indeed, the functioning of a sociotechnical system could reveal more on the phenomenon under investigation than theories that assume that each instance of the system works in the same way. This functioning can be unpacked «only if some extraordinary event – a crisis – modifies the direction of the translation from things back to words and allows the analyst to trace the movements from words to things» (Akrich & Latour, 1992, p. 260). For my research, these considerations resulted in methodologically recognising the relevance of what was missing (for example: machines working improperly, basic competencies, lack of interest towards online sharing, lack of projects, etc.) and from there engaging with the existing literature on Making from a different angle, one that acknowledges that the social is performed and that performances may fail too.

3.4 Field-making

3.4.1 Turin: a post-industrial city in search of a new identity[3]

The Introduction to this book and the first chapter have argued against a conceptualisation of the city as a bounded space endowed with specific features that derive from the spatial formation it represents. Thus, the following lines that aim at introducing to the unfamiliar reader the city in which the research was conducted could seem to contradict this assumption. On the contrary, this introduction to 'the city of Turin' becomes clear if seen in light of the fact that, from a methodological point of view, the present work situates within the broader family of «ethnographies *in* the city', which opposes the one of 'ethnographies *of* the city» (cf. Hannerz, 1980; in Capello & Semi, 2018, pp. 11-17). Moving away from any presumption of saying something on the city in its wholeness, an ethnography *in* the city «is committed to investigating the more disperate phenomena which occur within the city boundaries» (Capello & Semi, 2018, p. 13). While - as seen before - this research hinges on the idea that the equation between urban phenomena and the city as its administrative boundaries presents some problems, still we cannot overlook the socioeconomic backdrop that the phenomena investigated find in the specific city in which they are studied. Thus, the above definition may be attuned to the theoretical approach of this research claiming that the present ethnography *in* the city investigates a phenomenon that occurs in and through other urban assemblages that perform and performed the urban economy. In other words, this short introduction to Turin is more a brief excursus on its urban economy, rather than on the city per se. This approach, therefore, allows offering a topological description of a specific phenomenon within a specific city without being trapped into essentialist understandings of the urban space (cf. Tironi, 2010).

As Chapter 1 has shown, the discourse over Makers in urban studies and economic geography frequently overlaps with the investigation of the transformations that work is undergoing in typical examples of creative cities. Usually, in these cities policy measures are taken that aim at fostering innovative and creative urban economies, characterised by self-entrepreneurialism, digital technologies, and collaboration as distinctive features of the work of knowledge professionals. In line with this analytical approach towards Makers and Fablabs, the Italian case usually studied is indeed Milan, due to its status of «knowledge-based economy city, with a strong degree of innovation in production activities and new workplaces» (Armondi and

[3] Part of this section has been published also in Cenere (2021).

Bruzzese, 2017, p. 33). The relevance of Makers and Fablabs in Milan is shown also by the strong interest that local government has towards the phenomenon, supporting and funding the opening of these organizations, which are understood as new workplaces similar to coworking spaces (Chiappini & Törnberg, 2018; see also, d'Ovidio & Rabbiosi, 2017; Vicari et al., 2015).

However, a long tradition in urban studies has warned against the risk of building theories on empirical evidence coming from global cities whose features are considered as the norm (Robinson, 2002), as the Milanese example seems to be for the Italian Maker scene. These analyses foster homogeneous views of Makerspaces treating them as «new productive centralities» in innovative urban economies (Chiappini & Törnberg, 2018, p. 78), thus hindering an understanding of which diverse forms of value are produced through them.

It is for theses reasons that focussing on alternative cases could allow to decouple urban and geographical theory on the forms and spatialities of Makers' work and the contextual specificities of empirical investigations. In this respect, Turin is well-suited to explore Makers' work since neither the local Fablab is well embedded in Turin's production ecosystem nor Turin's urban economy is a particularly significant example with regards to features such as knowledge-orientation, innovative capacity, and creativity.

Turin, situated in the North-West of Italy, was for a long time the national example of the Fordist one-company town, due to the preeminent role that the automotive company FIAT had on the socioeconomic fabric of the city. Besides the crucial role that the company had for the economic growth of the city, Turin was in general characterised by a strong reliance of its economy on the industrial sector until the 1980s (cf. Bagnasco, 1986; 1990). Since that moment, the city has been experiencing a relentless decline. The global crisis of Fordism provoked a great shocked to an economy hyper-specialized on manufacturing, thus forcing the city to implement long-term strategies to overcome the economic transformation. Since the 1990s and especially during the 2000s, the city had to face the dismantling of its industrial core and embarked on various branding strategies through which it tried to represent itself as creative, cultural, and international (Vanolo, 2015a; 2015b). These entrepreneurial strategies culminated in 2006, when Turin hosted the Winter Olympic Games, which marked the 'illusionary effort to reduce the liminal uncertainty through a grand celebration of re-aggregation' (Capello, 2018: 47; see also Vanolo, 2008). More recently, further strategies for economic recovery were informed by the 'smart city' and 'start-up city' narratives, pivoting on the crucial role of technology and innovation (Rossi et al., 2015).

However, the passage towards a knowledge-based and service-oriented economy was never accomplished, and the longed-for relaunch of the urban

economy based on a progressive enfranchisement from the industrial sector is still yet to come. Moreover, the 2008 economic downturn was experienced as a second major economic shock that exacerbated the recession affecting the city, especially with regards to a manufacturing industry that was still the most important economic sector albeit its ongoing difficulties in accomplishing a restructuring process (Gonzalez et al., 2018). Recent figures on the growth of start-ups, creative industries, and forms of micro-entrepreneurialism suggest that Turin is not an emblematic example of an urban economy massively characterised by those transformations in the spaces and forms of work typical of digital capitalism (Centro Einaudi, 2020).

Notwithstanding the economic crisis that has been affecting the urban economy, a collective belief locates one of the distinctive traits traceable along the whole history of the city in Turin's ambition of being a laboratory, whose «transformations [...] have always been seen as possible previews of what was about to happen elsewhere» (Capello & Semi, 2018, p. 19; see also Armano, 2010). The opening of the first Italian Fablab could thus be read as another step along this path.

3.4.2 Choosing a field site and gaining access

The decision of choosing Turin as case study for my research was due mainly to two different reasons: the discard of Milan and the long-lasting experience of Fablab Torino. At first, the choice fell on Milan,[4] due to both the fact that the city has been experiencing a phase of cultural and economic buzz and the spreading of Makers' activities as part of the Municipality's strategy for an urban sharing economy. However, both the already existing research on the city and the will to investigate a more 'ordinary city' (cf. Robinson, 2006) shifted the focus away from Milan, in search for an urban context where the grassroots forces allegedly typical of a 'Maker economy' could be more evident. Turin represented a good case in point, because of its ongoing process of economic restructuring that sees the city, on the one hand, still imbued with a Fordist industrial culture and charachterised by a manufacturing core, and, on the other, struggling for keeping pace with a global economy where creativity, culture, and immaterial labour have become the new economic mantra. These features were strongly backed up by the fact that Turin was the first Italian city where a Fablab was opened, with the initial ambition to represent an innovative space for the whole country.

[4] However, Milan somehow *stayed* in my research, as will be explained in the following subsection.

At this point, a clarification is needed to explain why I started my investigation on Makers in Turin from Fablab Torino. Two considerations throw light on that, one linked to the backdrop work on the literature and the second related to my interest as an (aspiring) human geographer. According to the evidence from the literature review shown in Chapter 1, Makers heavily rely on a complex infrastructure made not only of digital spaces such as forums and dedicated platforms but also of physical shared spaces, such as Fablabs and Makerspaces. Therefore, given the strong emphasis bestowed on the availability of shared digital fabrication machines and places where sharing knowledge with other peers, I considered basing the research in a Fablab the most viable and fruitful research strategy. These considerations matched with an interest towards the relevance of spaces and their interrelation with social life, which drove me towards both a focus on the organisation of a specific Fablab and an analysis of a Fablab as a place where multifarious forces interact and from which multiple urban phenomena could be read.

While there are various spaces that could be identified as belonging to the so-called Maker Movement in Milan, the preliminary research on Turin identified Fablab Torino as the only available option. As a matter of fact, there is another association called Fablab (i.e., Fablab Pavone), but it is not actually part of the Fab Foundation network and is more of a recreational organisation, which provides workshops not only on digital fabrication, but also on WordPress, websites creation, and even card games and foreign languages. Other spaces, partially attuned with some of the features generally attributed to Makers, were identified during the fieldwork, as will be explained later on. Moreover, the fact of being hosted by a coworking space conferred to Fablab Torino the image of a space more connected to current transformations of work and the economy, strongly imbued by a culture of innovation.

Therefore, I started collecting data on Fablab Torino and its story, mainly through online resources and newspaper articles. After that, I entered the crucial phase for any ethnography, 'entering the field'. The issue of access is one of great concern for any social scientists engaging with this methodology, and the negotiation of that is actually something that goes on for the whole duration of the fieldwork, being somehow scattered across the various persons that the researcher meets (Hammersley & Atkinson, 2007, p. 4). Thus, the identification of a reliable gatekeeper is an issue of great importance for the very starting of the research.

In October 2016, I decided to get in contact with Fablab Torino via email, asking for information on the organisation and their availability for a meeting. The person who replied invited me to pass by on Tuesday afternoon, during the weekly open day. When I visited the space, I was welcomed by

the President of the association and another member of the board, a key figure of the association, being also part of the founders group. It was this person who took me on the tour of the Fablab, briefing me on both the vision behind the project and the organisation of the space. On that occasion, I explained to him my research project and the kind of methods that I was about to use. He gave me his email address, inviting me to get in contact again for any further information. After a couple of days, I actually sent him an email, asking about other similar organisations they were possibly in contact with and their activity on the local area, making explicit reference to the 'sharing economy' as a sort of general category that I used to frame their experience – some very naive questions and references that I now deeply regret. I never received an answer to that email.

Toward the end of the month, I went to Rome for the Rome Maker Faire. It was my first participant observation, aimed at getting to know from the inside the Makers' universe, attending talks and walking through the countless booths of the exhibition. When I got into the Fiera di Roma, where the fair was hosted, awkwardly the first person I met was the guy who showed me around on the open day. We greeted each other and chatted for a while. I felt intimidated by him somehow, so I did not make any reference to the unanswered email. Back to Turin, I took that fortuitous meeting in Rome as an excuse to drop him another email, in which I referred to the Maker Faire and asked him for another meeting to talk again about the possibility of starting a participant observation at Fablab Torino. Again, no answer to my email.

I started feeling depressed and discouraged, even if I knew that the negotiations for getting access are usually tricky. But «a thick skin and plenty of persistence are essential for everyone intending a career in social research» (McDowell, 2001, p. 205), so I decided to go for another gatekeeper. I pinned down the President on Linkedin and sent him a very formal email, in which I expressed again my interest towards focusing my research on Fablab Torino as part of 'new organisations contributing to the transformation of the city' – again, a very broad and almost meaningless expression, which I deeply regret now. He agreed on meeting and invited me to pop up at Paratissima, an independent art and design exhibition in Turin where Fablab Torino had a booth. We met over a coffee for a very short chat. He asked me more about the project and I was pleasantly surprised when he understood the word 'ethnography': he told me he had a degree in Psychology, so he was familiar with qualitative methodologies and he himself used them once. He made some jokes on them being my guinea pigs and soon agreed on my fieldwork starting. That was the first time I realised that there is always something in the field that is not completely under the researcher's control and that we have to abandon ourselves to some fortuitous circumstances that could reveal

fruitful (Hyndman, 2001). The fact of sharing a background in social sciences was certainly something that allowed me to establish an easier connection with the President, avoiding also the difficult task to provide more details on a research project that was at its very infancy and on a methodology that I was actually adopting for the first time.

After that, I was formally introduced to the community by a message on the Telegram chat,[5] in which the President introduced me as a PhD student doing ethnographic research on the Fablab. Being this person the President of Fablab Torino, I was at that point confident about my access to the field. It was only later, after entering more into the internal dynamics and power relations of the organisation (cf. Katz, 1994, pp. 68-69), that I realised that the person who showed me around on the open day was actually the one who had gained a position of relative power in the actor-world of Fablab Torino. Indeed, thinking about who mediates the researcher's access to the field is a worthy endeavour, since it opens up questions about how the fieldwork is affected by power dynamics and the extent to which the researcher is part of the field too, becoming entangled within these power relationships. These considerations leave me with an unanswered question: to what extent my struggles in the field were due to the fact that the authorisation for the research did not come from that person?[6]

3.4.3 The main field site: Fablab Torino

Fablab Torino has been the first Fablab to be opened in Italy. Born as Fablab Italia in the occasion of the exhibition Stazione Futuro within the celebrations for the 150th anniversary of the Italian Unity in 2011, its name and location changed one year later becoming permanently hosted by the organisation Toolbox Coworking (Balestra & Ferrero, 2016). The same building hosts also the start-up Officine Arduino (now Officine Innesto), strongly connected to the association Fablab Torino. Among the founders of Fablab Torino can be listed Massimo Banzi, co-founder of Arduino, the company producing the single-board microcontroller renowned among Makers,

[5] Telegram is an instant messaging platform, similar to Whatsapp. The choice of using Telegram instead of Whatsapp was motivated mainly by two reasons: the fact that the first is considered more privacy-respectful and safer than the second, two issues that the most geek attitude of Makers strongly perceives; and, the possibility to create 'bot', that is, a sort of program that runs autonomously and performs very simple task, somehow simulating the performance of the task by a human.

[6] For example, my requests of being added to the Telegram chat of the board or to their mailing list were always dribbled through some jokes, indeed resulting in an unsaid refusal.

together with Riccardo Luna, at that time director of the magazine *Wired Italia* and since 2014 Digital Champion[7] for the Italian government.[8]

As reported in the description provided on its Facebook page, Fablab Torino is an association that 'is born out of different forces and needs, all with a common goal: bringing Digital Fabrication and Open Source culture in one physical space where machines, ideas, and people could freely mingle. Frequently, the Fablab works as a Hub of competences, in which people who hang out there find among the other users the knowledge they lack to realise their projects. In this sense, we try and facilitate horizontal exchanges of competencies and skills among people. [The association works] with the support of Officine Innesto and the hospitality of Toolbox Coworking'.[9]

Figure 7. Fablab Torino leaflet.

Indeed, Fablab Torino is hosted for free by the organisation Toolbox Coworking, a coworking space opened in April 2010 in a former industrial area, in via Egeo 16, Turin. Located at approximately 1.500 meters from Porta Nuova station, framed by the railways, this part of the city now corresponds to the South-West border of the rich neighbourhood of Crocetta, and

[7] The Digital Champion is a figure promoted by the European Commission to enforce its Digital Agenda. Each member State appoints one Digital Champion, who has the role of helping in the government's strategy for a more digitalised country.

[8] The origins of Fablab Torino will be discussed more in details in Chapter 4.

[9] Retrieved from https://www.facebook.com/pg/fablabtorino/about/?ref=page_internal. Last access: 3 November 2018.

borders on South with Borgo Filadelfia, previously part of the Lingotto neighbourhood, developed around the FIAT industrial plant. During the XXth century, the area hosted a foundry, a body shop, and a connected firm for mouldings. All these firms underwent a crisis in different periods, which eventually led them to close their doors (Balestra & Ferrero, 2016).

Besides Toolbox, Fablab Torino is deeply connected with two other organisations and projects, both situated on the upper floor[10]. The first one is Officine Innesto, a startup that, together with the Fablab, was born out of the initiative of the corporation Arduino. Officine is complexly entangled with the activities of Fablab Torino, also because the people working there are part of the association and its board too, together with the fact that the firm is the owner of the machines. However, this relationship is a tricky issue and it is difficult to disentangle it; indeed, during my fieldwork, my very difficulty resonated with the one experienced by some Fablab Torino members, especially new ones, who frequently asked *me* for clarifications. The second one is a project started by Officine, that is, Casa Jasmina, a DIY home where experimenting, making, and hacking with the Internet of Things (IoT). While being a project of the startup, I conducted participant observation there too, mainly during the workshops organised with Fablab Torino members or addressed to external people.

The board of Fablab Torino is elected on a two-year base by all the members of the association. When I entered the field, the board had just changed and it changed again right after I left. The access to machines is regulated through paid membership (Student, Standard, and Pro) and a system of credits. On Wednesday night, the various communities of the Fablab gather to work on their projects or simply spend time together. While I was doing my fieldwork, these were: Arduino User Group, Audio Hacklab, and 3D Printer User Group[11], while another informal group on Soft Making was added towards the end of my fieldwork but not formalised as a community. Tuesday and Thursday nights are devoted to workshops, both free and with a fee. On Saturday, workshops for children are organised,[12] under the label Fablab for Kids. Each year, Fablab Torino together with Officine Innesto organises the

[10] For a detailed description and discussion of the internal architecture of the space, see Chapter 5.

[11] In the past, there used to be another community, Be.In.To., dedicated to bio-hacking. A prototype developed by the community is still present at the Fablab, even if no longer working. One of the funders has been trying to relaunch the community during the past year, without success.

[12] During my fieldwork, I took part in these activities only twice, since the educational side of Makers and Fablab's activities with schools were not related with the way the present research has framed the topic. Analogously, I excluded the work of Officine Innesto employees when it was related to service activities and external commissions.

Torino Mini Maker Faire, a local event independently organised but part of the international network of Make branded events (see Chapter 4).

Even if Turin has been the first city in Italy to host a Fablab, the local political institutions have not capitalised on that. The association Fablab Torino is mainly supported by the two private entities linked to it, i.e., Officine Innesto and Toolbox Coworking. The Municipality gives the patronage for some of the activities organised by the association, such as the annual Mini Maker Faire. In an official document, almost copycatting Fablab self-description available online, the Municipality considers it as 'one of the main actors for *entering the labour market* [...] that brings Digital Fabrication and Open Source in a physical space, where machines, ideas, people, and original approaches freely blend' (Deliberazione della Giunta Comunale della Città di Torino, 2016 02266/068: 2; emphasis added).

I conducted participant observation at Fablab Torino in three different slots:[13] from November 2016 to June 2017; from October 2017 to January 2018; and in June 2018. I went there on an average of three times per week. Usually, my observations were conducted during the afternoon and the night, the Fablab being open to the public from 4 pm. Besides conducting participant observation during the hours devoted to independent work, I took part both in the community nights and in workshops. Toward the end of my fieldwork, I also did some morning observations, staying in Officine Innesto premises and following the work of the employees when it was related to the activities of Fablab Torino.

People gathering at the Fablab are mainly men[14], with an average age of 40. The youngest members (in their 30s) are designers who also use the space either for their professional activity or work for Officine Innesto. The female members who regularly attended the space were three, but they change during my fieldwork. The association counts approximately 200 members, whereas the Telegram chat of Fablab Torino (see below) gathers approximately 100 people. However, as stressed throughout the entire book, during my fieldwork I used to meet no more than 30 people.

The few people using the Fablab as part of their complex urban infrastructure of workplaces were mainly young designers, graduated at the local Polytechnic, who worked as freelances. They entered the Fablab during the first years of its activity, to use digital fabrication machines and fabricate prototypes of their projects. Indeed, the interviews revealed that in this group

[13] The two interruptions were due to, in the first case, an attempt to enlarge the scope of my fieldwork (see next section) and, in the second case, a three-month visiting period in Durham, UK.

[14] The high male presence is the reason behind my choice of using male pronouns when talking about Makers in general in the fieldnotes.

prevailed the discourse on Makers as innovators and self entrepreneurs that characterises the 'techno-myth' developed by the US-based Maker Movement and digital capitalism more in general (cf. Chapter 5). They saw in the Fablab the possibility to go a step further in their work, actually *producing* what they once used to simply design, and thus not limiting themselves to use their competneces working for a major firm. Still gravitating around the Fablab but no longer using it for their professional activities were young computer engineers who used to work for the startup connected to the company Arduino, until the time I started my fieldwork. These people were the most expert on coding. The last type of Fablab members attending the space because they were attracted by the availability of shared machines to use for their personal projects and by the alleged possibility to meet other persons with complementary skills was constituted by those persons who, albeit having a job, were interested to assess the possibility to start an entrepreneurial activity.

However, as mentioned in previous sections, when I entered the field, I had to cope with unexpected but unavoidable evidence: during the afternoons, there were barely a couple of people using the space, which instead used to become more crowded after 6 pm, especially during the communities' nights.[15] Moreover, even during those gatherings, it was rare for me to observe someone making a prototype or working on a project. While I was expecting to observe people busy in productive activities, instead I found myself dealing with (what later on I happened to know was) a moment of crisis in the organisation's activities. After some months, I realised that the night was the moment I could have a better chance to observe the members' activities.

People gathering at the Fablab during the community nights were mainly amateurs, attracted by the possibility to learn something new on specific digital fabrication machines rather than by the desire to either produce a prototype of something or develop an entrepreneurial activity. Some of them decided to become members of the Fablab because they identified with the open-source ethos that was part of the initial narrative around the Fablab. Others were men in their 50s or even retired who worked in the manufacturing sector as engineers and were interested in using their competences for collateral projects done mainly for fun. Indeed, during the time I spent at Fablab Torino, they used to attend the space mainly during the community nights.

With regards to the projects and prototypes developed at Fablab Torino, the main evidence came from the interviews conducted to historical members

[15] On the temporality of Makers' practices, see Chapter 6.

(cf. section 3.4.5) and by looking at the artefacts on display on the shelves (cf. section 5.3.2). As per the 'harware', they were mainly produced using a 3D printer or the lasercutter, thus being either made out of plastic or by raw wooden sheets cut and assembled in a very simple way. As per the 'software' (when they had one), they were usually made through Arduino or similar microcontrollers, eventually using a system of bots for remote controlling. The prototypes usually shown by members to demonstrate the innovative potential of the Fablab were made during the years before I started my fieldwork, either through a strong collaboration with the Polytechnic of Turin or with the Arduino company. These are for example a customized wheelchair designed for basketball players, a camera for selfies, DIY lamps that are connected to the smartphone, and a device used to grow algae in order to produce biodiesel.

As already said in this chapter and as will be discussed at length in the empirical chapters, during my fieldwork it was rare to see people working on a project. However, the few projects I had the opportunity to observe were mainly the ones developed during the community nights, either independently (such as the customized vacuum described in Chapter 5) or together (such as the electronic music devices developed by Audio Hacklab). Therefore, the few artefacts I could observe did not correspond to those innovative prototypes usually described as a typical Maker production.

Important moments to appreciate what is framed as the outcome of a Maker production were both the national Rome Maker Faire and the Torino Mini Maker Faire, albeit the first one was more business-oriented in terms of both projects and exhibitors (cf. section 4.4.3). There, typical examples of Making were IoT devices such as an air-sensor to measure the air quality or a machine for paper recycling, objects that aim at showing one's own skill in using digital fabrication machines and the aesthetics of Makers' production, such as a digitalised old typewriter or a remotely controlled panel inspired by a TV serie, but also small robots to teach children how to code.

The apparent lack of 'offline activity' was partially balanced by their 'online activity'. Indeed, as soon as the President added me to the main group, I realised that there were definitely more people interacting on the chat than the ones I used to meet at the Fablab. When I started participating in the communities' nights, I also asked the members to add me to the Telegram chats of each one. I conducted virtual observations (see, for example, Hine, 2000; Kozinets, 2002), becoming part of five chats – the main one, the three of the communities, and the one of the other group previously mentioned. The very fact of finding myself forced to take part into an ongoing conversation through the various Telegram chats of Fablab Torino was a

source of data, since I thus became aware of the complex spatiality of knowing practices (Chapter 4) and community participation.

Together with these, I constantly monitored the online activities on social networks (Fablab Torino's Facebook and Twitter pages), in order to investigate also the self-representation of the organisation and how it played with the actual practices of its members. I also used other online platforms such as e-commerce ones, Github (see Chapters 4 and 6), and other websites devoted to Making to monitor the practices of knowing, producing, and selling of some of its members.

3.4.4 Tapping other geographies of Making

As said in the previous section, doing ethnography implies embracing the messiness of reality. But in trying to connect the empirical and the theoretical, the researcher is faced with a double choice: either wiping the slate clean hiding the mess under a neat theoretical structure; or, let the mess speaks for itself, being faithful to it.

When I faced 'the mess' of my fieldwork, my PhD research had a break. I first tried to 'wipe the slate clean' by looking to other, more 'neat and clean' cases, which could be in some ways matched with the study of a Fablab. Following the actors (in this case, only the human ones), conducting desk research, and partially through snowball sampling, I identified other spaces variously related to the world of Making. During the 2017 edition of the Torino Mini Maker Faire (see below), I met the founders of another Makerspace (Solido Collettivo) and they also told me about a digital fabrication service-provider (Prototype Factory). Again in 2017, I attended the Open Innovation Summit at Open Incet,[16] where I met the founders of Izlab, recently inaugurated there. Talking with one member of Fablab Torino and doing desk research, I identified the association Cecchi Point, in particular, its Officine Creative, as a space that shared with the Fablab the interest towards DIY. Finally, both following Fablab Torino activities and trying to map the sites in Turin where a certain discourse on Makers had been taking root, I ended up in design exhibitions (Paratissima, Operae, Torino City of Design) and handmade markets (Bunker Big Market, San Salvario Emporium).[17] However, the attempt to 'enlarge my fieldwork' following the line of independent production brought me too far away from the world of Making as

[16] For further information, see chapter 4.

[17] All the organisations, exhibitions, fairs, and markets listed will be described in the following chapters.

technological DIY, innovation, and sharing I was interested in, leaving me on the crowded shores of a world made of independent crafters and designers, whose only commonalities were either the use of digital fabrication machines or the rediscovery of handmade production thanks to a variety of digital technologies for sharing. Far from considering those as a useless effort and sharing a regard towards 'false paths' mentioned by Burawoy in the quote that opens the chapter, I claim that those 'detours' in fieldwork were extremely useful in making me appreciate the specificity of Fablab Torino and of the practices and discourses imbuing the actor-world it was part of. The discourses on open innovation, democratised production, industrial revolution, and technological DIY, even if in the complex ways I will explore in the following chapter, were something that clearly distinguished Fablab Torino from those spaces for production and consumption of independently fabricated artefacts.

Figure 8. Open Inovation Summit, leaflet.

Crucial for both having a wide-ranging perspective on the phenomenon under investigation and identifying other key actors was the participation at the editions 2016 and 2017 of the Rome Maker Faire-The European Edition (MF) and at the editions 2017 and 2018 of the Torino Mini Maker Faire (TOMMF). While all of them, notably the Rome ones, were identified as crucial spatialities for performing a certain economic knowledge on Makers (see Chapter 4), the MF 2017 and the two TOMMF allowed me to identify other communities of Makers in Turin. Attending the fairs I came in contact

with Hackability, Hackability@Polito, DAM Bros Robotics, and Rokers (Robot Makers), all of them exposing their prototypes there. Unfortunately, the fact of having identified these communities towards the end of my field-work, together with their project-based working practice (see Chapter 6), made difficult for me to pin down their activity and conducting participant observation. Therefore, I only took part in one meeting of Hackability, whereas I conducted interviews with all the other communities, supported by desk research on them and virtual ethnographic research on their social media platforms. This approach evidences also one of the limits of the research: this very fragmented nature of the phenomenon, the juxtaposition of Makers with small enterprises, students, and craftsmen at the fairs, and my interest towards new workplaces and centres of production contributed in holding back the enlargement of the field to independent Makers that were not used to take advantage of the Fablab as space of production.

Figure 9. Rome Maker Faire 2016 and 2017, leaflets.

Concluding, I want to spend a few words on what has always been a sort of 'implicit comparison' that both led and held back my research, the one with the Milanese 'Maker scene'. As I have previously mentioned, due to both a general interest towards innovative forms of work and increasing support to these experiences from the side of the Municipality, Milan has been experiencing a great ferment around Makers and Fablabs. Moreover, some initiatives have been launched to make the academic world meet the main actors in the city's Maker scene, involving both institutional actors and

Maker players. It was through these various initiatives, but also independently following the progress of some of these Fablabs/Makerspaces and visiting them, that I had the chance to remain updated on what was going on in Milan. The information that I gathered (while, of course, this does not amount to a research endeavour) was constantly haunting me: why in Milan the phenomenon seemed so lively? What could I say looking into one Fablab only? Was a political backing a necessary element for performing Making as an 'urban phenomenon'? While I only partially got to answer these questions, nevertheless they proved to be useful in appreciating the very *performative* role of theories on Makers as economic innovators. Indeed, those theories, reproduced by the work of both politicians, practitioners, and engaged researchers, have been strongly leading the way in which Milan Makerspaces and Fablabs are framed as innovative shared workplaces and centres of production. Coming back to methodological considerations, it can be said that I used this evidence as a sort of litmus for the case I was investigating, heading precisely to pondering *how* those theories perform Making *when entangled with different sociomaterial arrangements*. In this way, Milan and its 'Maker scene' became somehow inevitably part of my field, thus reinforcing the claims of those who think to the field as 'always here and now' (Hyndman, 2001), as stretching well beyond the supposed boundaries of our field sites. This position, besides dwelling on the way our positionality as researchers is constructed also outside the proper field site, could also provide insights on how some distant 'there and then' affect the fieldwork itself and the approach to the research object.

3.4.5 Interviews

Another strategy that I used to cope with the unexpected lack of evidence on Makers as producers and workers was to rely more on the use of semistructured interviews. However, I am aware that the investigation of practices through interviews rather than through direct observation presents some pitfalls. Interviews in social sciences are employed in order to elicit narratives on the self and investigate meanings attributed to practices and social objects (Crang & Cook, 2007). In my research, I used interviews both to this aim but also (due to my ANT sensibility) to explore the networks and patterns of relations of the communities of Makers I was investigating, thus using interviews mainly as a means to follow the actors (Ruming, 2009).

I conducted 36 semistructured interviews, lasting on average one hour (the shortest ones lasted 30 minutes, while the longest were up to 2 hours). All of them have been recorded with the recording app of my smartphone

and then fully transcribed. The people interviewed were regular members of Fablab Torino, funders, managers (both actual and former ones), and people belonging to the other Makerspaces and Maker communities mentioned in the previous subsection. The setting for the interviews changed from time to time, being alternatively the Fablab itself, the relax area of Toolbox coworking, other Makerspaces in case of people not member of Fablab Torino, or bars suggested by the interviewees. Only one was conducted on the phone.

Upset by the lack of activity of Fablab Torino – thus apparently having nothing to observe and/or participate in –, I tried to cope with it by starting interviewing people. It was this very uneasiness with the field that drove the first interviews, which, on the one hand, drew partially on the theories espoused at that time (i.e., Makers as self-entrepreneurs, prosumers, innovators, etc. and Fablabs as nodes in an undergoing sociospatial transformation of work and production in cities, which is mainly characterised by self-organisation, sharing, and a platform spatialization), while, on the other, pivoted on an effort to understand what do we even mean by 'Maker', after all. Regarding, in particular, this last point, the perception of the fact that something different was going on there, along with an ethical commitment towards being faithful to the meanings my informants attributed to the space, elicited a concern for not dressing those people and their practices with theories too tight. I somehow followed the «natural instinct [...] to find people who know the answers [to the research questions] and can give [...] the answers» (Phillips & Johns, 2012, p. 143). While asking explicitly 'What do you mean by 'Maker'?' could sound as a sort of essentialisation of Making and a strategy that puts the researcher at risk of 'going native', it was indeed an instrument for empowering the informants by «uncovering the knowledge that "mere folks" produce» (Rose, 1997, p. 310).

After this initial phase, even if I didn't' follow any particular set of questions, while proceeding with my fieldwork I narrowed down more precisely the kind of questions I wanted to ask my informants. After information on their education and job, I asked about how they had entered in contact with the Fablab and/or how they had become interested in Making. In order to map their activities, I made them elaborate more on their attendance at Fablab, the projects they had been up to, the instruments (both offline and online) they used for the practice and their participation in a community. After becoming more aware of the difference between the current status of the organisation and the past one, I also asked early members to talk about the changes that Fablab had undergone. For what concerns people not attending Fablab Torino, the basic questions on their activity were accompanied by questions on either the opening of their Makerspace or their participation in Maker-

related events or, again, the role of a community of peers and amateurs in production and the relevance of sharing.

As mentioned at the beginning, interviews proved to be crucial also in virtually reaching other spaces for Making (private homes, especially) which I was not able to observe in person, thus allowing to trace the associations necessary for having a broader understanding of the different *agencements* that enact Making. Thus, through interviews I got to know: that many of them conducted their activities also at home, that others (more entrepreneurial) based their activities also in a startup incubator, the events they took part in, and other spaces for Making (both online and offline) they had used or were still using.

However, there is always a partial unpredictability in conducting interviews too, since «despite all the advice in the world about how to do interviews [...] it is a combination of luck, circumstances, and the particular individual interaction on the day that affects how the interview goes» (McDowell, 2001, p. 209). Indeed, during my fieldwork individual interaction was certainly crucial in making some interviews more effective than others, having built a reciprocal trust that favoured a certain level of confidence and openness. On the contrary, other occasions prevented me to conduct a satisfying interview, as for interviews made over the Maker Faires or because of the difficulty in pinning down people, which sometimes resulted in an insistence from my side that antagonised the interviewee.

3.5 Conclusions

The chapter has focused on the methodological aspects of the research, unpacking the heterogeneous issues that both informed the design of the research from the beginning and emerged throughout. It has also dwelled on considerations regarding the role of the researcher, her positionality and the importance of having a reflexive approach to these issues.

Notably, the literature review pointed to the need of methodological tools for investigating how narratives on Makers and Fablabs are interrelated with situated socio-material practices. More specifically, the identification of Fablabs as part of evolving urban economies from the side of urban scholars justified the decision to adopt a methodological strategy that aimed at investigating Makers and Fablabs as, respectively, the organisational form and the subjects of a collaborative, high-tech, and open way to produce value through the production of material artefacts. Therefore, the chapter argued for an ethnographic investigation, where participant and non-participant observation are combined with semi-structured interviews in order to look into the

practices, arrangements, and spatialities of Making. An ethnographic approach, while being still in the minority within economic geography, nevertheless constitutes an invaluable resource for the study of the practical, processual, and broadly defined cultural nature of the economy.

However, the encounter with the field and the data collected acted back on the theoretical framework I was mobilising, thus impacting on both the empirical work conducted later and the data analysis too. Notably, I read the data gathered via observation and interviews through the lens provided by both online materials on the genealogy of Fablab Torino and the accounts of it made by some of the informants. I also looked at the contingent moments of translation – either successful or failed - in which heterogeneous entities were aligned in order to perform Making as a practice that belongs to a new economic paradigm, paying particular attention to the spatialities that emerge throughout the process. This methodological approach allowed me to answer the broader question on *how* do socio-technical arrangements for Making qua economic ones come into being and which kind of spatialities are contextually performed.

4. Knowledge

4.1 Introduction

'The beautiful thing about these spaces is that they are really open to everyone. So, if you fancy you can come here and learn as much as you want. The limit to how much you can learn is your willingness to learn, your willingness to work hard at studying. Because the amount of information that you're provided with or that you have access to is unrestrained.'
(Interview with Guglielmo, former Fablab Torino Maker, March 2017).

The knowledge economy is a phrase to which we have become accustomed. It encompasses a variety of different realms that have become the core of capitalist economies after the fall of Fordist regimes, a transformation that has progressively overshadowed the relevance of material production in processes of value creation.

The role of knowledge creation, exchange, and circulation is a key theme when studying Maker practices too. As seen in Chapter 1, the alleged democratisation of production of Makers lies precisely on the access to not only machinery but also open information. How does a Maker get to know what he or she needs in order to design and produce a new prototype? What is the role of a Fablab in this process? Which kind of knowledge participates in enacting Fablabs as spaces for the democratisation of innovation, thus constructing new spatial forms of production?

Issues regarding the production and circulation of knowledge have affected geographers too, especially those economic geographers engaged in the investigation of the extent to which knowledge contributes to economic competitiveness and innovation processes (Bryson et al., 2000). Notably, geographers have variously investigated the spatial forms of these processes, in the attempt to grasp the spatial variables that constitute an advantage for

knowledge creation. Thus, the quest for understanding the relationship between space and knowledge has accompanied the evolution of both the economy and the discipline, the latter shifting from being merely concerned with agglomeration mechanisms as the most relevant spatial configurations in the exchange of *knowledge*, to be now more interested in the role of networks and other more fluid and fragile arrangements of *knowing* in boosting innovation. Notably, recent evolutions in the discipline towards an approach more attuned to practices and relations (cf. Chapter 2) have focused on knowledge and spatialities of knowledge as a practised and performed accomplishment.

In order to situate the discussion within the framework of the most recent debates on the topic in economic geography, the following chapter will firstly provide a brief overview on the shift that has been made by some geographers towards a practice-oriented understanding of knowledge and its spatialities. In line with a focus on economic geographies of the practices and performances of knowing, the chapter will then move to the role played by economic knowledge, on the one hand, in constituting a geography of urban sites for the democratisation of production and the advent of a form of new and collaborative work, and, on the other, in framing Maker practices as economic. The second part of the chapter will be devoted to the analysis of *knowing* among Makers as a sociomaterial practice that entails processes of translation. Practices of knowing are, on the one hand, situated, while on the other, they enact specific spatialities. Therefore, three socio-technical arrangements of knowing will be analysed: arrangements for learning collectively, arrangements for knowing based on an individual engagement, and an event where practices of knowing are enmeshed with (economic) knowledge performations.

The chapter argues that a focus on the geographies of knowledge production proves useful in order to shed light on Makers, since it both allows for a more nuanced understanding of the 'openness' of knowledge allegedly at the core of Making and opens up the space to account for the contingent and situated nature of knowing. This approach will stress the performativity of knowledge, not only showing how it may or may not result into a valuable economic asset depending on the actor-networks in which knowing practices are enrolled but also focusing on geographies of economic performativity. In this way, the chapter disentangles knowledge creation from specific spatial configurations (cf. Ibert, 2007), while emphasising the relevance of sites and practices.

4.2 Knowledge in economic geography

The analysis of how knowledge circulates and how innovation is produced is at the core of a long and heterogeneous tradition of research within economic geography that has evolved over the decades. Inspired by a Schumpeterian understanding of innovation, in the 1970s and 1980s economic geographers were interested in identifying the regional factors that justified the competitive advantage of some regions over others. Regions were conceived as bounded systems in which different actors – firms, universities, institutions – contribute to the genesis of innovations and their spatial diffusion. Geographical distance and proximity lay at the core of this stream of literature, which employs concepts such as *spillovers, industrial ditrict* (Becattini, 1979) and *innovative milieu* (Camagni, 1995) to describe how the production of new knowledge benefits more those persons and institutions that are closer to the centre of knowledge production. These theories are intimately related to the concept of spatial agglomeration (Krugman, 1991; Porter, 1990) as core factor to explain the economic activity of a region and the external economies that provide competitive advantages to those firms situated within the same cluster.

These analyses have as main feature a territorial understanding of the space of economic action, which inevitably drives attention to, on the one hand, the impact that distance among actors has on the circulation of knowledge and, on the other, the accumulation of stocks of knowledge within a specific region. Thus, learning processes are conceived as dependent on local networks and it is the relation among firms, local institutions, and other agents with different levels of knowledge and expertise that explains the innovative performance of a region (Asheim, 1996; Cooke, 1992). In particular, the theory of tacit and codified knowledge developed by Michael Polanyi (cf. Polanyi, 1958, p. 1966) contributed a discrete and cognitive understanding of knowledge to regional studies, which has developed into an idea of 'regions as islands' (cf. Amin & Cohendet, 2004), where knowledge circulation is facilitated by greater proximity, stressing the role of tacit knowledge in tightening inter-firms relations (Vallance, 2007). Conceiving knowledge in a rationalistic way and as an object per se, processes of interactive learning have become the most relevant ones in this body of work and, correspondingly, geography-as-distance has been identified as the main variable to investigate, since it could represent an obstacle for the transfer of information and the circulation of knowledge (Ibert, 2007). Proximity has thus been considered crucial to «facilitate knowledge creation by reducing uncertainty and resolving coordination problems» (Rutten, 2017, p. 159).

