European Commission

JRC TECHNICAL REPORTS

Overview of the Maker Movement in the European Union

Paulo Rosa

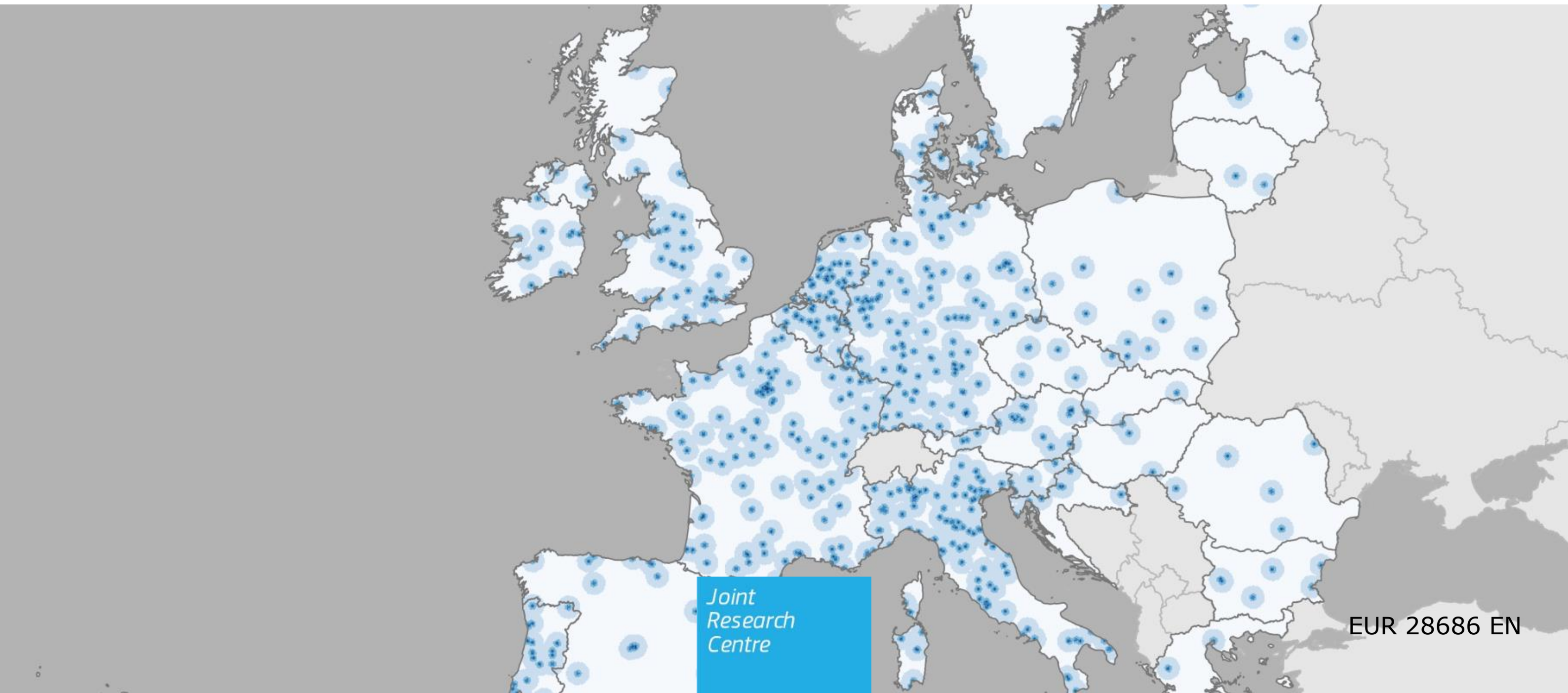
Federico Ferretti

Ângela Guimarães Pereira

Francesco Panella

Maximilian Wanner

2017



Joint Research Centre

EUR 28686 EN

Contact information
Name: Paulo Rosa
Email: paulo.rosa@ec.europa.eu
Tel.: +39 0332 78 6490

JRC Science Hub
https://ec.europa.eu/jrc

JRC107298

EUR 28686 EN

PDF ISBN 978-92-79-70525-0 ISSN 1831-9424 doi:10.2760/227356

Luxembourg: Publications Office of the European Union, 2017

How to cite this report: Rosa, P. et al., Overview of the Maker Movement in the European Union, EUR 28686 EN, Publications Office of the European Union, Luxembourg, 2017, ISBN 978-92-79-70525-0, doi 10.2760/227356, JRC107298

Table of Contents

1 Introduction

Over the last decade, we witnessed an unprecedented boom of communities engaged in do-it-yourself (DIY) activities worldwide. These hobbyists, engineers, artists, designers, hackers, and craftsmen are exploring new ways for personal expression by hacking and remaking their physical world as they see appropriate. Events such as the Maker Faire[1] or the European Maker Week[2], supported by the European Commission, are having an important role in promoting the so-called "*maker culture*". Additionally, more and more specialized magazines and blogs, as well as, scholarly publications emerge addressing "*making*" from a range of perspectives.

The "*maker movement*" is celebrated as a driver for the new "*industrial revolution*" (Anderson, 2012) and the "*democratization of innovation*" (Hippel, 2005) due to its close connection to novel digital fabrication tools that enable individuals to manipulate atoms as easily as they manipulate bits. The present narrative is that anyone can and should have access to the tools and knowledge necessary to build anything they might need or want. Indeed, the increasing availability and affordability of digital fabrication tools such as 3D printers and laser cutters is bringing the programmability of the digital worlds which we invented to the physical world we inhabit (almost) to everyone. But, above all, the maker movement is about the people's needs to engage with objects in ways that make them more than just consumers (Dougherty, 2012). It stands out as a self-empowering vision about the surrounding world where the creation and learning process is of extreme value. In this sense, it is also expected that the maker movement will give rise to new forms of education and perhaps employment guided by an increased focus on craftsmanship and engagement with the material world (Dougherty, 2013; Martin, 2015).

FabLabs, Hackerspaces and Makerspaces can be seen as the physical representations of the maker movement. These unique spaces seek to provide communities, businesses and entrepreneurs the infrastructures and manufacturing equipment indispensable to turn their ideas and concepts into reality. For example, these spaces make designing new, highly customizable, devices risk-free and low-cost. Equally important, these open spaces serve as a physical place where individuals can freely gather and share their experience and expertise.

While these promises sketch out intriguing futures, they need to be also understood along the sociotechnical phenomena that emerge together the flourishing of the maker movement, such as (1) the re-distribution of the power of creating technology to local communities; (2) the ideology of sharing and open source; (3) the vision of enabling a better integration of science, technology and economy; and (4) the idea of rejuvenating the community spirit through craftsmanship.

In this report, we assess and quantify the range of the maker movement across Europe, investigating the distribution and activity of FabLabs, Hackerspaces and Makerspaces as the physical spaces where the phenomenon takes place. Also, we explore tools and techniques employed within the spaces, as well as, community strategies with an aim to uncover the socio-technical and socioeconomic impact of the initiatives.

This research work follows a broader investigation that has been conducted by the authors on the issue of alternative approaches to science that are often pursued by communities located outside established science. In this context, in 2014, a first report on the do-it-yourself (DIY) movement was produced, with

[1] http://makerfaire.com/ (last access: 22 June 2017).
[2] https://www.facebook.com/EUMakerWeek/; https://twitter.com/eumakerweek (last access: 22 June 2017).

focus on what was designated by DIY Science: private or community based initiatives that use scientific methods combined with other forms of enquiry to engage with techno-scientific issues and societal challenges (Nascimento, Guimarães Pereira, & Ghezzi, 2014). Subsequently, in 2015, a seminar entitled "DIY science: the challenges of quality"[3] was organized (see Ravetz, Guimarães Pereira, & Nascimento, 2015 for the seminar report), where the inherent challenges brought along the conduction of "*informal*" science were discussed, such as the quality assurance practices of scientific developments carried out inside spaces such as makerspaces, or within citizen science projects.

In parallel to the hereby presented research work, other aspect that clearly connects with themes ascribable to the maker movement and its innovative potential are being investigated. For example, what is the potential impact of the maker movement in the future of jobs? Through a qualitative study that draws upon some of the results presented in this report, we investigate recurring key elements as depicted by involved stakeholders on the one hand, and institutions on the other. Expectations and driving factors that play a central role in the shaping of legitimization and coordination both at the community and policy level are being explored. Lastly, the implementation of a makerspace located in the premises of the Joint Research Centre, aimed at securing an exploratory space to promote critical thinking and tinkering about techno scientific issues relevant for policy making (Rosa & Guimarães Pereira, 2016).

The results in this report are foreseen to be progressively updated by allowing communities and spaces across Europe to access online and update autonomously the publicly available data in order to create a reference network database functioning at the EU level. A series of infographics were also produced based on the data collected and are made available in this report as annex.

[3] https://ec.europa.eu/jrc/en/event/workshop/do-it-yourself (last access: 22 June 2017).

2 What is the “Maker Movement”?

In the last decade many conceptualizations of the “maker movement” have evolved and grown in popularity. Figure 1 reports the number of published scientific articles mentioning the wording ‘maker movement’ or ‘makerspace’[4].