By the mid-1990s and beginning of 2000s, static and bounded conceptualisations of 'clusters' and 'milieus' developed to make sense of the spatial forms of knowledge creation and circulation in Fordist industrial production regime have been partially substituted by new conceptualisations of the triad 'knowledge, space, economy'. The study of the relationship between these elements underwent a profound change when a new economic paradigm upsurged, namely, the knowledge economy. Since then, knowledge has been no longer conceived just as a crucial factor within innovation processes but as the most important product of an economy based on services and informational goods rather than manufactured ones. This shift has entailed a reconfiguration of work too, since the global economy has become a 'cognitive-cultural one' (Scott, 2007) in which the most important assets are the intellectual and affective capacities of the worker.

These transformations, together with the increasing relevance of information and communication technologies (ICT), brought to a spatial reconfiguration of knowledge production and circulation, which have shifted to the global level. To respond to these transformations, new conceptualisations of the spatial configuration of knowledge circulation have been introduced. Boschma (2005) highlights that, besides the absolute and relative physical distance between economic actors, other forms of proximity have gained relevance in innovation processes. Indeed, cognitive, organisational, institutional, and social proximities are juxtaposed to distance in order to understand how various forms of closeness impact on the circulation of knowledge. In general, «the argument frequently developed is that proximities help to control the coordination of complex production processes and thus enable an extended social division of labour» (Bathelt & Gibson, 2015, p. 986). However, despite the attempt to go beyond a territorial conceptualisation of the topic, these approaches still focus on knowledge as an object that moves through space, passing from an actor to another.

At the same time, the urban scale gained a primary position as the locus of creativity. According to these theories, the density charcaterising urban environments, the presence of R&D centres and institutions of Higher Education, the provision of a high-quality infrastructure of services, and a general cultural vibrancy make cities the locus where innovation is produced within the knowledge economy framework Florida, 2002; Scott, 2006; Storper & Scott, 2009).

However, theories on the urban dimension of the creative industries (Scott, 1997) and a general understanding of cities as hubs of creativity and innovation (Florida, 2002) match the old reliance on agglomeration and proximity with a specific attention towards urban density, stressing the relevance of the local "buzz" (Storper & Venables, 2004) in the diffusion of tacit

knowledge. Indeed, as highlighted by Amin and Cohendet (2004, p. 89), «an extension of this kind of thinking can be found in contemporary work on the geography of the knowledge economy, which finds in cities – city centres to be more precise – the contact networks and cultural amenities that are said to sustain the creativity and lifestyle of the fast-paced knowledge worker (Leadbeater, 1999; Grabher, 2001), as well as the density of codified knowledge that sustains excellence and variety through the fruits of science, technology, and education lodged in corporate HQs, research establishments, higher education, arts, and cultural organizations, and the media industries».

More recently, increasingly flexible production, the rising of new forms of labour, and the pervasive diffusion of digital technologies have further complicated the landscape of knowledge production and circulation. To understand how space and knowledge influence each other within current economic scenarios, alternative interpretations and theories have been provided. On the one hand, the focus has shifted from formal organisations, such as firms and clusters, to more informal and personal networks, understanding informal arrangements as a sort of compensation force for the lacks in formal organisations (Grabher & Maintz, 2006). On the other, new ontologies of both space and knowledge have been introduced to appreciate the dynamic and fluid nature of processes and spatialities of knowledge production. This approach has aimed at opening up the space to geographies of knowledge as actively produced (French, 2000), rather than determined by pre-given univocal relations between space and knowledge.

Notably, a focus on *knowing* as practice has replaced the interest on knowledge, assuming that processes of knowledge creation are performative, situated, holistic and in flux, due to their embeddedness in action (Ibert, 2007; see also Müller, 2015a). Knowing as a social and materially constituted practice is considered the locus of investigation inasmuch as the orderings of the ways knowledge is produced, stored, exchanged, and circulated are relevant for understanding our interaction with both the social and the physical world (Amin & Cohendet, 2004). The strict differentiation between formal and informal organisations is thus put into question too, suggesting a closer look at the personal relations that form contemporary networks of learning (Grabher & Maintz, 2006).

This sort of pragmatist approach towards the relationship between knowledge and space draws on the tradition of sociology of knowledge and laboratory studies. This body of work understands knowledge not as an already existing entity, rather as something that is constructed by specific communities of people and their situated sociomaterial practices. In these works, scholars such as Bruno Latour and Karin Knorr-Cetina adopted a thorough ethnographic approach in order to unearth the ways scientific facts are

produced through the practices of the laboratory, thus questioning both the way those facts are usually considered as data and a mere interest towards the institutions of scientific knowledge production.

From a spatial point of view, an engagement with knowing as a situated practice matches with a spatial ontology that identifies in *sites* the crucial locus of investigation. Besides the relevance of a specific place – i.e.,, Fablab Torino – in defining knowing practices by structuring the interactions among people, it is to sites as locus of enactment that we should pay attention. Following the topological and performative ontology of space theorised by ANT, knowledge is an emergent entity that is differently enacted at multiple sites. Maker knowledge does not move into pre-existing bounded spaces, such as global or local communities. Rather, it emerges as a multiplicity of knowing practices that are enacted at a multiplicity of sites. The latter do not correspond to bounded spatial objects; on the opposite, they are co-produced by the enmeshment of practices and socio-technical arrangements, through which the present and the absent are folded together (Callon & Law, 2004). Sites are relational and it is through the sociomaterial practices that are performed through them that Maker knowledge is assembled in different ways. While a territorial understanding of knowledge exchange and circulation would insist on identifying human actors as exclusive subjects of the action, ANT's topological approach unpacks the relevance of technologies and other material artefacts in distributing the action, thus framing knowledge as the outcome of heterogeneous associations. Indeed, «knowledge, too, is a product of translation, for it requires the alignment of bodies, machines, communication technologies, texts and so on to be stabilized and become a valid claim» (Müller, 2015a, p. 70). This understanding of knowledge production emphasises once more the relevance of geographical research that looks at the topological dimension of its spatialities, preserving the centrality of a focus on sociospatial relations in the analysis of knowledge dynamics while being in a framework of 'distanciated' economic relations (Amin & Cohendet, 2004; Amin & Thrift, 2002).

Concluding, a theoretical approach pivoting on the enacted spatialities of knowing is particularly useful in the case under investigation, where knowledge is not only at the core of processes of value creation, but it is also entangled with claims for the openness of information, which eventually lead to an enmeshment between production and consumption. Moreover, the shifting role of individuals and lay people in production, together with a corresponding emphasis on collaborative practices among them, challenge research on the spatialities of knowing with the fragility and contingency of these arrangements of learning (cf. Richardson, 2016). Therefore – and as anticipated by the introduction to the chapter –, what follows will adopt the

just mentioned performative, pragmatic, and sociomaterial understanding of both knowing and its spatialities. This approach will unfold, firstly, through a focus on the *geographies of knowledge performativity* enacted along the actualisation of economic theories on Makers through specific agencements, showing how this process is both contingent upon the production of spatialities that frame Making as democratised production and tied to specific sites where economic theories about Making are produced; secondly, through an analysis of *knowing* as processes of knowledge production that enact different spatialities. These two analytical foci will be identified, respectively, with knowledge *about Making* and knowledge on *how to Make*.

4.3 When knowledge enacts the social: from knowing Making to making Making

'...at the entrance, on the left, there's a small relaxing area with a sofa and two old armchairs. On the wall, a simple bookcase. Among many books on informatics and electronics, a pile of books edited by Maker Media*, with the typical blue and red format:* Making things talk, Making things see, Lego and Arduino projects, Make an Arduino controlled robot...' (*Fieldnote, 18th November 2016).*

4.3.1 Geography of an economic performation

As discussed in Chapter 2, economic theories do not simply describe realities; they actively contribute to performing them. In this process, various spatialities are enacted alongside the performation of specific economic theories. As highlighted by Barnes (2002), books are powerful devices in circulating knowledge and enabling processes of economic performation. Theories and discourses are enabled to act at a distance (cf. Latour, 1986) thanks to these powerful intermediaries, which stabilise a network of relations through which knowledge can circulate and enact specific realities in sites distant from the ones in which it has been produced. Books, therefore, act as *literary inscriptions*, that is, «relatively immutable media that resist transport» (Callon, 1991, p. 135). Latour and Woolgar (1979) and Latour (1987) introduced the concept in order to shed light on the fact that scientists do not simply describe an objective reality that stays out there, but rather take part into the constitution of that reality enrolling the entities analysed into «traces, spots, points, histograms, recorded numbers, spectra, peaks, and so on» (Latour & Woolgar, 1979, p. 88 note 2). Thus, texts, figures, and other

visual representations are the outcome of a process of translation through which a spokesperson has succeeded in aligning all the entities involved in producing a certain image of the world, one that contributes in both stabilising an otherwise unstable set of relations among those entities and that can also be mobilised in order to act at a distance and enrol new entities.

Figure 10. Books on the shelves. Author's photo.

Those books on the shelves, together with others explicitly oriented to describe what Makers *are* instead of providing guidelines to their work, constitute a crucial part in the process that has led to the enactment of Making in Turin. While during the months I spent at the Fablab I have never seen anybody taking those volumes off the shelves, there actually used to be a time in which the relations with the official Maker culture born in the US and, in particular, from *Maker Media* was more present, directly affecting the birth and growth of Fablab Torino.

'At a certain point, when they decided to start Wired Italia *and to have Riccardo Luna as director, he came to Milan and asked people to be introduced to someone who was doing something [...] So he asked Chris Anderson,* Wired America*'s editor-in-chief: but we're doomed in Italy, there's no innovation! And he replied: are you kidding? Don't you know Massimo Banzi and Arduino? [...] So, Riccardo was asked to organise the exhibition for the 150th anniversary of Italy in Turin and he asked me to collaborate for the part on the future of work [...] after a little bit of brainstorming, we realised that there were Fablabs all over the world, even in Afghanistan, but not in Italy. So, I said: let's build a Fablab there! But it cannot be something where people go and there's a 3D printer turned off and that's it. We should have something alive!' (Interview with Massimo Banzi, CEO of Arduino, December 2017).*

In this narrative of Fablab Torino's origins made by one of the main figures of its foundation, the way specific economic theories affected the decision to build up a Fablab is apparent. The sociomaterial arrangement of the specific section of the *Stazione Futuro* exhibition in which digital fabrication machines were placed and hands-on demonstrations were proposed to the audience, namely, the one on the future of work, entangled with these theories in enacting that prototype version of a Fablab as an organisation revolutionasing urban workplaces, production processes, and individuals' participation in innovation. In particular, when a permanent Fablab was built after the exhibition as a part of Officine Arduino, the idea inspiring Banzi was to foster a community of Makers as a sort of external R&D for Arduino,[1] as he explains in the interview: *'what I wanted was simply that people could build a community, [could] have access to some stuff...I wanted to build a community. Cause I wanted to have a space where...actually, in the past, we [N/A the company] did manage to glean from the Fablab culture to look for people who could do things'*. The influence of theories on open innovation and open R&D is clearly identifiable in the reasons behind the opening of Fablab Torino. According to these economic theories, users could become an essential part for the innovation process of a firm (Grabher et al., 2008; Prahalad & Ramaswamy, 2004); therefore, the Fablab was conceived as an informal organisation, a place where everyone could experiment with digital fabrication and eventually contribute to the creation of an innovative product.

[1] Retrieved from: https://www.youtube.com/watch?v=4F0BrhVLDQQ. Last access: 21 August 2018.

Thus, knowledge about Making and Fablabs coming from the US is firstly moved from there to Turin via some intermediaries constituted by the exhibition and two key persons who were variously connected to those sites where theories about the potentialities of Makers for the economy were developed. One of these people, Massimo Banzi, was already familiar with the Maker Movement thanks to his experience in the US, where he used to attend the first Maker Faires, described by him as a moment that *'were needed mainly to us, to count us as Makers'*. Moreover, Banzi has been actually one of the main proponents of the Movement itself, thanks to the spreading of Arduino.[2] The other person, Riccardo Luna, is crucially part of one of the most relevant channels of the 'economics at large' nowadays, that is, the tech-Bible *Wired* (cf. also Barry & Slater, 2002a, p. 190). Luna too contributed to circulating a discourse on the socioeconomic transformations currently undergoing, thus acting as a crucial actor in building up a geography of sites through which knowledge on the transformations affecting the economy and connected to the rise of Makers was circulated.

'There's something different, something that has changed. Today [...] we can do a lot of things by ourselves. We can make a website by ourselves, we can make an app by ourselves, we can make a cup, we can start a business [...] Today that the means to produce objects or bits have become so less expensive and easy to use, the barrier of entry to put ourselves to the test and do something by ourselves has become a lot lower. [...] The ones who are now changing the world are [people like] a hacker from a basement in Brooklyn. [...] There's a wonderful work from an Italian economist who teaches at Berkley, Enrico Moretti. He published a book last year, The new

[2] *RW: What do you think about the popularity of the maker movement? That started getting big after Arduino was already a thing, right?*

MB: Yes. We sort of happened in the right moment because the moment people started getting into hardware again, they found Arduino was a tool they could use. So people realized they could use Arduino to build circuits and make prototypes. The kind of people who are amateurs or doing it for fun or trying to solve a specific problem. It became a world of possibilities where people were even starting to make companies out of their Arduino prototypes.

It's quite interesting. We were adopted by the maker movement as their electronics platform, and the great thing about that is that there are a lot of people who never thought they could program microcontrollers, never thought they would make circuits. And they end up making startup companies making electronic products, something which, 15 years ago, was very, very difficult and was available only to people who had experience in electronics.

Retrieved from: https://readwrite.com/2014/05/12/arduino-massimo-banzi-diy-electronics-hardware-hacking-builders/. Last access: 14 August 2018. See also https://mag.wired.it/news/2012/10/31/wired-novembre-edicola-speciale-re-made-in-italy-123234.html

geography of jobs, *that explains clearly that the only stimulus to economic growth is innovation. And what changes when it is a city the one investing on innovation? [...] The spillovers are on everyone' (Riccardo Luna at the event* Giovedì Scienza - La Terza Rivoluzione Industriale*, Turin, 23rd January 2014).*[3]

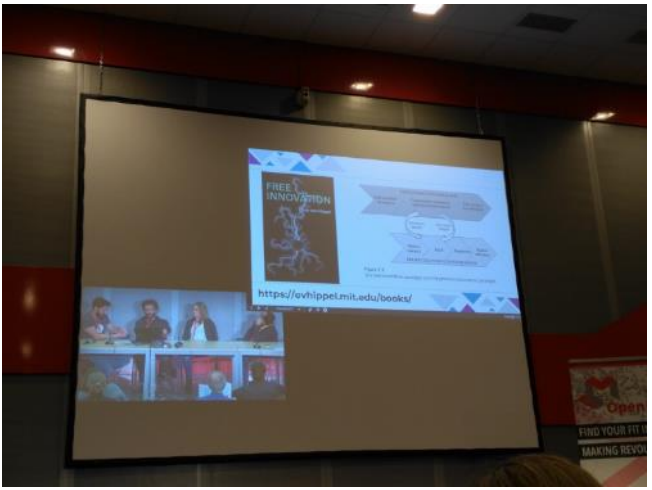


Figure 11. Rome Maker Faire 2017, slides referring to Von Hippel's theories. Author's photo.

As stated at the beginning of the section, books and other literary inscriptions represent crucial immutable mobiles that, while circulating through different sites, perform the economy by enrolling actants in a sociomaterial arrangement that enacts a specific economic ordering in sites distant from the one of knowledge production (cf. Latour, 1986). Notably, *Wired* magazine and, more generally, the kind of 'economists at large' connected to it, provide the economics' background that inspired also future intervention on what a Fablab is, where ideas about open innovation and customisation intersect concepts such as the third industrial revolution and democratic access to the means of production. Indeed, this discourse on the new path of global economy and the empowerment of consumers became a mantra for Fablab Torino managers, which was always kept as the main narrative used to describe the relevance of the organisation and the role of Makers:

'We used to buy games, now we build them, we make them in 3D [...] here's my son, he took this toy car and added a star on it. From that moment,

[3] Retrieved fomr: http://www.giovediscienza.it/old/modules/conferenze/article.php?storyid=11. Last access: 14 August 2018.

the car became his car, it became customised [...] This has been defined as the third industrial revolution. As you can see easily from this cover of The Economist*, it is a revolution where you have direct access to the means of production. [...] In this book by Rifkin, he deals with the topic in a more holistic way: it's also a revolution of democracy, of trade. [...] The more a product goes on Rogers curve of innovation from early majority to last majority, the more you can buy it both as a physical product and as a virtual one. [...] This is the title of a book that Chris Anderson wrote in 2012,* The Long Tail*, a book that I warmly suggest you read. In the next book,* Free*, he predicts an economy where everything is free' (Fieldnote, member of the Fablab board delivering a speech for a school visiting the space, February 2017).*

Summing up, through the 2011 exhibition *Stazione Futuro* and the circulation of immutable mobiles represented by books and magazines, the Fablab model was introduced in Turin (and in Italy) as an example of the trajectory that the economy and the nature of work were about to take. A new socio-technical arrangement was built through, on the one hand, the assemblage in the same place of innovative digital machines that constituted a sample of Fablab and, on the other, the framing of these machineries as part of a transformation in production and work, thanks to the circulation of economic theories on the role of sharing and collaboration in innovation processes, the increasing relevance of digital fabrication, and the democratisation of production.

After this initial phase, thanks to the great success of the exhibition, Fablab Italia became Fablab Torino and gained hospitality by Toolbox Coworking (cf. Chapter 3). The reason why the coworking space has been hosting the Fablab for free could be traced in the words of Toolbox project manager, which highlight how the two entities (i.e., the sample version of the Fablab at the exhibition and the coworking space) were framed as part of the same economic transformation:

'Those years were years of the de-materialisation of value. [...] We met [with the Fablab] by chance because a person who works for us had worked in organising the exhibition and told us that the people working for Fablab Italia wanted to transform this experience in a job. [...] I had been there to have a look and this thing about 3D printers, atoms instead of bits...it talked about future, innovation… [...] We needed to create a place where people work well, feeling as in a social media, as within an information flux. There are things you just give a try with and you know that they are positive,

responding to an idea of progress' (Interview with Aurelio Balestra, project manager of Toolbox Coworking, October 2017).

Thus, the two organisations could be understood as part of two actor-networks that, while different, had among the associations that constitute them something in common that enacted a relation of proximity between the two. Indeed, both of them were linked to a desire for innovation and new forms of work that could have fostered economic growth. This is a kind of proximity that has to do «with the identity of the semiotic pattern. It is a question of the network elements and the way they hang together. Places with *a similar set of elements and similar relations between them* are close to one another» (Mol & Law, 1994, p. 649). While being already related in a topological spatiality that performs theories on new forms of work, the ties between the two were strengthened by processes of physical displacement too. Different persons moved from one place to the other, thus building a further relation that eventually led to the digital fabrication machines moving to the coworking space and constituting the first germ for the opening of Fablab Torino. Thus, economic knowledge, framing the two entities as somehow belonging to the same actor-network, enacted not only a new spatiality of changing urban forms in economic organisation, but also the conditions for performing those new material relations that constitute a new place – that is, Fablab Torino as part of a collaborative and innovative workplace.

Summing up, at the initial stages of Fablab Torino history, a process of *translation* was successfully performed, thanks to the fact that the translators succeeded in: identifying a problem in the need for new forms of work and production and ascribing roles to the actants involved (*problematization*); making the other entities accept their roles by creating relations with other actors, such as the coworking space, books, and other inscriptions on economic theories on Makers, while weakening the ties to others, such as the geek subculture (*interessment*); implementing strategies to make the other entities accept their roles, for example delivering speeches and employing the first staff members for the Fablab (*enrolment*); making all the actors follow the 'spokesperson', i.e., the entities that have participated in the enrolment, for example having all the digital machines actually functioning or the staff sharing the open source values (*mobilisation*) (cf. Callon 1986a; 1986b). Through this four-step process, the economic theories mentioned above succeeded in performing the reality they claim to describe in Turin, co-constituting new urban spaces of innovation and production.

4.3.2 Geographies of knowledge(s) creation

The performation of Making as democratised production and innovation in Turin is also contingent upon the production of a spatiality of *knowledge creation*, constituted by various sites where those economic theories are performed through the reiterative and citational qualities of speech acts (cf. Butler, 1993). Besides the role of Fablab Torino itself, these sites correspond to a series of temporary events such as, for example, the conference TEDxTorino and the Italian Democratic Party convention at Lingotto, which were both attended by some members of Fablab Torino as speakers, and the flagship event Torino Mini Maker Faire (see section 4.4.3).

Figure 12. Fablab Torino Maker participating at TEDx Torino. Photo from Twitter.

While these events were exclusively connected with performing Makers and Fablabs as an innovation in production based on the fruitful encounter between digital fabrication and an open source ethos, other sites have emerged as tied to the reproduction of related economic theories, such as the ones on open innovation and customisation. For example, in the subsequent years, the relevance of adopting an open innovation paradigm for urban economic growth has been brought about by Fondazione Brodolini, a private

foundation extremely active in the fields of local development, open innovation, Fablabs and Makerspaces.[4] In 2017, the Fondazione organised the event *Open Innovation Summit* at Open Incet, the city 'platform for the matching of demand and supply of innovation'[5]. The event aimed at discussing the role of cities in fostering innovation through the paradigm of openness.

Economic theories regarding the relevance of customisation, the open innovation paradigm, and the role of communities as sources of innovation were performed also by other institutional players in Turin, such as the Polytechnic of Turin and some local tech companies. This more corporate-oriented spatiality for open innovation had resulted in the creation of other communities of Makers that have formed in synergy with start-ups, thus performing as a sort of external R&D division. The mechanism is made clear in the words of the founder of a startup-cum-community:

'We want to make robotics accessible to people, with mass customisation as a perspective [...] And open source communities, what should they do? This [pointing at the blackboard where he wrote down the business plan]: content, copy, create, implement, share. That is, you have a community open source that creates projects and it's here. But then, in order to feed it, you have to provide a content and make them copy and implement it, or encourage them to create contents [...] I'm happy if you create and then somehow I link the project you made to me' (Interview with Emanuele, founder of a Maker startup based in Turin, November 2017).

Focusing on the spatiality of knowledge allows also to acknowledge the role of other sites in producing knowledge variously connected to Making. Indeed, despite the initial success of the translation process that enabled to frame Making as the opening up of production and innovation to everyone – a success that resulted into the opening of Fablab Torino –, during the following the circulation of other theories on Makers and Fablabs has opened up a crack in the stabilisation of the actor-network as it was mobilised by the initial spokespersons. Indeed, as discussed in Chapter 1, an Italian discourse about 'digital craftsman' and the role of digital fabrication in revolutionising the profession of designer started spreading right after the Maker phenomenon became known outside the first small circles of tech-enthusiasts.

[4] As a matter of fact, Fondazione Brodolini supports the creation of two Fablabs in Milan. See http://www.fondazionebrodolini.it/en/projects/mhuma-milan-hub-makers, http://www.luiss.it/news/2017/11/06/nasce-milano-luiss-hub-makers-and-students. Last access: 21 August 2018.

[5] Retrieved from http://openincet.it/chi-siamo/. Last access: 10 August 2018.

'I can't stand the definition 'digital craftsman'! [...] because clearly, it's a marketing term which helped some specific persons to certify themselves as experts on Makers. [...] we were trying to do something and then there were some people who, from the outside, said: we're experts of that stuff [...] At a certain point in Milan, there were some designers who have started to call themselves 'Makers'. I had an argument with them [...] what you say about Makers has nothing to do with Makers, those are your problems as Milanese designers' (Interview with Massimo Banzi, CEO of Arduino, December 2017).

In Turin, theories on Making as an innovative approach to the profession of designers are strongly attached to some key institutional players. The main one is represented by the Polytechnic of Turin and its Industrial Design branch, here represented by Prof. Alfonso. Some years ago, he has started a partnership for one of his courses with Fablab Torino and Officine Innesto, where he brings his students to work on some Maker projects. Professor Alfonso explains the relevance of a Maker approach for the evolution of the designer's expertise:

'Especially in the production domain, micro-production and the ability to conceive and produce objects in variable quantity is one of the keys. Big industries are moving to the on-demand, but they cannot do it quickly [...] because they go against their very nature, which is the one of serial production [...] The Maker, the digital craftsman who wants to act now can do it right away' (Interview with Prof. Alfonso, lecturer in Industrial Design at Polytechnic of Turin, October 2017).

Conceiving as a *'risk'* the possibility that everyone could produce everything, the Professor highlights the importance of having some knowledge about product design, since *'free production for everyone is not democracy, it's anarchy'*. During the years, this understanding of the Maker as a hybrid figure matching design and craftsmanship through the use of digital technologies has been circulated in Turin also through an 'eventful geography' made of dedicated events. *Operae*, *Paratissima*, and *Torino Design City* constituted occasions in which people have learnt through artefacts and talks how digital fabrication could transform the process that leads from the design of a product to the actual production of a physical prototype.

Thus, during the following years, an alternative geography of economic performation has partially threatened the stabilization of the agencement where statements about the democratisation of production and innovation are made true (cf. Chapter 2). This partial clash between the two economic

discourses highlights the fact that «all knowledge, even scientific knowledge, is local» (Barnes, 2008, p. 1440). While knowledge about Makers developed in the US was moved to Turin through the mediation of some crucial intermediaries, this has not prevented the production of other theories on the phenomenon more connected to the socioeconomic context of a city – Turin – and a region – the Northwest of Italy – characterised by a strong tradition of industrial production and design.

Summing up, a spatial perspective on processes of economic performation with regards to Makers and Fablabs allows, on the one hand, to show how those performation processes always entail the co-constitution of a specific spatiality that sustains them and, on the other, to trace a geography of sites where knowledge about Makers is produced and reproduced. The circulation of immutable mobiles such as books and other literary inscriptions containing economic theories developed in the US context, the role of some key spokespersons, the exhibition 'Stazione Futuro', and other temporary events constitute the specific geography of economic performativity that enables the enactment of Making as democratised production in Turin. However, other local sites take part in these processes of knowledge production. While this results sometimes into sociomaterial arrangements that perform the opening up of production embodied by Makers in a more corporate-oriented way (such as the robotics start-up), the production of economic discourses that frame Makers as a sort of evolution in the profession of designers contribute to undermining the stabilization of the actor-network during the years.

4.4 Knowing how to make: performing knowledge, enacting spatialities

One of the advantages that are considered significant in attending a Fablab consists in the possibility to meet like-minded people with different competencies to draw from for one's own projects. This consideration implies a perspective according to which great relevance is ascribed to face-to-face contact and physical proximity. On the other hand, Makers are also depicted as belonging to a global community of peers, whose very existence relies on the possibility both to have access to shared information and to draw on common learning resources. This strong scalar point of view situates Maker knowledge halfway between globally-produced learning tools and data and locally-based opportunities to learn from others with more expertise.

However, as seen in the introduction to this chapter, focusing on knowing as a practice rather than on knowledge as a bounded and rationalistic object

allows to shed light on how knowledge is always performed, situated, and processual. Moreover, this practice-oriented analysis also reverses the relationship between space and knowledge commonly assumed in talking about the Maker Movement, thus substituting the assumption that knowledge is determined by a specific scale or spatial configuration with an interest to the way knowing 'how to make' contributes to enacting various spatialities.

The present section follows this performative and sociomaterial approach to knowing, identifying three categories of socio-technical agencements through which practices of knowing *how to* be a Maker emerge. The first one comprehends workshops and Fablab communities as collective spatiotemporal arrangements for learning. The second one is based on an individual engagement with both production and fruition of online learning resources, such as tutorials and documentation. The last one is constituted by the local event Torino Mini Maker Faire, connected to the global flagship event promoted by *Make* Media. The event is both a socio-technical agencement that creates the context in which knowledge about Making as an economically relevant phenomenon is made true (i.e., a site for economic performation) and a site for knowing. In addition, knowing practices emerging in the framework of the event are precisely part of the performation process elicited by the fair, that is, they contribute to performing and economizing Making. The following analysis argues, on the one hand, that knowledge on 'how to Make' emerges from a translation process that entails a topological spatiality opposite to the traditional scalar division between global and local and, on the other, that the enactment of Making as democratised production and new form of work is contingent upon the emergence of learning practices as part of an innovation process.

4.4.1 Knowing collectively: workshops and communities

> *'Everyone can come and is helped in realising his ideas. This means: I give you the competences to use digital machines or other competences, and we discuss the projects. Very complex projects often manage to be born within the space because sitting next to you, you find someone with completely different competences but who shares a lifestyle with you' (Enrico Bassi, former President of Fablab Torino, 2013).*[6]

[6] Retrieved from https://www.gravita-zero.org/2013/10/fablab-e-coworking-un-nuovo-modo-di.html. Last access: 10 August 2018.

'Well, I come here because I can find like-minded people...and I can learn new things from them. [However,] there's the need of someone who...who drags the others, who suggests things and... well, the members who hang out at the Fablab now, they're not very much... they're at the level of say... they are beginners. So, maybe they still have been learning Arduino, thus clearly they can't propose a project [...] [Whereas] when you propose any kind of training, you see that the chats explode: "I'm coming!!"' (Interview with Vincenzo, Fablab Maker, November 2017).

As part of the coworking ecosystem, one of the main values attributed to a Fablab is the fact of eliciting collaboration among people and having the opportunity to share knowledge and competences. Thus, the idea of being part of the same community is crucial not only in discourses on the Maker Movement but also in stressing the added value of working together in the same place. As Davies (2017, p. 81) highlights, learning is at the core of the community dimension of a Makerspace, since «this community is mutualistic and sharing, inspirational, and enables new connections between like-minded people. […] Essentially, this commonality is about […] doing, making, understanding, tweaking, learning, and sharing». The role of a shared space is understood as crucial in creating the possibility for knowledge to circulate and be embedded into specific projects. However, a change in perspective could reveal how a specific Fablab structures collective learning (cf. Ibert, 2007), thus emphasising how practices of knowing are always situated (cf. Latour & Woolgar, 1979).

Learning collectively is practised at Fablab Torino through two different agencements, that is, communities of people interested in the same topic and workshops. The various communities usually meet during the dedicated moment for gathering, that is, Wednesday night. Meetings at the Fablab are always preceded by a shared dinner at a restaurant nearby. After that, they open their laptops or pull off their 3D printers and mainly start to tinker with them. Usually, they exchange views about the technicalities of the machines, with neophytes asking for advice to the more experts.

However, during the years, the share of skilled Makers able to "drag the others" as said by Vincenzo in the opening quote became low if compared to the people attending the Fablab to learn how to use digital fabrication tools. The perceived lack of competences found at the Fablab by more expert members is an element that could threaten the stability of the agencement, wrecking the enactment of Fablab Torino as a place where innovation can flourish thanks to the production of new and valuable knowledge.

'Samantha: So, do you feel just giving your own competence away?

Vincenzo: Yes...after a while, you just have enough. I, well I don't think I am a super expert...but I've been working there for a lot of years, I've learnt some stuff... I've attended the Fablab for a lot of years and given a lot. [I've] received very little in terms of competence [...] I mostly don't find persons to have a conversation with who have the same or higher level [of competence]... where you say there's an exchange and maybe we can – even talking – have an idea and follow it through' (Interview with Vincenzo, male, Fablab Torino Maker, November 2017).

'Those figures of expert people who maybe can handle all the support [within the community] in case I am not there, they've never come out. Instead, it has almost become a bowls club for old people [...] And then they get offended if I tell them: well, it's been two years you're hanging out here, and still you haven't learnt how to replace the printer's filament??' (Interview with Agostino, Fablab Torino Maker, July 2018).

The way communities self-organise at Fablab Torino manifests features typical of what Grabher and Maintz call *connectivity networks.* Connectivity networks differ from 'project networks' and 'sociality networks' for their focus around specific themes, that is, the interest of members towards the know-how of a specific machine or technology. Thus, interactions are usually asynchronous, engaging one person with many others, such as in forums or blogs. Understood through this analytical lens, two of the Fablab communities investigated seem to reproduce the kind of virtual interactions of the online networks in which they are engaged, both through their meetings at the Fablab and via the chats on the dedicated Telegram channel. Therefore, being focused on the know-how of something, the kinds of relationships that are established at the Fablab are always fragile and bound to break apart when the needed skills are not available.

Figure 13. Community night. Photo from Fablab Torino Facebook page.

Another kind of knowing practice that performs Fablab Torino Makers as a community is shaped by the intense use of Telegram chats as tools to share useful information or to give on-demand advice:

'Tiberio: Hi Fabbers! Where can I find some CNC projects to make furniture? I'm moving and I'd like to make by myself the table, the bed...'
Paolo: Opendesk'

'Fulvio: Hi guys! Do boards (1-5V) that consume a little electricity exist?
Aldo: how little? Give us more details
[...]
Gabriele: What does it have to do? Does it have to communicate? With which technology? Does it have to activate something?
[...]
Fulvio: I would do it with an ESP and a relay. The deep sleep consumes little Ampere, I guess. But I don't know if it gets to make a cycle of 24h. I have temperature sensors that turn on every 20 minutes and send the data via Wi-Fi, with three AA rechargeable batteries it lasts 3-4 months' (Information exchange on two different Telegram chats).

Telegram chats are the 'material scaffolds' (Orlikowski, 2006) Fablab Torino Makers draw on to perform specific knowing practices. These practices pivot on quick and on-demand access to information that is favoured by the fact that what scaffolds them is a chat for instant messaging, thus strongly characterising these epistemic communities (cf. Knorr-Cetina, 1999) as

'connectivity networks', where 'easy access to information is decisive for [their] ephemeral and weak-tie character' (Grabher & Maintz, 2006, p. 7).

However, the Telegram chat could also be enrolled as useful 'scaffolding' of knowing practices that perform «project[7] networks […] driven by the complementarity of skills» (Grabher & Maintz, 2006, p. 5). An example of this is the Soft Making group, a new entry in the Turin's Maker scene gravitating around the Fablab. Born from the initiative of one of the members (Valeria) who spent one year attending both the activities of Fablab Torino and the Fabricademy program[8] in a Fablab in Milan, the group refused to call itself 'community' and to become part of the Fablab ecosystem, in explicit contrast with the *'help-desk approach of Fablab communities'*. Instead, they use the Telegram chat to share inspirational material or useful information related to the projects they are working on[9]. They also occasionally meet at Valeria's lab when eventually they have to work on the fabrication of a prototype or experiment with new techniques. Another occasion for meeting consists of a sort of informal lecture given by a Maker coming from out of town met by Valeria at the Rome Maker Faire.

'My dears, Massimiliano [N/A the biohacker] is in town, directly from Salerno, yessss! Let's meet one night at my lab with whom wants to have a chat on biohacking stuff! [...] We put him on the pedestal, he talks about bacteria and soggy filth and we all gawp at listening to him as the last time' (Message on Telegram chat of the group, 25th June 2018).

'We're sitting at the table. Valeria offers us beers and some snacks. Massimiliano asks her to let him see some experiments made with the new material, and then starts talking about that and the properties of another material. Valeria opens a notebook and starts taking notes. "Wait, wait, wait! No, cause he says names, things... and then I text him: what was that..? Can you link me..?". Massimiliano plays a video on his Facebook page: "Have you seen it?", Valeria: "Wooow! How does it work?" (Fieldnote, Valeria's laboratory, 28th June 2018).

The mediation of Valeria enacts a new sociospatial arrangement for knowing, which partially displaces epistemic communities of Making outside the Fablab while translating a private house, organic materials, and

[7] More on projects in Chapter 6.

[8] The Fabricademy, working along the same lines as the FabAcademy, is a 'a transdisciplinary course that focuses on the development of new technologies applied in the textile industry'. Retrieved from http://textile-academy.org/, last access: 13 August 2018.

[9] The group will be thoroughly analysed in section 6.3.

online tutorials into a device for the democratisation of production. This translation brings into being an eventful geography of knowing through which a new (temporary) spatial form of production and innovation is enacted. Thus, knowing practices entangle with the place in which they are enacted (the house), making it perform as a site for the democratisation of production and peer-to-peer exchange of knowledge.

In contrast with communities, a more structured arrangement for learning at Fablab Torino is represented by workshops. Workshops are usually run in a specific area of the Fablab. The room is furnished with self-fabricated yellow tables, a couple of closets used to cram various stuff into, and a messy workbench, where usually electronic stuff and Arduinos are stored. A projector sheet and a whiteboard are employed in support of the workshops.

Figure 14. Fablab Torino's wall of fame, workshop area. Author's photo.

The organised workshops are both for payment and free, the first ones being organised once in a while and focusing on very specific topics, such as the implementation of a wireless technology for the Internet of Things (IoT) or the creation of an IoT lamp. The second ones consist in weekly workshops held to introduce members to the use of the machinery provided (i.e., 3D printing, laser cutter, CNC milling machine, vinyl cutter, Arduino) and called 'Hello World!', thus recalling the tradition of using the same phrase in computer programming as the first test, an explicit geek reference. Indeed, even before the opening of the Fablab, some preludes of this practice of knowing through workshops were already there and they traced a spatiality very different from the one made of coworking spaces and incubators that is usually

associated with economic theories on Makers and Fablabs as part of a broader ecosystem made of innovative and collaborative spaces for work.

'Me and Costantino, we met in 2008 and we started organising these events in Milan [...] We kind of imported this event called Dorkbot, which is an event that was born in 2000 in New York I guess, and it was a way for local digital artists to show their creations [with electronics] [...] I think that the Makers' world in Italy has intersected frequently with the kind of people who used to hang out at centri sociali.[10] *' (Interview with Massimo Banzi, December 2017).*

'I did my bachelor's thesis on Arduino [...] I got quite involved so that I attended this workshop held by Banzi at that cafe...Caffè Basaglia,[11] which was one of the traditional places we used to meet at. There, I met Giorgio, who's now one of the pillars of the Fablab [...] At that time, I used to live in Volpiano, and he and another friend used to come over and spend the nights playing around with Arduino' (Interview with Bruno, male, Fablab Maker, June 2017).

*'I looked for associations dealing with Arduino, electronics and I found that one...I don't remember the name. From there, they brought me to another association-*centro sociale*, called* Underscore*, at Gabrio' (Interview with Agostino, Fablab Maker, July 2018).*

This relation with the world of independent cultural production and politically committed organisations seems still alive in the current management of the Fablab. Indeed, some workshops have been held at Bunker, a cultural centre opened in a former industrial building, and other members have individually organised workshops for an independent music festival at Cavallerizza (a self-organised space for independent cultural production)[12], for a psytrance festival in Hungary, and also individually attended workshops held by Mozilla in Goa. The practices of knowing performed by some Fablab Torino members, build up a spatiality of Making that is alternative to one made

[10] *'Centro sociale'* (lit. social centre) is usually employed to refer to a self-administered collective space, sometimes illegally squatted, connected to either an anarchist or left political tradition. These organisations host various activities and services of public utility and they are imbued with a strong political awareness.

[11] Caffè Basaglia is affiliated to ARCI, the biggest network of Italian associations involved in cultural production.

[12] For more information, see https://cavallerizzareale.wordpress.com/. Last access: 10 March 2019.

of incubators, manufacturing sites, and spaces devoted to boosting innovation and entrepreneurialism. These findings stress the fact that some of the knowing practices performed by Fablab Torino Makers enact a spatiality in which the Fablab is enrolled in an urban assemblage of independent cultural production and is also connected to spaces where technological DIY practices are associated with a strong political trait. This highlights once more that geographies of Makers knowledge 'are not pre-given, but are constituted by weaving together the particular [...] and the general [...] through situated practices' (Gregson et al., 2002, p. 607).