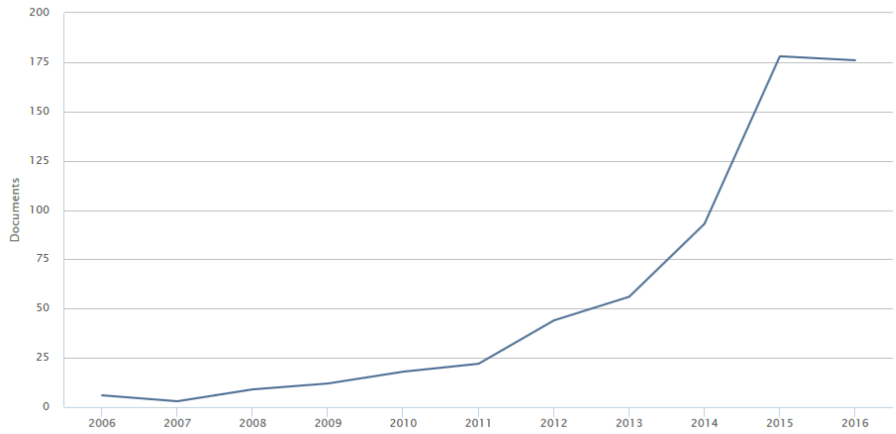


Figure 1: Number of published papers (yearly) with mention to the maker movement.

The term “maker movement” is still subject of open discussion, and therefore it is used and addressed with some variants. For example, it may refer to STEM[5]-oriented *hacking* activities usually related to electronics and robotics, or refer to more traditional arts and crafts activities associated to woodworking and metalworking. Some scholars would argue that the maker movement is not new, but it has always been present in human history as “[makerspaces] *have existed in various forms as long as people have been making items and have needed places to work with tools and equipment*” (Burke, 2014 p.2). Undeniably, some aspects that are widely recognized as characteristics of the maker movement, such as the focus on hobbies, art and craft groups, shop classes, practical education and science fairs have been also present in other forms of community spaces.

What are the foundations of this movement? The counterculture of the 1960s, with its “*power-to-the-people*” rhetoric, played a significant role in its emergence. Interestingly, the word “*hacker*” came to use in places like the MIT as a tech slang meaning of "*one who works like a hack at writing and experimenting with software, who enjoys computer programming for its own sake*”[6]. Technology was then seen as an opportunity of emancipation, characterized by a delight trait and the belief that it could empower individuals and make them able to de-institutionalize society (Lindtner et al., 2014).

With the shift towards the so-called “*information age*” (Castells, 1996), characterized by traditional industry substituted in western countries with economies based on information digitalization, it does not come as a surprise that *hacking* offered room for political imagination (Barnes, 2008). People like Steve Wozniak, Steve Jobs, and Stewart Brand in the United States of America (USA) were gaining attention with their “unofficial” artificial intelligence laboratories, the same which later would have given birth to companies

[4] Query search retrieved on 11 November 2016 from Scopus.com (query specification available upon request).
[5] STEM: Science, Technology, Engineering and Mathematics.
[6] http://www.etymonline.com/index.php?search=hacker (last access: 22 June 2017).

like Apple or Microsoft. The Homebrew Computer Club[7], formed in Silicon Valley around 1975, can be seen as an early hackerspace where hobbyists would meet informally in a garage to work on do-it-yourself projects, discover technology potential and most likely also discuss politics and society. If in the 1960s and 1970s such thinking was considered part of the counterculture for its expected revolutionary potential, similar movements have nowadays entered the mainstream as widespread and at least partly accepted as social practices. Every year many books on the topics of hacking and making are published, events organized, and greater attention is drawn by the media and more recently by the academia.

In contrast to its original connotation, "*hacking*" is now generally understood as the full access to a specific technology, be it physical or digital, online or offline, open or patented (Richterich, 2016). As Evgeny Morozov puts it "[nowadays] *hackers aren't smashing the system; they're fiddling with it so that they can get more work done*" (Morozov, 2014). Aligned with such view, we recently assisted to various declinations of the hacking culture even promoted by the institutional world (e.g. the "*Europeana Space: Hacking Culture Bootcamp*"[8]) as well in an even greater number of educational programs all across Europe (e.g. DIDIY[9], DIYLAB[10], Hacking&IBM training[11]). In the light of these evolutionary aspects, "*making*" could be defined as a declination of the hacking phenomenon with a particularly evident slant on the re-creation and assembly of products normally using unused, discarded or broken electronics and raw materials.

The various landscapes of the maker movement all have in common a strong DIY approach, mostly applied to emerging personal fabrication technologies such as 3D printing and laser cutting, as well as distributed access to information across individuals of the same community and, in turn, across different communities themselves. Indeed, makerspaces can have a transformative and empowering role by grasping and nurturing individual capabilities for the benefit of the entire community. A first stance on making as a "*collective movement*" in line with such principles emerged with the publication of the *Make* magazine[12]. Online since 2005, it created a virtual space where makers from all over the world could connect and share experiences. The introduction of the Maker Faire concept in 2006 as a social event to showcase projects, share knowledge and work together strengthen the popularity of making and revealed the general public's interest in participating in hands-on activities and in learn new skills.

"*Making*" could be defined as a declination of the hacking phenomenon with a particularly evident slant on the re-creation and assembly of products normally using unused, discarded or broken electronics and raw materials.

2.1 Makerspaces, Hackerspaces and FabLabs

The objects of study of this research are the physical spaces where the maker movement takes place, namely the claimed FabLabs, Hackerspaces and Makerspaces. Although these community oriented spaces appear to converge towards a similar structure and use, they have significant distinctions and different origins. In the remainder of this section we address these differences.

FabLabs (shorter for Fabrication Laboratories or Fabulous Laboratories) are workshops, where people can meet, exchange ideas and collaborate with the common purpose of design and digitally manufacture

[7] See for instance: http://www.computerhistory.org/revolution/personal-computers/17/312 (last access: 22 June 2017).
[8] http://www.europeana-space.eu/hackathons/europeana-tv-hackathon/ (last access: 22 June 2017).
[9] http://www.didiy.eu/ (last access: 22 June 2017).
[10] http://diylab.eu/ (last access: 22 June 2017).
[11] http://hackingedu.co/; https://www.facebook.com/hackingedusf/ (last access: 22 June 2017).
[12] https://makezine.com/ (last access: 22 June 2017).

custom built objects. The concept was developed by Neil Gershenfeld (see Gershenfeld, 2005) from the Center for Bits and Atoms (CBA) of the Massachusetts Institute of Technology (MIT), initially with the aim to explore the implications and applications of personal fabrication in those parts of the world that cannot easily have access to tools for fabrication and instrumentation. Hence, the first FabLabs were created in rural India, Costa Rica, northern Norway, inner-city Boston and Ghana. A distinctive feature of FabLabs is that they must comply with the Fab Charter[13]. Moreover, they all have at their core structure the same hardware and software capabilities, making it possible for people and projects to be easily distributed across them. FabLabs are supported by a global FabLab association[14], responsible for the dissemination of the FabLab concept as well as being the connection point between the various FabLabs across the world. The FabLab association objectives also comprise the promotion of collaboration among FabLabs, the share of expertise, the brainstorm of ideas, and the spread of research. FabLabs are typically set up in the context of an institution, be that a university, a company or a foundation.

Hackerspaces (see for instance, Pettis, Schneeweisz, & Ohlig, 2011) are typically setup from within a community for the community, thus being community-funded and community-managed spaces. The concept behind hackerspaces started in Berlin, Germany and can be traced back to August 1995, when C-Base, the world's first hackerspace, was founded[15]. The idea was to have a non-repressive physical space where people interested in programming and tinkering with technology could meet, work, and learn from each other. As the spaces grew in popularity, the terms "*hacking*" and "*hacker*" became broader, going beyond programming activities to include physical prototyping and electronics. An effort was also made to distance these spaces from the largely negative connotations of the term "*hacking*" presented in the mainstream media. Each hackerspace can be seen as a unique space in the sense that it has its own organization, structure, ideology and focus. More than providing the hardware tools and manufacturing equipment, they provide the learning environment and the necessary support for individuals to develop their projects based on their own interests. Hackerspaces are also all completely independent from each other's, although collaboration between spaces is quite common.

As for **Makerspaces**, the term was originally associated with MAKE Magazine (Cavalcanti, 2013), often in the context of creating tinkering-spaces for children. However, in the last years, the concept became more widespread, going beyond the MAKE Magazine trademark spaces. The concept started to be commonly used by practitioners to refer to any generic space (often also including FabLabs and Hackerspaces) that promoted active participation, knowledge sharing, and collaboration among individuals through open exploration and creative use of technology (i.e. through tinkering and making). In this sense, makerspaces do not comply with a pre-defined structure and indeed do not need to include a pre-defined set of personal fabrication tools (or by that matter, any of them to be considered a makerspace). The focus is on having a publicly-accessible creative space that explores the maker mind-set and tinkering-practices.