Besides these workshops autonomously run by Fablab Torino, a specific kind of learning opportunity provided by some Fablabs is the Fab Academy, the educational program on digital fabrication delivered internationally by the Fab Foundation. The Academy has a fee of 5,000 euros and is structured in modules, each one dealing with a specific practice of Making or a digital fabrication tool. At the end of each module, an assignment has to be submitted, eventually becoming part of the final project delivered (and documented; cf. next section) for obtaining the diploma. Classes are delivered by Prof. Neil Gershenfeld, the founding father of Fablabs, together with local mentors who have previously attended the program. Indeed, as can be read on the Academy website, it is a 'distributed educational program', where local nodes and mentors are connected globally by the sharing of contents and interactive video classes.[13] This distribution is enabled by a material infrastructure made both by the machinery provided (see Chapter 5) and the very mundane intermediation of laptop screens. The relevance of the screen emerges in the words of a Fablab Torino member who has attended the Academy in 2016 and was in charge of presenting the program for the forthcoming years:

'There's this huge screen, with Neil's big face in the middle, who tells you this and that, and then there are all those boxes around, which randomly pick one of the webcams of the various Fablabs. And then, if you ask to speak, you turn on your microphone and you are framed. And you are in the middle of this world of people [...] entering in this network of people from all around the world that...if you have a problem, you email them: guys, this doesn't work...' (Fieldnote, 5 December 2017).

'Neil [...] picks up randomly a person. He asks to present the project, then he picks up another one, and it goes on like this for an hour and a half' (Interview with Paolo, Fablab Torino Maker, July 2018).

[13] Retrieved from http://fabacademy.org/about/diploma/. Last access: 17 August 2018.

The screen is a crucial component of a socio-technical arrangement that actualises the global community of Fablabs as an epistemic community (cf. Knorr-Cetina, 1999) that heads to the incorporation of those knowing practices into agencements for the production of value. The screen is fundamental for eliciting the creation of a 'we-relation' and a 'community of time'[14] through the performance of a real-time conversation and exchange (Knorr-Cetina & Bruegger, 2002). In this way, in the years when the programme was activated, Fablab Torino performed as a necessary node for a certified Maker expertise to circulate, since the performance of this highly specialised knowledge about digital fabrication and independent production establishes a connection between Fablab Torino and an international, dispersed geography of labs and Makers. Indeed, the screen is the kind of 'mobile machine' that embodies the requirements of co-presence; «to inhabit such machines is to be connected to, or to be at home with, 'sites' across the world—while simultaneously such sites can monitor, observe, and trace each inhabited machine» (Urry, 2004, p. 35).

However, during the 2016 edition of the Fab Academy at Fablab Torino, only one person out of five was a complete neophyte of Making, while the others were already somehow in the field, being either designers, architects, or engineers. Moreover, for both the years 2017 and 2018, Fablab Torino failed in attracting people for the programme, thus not activating it. This was mainly due to the high cost of it, a problem that in the past was usually overcome through the availability of scholarships funded by external institutions[15]. The actual impossibility to start the programme and enter a sociospatial pattern of knowing 'how to Make' connected to the official Fablab network undermines the capacity of Fablab Torino to perform as a site for skilled digital personal fabrication.

Despite this recent failure in hosting the Academy, during the past edition the availability of scholarships not only allowed for the successful enrolment of Fablab Torino in an international epistemic community, but it also enabled the enactment of a connection point between Fablabs and firms, through the displacement of learning practices out of the firm.

[14] This is particularly evident in the words of one former student: *'[The Fab Academy] is something that is done all over the world, at the same time. Usually, it's Wednesday, 9am, Boston time. Thank God, here it's 3pm. But if you live in New Zealand...you have the Fab Academy at 2am!!'.*

[15] One of the members thus decided to enrol in the Academy hosted at one Milanese Fablab now run by a former manager of Fablab Torino.

'My company asked me to attend the Fab Academy, two years ago [...] The interest was to train someone of the Institute [A/N Istituto Superiore Mario Boella, the research centre the interviewee works for] in fabbing skills, in digital fabrication. And, there was some money - given by I don't remember whom - to train an employee. And they chose me because I used to tinker with those things already' (Interview with Carlo, Fablab Torino Maker, November 2017).

Both the Fab Academy programme and other knowing practices could open up a conduit between firms and Fablabs that economises practices of Making by translating them into the realm of manufacturing. Thus, learning through workshops could also perform the opening up of firms belonging to the traditional manufacturing industry characterising Turin's economy and research institutes too to the innovative contribution of independent producers. Workshops can thus be used as devices to elicit the coming into being of a new spatiality of open manufacturing and open innovation, where associations are traced among Fablab, firms, innovative machinery, and knowing practices.

'The thermoforming season is officially open at FablabTO! The WL3D friends lent us a thermoforming machine which is going to stay at the lab till November and we've been already playing around... To start experimenting, tomorrow take part in Termoformania! Basic workshop of thermoforming - *the event is part of the* EMW – European Maker Week*!' (Post on Fablab Torino Facebook page, 25th October 2017).*[16]

'Nicola shows me a black plastic sheet, impressed with the shape of a mouse. He tells me he's playing around with a new machine. We move to the Fablab Pro to see it. Here, Alessandro is testing it, a thermoforming machine, as they explain me. Alessandro tells me the firm that has loaned it to them is trying to convince them to buy one' (Fieldnote, 23rd October 2017).

'Barbara: There's this new Kuka robot, they loaned it to us, there will be a workshop to learn to use it... With costs fixed by Kuka, cause they are the providers. So, basically, it is as if we rent them the space [...] Who's coming to the professional workshop, just a little part of them will be made by Fablab users. And this doesn't mean that these users may use it freely.

[16] Retrieved from https://www.facebook.com/fablabtorino/videos/1789677471106744/. Last access: 12 August 2018.

Samantha: But why does Kuka give a robot to a Fablab..? Why don't they do the workshop at theirs?

Barbara: By the way, they're opening in Grugliasco [N/A nearby Turin]... Well... probably, in order to have the entrance from the Fablab enrolments, to drag also the Fablab community, which is their target, anyway' (Interview with Barbara, Officine Innesto member of staff, June 2018).

Theories on open innovation and independent production are thus made true through the construction of a context (i.e., the workshop) for knowing 'how to Make' that enhance the possibility for new technologies to be adopted and used autonomously. In this way, new geographies of innovation may come into being via knowing practices that are upheld by the physical displacement of machines from one space (the firm) to another (the Fablab).

4.4.2 Learn-it-yourself: from tutorials to documentation

'Hi, Giacomo! On this chat, we usually post a welcome video for the newcomers. Something found online that is related to their main interest. Here it's yours! Enjoy!'

'Valeria: If you have any ideas about it (and a link to a tutorial maybe! [embarrassed emoji]) it's now or never!
Edoardo: but why necessarily tutorials? Inventing the robotic systems is the funniest part! [laughing emoji] Which includes sleepless nights, but anyway...
Sergio: the problem is the time between the beginning and the end, especially if you have a deadline
Valeria: well, we have tons of sleepless nights to make available, but we need someone who guides a little bit the process on the technical side. Especially in learning what to do and how. Or, we're going nowhere [smiling emoji]
Edoardo: I can help you!' (Fieldnote, messages exchanged on a Telegram chat).

Tutorials epitomise the approach to knowledge that distinguishes not only Makers but also a general engagement in learning which pivots, on the one hand, on Internet-based interactions and, on the other, on a task-orientation. Sometimes, it could also happen that during a community night at Fablab Torino, people look for tutorials online instead of asking other members. And scrolling the congested chats of the communities is like a steeplechase

through the hundreds of links posted by the members. Sometimes, they do not even introduce the post with some words; the link and its preview are simply thrown in the middle of a conversation, as a sort of self-evident interesting source of learning and inspiration. Either if a group is working on a project or out of mere curiosity, the practice of sharing tutorials (either video or written ones) with the other members of the chat is a common knowing practice among Makers. Dedicated websites are highly used, but people have also personal preferred channels, such as Facebook groups, online forums, and random Youtube videos. Sharing or following online tutorials do not merely represent a way through which already existing Maker niches exchange or access knowledge; rather, this knowing practice performs those very Maker niches. Indeed, the latter come into being also through the sociomaterial arrangements constituted by links to tutorials, Telegram chats, and a form of sociability heavily reliant on instant messaging.

'Francesco: Hi! Friday morning question. I have to transform a chaos of sketches into a library (Arduino). I've started reading https://www.arduino.cc/en/Hacking/LibraryTutorial and https://www.arduino.cc/en/Reference/APIStyleGuide. Is there any other document/resource that could be of any help to me? Tips?

Bruno: There's also this old tutorial on the playground https://playground.arduino.cc/code/library

Bruno: My advice is to take some libraries and look at how they do everything'

'Luciano: https://mitxela.com/projects/etching_pcbs

Oreste: Wonderful! I want to get to make something similar with the 3D printer, filament extruded on copper and then bath in acid'

(Fieldnote, messages exchanged on a Telegram chat).

As the opening excerpt from the field notes exemplifies, tutorials enable a process of simplification of usually highly complex practices. Indeed, 'the circulation of tutorials, information and skills [...] seems to show a trajectory of popularisation of hacking practices, which implies both a simplification of the technical skills required to perform this practice and an overall change in the cultural codes, discourses and communication channels involved in its circulation' (Magaudda, 2012). However, this simplification of knowledge clashes with the expertise of someone who is more attuned with hacker practices of modification of products and fabrication of new ones on the basis of one's own skills.

Technology-oriented tutorials enact a form of knowing through which the Maker is enrolled into a global ecosystem of knowledge, «a spatial extension of intelligence» (Thrift, 2006, p. 291) that aims at boosting the invention process. For what concerns Makers, tutorials but also simple videos are a crucial device in new time-space arrangements for innovation: sometimes intertwined with the practice of sharing, links to videos, tutorials, and pictures act as a 'material scaffolding of knowledgeability' (Orlikowski, 2006), which is enacted to trigger inspiration and, at the same time, performs a new spatiality of innovation. This space is, indeed, performed through the association between distant Makers, different sites for Making, learning materials, and DIY endeavours. As claimed by Thrift, these knowing practices 'boost an invention process' and, therefore, are economised as soon as they converge towards practices of comparison with not only other amateurs but also professionals.

'Valeria: Soft Making is also parametric design and with Iris van Herpen [N/A a Dutch fashion designer] there's enough to feast your eyes https://www.facebook.com/hautecoutureweek/videos/2022394521138957/

Giancarlo: All undemanding everyday stuff! [laughing emoji]' (Fieldnote, messages exchanged on a Telegram chat).

The Maker as an independent producer and innovator emerges here through the assemblage of a socio-technical arrangement in which she entangles with knowing practices that, pivoting on comparison with the work of people who engage in that activity for their job, inevitably elicit the desire to make something of the same level and new, thus, to innovate.

The mere access to pieces of code, recipes for bioplastic, DIY guidelines is sufficient to elicit practices of Making that pivot on knowing-as-copying. This is also a form of circulation of knowledge typical of Makers, in which the access to information is sufficient to trigger someone's desire for making. However, this process of enacting innovation starting from tutorials and other online learning material does not always succeed. Sometimes, tutorials become no more than triggers for a copy-paste practice of knowing, thus failing in performing as part of an innovation process.

'Unfortunately, very often this Maker vision and, let's say, the Maker way of building stuff and writing code make things a little bit...let me say...rough. I mean, very often someone starts in a hurry of making something and does it by picking some pieces of code founded online from other Makers, who in turn maybe have copied from someone else. And you often don't understand what you're writing and why you're writing it in that way. And the result is

that online you find a lot of pages, a lot of information material, kilos and kilos of code which are not...let's say, wonderful' (Interview with Carlo, Fablab Maker, November 2017).

Indeed, as seen before, knowing practices should be translated into texts and other 'literary inscriptions' (cf. Latour & Woolgar, 1979) in order to become mobile. Hence, the relevance of documentation for Makers, which makes the knowledge behind that project mobile. Projects are usually documented through Github, an online platform that hosts open-source projects, recently acquired by Microsoft. Some of the members of Fablab Torino independently collaborate to an open source project of a 3D printer firmware through the Github platform:

'Agostino: For the development, you use this kind of tools, like Github for example [...] This is the one of the firmware. [...] It's all about sharing, so at the software level too, I can easily create a fork (it's called in this way) from this project - you create in your Github space a copy of this and from now on, you can work on your fork...without contributing to this...creating your own version. And then maybe in the future, you decide that your fork can be added to the main repository' (Fieldnote, chat with Agostino, Fablab Torino Maker, 25 October 2017).

Once more, a material scaffold – i.e., the platform[17] – is necessary for the successful enactment of Makers' knowing practices. Even if the project or an implementation of an already existing one is bounded for its development to a specific material and situated context, the provision of detailed documentation on the whole process allows the creation of an epistemic community that participate in the same practice through the interrelation of distant places and individuals.

Considering that 'innovation is more likely to occur if actors manage to connect elements from practices that belong to different places' (Ibert, 2007: 109), it is not surprising that the role of documentation is particularly valued at the Fab Academy. A crucial part of the whole process is constituted by documenting the project through the creation of a website hosted on the Fab Academy's platform.

'Documenting is crucial because if you haven't documented properly, then you'll have to start over. [...] They give you tons and tons of datasheets

[17] More on platforms in Chapter 6.

[...] and they teach you especially to document, which is extremely important!' (Fieldnote, 5 December 2017).

The importance of sharing the documentation of a project is one of the pillars of the hacker culture Makers are buying into. Indeed, the open source mission relies precisely on the availability of free information on projects, techniques, or machinery. However, the practice of documenting has become secondary among Fablab Torino users: indeed, the documentation that can be found on Github mainly regards projects that were developed in the past years. The lack of documentation is thus a signal of the partial failure of Fablab Torino in acting as a device for the enactment of a Maker culture that pivots on the production and sharing of knowledge, as confirmed by one of the more active members:

'Samantha: Has it ever been organised a workshop on how to document a project?

Paolo: On documenting, no. On Github, yes. But no one showed up. But it's a tricky subject because people think it's difficult and useless. Actually, if you're a Maker, either you already know how to do it 'cause you know the importance of doing it, or you don't have time. For example, I already know how to do it, but I've learnt it step by step... plus, it's a subject that is not even easy to explain, neither to me it's so clear...nor for whom uses it often. You know that you have these commands that do these things and as long as you do them, it's fine. But as soon as you have a problem, it's difficult to understand where you did wrong... So, it's kind of a boring subject, a little bit snubbed, few people do it.' (Interview with Paolo, Fablab Torino member, July 2018)

As seen in the previous section, sometimes the acquisition of a new piece of machinery triggers the organisation of dedicated workshops, thus making knowing practices the connecting point between firms and both amateurs and professionals gathering at the Fablab. New machines contribute to the performance of another knowing practice, that is, the crafting of online reviews of the product.

'Michele, Alessandro and Sonia activate the 3D printer. It is new and shiny, never seen it before. It looks different from the others on the table, seems a more professional one. Alessandro: Yes, I would say that if we want them to give us the thermoforming machine, we should be a bit kiss-ass... [...] Michele: the target will be the Fablabs users, right? We explain to them

how to use the machine... Alessandro: Yes, we make this video for our members but also for the other Fablabs.

They start shooting the video. Alessandro: Hi! Everyone knows XX, the firm that has provided us and other Fablabs with the laser-cutters. They now have a branch of 3D printers too and they gave us this one to test...' (Fieldnote, 25 March 2017).

In this way, Makers knowing practices buy into another digital practice, the so-called 'unboxing', that is, filming oneself while taking a product off the package, testing it for the first time, and uploading the video online.[18] Two Fablab Torino members are recruited for the unboxing of a new robotic arm; then, the video is uploaded in streaming on the Facebook page, tagging the firm producing the robot too.

'Paolo and Tiberio open the box containing the robot and pull out all the components, explaining what they are and arranging them on the table so that the phone camera could shoot them easily. They start reading the manual, then assemble the robotic arm and try to use the software' (Fieldnote based on the Facebook video, 11 January 2017).

The Fablab could thus become a site for consumers to perform as producers through the creation of a specific agencement made by Makers, new machinery, and communication technologies. This agencement acts as a site for the democratisation of production inasmuch it not only displaces the machinery physically, but it also displaces the knowing practices associated with its use. At the same time, these actor-networks enact a transformation in production through which users contribute to producing knowledge on new technological products and industrial machinery and to advertising them.

Concluding, in all the previously mentioned examples, communication technologies are crucial in scaffolding Makers' knowing practices, creating a space that overcomes territorial boundaries, a space made of relations and material mediators. Smartphones, laptops, platforms for sharing enable the creation of relations among distant actors, making the absent present, the distant close (Callon & Law, 2004). Tutorials and extended documentation represent the way knowledge is transformed into *inscriptions*, thus becoming able to circulate.

Knowing 'how to Make' is distributed among Makers, tutorials, smartphones, repositories, lines of code, Telegram chats, Fablab, private

[18] https://www.theguardian.com/technology/shortcuts/2014/jul/21/unboxing-youtube-phenomenon-videos-unpackaging-toys. Last access 18 August 2018.

houses, etc. Far from questions on proximity, what emerges is that *presence* do not always imply face-to-face interaction and physical co-presence (Callon & Law, 2004). The heterogeneous sociomaterial arrangements described enact spatialities of knowing in which the Fablab is not always an obligatory passage point (Callon, 1986b; 1987), being sometimes only a marginal actor, inasmuch Makers' knowing practices rely mainly on different intermediaries.

4.4.3 The event: Torino Mini Maker Faire

'I'm standing at the Info point, greeting visitors and exhibitors. I give Makers their badges and info on where their booth is, then I make them sign a paper of presence. When visitors come in, I welcome them, gifting a balloon with Make*'s logo to the kids and a pin to everyone. The pin says: we are all MAKERS'*
(Fieldnote from TOMMF 2018).

Pursuing the line of investigation traced in the previous sections, the present one investigates another site in which paying attention towards practices of knowing rather than knowledge could reveal more on the way Making and a Maker scene are enacted. Indeed, besides the unquestionable role of communication technologies discussed in the previous section, recent works in economic geography have emphasised the relevance of temporary co-presence for the production of knowledge (Grabher et al., 2008), as briefly discussed in the introduction to this chapter. Investigating this topic, economic geographers have pinpointed trade fairs and other similar events as crucial elements in the spatiality of the 'knowledge economy'. Conceived mainly as 'temporary clusters' (Bathelt & Schuldt, 2008), these events have been investigated as sites where the temporary gathering of people in one place favours both the production and the circulation of knowledge. The gathering of usually dispersed professionals and firms within a unique spatiotemporal framework is said to enable the circulation of different kinds of expertise through the establishment of temporal relations among otherwise distant agents. This literature plays with the importance usually conferred in economic geography to the role of proximity. Thus, events are said to enable the circulation of knowledge precisely thanks to their capacity of facilitating face-to-face interactions.

However, this kind of research underplays the relevance of performances and performativity in the relationship between knowledge and the event itself. Indeed, «the literature on the geographies of knowledge, while

illustrating the spatiality of knowledge practices, misses understandings of how this knowledge is performed and performative» (Cranston, 2014, p. 1127). In an economic performativity framework, events such as fairs could be read as socio-technical *agencements* that take part in making economies.

Following the path traced in the previous chapters, the section moves to consider an event such as the Torino Mini Maker Faire (TOMMF) as a site where on the one hand, knowing enacts Maker practices as a democratisation of production and innovation and, on the other, it performs an urban Maker scene. There are two ways in which knowledge could be analysed at TOMMF: first, and more attuned with the literature on trade shows, there is a concern with knowing practices on *how to Make* performed by Makers; second, knowledge *about Making* is shown to be performative, bringing into being a 'Maker economy' in the city. These two practices are interlinked, as will be discussed.

Figure 15. TOMMF leaflet.

As anticipated in Chapter 1, the first Maker Faire was organised by *Maker Media*, a division of the American *O'Reilly Media* company, in 2006 at San Mateo, California. The event has been growing and spreading worldwide ever since, giving rise to a family of smaller local events called Mini Maker Faires, organised independently under a licencing program of *Maker Media*. The TOMMF has been organised every year since 2013 by Fablab Torino and hosted in the premises of both the organisation and Toolbox Coworking.

The event is free of charge for both exhibitors and visitors, and it aims at celebrating creativity and invention, 'gathering tech enthusiasts, crafters, educators, tinkerers, hobbyists, engineers, science clubs, authors, artists, students, and commercial exhibitors'[19]. The official website of the Maker Faire defines the event as 'the Greatest Show (and Tell) on Earth – a family-friendly festival of invention, creativity and resourcefulness, and a celebration of the Maker movement'[20].

This family-friendly feature is a necessary element in performing innovation and personal digital fabrication as something within everyone's reach:

'A group of people, many of which kids, gathers at the entrance of the first room. Suddenly, I realise that there's loud music playing from some part of the fair. I cannot really see what's going on at the centre of the small circle formed by those visitors, but I can see many of them taking pictures. I reach them, trying to peek through the wall of shoulders, and suddenly I see: there is a humanoid robot, 50 cm tall, doing push-ups at the rhythm of the music. It finally ends the performance and raises its arms in the act of celebration. Everyone claps for that' (Fieldnotes from TOMMF 2018).

As the opening excerpt from the fieldnotes briefly shows, the TOMMF contributes to opening up and democratise production and innovation by translating them into the private realm of family weekend activities. The link between innovation and the private dimension of the family is enacted, making production (apparently) within everyone's reach through the acts of showing, explaining via simplification, testing, and making the prototype perform.

Besides the fact that it is a fair open to everyone and explicitly targeted to families, the TOMMF is mainly an important moment for Makers in Turin, since the event enacts Makers as a community of people recognising themselves for doing similar things, thus being an almost 'obligatory passage point' (Callon, 1986b; 1987) in the city for being recognised as a Maker. However, during the years, the fair too has changed.

'Well, I think that now [the TOMMF] is less entrepreneurial. The first years, I used to go home with a bunch of business cards, now there are no stakeholders around... but you know, you have to be here, to show up, it's a moment for us to gather, to feel us, to see us as a group' (informal chat at TOMMF 2018 with Riccardo, President of a Turin's Makers community).

[19] Retrieved from https://makerfaire.com/makerfairehistory/. Last access: 21 November 2018.

[20] Retrieved from https://makerfaire.com/makerfairehistory/. Last access 2 August 2018.

The Maker Faire is 'the greatest show of all', as its advertisement claims. But it is also a place to show up (and show off), as in the words of this Maker. The coming together of people at the annual TOMMF is important for various groups or independent Makers in Turin to perform their activity as Makers. It is a show, thus one could be tempted to indulge in the immediacy of Goffman's notion of performance as the playing out of roles by pre-existing subjects. However, as previously outlined, I argue for understanding events such as the TOMMF as socioeconomic arrangements in which practices, subjectivities, cultures, and economies are actively brought into being through temporary and contingent performative endeavours.

Maker Media is the actor from 'economics at large' that plays one of the main roles in performing a Maker economy through the organisation of a Mini Maker Faire. This theorisation interacts with the specific sociomaterial arrangement encountered in Turin, thus creating an emergent, contingent, and situated performances of a Maker economy.

'Samantha: The TOMMF...how does the organisation work?

Barbara: It's a format of events, so you have to submit a formal request to Make*, who has to guarantee you the possibility of doing it. There's a fee that has to be paid - which has risen to 5.000 euros, it was 2.500 last year, by the way...*

Samantha: But they give you more...

Barbara: No, for the moment it's still the same. It's that they've become cooler, so... At that point, they give you the logos, the official graphic material, the website too is designed by them, it's standard and you have to comply with it. Then theoretically, before posting any contents, you should wait for them to approve it. But with an 8-hour difference, it wasn't feasible. Unfortunately, starting late [to organise] and without a big team working at that...' (Interview with a member of the TOMMF's organisation team, June 2018).

The official discourse on Makers enters in Turin through the very 'things' (Cochoy, 2007) that take part into the production of the socio-technical system making the TOMMF: branded materials, logos for online marketing, and the payment of a fee are all constitutive elements for the construction of the local event as an official counterpart of the flagship one. Together with this preparatory work, the branding of the event is all aimed at conveying that Making equates grassroots innovation. A long banner on the street welcomes the visitor to the *'Festa dell'innovazione di strada'* (that is, *Festival of grassroots innovation*). At the entrance, volunteers welcome everyone with a pin

reporting the motto ‘We are all Makers’, while kids are given a balloon, either blue or red, the two flagship colours of *Make* and Maker Faires.

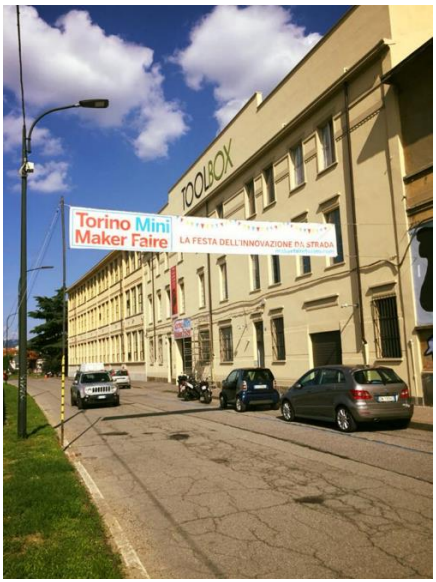


Figure 16. TOMMF banner. Author’s photo.

On the blueprint of the first Maker Faire and the network of events spread worldwide, TOMMF offers the visitors a full program of talks. The topics are various, covering issues more related to the global Maker Movement, themes specifically connected to the city, and subjects related more generally to technological innovation. The ‘Talk Area’ is situated in a lateral room of the coworking space, usually devoted to start-up pitches, conferences, and similar big gatherings. Small colourful armchairs are arranged in a semicircle in front of other armchairs and sofas destined to the speakers. Behind them, two huge projector sheets show the title of the talk, with the typical red and blue graphic design of *Maker Media*. Even if usually attended mainly by people variously belonging to the Maker ecosystem rather than visitors, talks are a powerful instrument in enacting Making as the harbinger of an innovative and democratised approach to production.

‘For the first time, the West is picturing - thanks to you [N/A the Makers] too - that we should bet on manufacturing, on the winning union between manufacturing and the digital, because rediscovering production in the West makes sense. There’s a change of economic paradigm*: a shift from an*

economy of scale to an economy of multiplicity and customisation*. [...] The solution has to be invented with a little bit of bravery. That's why I like thinking that innovation could come from Fablabs, from their 'uncombed innovation' [...] the first solution is throwing down the walls, the firm's walls too. [...] For example, (let's say) I need a piece of your competence to innovate the rebar industry. I don't need you to come to the R&D office of the rebar firm, I need to be able to build an* open innovation *system, though. That could really come in Italy, which is a world that is really* the long tail *[...] That's why I'm interested in* the philosophical model of collaborative and grassroots production*' (Paolo Manfredi, Confartigianato Torino[21], speaker at the talk* Industria 4.0 e le tribù dei Makers*, TOMMF 2017).*

'...the sharing of spaces and know how to respond to collective needs. [...] in some parts of the city, some organisations have been starting to build up a system in which the sharing of knowledge and skills [...] is somehow also becoming an innovation capacity, passing from technological innovation to social innovation. [...] Torino has actually a very strong specificity, that is, production. This as long as the situation, firms, and the vision capacity of the city remain permeable' (Marco Giusta, Council member of Turin Municipality, speaker at the talk Spazi creativi*, TOMMF 2018).*

These pieces of talk contain in a nutshell all the elements usually portrayed as pillars of a Maker economy: the reliance on an open system, where knowledge and innovation can flourish everywhere, not only within the walls of the appointed institutions, thus becoming 'grassroots'; the epochal transformation that these changes represent for 'the economy' as a whole; the ethos of collaboration; and, even more explicitly, the reference to the 'long tail' (i.e., selling less of more, a new market derived from the production and selling of more, customised, and unique products, in contrast with the Fordist model of mass production) that Chris Anderson (2006) claims to be the market model of the future. Theories on the transformation of production processes Makers allegedly take part in are practised through the talk, thus not only conveying a representation of these transformations but actually contributing to actualising them, since «this knowledge is based on the performance of people and is in itself performative» (Cranston, 2014, pp. 1126-1127). Indeed, the very presence of some of the key figures of the Maker Movement embodies the circulation of economic theories that identify in Makers a new revolutionary subject able to bring a bottom-up transformation to the economy. Both the talk by the CEO of Arduino Massimo Banzi in the

[21] Confartigianato is the General Federation of Italian Artisans and Craftsmen.

2017 edition and the one made by the director of the Fab City project[22] Tomas Diez in 2018 perform the advent of a global community of peers that play a crucial role in transforming the spatial forms of production, triggering a small-scale, urban manufacturing.

This theorisation of Makers plays with an Italian discourse that relates the phenomenon to a transformation within the profession of designer. As seen in section 4.3, this discourse equates Makers with so-called *artigiani digitali* (i.e., digital craftsmen), a definition that aims at highlighting the new potentialities offered to designers and traditional craftsmen by digital fabrication tools. Here, the reference to grassroots innovation, sharing, and prosumption have almost disappeared, making room for reflections focusing on the evolution of the job. In the 2017 edition, this knowledge is circulated through a talk aimed at promoting a project born out of the festival *Torino Design of the City*, a lateral event of the World Design Organization General Assembly, which adds to other local events dedicated to design[23] in which Making and DIY production have gained visibility. The project presented at the TOMMF was launched by Fablab Torino, a local association of designers, Turin Chamber of Commerce, and the local Confartigianato. It aimed at aggregating Makers, designers, and craftsmen in order to innovate both the design process and the final projects thanks to the use of digital fabrication machines.

This alternative and almost exclusively Italian vision of Making generates frictions in the performative enactment of the discourse on Makers as *grassroots* innovators, triggering a sort of balancing force that aims at adjusting those deviations, taking them back on track through the broader discourse on innovation in production *tout court*.

If talks are mainly addressed to 'insiders' of the Maker universe, the occasional visitor rarely stops to listen to the talks, preferring instead walking through the booths and stopping by to ask for information or simply peeking at the prototypes. During the 2018 exhibition, many booths were occupied by students from the Polytechnic and the prototypes they made as assignment for the exams. A smart system to visualise indoor air quality, a recycling paper machine, bioplastic cups, a distillation system for saltwater are just some of the prototypes developed by the students and exhibited at the fair. Thus, through the practice of showing and explaining the projects at the fair, the democratisation of production is actually performed. At the same time, the booth acts as an economisation site (Kear, 2018), transforming those university projects into hypothetical prototypes to be sold on the market.

[22] https://fab.city/

[23] For example, the exhibitions *Operae* and *Paratissima*, both dedicated to the world of independent designers.

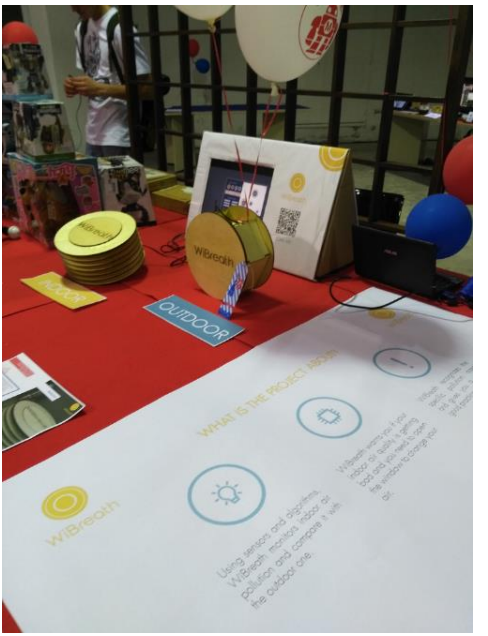


Figure 17. TOMMF 2018, Polytechnic student's project. Author's photo.

Thus, the TOMMF could be also an occasion for Makers to measure their work, sometimes with other amateurs, sometimes with more expert endeavours as the students' projects represent.

'[I attend the fair] to see new things, to have a look at what's around, what other people do, in part for inspiration, in part to understand what you can do. I mean, if you do something but there are other ten doing the same, you say: let's change the subject, let's not do the same. Instead, when you see always new things, you can get inspired or give feedbacks [...] I don't know, also to see what other people think about what you do...' (Interview with Paolo, Fablab Torino Maker, July 2018).

'Definitely, you have the incentive of comparing your work. This thing, I show it to you, but if I put it among ten of those, is it first or last? Not as a competition, but to measure you against reality, actually...' (Interview with Damiano, Maker, July 2018).

Thus, the booth represents the sociomaterial arrangement through which a Maker's competence becomes tangible, via a mundane practice of benchmarking. As the above quote shows, (informal) benchmarking such as

'measuring', 'comparing', and 'getting feedbacks' acts as a calculative practice (Callon, 1998) through which Makers compare their efforts to the ones made by others in order to both learn from them and test the quality of their own projects. The booth becomes itself a site for the economisation (Çalışkan & Callon, 2009) of Making, an entanglement of practices and materiality through which both a calculative agency is constructed and one's performance as Maker is tested against the actual possibility of transforming it into an entrepreneurial activity.

'[The participation at the fair] allows you to see if this can become a job. If people come to your booth, if they are interested...if you can *set up a booth at all! At the beginning, no one taught us anything, this should go like this, this like that [on the booth]... Then you make mistakes, you learn, and experiences come out that you can use in other fields [...] You learn how to present and convey your idea, you have it clearly in your mind but how can you pitch it to people? We invented a sort of poster. Five days before the fair, we made these A2 posters, so that lazy and shy people too could get to know about the project' (Interview with Damiano, Maker, July 2018).*

People 'getting to know about the projects' are a crucial part of Makers' performance at the fair, since the democratisation of production is brought into being by the very acts constituting a performance in the sense of bodily practice. The booth acts as a device that coalesces Maker-exhibitor, visitor, and prototype in performing Making as the democratisation of production, as an economic innovation.

Figure 18. TOMMF 2018, booth. Author's photo.

Concluding, TOMMF acts as a device that performs a Maker scene in Turin while also economising practices of technological DIY and related knowing performances. More than being an event in which already existing Makers gather to show their creations, the fair actually contributes to bringing into being a Maker economy and an urban Maker scene by giving temporary stability to otherwise dispersed practices. Yet, it is again a stability performed through *translation*, inasmuch as heterogeneous practices (i.e., students' projects, amateurs' DIY experiments, educational activities, entrepreneurial works, craft works, etc.) are economised through the site, made legible as examples of innovation through the performative work of an economic knowledge that shapes those practices with homogeneity and coherence. In other words, the TOMMF is not merely the visible outcome of a pre-existing 'Maker scene' in Turin. Rather, it *does* something; it enacts an ordering, making specific material arrangements and practices hang together in performing that very Maker scene as a practical materialization of Maker production. Thus, the Maker Faire is a necessary device, a (temporary) obligatory passage point through which the translation (Callon, 1986b) of spatially dispersed and heterogeneous Maker practices into a unique productive and innovative urban Maker scene occurs. In contrast with traditional economic geography analysis of temporary events, rather than being simply an event where knowledge is circulated thanks to the temporal proximity of the actors involved, I have argued that the Maker Faire brings into being a new spatiality of production and innovation too. Indeed, the talk and the booth

are also crucial in arranging a spatiality in which distant institutional players, shared spaces for Making, Universities, private houses, and virtual spaces are relationally connected.

4.5 Conclusions

Makers and Fablabs are usually connected to discourses concerning open innovation and commons-based peer production. In these discourses, knowing practices performed by both individuals and groups are at the core of the possibility to produce value in an independent and self-organised way. People are said to be able to produce artefacts by themselves either in self-organised groups or independently precisely thanks to the increased access to a great amount of information. The way knowledge is produced and circulated is also a central concern of economic geography, whose analyses have moved from an interest in knowledge as a bounded and discrete entity that moves through space to an interest in knowing practices that are always situated and enact different spatialities.

The chapter has started to answer the research questions introduced in Chapter 2 by isolating knowledge and knowing practices as crucial aspects for the coming into being of Makers and Fablabs as economically relevant phenomena that consist in a democratisation of production and the raise of urban collaborative spaces for work. Notably, I identified how a specific economic knowledge – which I called *knowledge about Making* – participated in both the very constitution of Fablab Torino and the process of framing some practices as innovative. Starting to answer how economics (at large) contributed to performing Fablab Torino as an innovative economic organisation and in bringing into being an urban Maker scene, the chapter has highlighted the role of some immutable mobiles, an exhibition, and key spokesperson.

Then, the Chapter has focussed on *knowledge on how to Make*, in order to provide more nuanced accounts that offer an alternative perspective on one of the core topics in research on Makers, that is, the ability to learn by tapping into global networks and through the face-to-face relationships of a Fablab's community. This process of knowledge circulation is considered at the core of the innovative capacities of Makers. On the contrary, through a focus on three kinds of sociomaterial arrangements for knowing – that is, arrangements for knowing collectively (i.e., workshops and communities), arrangements that sustain independent learning (i.e., tutorials and documentation), and the event Torino Mini Maker Faire – the chapter has highlighted how knowledge is always the result of a process of translation, which may

or may not succeed. Moreover, a further process of translation is needed in order to transform a knowing practice into something that holds an economic value, being part of innovation processes. That is, knowing 'how to Make' may or may not be economised.

Both the general translation process through which knowledge on how to Make emerges and the specific economization of the latter hinge on contingent material and spatial features. On the one hand, knowing practices that are entangled with project networks, structured educational programmes (Fab Academy), practices of benchmarking, engagement with machinery leased by local firms, and branded events (Maker Faire) succeed in bringing into being Making as an economic phenomenon. On the other, when knowing is entangled with workshops organised in sites for cultural production, practices of copy-pasting, connectivity networks, and a sporadic provision of shared documentation, agencements for a democratisation of innovation fail to stabilise, and Maker practices overflow (Callon, 1998). That is to say, knowing practices performed by Makers at Fablab Torino are sometimes still associated with other sets of relations, other contexts, which undermine the actualisation of Making as grassroots innovation. Thus, the Chapter has driven attention to how knowing practices and networks are constituted also through space, since the sites that are associated with knowing contribute to shaping it.

The second part of the chapter has offered some initial insights on both the role of Fablab Torino in enabling the performance of Making (as knowing how to Make) and the spatialities that are enacted through Making. Notably, it has shown how the strict scalar understanding of Makers' knowing practices mobilised by the literature should be substituted by an investigation of how knowing emerges as the product of the contingent and situated alignment of both human and non-human entities. It is through this practical creation of relations among heterogeneous entities that not only knowing how to make becomes possible but also it is either framed or not as part of a transformation in production and innovation. This process, rather than being uphold by a circulation of knowledge that is global in its online dimension and local when it comes to face-to-face interactions in Fablab Torino, is instead what makes the multiple spatial configurations of knowing emerge.