For the purposes of this study, the term makerspace is inclusive of FabLabs and Hackerspaces, pointing at community spaces that respond to the following characteristics:

---

[13] http://fab.cba.mit.edu/about/charter/ (last access: 22 June 2017).
[14] http://fablabinternational.org/ (last access: 22 June 2017).
[15] https://wiki.hackerspaces.org/c-base (last access: 22 June 2017).

a) Proximity

The existence of a physical space with shared facilities is a fundamental element in the conception of a makerspace. Firstly, for pragmatic and economic reasons as demonstrated by Taylor *et al.* (2016) (equipment such as laser cutters and CNC milling machines are economically expensive and bulky for private use); and secondly for social aspects such as pleasure, personal interest and enjoyment of working inside and for a community (Davies, 2016). Having a physical space also allows the organization of events, fairs, workshops and trainings to engage with the general public around themes of interest for the community.

b) Educational purposes

Sheridan *et al.* (2014, p. 506) points out that "*makerspaces and collaborative design and making activities generate interest in diverse educational realms*". Indeed, makerspaces are being valued for fostering new forms of collaboration and education in STE(A)M[16] related fields (Blikstein, 2013; Martin, 2015). Even if not a constant in all makerspaces, there are examples of makerspaces being used or implemented in schools and universities to deliver classes, lectures and perform real experiments specifically in the natural sciences in such a way that some even discuss a separated category of "*educational makerspaces*" (Kurti & Fleming, 2014). The educational side of makerspaces has also been considered by institutions beside schools (e.g. in science and technology museums), and in the organization of events such as ISAM (International Symposium on Academic Makerspaces)[17].

c) Entrepreneurship

William Barrett *et al.* (2015) consider that makerspaces play a role in entrepreneurship. The increased access to digital fabrication tools and technologies substantially facilitates the generation of local businesses. Personal fabrication technologies allow the rapid prototyping of tangible objects with a high level of quality, making the design of new, highly customizable products risk-free and low-cost. Moreover, these spaces are often being used as innovation hubs by architects, designers, and engineers to the point where R&D industries are promoting makerspaces as company spin-offs (see for instance Renault's FabLab in France (Passebon, 2014)). The authors also identify the figure of the "*accidental entrepreneur*" as a maker "[acting in] *diverse networks, and creating new ideas and innovative thinking*" (William Barrett et al., 2015, p. 4) despite his or her own objective to generate new products and technology.

d) Self-support

In general, makerspaces are funded either by securing a grant or by community support/sponsorships (or both). The money acquired/raised is typically used for equipment, supplies, organizing training activities, and the physical space itself (Hatch, 2013). Economic constraints often see community members, now with full access to technologies, tools and spaces, creating products and expertise that can sometimes end up sold in their networks, depicting self-employment as a frequent aspect in makerspaces.

---

[16] STE(A)M: Science, Technology, Engineering, (Arts) and Mathematics.
[17] https://project-manus.mit.edu/home/conference (last access: 22 June 2017).

e) Responsibility and ethics

Makerspaces are by default oriented towards the creation of an environment that fosters the sharing of experiences and expertise. They promote the use and creation of open content and data, including open hardware and software. By following a creation process based on the unconstrained access to documentation, manuals, source code or design blueprints, projects are open to anyone who wishes to reuse, revise, remix, and further redistribute them. As sharing is an absolute pillar of the maker movement, issues of responsibility often emerge in relation to tinkering with, remaking, repairing, recombining, and upgrading for the community's benefit. For that reason, Make Magazine author Mister Jalopy wrote in 2006 an article entitled "*The Maker's Bill of Rights*"[18], a manifesto of modus operandi (and partly ethics), documenting practices of responsibility, standardization and transparency that should be adopted largely by the community and that resumes much of the spirit of the 1960s.

The issue of responsibility has a special relevance if we consider the DIYbio/biohacking sub-movement (see for instance (Nascimento et al., 2014)). The movement faces a widespread concern from policymakers, journalists and the general public regarding its safety procedures and security monitoring. Worries concerning the danger of producing lethal viruses or epidemics, or releasing genetically modified organisms into the ecosystem and thus causing serious environmental or public health accidents, are very commonly associated with DIYbio, especially when referring to DNA manipulation. Existing regulations are unable to address the many ethical concerns and controversies raised by the movement due to the nonconventional setting in which the scientific research is carried out, i.e. outside universities or institutionalized labs. Proposed solutions encourage a culture of transparency, safety and self-governance, where, in essence, biohackers would be peer reviewed by other DIY biologists (Kuiken, 2016).

f) Makerspaces as a model for engagement

Makerspaces also offer unique opportunities for engagement of citizens in matters of interest by promoting more open and creative forms of engagement through material deliberation[19]. Institutions such as museums and libraries are already starting to apply the principles of the maker culture by having their resources, facilities and collections available to the publics in a mode to stimulate cultural activities, critical thinking and problem solving. They constitute a hybrid form of makerspace functioning as a useful tool for knowledge dissemination. The underlying philosophy ideally traces its roots back to the so-called "*Reggio Emilia approach*" developed in the 1960s': It pointed out the importance of teaching languages (e.g., painting, sculpting, drama) in everyday life as well as promoted collaborative methods aimed to involve learners and students in sharing and building upon their ideas rather than exclusively let them attend passively (Gandini, 1993). This aspect of makerspace usage is being explored at the JRC through a on the making development of a makerspace "Thinkers N' Tinkerers" (Rosa & Guimarães Pereira, 2016).

[18] http://cdn.makezine.com/make/MAKERS_RIGHTS.pdf (last access: 22 June 2017).

[19] "Material deliberation" refers here to non-traditional modes of deliberation and citizen engagement which incorporate more open and interactive forms of engagement such as, but not limited to, the sonorous (e.g. music, noise), the discursive (e.g. storytelling), the material (e.g. objects, places) and the affective (e.g. emotions raised in specific settings). See: Davies, S.R. et al. (2011): "Citizen engagement and urban change: Three case studies of material deliberation". Cities, 29 (6), pp. 351-357.

3 Building a Makerspace Database

3.1 Methodology

This research work follows a broader investigation that, at the time of writing, is being conducted on the "*maker movement*" and, in particular, on DIY Science. Preliminary research work was conducted on the basis of relevant literature on the maker movement, research reports on makerspaces (e.g. Menichinelli & Ranellucci, 2014; Sleigh, Stewart, & Stokes, 2015) and the authors own inquiry. In the context of this report, the core research objective was to look for trends and evolutionary aspects of the maker movement in the European Union (EU), assuming that (1) the growth of the movement is associated with the spread of makerspaces, and (2) an online presence is a key element in the existence of the physical makerspaces. A desk research approach for identifying and collecting relevant data was adopted and was retrieved for the period of January 2016 to December 2016 information from websites and social media pages of 826 makerspaces across the 28 EU countries (see Table 1). Searches which directed to internet pages were modulated by browsing search engines (e.g. Google Search), social media redirect links and already existing databases on makerspaces (www.fablab.io and www.wiki.hackerspaces.org), as well as, after direct contacts with actors involved in the maker movement.

Table 1: List of countries surveyed.

Countries		
Austria	Germany	Poland
Belgium	Greece	Portugal
Bulgaria	Hungary	Romania
Croatia	Ireland	Slovakia
Cyprus	Italy	Slovenia
Czech Republic	Latvia	Spain
Denmark	Lithuania	Sweden
Estonia	Luxembourg	United Kingdom
Finland	Malta	
France	Netherlands	

The data collected were transformed into a database which is currently being made available online. The aim is to give the identified makerspaces the opportunity to review, correct and complement the information collected.

3.2 Data collected and availability

To assess the relevance and validity of the data retrieved, guidelines for profiling each space were developed. The following information was collected systematically (when available) for each makerspace:

- Name, type (makerspace, hackerspace or FabLab) and address;
- Year of inauguration (when directly stated in official webpages);
- Number of members;
- Responsible person (name and e-mail);
- Online presence (website, Facebook and Twitter pages, number of followers and date of last post);
- Area of focus (e.g. digital fabrication, DIYbio, citizen science, education, programming, art);
- Facilities and equipment (characteristics of the space and availability of tools and technologies such as 3D printers, CNC milling machines, laser cutters, programmable hardware, etc.);
- Residence Programs (opportunity of temporal residence for agreed projects development);
- Organization of events (courses, seminars, and conferences organization);
- Relevant projects and publications (links to relevant material, examples of projects developed, tutorials and data repositories);
- Funding and type of membership (typology of access to the space, monthly fees, funding schemes);
- Ethic code, rules and statutes;
- Origins, community influence and other observations;

Text mining techniques were used to categorize qualitative information relative to discursive data such as “area of focus” or “relevant projects”.

Table 2 summarizes the approximated data availability for the major fields of the constructed database.

Table 2: Data availability.

Field	Data availability (%)
Physical location	100
Year of inauguration	57
Number of members	32
Contact email and website	92
Online visibility	72
Equipment	76
Area of focus	80
Type of membership	68
Organization of events	74
Ethics code and statute	18
Funding	50

It must be pointed out that the data were collected during 2016 and, consequently, it must be seen as an historical record of the state of affairs of EU makerspaces in the year of 2016. The maker movement is undergoing a rapid growth and it is very likely that the data collected was already missing out new spaces that in the meantime were created. Moreover, it is not possible to guarantee the accuracy of every bit of information as most of the data come from self–reported online sources.

4 Results

In the following sub section, we highlight some of our main findings along the following themes:

- Makerspaces typology;
- Makerspaces geographic location;
- Makerspaces temporal evolution;
- Makerspaces economic sustainability;
- Makerspaces main interests.

4.1 Makerspaces Typology

In the data collected it was made a clear distinction between FabLabs and Hackerspaces (as defined in section 2.1) and any space that drifted from the pre-defined definitions was generically labelled as "*other*" type of makerspace. FabLabs account nearly for half of the makerspaces in the EU28 (48%; 397 makerspaces), whereas Hackerspaces account for 40% (327 makerspaces) and other type of makerspaces for 12% (102 makerspaces).