5. Materiality

'I am sitting at the table, as usual. It's Thursday afternoon. No one is around. Where are those people? A space full of machines and empty of people – now. One of the 3D printers has a sign on it, advising people not to use it. Another one – a big, fancy, and new one – is covered by an old sheet. The laser cutter is broken, again. The silence is striking. What is (not) going on here? Why? Is it a failure of the organisation? How could I say that? Fablab is an acronym that stands for 'Fabrication Laboratory'. The MIT *course from which the idea of Fablabs came out was part of the* Centre for bits and atoms*. I see neither atoms nor fabrication going on now... But there should have been a time when* things *used to go in a different way, more similar to the idea that I have of a Fablab. How can I say that? I've watched some videos of Fablab's first years, I've found documentation online of the projects developed there at that time, and every time I come here, I cannot help but be frustrated by the prototypes and artefacts that seem to laugh at me from the shelves. Materiality stays, materiality is visible' (Fieldnote, April 2017).*

5.1 Introduction

'Fablab' is an acronym that stays for 'fabrication laboratory'. Thus, one of the main features of a Fablab is supposed to be its role in reconfiguring how the production of physical artefacts gets done. In order for this representation to be true, three aspects have to be present: first, the availability of a physical space whose features respond to an idea of production that pivots on an increased, horizontal, and shared accessibility; second, the equipment of the space with specific tools that facilitate and foster independent production; third, artefacts actually fabricated, mainly through the use of digital fabrication machines. All these aspects bring to the fore the importance of

paying attention to materiality as an unavoidable component of Maker practices. Indeed, scholars interested in Making have already highlighted the issue, either focusing on the relationship that Makers entail with their tools (Drewlani & Seibt, 2018; Toombs et al., 2015) or on Making as a sort of first-level engagement with materiality common to both craft and manufacturing (Gibson & Carr, 2016). However, another entry point in tackling the issue is an engagement with the role that materiality holds in performing Making as a new economic phenomenon.

While the whole thesis hinges on an approach that looks at technologies and other artefacts as always entangled in *sociomaterial* practices, the present chapter dwells on specific material entities as both crucial technical components in a socio-technical *agencement* for Making and expected outcome of these *agencements*. Looking at these particular aspects will allow to shed light on the contingency of and the work behind what is commonly assumed as an always guaranteed outcome (that is, the equation between Fablabs and production). In particular, the chapter will focus on two non-human entities that usually emerge as important ones in literature on Makers, that is, the Fablab space and the tools and machinery available. However, the chapter will not look at them either in a deterministic way or as a mere support to a pre-existing agencies. Rather, the ANT-informed perspective adopted and a focus on sociomaterial practices will frame them, on the one hand, as intimately interlinked with particular theories in economics and, on the other, as devices and other 'things' that are part of a complex socio-technical system corresponding to a specific practical realisation of theories and discourses (cf. section 2.2.3).

The first section will look at how Fablab Torino equips a Maker agency and how the spatial configuration of the organization participates in the enactment of an economy where production and innovation have been 'democratised'. In particular, the analysis will focus on the physical space of the Fablab and on some of the machines available, emphasising how what is usually considered at the core of a new paradigm of production personified by Makers and Fablabs – i.e., openness, sharing, creativity, customization, inventiveness, and self-organization – is actually inscribed in both these material elements. While some of the devices that take part in performing a Maker agency have been already discussed in the previous chapter (e.g., workshops, digital platforms, screens), those discussed in what follows are involved precisely in enacting a *productive* agent – i.e., in equipping a new producer. Focusing on a specific place enables also to appreciate the contingency and situatedness of what contributes to the emergence of a Fablab as a space for the democratization of production. The second part of the chapter will focus on another sociomaterial practice necessary for the stabilization of

the organising process that participates in performing a Maker economy, that is, the one of representing Fablab Torino and its productive activity, which aims at constantly reproducing the Fablab as a space of innovative and democratised production. This practice results in the materialization of representation through literary inscriptions and displayed artefacts, which contribute to the situated reproduction of economic theories on Makers and Fablabs.

5.2 Organising and equipping

Recently, organisational studies have become interested in the materiality of spaces and artefacts and in how practices constitute the bones for an organization to be produced and constantly reproduced. In the attempt to go beyond the static and dualistic concern with either the social or the material aspect of organisations, a growing stream of research has been looking at *sociomaterial* practices, thus somehow following the basic ANT tenet that claims for a symmetrical ontological status between human and non-human entities. These studies have thus focused on everyday spatial practices and artefacts entangled in the process of *organising*.

Drawing on these insights, what follows highlights how this sociomaterial tradition in the study of organizations resonates with works within the 'performativity programme', which have stressed how the spatial practices tangled in the production of an organisation constitute a crucial part in the performation process, in that they produce the conditions of felicity that actualise statements coming from economics (Beunza & Stark, 2004; Cochoy, 2007; Garcia-Parpet, 1986/2007; Knorr-Cetina & Bruegger, 2002). However, while these works pay attention to the way a specific economic discourse produces a space where it becomes true, they apparently fall short in accounting for the role of contingent and situated spatial practices, being blind to how the latters are entailed not only in processes of economic performation, but also in performances that result into those processes going adrift.

What follows will firstly analyse how the material production of a space for the organisation Fablab Torino represented a precise step in the enactment of a 'Maker economy' pivoting on democratised and open innovation, focusing on how both the physical space of the organisation and the machinery made available to the members aimed at performing an economy based on the horizontal access to the technologies and tools needed to elicit invention and innovation. However – and as will be illustrated in the following subsections –, on the one hand, non-humans may constitute an obstacle when

they encounter breakdowns and, on the other, conflicting sociomaterial practices may rise that perform the space in a different way.

5.2.1 Organising a space for Making

'Alessandro: We're a Fablab without Internet and without working 3D printers..!
Adriano: Well, after all, the 3D printers are just to keep the elders quiet!'
(Fieldnote, March 2017).

'...[Fablab Torino] clearly has remained a space with a couple of sofas, a workshop room and few tools, so you're less encouraged to say "I'm going to do this at the Fablab".
(Interview with Vincenzo, Fablab Torino Maker, November 2017)

5.2.1.1 The space

When Fablab Torino migrated in its current location (i.e., Toolbox Coworking), the idea that his inventor had in mind was: first, to 'create a space where people can meet'; second, to have a space 'to work directly with [those people who were already tinkering with Arduino]'; and, third, 'to put there some machines that the various firms that produced Arduino had but that did not use that much, and […] have a place where people work [but] also other people can come and play with our toys'[1]. Therefore, the main features of the space should have been great accessibility to the space itself, enmeshment between users and producers of Arduino, and open access to industrial machines not only to work but also to experiment in a playful way. These three features were inscribed in the material constitution of the space itself.

Starting from looking at the inner architecture, the premises of Fablab Torino are connected to both the ones of Toolbox Coworking and the room at the second floor where the Officine Arduino's employees (now, Officine

[1] The first quote is retrieved from 'Arduino camp. Innovazione dal basso', http://ed2013.makerfairerome.eu/2013/06/25/che-cosa-vi-siete-persi-a-innovazione-dal-basso-e-arduino-camp/. The second and third quotes are retrieved from 'Massimo Banzi. Arduino e le Officine per nuove idee e prodotti', https://www.businessadvisor.it/notizie/wbf-news/massimo-banzi-arduino-e-le-officine-nuove-idee-e-prodotti. Last access: 15 March 2019.

Innesto) work. This organisation of the space had the aim to create a material connection between the two main business actors participating in the creation of the Fablab; a double connection that would have produced a space where both the concept of open innovation and the basic tenets of the collaborative economy were made true, thanks to the facilitated flux of knowledge, information, but also material instruments among the various communities inhabiting the building.

Indeed, a Fablab is not only conceived as a space for production but also as a space where knowledge is freely shared in a horizontal way. Thus, as seen in the previous chapter, a room was settled specifically devoted to workshops. While this room hosts six tables to attend the workshops organised by the Fablab, two other tables are located in the entrance room. These tables are conceived as a coworking area, to work with personal laptops before or while using the machines. The latter are located in various rooms: while small electronic devices are available both in the entrance and in the workshop room, the laser cutter and CNC milling machines are located in the two big rooms that connect the Fablab with both Toolbox Coworking and Officine Innesto; the 3D printers are, instead, located at the entrance, close to the shared desks. This organisation was mainly due precisely to the materiality of those machines; indeed, not only the laser cutter and the milling machines are bulkier than the 3D printers, but they produce dust, noise, and they need safety conditions to be met.

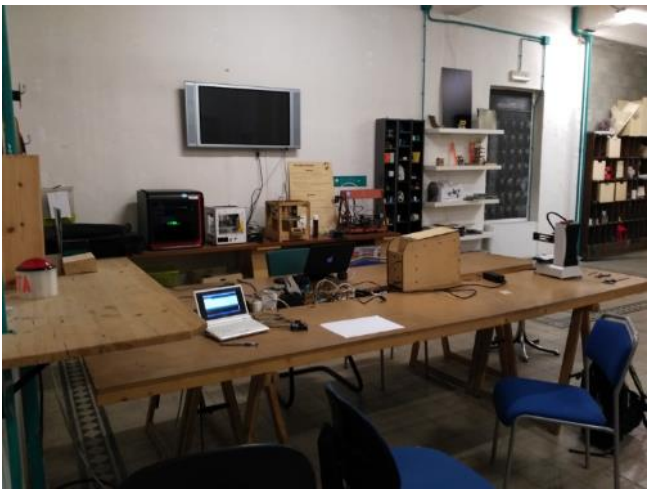


Figure 19. Fablab Torino, co-working area. Author's photo.

As highlighted by Garcia-Parpet (1986/2007) in her compelling analysis, the creation of new organisations whose physical space's characteristics have

inscribed within them the kind of actions and interactions described by economic theories constitutes one of the most important aspects in making the economy. If, in her example, the «spatial structure of the building» (Garcia-Parpet, 1986/2007, p. 44) was conceived to enact the perfect market model, walls, desks, and doors were organised in Fablab Torino in order to perform the unprecedented falling of the boundaries that used to separate – and, therefore, produce – consumers and producers. This distinction has to be substituted with the reference to an ill-defined idea of 'community', which the spatial configuration of the organisation aims at performing by evening out differences and subjectifying anyone who uses the space as someone who simply wants to make, create, innovate. Spaces for learning, spaces for production, and spaces for business had thus to be entangled in the original idea of the Fablab creators for the opening up of production to be obtained.

Figure 20. Fablab Torino, 3D printers area. Author's photo.

However, during the years the bare architectural design of the space has stopped being sufficient to perform the innovative relevance of the Fablab that the connection between its premises and those of both the co-working and the company aimed at eliciting. Regarding the relationship with Toolbox, besides the clear obstacle represented by the fact that the majority of Fablab Torino members uses the space after the co-working's closing hour, the material artefacts and technologies that should be in charge of creating this organisational arrangement actually fail. The co-working offices are separated from the rooms destined to Fablab Torino by an enormous, cold, and empty room, usually employed as an occasional garage for loading and unloading. However, no sign indicates the directions for the co-working,

and the fact that Fablab Torino has an independent entrance sometimes leads to unawareness of the very presence of the co-working from the side of newcomers. Even more strikingly, sometimes the fact of being under the same roof makes the materiality of the two spaces – i.e., furniture, utilities, cleanliness, and level of care – an evident source of comparison, which undermines the identification of Fablab Torino as an economic organisation.

'Gregorio asks me to go for a coffee at Toolbox. We open the heavy metal door that separates the Fablab from the co-working premises, cross the big, freezing, and cold room in between, and enter Toolbox. The contrast with the Fablab always puzzles me – it's a sensorial contrast. First, my body feels cosy in these warm rooms. Then, the light and the neat combination of colours affect my eyes. I hear the voices of people talking to each other or on the phone. We walk along the corridor, crossing some meeting rooms, shared offices, and the reception. Gregorio prefers going to the 'old' vending machines because he doesn't like the new ones. We sit on one of the orange armchairs of the 'relax area'. Gregorio: 'They [Toolbox's management] did a great job with the space! And this relaxing area...I like it a lot!'; 'Um...but you have one too, at the Fablab'; Gregorio laughs: '...I don't like that... It's too...meagre'. Fablab's relaxing area is actually constituted by two leather armchairs and a sofa, the three of them all evidently second-handed and marked by wear and tear' (Fieldnote, October 2017).

'I visited a Fablab in Porto. It's kind of an ex-firm [...] the furniture is not very different from ours, very spartan...even if it's much cleaner and more orderly, with many more tools... But they're still wooden axes with nails, with the drill inserted on it, that is, that's the drill-holder. It's very functional, let's say. Low budget. But...but it looks like a space that works' (Interview with Vincenzo, Fablab Torino Maker, November 2017).

Figure 21. Fablab Torino relaxing area. Author's photo.

The basic provisions of the space contribute sometimes to preventing the Fablab to 'look like a space that works'. Indeed, while the breakdown of machines represents an important threat to perform Fablab Torino as *the* organisation for Making in Turin (see section 5.2.1.3), the fact of feeling physically uncomfortable could constitute an even more substantial obstacle in attending the space. The frequent breakdown of the heating system and the fact that in the room where the laser cutter is situated no radiator is provided exemplify the issue:

'Hi guys, the heating system has a little malfunction and it's out of order till - hopefully - tomorrow, 5 pm. I'll keep you posted!' (Telegram chat, November 2016).

'...when they laugh, a puff of smoke comes out from their mouths. We all wear scarfs and wool hats' (Fieldnote, January 2017).

To conclude, the very entanglement with the urban space could represent a potential barrier to access as practised. The building is located in a liminal area of the city, that in the 1900s used to host various industrial activities, and it is enclosed by two railway branches. The presence of the railway is strongly perceived, partially cutting off the building from the surroundings. This lack of a 'spatial porosity' (Benjamin, 1985; see also Stavrides, 2007) affects the experience and practice of the connection with the urban environment, which is lived as marked by boundaries rather than traversable thresholds.

Figure 22. View of the building from the bridge over the railways. Author's photo.

5.2.1.2 Inscribing accessibility

'It's the first time I come to the Fablab [...] The entrance is well before the one of Toolbox, on the opposite side of the building. On the wall next to the door there's an intercom with the names of the various organisations hosted in the building. The sign 'Fablab Torino' is barely readable. No other signs outside help the newcomer [...] Laura, a newcomer, suggests to better signal it. Adriano, laughing "Yes, it's kind of an intelligence test!! Like: if you manage to get here..."' (Fieldnote, November 2016).

As already discussed in the previous section with regard to devices, the issue of access is one of great concern at Fablab Torino. Whilst Fablabs and Makerspaces have been considered in the literature parts also of the so-called 'access-based economy', the way this access gets to be assured is usually overlooked. But, well before the access to machines, the very access to the space is a pressing topic. In the early years of the organisation, an automated door-opening was developed by some of the more expert members and then went on being implemented, being hosted on Github in order to facilitate the contribution of other people to the project. However, as well stressed in a famous example by Latour (1992), a nonhuman *groom* (that is, a door-closer) is not always reliable.

During the Rome Maker Faire 2017, one of the board's members explains the reason behind the project as follows:

Figure 23. Fablab Torino entrance. Author's photo.

'In the Fablab Charter it's written: Fablabs are accessible as a community resource and their premises are accessible both by individuals and by workshop groups. [...] In designing Fablab Torino, one of the things that have always been perceived as a priority was the access [...] so, we've decided to develop LABadmin' (Fieldnote, Rome Maker Faire 2017).

'Something that is not spoken out in the wonderful Fab Charter is: how does a Fablab support itself? [...] So, a topic for us very pressing was how to repay a range of expenditures connected to the use of the machines. Thus, the machines had to become something that people could access via the NFC tags[2] [...] to turn on or unlock a machine with a relay if you are qualified to use that machine. So, we assumed that in back-end there was the possibility for you [managers of a Fablab] to see a user and for the user to see himself, to understand how much a machine costs, how many credits per minute' (Fieldnotes, Rome Maker Faire 2017, Giorgio speech, December 2017).

[2] NFC tags are small devices used to automatically transfer information, such as QR codes or barcodes. They can be embedded into different artefacts.

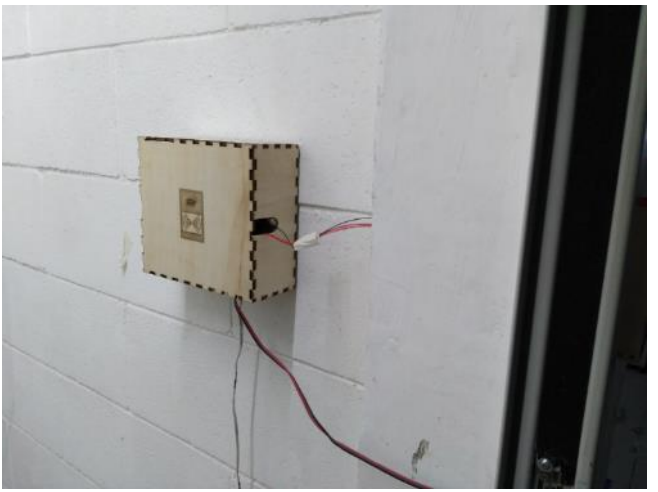


Figure 24. Accessibility device. Author's photo.

Here, we face another way in which materiality could become a crucial part of the socio-technical arrangement that sustains agency. That is, artefacts could perform as *inscriptions*, distributing competences among human and nonhuman agents (cf. Akrich, 1992; Latour, 1992). Human agents inscribe into the material artefacts a particular social order, a specific world, thus delegating to the technology the accomplishment of a task (i.e., assuring the accessibility of the space in order to allow people to self-organise and self-manage their productive activities). Thus, Fablab Torino performs as a space that promotes independent production also thanks to the inscription of an access paradigm into the automated door opening system. The *relation* among the association members, the membership card, the door, and the server constitutes the socio-technical arrangement through which competencies are distributed and the goal of accessibility is successfully met.

However, the delegation of work to a nonhuman agent does not always work as expected. I personally experienced the impossibility to enter through the automated system, which resulted into either texting someone or, if nobody was around, entering from Toolbox. Like me, many times people coming at Fablab Torino experience some difficulties in entering the place. The Telegram chat is full of messages such as *'the door is not working'*, *'I'm locked out'*, or *'we're fixing the door'*.

'Tiberio is playing around about the fact that the system to automatically open the door is broken again, and so the bottom for opening at a distance: "Since here they're all fabbers, they make super technological stuff, the Web, Internet, and then inevitably they get broken. And they don't fix them, 'cause

they've other things to do! What about the [membership] card? Mine has never worked [in opening the door]!"' (Fieldnote, January 2017).

Inscribing in those technological artefacts the vision of a space where people go, with no fixed schedule, to fabricate things by themselves, the people who invented these devices aimed at enacting a new socioeconomic system. As in Callon's account of the failed implementation of an electric car in France, where «the EDF [Electricité de France] defines a certain history by depicting a society of urban, post-industrial consumers grappling with new social movements» (Callon, 1986b, p. 21), the complex Fablab Torino system made of credits, automated access, and self-managed activation of machineries envisions a future of grassroots, independent producers. However, during the years after its opening, the translation process was constantly threatened at its very foundations since one of the enrolled entities (i.e., the automated door) failed to perform the role ascribed to it (cf. Callon, 1986b).

A different way in which materiality could constitute an obstacle to performing accessibility consists of a too strong characterisation of the space. Indeed, the very atmosphere conveyed by materiality can destabilise performances, especially when it comes to performing as a sort of 'blank canvas' that mediates access for all. As Bardhi and Eckhardt highlight in their work on car sharing as a form of access economy, anonymity is crucial in performing access: rather than engaging in appropriation and personalisation practices, users fear 'contagion' (Bardhi & Eckhardt, 2012, p. 888), looking for an anonymous space rather than one with the mark of other users' passage or some evident characterising sign. Indeed, the appropriation of the living space could also undermine the performance of sharing per se. The frequent wrong storing of manual tools, the accidental use of the personal tools of one of the users, or the untidiness provoked by occasionally leftovers from the communities' gatherings, such as empty bottles of beers and napkins, provoke resistance towards the sharing ethos. In a similar way, New Age posters or a constellation-shaped installation with an obscure God eye on it (see section 5.3.2) could convey an image of a space that is already owned by someone.

5.2.1.3 Digital fabrication tools

As strongly claimed by ANT and by its economic stream leaded by Michel Callon, agency is always distributed across various human and non-human entities. This means not only that the capacity to act is distributed,

but also that the *shape* that it takes depends on the entities involved in the performance. In other words, 'tools count' (Beunza & Stark, 200, p. 270).

Chapter 2 has driven attention to how a long tradition in STS has stressed the two-way relationship between the social and technologies, highlighting how technological artefacts do not merely determine the behaviour of human beings but are instead co-constituted through the sociomaterial practices in which they are entangled. Therefore, when it comes to the analysis of 'Maker tools', the latter should not be approached as instruments that are simply *used* by an already existing Maker. Rather, they should be analysed as *devices*, as part of a 'configuration process', that is, the definition of the identity of the user by «inscribing into the artefact a certain vision about the world in which it [is] to be inserted» (Drewlani & Seibt, 2018, p. 98). Furthermore, this process results in the emergence of a new economic agent when the vision of the world inscribed into the artefacts is one that bears relevance with regards to economic transformations.

Figure 25. Electronic bench. Author's photo.

Chapter 4 has partially touched upon this, for example highlighting the relevance of tutorials and booths in the way a 'Maker agency' is produced. This is even more evident in the case of Fablabs, a model of organisation that is replicated also by means of the provision of a common basic set of materials and tools, listed in the Fab Foundation inventory.[3] The acquisition of

[3] Retrieved from: https://docs.google.com/spreadsheets/d/1U-jcBWOJEjBT5A0N84IU-ubtcHKMEMtndQPLCkZCkVsU/pub?single=true&gid=0&output=html. Last access: 9 April 2018.

such tools is essential for a Makerspace to qualify as a Fablab (Hielscher, 2017) and to use the Fab Foundation logo.[4] In compliance with these rules, Fablab Torino provides a basic set of machineries for digital fabrication, available to the members: a laser cutter, three different 3D printers, a vinyl cutter, and two different CNC milling machines, together with some basic traditional tools and some Arduino kits. During the years, other machines have been temporarily introduced, such as a robotic arm used exclusively for an artistic research project won by a group of Fablab Torino Makers and provided by one of the manufacturing firms that represent the industrial legacy of the city.

Figure 26. Fablab Torino laser cutter. Photo from Fablab Torino Facebook page.

[4] 'Fab Labs have to share a common set of tools and processes. [...] The critical machines and materials are identified in this list: http://fab.cba.mit.edu/about/fab/inv.html and there's a list of open source software and freeware that we use online as well (embedded in Fab Academy modules here: http://academy.cba.mit.edu/classes/). But essentially it's the processes and the codes and the capabilities that are important. So you want a laser cutter for 2D/3D design and fabrication, a high precision milling machine for making circuits and molds for casting, a vinyl cutter for making flexible circuits and crafts, a fairly sophisticated electronics workbench for prototyping circuits and programming microcontrollers, and if you can possibly find the funds, you'll want the large wood routing machine for furniture and housing applications. (Who/What qualifies as a Fab Lab?, fabfoundation). Retrieved from: http://www.fabfoundation.org/index.php/what-qualifies-as-a-fab-lab/index.html. Last access: 9 April 2018.

Besides this equipment, other devices circulate among Fablab Torino Makers, both during workshop activities and for personal projects. As seen in the previous chapter, free workshops are periodically held for new members to familiarise with the basic tools for Making. One of the 'Hello World!' workshops is devoted to learning the basics of Arduino. The participants are given an Arduino with a breadboard (that is, a perforated plastic block on which inserting cables and other electronic components), and they have to download on their laptops the Arduino IDE (Integrated Development Environment, that is, the software used for coding). The task consists in the 'blinking' of a led light, which consists in writing the correct sequence of code needed to make a small led blink. As the Maker-teacher explains, the breadboard is a crucial *'prototyping device, since it makes easy the creation of circuits – without soldering at all!' (Fieldnote, Arduino Hello World, November 2017).* The breadboard and the Arduino IDE, by means of the simplification (Magaudda, 2012) of the coding practices, enables the performance of technology production for non-experts. As seen in the previous chapter, sometimes the simplification of production is enhanced by equipping the Maker with tutorials or pre-written lines of code to copy-paste. The same is true for machines such as 3D printers or laser cutters, where downloaded files may be simply transferred to the machines, without the need to design the artefact from scratch.

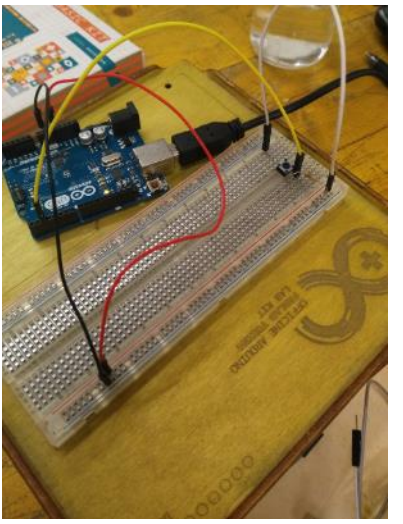


Figure 27. Arduino breadboard. Author's photo.

Sometimes, the most important equipment consists of online platforms that provide open tools to realise a DIY automated system. This is the case,

for example, of Home Assistant[5], an open-source device for home automation on which a group of Fablab Torino Makers have tinkered during a devoted workshop. An analogous tool is represented by Blynk[6], which simplifies, even more, the realization of a domotic device thanks to the availability of pre-designed widgets that the user has simply to drag and drop on her customized version.

However, the alignment of nonhuman entities in a sociotechnical system is never certain. When this non-alignment occurs in relation to the tools that are at the core of a new vision in the organisation of production, the net result is a failure in giving Makers the necessary equipment to perform as new economic agents.

Figure 28. Personal tools. Author's photo.

During my fieldwork, the breakdowns of the laser cutter or the actual impossibility to use other machines werw not random events at Fablab Torino. Problems regarding the laser cutter were particularly evident since it is actually the only machinery that users book (many of them having their own tools for Making, including 3D printers). Machines and community are tightened together, each performing the other: in a self-organised association, as Fablab Torino aims to be, the community has to take charge of the maintenance of machinery, while the latter have to work properly to constitute a community (cf. de Laet & Mol, 2000). However, financial difficulties (see section 5.3.1), together with the lack of someone who is always in charge of

[5] https://www.home-assistant.io/
[6] https://blynk.io/

supervising the use of the machine and the inexperience of some users contribute to the slow deterioration of the device.

The resistance of an artefact to perform the given role results not only in the lack of stabilisation of the actor-network but also in the opening up of new conduits for the practice. A new spatiality of independent production comes into being, in which certain places in Turin are more entrepreneurial-oriented than the Fablab since they are better equipped to support the performance of Making as part of a new economy, where efficiency and reliability still matters.

'It's a typical lazy afternoon, no one is around, I'm alone, sitting at the table and reading some papers. The bell rings, I get up to open the door. Roberto enters, we say hello to each other, and start chatting. I have already met him some weeks ago, and asked him about his work while he was using the laser cutter for his leather projects. He sells his works on Etsy - they are mainly cosplay clothes. Today, he is in a hurry because he needs to have everything ready for a fair where he's selling his works. But the laser cutter is broken - again. He didn't know it because he is not in the Telegram group. He looks desperate and complains about the frequent breakdowns of the machine. Then, he decides to go to another digital fabrication service in Turin' (Fieldnote, November 2017).

However, not only technical devices may fail; breakdowns can occur also in those 'Maker-things' that, while not immediately implying the actors' equipment with what is needed to perform independent production and open innovation, nevertheless shape Makers' situated practices:

'If you go there, you won't find pliers. A hammer? Forget about it! Screwdrivers properly working? Extremely rare!' (Interview with Tiberio, Fablab Torino Maker, May 2017).

'Well, yes, there are *machines (except I don't know if the laser cutters work...), but if you then don't have... don't know... screwdrivers or pliers to detach the pieces of plywood... well, it ends up you'll probably use the space as a service, then you'll take your stuff and go back home... So, there's much less care' (Interview with Vincenzo, Fablab Maker, November 2017).*

'...they are making a sort of interactive board. The basis is made of a thin sheet of cork. They want to cut it but they don't find anything. Finally, they

opt for a kitchen knife [...] They want to stick together the two pieces, but the glue's got dry' (Fieldnote, October 2017).

The availability or the lack of other tools besides the machinery for digital fabrication contribute to the practices of Making, the lack or low quality of other tools forcing to find other solutions. Thus, a focus on the bare 'things' (cf. Cochoy, 2007) that populate a Maker environment allows grasping the contingency and immediacy of the entanglements between materiality and practices.

5.2.1.4 Equipping an urban Maker scene

The methodological chapter has traced the uneven path that led to the current shape of this research. Following this path, other spaces were tangentially touched in the attempt to map the actors of an alleged 'Maker scene' in Turin. This new 'productionscape' is constituted by the entanglement of knowledge on Making discussed in Chapter 4 with different spaces that variously contribute to bringing into being Making.

Besides the different objectives of these organisations, what creates an alternative geography of organising production are precisely the machines provided by these spaces. Indeed, they all offer the access to digital fabrication technologies, an accessibility that is made visible in the city by the circulation of material artefacts characterised by what is considered by many of the interviewees a typical 'Maker aesthetic'. Pieces of wood jointed or glued, 3D printed monochrome artefacts, engraved objects, and even digital fabrication machines[7] circulate among various spaces in Turin, such as bars, handmade markets (i.e., Bunker Big Market, San Salvario Emporium), and design exhibitions (i.e., Paratissima, Operae), thus creating a sort of 'urban showcase' for Making as digital fabrication.

Urban assemblages for Making emerge not only through these 'spaces of visualisation' by the enactment of practices of *sight* but also through 'spaces of circulation', *sites* (cf. Thrift, 2000) where new productive subjects could be produced and a new form of production performed. These sites are other Makerspaces managed as services, where the emphasis is either on the possibility to independently overcome the design phase to approach fabrication or on digital fabrication *per se* rather than the innovative potential of these machines. The provision of the same set of machines, in which the fabrication of a physical artefact is mediated by the creation of a digital file that is

[7] http://www.makrshakr.com/

compatible with all the machines, enables the performance of a new spatial form of production in the city. Indeed, as the heralds of the Maker Movement purport, the common file format enables the mobilisation and decentering of material production, making it no more linked to a few industrial sites.

Figure 29. Leaflets of other Makerspaces in Turin.

However, the specific sociomaterial arrangements that characterise each of these spaces make the path of circulation uneven, creating a map of spaces for Making which, although sharing some tools and machines, as a matter of fact, differ when it comes to the practice of Making itself. Among the other spaces mapped during the fieldwork, two are Makerspaces more connected with the world of design and architecture (i.e., Izlab and Solido Collettivo), a third one works just as service-provider (i.e., Prototype Factory), whereas the last one is part of a broader social project based on the rediscovery of DIY and craftsmanship (i.e., Officine Creative). In all these cases, digital fabrication machines are entangled in arrangements where the emphasis on the sharing of knowledge and the open-source paradigm stays on the background, when not even missing.

Digital fabrication machines are, thus, a sort of 'fluid technology', 'mutable mobiles' (de Laet & Mol, 2000; cf. also Law, 2002b; Law & Singleton, 2005) that maintain their shape only by passing through various sociotechnical arrangements. Besides the ones characterising Fablab Torino, in the case of Solido Collettivo, for example, these arrangements are made of

students of Architecture in need of cheap and quick tools to make their scale models, alternative consumers in search for a way to customise their gifts, two architects specialised in digital fabrication through a professionalising course for young unemployed people, a social innovation project launched by the municipality, a partnership with a wedding planner and other craftsmen, etc.; whereas the sociotechnical arrangement these machines are part of at Izlab is made of professional interior designers, their studio, their business vocation that led them to move from the association centre that formerly hosted them, a former industrial building transformed through an urban renewal project into a centre for open innovation that hosts the Makerspace, etc. These various arrangements are entangled in different ways with practices of self-organised production through the independent use of digital fabrication machines, thus highlighting the flexibility and adaptability of these tools. This is what renders a machinery for Making a 'fluid object', because «in travelling to unpredictable places, [it is] an object that isn't too rigorously bounded, that doesn't impose itself but tries to serve, that is adaptable, flexible, and responsive» (de Laet & Mol, 2000, p. 226).

Besides Fablabs and Makerspaces, the practices of Making are circulated and enacted in Turin thanks also to retailers of small and affordable tools, such as 3D printers and Arduinos. Shops specialised either in electronics or in 3D printing contribute to spreading the culture of Making, offering also training activities to learn how to use those tools. A particularly interesting case is a 'made in Turin Making tool', Q3D, developed by a tech start-up based in Turin in partnership with Flying Tiger, a famous retailer chain specialised in cheap artefacts. The tool consists of a small lamp, sold in kits, which works also as a basic 3D printer.[8] Purchasable in Flying Tiger shops in Turin, the prototype circulates through both specialised events and others addressed to the general public, such as Torino Mini Maker Faire and Salone del Libro. In this occasion, the lamp cum 3D printer was employed in support of a Jeremy Rifkin's talk about his theory on zero marginal cost economy. Indeed, one of the persons involved in the project explains the reason behind the project in terms that resonate with Rifkin's theories, particularly emphasising the importance of providing people with tools to pass from being a mere consumer to be a prosumer.

It should be stressed also that, while the same machines can be transferred from one sociotechnical arrangement to another, producing different practices of Making, the same is true for the mobilisation of other tools and machines. That is, performances of Making as grassroots production and

[8] Retrieved from: http://www.sportfair.it/foto/2018/04/stampante-3d-tyger-politronica/718878/. Last access: 1 October 2018.

democratised innovation can be the outcome of an 'urban equipment' that consists of a material infrastructure made of more mundane and traditional tools and skills:

'Samantha: What kind of technologies do you use?

Maurizio: It depends on the kind of project. (Pointing at the various projects displayed in the leaflet) For example, for this, we addressed a seamstress. This is a woodcut. For that, we addressed a guy who professionally works the iron. The guys tried to do that by themselves, but then they asked him. Here, we addressed a centre for Plexiglas fabrication. These are 3D-made. For the remainder, the guys worked autonomously 'cause one of them has a basement full of tools. We have a 3D printer. We also work with CINI (Interuniversity National Consortium for Informatics), that has a laboratory on assertive technologies and bought a 3D printer, which is physically at San Giovanni Hospital' (Interview with Hackability@Polito, October 2017).

Thus, while on the one hand fluid digital fabrication machines contribute to performing Making in Turin in different ways (cf. de Laet & Mol, 2000), on the other, the enactment of Making as innovative democratised production may result from the mobilisation of traditional machinery and unusual organisations, that is, from different topological spatialities that nonetheless perform similarity (cf. Mol & Law, 1994). A focus on the machines employed by Makers could, therefore, allow acknowledging how geographies of Making in Turin are constructed through the production of multiple topological spaces.

5.2.2 Destabilising economic performation through conflicting organising

When material actants that have been framed as parts of new economic entities cease to be aligned to the representations given of them by economic theories, the outcome is destabilisation in the process of organising. The relations that connect machines and other tools with the other entities constituting Fablab Torino as a socio-technical agencement of innovative production may be broken. In their place, alternative associations between those material artefacts and the actor-networks they previously belonged to – i.e., leisure activities – may be traced anew, thus undermining the performance.

Twice a year, Fablab Torino hosts the event B.E.L.F.A.G.O.R. (Baratto Elettronico Libero Filantropico Auto-Gestito Orientato al Riuso, that is Free and Self-Managed Philanthropic Electronic Bartering Reuse-Oriented),

organised by the community Arduino User Group. A website was created to promote the event:

'Before developing a new product, launching a start-up, closing a Kickstarter, or making the world a better place, B.E.L.F.A.G.O.R. offers you the unusual opportunity to exchange the wonderful things collected during the years, through socialization![9]'.

Figure 30. B.E.L.F.A.G.O.R. night. Author's photo.

For the occasion, rough booths with things to exchange are set up on the tables, while the outcome of the bartering is reported on small pieces of paper hanged on the wall. People wander around the booths, picking some electronic devices, and asking the owner technical information about it. Usually, this technical information triggers the narration of a personal story, in which the owner tells the other when and why he decided to purchase the product, dreaming about the projects he never followed through and others that are still yet to come. Through these sociomaterial practices and agencements the Fablab performs as a space for encounter, a space of sociality that is disconnected from the goal of being a site of innovation and production.

[9] Retrieved from: http://belfagor.trade/. Last access: 9 April 2018.

Machines and other devices are displaced not from one physical region to another, but from an actor-network to another one, becoming part of a different pattern of relations. This action displaces those machines and tools from being part of a sociotechnical system aiming at enabling independent production, attaching them to a bundle of arrangements and practices that reproduce old forms of sociality. A party can be thrown, with music, food, and drinks as typical ingredients. And digital fabrication machines can become the guests of honour.

'It's Fablab's birthday party. People are hanging around, drinking beers and eating pizza. One of the 3D printers is surprisingly working. It has been turned into a 'chocobot', that is a 3D printer extruding objects made of chocolate. I look around in the room and I see for the first time in months the very same small robotic arm which I saw Tiberio and Paolo make the unboxing of. Tiberio invites me to join them in playing with the robot. They have connected it with an old joystick and put a bowl close to it, where laser-cut gadgets are hidden among Styrofoam pieces. The game consists of moving the robotic arm to get the gadgets, as in one of those machines that you can find at a fun fair. I play the game and then move towards the other room. Being close to Carnival, the laser cutter is used to fabricate unique low poly Carnival masks. The Fablab Pro is accessible too. There, the big robotic arm has been activated, moving up and down with a big photo of the president's face on its extremity, wearing a party hat, and with a party horn blower stick to his mouth' (Fieldnote, 24th February 2017).

What is usually considered a tool for fabrication, in those occasions become a source of fun. «Multiple performances produce multiple realities» (Law & Singleton, 2000, p. 772). Lasercutter and 3D printers are innovative machines in one enactment and something to play with in another. Electronic devices are entangled with IoT projects in one enactment and in another, they trigger daydreams or personal stories that create bonding. The fluidity of technologies (de Laet & Mol, 2000) emerges once again, unpacking how their unbounded and vague nature allows them to get entangled with different sociomaterial worlds. This redefinition of the actants' identity not only threatens the stability of the actor-network but also blurs the boundaries established by the framing process: apparently, digital fabrication machines are no longer mere devices for independent production, walking the path of economisation in the opposite direction. However, a different interpretation may be equally valid: when economic knowledge suggests the advent of an economy in which value lies in the opening-up of innovation processes, the act of 'disentanglement' – that is, tracing a clear boundary between the

relations that are important for the economic agent to perform correctly and the ones that she has to drop (cf. Callon, 1999) – may not be what is needed. Thus, entangling machines with arrangements of sociality may allow for practices of play and familiarisation that facilitate the approach to these technologies.

To conclude, the production of space entailed in the ephemeral and provisional enactment of a new economic organisation – i.e., Fablab Torino – is central to bring into being an envisioned economy made of independent, innovative, and self-organised producers. The organising process rests on the material production of the space through both a constant work on the architecture and the provision of machinery and tools in which a certain vision of the economy is inscribed. Thus, both an economic organisation and an economic agent that pivot on openness, collaboration, accessibility, and autonomy are enacted. However, the same non-human entities that participate in this economic performation may turn into sites of resistance, making evident how they should not be seen as mere defining features of the phenomenon under investigation that could be taken for granted and considered as always given, but as active participants in the continuous process of differently organising the production of artefacts.

5.3 Representing

Meanings and discourses associated with any social phenomenon can freeze into material and immaterial representations that aim at offering a static picture of them. These representations, rather than giving a realistic depiction of reality, conceal instead the processes that stay behind the performance of that reality which they contribute to enacting. Latour and Woolgar (1979) substituted the idea of (scientific) representation with the one already mentioned of *inscription*. This shift allowed them to stress that scientists do not just represent an already existing out-there reality, but rather they take part in its constitution precisely through the sociomaterial practices interested in the process of inscription (cf. Latour & Woolgar, 1979, p. 128).

Adopting a very different perspective, these written and visual representations may be understood as examples of material culture, and thus analysed as mere repositories of meaning. This perspective would apply also to objects on display, in that precisely the act of displaying them could result in accounting for them exclusively as symbols. Indeed, what follows gathers literary inscriptions and displayed artefacts as two key non-human mediators in the representation of the organisation Fablab Torino, its activities, and its members. However, rather than looking at the mobilised examples through

the lenses of material culture, the analysis shows how those artefacts are active participants in performing the Fablab as site for innovative and democratic production via sociomaterial practices of representation. That is, the section argues that, besides the economic knowledge that originally framed the object under investigation, other local and situated sociomaterial practices of representation contribute to reproducing and backing up the performation process through which new economic organisation (Fablab Torino) and subjects (Makers) enact the opening up of production and innovation.

5.3.1 Governing performation

The use of inscriptions is not only limited to the scientific laboratory, rather this form of material representation is a powerful instrument of enrolment in any situation. As stressed by Callon in his ANT masterpiece on the production of an electric vehicle (Callon, 1986b), inscriptions represent a crucial participant in the spokesperson's strategy of enrolment, since they align entities and render *immutable* the associations among them. Inscriptions also hold the crucial property of being *mobile*. Indeed, as already seen (cf. section 4.3.1), the act of *displacement* strongly contributes to the whole process of translation, since it allows the spokesperson to organise the movement of the entities involved. Remembering that framing and economic performation represent a particular kind of translation, we could thus see how some inscriptions are important devices in, firstly, aligning human and non-human entities into a certain definition of the actor-world and, secondly, in building on this definition in order to feed the *agencement* needed for the economic performation.

Thus, a mobilisation of Fablab Torino as a stable set of relations inscribed into a written medium aims at enabling the mastering of other actors, variously distant from the specific socio-technical arrangement in which the crucial action takes place. This is the attempt made in the first weeks of 2018, when new rules are proposed to the Fablab members by the board. The new rules aim re-framing Fablab Torino as an organisation that participates in transforming urban economies, being part of an infrastructure of new spaces of production and work. However, for the new rules to be accepted by the members, a stable image of Fablab Torino has to be mobilised:

'Tonight, a meeting with the members is scheduled in order to discuss some changes decided by the board for the next year, together with other news and proposals. The meeting was requested polemically by Dario on the Telegram chat after knowing about the increase of the membership prices.

Giorgio stands in front of us and starts projecting some slides on the wall. "There's been an increase in the number of members from 2016 to 2017 [...] I usually talk to many people here and a lot of them tell me that there's a sense of decay. I don't see this decay, but there are questions from the community that have to be answered. This is the slide of the page with the Fablab memberships [...] We decided to change the cost of the membership card [...] Obviously, before doing it, we did a benchmark with other Fablabs in Italy. [...] All of them have much higher prices [...]. This instead is my personal view of this place"; then he projects a basic scheme, where the Fablab is made by the various communities already existing, to which in the next year two new ones will be added. In the corner of the scheme, there's a box saying: "Nice to have: Hackteria", an international group of biohacking that Giorgio would like to bring to Turin in order to replace the former Fablab biohacking community that is no more active' (Fieldnote, January 2018).

'Giorgio moves to talk about the reasons why they have decided to draw up a list of rules and the novelties that this is going to introduce. He stresses the article that deals with the communities. "We give to the communities a sort of do ut des. *So, the community can have x number of credits for the machines, but every three months they have to produce a project that has to be documented on the 'Projects' page of the Fablab website [...]. It's really honest as a deal with the communities [...]. We've decided that for a number of reasons, economic too, cause we really have some economic problems - we've decided to increase a bit the cost of the membership card and to ask this to the communities". (Fieldnote, January 2018).*

So, what does Giorgio see in the inscriptions constituted by the spreadsheet and the other numbers and figures on the slides? He sees (and wants the members to see) a space whose number of members is actually increasing, but where both the lack of projects and the high cost of maintenance ask for a change in the organisation. The slides, that is, depict a specific social ordering that is bound to make room for a new one. They enact an association that hosts self-organised communities bound together by the interest toward the merge of DIY with digital and open fabrication; and they enact also the need for draining more resources (both financial and creative ones) from those very communities. Paraphrasing Law, «if [the slide] is a 'thing', or a fairly stable set of relations [...], it is also, at least in relation to its use, a performance. Together with the person using it, it acts to produce effects» (Law, 2002a, p. 27). Thus, what Giorgio sees in the spreadsheet, with its numbers and figures, is an organisation that is growing but that has some severe economic difficulties. The mobilisation of this inscription aims

precisely to enable that 'mastering' (Latour, 1986) necessary to enrol actants into the spokesperson's project. In other words, inscriptions are an instrument of power. Through them, the Fablab Torino board (represented by Giorgio) gains a position of relative power in defining what should be the goals of the organisation, what and why do not work properly, and how to improve the situation. In order to strengthen this process of enrolment, the inscription mobilises also a relational space, one that bounds together Fablab Torino and other Fablabs and Makerspaces which are listed and referred to as made by *'all friends, people who used to stay here'*. Thus, for the inscription to be even more powerful, it traces connections with distant places made closer thanks to the practice of benchmarking.

The second inscription mobilised by the Fablab board in order to sustain the enactment of the organization as productive and respondent to a certain idea of innovation is the article in the new Regulation to which Giorgio refers in the second quote reported. The article establishes that 'each community has to realise every three months a documented project for the Fablab and then posted it in the 'Projects' section of the Fablab Torino website'[10]. Thus, the new Regulation aims at functioning as a framing device that disentangles Makers' activities from the relational network and the spatiotemporal organisation of leisure activities among friends, while building instead a new economised relation pivoting on productivity and innovation.

However, while this inscription aimed at performing the Fablab as a place where artefacts are produced, it could remain just a dead letter if the entities refuse to enrol. Indeed, some people decided not to renew their membership, while none of the communities met the target of a project each three months. People boycotted the rule, both because they explicitly disagreed with it or more generally with that vision of the Fablab and because of the lack of expertise discussed in the previous chapter.

'We, as 3D printer user group, we haven't produced anything. I don't know about the other communities. I could have come up with something...but I hadn't enough time, there was the Maker Faire, I didn't have time to lose. I felt sorry because I do care about the Fablab, but imposing this kind of things...it doesn't work. People have to produce out of their own willing. It's not that I don't like the fact that the Fablab asks us to produce something. But in our own time' (Interview with Agostino, Fablab Torino Maker, July 2018).

[10] Retrieved from http://fablabtorino.org/regolamento/. Last access: 10 September 2018.

Thus, while not having a secure outcome, the situated inscription of a certain definition of the world (i.e., the Fablab) into material artefacts such as slides used during a meeting and rules published on the organisation's website constitutes a useful strategy that the spokespersons (i.e., the board) could mobilise, in order to boost the enactment of the economic knowledge they had aligned with.

5.3.2 Displaying performation

While *literary inscriptions* represented by texts and other written materials are crucial in performing reality via a process of enrolment through which entities are translated into the static network of relations described in the inscription, other artefacts may act through their very materiality in performing reality, materialising its representation.

An interesting example of representation in Fablab Torino is constituted by sociomaterial practices of displaying that involve artefacts and prototypes produced in the past. Two walls of the main room are furnished with shelves where 3D printed objects and laser-cut prototypes are stored, while others are hanged on the walls.

'The interns have been asked to tidy up the shelves where the prototypes made at the Fablab during the past years are displayed. Alessandro is talking with them. I stop by the shelves with Nicola. He and Alessandro try to remember who made what. Alessandro grasps a weird plastic thing. One of the interns asks him what it is. "It's a mould for chocolate eggs. It was made during the very first years..."' (Fieldnote, 23rd October 2017).[11]

[11] The same object was documented in a Youtube video made during its fabrication, in 2011, where the Maker behind the project explains its genesis: *'It's Easter time! Fablab cannot fail to have its own Easter egg. And since here there's no one sane, the moulds aren't normal either. So, we designed them with sections, pixels...as a Super Mario egg'.* Retrieved from https://www.youtube.com/watch?v=CMsAJADfmLw. Last access: 5 September 2018.

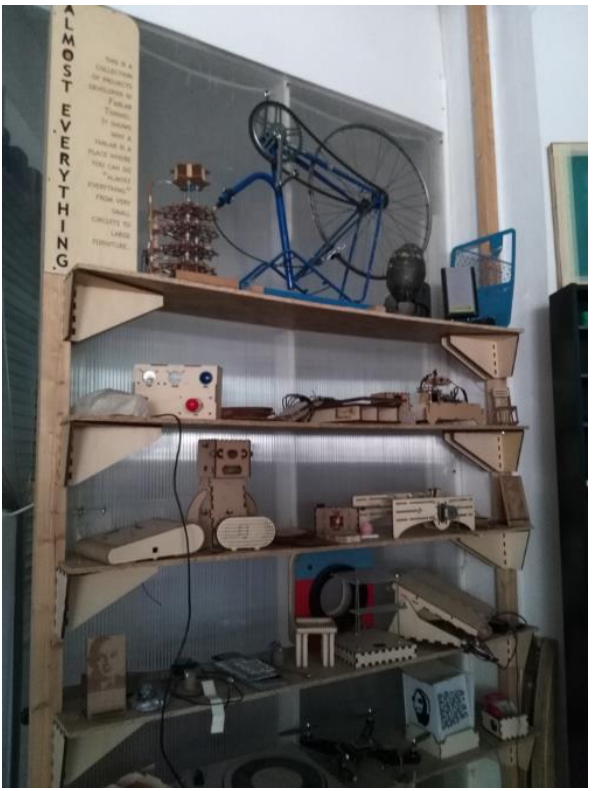


Figure 31. Prototypes on the shelves. Author's photo.

The effort of rendering visible Fablab Torino production through the creation of spaces destined to this goal enables practices of storytelling to rise and a sort mythical tale of Fablab Torino origins to circulate and materialise. Sometimes, these objects become part of practices of promotion by the manager of the co-working space, who from time to time brings for a tour of the Fablab people interested in renting a desk at Toolbox, in order to show them the innovative atmosphere of the whole place. Creating a space of visibility by means of an entanglement with the material thus performs the Fablab as a space of production and innovation, potentially contributing to attracting people and money. This means that the making of economies rests also – as seen before (cf. section 5.2.1.4) – on the creation of 'spaces of visualization' involved in the performance (cf. Thrift, 2000) that enable to frame objects, subjects, and practices as signals of an upcoming revolution in production. However, somehow departing from Thrift's conceptualisation of these spaces as instruments of governmentality projects, spaces of visualization may also function in ways that have nothing to do with any broader project

of subject engineering. That is, besides the process of *constructing* spaces of visualization, their very materiality can have an active role in visualizing and representing economic entities. The display of artefacts such as an engraved lamp, an architecture component for microalgae cultivation, a DIY camera, a portable solar tracking device, a small speaker for smartphones, together with polished 3D printed forms does not just correspond to the creation of a space into which practices of narration and representation performed by humans can plug. Rather, material objects actively *participate* in narrative production (Humphries & Smith, 2014). The materials used and the way in which the artefacts have been assembled – laser-cut pieces of plywood slotted into each other, with low interest for aesthetics – directly perform a simplification of production; that is, it is the materiality of the objects itself that represents Maker production as an easier endeavour if compared to both traditional craft and industrial production. Moreover, the entanglement between artefacts and practices of display aims also at eliciting inspiration through imitation, thus producing an arrangement of open production in which artefacts directly affect Makers.

Figure 32. 3D printed artefacts on the shelves. Author's photo.

Another kind of displayed objects is the one of prototypes produced at Fablab Torino or other artefacts that are at the core of Makers' production.

'Giorgio asks me to follow him in the room where the laser cutter is. He wants to show me something. 'From an ethnographic point of view, this is cool! We changed the laser and we hung the old one on the wall! Like a trophy, for all the work done!!' Then he tells me how many productions it had done' (Fieldnote, April 2017).

'The idea of representing a digital behaviour in a physical way has been always a fixation for the group. The celebration of the diversity of the space led Bruno to create a useful bot: the task was to analyse and count the number of messages [on the Telegram chats N/A], visualising with the brightening of the stars the amount of messages. The only question was: which constellation to use? Obviously, the Hokuto constellation (AKA, Ursa Major) from our childhood anime 'Ken Shiro'![12]'.

The artefact in the second fieldnote is an Arduino-based brightening constellation that lights up every time people send messages on the related Telegram chats, giving a real-time physical representation of the online communities' interaction. The installation has replaced the blackboard upon which monthly events were noted. Each 'star' (a round yellow box with a led and a sensor) represents one of the Fablab Torino communities, whose symbols have been realised with the vinyl cutter and glued on them – an eye framed by a triangle, the God eye, representing the total of the communities' interactions. One of the Makers who has been contributing to the project sends a picture of it on the Fablab Telegram chat, explaining: *'We've tried to give a physical dimension to the Fablab virtual communities. Soon, the Github code'.*

[12] Retrieved from http://fablabtorino.org/esptelegramstat. Last access: 24 September 2018.

Figure 33. Constellation. Author's photo.

While the space of visualization produced by these artefacts corresponds to the creation of a space where certain values circulate – i.e., the importance of DIY –, an autonomous performative force of the displayed objects emerges too. The constellation is a purely aesthetic and playful project, which represents one of the elements at the core of Making, that is, the enmeshment between work and leisure (cf. Chapter 6). Moreover, the two artefacts trigger practices of bonding and identification with the organization, since they narrate a 'we' dimension based both on the fact of having behind a history of production that has been made by all of them and on the still present exchange among them.

To conclude, these practices not only are spatial practices that produce the space of the organization by representing it, but they also play an important role in performing the Fablab as a space of invention, innovation, and production. While in the case of literary inscriptions the role of the non-human representative intermediary is acknowledged as the outcome of a translation process aiming at aligning elements into a stable image of the organization, in the case of displayed artefacts the object itself and its materiality

are active participants in the sociomaterial practices of representation of the Fablab. These examples highlight the fact that «objects establish relations with users through their materiality, participate in practices with people and forge layers of biographical strata that are interwoven with our own life stories» (Humphries & Smith, 2014, p. 491).

5.4 Conclusions

From a theoretical point of view, the analysis has stressed how an organisation – such as Fablab Torino – needs continued maintenance to constantly perform the ordering process that enacts it and that participates in actualising the performative power of economics in constituting Makers as part of an economic phenomenon. In this continuous reproduction of ordering and organising, the entanglement between space and materiality constitutes an important analytical focus. In the case under investigation, the production of a specific organisational space and the provision of a shared set of machines and tools allowed Fablab Torino to perform a new form of production pivoting on openness, accessibility, and sharing. However, the analysis has also shown how, when the non-human entities involved in the performation stop to align, the whole project starts to crumble.

In order to avoid this risk, the organisation has to be made and unmade constantly, mobilising sociomaterial practices of representation too. Two non-human entities, such as literary inscriptions and artefacts on display, are crucial in conveying a stable image of Fablab Torino that corresponds to the one given by economic theories on Makers and Fablabs. In this way, both through their enrollment by powerful spokespersons such as the organisation board and through the immediate way in which the objects' materiality affects visitors and members of Fablab Torino, non-human entities actively participate in framing Making as democratised production and innovation through situated practices of representation.

Focussing on specific non-human entities, the chapter has highlighted their role in performing Fablab Torino as a socio-technical *agencement* that enacts a democratization of production. Rather than assuming a deterministic understanding of technologies and organizations, the chapter has looked at tools, machinery, furniture, architecture of the space, and other artefacts as active entities that distribute Maker agency, equipping Fablab Torino members in order to become new productive and innovative subjects. Moreover, the focus on the organizational space and its materiality has offered an original entry point for the analysis of Fablabs from an economic geography perspective.

However, the contingent nature of performation processes reveals itself also through the analysis of how the materiality of the entities in the network compromises the alignment. Broken tools, out of order machinery, pieces of furniture that convey carelessness, cold rooms, or automated systems developed to improve accessibility which instead do not work contribute to the partial failure of the Fablab in acting as a socio-technical *agencement* that performs a democratization of production.

6. Work

'There are no projects [...] it has become a hangout where every now and then on Wednesday night there are 2-3 persons who chat, look at some websites, go eat pizza... I mean... it's not very productive'
(Interview with Vincenzo, Fablab Torino Maker, November 2017).

'I go frequently to the clients, my laptop at hand, I move from my clients to the suppliers. Here, I come very rarely, because actually every time I sit down there's something to fix, people who... Here, I come mainly to hang out... If it's sunny, I work at the park, and I've recently found a secret spot at Palazzo Madama. This morning I worked from home cause...cause it was raining. I think it's super cool working in a coworking space and nowadays it is necessary if you want to create a network, especially if you've just started working'
(Interview with Michele, Fablab Torino Maker, March 2017).

6.1 Introduction

If the one contained in the opening vignette is currently the representation of Fablab Torino mostly shared by its members, how can we say something about work? If – as shown in the previous chapters – the place gets crowded especially during the night and people who gather in those occasions find in Fablab Torino a sort of working men's club, a place for cultivating their high-tech hobbies, is it possible to consider the organisation as a workplace too, or at least, as somehow related to the changing nature of work? More generally, how and when can we talk about Making as a form of work? These questions are rooted into broader issues regarding the conceptualisation of work, which, in this research, unfold also through the need of finding a way

to trace – theoretically – the spatiotemporal boundaries that separate work and leisure.

In sketching the profile of Makers, Chapter 1 has also traced the contours of the ways their practices could be studied as transformations of work, mobilising concepts such as prosumption, self-entrepreneurialism, peer-production, new manufacturing, etc. Acknowledging the complex blurring of the boundaries between production and consumption, work and leisure, productive time and free time that have been discussed in Chapter 1, any discussion about work entails a more profound questioning of the difference between non-productive and productive activities (Scholz, 2013). Indeed, rather than being a uniform change heading towards the same direction, Makers' endeavours seem more heterogeneous, presenting various and not always converging styles of work. This variety unfolds also through an analogous heterogeneity of the spatialities of Makers labour, brought into being by different socio-technical arrangements that sustain it.

The following sections analyse precisely how these various geographies and sociotechnical systems intimately intertwine with the forms of work that unfold through Makers' practices, claiming that an investigation of them is needed in order to acknowledge the complexity of evolving urban 'workscapes' (Felstead et al., 2005). Notably, the analysis will mobilise the concept of 'Maker work' as an *abstract category* that identifies multiple performances of Making resulting into the production of some forms of value, while I will refer to 'labour' as the diverse situated, distributed, and contingent sociomaterial *practices* co-emergent with specific socio-technical arrangements that economised Making through the production of value.

The chapter claims that there is no univocal form of work when we talk about Makers, rather we face *multiple performances of work*. The difficulty faced in trying to frame Makers as part of broader transformations in the nature of work lies precisely in the *fluidity* of this new category. Maker work can assume different forms depending on the entities enrolled in the actor-network that sustains it and the practices performed, enacting different realities that can either overlap or clash (cf. Müller, 2015a; Law & Mol, 2001). The coming into being of these different performances of work is sustained by various spatialities, which in turn are differently entangled with different urban assemblages.

Given the ephemeral Fablab Torino performation as a space that sustains a new production paradigm, the material gathered in the present chapter is the result of theoretical reflections made on highly fragmented, scattered, and ephemeral emergences of work-related issues coming from the empirical data. In other words, rather than favouring thick descriptions of the case, the chapter indulges more on the conceptual stimuli provided by the hints

coming from the field. To pursue this goal, the chapter is also more reliant on the instantiations of Making *beyond* Fablab Torino, in order to broaden the scope of the analysis by including evidence that are more relevant with regards to the changes in the spatialization and forms of work that Making entails, rather than dealing exclusively with the relevance of Fablabs and Makerspaces as new organisations that are part of how work in cities has been changing.

The first section of the chapter will briefly discuss what I call 'archetypes of work', tropes on Maker work that circulate in economic theories connected to the rising of Makers and related transformations in production. Still drawing on performativity theories on the 'making' of the economy (cf. Mitchell, 2008) and endorsing the usefulness of a pragmatic and socio-material approach to the analysis of work too, I will argue in the second part that those archetypes perform Making as work, in that they take part in creating *agencements* of Maker work. In particular, I will show how 'Maker work', rather than being identifiable with univocal features, should instead be identified with multiple performances that unfold through the entanglement between various socio-technical arrangements and different forms of labour (i.e., affective, digital, and material labour) that co-emerge through those arrangements.

6.2 Archetypes of Maker work

The economic theorisation of Making is replete with tropes on work that are part of the current transformations of production in the digital economy. Strong individualisation, together with an apparent contradictory reliance on communities, an ethos of sharing, a passionate attachment to work, the massive use of platforms, and the emphasis on creativity are just some of the features that are usually attached to broader phenomena to which Making is related.

In what follows, I introduce what I call *'archetypes'* of work that circulate in the economic discourse on Makers: the project, the platform, and creativity, respectively corresponding to the spatiotemporal organisation of work, its sociotechnical arrangement, and the ethos sustaining it. These three archetypes, rather than being significant *per se*, are instead categories, *forms without content* that performatively contribute to enacting 'the work of Makers'. Going back to mainstream theorisations of the economic impact that Makers may have, the present section traces the contours of the way Makers' productive efforts are dealt with. However, as stressed in the other chapters, performation processes necessitate of socio-technical arrangements that

sustain what economic discourses portray (which will be the focus of section 6.3).

6.2.1 Project

Since the seminal work of Boltanski and Chiapello (1999), the shift of working practices towards a project-oriented organisation has been identified as one of the key features of contemporary work organisation in post-industrial economies. This kind of work has been usually associated with the creative industries of post-Fordist economies, given their strong reliance on flexibility, independence, and serendipitous encounter of their workers. In economic geography research, the primacy of the firm has been partially overcome by drawing more on a recent body of sociological works that unearth the relevance of projects for the organisation of work and the division of labour (Watson, 2012). Challenging a common essentialist approach within economic geography, encouragements have been made to elevate projects at the level of crucial organisational structures of the economy, considering them as «a temporal organisational arena in which knowledge is combined from a variety of sources to accomplish a specific task» (Grabher, 2004, p. 104). Also, this change in perspective allows shifting the focus towards labour, thus letting the spatial and temporal specificities of project-based work emerge. Indeed, project-based work is strongly influenced by personal investments in the construction of fluid personal relations, which build up complex networks usually based on forms of compulsory sociality that make the boundaries between work and private life blurred.

The previously mentioned definition proposed by Grabher highlights not only that projects provide economic activity with a different ordering for what concerns both the circulation of knowledge and working practices, but also that they challenge the relationship between time and work typical of the Fordist industrial economy. Pivoting on tasks, projects structure the time devoted to work in a way that no longer relies on the disciplinary force of 'clock time', providing instead a sort of teleological wholeness to labour (Thompson, 1967).

When projects are at the core of the way economy is organised, the individual emerges as the principal source of action. Indeed, the agency of *homo economicus 2.0* is configured by sociotechnical agencements constituted not only by discursive elements and technological devices but also by procedures and forms of organisation that pivot on the project. These forms of organisation based on projects and tasks unleash the singular form of agency that dominates digital and knowledge-based economies, encouraging everyone

'to embark on collaborative projects in which roles are poorly defined and mutually influenced' (Callon, 2008: 40).

In line with this 'projectification of production' (Grabher, 2002), books and websites praising the advent of Makers look like a jumbled array of projects, presented as examples of the unleashed creativity of individual Makers (see section 6.2.3). This form of work organisation is taken for granted by authors such as Anderson, Gershenfeld, Hatch, and Rifkin, while they rattle off a long list of apparently disparate artefacts autonomously fabricated by the heroes of their works. Economic theories that somehow back the arguments in favour of a Maker economy - that is, works on open innovation and peer-production - reflect too the assumption that holds projects as the unit of measurement of work. Indeed, project ecologies are the necessary element for this division of labour to be performed, configuring both space and time in a way that enables the self-organised participation of increasing numbers of individuals. Independently from who is the subject undertaking Making, this discourse mobilises projects as the unifying element; beyond either the specific skills possessed or the kind of paid work regularly performed, the stretched spatiality and bounded temporal frame characterising projects enable the encounter of self-organised people. As seen in the previous chapter, the project form is considered crucial by Fablab Torino management too both as *the* form that Makers' practices should take if they aim to be considered valuable production (cf. section 5.3.1) and in order to sustain the organisation.

Besides individual projects, immanent to this organisational form is also the idea of collaboration, in that various actors are brought together through a shared goal, contributing to it through their various skills and competencies. Indeed, the relevance of projects for Makers buys into a general discourse on the role of 'networked information economy' in enhancing the autonomy of individuals, who can now rely on an increased «range and diversity of cooperative relations people can enter, and therefore of collaborative projects they can conceive of as open to them» (Benkler, 2006, p. 9). A report commissioned by Maker Media espouses the centrality of projects in the 'future of work', arguing that 'traditional employment may decline as work is organised primarily around projects rather than work titles'.[1] Moreover, leaving outside any institutional boundaries, projects seem to allow the encounter of both professionals and amateurs, having as pivot not labour as «productive waged work' but *activity*, which 'surmounts the oppositions between work and non-work, the stable and the unstable, wage-earning class and non-wage-

[1] Retrieved from: https://www2.deloitte.com/content/dam/Deloitte/us/Documents/technology-media-telecommunications/us-maker-impact-summit2-2014-09222014.pdf. Last access: 17 December 2018.

earning class, paid work and voluntary work, that which may be assessed in terms of productivity and that which, not being measurable, eludes calculable assessment» (Boltanski & Chiapello, 1999, p. 109).

Besides these general considerations on the way work in the knowledge economy has been more and more organised around projects, the ephemeral nature of projects asks for methodological instruments that acknowledge their contingency and instability, since «projects are highly dependent on the creation, mobilisation and temporary fixation of actor-networks» (Müller, 2015a, p. 80). That is, projects too could be considered as actor-networks that have to be made through the active enrolment of different entities, thus asking to be investigated in their coming into being. Thus, ANT provides once again the tools to look at how projects are put together and how they allow for the emergence of different forms of work.

6.2.2 Platform

The spatiotemporal organisation of work through projects goes hand by hand with the spreading of platforms as the increasingly diffuse sociotechnical arrangement of digital economies, which allows otherwise distant actors to exchange information and products, and to distribute labour. The emphasis of the diverse sharing economy realm on the predominance of access over ownership is predicated precisely on the intermediation of digital platforms, whose infrastructure gives shape to new forms of digital labour. The mediation of platform enables the division of a complex work into small and simpler tasks, which individuals can perform either through the exclusive use of digital instruments or recurring to physical assets too. This distribution of work performs the advent of a new economic agent, 'the crowd', which variously engages in highly heterogeneous forms of work, providing different services and tasks (Howcroft & Bergvall-Kåreborn, 2018).

The word 'platform', exiting the boundaries of the computational realm in which it was born, aims at creating a family of Internet-based instruments for interacting and communicating, emerging «not simply as indicating a functional shape: it suggests a progressive and egalitarian arrangement, promising to support those who stand upon it» (Gillespie, 2010, p. 350). Uber, Airbnb, as well as Etsy, Facebook, and Kickstarter are just some of the most renowned examples of platforms dominating contemporary digital economies. Others have been emerging, generating a complex ecosystem of

various[2] infrastructures that hold in common the ability to extract value from the data shared by their users (Srnicek, 2017).

While the kinds of platform this chapter deals with are far from being the well-known Uber, Airbnb, Amazon Mechanical Turk and the like usually blamed for their exploitative mechanisms, the sociotechnical arrangements of platforms devoted to Makers are in part similar in their functioning. As seen in Chapter 3, at the core of Making lies the circulation of knowledge through online platforms devoted to the sharing of projects, tutorials, code, draws, and other files. Thingiverse, Github, Instructables, and Arduino Playground are just some of the most known platforms on which it is possible either to upload or to download the information needed to make something in a DIY fashion. Besides those, Makers may employ other platforms that connect their projects to the market, for example, either to finance them through crowdfunding campaigns (e.g., Kickstarter) or to sell them (e.g., Etsy). Platforms represent therefore crucial sites to be investigated when looking at the way Making as a productive activity unfolds.

Advocates of Making praise platforms precisely for their ability to provide lay people with access to the means of production, unleashing their productive and innovative potential. The provision of this kind of platforms will allow exploiting «the pool of talent» that, while being either particularly gifted or educated for the job, has nonetheless remained outside the classic formal employment structure (Anderson, 2012, p. 125). Jeremy Rifkin, in tracing the contours of the 'Third Industrial Revolution', argues that the Internet of Things (IoT) – one of the principal domains explored by Makers – constitutes precisely the 'technology platform' at the core of this transformation, whose purpose is «to encourage a sharing culture, which is what the Commons is all about. It is these design features of the IoT that bring the social Commons out of the shadows, giving it a high-tech platform to become the dominant economic paradigm of the twenty-first century. [...] The platform turns everyone into a prosumer and every activity into a collaboration» (Rifkin, 2014, p. 21).

In opposition to these enthusiast claims, Srnicek (2017) invites us to look at platforms as a new business model within capitalism. However, in defining platforms as an archetype, I claim that they go well beyond the boundaries of capitalism, reconfiguring how *any* kind of productive activity is sociotechnically arranged. Indeed, a Telegram chat too can become a platform inasmuch as it is mainly used as a sort of black canvas to be filled with contents such as tutorials, pictures of personal machines or artefacts, and links to

[2] Srnicek (2017) distinguishes five types of capitalist platforms: advertising, cloud, industrial, product, and lean platforms.

inspiring videos or articles. Thus, the inner functioning of platforms has to be investigated. Drawing on this approach, the chapter won't dwell on debates over platforms and capitalism/post-capitalism economy, instead pivoting on an «explicit concern with the practical accomplishment of 'the platform' as a distinct mode of socio-technical intermediary» (Langley & Leyshon, 2017, p. 14).

6.2.3 Creativity

Since the oft-quoted work of Richard Florida (2002), creativity has gained a primary role in debates over the kind of work that should be promoted in order to boost urban growth. Followers of Florida's thesis and policymakers enchanted by easy receipts for fast economic growth have espoused the idea that the attraction of talented people working in the broad realm of cultural industries would exert a catalyst effect on other economic sectors, thus stimulating a cascade effect on the whole city. In particular, everything related to the idea of creativity as innovation and cultural content has been mobilised in discourses concerning the needs of post-industrial cities to find a new essence and image for themselves (Landry & Bianchini, 1995). Debates in urban studies on the role of creativity thus intersect discourses on the nature and transformation of 'creative labour'. Usually, this concept has been associated with the work of people serving in creative industries, whose products are characterised by a strong symbolic, semiotic, and aesthetic value. This type of work has been praised for its alleged potential of offering the worker activities which generate a greater sense of fulfilment and self-expression.

Critics of discourses praising creativity have contended that optimistic narratives about the positive effects of a rising creative class in cities hide the strong issues of justice and equal distribution of resources and opportunities among the city dwellers. In line with these critiques, scholars who have focused on creative work have mainly mobilised Marxian theory of labour to highlight how they reflect the main features of neoliberal economies, denouncing how working in these economic sectors usually goes with high level of precarisation, self-exploitation, and an intense search for equilibrium between individualisation and forced sociality (Hesmondhalgh & Baker, 2011; McRobbie, 2016). The subject of these economies, where culture is commodified, is «the ideal type of the artist that has evolved toward that of the 'creative', a hybrid socio-economic actor who carries the romantic ideal of the artist into the fragmented ecosystem of the market – where the individual is entrepreneurialised (Gandini, 2016) and the social relations around collaboration commodified» (Graham & Gandini, 2017, p. 3).

More recently, the vagueness of the concept has allowed enlarging the plethora of subjects belonging to the 'creative class' (Florida, 2002), driving to claims on the creativity of everyone. This move has set the basis for theories on Makers as consumers who simply unleash the unexpressed creativity that is ultimately a basic human feature (Gauntlett, 2011). The «democratisation of innovation and creativity» (Rifkin, 2014, p. 23) is precisely considered the outcome of the increased engagement of people in production, thanks to platforms for sharing and greater access to the means of production. These instruments have been allowing «a whole new class of creators» (Anderson, 2012, p. 66) to rise since new digital infrastructures are usually identified as empowering instruments that unleash the creativity of lay people who have remained outside the boundaries of formal organisations. Unburdened by all the implicit and explicit references to a sort of artistic expression, the idea of 'creating' as it has been appropriated by mainstream discourses on Makers is a mere exhortation to *create something*, that is, to make, to engage first-hand with the transformation of both the material and digital world. Thanks to this deprived version of what was already become no more than a buzzword, cheerleaders of the Maker Movement arrive to claim that «we are at just the beginning of the largest explosion of creativity and innovation the world has ever seen» (Hatch, 2013, p. 8). Indeed, both mainstream and critical literature associate Fablabs and Makerspaces to the rising of urban spaces for innovation and creativity, hinging on the mobilisation of ideas of community and sharing (Schmidt & Brinks, 2017).

Besides the empowering potential of this new infrastructure for sharing, discourses on creativity meet the praises of the advent of Makers also through the identification of the latter with two other realms usually associated with creative labour. On the one hand, work in the high-tech sector has been identified as the model of a new, more autonomous and humane form of work, mobilising as an example of best practice the Silicon Valley and its ideology of passionate work. On the other, the revival of craft activities has been matched with the rediscovering of the need of expressing oneself and looking for authenticity, going back to forms of work more focused on the production of something unique and meaningful (Luckman, 2015). Thus, Making has come to indicate the application of forms of creative, technology-mediated labour to the manufacturing industries, since «the energy and creativity of entrepreneurs and individual innovators [can] reinvent manufacturing, and create jobs along the way» (Anderson, 2012, p. 16). The Maker version of creativity matches a technical and engineering approach to work that identifies the aim of labour in finding solutions to problems. This approach translates into ideas of collaboration, resulting into a grandiose exhortation to

«collectively use our creativity to attack the world's greatest problems and meet people's most urgent needs» (Hatch, 2013, p. 10).

6.3 Emerging arrangements of Maker work

As anticipated in the introduction to this chapter, the aforementioned archetypes of work traced by economic theories on Makers are not considered as mere descriptions. Instead, the following section claims that they percolate into contingent arrangements and situated labour practices through which 'Maker work' emerges as a multiple performance, rather than a category with clear boundaries. The analysis partially draws on the pragmatic and processual approach employed by Richardson and Bissell (2019) in suggesting a dynamic understanding of new geographies of labour, which acknowledges the evolving landscape of work and production in their very *doing*. This theoretical move is justified by the urgent need to have a new vocabulary to grasp the transformation of work, since longer traditions such as the Marxist one may need to be backed by new conceptualisations that better account for not only the socioeconomic changes interwoven with issues of work but also anthropological ones.

Therefore, in what follows, issues on Makers related to work and its geographies will be tackled through an approach more attuned with the investigation of practices and the specificity of different socio-technical arrangements. This approach resonates with the one mobilised in the previous chapters, allowing also to go beyond traditional theorisations of work and following the path of those scholars who variously speculate on a 'post-work' future (Weeks, 2011). In line with Richardson and Bissell (2019) and with the ANT-informed approach employed so far, the chapter will look to the doing of labour, thus specifically speaking to the debates I touched upon in Chapter 1, while offering an alternative theoretical point of view to those issues regarding Makers and work. Rather than trying to pigeonhole Maker work through already existing categories, the chapter will: 1) look at how the archetypes of work performatively contribute to the enactment of Maker work by creating socio-technical *agencements* in which Makers (may) enact new working subjectivities; and 2) build on micro understandings of the activities that 'make' Making, and of how they translate into work. As Richardson and Bissell (2019, p. 283) suggest, «instead of taking 'worker identity' as a starting point, we can begin by focusing on the capacities of the body that might (or might not) become work, despite not being in a formal workplace», so that issues about self-entrepreneurialism, exploited consumer work, empowering peer production, and the like will be smoothed out.

I will argue that the 'doing' of labour as heterogeneous sociomaterial practices emerges in various ways, which result in multiple performances of Making as work (i.e., work in peer-to-peer non-capitalist ecologies, entrepreneurial work in a capitalist market, post-work, user work, etc.). The chapter will tackle labour as a specific form of agency, still employing the ANT understanding of the latter as distributed, and consequently looking at how it emerges through different socio-technical arrangements that sustain Making. As in much of the discussion above, the shift towards practices, processes, arrangements, and doings is justified by the actual impossibility of delineating a uniform 'Maker subjectivity' to which univocally refer as the product of governmentality projects, as a Foucauldian approach would claim.

The section will distinguish between three different forms of labour involved in performances of Making, notably affective, digital, and material labour. Rather than considering them as either distinctive of a specific worker subjectivity – for example, the entrepreneur of the self – or univocally definable, I will show how each of those emerge through various socio-technical arrangements. Despite this conceptual distinction, I do not consider these forms of labour as mutually exclusive. Rather, I differentiate sociomaterial practices of labour along this tripartite scheme in order to unpack the specificities of each of them in the value-production process, each time isolating one dimension of this process – i.e., affect, digital technologies, and matter.

Furthermore, the analysis will provide hints on the potentialities that a geographical investigation informed by post-structural approaches may have. In particular, I will argue that, rather than simply equating Fablabs to new urban workplaces, Making is performed as work through the contingent enactment of spatialities of work that connect distant sites together. These sites intertwine with practices of labour, thus reversing the usual relationship that considers 'work' only those practices performed within the walls of a proper workplace. Making as work is therefore distributed across multiple 'sites of work' that are informed by the archetypes on work defined by economic theorisation.

6.3.1 Affective labour

Recent debates over the changing nature of capitalism have been speculating on the idea of an affective form of labour, which is said to have become prominent as one of the main productive forces under regimes of post-Fordist production. The concept comes from two, sometimes highly divergent, traditions of thought, the first being feminist theorisations of unwaged work,

such as domestic labour and the emotional labour of service workers (Hochschild, 1983), the second corresponding to the Autonomist tradition of scholars such as Lazzarato, Hardt, Negri, and Terranova, who put the emphasis on how capitalism elicits a kind of human activity that creates belonging, bonding, and passionate attachment towards forms of value-production not perceived as such.

While the common understanding of this form of work is usually associated with all-encompassing discourses over the changing nature of capitalism, the following section explores the way affect is generated by and emerges through various sociomaterial arrangements and how it may translates into a form of labour through which various performances of Maker work emerge. Merging ANT attention towards sociomaterial arrangements with assemblage thinking inspired by the work of Deleuze and Guattari, an alternative understanding of affect looks at «the affective dimension of socio-material relations [...] as emerging together with them» (Müller & Schurr, 2016, p. 226). In this way, each pattern of relations is valued for its own specificity, analysing case by case *how* affective labour emerges in the practices of Makers.

6.3.1.1 Entrepreneurialism, communication, and emotion

One of the arrangements through which Maker work unfolds is constituted by the use of crowdfunding platforms, that is, digital infrastructures for peer-to-peer funding of a broad range of projects. In particular, these platforms and the kind of affective labour they elicit situate within broader agencements for self-entrepreneurialism. The latter is usually identified as a key feature of neoliberal forms of subjectivity (Foucault, 2008), when the enterprise soars at the hight of principal reference of economic agency and efficiency, competition, and branding become the distinguishing traits of how work is measured. An example of this particular emergence of affective labour is constituted by a start-up of Makers, which was born during the first years of Fablab Torino but still partially gravitating around the organisation. The enterprise was born out of a 'Politecnico team', a small group of Design students who started working together for their graduation project. They entered the Fablab in 2014 in order to transform what was just an idea into a physical artefact. Thanks to the support of an expert Maker, they assembled the first prototype and exhibited it at the Torino Mini Maker Faire, where people pushed them to sell the prototype. The event triggered the passage from being a mere students' project to become a seed for an entrepreneurial initiative. The same year, the group was, indeed, incubated in the Politecnico

incubator and, one year later, they decided to launch a crowdfunding campaign first on Kickstarter and then on Indiegogo, in both cases reaching the goal. In 2016, they became a limited company and launched an equity crowdfunding campaign on the platform Mamacrowd.