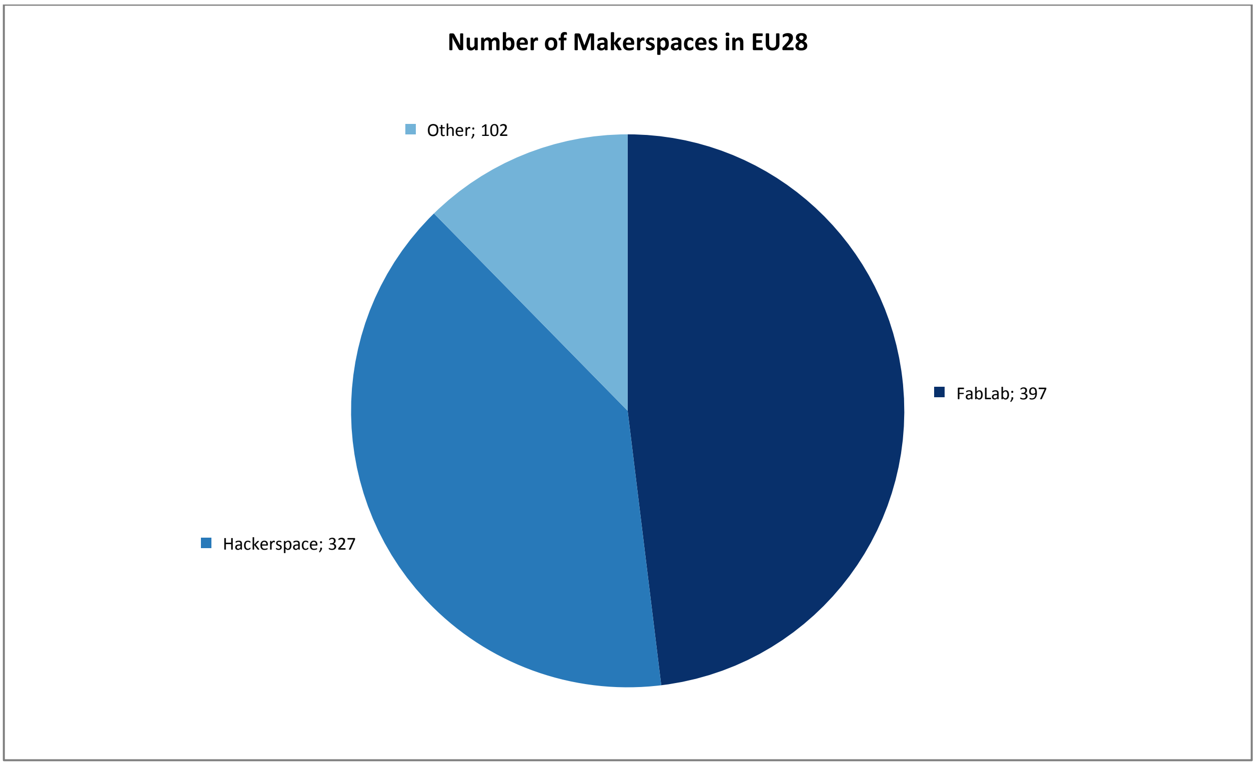


Figure 2: Total number of Makerspaces in EU28 by typology.

Table 3: Data quality box for Figure 2.

Data Source	JRC STS Makerspace Database: Data collected by the authors from multiple online sources (see section 3.1).
Data Year	Data collected from Jan. 2016 to Dec. 2016
Data Status	Raw data
Data Type	Numeric (integer)
Data Items	Data from 826 makerspaces

4.2 Makerspaces Spatial Location

In the graphs below (Figure 4 and Figure 5) it is possible to see the absolute number of makerspaces per country and distinguish them according to the applied typology of FabLabs, Hackerspaces and other types of makerspaces. The most immediate finding is that all of the EU28 countries have at least one makerspace located in their territory (Figure 3), with all EU28 capital cities having as well at least one makerspace. The average number of makerspaces per country is 29.5.

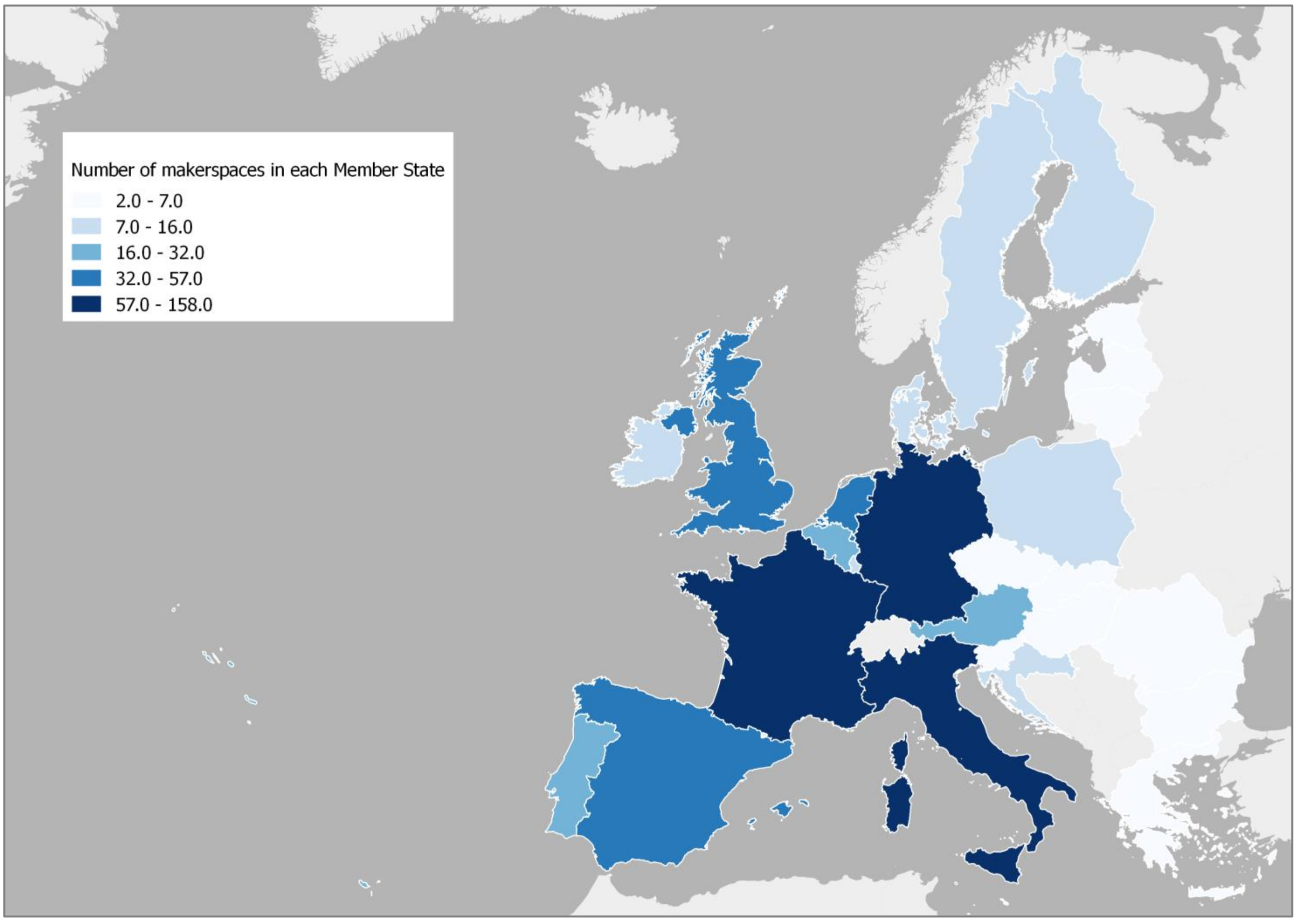


Figure 3: Number of Makerspaces in EU28, by country.

Table 4: Number of Makerspaces in EU28, listed by country.

Country	Number of Makerspaces
Austria	23
Belgium	32
Bulgaria	7
Croatia	9
Cyprus	2
Czech Republic	7
Denmark	16
Estonia	4
Finland	14
France	158
Germany	151
Greece	7
Hungary	3
Ireland	13
Italy	133
Latvia	3
Lithuania	2
Luxembourg	10
Malta	2
Netherlands	54
Poland	16
Portugal	29
Romania	6
Slovakia	3
Slovenia	3
Spain	51
Sweden	11
United Kingdom	57

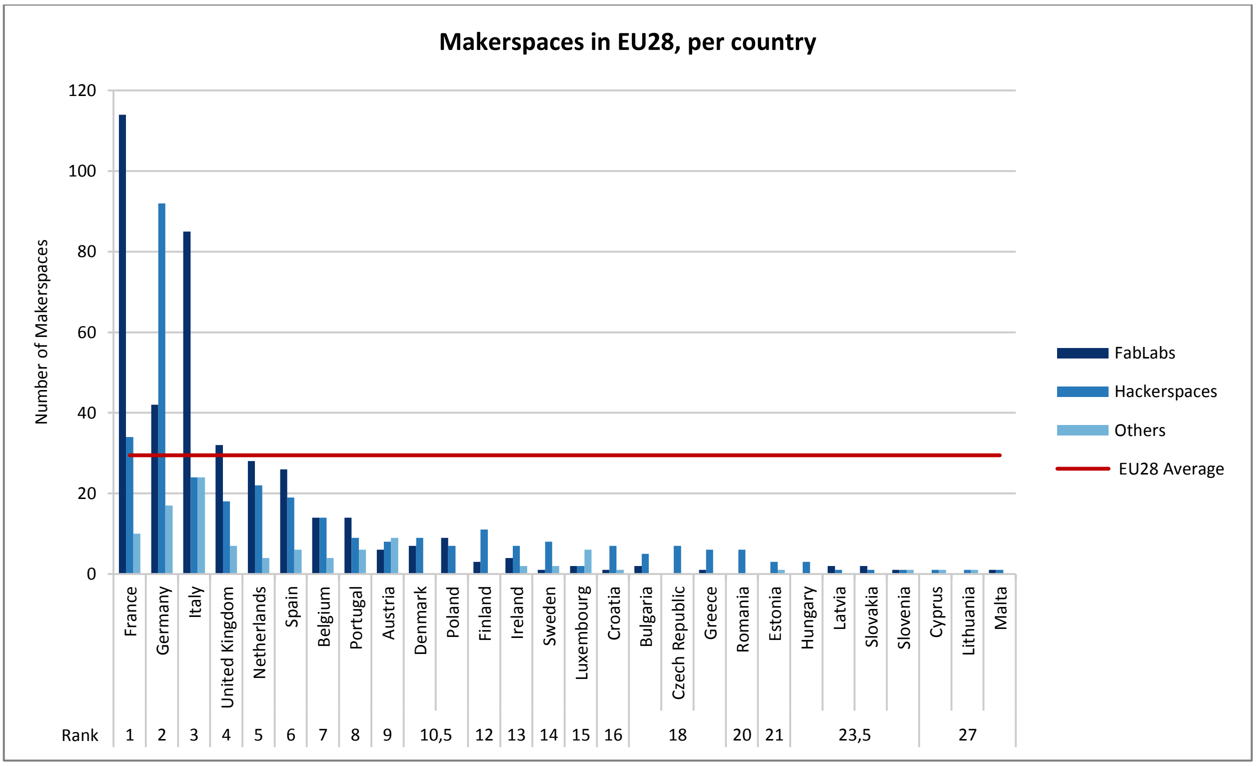


Figure 4: Total number of Makerspaces in EU28, listed by country and typology.

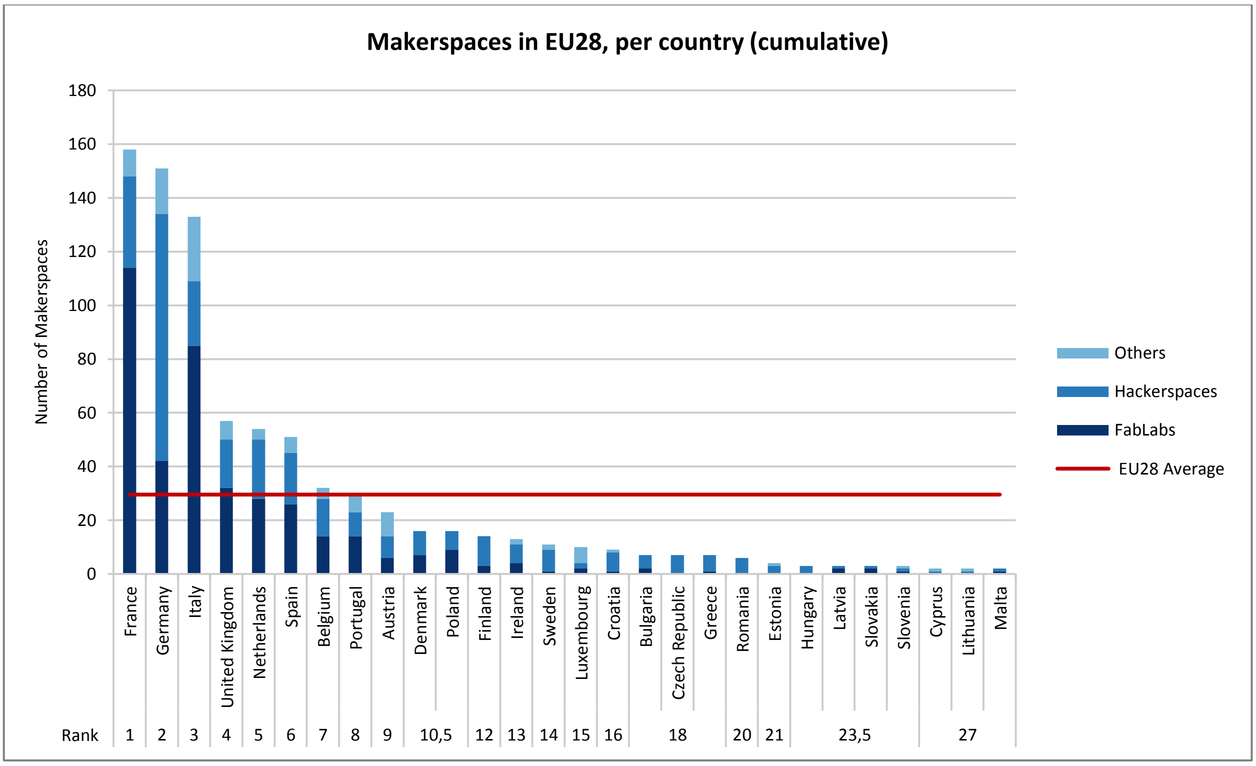


Figure 5: Total number of Makerspaces in EU28, listed by country and typology (cumulative).

Table 5: Data quality box for Figure 4 and Figure 5.

Data Source	JRC STS Makerspace Database: Data collected by the authors from multiple online sources (see section 3.1).
Data Year	Data collected from Jan. 2016 to Dec. 2016
Data Status	Processed data
Data Type	Numeric (integer)
Data Items	Data from 826 makerspaces

There are several observations from the figures above:

1. France, Germany and Italy, which represent 41% of EU28 population and 29% of EU28 area[20], represent 53% of the makerspaces within the EU28 (total of 442 makerspaces).

2. There is a considerable gap in terms of number of makerspaces between the first three countries (France, Germany and Italy) and the subsequent three (United Kingdom, Netherlands and Spain). While the first three countries account for 442 makerspaces, the following ones account for 162 makerspaces. Looking with detail to the third and fourth countries in the list, while Italy accounts for 133 makerspaces, the United Kingdom totals 57 makerspaces: not even half of the value of one of the top three countries.

3. It is interesting to note that Poland, the country with the fifth highest population, only appears in the tenth position (together with Denmark) of the countries with the highest number of makerspaces in the EU28.

4. 92% of all makerspaces are located in EU15[21] member states and essentially make up the top countries with the most number of makerspaces, showing that the maker movement has considerably been built up in the Western countries (the only exception from the EU15 is Greece, with only 7 makerspaces). Consequentially, the EU15 average (50.6 makerspaces per country) is substantially higher than the EU28 average (29.5 makerspaces per country).

A close analysis of the makerspaces typology in the member states shows that France has a higher number of FabLabs (114 spaces; 72.2%) than Hackerspaces (34 spaces; 21.5%) whilst in Germany the opposite occurs (FabLabs: 42 spaces; 27.8% and Hackerspaces: 92 spaces; 60.9%). Other countries where the number of FabLabs is substantially less than the number of Hackerspaces include countries with low population and a low absolute number of makerspaces such as, Croatia, Cyprus, Czech Republic, Estonia, Greece, Hungary, Lithuania, Romania, and Sweden. With regards to Germany, the higher number of Hackerspaces is most likely associated to the birth and rise of the hacker culture in this country.

Looking at the density of makerspaces in the EU28 countries (Figure 6), i.e. the number of makerspaces per 1,000,000 citizens, other conclusions can be drawn.

[20] http://europa.eu/about-eu/countries/index_en.htm (last access: 22 June 2017).

[21] EU15: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden and United Kingdom.