In the story of this student-team evolved into a start-up, the Fablab plays an important role in the provision of the needed machinery. However, the university and its start-up incubator (imbued with ideas of entrepreneurship, self-employment, and innovation), the event Mini Maker Faire and the online platforms for crowdfunding constitute crucial sites to perform Making as a form of creative and entrepreneurial work. That is to say, this performance of Maker work has been made possible only by an assemblage made of heterogeneous entities that have coalesced in enabling the matching of Making as a practice of production with an entrepreneurial attitude towards work. The enrolment of people needed to support the project in its entrepreneurial development has required an unfolding of affects, performed initially through a showcase event such as the Maker Faire, but most of all through the following mobilisation of the sociomaterial relations triggered by the crowdfunding platform, here acting as the principal enrolling entity. As explained by one of the members:

'Actually, the aim of Kickstarter is precisely to build a community [made of] people that back your project. [...] We've also decided that the project should have been open [...] and this thing during the campaign was useful because the smartest, the more used at tinkering [among the backers] had already the idea of how the project was and what could have been done' (Interview with member of the startup, February 2017).

Since the very first steps, the economic performativity of the platform is crucial in shaping the type of work emerging from this arrangement, asking as the first thing to do to 'Start a project'. Then, the user has not only to describe the project, but also to provide accurate documentation of it, by uploading engaging videos and other promotional materials, all of which is aimed at creating attachment, bonding, and a sense of community. The start-up has also to constantly engage with the community of backers, that is, people that have decided to fund the project, who eventually will be rewarded with small gifts (Barbrook, 1998). New geographies of entrepreneurial work emerge, thanks to a form of affective labour distributed among the start-up of Makers, a device constituted by the crowdfunding platform, and the community of backers. Thus, through the enactment of affect, distant others are mobilised and enrolled in an agencement that sustains the performance of an entrepreneurial form of work. An affective geography is thus mobilised

through the engagement of distant 'others' that take part in the project as active financial supporters, thus showing how in this case «affects function as a driving force in processes of accumulation, as a system of adherence, or orientation to particular modes of production» (Cockayne, 2016c, p. 457). Being friendly, constantly interacting with the community, using the language prescribed by the platform (i.e., English), presenting your values, but also giving the right rewards to the backers represent the basic communicative and relational features demanded by the platform.

In this way, the merging of the project as spatiotemporal organisation of work with the platform as the main socio-technical device of ordering enables the performance of Making as a form of work that heavily relies on both individualisation and collaboration. The use of platforms in order to reach supporters worldwide shapes the way Makers perform their entrepreneurial attitude, creating a socio-technical system in which communication and emotions are triggered as productive and as a source of value. Indeed, the failed achievement of the goal could be determined by poor communication, which does not match the standards employed by crowdfunding platforms, thus resulting in a failure in creating the kind of affective relations needed to elicit processes of value creation:

'[The guys of the crowdfunding platform] asked us to participate. We would have made this step in a more mature phase, though... They didn't even support us well...maybe for economic reasons [...] they addressed us to an agency they knew, which for 4,000 euros would have made the promotional video, the campaign... So, honestly, we decided to ask to a friend of us [N/A and they didn't reach the crowdfunding campaign's goal]'. (Interview with Damiano, Maker, June 2018).

A general lack of communicative skills could be ruinous for a Fablab too, whose very existence relies on the capacity to attract as more members as possible:

'One of the flaws of Fablab Torino is narrating in the right way... I mean, we don't have that culture of creating a storytelling of the project, communicating ourselves... We're too much sabaudi *'*[3]*. (Interview with Alessandro, Fablab Torino Maker, February 2017).*

[3] The term 'sabaudo' means literally 'related to the Savoia dynasty', which used to reign over the region. The term is now also used to refer to a mix of elegance, austerity, sense of duty, and high discretion typically related to Turin's people.

'Other friends have a little bit suffered from this fact...that there's nobody welcoming you, that there's nobody curating the human side...' (Interview with Michele, Fablab Torino Maker, March 2017).

This form of immaterial labour relying on communication (Lazzarato, 1996) goes hand in hand with the kind of emotional labour that is demanded to a host in order to actively construct a place for work and a community (Brown, 2017). Many were the complaints about the lack of a proper welcome at Fablab Torino as is common in a coworking space. Thus, the meagre commitment to this form of labour results into a flaw by the organisation of presenting itself as an entrepreneurial space.

6.3.1.2 Passions

Making as an entrepreneurial and creative work is also highly characterised by risk and a strong attachment to work itself. As one of the start-up members explains, the affective dimension of this kind of work is significant:

'It's kind of a challenge. It's something yours, that you want to carry on. You don't...you don't do that to make more money than in other jobs... You don't do that to become rich [...] You have your project, and you want to carry it on. The idea is this: it's a project that is yours, you can carry it on and manage it as you like. [...] It was not a choice well thought out... It was more an impulsive choice, a choice out of passion, I would say...' (Fieldnote, chat with a member of the startup, March 2017).

In order to sustain this kind of work, not only relational bonds with an online community have to be established, but also an affective attachment towards work itself demands to be performed. In this way, a passionate attachment to work is enacted, and Making becomes a practice that not only combines one's own passion with a (precarious) profitable activity but employs also passion as a vital flame that enables to bear all the rest. However, the only emotions that have to be exposed are the positive ones, while the negative ones get to be overlooked. Thus, self-entrepreneurial forms of work emerge when affective labour is performed as «the optimistic work of ''maintaining an attachment to a significantly problematic object,'' in spite of that object's potentially toxic effects (Berlant, 2011, p. 24)» (Cockayne, 2016c, p. 457):

'The world offreelances is a world in which you have to be very well organised, [since] you're the controlling father, your own perpetrator, and you can be able to work from 8 am to 5 pm in a very efficient way. [But] my nature is not like that, I create to myself a kind of dynamics that do not allow me to do this. You have fixed clients, projects to carry on, sometimes the projects have a peak of workload, so you have to work like a dog, with incredible stress, other times projects are completely still [...] Sometimes you work over the weekend or you finish [...] after dinner. But I don't feel a victim of my work, because I do things that I like a lot. And they are also a lot of doors that you open because if you do this kind of creative work [...] you have to try and disseminate a lot to receive something back. So, you take part in events, fairs, exhibitions, talks, whatever you think could be useful. And maybe one out of ten generates something. But you have to do it' (Interview with Alessandro, Fablab Torino Maker, February 2017).

One's own productive capacity seems to equate here with life itself: when this productive capacity is not at its best, the fault relapses on the worker's (poor) ability to manage everything, while stressful work habits are perceived not as something that diminishes life quality but rather as positive and meaningful when checked against their usefulness in enhancing the subject's productive capacity itself. This passionate attachment to work, characteristic of the hacker ethic (Himanen, 2001), entails the worker body to be affected both positively and negatively, getting enmeshed in a 'passion trap' from which is almost impossible to get out (Armano & Murgia, 2013). Rather than feeling exploited, these Makers-entrepreneurs find in their work the source of 'satisfaction', which «erases the necessity for clear distinctions between ''work'' and ''life,'' as the former becomes the defining and central feature of the latter» (Cockayne, 2016b, p. 461).

A passionate attachment to work not only emerges when Making is already part of waged forms of work but also is connected to performances of Making which aim at reaching that goal. Indeed, Makers sometimes engage in these activities as a creative alternative to their not satisfying jobs, aiming at substituting the latter with them:

'Having many things to deal with could be a positive fact but it's also difficult if the group [of people working on them] is small. [...] She [N/A his wife] is very patient. Because what other people do during their work time, I do during my free time. It becomes hard after some time, but... if you have the goal of making a job out of it, you don't lose that energy ...hopefully! [...] I decided to be an engineer because I wanted to build things! So, somehow,

I gain more satisfaction outside the job, as long as the creative process is concerned' (Interview with Damiano, Maker, June 2018).

This approach to Making resonates with the one shared by other interviewees (see for example Valeria in section 6.3.1.3) who, while not earning money from their activities, nonetheless aim at reaching this goal. Because of that, these Makers take part in events, exhibitions, and fairs in order to transform a hobby into a profitable activity by creating for themselves opportunities for circulating their work and, consequently, their skills. *Desire* (for Making to become a job) may constitute therefore another powerful force that comes into being together with the creation of an assemblage of Maker work, «because it makes assemblages coalesce together» (Müller & Schurr, 2016, p. 224). In contrast with ANT's preference towards the actual (but see, for example, Law, 2004; Law & Mol, 2001), assemblage thinking helps here to understand how the virtual and the potential too exert a strong influence in bringing into being new arrangements of work and producing geographies of 'future works'.

6.3.1.3 Communities

The excerpt from the interview to Alessandro highlights also how fairs and other events are considered crucial sites for the performance of Making as an entrepreneurial form of creative work, inasmuch as they offer a stage for the kind of communicative and relational labour needed to survive in an economic framework where the high individualisation of work has been balanced by the participation in multiple relational networks. It is during flagship events such as the Rome Maker Faire that forms of «compulsory sociality» (Gandini, 2016, p. 136) that turn social life into source of value emerge, establishing relations with other Makers whose skills can be useful to develop new projects and engaging in networking as «an additional form of labour that is required to demonstrate ongoing employability» (Gregg, 2011, p. 13). In order to capitalise on this new relation, other forms of labour should be performed, such as the organisation of a 'homemade conference' that aims at attracting participants to the community and triggering the development of new projects:

'Valeria has organised a meeting at her place for tonight. She has invited Massimiliano, a guy she met at the Rome Maker Faire. She said she got fascinated by his work on biohacking and, since she has started experimenting with bio material too with her group, she wants him to pitch them what he

knows. [...] She has set up the living room as a sort of meeting room: there is a projector, some prototypes and pieces of materials scattered on the dining table, and some beers and chips for the small audience' (Fieldnote, June 2018).

The mingling of professional tools, private spaces (see further), and practices of presentation is entangled with another form of affective labour which consists in the creation of communities. The idea of an organisation of production based on the voluntary work of a great number of 'peers' aims at stressing the fact that the production of either an artefact or an online content can be accomplished without the traditional hierarchical model of Fordist firms, relying instead on communities of peers which coordinate autonomously in a horizontal way. The basic assumption is that, when provided with a strong infrastructural network that enables autonomous organisation, people coalesce into communities that freely contribute with their productive efforts (see for example Benkler, 2006; Tapscott & Williams, 2006). However, this assumption reveals its counterintuitiveness when we look into different arrangements of Making. As explained by the funder of a robotic startup based in Turin and manager of a community of Makers gathered around a devoted platform, the mere provision of a platform and some open contents is not sufficient to engage people. Communities of peers, rather than emerging autonomously, have to be created and constantly fed:

'...the community does not develop spontaneously. Or better, partially it does, but then it needs to be fed. [...] We [N/A community managers] had to meet with the ones coordinating the community, push them a little to meet, find guidelines or a concept to pursue with the community, 'cause at first, they were...very messy! Those were meetings in which we used to talk about all and nothing, but then they developed into groups that worked on projects' (Interview with Mauro, former community manager of Fablab Torino, January 2018).

Rather than autonomously organising around projects in order to perform a productive effort, for an actor-network of peer-production in Making to come into being there may be the need of an enrolling actant, which directs the knowledge and activity of the group towards a specific goal identified in the form of a project. Thus, the creation of *productive* communities is based once again on the circulation of affect among people, so that a collective subject comes into being. This process could be enacted also by leveraging on the blurred boundaries between work and leisure, labour and play:

'[This prototype for the Rome Maker Faire] is one of these projects, to start and see how to work together in a domain which is not the one of work, to lay the foundations for a collaboration. Having won at the TOMMF the membership cards, we have converted them in this micro-budget...like kids selling lemonade for two coins! We're trying and do this trick: OK, we won there...it's an adventure, we're self-funding it! We have used that money to buy the materials so that nobody has to use his own money. It's like from one game to another: catch another game, which allows you to do something else, etc.' (Fieldnote, chat with Valeria, June 2018).

Maker work as autonomous, non-hierarchical, collaborative labour emerges here through the efforts of a spokesperson who actively contributes in bringing into being a new form of production by leveraging on those economic theories claiming that one of the main motivations for self-organised production is fun and creative engagement (Benkler et al., 2015). This organisation of Making lies precisely on the blurring of the boundaries between work and play and the fact that 'it is impossible to differentiate clearly between nonproductive leisure activity existing within the sphere of play and productive activity existing within the field of the workplace' (Scholz, 2013).

The issue raised by Scholz somehow equates productive activity with an activity that produces exchange value in a capitalist economy. Going beyond this definition based on Marx's labour theory of value but following the theoretical path of the differentiation between leisure and work, other forms of affective labour seem to be at stake when we look at other practices of collaboration among Makers. As seen in Chapter 4, the members of Fablab Torino more passionate with coding and IoT frequently profit for Github as the main platform for their projects, employed to work collaboratively on codes. The specific script of the platform (Akrich, 1992; Wajcman, 2006) not only shapes the forms of digital labour performed (see section 6.3.2) but also triggers forms of network sociality (Wittell, 2001) that may or may not result into leveraging on affect as a productive force.

'At the software level too I can easily, from this project, create a fork (it's called in this way) - you create in your Github space a copy of this and from now on, you can work on your fork...without contributing to this...creating your own version. And then maybe in the future, you decide that your fork can be added to the main repository. [...] It happened sometimes that we wrote to this guy [N/A the main developer of the project Agostino is contributing to] at 11 pm for a problem and he said: now it's fixed, download the update' (Fieldnote, chat with Agostino, Fablab Torino Maker, July 2018).

'And then there are things that please you, when you open the project and read: "Credits: XX and XY", which is me. In the acknowledgements. These are things that reward you, don't they?' (Fieldnote, chat with Agostino, Fablab Torino Maker, July 2018).

Discourses about rewards match with the idea of 'giving back', frequently mobilised by Makers as one of the main reasons behind their involvement in open-source projects, which plainly resonate with the hacker ethic. Thus, platform-mediated systems of rewards act as assembling forces that facilitate the contribution of people in a project and their ongoing participation in it.

Forms of affective labour entangled with socio-technical arrangements that perform a community may have as one of the entities that compose them corporations too, as in the case of a platform that aims at collecting the hackings and customizations of an industrial product, such as IKEA pieces of furniture. One of the Fablab Torino Maker produced at the Fablab an artefact that converts a drawer into a table and uploaded the project not only on his Github profile but also on a website gathering various DIY projects featuring IKEA products. The platform became an arrangement that elicits the emergence of a community of peers that share DIY projects, while also producing value from a branded commodity by customizing it. But communities as sources of value in processes of commodity customization could also emerge among some Fablab Torino members. The hacking of a vacuum by one of them performs an «iterative process of experiment» (Thrift, 2006, p. 288), through which mobilising the skills of others in order to produce a customized object that embodies a new kind of value.

'Wednesday night, communities meeting. The table has become a mess – laptops, cables, 3D printers, PCBs are randomly scattered on the table, leaving almost no spots free. Among them, a bulky automated vacuum. The vacuum is Carlo's. [...]'I hacked it! I've created a bot so that I can have stats and control it via Telegram. I've created these [Telegram] buttons (start, stats, schedule, stop, make a tour of the room, go back to charge), and named it Pippo'. He tries and makes it function, but it doesn't work, apparently because of some connectivity problems with the Fablab Wi-Fi network. Carlo: 'That's why you should try in different places because at home you never have problems'. He asks P to use his smartphone as a hotspot and the vacuum eventually starts going around the room. All the others stare at the vacuum and make jokes about the filth that it is going to find on the floor. Indeed, Carlo stops it after a few minutes. Bruno is particularly interested in it: 'Why don't you put a PCB inside it??', 'I wanted to, but there would be problems

for the height – it won't be able to go under certain things...'' (Fieldnote, October 2017).

Figure 34. Carlo's prototype. Author's photo.

These practices enact a system of open innovation that distributed the creation of value between companies and users (cf. Banks & Humphreys, 2008), thanks to participation of the Maker to different communities. Indeed, on the one hand, there is an online community of people contributing ready-made codes that could be copy pasted, thus facilitating the engagement the customisation process. On the other, the community night at the Fablab in which he shows his project to other members constitutes the sociomaterial arrangement that allows practices of sharing to be enrolled into a network of use value production.

To conclude, work emerges through the unfolding of affective labour as an assembling force, which not only drives human and non-human actants to coalesce but also generates new geographies of work, relational spaces both online and offline which come into being through the interactions among the entities involved. However, while the mingling of affect and production is

always present in the above examples of Making, they show also how affective labour cannot be simply equated with a value-producing form of labour in late capitalist economies. Thus, rather than seeing affect as the distinctive feature of contemporary regimes of capital accumulation, it has been shown how «all forms of production, capitalist and non-capitalist, are always imbricated in the circulation and production of systems of desire and affect, though with temporally and geographically specific and differential effects on workers» (Cockayne, 2016c, pp. 457-458).

6.3.2 Digital labour

As seen in Chapter 1, concepts such as 'peer production', 'co-creation', and 'prosumption' are often mobilised in talking about Makers. These concepts have in common the idea of opening up production, 'democratising' innovation processes through the inclusion in different ways of subjects usually remaining outside production. The core of this transformation is identified mainly with the infrastructure for production constituted by digital technologies. Both mainstream literature and critical scholars assume as starting point the digital as main agent of change in, on the one hand, the organisation, distribution, and nature of production and, on the other, what it means to be 'at work' (see, for example, the 2010 special issue of *ephemera* and Scholz, 2013). In particular, numerous scholars drawing from Autonomist Marxism and mobilising the concept of immaterial labour, have identified digital labour as a new form of unpaid work (Fuchs, 2013; Scholz, 2013; 2017; Terranova, 2000). According to Terranova, the free labour that unfolds through the use of digital technologies is 'simultaneously voluntarily given and unwanted, enjoyed and exploited' and performed through internet-based activities such as «building web sites, modifying software packages, reading and participating in mailing lists and building virtual spaces» (2000, p. 33). However, these analyses usually take into account forms of digital labour based on the use of platforms owned by a big corporation, such as Facebook or Amazon. On the other hand, they also assume as starting point that free labour equals exploitation, while instead the fact that a great amount of labour in contemporary societies is unpaid urges for acknowledging that this kind of binary distinctions is a tricky one (cf. Hesmondhalgh, 2010). While the previous section has already partially touched upon this issue, what follows will look more in detail at the concept of 'digital labour', framing it not as the distinctive form of free labour chracterising digital capitalism, but as co-emergent with different socio-technical arrangements.

6.3.2.1 Digital temporalities and productivity

Beside shared machinery and workshops offered by Fablabs, a diverse range of platforms are provided to lay people and consumers who want to approach DIY production. As seen in Chapter 4, these platforms usually provide not only tutorials on how to create something, but also ready-made downloadable files that simply need to be transferred to a digital fabrication machine. Among the platforms that are usually employed, Thingiverse and Instructables are the ones most cited by the participants. Both owned by two big corporations, the two platforms offer the possibility to upload and download projects, shared under an open-source licence. While this kind of platforms serves more the need of having a ready-made file of an artefact, others such as the already mentioned Github aim also at facilitating a network-distributed work on the same project. Notably, providing documentation is considered one of the crucial tasks of Makers' ecologies for peer production and open innovation (cf. Chapter 4). The relevance of this activity is due to the high reliance of post-Fordist production on knowledge, the latter corresponding either to a thorough description of a project so that it can be replicated or to the fulfilment of small, sometimes low-skill tasks. Indeed, Github, with its complex division of work into tasks and small chunks of code, is crucial in sustaining practices of participation and collaboration, triggering and shaping the practices of work performed by those Makers more skilled in coding. These performances of digital labour come into being through the complex script (Akrich, 1992; Wajcman, 2006) of the platform, which triggers specific practices of work:

'Ah but this is Paolo! What has he done? [...] He only *made the documentation. He removed all this stuff and formatted it with the hyphens [...] Ah, he formatted it to make it fit [N/A to the other documentation on the project] Well, this is good.* They've started to do things seriously*' (Fieldnote, chat with Agostino, Fablab Torino Maker, July 2018).*

While the contribution made on the documentation seems negligible and meaningless at first, it acquires relevance when looking at the big picture. This practice of Making entails a form of digital labour that relies on the distribution of tasks among various contributors, as described by peer-production theorists. While the modularization of work into manageable and (sometimes) mundane tasks have clear spatial implications, its relation with issues regarding the management of time is of consequence too. However, tasks as a form of digital labour seem far from the ones praised by E.P.

Thompson (1967) as teleologically significant and ontologically unitary, in opposition to the 'tyranny of the clock' imposed by the industrial organisation of work. Digitally mediated tasks such as the one of the fieldnote excerpt are characterised for being sometimes 'micro-tasks', which therefore need to be seen as parts of a broader project for that labour to become productive of some sort of value.

Even if not comparable with the unity of time, space, and meaning attributed to task in pre-industrial societies, the alternative geographies of work that come into being through digital technologies actually bring with them different management of time. 'Intimate geographies of the digital' (Richardson, 2018) emerge through personal experiences of being at work, in which digital technologies stress 'the potential inconsistencies between being 'at' work and 'doing' work' (Richardson, 2018, p. 255). However, these inconsistencies emerge not only between the spaces where the productive activity is taking place and the personal feeling of *doing* work but also through management of time that seems to extend work time:

'Personally, I lost a bit the passion for certain things... and my personal story somehow cuts across this other story [N/A the one of why he does not go the Fablab anymore]. One of the problems [N/A with my partner] was that I devoted myself too much to these things. At home, all the days, all day, the night too, I used to work at these things. With a playful approach, though, it's not Excel!' (Interview with Adriano, Fablab Torino Maker, March 2017).

'He [N/A the Maker at the head of the project Agostino is collaborating to] is...he is incredible, he is always on. These things are shared by all developers, who work during the night. Me too, I have that imprinting due to my job, I was a developer for many years. The night is the perfect moment, when there's calm, quiet, you start working' (Fieldnote, chat with Agostino, Fablab Torino Maker, November 2017).

As Richardson suggests, «the postwork imaginary offers a framework for the ambivalence of the extensive properties of digital work that, whilst potentially resulting in more 'work' time, might also mean more desirable activity» (2018, p. 253). However, the entanglement of Maker practices with both the materiality of the digital fabrication machines and the amount of information that can be accessed results into personal experiences of how one's own time is managed in light of the productive effort performed, thus making *temporalities of postwork* emerge as a form of sociomaterial practice. Rather than taking for granted the outcome that the introduction of a particular technology could have, we should look at the always context-specific,

contingent, material arrangements that are produced by it (cf. Wajcman, 2016).

'You can fabricate everything but in the end, you haven't fulfilled anything 'cause [it is] as with TV series, you lose days and days to watch an episode after another when actually the same story could have been narrated in a two-hour movie [...] But sometimes I have exactly this frustrating feeling of not making the most of my time. [...] engaging in a million of things simply because I have the machine that allows me to do it and a lot of information online, and I wish I could make them all but the truth is that I still haven't made something that I really wanted to do' (Interview with Rocco, Fablab Torino Maker, December 2017).

The mere availability of machines and information triggers forms of digital (and material) production which however frequently do not end up with an outcome clearly recognisable as valuable and, most of all, with something meaningful for the Maker. Thus, digital fabrication machines and other aids for Making, while being pictured as enabling 'rapid' prototyping, can also be imbricated in the emergence of alternative temporalities, such as the one of '*not* making the most of his time' experienced by Rocco, as long as his activity does not result in valuable production.

On the contrary, when a DIY activity is organised through principles and modes borrowed from market economy, even an open-source platform may turn into a site for the economisation (Çalışkan & Callon, 2009) of Making, a socio-technical *agencement* through which an economic agency is constructed. This is the case of an ad-hoc community created at Fablab Torino around home automation projects based on an open-source platform. The enrolment of this platform is justified by recurring to anti-capitalist logics, describing it as an alternative to the same solution offered by big corporations and mobilising alternative ethos of work, more attuned with a hacker ethics (Himanen, 2001). The platform has indeed an open API (application programming interface), which makes thus easier for people who want to contribute to its development to interact with it. While the platform's script triggers engagement and experimentation, in order to avoid the 'wasting of time' complained by Rocco, the activities of the group are organised by the person who launched the workshops and the community, who worked in the business of home automation. A preliminary brainstorming, the use of sticky notes to collect ideas, the atmosphere of informality and conviviality, the division into small groups gathered around a 'project', the creation of documentation characterise the work of the community. Calculative practices (Callon, 1998) such as setting a problem to be solved, brainstorming,

engaging in benchmarking practices, producing reports shape the engagement with the new digital device, resulting into the emergence of a form of labour highly characterised by the goal of making something new, of innovating from below.

However, this initial engagement with the platform can also result into forms of Making that correspond to digitally-enabled, high-tech versions of DIY, answering a need – thus, producing use value – rather than engaging in the development of a product which aims at beating the market ones in terms of innovation:

'Hi everyone! Hoping could be of interest, I'll brief you on the implementation of [the platform] at my place. Yesterday the heating system went down. The man came in the morning and for 50 euros he diagnosed that the thermostat is broken. The first impulse was to go on Amazon and buy a new one. But while he was working, I noticed that at the bottom of the boiler just come out two strings, which, if closed, ignite the flame. So... go with ESP8266, relay, and ESPeasy! Outcome: the photos attached. In the last one, you can see the monitoring of the boiler [through the platform]' (Telegram chat, March 2018).

6.3.2.2 Distributed professionalism

The use of both digital platforms (to work collaboratively, to sell products, and to share prototypes) and digital fabrication machines results in new geographies of professionalism too. The performance of 'professional Making' is limited to specific spaces, either physical such as temporary events and other occasions for presenting one's own work or online such as social media used for self-promotion and platforms devoted to the sharing of projects. All the related practices that sustain the performance of professionalism in those spaces are usually confined to the space of private houses, though. As seen in section 6.3.1, Valeria not only organises meetings at her place, but the latter is also where she stores materials and experiments. The reliance on digital technologies for both the material and immaterial dimensions of Makers' labour erases the need for a permanent and traditional workspace, somehow unpacking what it means to be 'working', which is indeed «a network of different performances joined in multiple and complex relations. The effect [...] moves from place to place, yet it is also an effect of endless effort in particular localities» (Law & Singleton, 2000, p. 774). All the practices included in doing Maker work as a professional job are scattered

across a complex spatiality made of physical and digital spaces to which different performances are associated.

'At home, in the kitchen, I have a mannequin which wears our [branded] t-shirt and which is necessary for the exoskeleton [N/A the prototype] to be maintained in its right position. She [N/A his wife] has called it Pippo, it's part of the family! Since we don't have a lab [...] It's bulky and it is used to maintain the shape of the exoskeleton' (Interview with Damiano, Maker, June 2018).

'Well, the pieces – except for the electronic box, which is produced in China but is assembled here, in Caluso, in the province of Turin – all the other components are made by mechanical companies nearby Turin. And then the storehouse is Maurizio's basement!! (they laugh) *[...] And at the moment it's we who assemble the products' (Interview with a member of a Maker start-up, April 2017).*

Working through digital technologies thus creates geographies of professionalism through which Making unfolds as professional work in certain spaces, while, in order for this to happen, other spaces are simultaneously created. Notably, the house emerges as the space of the invisible, where the performances of Making needed to sustain professional ones have to take place. Thus, digital labour emerges once more as distributed but it also cannot be severed from other, non-digital forms of labour (such as tinkering with new materials, storing products ready to be shipped, and preserve a prototype). The latter takes place through distributed geographies of work emerging from micro-practices that transform private homes into workspaces. Following the path traced by knowledge workers and self-employed individuals, Makers negotiate their spatiotemporal boundaries between shared and traditional workspaces, home, and other kinds of third places (cf. Avdikos & Kalogereris, 2016; Felstead et al., 2005).

The informality of Making entangles with spaces and practices of professionalism through the dispersion of digital labour among sites for Making as leisure and sites of waged work too. Indeed, the previous fieldnote excerpt reporting the experience of Agostino with Github highlights the way Making as digital labour buys into one's own waged work. This is a common experience among those Makers who hold a job as developers (see also section 4.4.1):

'I like sharing, a lot. 'Cause most of the work I do, like the "serious" one, the one I get paid for, is very often based on open-source projects' (Interview with Bruno, Fablab Torino Maker, June 2017).

Thus, the digital labour performed by Makers relies here on digital skills which have been developed also through their waged work, opening scenarios of 'post-work' (cf. Richardson, 2018; Weeks, 2011) where what would be traditionally conceived as two autonomous sites and practices of work and leisure is instead aligned into one common network of value production. Platforms devoted to the sharing of open-source projects and collaborative coding can be re-framed as interfaces that enact a connection between free time and time devoted to waged labour, between the workplace and the intimate space of the home. At the same time, the opposite is true when Making becomes an opportunity to familiarise with digital fabrication machines and other platforms that may lead to an upgrade for the Maker in his or her daily job (cf. Interview with Carlo, section 4.4.1). In this way, «it might be possible to think at their work as involving the building of skills which lead to higher wages being paid in the long term – a kind of deferred wage» (Hesmondhalgh, 2010, p. 278). Digital labour does not simply come into being at the moment in which the Maker writes a line of code on Github, but rather is distributed among various sites of production. Therefore, on the one hand, arguments against digital labour as mere exploitation of free labour cannot be easily endorsed when the latter becomes highly relevant for paid labour too; and, on the other, enthusiastic claims on the democratisation of production actually hide the fact that Maker practices sometimes buy into skills acquired through one's own job.

6.3.3 Material labour

As the neologism aims at suggesting, Makers are people mainly engaged in fabricating material artefacts. Related to this material dimension of Makers' production, speculations on the transformation of manufacturing and craft have been raising, starting from mainstream praises of mass customisation and ending with academic theories on small, distributed manufacturing (cf. Chapter 1). What both the approaches disregard is *how* this distribution is materially enacted through the labour of Makers and what forms of work emerge through the engagement of Makers with both the materiality of machines and materials.

The previous chapter has stressed in different ways how materiality plays a crucial role in eliciting the emergence of a Maker agency: digital

fabrication machines equip the Maker so that performances of democratised production may emerge, while the very architecture of Fablab Torino aims at performing a transformation in production that pivots on self-organization, accessibility, and collaboration. The present section will focus specifically on the *labour* performed by Makers when engaging with the materiality of tools, machines, and the matter manipulated for the production of the artefact. In this way, the chapter espouses the exhortation made by Carr and Gibson to focus more on making per se, which «means being able to consider who is doing the making, as well as materials, their skilled manipulation, circulation, redeployment, and their agency, simultaneously across a much wider set of spaces and circumstances» (Carr & Gibson, 2016, p. 302). Indeed, in using the wording "material labour", I draw on works such as Carr (2017) and Carr & Gibson (2016; 2017), where it identifies embodied practices and relations with materials that result into the production of value. Besides my shift towards a distributed understanding of agency of which labour is one particular form, the similarity lies in ascribing specificity to the kind of labour that emerges from the physical encounter with the matter.

While the digital represents with no doubts a crucial dimension for Makers, forms of labour that are exerted on and through the matter undoubtedly hold importance too. Looking at material labour makes possible to grasp, on the one hand, how – once more – performances of Making overflow into already existing professions and sectors and, on the other, how individual engagement with the matter is shaped in ways that make it different from old forms of material production.

6.3.3.1 Projectification: between adhocracies and individualisation

One of the main devices for the distribution of manufacturing to be accomplished corresponds to the diffusion of forms of «projectification of production» (Grabher, 2002, p. 1915) within the realm of material artefacts too. Rather than being centred on either the clock-time of the Fordist assembly line or on the patient work of the craftsman's hands on the matter, the material production of artefacts is strongly influenced by the entanglement with the spatiotemporal organisation of projects. The Maker is no more able to linger on the physical, embodied relationship with the matter, nor is her work disciplined by the rigid rhythm of the Fordist factory. Her engagement with the matter is usually dictated by the tempo of projects and events, which work as 'operating adhocracies', that is, «fast-moving and task-oriented organisations with fluid structures and manifold interfaces with their outsides» (Müller, 2015a, p. 80). Besides the kind of collaboration mediated by digital

platforms analysed before, frequently Makers work is organised around projects through which the contribution of different persons is made possible and the sociospatial organisation of production is transformed. Indeed, the deadline fixed by the project schedule and the final application of the artefact (i.e., use in a workshop, selling on e-commerce platforms, display in a temporary events) impact on the kind of materials used, the skills required, and the level of accuracy, that is, the kind of material labour performed:

'He had made this boombox [N/A a portable music player]... so we decided to have a workshop on its fabrication. But it wasn't feasible to make something that took him two weeks to build. So, we looked on the internet how to make a loudspeaker [...] And he already knew where to buy cheap speakers [...] And almost for fun…the silicone for showers and swimming pools is perfect for audio stuff... and then we cut the pieces and wedged them' (Interview with Vincenzo, Fablab Torino Maker, November 2017).

'Claudio is saying that the laser-cut is fundamental for them, it cuts everything. But unfortunately, it has problems too: it never cut in a perfect way. For example, the sides [of their prototype] are never of the right dimensions. Luckily - they say - they sell on Kickstarter and the guys [N/A the backers] don't get annoyed, but if they had another target, the clients would have complained' (Fieldnote, March 2017).

The workshop loudly praised by Sennett (2008) as the unit of space and time around which craft labour is organised is itself dispersed across almost point spaces, 'cropping up' (cf. Richardson, 2018) through the performances of self-organised Makers. These altogether make material labour emerge from the entanglement of Maker practices with different spaces, which either enable or foreclose particular engagements with materiality (e.g., enabling the use of alternative and cheap materials, foreclosing attention to details and accuracy).

At the same time, material labour as it emerges from the various arrangements for Making is highly characterised by creativity, which however often corresponds not much to the genius of the artist but to the «expansion of [...] *auteur* practices» (Richardson, 2018, p. 248). Etymologically, the author is precisely someone whose work increases reality, that is, someone who brings something new, someone who *innovate*. Indeed, what seems to be at the core of the material labour of many Makers is not so much an interest in fabricating something either aesthetically pleasant or functional, but the willing to bring one's own contribution in solving a problem by means of high-tech tools and the creation of 'cool projects' (Davies, 2017). Thus, automated

selfie-machines or robotic jellyfish are produced in a playful attitude towards the potentialities of digital fabrication.

'[The selfie-machine] was a project oriented to make money. I imagined it to be sold or leased to some cafes, then after a bit of experience, I oriented myself toward another target. They would have hanged on the wall this kind of small square, people would have taken selfies, this machine would have become a sort of gallery for the cafe. And then, it actually worked! I developed it with another person, Ugo, whom I'm professionally in love with, he's a software developer. He worked on the software and I worked on the case, the design, the fabrication... For a long time, we leased it for events [such as] the Rome Maker Faire, New Holland fair, an event for Reply... [...] For the Maker Faire, we were asked [to provide] 5 of them and I made an investment for 7/8. So, there was a further step in the production process: I had designed the previous case, but for 7/8 it was made no more with the laser cutter but with the milling machine. So, I asked Saverio to design a case compatible with the milling machine production' (Interview with Adriano, Fablab Torino Maker, March 2017).

'Tonight, we dissect a robotic jellyfish to create our new one! [...] The magic part, besides the jellyfish functioning – which is the magic we all hope – is the art installation we'd like to create around it to exhibit it at the [Rome] Maker Faire' (Message on Telegram chat, June 2017).

'Unfortunately, I cannot come at the Maker Faire this year, so we have to reconsider the schedule to conclude and give visibility to the robotic aquarium. It's a project that is taking a very nice shape and it has a meaning that goes beyond the mere technical fact. It's been teaching us to know each other, to create together and to give life to something that we could share with others and improve in the future with other entities [N/A the animated creature inhabiting the aquarium]' (Message on Telegram chat, September 2017).

The production of a material artefact is organised around a project that aims more to amaze than either to offer solutions to actual problems or to make aesthetically pleasant artefacts. Making is here an effort in demonstrating the mastering of some fabrication tools, not to «being content with the 'black boxes' that surround us» (Davies, 2017, p. 65); thus, material labour and immaterial labour seem here indiscernible. The most relevant part of engaging with the fabrication of an artefact sometimes is represented by the possibility that it opens up to show one's own knowledge through a stable

and visible outcome. In the passage from learning how to make something and eventually making it, the immaterial labour behind the project has to remain visible. Therefore, the material labour of fabricating the artefact seems almost less valuable than the one of *knowing* how to do it. The displacement of an artefact through the ecologies of temporary events dedicated to Making allows precisely to make this immaterial content portable.

Thus, the engagement with the matter of both prototypes and machines is triggered by a curious and playful attitude, which pivots on the possibility to engage firsthand with the production of something that has a high technological content. In a rush to reach the goal of making something, sustained by tutorials, downloadable files, and copy paste designs, the form of material skills that emerges is far from the «skill development [based on] repetition» characteristic of traditional forms of craft (Sennett, 2008, p. 38). Rather, a 'one-shot' approach shapes the labour performed, absorbing the very *rapidity* inscribed in digital fabrication machines, in which skills seem to be in great part incorporated.

Besides rapidity, Makers' production is heavily characterised by *provisionality* too. Particularly, prototypes embody some of the current transformations ongoing in production, through the very «incorporation of *failure* as a legitimate and very often empirical realisation» (Corsín Jiménez, 2014, p. 381). The experimental nature of prototypes results in a new *temporality of production*; besides the 'rapidness' enabled by the machinery *per se*, this new temporal framework is clearly enacted through the practice of 'cannibalising', as a Maker defines the way old prototypes are usually taken apart to get pieces useful for new experiments:

'[that prototype] has been probably cannibalised, as all the Fablab projects. The thermal printer is probably inside something else. Yes, this is something that is also very common to these spaces...mainly where...it's always about money, but usually, if you make a prototype it's difficult that it stays there on display. Either it has some kind of importance...or it is cannibalised and recycled' (Interview with Vincenzo, Fablab Torino Maker, November 2017).

At the same time, it is the ability to go *beyond* the rapidity and automation performed by digital fabrication machines to characterise a more professional approach to Making, based on skills regarding the labour of the machine on the matter:

'As soon as [...] you have an understanding of the materials different from the one the amateur has, which is to say that you then know how to choose

the right material for that product...and you usually finalise the project, which is another huge difference between who does it as an amateur and who does it as a professional'. (Interview with Michele, Fablab Torino Maker, March 2017)

However, even if the digital is assumed to impact on the production of material artefacts also by transforming the 'time-sense' of production, accelerating it, the temporality generated by the sociomaterial arrangement constituted by the Maker and the machine is not always one of speed. Instead, while digital fabrication machines are *designed* to speed up production, they may frequently need practices of repair and maintenance.

Still pivoting on projects and creativity and aimed at triggering the speeding up of material production, another crucial arrangement for eliciting the enactment of open innovation and distributed manufacturing through Making is represented by hackathons. Hackathons are technology-centred events organised around a specific topic, usually lasting between one day and one week, in which people work in teams to develop a project-based solution to a problem. Originally organised for collaborative software development, hackathons have been incorporated into Maker ecologies. However, most of the critical literature on the topic focuses on the immaterial aspect of the work in hackathons and the production of entrepreneurial subjectivities this format endorses (Irani, 2015; Zukin & Papadantonakis, 2017), while disregarding how hackathons constitute also agencements for the enactment of forms of material labour through which collaboration, speed, and distribution of the production process among various actants are enacted.

One of the communities of Makers based in Turin has implemented during the years precisely the use of hackathons in order to trigger participation and facilitating the encounter among Makers, designers, and people with disability, with the aim of producing customised aids for the latter. Here, material labour is distributed among the machines used, the Makers and professional designers involved, and the final users, who become part of this arrangement also through their very bodies, on which the technology is shaped and tested. Thus, the encounter between production and consumption and the coming into being of mass customisation are enacted through the production of a space (originally, Fablab Torino; later, hackathons in different sites) in which the very bodies – with their abilities and disabilities – of Makers and users, the needs born by the encounter between the users' bodies and the specific features of their homes, together with the possibilities and constraints of the machines can be enrolled into the same actor-network of innovation.