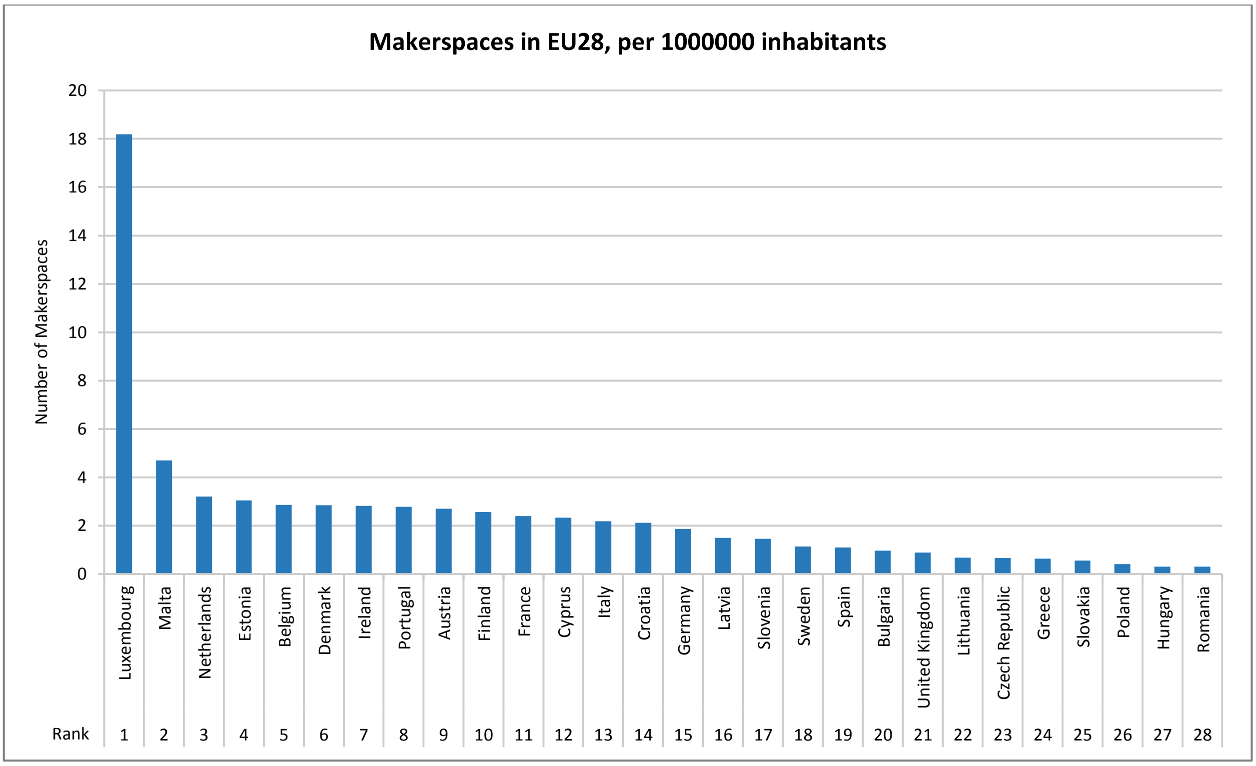


Figure 6: Number of Makerspaces in EU28, per one million inhabitants.

Table 6: Data quality box for Figure 6.

Data Source	JRC STS Makerspace Database: Data collected by the authors from multiple online sources (see section 3.1).
Data Year	Data collected from Jan. 2016 to Dec. 2016
Data Status	Processed data
Data Type	Numeric (integer)
Data Items	Data from 826 makerspaces

Overall, there is approximately one makerspace per 400.000 citizens in the EU. Luxembourg can clearly be classified as an outstanding outlier with a density of more than fivefold the EU average. Malta with its relative small population ranks second and, thus, is a similar special case. The other member states above the average are the EU15 countries, except for Estonia which ranks fifth in density (see also Figure 8).

In terms of geography, it is possible to see that the highest concentration of makerspaces is in central Europe corresponding to countries such as France, Germany, Italy, Netherlands and Belgium (see Figure 7 and Figure 9).

In Figure 7 it is also possible to see that the makerspaces' geographic location differs from country to country. In countries where the number of makerspace is higher than the EU average (e.g. France, Germany, Italy, Netherlands, Belgium and Portugal) the spatial arrangement is very homogenous. On the other hand, in countries with an overall low number of makerspaces (namely Cyprus, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Romania, Slovakia and Slovenia), the location of these makerspaces is limited to the most populated areas (usually capital cities).

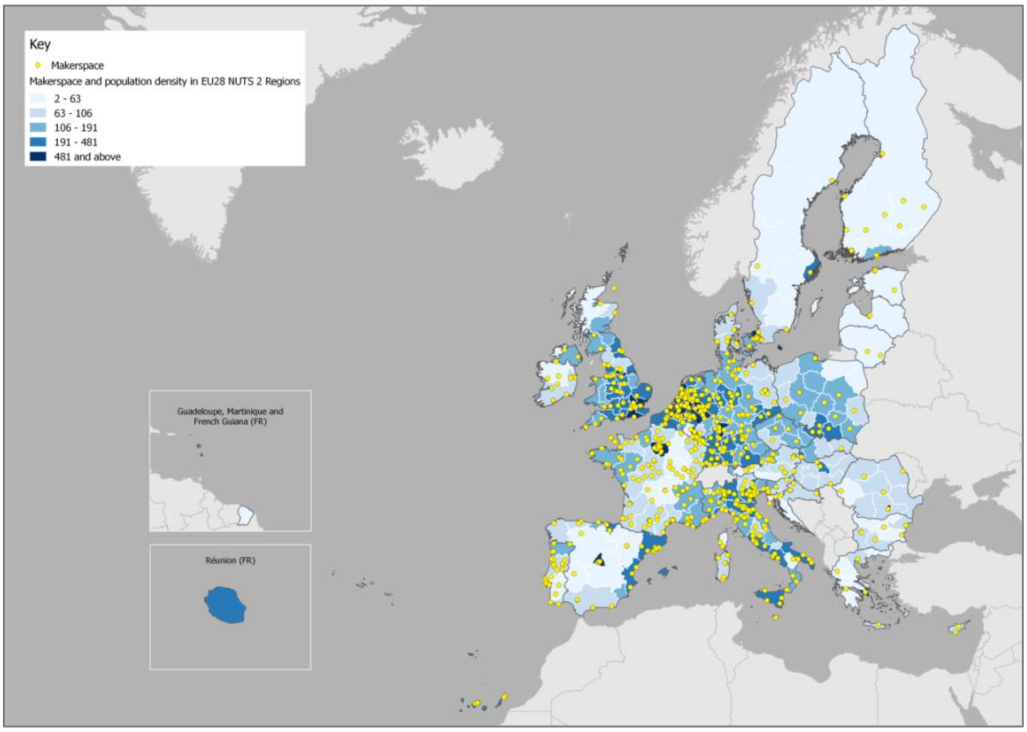


Figure 7: Geographic location of the Makerspaces in EU28 superimposed to the population density in EU28 NUTS 2 Regions.

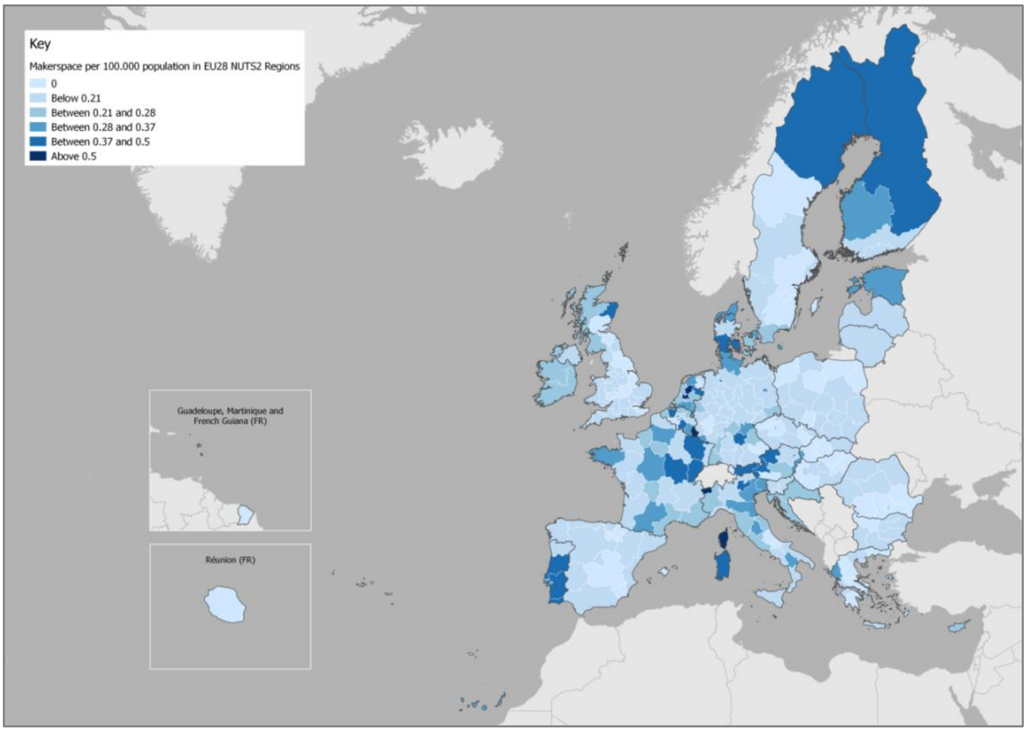


Figure 8: Number of Makerspaces per 100000 inhabitants in EU28 NUTS 2 Regions.

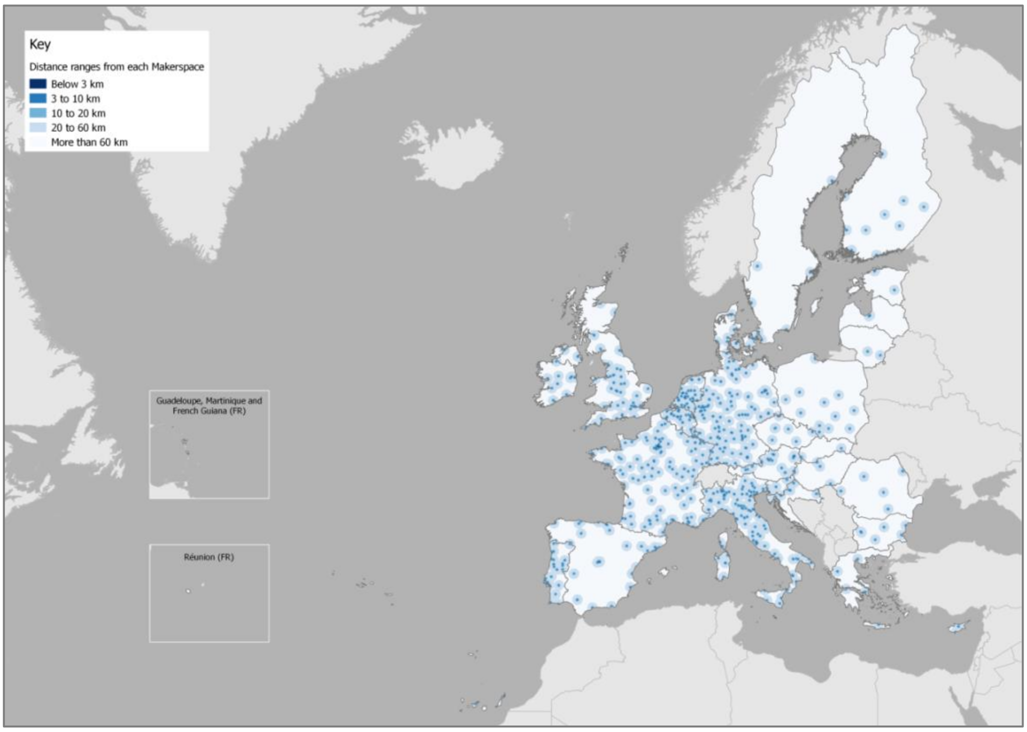


Figure 9: Geographic location of the Makerspaces in EU28, and distance range from each.

Table 7: Data quality box for Figure 7, Figure 8 and Figure 9.

Data Source	JRC STS Makerspace Database: Data collected by the authors from multiple online sources (see section 3.1).
Data Year	Data collected from Jan. 2016 to Dec. 2016
Data Status	Processed data
Data Type	Geographic
Data Items	Data from 826 makerspaces

As further research it would be interesting to study the historical and cultural reasons of these differences.

4.3 Makerspaces Temporal Evolution

In Figure 10, the evolution of the number of Makerspaces in EU28, per year, starting from 2000 is depicted with the available data. It must be pointed out that the information available in this figure is partial and should be analysed with caution as around 43% of the records are missing (a total of 352 makerspaces without a clear year of inauguration)[22]. This being said, it is possible to see a starting boom in the number of new makerspaces in 2007-2008 which continually increased in the subsequent years until 2013. From 2014 to 2016 it seems that the number of new makerspaces steadily decreased to the numbers of 2008. From the graph illustrating the cumulated number of makerspaces by year it is possible to see the formation of a saturation curve for the years of 2015-2016. Assuming that the data is representative, a

[22] This plot assumes that there is a uniform distribution of the available (and unavailable) data over time.

possible reason for such evolution can be that, as the number of makerspaces increases in a country, the demand for additional, new makerspaces decreases. This may be explained by ideas of “saturation”, namely that if several makerspaces exist in a city or nearby, there could be no further need to create another makerspace within the same sphere of influence. Further explanations for this decrease need to be explored through another study, including aspects of governance, business model, individual and collective expectations, besides the historical, educational, industrial and cultural context.

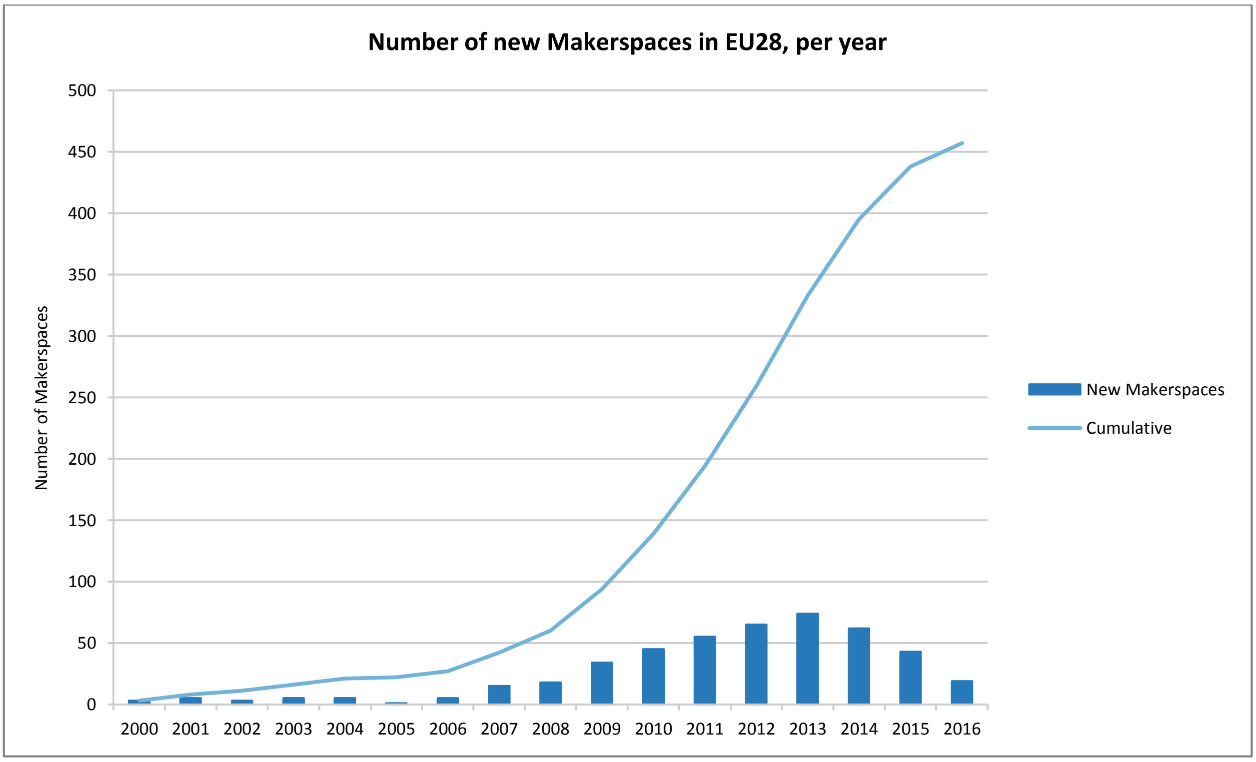


Figure 10: Evolution of the number of Makerspaces in EU28, per year.

Table 8: Data quality box for Figure 10.

Data Source	JRC STS Makerspace Database: Data collected by the authors from multiple online sources (see section 3.1).
Data Year	Data collected from Jan. 2016 to Dec. 2016
Data Status	Processed data
Data Type	Numeric (integer)
Data Items	Data from 474 makerspaces

4.4 Makerspaces Economic Sustainability

The economic sustainability of a makerspace is greatly dependent on secured funding, for instance via sponsorships, and sources of income. From the data collected, the most common sources of income are (1) via a membership fee that can either be flat (monthly or annual payment) or varied (payment based on the frequency someone uses the makerspace); or (2) via the payment of a fee based on the equipment usage time or material consumed.

In Figure 11 it is possible to see the number of makerspaces by country that can be described by the funding schemes listed above. The most common procedure seems to be a membership fee, either flat or varied. Overall, 335 makerspaces were identified with a membership scheme (representing 72% of the makerspaces with this type of data available); 73 makerspaces (16%) with a payment scheme based on equipment usage or material consumed; and 55 makerspaces (12%) with no fee at all (clearly stated as such). The types of data were missing for 363 makerspaces (44% of the total number of makerspaces).

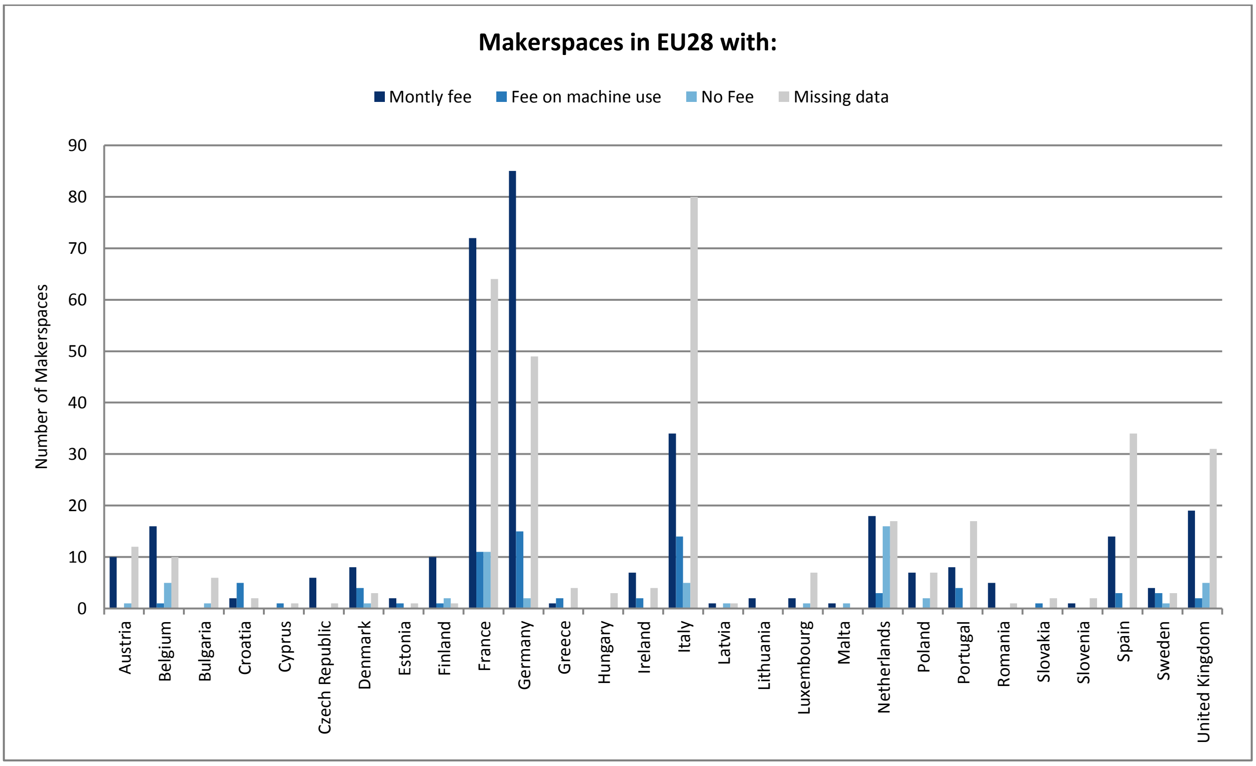


Figure 11: Total number of Makerspaces in EU28, by country with monthly fee; fee based on equipment use; and no fee.