6.3.3.2 Encountering the manufacturing fabric of the city

Hackathons, like events, Fablabs, and coworking spaces, enact socioeconomic scenarios in which cities are platforms of 'intermediary spaces', whose role is to catalyse the exchange of ideas and competences considered to be at the basis of innovation processes. Besides those, other 'urban platforms' for Making are created to trigger a transformation into manufacturing and craft. These are conceived as *'local enabling spaces' (Talk 'Platforms for Makers', Rome Maker Faire, 2017)*, which are structured to facilitate the encounter between local SMEs and craftsmen on one side with Makers and designers on the other.

In Turin, different players have been involved in the creation of two platforms. The first one, *OpenMaker*, is a platform launched by the EU and having as local partner Top-IX Torino, a non-profit consortium working in the field of Internet exchange; the second, *Labcube*, is a project managed by Turin Chamber of commerce, Confartigianato Torino, Fablab Torino, and the non-profit association Turn-Design Community Torino. Through calls for projects, organisation of events, support in the collaboration stage, the two platforms trigger the constitution of urban assemblages for innovation, that act as device for the enactment of the kind of material labour described by theories on the Industry 4.0. Notably, through the very physical encounter between the Makers' skills on digital fabrication machines and other actors(-networks) in craft and manufacturing, the platforms enact the emergence of new forms of material labour, heavily reliant on the use of robotic machines and sustaining the diffusion of mass customisation.

'There's this craftsman who makes leather shoes, extremely high-quality. He buys the leather but he goes to choose it from the supplier who sees the cow before using the leather for the shoe! [...] He's one of the craft excellences of Piedmont... so, on the supply chain he has to go on being a craftsman, you cannot change the machines he uses. So we decided to insert in the shoes an NFC, which he could program, and then it gives to the customer all the info about the product' (Fieldnote, chat with Michele, October 2017).

Figure 35. Labcube project, description panel. Author's photo.

Figure 36. OpenMaker project, leaflet.

Besides these 'adhocracies' for the transformation of material labour, the enmeshment between Making and more traditional forms of manufacturing comes into being also through the displacement of skills acquired through Making. Practices of Making overflow into spaces of industrial production which belong to a Fordist system of production. The material skills acquired at the Fablab or at home, through constant engagement with new digital fabrication machines and the way they interact with the matter are fluid, moving from one actor-network to another, as a sort of 'mutable mobile'. While «industrial cities and regions [may] act as repositories of skill» (Carr & Gibson, 2016, p. 308), the skills acquired at the Fablab could be translated into the material labour performed in a traditional shopfloor too:

'Franco: This piece is not on the market... they ask me to produce it... and there starts the process: you look at the fork, at the braking system... and you invent something manageable... Once, I used to experiment with the milling machine, with many wasted hours... Now, I made it in Pla... if it works, I replicate it in Ergal... if it doesn't, I throw it away and start over' (Telegram chat, Fablab Torino Maker, April 2017).

Thus, new forms of work emerge also through the encounter between the skills acquired at the Fablab and the industrial fabric of the city. Therefore, an appreciation of how material skills developed through paid work in a traditional shopfloor inform DIY production at the Fablab and vice-versa could contribute in shedding light on how work is performed across the boundaries that discoursively separate apparently different spaces (cf. Carr, 2017). Either ordered through ad-hoc 'urban platforms' or enacted through the serendipitous application of new skills in daily jobs, the application of digital fabrication to small manufacturing is enacted through the «site-specific co-mingling of humans and machines» (Richardson & Bissell, 2019, p. 281). In this way, it is possible to overcome those readings of Makers and Fablabs that simply equate them with a new form of urban manufacturing, providing instead more nuanced representations of the multiple and fragmented ways in which practices of Making may encounter a local manufacturing ecosystem.

6.4 Conclusions

Rather than maintaining that, when it comes to work, Makers can be considered as particular instantiations of either more general worker subjectivities that have been spreading in societies of late neoliberalism or the first germs of post-capitalist socioeconomic systems, the chapter has argued that

heterogeneous performances of 'Maker work' may emerge through different socio-technical arrangements. In that, the analysis has spoken to the theories presented in Chapter 1 trying not to indulge in generalising perspectives on the work of consumers, entrepreneurialisation in neoliberal economies, or the exclusive role of Makers in changing urban manufacturing. On the contrary, the analysis has dug in how various forms of labour emerge as a practical accomplishment through multiple socio-technical arrangements.

The chapter has experimented in dismissing more critical stances to embrace instead theoretical and empirical angles from which we are more able to grasp «the material complexities, tensions and opportunities of these co-creative practices» (Banks & Deuze, 2009, p. 425). From a theoretical point of view, it has thus endorsed the STS and ANT sensibility towards technologies, materiality, and contingencies, looking at how forms of affective, digital, and material labour emerge alongside various socio-technical arrangements for Making that inform them. These arrangements come into being as economic performations of the 'archetypes of work' contained in economic theories on Makers, that is, projects, platforms, and creativity. The archetypes of 'Maker work' elicit forms of distributed agency through which value is produced, which the chapter have grouped as affective, digital, and material labour. However, rather than being homogeneous, these forms of labour emerge through heterogenous arrangements that enact 'Maker work' in multiple and contingent ways.

This perspective has been accompanied by a focus on the role of space in the enactment of the various forms of 'Maker work', identifying the spatialization(s) of work as a particularly explanatory element. Indeed, different spatialities and 'workscapes' emerge from the entanglement of various practices of Making with changing assemblages, which are constituted by not only a «network of workplaces and workstations that are occupied by individuals or groups» (Felstead et al., 2005, p. 16), but also online sites where Makers perform different work-practices related to their activities, such as selling, collaborating, or producing. Collaborative spaces such as Fablab Torino, events, private houses, online platforms, ephemeral project-based geographies, but also more traditional firms and workshops constitute the relational spaces across which the 'doing' of labour is distributed. Maker practices are, therefore, entangled with the creation of urban assemblages of Making as work. These complex networks of points of production need to be unpacked in order to grasp not only the variety of labour performed by Makers but also the specificities of new forms and spatialities of work in the evolving urban landscape of digital and material production.

From both an empirical and a theoretical point of view, it can be concluded that Fablabs, rather than representing *tout court* examples of the rising

of a new kind of workplaces in cities, should instead be conceived as platforms themselves. Even if Fablab Torino is not used in a stable and univocal way as a workplace, it is variously enrolled in practices and actor-networks through which performances of work emerge.

Conclusions

'Presenter: Sharing is important. […] When you let the system self-organise, it often produces things not only unexpected but also enduring, and surprising outcomes. Banzi: Yes […] it is a creative magma. […] We should look at the signal-to-noise ratio. […] If there wasn't all the chaos, we wouldn't be able to find beautiful thing within. Thus, we have to give people the opportunity to try and see what happen'.
(Arduino Camp, June 2013)[1]

'This is an instrument that allows small start-ups to have a space for creating. […] It's a space to gather people of good will. Now, there's a lot of space for creating start-ups […] Look around in the Makers world, 'cause there you'll find millions of niches where you find 10,000 clients to whom selling your invention, and that allows you to earn a living. You don't need a firm, […] a huge company to do something innovative. It could be a person, on her own, at home, with some ideas'.
(Massimo Banzi, March 2012)[2]

'From the point of view of a "graduated" economy, I don't know how to say it… I mean, it doesn't really change anything in the short term. Maybe in a more nuanced way. And that's what is difficult. Above all, it is difficult because it's something that has a too short history […] Then, being an association, the board that is in charge now is different from the one of the past…'.
(Interview with Paola, former Fablab Torino Maker, December 2016)

[1] http://ed2013.makerfairerome.eu/2013/06/25/che-cosa-vi-siete-persi-a-innovazione-dal-basso-e-arduino-camp/.

[2] https://www.businessadvisor.it/notizie/wbf-news/massimo-banzi-arduino-e-le-officine-nuove-idee-e-prodotti

Economy and space are intimately entangled. Spaces that materialise economic relations can be markets for selling and buying strawberries, which aim at being a socio-technology performing perfect competition (Garcia-Parpet, 1986/2007). They can be offices in a scientific laboratory, where a calculative agency emerges through the alignment of heterogeneous material entities (Law, 2002a). They can be trading rooms, which are configured in order to perform sociomaterial practices that enable comparability (Beunza & Stark, 2004). They can be supermarkets, where purchase choices are made thanks to the way the spatial configuration of shelves and corridors guides the buyer (Cochoy, 2007).

But they can also be Fablabs, where digital fabrication machines, accessibility, the sharing of space and tools, and a mixture with learning assets are put together in order to foster a change in production and work. In all these cases, materially heterogeneous sets of relations need to be created and specific sociomaterial practices have to be performed in order for an economic agency to come into being, and organising space becomes a crucial endeavour. For these reasons, research such as the one contained in this book bears importance for geography, urban studies, and social sciences in general, since they examine «a production space where cultural forms and economic norms are enacted, performed, and *put in place*. In these processes, the whole innovation complex— buildings, districts, and the city as a whole— develops scale, shape, and meaning» (Zukin, 2020, p. 23).

The originality and the strength of the research on which this book is based lie in the fact that it overcomes concepts such as collaborative and democratised production, open innovation, and sharing economy as explanatory categories to be used as starting points for the analysis of Fablabs and Makers. On the contrary, the present work considers those labels «as a prompt rather than the target of geographical research» (Richardson, 2015: 128), showing that these concepts come from specific economic discourses and theories that both frame the activities of so-called Makers as a transformation in the economy and contribute to the coming into being of Fablabs. In so doing, the present work highlights that the extent to which a Fablab could be considered a new workplace and a space of production belonging to new urban economies in the age of digital capitalism is something that should be investigated rather than postulated. In order to do that, I considered the economy as something that *is done* through performances and practices that hinge on specific sociomaterial orderings (Jones & Murphy, 2010; Müller, 2015). Thus, throughout the book, it has been possible to appreciate a refusal of binary assumptions on Makers and Fablabs, in favour instead of an appreciation of multiplicity and performativity.

Although at the time this research was conducted almost all the articles and books published on the topic in social sciences (especially in urban studies) adopted a rather homogeneous understanding of Makers and Fablabs and largely drew from mainstream representations of the phenomenon, more recently, alternative interpretations have flourished that resonate with the theoretical and methodological concerns that I had when conducting my fieldwork. Notably, the works of Johns and Hall (2020), Lange and Bürkner (2018), Lhoste and Barbier (2018), Schmidt (2019), and Smith (2020) deploy an attention towards sociomaterial practices, assemblages, and an appreciation for heterogeneity, performativity, and becoming that made them very close to the present analysis.

The research of these scholars and mine follow the path traced by those heterogeneous bodies of work in social sciences that claim to shift the focus from either asking or taking for granted the nature of something (i.e., questions on *what*) to asking what it does and how does it appear as a coherent and situated entity (i.e., questions on *how*). Notably, the research has been informed by the following, pressing questions: «How to *talk* about something, how to name it, without reducing it to the fixity of singularity? […] How to talk about objects […] that are more than one and less than many? How to *talk about* complexity, to *appreciate* complexity, and to *practice* complexity? […] How to resist the singularities that are usually performed in the act of naming?» (Law, 1999, pp. 10-11).

***

The present work opened with an acknowledgement of the increasing relevance that Fablabs and Makers were gaining at the time this research was conducted, as both policy objects and scientific research topics. This interest was due mainly to the value ascribed to the phenomenon for what concerned major trends in the current transformation of the economy within urban contexts. Notably, Makers and Fablabs have been put under the microscope for their alleged transformative role in both triggering a new organisation of production and participating in the evolution of forms and spaces of work in cities. The topic has raised the interest of economic geographers and urban scholars too, who have been principally concerned with the catalyst power of Fablabs and Makerspaces as harbingers of a new wave of urban economic growth based on creativity and innovation.

However, the book has highlighted the sort of 'efficacy bias' that lies at the core of both critical and mainstream literature on the topic, which leads to taking for granted that Fablabs are always populated by people that *produce (value)* and *work*. Both policy discourse and research usually conceive

Fablabs and Makers as part of these changes in the economy, using the latter as *descriptions* to be employed as a starting point in order to frame the analysis. In other words, as the Introduction clearly stated paraphrasing Michel Callon, both mainstream and critical literature on Fablabs and Makers as economic entities seem to know *what they are*, disagreeing on their effects while finding a common ground in assuming their nature as unproblematic. In other words, I shifted the focus to investigating the relationship that occurs in a specific place between economic *discourses and representations* on one side and *practices and realities* on the other.

The research thus framed the topic through three different while related questions. Firstly, the work asked how a space for Making (a Fablab and/or a Maker scene) comes into being and what is the role of economic theory in this enactment. In acknowledging that economics performs the economy only if specific socio-technical arrangements (i.e., conditions of felicity) are present, the research considered Fablabs as *agencements* that aim at performing an economic shift constituted by a democratization of production and innovation – i.e., the access to production by people usually outside it, thanks to both an ethos of sharing and a strong reliance on digital technologies. Secondly (and related to the first question), the research paid attention to how a Fablab enables (or not) this process of performative enactment by contributing to framing specific practices as new economic phenomena. Thirdly, the research mobilised a geographical sensibility to space as a crucial level of analysis to shed light on processes of economic performation, asking which spatialities come into being alongside the enactment of a Maker economy and how the heterogeneus sites that are enrolled in the different arrangements sustaining Makers' practices either facilitate or prevent the enactment of Making as a new form of work.

In an effort – elicited by the fieldwork – to offer an alternative perspective, the research moved towards theories that, instead of taking for granted the economic relevance of the phenomenon, *question* it by looking at *if and how* Makers and Fablabs are brought into being as new economic entities. Thus, the analysis twirled the focus, in order to adopt a theoretical perspective that neither dismissed the need for investigating the phenomenon as a relevant economic transformation nor took for granted the actual meaning of it. To bridge these two positions, I claimed for an approach that looked at *how* spaces and practices belonging to the Makers and Fablabs ecosystem come into being as economic entities. Therefore, I partially abandoned the vocabulary identified in Chapter 1 as the one usually employed in talking about Making as an economic transformation by both mainstream and critical literature, instead of using it not as a lens through which looking at the case study but as *part* of it.

These alternative framework and conceptual toolkit were identified within tradition in economic sociology and some recent works in economic geography that drive attention to the construction of the economy. A focus on *how* the process of making a 'Maker economy' is practically accomplished allowed to leave the door open to contingency, situatedness, and fragility. Notably, the 'performativity programme' inspired by the work of Michel Callon and strongly indebted to the tradition of both Actor-Network Theory (ANT) and the stream of Science and Technology Studies (STS) informed by that was mobilised for its peculiar understanding of socio-technical systems as contingent, practical, and ephemeral actualisations of economic discourse. Thus, what at first could have been downgraded to poorly significant case study was, in turn, framed as a telling example of the performative nature of economics, whose successful result in bringing into being the world it describes is always contingent upon the construction of specific sociomaterial arrangements.

Throughout the chapters, the mobilization of the alternative triad *knowledge*, *materiality*, and *work* allowed to look in detail at the micro-processes through which both a Fablab and various practices entailed in what being a Maker means come (or, fail to come) into being as examples of a transformation in urban economies. From a geographical point of view, this has meant, on the one hand, appreciating how specific economic discourses and theories always entail the production of specific spaces and, on the other, tracing the networks that, by connecting heterogeneous entities and drawing together distant spaces, bring into being contingent forms of Makers and Fablabs.

The work has stressed that the emergence of Making as a relevant phenomenon for urban economies is ephemeral, contingent, and never stabilised. At first, specific economic theories (namely, those on open innovation, peer-production, sharing economy, and prosumption) and discourses on Makers were moved to Turin and successfully enrolled into sociotechnical arrangements constituting new spaces of work and production in digitalised urban economies. However, at the time I conducted my fieldwork, it was clear, on the one hand, that some humans and nonhumans had started to disalign from the actor-network and, on the other, that more generally the relevance of Making as part of the reconfiguration of urban economies was contingent upon the sociotechnical systems and the sites involved in the practices of Makers. Indeed, a Fablab is not a site that automatically belongs to the 'innovation complex' (Zukin, 2020) of a city. As the research has shown, a constant process of ordering has to be put on place in order for economic theories on open innovation, peer-production, and sharing economy to be successfully performed through the activities of Makers at the Fablab. On the

contrary, the evidence collected from the ethnographic work on the recent history of Fablab Torino and the practices of its members tells a different story. It is a story in which multiple actants – broken machines, conflicting discourses, rules not followed, the use of some digital platforms instead of others, etc. – took part in preventing the stabilisation of an actor-network that translates Fablab Torino into a site of innovation and an urban collaborative workplace. At the same time, it is a story that shows how Making is enacted in multiple ways and emerges as a new form of work and production only as the contingent, never certain outcome of network relations that operate at different, multiscalar sites, in which they are entangled with other urban assembalges.

***

In mobilising theories on economic performativity and drawing on the ontological and epistemological tenets of ANT, the research has contributed to the debates on the topic by driving attention to the potentialities of an approach that looks at how economic entities are practically made and unmade, how they stabilize or, instead, how they constantly risk crumbling. The production of new economic entities entails a high amount of work that usually goes unnoticed in both economic geography and urban studies. Thus, unearthing the sociomaterial practices and the heterogeneous socio-technical arrangements involved in the practical realisation of the economy is a needed effort.

On the one hand, it allows disarming enthusiastic accounts that praise any new phenomena - such as the advent of Makers - as revolutionising. On the other, it acts as a tool to downsize critical analyses that, in a rush to provide explanations and interpretations (cf. Latour, 2005, p. 50), «often tell us very little about the material complexities, tensions and opportunities» (Banks & Deuze, 2009, p. 425) that constitute social life. Notably, the research has experimented in applying the performativity vocabulary to the realm of production instead of those of market exchange and financial transactions, an attempt that, to the knowledge of who is writing, was rarely made (but see Swanton, 2013).

Mobilising conceptualisations of space as relational, performative, and practised, mingling theories developed within the disciplinary boundaries of geographic research with ANT's theorisation of topological spatialities, the research has offered an alternative spatial perspective on the phenomenon. The analysis has avoided indulging on either geographical perspectives that look at Fablabs pivoting on the importance of proximity and agglomeration or on opposite explanations that mobilise Makers' immanent capacity to plug

into global networks of shared knowledge and collaborative work. Rather, I claimed for focusing the analysis on a Fablab as a willing-to-be seed of the kind of 'light institutions' that Amin and Thrift (2002) identify as a crucial site for investigating urban economies, avoiding focussing only on specific spatial configurations as relevant.

Also, I echoed those scholars (see, for example, Jones & Murphy, 2010; Müller, 2015a; Richardson, 2016) who, in recognising that an economic geography research made of stable categories such as firms, clusters, global networks, and industries for grasping sociospatial transformations is no longer feasible, claimed for both the relevance of a focus on individuals as crucial dimension of contemporary economic phenomen and the important contribution that post-structuralist theories could have on the discipline. Indeed, the constantly changing nature of economies and economic geographies needs new conceptual and methodological tools to be appreciated (Thrift & Olds, 1996). These arguments entailed a dual focus on the *organisation* Fablab Torino and on *individual* Makers as entry points for analysing how various spatialities of Making are performed and how, eventually, new economic geographies emerge as a contingent outcome of specific sociomaterial practices. This epistemological choice corresponded also to a shift of attention to the performativity of organizing, that is, to «the mundane practices through which organization is brought into being at the level of the individual, which is in tune with the budding interest in theories of practice» (Müller, 2015b, p. 305). This constitutes an important novelty in the analysis of both the spatial configuration and the economic relevance of the phenomenon, in that, on the one hand, it overcomes the methodological shortcoming of urban scholars and geographers who focus exclusively on the organisations' managers and other 'elite' informant and, on the other, it merges a more anthropological attention to individual practices entailed in making, producing, and working with an interest towards economic spatialities.

Moreover, conferring analytical relevance to the investigation of the phenomenon in cities which are not those – such as Milan, for what concerns the Italian context – universally known as 'best practices' in terms of capacity to innovate, to foster economic growth, and to capitalise on creativity is part not only of an alternative empirical agenda but also of a theoretical and methodological one, which praises the heuristic potential of ordinary cases (cf. Robinson, 2006). Indeed, a significant body of works in urban studies has proven that where we theorise from is relevant. This is true also for the rising of alleged new spaces of work and production, since everything that pertain to them is not indifferent to the specific context in which they are situated – and, consequently, the theories we made on them aren't too.

***

Concluding, the frequent mobilisation of Makers and Fablabs in public discourse as example of economic innovation urges any research on the topic to measure itself against the celebratory framing made by policy makers. In depth investigation based on ethnographic methods has a strong heuristic potential in revealing not only the inner functioning of these organisations but also the practices that constitute what is usually "black-boxed" by simply referring to it as 'Making'. Moreover, research that questions *how* those practices and organisations become relevant economic transformations rather than assuming it represents a needed effort in order to shed light on the difficulties, the amount of work, the individual risks, and ephemeral results that frequently constitute this kind of experience. In this perspective, research on Makers informed by theories that look precisely at the work needed to enact any economic reality represents a powerful tool in counterbalancing the hype that surrounds experiences which aim at capitalising on the creative and passionate engagement of individuals.

The analysis made on Fablab Torino, its history, and the so-called Makers attending the space shows how the lack of clarity on new spaces of work and production urges this sort of micro-level investigations. Indeed, the research discussed in this book clearly asks for policymakers to be careful in «promot[ing] and endors[ing] the value of creative hubs as a catalyst for innovation and growth in local creative and cultural economies, as well as for producing urban regeneration» (Gill et al., 2019, p. 2). As argued by this work, these spaces bring with them the heavy luggage of visions and imaginaries on how cities and their economies should be. However, neither these discourses are neutral, nor they bring into being the same outcomes everywhere. As brilliantly explained by Sharon Zukin in her recent work, «what cities are envisioning today is nothing less than the urbanization of Silicon Valley, an imaginary based on placing new digital technologies in dense, strategic clusters, creating new cultures of innovation and production, and capturing the economic rewards» (Zukin, 2020, p. 3). As the particular case studied in this book has shown, not only policymakers should avoid acritically embracing enthusiastic recipes for new urban economies that hide the interest of global capital, but they should also be aware that the same recipes may not work for every city.

Wether the spaces building the material urban 'innovation complex' (Zukin, 2020) needed for innovation to occur are successful or not in bringin into being new urban economies, local governments represent crucial elements in the process, by subsidising businesses, endorising some actors instead of others, building arenas that facilitate the networking of different

organisations, or simply helping a specific discourse on the economy circulating. Therefore, research on the heterogeneity of urban innovation sites (such as Fablabs) and on alleged new innovative subjects (such as Makers) warns policymakers against looking at the cities in which successful examples could be spotted and simply use them as best practice models. On the contrary, experiences coming from different contexts should be carefully analysed in their micro dimensions, looking in a critical way at the discourses and imaginaries mobilised, identifying the resources used, the practices performed, the networks built, and the entities enrolled in the process of building a Fablab (or a similar organisation) as a space that participates in infrastructuring a new, digital urban economy. These observations prove once more the relevance of studies on new spaces of work and production that «start with what actually happens, rather than what should, or might, occur» (Gill et al, 2019, p. 6). By looking at "Making in the making", this book has tried to pursue this goal.

References

Akrich M. (1992), *The De-Scription of Technical Objects*, in Bijker W. E. and Law J. (1992), *Shaping technology/building society: Studies in sociotechnical change*, MIT Press, Cambridge, Massachusett.

Akrich M. and Latour B. (1992), *A summary of a convenient vocabulary for the semiotics of human and nonhuman assemblies*, in Bijker W. E. and Law J. (1992), *Shaping technology/building society: Studies in sociotechnical change*, MIT Press, Cambridge, Massachusetts.

Amin A. (2002), "Spatialities of globalisation", *Environment and planning A: Economy and Space*, 34, 3: 385-399.

Amin A. and Cohendet P. (2004), *Architectures of knowledge: Firms, capabilities, and communities*, Oxford University Press on Demand, Oxford.

Amin A. and Roberts J. (2008), "Knowing in action: Beyond communities of practice", *Research policy*, 37, 2: 353-369.

Amin A. and Thrift N. (2000), "What kind of economic theory for what kind of economic geography?", *Antipode*, 32, 1: 4-9.

Amin A. and Thrift N. (2002), *Cities: reimagining the urban*, Polity Press, Cambridge.

Amin A. and Thrift N. (Eds.) (2004), *The Blackwell Cultural economy reader*, Blackwell Publishing Ltd, Oxford.

Amin A. and Thrift N. (2007), "Cultural-economy and cities", *Progress in human geography*, 31, 2: 143-161.

Anderson C. (2006), *The long tail: Why the future of business is selling less of more*, Hachette Books, Paris.

Anderson C. (2012), *Makers: The New Industrial Revolution*, Random House, New York.

Arcidiacono D., Gandini A. and Pais I. (2018), "Sharing our way into the future", *The Sociological Review*, 66, 2: 466-471.

Armano E. (2010), *Precarietà e innovazione nel postfordismo. Una ricerca qualitativa sui lavoratori della conoscenza a Torino* (Vol. 2), I Libri di Emil, Bologna.

Armano E. and Murgia A. (2013), "The precariousnesses of young knowledge workers: A subject-oriented approach", *Global Discourse*, 3, 3-4: 486-501.

Armondi S. and Bruzzese A. (2017), "Contemporary production and urban change: The case of Milan", *Journal of Urban Technology*, 24, 3: 27-45.
Armondi S. and Di Vita S. (2017), "Contemporary Production, Innovative Workplaces, and Urban Space: Projects and Policies", *Journal of Urban Technology*, 24, 3: 1-3.
Arvidsson A., Caliandro A., Cossu A., Deka M., Gandini A., Luise V. and Anselmi G. (2016), "Commons based peer production in the information economy". Available at: https://www.researchgate.net/profile/Alessandro_Caliandro/publication/310624903_Commons_Based_Peer_Production_in_the_Information_Economy/links/5834403108ae004f74c85030.pdf
Avdikos V. and Kalogeresis A. (2017), "Socio-economic profile and working conditions of freelancers in co-working spaces and work collectives: evidence from the design sector in Greece", *Area*, 49, 1: 35-42.
Bagnasco A. (1986), *Torino: un profilo sociologico*, Einaudi, Torino.
Bagnasco A. (1990), *La città dopo Ford: il caso di Torino*, Bollati Boringhieri, Torino.
Balestra A. and Ferrero M. (2016), *Area OSI OVEST-NORD: Toolbox Coworking!*, in Armano E., Dondona C. A. and Ferlaino F. (Eds.) (2016), *Postfordismo e trasformazione urbana*, Ires Piemonte, Torino.
Banks J. and Deuze M. (2009), "Co-creative labour", *International journal of cultural studies*, 12, 5: 419-431.
Banks J. and Humphreys S. (2008), "The labour of user co-creators: Emergent social network markets?", *Convergence*, 14, 4: 401-418.
Barbrook R. (1998), "The hi-tech gift economy", *first monday*, 3, 12.
Bardhi F. and Eckhardt G. M. (2012), "Access-based consumption: The case of car sharing", *Journal of consumer research*, 39, 4: 881-898.
Barnes T. J. (2002), "Performing economic geography: two men, two books, and a cast of thousands", *Environment and Planning A: Economy and Space*, 34, 3: 487-512.
Barnes T. J. (2008), "Making space for the economy: live performances, dead objects, and economic geography", *Geography Compass*, 2, 5: 1432-1448.
Barry A. and Slater D. (2002a), "Introduction: the technological economy", *Economy and society*, 31, 2: 175-193.
Barry A. and Slater D. (2002b), "Technology, politics and the market: an interview with Michel Callon", *Economy and Society*, 31, 2: 285-306.
Bathelt H. and Gibson R. (2015), "Learning in 'organized anarchies': the nature of technological search processes at trade fairs", *Regional Studies*, 49, 6: 985-1002.
Bathelt H. and Schuldt N. (2008), "Between luminaires and meat grinders: International trade fairs as temporary clusters", *Regional Studies*, 42, 6: 853-868.
Bauwens M. (2005), "The political economy of peer production", *Ctheory Journal*, http://www.ctheory.net/articles.aspx?id=499.

Beauregard R. (2014), *Note on the Maker Movement and the City*. Available at: http://www.fondazionefeltrinelli.it/wp-content/uploads/2015/02/Beauregard_Noteonthemakermovementandthecity.pdf
Becattini G. (1979), *Dal settore industriale al distretto industriale. Alcune considerazioni sull'unità di indagine dell'economia industriale*, Il Mulino, Bologna.
Benjamin W. (1985), *Naples*, in Benjamin W. (1985), *One Way Street and Other Writings*, Verso Books, London.
Benkler Y. (2006), *The wealth of networks: How social production transforms markets and freedom*, Yale University Press, New Haven, Connecticut.
Benkler Y., Shaw A. and Hill B. M. (2015), *Peer Production: A Form of Collective Intelligence*, in Malone T. and Bernstein M. (Eds.) (2015), *Handbook of Collective Intelligence*, MIT Press, Cambridge, Massachusetts.
Berndt C. and Boeckler M. (2009), "Geographies of circulation and exchange: Constructions of markets", *Progress in Human Geography*, 33, 4: 535-551.
Berndt C. and Boeckler M. (2011), "Geographies of markets: Materials, morals and monsters in motion", *Progress in human geography*, 35, 4: 559-567.
Beunza D. and Stark D. (2004), "Tools of the trade: the socio-technology of arbitrage in a Wall Street trading room", *Industrial and corporate change*, 13, 2: 369-400.
Bianchini M. and Maffei S. (2013), "Microproduction everywhere. Defining The Boundaries of the emerging new Distributed Microproduction socio-technical paradigm", *Social Frontiers.* Available at: http://www.transitsocialinnovation.eu/content/original/Book%20covers/Local%20PDFs/93%20SF%20Bianchini,%20and%20Maffei%20Distributed%20economies%20paper%202013.pdf
Bianchini M., Menichinelli M., Maffei S., Bombardi F. and Carosi A. (2015), *Makers' Inquiry. Un'indagine socioeconomica sui makers italiani e su Make in Italy*, Libraccio Editore, Milano.
Bijker W. E. and Law J. (1992), *Shaping technology/building society: Studies in sociotechnical change*, MIT Press, Cambridge, Massachusetts.
Boggs J. S. and Rantisi N. M. (2003), "The 'relational turn' in economic geography", *Journal of economic geography*, 3, 2: 109-116.
Boltanski L. and Chiapello E. (1999), *Le Nouvel Esprit du capitalisme*, Gallimard, Paris. English edition (2005).
Bondi L. (2005), "Troubling space, making space, doing space", *Group analysis*, 38, 1: 137-149.
Boschma R. (2005), "Proximity and innovation: a critical assessment", *Regional studies*, 39, 1: 61-74.
Braybrooke K. and Jordan T. (2017), "Genealogy, Culture and Technomyth", *Digital Culture & Society*, 3, 1: 25-46.
Brenner N., Madden D. J. and Wachsmuth D. (2011), "Assemblage urbanism and the challenges of critical urban theory", *City*, 15, 2: 225-240.
Brenner N. and Schmid C. (2015), "Towards a new epistemology of the urban?", *City*, 19, 2-3: 151-182.

Brinks V. and Schmidt S. (2015), "Global knowledge communities in temporary spaces", in *Paper Presented at Transience and Permanence in Urban Development (TPUD)*, University of Sheffield, Sheffield, January: 14-15.
Brown J. (2017), "Curating the 'Third Place'? Coworking and the mediation of creativity", *Geoforum*, 82: 112-126.
Bruns A. (2008), *Blogs, Wikipedia, Second Life, and beyond: From production to produsage*, Peter Lang, Lausanne.
Bryson J. R., Daniels P., Pollard J., & Henry N. (Eds.) (2000), *Knowledge, space, economy*, Routledge, London.
Burston J., Dyer-Whiteford N. and Hearn A. (2010), "Digital labour: Workers, authors, citizens", *ephemera*, 10: 3/4.
Butler J. (2010), "Performative agency", *Journal of cultural economy*, 3, 2: 147-161.
Çalışkan K. and Callon M. (2009), "Economization, part 1: shifting attention from the economy towards processes of economization", *Economy and society*, 38, 3: 369-398.
Callon M. (1986a), *Some elements of a sociology of translation: domestication of the scallops and the fishermen of St Brieuc Bay*, in Law J. (Ed.) (1986), *Power, action and belief: a new sociology of knowledge?*, Routledge, London.
Callon M. (1986b), *The Sociology of an Actor-Network: The Case of the Electric Vehicle*, in Callon M., Law J. and Rip, A. (Eds.) (1986), *Mapping the Dynamics of Science and Technology: Sociology of Science in the Real World*, Basingstoke, Macmillan, New York.
Callon M. (1987), *Society in the making: The study of technology as a tool for sociological analysis*, in Huges T. and Pinch T. (Eds.), *The social construction of technological systems: New directions in the sociology and history of technology*, MIT Press, London.
Callon M. (1991), *Techno-economic networks and irreversibility*, in Law J. (Ed.), (1991), *A sociology of monsters: Essays on power, technology, and domination*, Routledge, London.
Callon M. (Ed.) (1998), *The laws of the markets*, Blackwell, Oxford.
Callon M. (1999), *Actor-network theory—the market tes*, in Law J. and Hassard J. (1999), *Actor network theory and after*, Blackwell, Oxford.
Callon M. (2005), "Why virtualism paves the way to political impotence: A reply to Daniel Miller's critique of 'The laws of the market'", *Economic sociology: European electronic newsletter*, 6, 2: 3-20.
Callon M. (2007a), "An essay on the growing contribution of economic markets to the proliferation of the social", *Theory, Culture & Society*, 24: 7-8: 139-163.
Callon M. (2007b), *What does it mean to say that economics is performative?*, in MacKenzie D., Muniesa F. and Siu L. (2007), *Do economist make markets? On the performativity of economics*, Princeton University Press, Princeton.
Callon M. (2008), *Economic markets and the rise of interactive agencements: from prosthetic agencies to habilitated agencies*, in Pinch T. and Swedberg R. (Eds)

(2008), *Living in a material world: economic sociology meets science and technology studies*, MIT Press, Cambridge, Massachusetts.
Callon M. (2009), "Elaborating the notion of performativity", *Le libellio d'AEGIS*, 5, 1: 18-29.
Callon M. (2010), "Performativity, misfires and politics", *Journal of Cultural Economy*, 3, 2: 163-169.
Callon M. (2016), "Revisiting marketization: from interface-markets to market-agencements", *Consumption Markets & Culture*, 19, 1: 17-37.
Callon M. and Law J. (2004), "Absence – presence, circulation, and encountering in complex space", *Environment and Planning D: Society and Space*, 22, 1: 3-11.
Callon M., Millo Y. and Muniesa F. (2007), *Market Devices*, Blackwell, Oxford.
Camagni R. (1995), "The Concept of Innovative Milieu and its Relevance for Public Policies in European Lagging Regions", *Regional Science*, 74, 4: 317-340.
Capdevila I. (2013), *Fabbers, makers and coworkers: Local and global knowledge dynamics in knowing communities.* (Unpublished doctoral dissertation). HEC Montréal.
Capdevila I. (2018), "Knowing communities and the innovative capacity of cities", *City, Culture and Society*, 13: 8-12.
Capello C. (2018). *Torino liminale. Riflessioni antropologiche su post-fordismo e disoccupazione*, in Capello C. and Semi G. (Eds.) (2018), *Torino. Un profilo etnografico*, Meltemi, Milano.
Capello C. and Semi G. (2018), *Introduzione. Un'etnografia della (nostra) città*, in Capello C. and Semi G. (Eds.) (2018), *Torino. Un profilo etnografico*, Meltemi, Milano.
Carr C. (2017) "Maintenance and repair beyond the perimeter of the plant: linking industrial labour and the home", *Transactions of the Institute of British Geographers*, 42, 4: 642-654.
Carr C. and Gibson C. (2016), "Geographies of making: Rethinking materials and skills for volatile futures", *Progress in Human Geography*, 40, 3: 297-315.
Carr C. and Gibson C. (2017), "Animating geographies of making: Embodied slow scholarship for participant-researchers of maker cultures and material work", *Geography Compass*, 11, 6: 1-10.
Cenere S. (2021), "Making translations, translating Making: Actor-networks, spatialities, and forms of Makers' work in Turin", *City*, 25, 3-4: 355-375.
Centro Einaudi (2017), *Recuperare la rotta, Diciottesimo Rapporto Giorgio Rota su Torino*. Available at www.rapporto-rota.it
Chesbrough H. (2003), *Open innovation: The new imperative for creating and profiting from technology*, Harvard Business Press, Boston.
Chesbrough H., Vanhaverbeke W. and West J. (Eds.) (2006), *Open innovation: Researching a new paradigm*, Oxford University Press, Oxford.
Chiappini L. and Anselmi G. (2017), *Molto più di un bit… L'utilizzo della comunicazione online e offline dei maker*, in D'Ovidio M. and Rabbiosi C. (Eds.) (2017),

Maker e città. La rivoluzione si fa con la stampante 3D?, Fondazione Giangiacomo Feltrinelli, Milano.
Christophers B. (2014a), "From Marx to market and back again: Performing the economy", *Geoforum*, 57: 12-20.
Christophers B. (2014b), "Wild dragons in the city: urban political economy, affordable housing development and the performative world-making of economic models", *International Journal of Urban and Regional Research*, 38, 1: 79-97.
Cochoy F. (2007), "A sociology of market-things: on tending the garden of choices in mass retailing", *The sociological review*, 55, 2_suppl: 109-129.
Cochoy F. (2008), "Calculation, qualculation, calqulation: shopping cart arithmetic, equipped cognition and the clustered consumer", *Marketing theory*, 8,1: 15-44.
Cockayne D. G. (2016a), "Affect and value in critical examinations of the production and 'prosumption'of Big Data", *Big Data & Society*, 3, 2: 1-11.
Cockayne D. G. (2016b), "Entrepreneurial affect: Attachment to work practice in San Francisco's digital media sector", *Environment and planning D: Society and space*, 34, 3: 456-473.
Cockayne D. G. (2016c), "Sharing and neoliberal discourse: The economic function of sharing in the digital on-demand economy", *Geoforum*, 77: 73-82.
Cook I. (2004), "Follow the thing: Papaya", *Antipode*, 36, 4: 642-664.
Cooper M. and McFall L. (2017), "Ten years after: it's the economy and culture, stupid!", *Journal of Cultural Economy*, 10, 1: 1-7.
Corsìn Jimenez A. (2014), "The prototype: more than many and less than one", *Journal of Cultural Economy*, 7, 4: 381-98.
Crang M. (2005), "Qualitative methods: there is nothing outside the text?", *Progress in human geography*, 29, 2: 225-233.
Crang M. and Cook I. (2007), *Doing ethnographies*, Geobooks, Norwich.
Crang P. (1994), "It's showtime: on the workplace geographies of display in a restaurant in southeast England", *Environment and Planning D: Society and Space*, 12, 6: 675-704.
Cranston S. (2014), "Reflections on doing the expat show: Performing the global mobility industry", *Environment and Planning A*, 46, 5: 1124-1138.
D'Ovidio M. (2017), *Che cosa serve per fare open knowledge (e guadagnarsi da viver)?*, in D'Ovidio M. and Rabbiosi C. (ed.) (2017), *Maker e città. La rivoluzione si fa con la stampante 3D?*, Fondazione Giangiacomo Feltrinelli, Milano.
D'Ovidio M. and Rabbiosi C. (ed.) (2017), *Maker e città. La rivoluzione si fa con la stampante 3D?*, Fondazione Giangiacomo Feltrinelli, Milano.
Davies S. R. (2017), *Hackerspaces: making the maker movement*, Polity Press, Cambridge.
Dawkins N. (2011), "Do-it-yourself: The precarious work and postfeminist politics of handmaking (in) Detroit", *Utopian Studies*, 22, 2: 261-284.
De Laet M. and Mol A. (2000), "The Zimbabwe bush pump: Mechanics of a fluid technology", *Social studies of science*, 30, 2: 225-263.
Deliberazione della Giunta Comunale della Città di Torino, 2016 02266/068

Dewsbury J. D., Harrison P., Rose M. and Wylie J. (2002), "Enacting geographies", *Geoforum*, 33, 4: 437-440.
Di Vita S. (2017), *I laboratori maker di Milano. Quali politiche pubbliche?*, in D'Ovidio M. and Rabbiosi C. (ed.) (2017), *Maker e città. La rivoluzione si fa con la stampante 3D?*, Fondazione Giangiacomo Feltrinelli, Milano.
Dougherty D. (2012), "The maker movement", *Innovations: Technology, Governance, Globalization*, 7, 3: 11-14.
Doussard M., Schrock G., Wolf-Powers L., Eisenburger M. and Marotta S. (2017), "Manufacturing without the firm: Challenges for the maker movement in three US cities", *Environment and Planning A: Economy and Space*, 50, 3: 651-670.
Drewlani T. and Seibt D. (2018), "Configuring the Independent Developer", *Journal of Peer Production*, 12, 2: 96-114.
Du Gay P. and Pryke M. (Eds.) (2002), *Cultural economy: cultural analysis and commercial life*, Sage, London.
Dujarier M. A. (2015), "The activity of the consumer: Strengthening, transforming, or contesting capitalism?", *The Sociological Quarterly*, 56, 3: 460-471.
Dumez H. and Jeunemaître A. (2010), "Michel Callon, Michel Foucault and the 'dispositif'", *Le Libellio d'Aegis*, 6, 4: 27-37.
Dunn E. C. (2007), *Of pufferfish and ethnography: plumbing new depths in economic geography*, in Tickell A., Sheppard E., Peck J. and Barnes T. J. (Eds.) (2007), *Politics and practice in economic geography*, Sage, London.
Dusi D. (2018), "Beyond prosumer capitalism: Retaining the original understanding of presumption", *Current Sociology*, 66, 5: 663-681.
England K. V. (1994), "Getting personal: Reflexivity, positionality, and feminist research", *The Professional Geographer*, 46, 1: 80-89.
Entwistle J. and Slater D. (2014), "Reassembling the cultural: Fashion models, brands and the meaning of 'culture'after ANT", *Journal of Cultural Economy*, 7, 2: 161-177.
Ettlinger N. (2003), "Cultural economic geography and a relational and microspace approach to trusts, rationalities, networks, and change in collaborative workplaces", *Journal of economic geography*, 3, 2: 145-171.
Farías I. (2010), *Introduction: Decentering the object of urban studies*, in Farías I., and Bender T. (Eds) (2010), *Urban assemblages: How actor-network theory changes urban research*, Routledge, London.
Farías I. (2011), "The politics of urban assemblages", *City*, 15, 3-4: 365-374.
Felstead A., Jewson N. and Walters S. (2005), *Changing places of work*, Palgrave Macmillan, London.
Florida R. (2002), *The Rise of the Creative Class: And How It's Transforming Work, Leisure, Community and Everyday Life*, Basic Books, New York.
Foucault M. (2008), *The Birth of Biopolitics. Lectures at the Collège de France, 1978-1979*, Palgrave Macmillan, New York.

Fox S. (2014), "Third Wave Do-It-Yourself (DIY): Potential for prosumption, innovation, and entrepreneurship by local populations in regions without industrial manufacturing infrastructure", *Technology in Society*, 39: 18-30.
Fox Miller C. (2017), "The contemporary geographies of craft-based manufacturing", *Geography compass*, 11, 4: e12311.
French S. (2000), "Re-scaling the economic geography of knowledge and information: constructing life assurance markets", *Geoforum*, 31, 1: 101-119.
Fuchs C. (2014), "Digital prosumption labour on social media in the context of the capitalist regime of time", *Time & Society*, 23, 1: 97-123.
Fuentes C. and Sörum N. (2018), "Agencing ethical consumers: smartphone apps and the socio-material reconfiguration of everyday life", *Consumption Markets & Culture*, 1-26.
Gandini A. (2015), "The rise of coworking spaces: A literature review", *ephemera*, 15, 1: 193.
Gandini A. (2016), "Digital work: Self-branding and social capital in the freelance knowledge economy", *Marketing theory*, 16, 1: 123-141.
Garcia-Parpet M.-F. (2007), *The Social Construction of a Perfect Market: The Strawberry Auction at Fontaines-enSologne*, in MacKenzie D., Muniesa F. and Siu L. (2007), *Do Economists Make Markets? On the Performativity of Economics*, Princeton University Press, Princeton.
Gauntlett D. (2011), *Making is connecting: the social meaning of creativity from DIY and knitting to YouTube and Web 2.0*, Polity Press, Cambridge.
Gershenfeld N. (2005), *Fab: Personal fabrication, fab labs, and the factory in your computer*, Basic Books, New York.
Gherardi S. (2009), "Knowing and learning in practice-based studies: an introduction", *The Learning Organization*, 16, 5: 352-359.
Gibson-Graham J. K. (2006), *The End of Capitalism (as We Knew It): A Feminist Critique of Political Economy; with a New Introduction*, University of Minnesota Press, Minneapolis.
Gill R. and Pratt A. (2008), "In the social factory? Immaterial labour, precariousness and cultural work", *Theory, culture & society*, 25, 7-8: 1-30.
Gill R., Pratt A. and Virani T. E. (Eds.) (2019), *Creative hubs in question: Place, space and work in the creative economy*, Cham, Springer.
Gillespie T. (2010), "The politics of 'platforms'", *New media & society*, 12, 3: 347-364.
Glass M. R. and Rose-Redwood R. (Eds.) (2014), *Performativity, politics, and the production of social space*, Routledge, London.
Governa F. (2017), "Pratiche di ricerca. Practice turn e more than representational theories", *Rivista geografica italiana*, 124, 3: 227-244.
Grabher G. (2002), "Fragile sector, robust practice: project ecologies in new media", *Environment and Planning A*, 34, 11: 1911-1926.

Grabher G. (2004), "Learning in projects, remembering in networks? Communality, sociality, and connectivity in project ecologies", *European urban and regional studies*, 11, 2: 103-123.
Grabher G., Ibert O. and Flohr S. (2008), "The neglected king: The customer in the new knowledge ecology of innovation", *Economic Geography*, 84, 3: 253-280.
Grabher G. and Maintz J. (2006), *Learning in personal networks: Collaborative knowledge production in virtual forums*, in Hof H. and Wengenroth U. (Eds), *Innovation Research: Concepts, Methods, and Perspectives*, LIT, Munster.
Graham J. and Gandini A. (2017), *Collaborative production in the creative industries*, University of Westminster Press, London.
Graham S. and Thrift N. (2007), "Out of order: Understanding repair and maintenance", *Theory, Culture & Society*, 24, 3: 1-25.
Granovetter M. (1985), "Economic action and social structure: The problem of embeddedness", *American journal of sociology*, 91, 3: 481-510.
Gregg M. (2011), *Work's Intimacy*, Polity, Cambridge.
Gregg M. (2015), "Hack for good: Speculative labour, app development and the burden of austerity", *The Fibreculture Journal*, 25: 185-202.
Gregson N. and Crewe L. (1997), "The bargain, the knowledge, and the spectacle: making sense of consumption in the space of the car-boot sale", *Environment and Planning D: Society and Space*, 15, 1: 87-112.
Gregson N., Crewe L. and Brooks, K. (2002), "Shopping, space, and practice", *Environment and planning D: society and space*, 20, 5: 597-617.
Gregson N., Metcalfe A. and Crewe L. (2007), "Moving things along: the conduits and practices of divestment in consumption", *Transactions of the Institute of British Geographers*, 32, 2: 187-200.
Gregson N., Metcalfe A. and Crewe L. (2009), "Practices of object maintenance and repair: how consumers attend to consumer objects within the home", *Journal of Consumer Culture*, 9, 2: 248-272.
Grenzfurthner J. and Schneider F. (2009), *Hacking the Spaces*. Available at: http://www.monochrom.at/hacking-the-spaces/
Grodach C., O'Connor J. and Gibson C. (2017), "Manufacturing and cultural production: Towards a progressive policy agenda for the cultural economy", *City, Culture and Society*, 10: 17-25.
Hammersley M. and Atkinson P. (2007), *What is ethnography?*, in Hammersley M., and Atkinson P. (2007), *Ethnography: Principles in practice*, Routledge, London.
Haraway D. (1988), "Situated knowledges: The science question in feminism and the privilege of partial perspective", *Feminist studies*, 14, 3: 575-599.
Haraway D. (1991), *Simians, cyborgs and women: the reinvention of nature*, Free Association Books, London.
Hardt M. (1999), "Affective labor", *boundary 2*, 26, 2: 89-100.
Harrison P. (2009), "In the absence of practice", *Environment and Planning D: Society and Space*, 27, 6: 987-1009.

Harrowell E., Davies T., and Disney T. (2018), "Making space for failure in geographic research", *The Professional Geographer*, 70, 2: 230-238.
Hatch M. (2013), *The Maker Movement Manifesto*, McGraw-Hill Education, London.
Herbert S. (2000), "For ethnography", *Progress in human geography*, 24, 4: 550-568.
Hesmondhalgh D. (2010), "User-generated content, free labour and the cultural industries", *ephemera*, 10 (3/4): 267-284.
Hesmondhalgh D. and Baker S. (2011), *Toward a political economy of labor in the media industries*, in Wasko J., Murdock M. and Sousa H. (Eds), *The Handbook of Political Economy of Communication*, Blackwell Publishing Ltd, West Sussex.
Hielscher S. (2017), "Experimenting with Novel Socio-Technical Configurations", *Digital Culture & Society*, 3, 1: 47-72.
Himanen P. (2001), *The hacker ethic*, Random House, New York.
Hine C. (2000), *Virtual ethnography*, Sage, London.
Hochschild A. (1983), *The managed heart: commercialization of human feeling*, University of California Press, Berkeley.
Howcroft D. and Bergvall-Kåreborn B. (2018), "A typology of crowdwork platforms", *Work, Employment and Society*, 33, 1: 21-38.
Hume L. and Mulcock J. (2004), *Introduction: awkward spaces, productive places*, in Hume L. and Mulcock J. (Eds.) (2004), *Anthropologists in the field: Cases in participant observation*, Columbia University Press, New York.
Humphreys A. and Grayson K. (2008), "The Intersecting Roles of Consumer and Producer: A Critical Perspective on Co-Production, Co-Creation and Prosumption", *Sociology Compass* 2, 3, 963-80.
Humphries C. and Smith A. C. (2014), "Talking objects: Towards a post-social research framework for exploring object narratives", *Organization*, 21, 4: 477-494.
Hyndman J. (2001), "The field as here and now, not there and then", *Geographical Review*, 91, 1/2: 262-272.
Ibert O. (2007), "Towards a geography of knowledge creation: the ambivalences between 'knowledge as an object'and 'knowing in practice'", *Regional Studies*, 41, 1: 103-114.
Ingold T. (2013), *Making: Anthropology, archaeology, art and architecture*. Routledge, London.
Irani L. (2015), "Hackathons and the making of entrepreneurial citizenship", *Science, Technology, & Human Values*, 40, 5: 799-824.
Jacobs J. M. (2012), "Urban geographies I: Still thinking cities relationally", *Progress in Human Geography*, 36, 3: 412-422.
Jakob D. (2012), "Crafting your way out of the recession? New craft entrepreneurs and the global economic downturn", *Cambridge journal of regions, economy and society*, 6, 1: 127-140.

Jenkins H. (2006), *Convergence culture: Where old and new media collide*, New York University Press, New York.
Johns J. and Hall S. M. (2020), "'I have so little time […] I got shit I need to do': Critical perspectives on making and sharing in Manchester's FabLab", *Environment and Planning A: Economy and Space*, 52, 7: 1292-1312.
Jones A. (2014), "Geographies of production I: Relationality revisited and the 'practice shift'in economic geography", *Progress in Human Geography*, 38, 4: 605-615.
Jones A. and Murphy J. T. (2010), "Practice and economic geography", *Geography Compass*, 4, 4: 303-319.
Jones M. (2009), "Phase space: geography, relational thinking, and beyond", *Progress in human geography*, 33, 4: 487-506.
Jordan T. and Braybrooke K. M. (2017), "Genealogy, culture and technomyth: decolonizing western information technologies, from open source to the maker movement", *Digital Culture and Society*, 3, 1: 25-46.
Karvonen A. and Van Heur B. (2014), "Urban laboratories: Experiments in reworking cities", *International Journal of Urban and Regional Research*, 38, 2: 379-392.
Katz C. (1992), "All the world is staged: intellectuals and the projects of ethnography", *Environment and Planning D: Society and Space*, 10, 5: 495-510.
Katz C. (1994), "Playing the field: questions of fieldwork in geography", *The professional geographer*, 46, 1: 67-72.
Kear M. (2018), "The Marketsite: A New Conceptualization of Market Spatiality", *Economic Geography*, 94, 3: 299-320.
Knorr-Cetina K. (1981), *The manufacture of knowledge*, Pergamon, Oxford.
Knorr-Cetina K. (1999), *Epistemic Cultures. How Sciences Makes Knowledge*, Harvard University Press, Cambridge, Massachusetts.
Knorr-Cetina K. and Bruegger U. (2002), "Global microstructures: The virtual societies of financial markets", *American journal of Sociology*, 107, 4: 905-950.
Kohtala C. (2017), "Making 'Making' Critical: How Sustainability is Constituted in Fab Lab Ideology", *The Design Journal*, 20, 3: 375-394.
Kostakis V., Niaros V., Dafermos G. and Bauwens M. (2015a), "Design global, manufacture local: Exploring the contours of an emerging productive model", *Futures*, 73: 126-135.
Kostakis V., Niaros V. and Giotitsas C. (2015b), "Production and governance in hackerspaces: A manifestation of Commons-based peer production in the physical realm?", *International Journal of Cultural Studies*, 18, 5: 555-573.
Kozinets R. V. (2002), "The field behind the screen: Using netnography for marketing research in online communities", *Journal of marketing research*, 39, 1: 61-72.
Kreiss D., Finn M. and Turner F. (2011), "The limits of peer production: Some reminders from Max Weber for the network society", *New Media & Society*, 13, 2: 243-259.

Krugman P.R. (1991), *Geography and Trade*, Leuven University Press, Leuven.
Kubitschko S. (2017), "'There Simply Is No Unified Hacker Movement.' Why We Should Consider the Plurality of Hacker and Maker Cultures", *Digital Culture & Society*, 3, 1: 185-196.
Landry C. and Bianchini F. (1995), *The creative city*, Demos, London.
Lange B. and Bürkner H. J. (2018), "Flexible value creation: Conceptual prerequisites and empirical explorations in open workshops", *Geoforum*, 88: 96-104.
Langley P. (2016), "Crowdfunding in the United Kingdom: A cultural economy", *Economic Geography*, 92, 3: 301-321.
Langley P. and Leyshon A. (2017), "Platform capitalism: the intermediation and capitalisation of digital economic circulation", *Finance and society*, 3, 1: 11-31.
Latour B. (1986) "Visualisation and cognition: Drawing things together", *Knowledge and society studies in the sociology of culture past and present*, 6, 1: 1-40.
Latour B. (1987), *Science in action: How to follow scientists and engineers through society*, Harvard University Press, Cambridge, Massachusetts.
Latour B. (1992), *Where Are the Missing Masses? The Sociology of a Few Mundane Artifacts*, in Bijker W. E. and Law J. (Eds) (1992), *Shaping technology/building society: Studies in sociotechnical change*, MIT press, Cambridge, Massachusetts.
Latour B. (2005), *Reassembling the social: An introduction to actor-network-theory*. Oxford University press, Oxford.
Latour B. and Porter C. (1996), *Aramis, or, The love of technology*, Harvard University Press, Cambridge, Massachusetts.
Latour B. and Woolgar S. (1979), *Laboratory life: The social construction of scientific facts*, Sage, London.
Lave J. and Wenger E. (1991), *Situated Learning: Legitimate Peripheral Participation*, Cambridge University Press, Cambridge.
Law J. (Ed.) (1991), *A sociology of monsters: Essays on power, technology, and domination*, Routledge, London.
Law J. (1999), *After ANT: complexity, naming and topology*, in Law J. and Hassard J. (Eds.) (1999), *Actor network theory and after*, Blackwell, Oxford.
Law J. (2002a), *Economics as interference*, in Du Gay P. and Pryke M. (Eds.) (2002), *Cultural economy: Cultural analysis and commercial life*, Sage, London.
Law J. (2002b), "Objects and spaces", *Theory, culture & society*, 19, 5-6: 91-105.
Law J. (2004), *After method: Mess in social science research*, Routledge, Abingdon.
Law J. (2008) "On sociology and STS", *The sociological review*, 56, 4: 623-649.
Law J. (2009), *Actor network theory and material semiotics*, in Turner B. S. (Ed.), *The New Blackwell Companion to Social Theory*, Blackwell, Oxford.
Law J. (2015), *STS as Method*. Available at: http://heterogeneities.net/publications/Law2015STSAsMethod.pdf
Law J. and Hassard J. (1999), *Actor network theory and after*, Blackwell, Oxford.

Law J. and Hetherington K. (2000), *Materialities, globalities, spatialities*, in Bryson J. R. Daniels P., Pollard J. and Henry N. (Eds.) (2000), *Knowledge, space, economy*, Routledge, London.
Law J. and Mol A. (2001), "Situating technoscience: an inquiry into spatialities", *Environment and planning D: society and space*, 19, 5: 609-621.
Law J. and Ruppert E. (2013), "The social life of methods: Devices", *Journal of Cultural Economy*, 6, 3: 229-240.
Law J. and Singleton V. (2000), "Performing technology's stories: on social constructivism, performance, and performativity", *Technology and Culture*, 41, 4: 765-775.
Law J. and Singleton V. (2005), "Object lessons", *Organization*, 12, 3: 331-355.
Law J. and Urry J. (2004), "Enacting the social", *Economy and society*, 33, 3: 390-410.
Lazzarato M. (1996), *Immaterial Labour*, in Hardt M. and Virno P. (Eds) (1996), *Radical Thought in Italy: A Potential Politics*, University of Minnesota Press, Minneapolis.
Lazzeroni M. and Morazzoni M. (Eds.) (2020), *Interpretare la quarta rivoluzione industriale. La geografia in dialogo con le altre discipline*, Carocci, Roma.
Leadbeater C. (2009), *We-think*, Profile books, London.
Leadbeater C. and Miller P. (2004), *The pro-am revolution*, Demos, London.
Lee R., Leyshon A. and Smith A. (2008), "Rethinking economies/economic geographies", *Geoforum*, 39, 3: 1111-1115.
Lhoste E. and Barbier M. (2018), "The institutionalization of making: the entrepreneurship of sociomaterialities that matters", *Journal of peer production*, 12, 1: 111-128.
Licoppe C. (2010), "The 'performative turn' in science and technology studies: Towards a linguistic anthropology of 'technology in action'", *Journal of Cultural Economy*, 3, 2: 181-188.
Lindtner S. (2014), "Hackerspaces and the Internet of Things in China: How makers are reinventing industrial production, innovation, and the self", *China Information*, 28, 2: 145-167.
Lindtner S. (2015), "Hacking with Chinese characteristics: The promises of the maker movement against China's manufacturing culture", *Science, Technology, & Human Values*, 40, 5: 854-879.
Luckman S. (2015), *Craft and the creative economy*, Palgrave Macmillian, Basingstoke.
Lynch M. (2000), "Against reflexivity as an academic virtue and source of privileged knowledge", *Theory, Culture & Society*, 17, 3: 26-54.
MacKenzie D., Muniesa F. and Siu L. (2007), *Do economist make markets? On the performativity of economics*, Princeton University Press, Princeton.
MacKenzie D. and Wajcman J. (1985), *The social shaping of technology*, Opne University Press, Milton Keynes.

Macrorie R., Marvin S. and While A. (2021), "Robotics and automation in the city: a research agenda", *Urban Geography*, 42, 2: 197-217.
Maffei S. and Bianchini M. (2014), "City Making", *DIID. Disegno industriale industrial design*, 57: 58-64.
Magaudda P. (2010), "Hacking Practices and their Relevance for Consumer Studies: The Example of the 'Jailbreaking'of the iPhone", *Consumers, Commodities and Consumption*, 12, 1: 12-1.
Magaudda P. (2012), "How to make a 'Hackintosh'. A journey into the 'consumerization' of hacking practices and culture", *Journal of Peer Production*, 2: 1-8.
Mariotti I., Pacchi C. and Di Vita S. (2017), "Co-working spaces in Milan: Location patterns and urban effects", *Journal of Urban Technology*, 24, 3: 47-66.
Martelloni et al. (2017), *Universities, Enterprises and Maker Communities in Open Design & Manufacturing across Europe An exploratory study*, D3.1 Research Report. Retrieved from: http://odmplatform.eu/wp-content/uploads/2017/05/D3.1-ODM-Research-Report-Integral.pdf
Massey D. B., Allen J. and Sarre P. (Eds.) (1999), *Human geography today*, Polity Press, Cambridge.
Mazali T. (2016), *Digital workers*, Aracne, Roma.
McDowell L. (1997), *Capital culture: Money, sex and power at work*, Blackwell, Oxford.
McDowell L. (2001), "Working with young men", *Geographical Review*, 91, 1/2: 201-214.
McFall L. (2009), "Devices and desires: How useful is the 'new' new economic sociology for understanding market attachment?", *Sociology Compass*, 3, 2: 267-282.
McMorran C. (2012), "Practising workplace geographies: embodied labour as method in human geography", *Area*, 44, 4: 489-495.
McRobbie A. (2016), *Be creative!*, Polity Press, Cambridge.
Menichinelli M., Bianchini M., Carosi A. and Maffei S. (2017), "Makers as a new work condition between self-employment and community peer-production. Insights from a survey on makers in Italy", *Journal of Peer Production*, 10: 1-16.
Merkel J. (2015), "Coworking in the city", *ephemera*, 15, 2: 121-139.
Micelli S. (2011), *Futuro artigiano: l'innovazione nelle mani degli italiani*, Marsilio Editori, Venezia.
Miller D. (2005), *Materiality: an introduction*, in Miller D. (2005), *Materiality*, Duke University Press, Durham.
Mitchell T. (1998), "Fixing the economy", *Cultural studies*, 12, 1: 82-101.
Mitchell T. (2005), "The work of economics: how a discipline makes its world", *European Journal of Sociology/Archives Européennes de Sociologie*, 46, 2: 297-320.
Mitchell T. (2008), "Rethinking economy", *Geoforum*, 39, 3: 1116-1121.

Moilanen J. (2012), "Emerging hackerspaces–peer-production generation", Paper presented at the *Open Source Systems: Long-Term Sustainability: 8th IFIP WG 2.13 International Conference*, Hammamet, Tunisia.
Mol A. (1999), "Ontological politics. A word and some questions", *The Sociological Review*, 47, 1_suppl: 74-89.
Mol A. and Law J. (1994), "Regions, networks and fluids: anaemia and social topology", *Social studies of science*, 24: 4: 641-671.
Montanari F. and Mizzau L. (2016), *I luoghi dell'innovazione aperta*, Fondazione Brodolini. Available at: http://bit.ly/2lHeLaS
Morandi C., Rolando A. and Di Vita S. (2016), *From smart city to smart region: Digital services for an internet of places*, Springer, Cham.
Moretti E. (2012), *The new geography of jobs*, Houghton Mifflin Harcourt, New York.
Müller M. (2015a), "A half-hearted romance? A diagnosis and agenda for the relationship between economic geography and actor-network theory (ANT)", *Progress in Human Geography*, 39, 1: 65-86.
Müller M. (2015b), *Organization, Geography of*, in Wright J. (2015), *International Encyclopedia of the Social & Behavioral Sciences, 2nd Edition*, Elsevier, Oxford.
Müller M. and Schurr C. (2016), "Assemblage thinking and actor-network theory: conjunctions, disjunctions, cross-fertilisations", *Transactions of the Institute of British Geographers*, 41, 3: 217-229.
Murdoch J. (1997), "Inhuman/nonhuman/human: actor-network theory and the prospects for a nondualistic and symmetrical perspective on nature and society", *Environment and planning D: Society and Space*, 15, 6: 731-756.
Murdoch J. (1998), "The spaces of actor-network theory", *Geoforum*, 29, 4: 357-374.
Murdoch J. (2006), *Post-structuralist geography: a guide to relational space*, Sage, London.
Nimmo R. (2011), "Actor-network theory and methodology: Social research in a more-than-human world", *Methodological Innovations Online*, 6, 3: 108-119.
Orlikowski W. J. (2006), "Material knowing: the scaffolding of human knowledgeability", *European Journal of Information Systems*, 15, 5: 460-466.
Pahk S. H. (2017), "Misappropriation as market making: Butler, Callon, and street food in San Francisco, California", *Journal of Cultural Economy*, 10, 3: 296-308.
Pavlovskaya M. and St. Martin K. (2014), *Economy*, in Lee R., Castree N., Kitchin R., Lawson V., Paasi A., Philo C., Radcliffe S., Roberts S. and Withers C. W. J. (Eds.) (2014), *Sage Handbook of Human Geography*, Sage, London.
Pels D., Hetherington K. and Vandenberghe F. (2002), "The status of the object", *Theory, Culture & Society*, 19, 5-6: 1-21.
Phillips R. and Johns J. (2012), *Interviewing for fieldwork*, in Phillips R. and Johns J. (Eds.) (2012), *Fieldwork for human geography*, Sage, London.

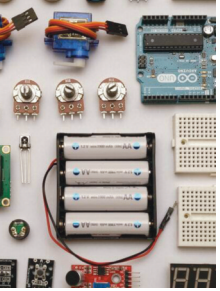
Polanyi M. (1958), *Personal knowledge, towards a post critical epistemology*, Harper Torchbooks, New York.
Polanyi M. (1966), *The Tacit Dimension*, Routledge, London.
Pollio A. (2019), "Forefronts of the sharing economy: Uber in Cape Town", *International Journal of Urban and Regional Research*, 43, 4: 760-775.
Pollio A. (2020) "Making the silicon cape of Africa: Tales, theories and the narration of startup urbanism", *Urban Studies*, 57, 13: 2715-2732.
Porter M.E. (1990), *The Competitive Advantage of Nations*, The Free Press, New York.
Prahalad C. K. and Ramaswamy V. (2004), "Co-creation experiences: The next practice in value creation", *Journal of interactive marketing*, 18, 3: 5-14.
Price L. (2015), "Knitting and the city", *Geography Compass*, 9, 2: 81-95.
Price L. and Hawkins H. (Eds.) (2018), *Geographies of Making, Craft and Creativity*, Routledge, London.
Probst L., Frideres L., Pedersen B. and Lidé S. (2015), *Business Innovation Observatory. Collaborative economy. Collaborative production and the Maker Movement*, European Commission, Directorate-General Growth, Brussels.
Ratto M. and Boler M. (Eds.) (2014), *DIY citizenship: Critical making and social media*. MIT Press, Ca,bridge, Massachusetts.
Ratto M. and Ree R. (2012), "Materializing information: 3D printing and social change", *First Monday*, 17, 7. Available at: http://firstmonday. org/ojs/index.php/fm/article/view/3968/3273.
Reid-Henry S. (2003), "Under the Microscope: Fieldwork Practice and Cuba's Biotechnology Industry: A Reflexive Affair?", *Singapore Journal of Tropical Geography*, 24, 2: 184-197.
Richardson L. (2015), "Performing the sharing economy", *Geoforum*, 67: 121-129.
Richardson L. (2016), "Sharing knowledge: Performing co-production in collaborative artistic work", *Environment and Planning A: Economy and Space*, 48, 11: 2256-2271.
Richardson L. (2018), "Feminist geographies of digital work", *Progress in Human Geography*, 42, 2: 244-263.
Richardson L. (2020), "Platforms, markets, and contingent calculation: The flexible arrangement of the delivered meal", *Antipode*, 52, 3: 619-636.
Richardson L. and Bissell D. (2019), "Geographies of digital skill", *Geoforum*, 99: 278-286.
Rifkin J. (2011), *The third industrial revolution: how lateral power is transforming energy, the economy, and the world*, Palgrave Macmillan, London.
Rifkin J. (2014), *The zero marginal cost society: The internet of things, the collaborative commons, and the eclipse of capitalism*, Palgrave Macmillian, London.
Ritzer G. (2014), "Prosumption: Evolution, revolution, or eternal return of the same?", *Journal of Consumer Culture*, 14, 1: 3-24.
Ritzer G. (2015), "The 'new' world of prosumption: Evolution, 'return of the same', or revolution?", *Sociological Forum*, 30, 1: 1-17.

Ritzer G. and Jurgenson N. (2010), "Production, consumption, prosumption: The nature of capitalism in the age of the digital 'prosumer'", *Journal of consumer culture*, 10, 1: 13-36.
Robinson J. (2006), *Ordinary cities: between modernity and development*, Routledge, London.
Rosa P. et al. (2017), *Overview of the Maker Movement in the European Union*, EUR 28686 EN, Publications Office of the European Union, Luxembourg.
Rosa P., Guimarães Pereira Â. and Ferretti F. (2018), *Futures of Work: Perspectives from the Maker Movement*, EUR 29296 EN, Publications Office of the European Union, Luxembourg.
Rose G. (1997), "Situating knowledges: positionality, reflexivities and other tactics", *Progress in human geography*, 21, 3: 305-320.
Rose G. (1999), *Performing space*, in Massey D. B., Allen J. and Sarre P. (Eds.) (1999), *Human geography today*, Polity Press, Cambridge.
Rossi U. (2017), *Cities in global capitalism*, Polity Press, Cambridge.
Rossi U., Quaglia A. P., Di Bella A. and Rosati U. (2015), *Verso la tech city? Torino e le imprese innovative start-up*, in AA. VV. (2015), *Potenziali di città. Torino oltre la crisi*, EU-POLIS, Torino.
Ruming K. (2009), "Following the actors: mobilising an actor-network theory methodology in geography", *Australian Geographer*, 40, 4: 451-469.
Rutten R. (2017), "Beyond proximities: The socio-spatial dynamics of knowledge creation", *Progress in Human Geography*, 41, 2: 159-177.
Sayes E. (2014), "Actor–Network Theory and methodology: Just what does it mean to say that nonhumans have agency?", *Social Studies of Science*, 44, 1: 134-149.
Schatzki T. R. (1996), *Social practices: A Wittgensteinian approach to human activity and the social*, Cambridge University Press, Cambridge.
Schmidt S. (2019), "In the making: Open Creative Labs as an emerging topic in economic geography?", *Geography compass*, 13, 9: 1-16. Available at: https://doi.org/10.1111/gec3.12463.
Schmidt S. and Brinks V. (2017), "Open creative labs: Spatial settings at the intersection of communities and organizations", *Creativity and Innovation Management*, 26, 3: 291-299.
Scholz T. (2017), *Uberworked and underpaid: How workers are disrupting the digital economy*, Polity Press, Cambridge.
Scholz T. (Ed.) (2013), *Digital labor: the internet as playground and factory*, Routledge, London.
Scott A. J. (2007), "Capitalism and urbanization in a new key? The cognitive-cultural dimension", *Tabula Rasa*, 6: 195-217.
Sennett, R. (2008), *The craftsman*, Yale University Press, New Haven.
Sheehan R. (2011), "Actor-network theory as a reflexive tool: (inter) personal relations and relationships in the research process", *Area*, 43, 3: 336-342.
Shultz B. (2015), "The work behind the scenes: The new intermediaries of the indie crafts business", *Regional Studies*, 49, 3: 451-460.

Shurmer-Smith (Eds.) (2002), *Doing cultural geography*, Sage, London.
Smith A. (2017), *Social Innovation, Democracy and Makerspaces*, SPRU Working Paper, University of Sussex, June.
Smith A., Ely A., Fressoli M., Abrol D. and Arond E. (2016), *Grassroots innovation movements*, Routledge, London.
Smith A., Hielscher S., Dickel S., Soderberg J. and van Oost E. (2013), *Grassroots digital fabrication and makerspaces: Reconfiguring, relocating and recalibrating innovation?*, SPRU Working Paper, University of Sussex, June.
Smith T. S. (2020), "'Stand back and watch us': Post-capitalist practices in the maker movement", *Environment and Planning A: Economy and Space*, 52, 3: 593-610.
Spinuzzi C. (2012), "Working alone together: Coworking as emergent collaborative activity", *Journal of Business and Technical Communication*, 26, 4: 399-441.
Srnicek N. (2017), *Platform capitalism*, Polity Press, Cambridge.
Stavrides S. (2007), *Heterotopias and the experience of porous urban space*, in Franck K. and Stevens Q. (2007), *Loose space: Possibility and diversity in urban life*, Routledge, London.
Storper M. and Venables A. J. (2004), "Buzz: face-to-face contact and the urban economy", *Journal of economic geography*, 4, 4: 351-370.
Swanson K. (2014), *Urban ethnographic research*, in Ward K. (Eds.) (2014), *Researching the city*, Sage, London.
Swanton D. (2013), "The steel plant as assemblage", *Geoforum*, 44: 282-291.
Tapscott D. and Williams A. D. (2006), *Wikinomics: How mass collaboration changes everything*, Portfolio, New York.
Terranova T. (2000), "Free labor: Producing culture for the digital economy", *Social text*, 18, 2: 33-58.
Thompson E. P. (1967), "Time, work-discipline, and industrial capitalism", *Past & present*, 38: 56-97.
Thrift N. (2000), "Performing cultures in the new economy", *Annals of the association of American Geographers*, 90, 4: 674-692.
Thrift N. (2006), "Re-inventing invention: new tendencies in capitalist commodification", *Economy and Society*, 35, 2: 279-306.
Thrift N. and Olds K. (1996), "Refiguring the economic in economic geography", *Progress in human geography*, 20, 3: 311-337.
Tironi M. (2010), *Gelleable spaces, eventful geographies*, in Farías I. and Bender T. (Eds.) (2010), *Urban Assemblages: How Actor-network Theory Changes Urban Studies*, Routledge, London.
Toffler A. and Alvin T. (1980), *The third wave*, William Norrow, New York.
Toombs A. L., Bardzell S. and Bardzell J. (2015), *The proper care and feeding of hackerspaces: Care ethics and cultures of making*, in AA. VV. (2015), *Proceedings of the 33rd annual ACM conference on human factors in computing systems*, ACM Press, New York.
Troxler P. and maxigas (2014), "Editorial Note: We now have the Means of Production, But Where is My Revolution", *Journal of Peer Production*, 5.

Troxler P. and Wolf P. (2017), "Digital maker-entrepreneurs in open design: What activities make up their business model?", *Business Horizons*, 60, 6: 807-817.
Vallance P. (2007), "Rethinking economic geographies of knowledge", *Geography Compass*, 1, 4: 797-813.
Vanolo A. (2008), "The image of the creative city: Some reflections on urban branding in Turin", *Cities*, 25, 6: 370-382.
Vanolo A. (2015), "The image of the creative city, eight years later: Turin, urban branding and the economic crisis taboo", *Cities*, 46: 1-7.
Vicari S., Colleoni E. and D'Ovidio M. (2015), *Makers. The making of the human city.*, Feltrinelli, Milano.
Voigt C., Montero C. S. and Menichinelli M. (2016), "An empirically informed taxonomy for the Maker Movement", *International Conference on Internet Science*, Springer, Florence.
Von Hippel E. (2005), *Democratizing innovation*, MIT press, Cambridge, Massachusetts.
Wajcman J. (2006), "New connections: social studies of science and technology and studies of work", *Work, employment and society*, 20, 4: 773-786.
Wajcman J. (2016), "Anförande: Pressed for time: The digital transformation of everyday life", *Sociologisk forskning*, 53, 2: 193-199.
Watson A. (2012), "Sociological Perspectives on the Economic Geography of Projects: The Case of Project-Based Working in the Creative Industries", *Geography Compass*, 6, 10: 617-631.
Watson M. and Shove E. (2008), "Product, competence, project and practice: DIY and the dynamics of craft consumption", *Journal of Consumer Culture*, 8, 1: 69-89.
Webb J. and Hawkey D. (2017), "On (not) assembling a market for sustainable energy: heat network infrastructure and British cities", *Journal of Cultural Economy*, 10, 1: 8-20.
Weeks K. (2011), *The problem with work: Feminism, Marxism, antiwork politics, and postwork imaginaries*, Duke University Press, Durham.
Wittel A. (2001), "Toward a network sociality", *Theory, culture & society*, 18, 6: 51-76.
Yeung H. W. (2003), "Practicing new economic geographies: a methodological examination", *Annals of the Association of American Geographers*, 93, 2: 442-462.
Yeung H. W. (2005), "Rethinking relational economic geography", *Transactions of the Institute of British Geographers*, 30, 1: 37-51.
Zukin S. (2020), *The innovation complex: Cities, tech, and the new economy*, Oxford University Press, Oxford.
Zukin S. and Papadantonakis M. (2017), *Hackathons as Co-optation ritual: Socializing workers and institutionalizing innovation in the "new" economy*, in A.L. Kalleberg, S.P. Vallas (Eds.) (2017) *Precarious Work / Research in the Sociology of Work*, Vol 31, Emerald Publishing Limited, Bingley.

Zwick D., Bonsu S. K. and Darmody A. (2008), “Putting Consumers to Work: Co-creationand new marketing govern-mentality”, *Journal of consumer culture*, 8, 2: 163-196.



Making in the making

Performing new forms and spatialities of production

During the last two decades, we have witnessed the spreading of shared spaces of work and production in different urban contexts, attracting attention from both policymakers and scholars in economic geography and urban studies. In particular, Fablabs are considered open workshops for grassroots innovation, which is enabled by the availability of shared digital fabrication machines and by the possibility to share knowledge with peers and work together on a project, either in person or online. People attending Fablabs are usually called Makers and, according to the discourse surrounding them, they are deemed the harbingers of a democratisation of production and part of a broader transformation of urban economies and work in the era of digital capitalism.
The book is the result of a PhD research on Makers and Fablabs in Turin, mainly based on an ethnographic observation conducted at Fablab Torino. It offers an original theoretical framework inspired by the recent strand of post-structuralist economic geography, together with a reliance on ontological tenets coming from Actor-Network Theory and Science and Technology Studies. Adopting an interdisciplinary approach, the study is therefore of interest for scholars in different social sciences who study the reconfiguration of work and production in cities and digitally mediated economic transformations.
The analysis unpacks the enactment of Making as a new form of work and production through three different conceptual foci – knowledge, materiality, and work. Notably, the inquiry looks at how Fablab Torino and the urban 'Maker scene' in Turin are performatively enacted through the entanglement between economic theories on the phenomenon with specific socio-technical arrangements aiming at making those economic theories true. The geographical relevance of the phenomenon is identified not in some static spatial configuration but, on the one hand, in the heterogeneous and emergent spatialities that emerge from individual practices of Making and, on the other, in the sociomaterial practices of organising that bring into being economic organisations such as Fablabs.

Samantha Cenere holds a PhD in Urban and Regional Development. She is an Urban Geographer and she is currently a Postdoctoral researcher at DIST - Polytechnic University of Turin. Her research interests include the sociospatial reconfiguration of work and production in cities, retail gentrification, and the relationship between universities and urban transformation.

FrancoAngeli
La passione per le conoscenze