Table 9: Data quality box for Figure 11.

Data Source	JRC STS Makerspace Database: Data collected by the authors from multiple online sources (see section 3.1).
Data Year	Data collected through Jan 2016 to Dec 2016
Data Status	Processed data
Data Type	Numeric (integer)
Data Items	Data from 463 makerspaces (missing data for 363 makerspaces)

Figure 12 illustrates the different membership rates applied across the EU28 countries. These ranged from an average of 4.2 €/month in Malta to an average of 43.2 €/month in The Netherlands. The EU28 average was of 20.93 €/month with twelve countries being above this average: Austria, Belgium, Estonia, Finland, France, Ireland, Latvia, Lithuania, Netherlands, Romania, Spain, and United Kingdom.

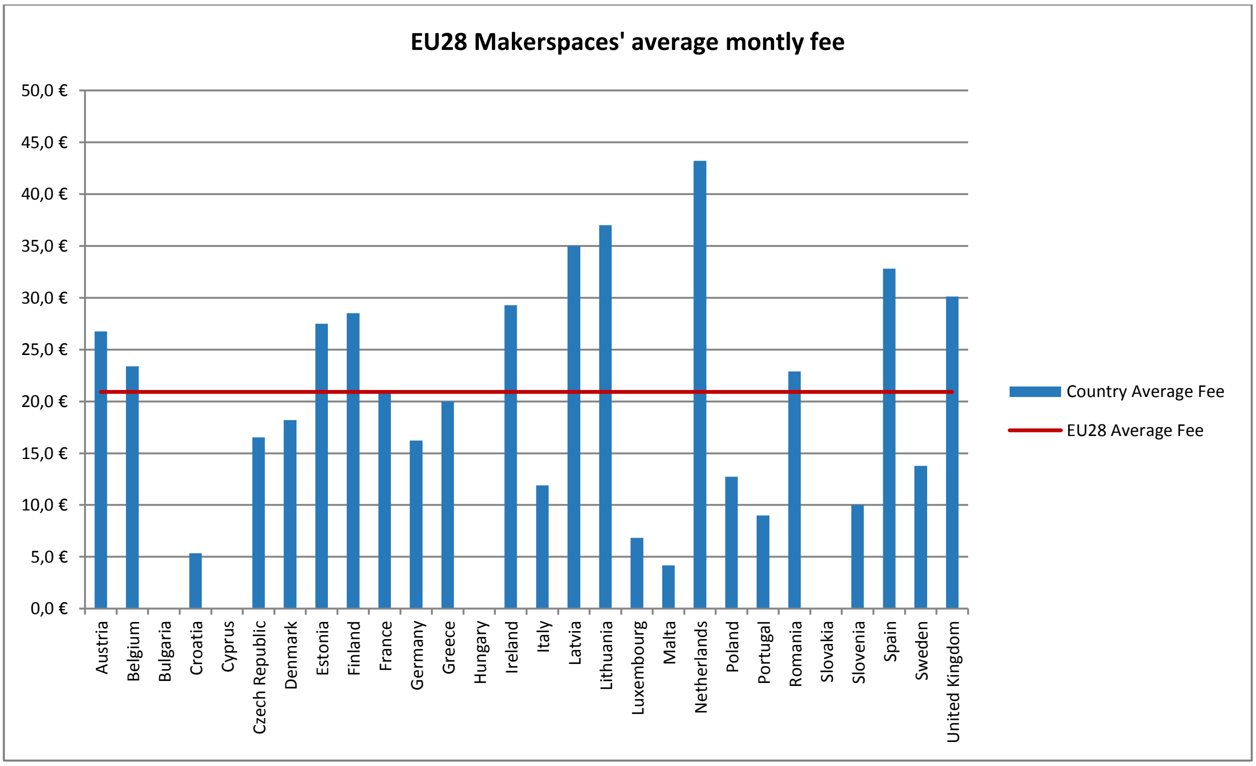


Figure 12: Average monthly fee, by country, of the Makerspaces in EU28.

Table 10: Data quality box for Figure 12.

Data Source	JRC STS Makerspace Database: Data collected by the authors from multiple online sources (see section 3.1).
Data Year	Data collected from Jan. 2016 to Dec. 2016
Data Status	Processed data
Data Type	Numeric (decimal)
Data Items	Data from 335 makerspaces

4.5 Makerspaces' Main Interests

Based on work developed, topics addressed, and interests highlighted by the different makerspaces' homepages, it is observed that the main thematic areas of interest are very similar among the various spaces (and as expected STEAM related). 546 makerspaces indicated interest in digital fabrication, 273 in programing and 247 in electronics (Figure 13). Topics related to design, arts and education were also frequently mentioned.

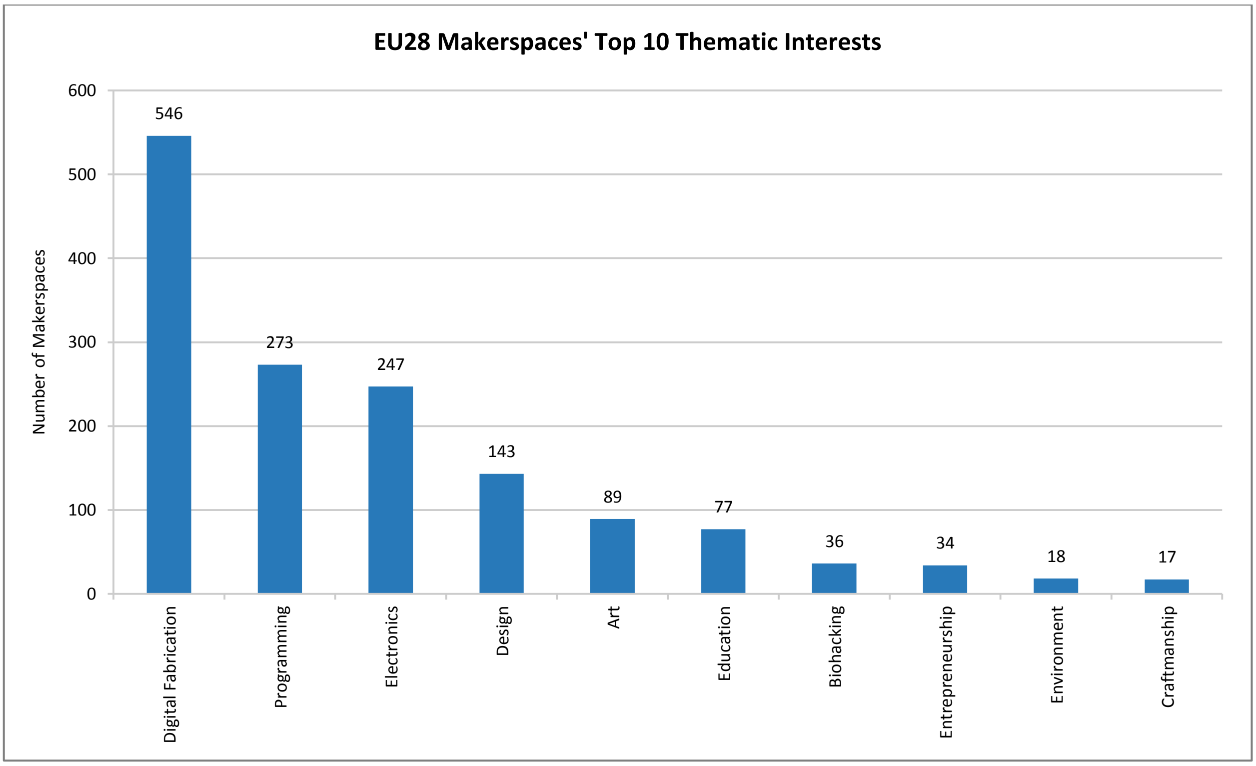


Figure 13: Top 10 main interests of the Makerspaces in EU28.

Table 11: Data quality box for Figure 13.

Data Source	JRC STS Makerspace Database: Data collected by the authors from multiple online sources (see section 3.1).
Data Year	Data collected from Jan. 2016 to Dec. 2016
Data Status	Processed data
Data Type	Numeric (integer)
Data Items	Data from 826 makerspaces

The list of equipment available in the makerspaces reflects the interest of the various spaces (Figure 14), with digital fabrication tools (namely 3D printers, laser cutters and CNC milling machines) having a dominant role: 558 makerspaces listed they have at least one 3D printer, 389 makerspaces at least one laser cutter, and 373 makerspaces at least one CNC milling machine. The availability of tools to produce electronic circuits was manifested in 403 makerspaces.

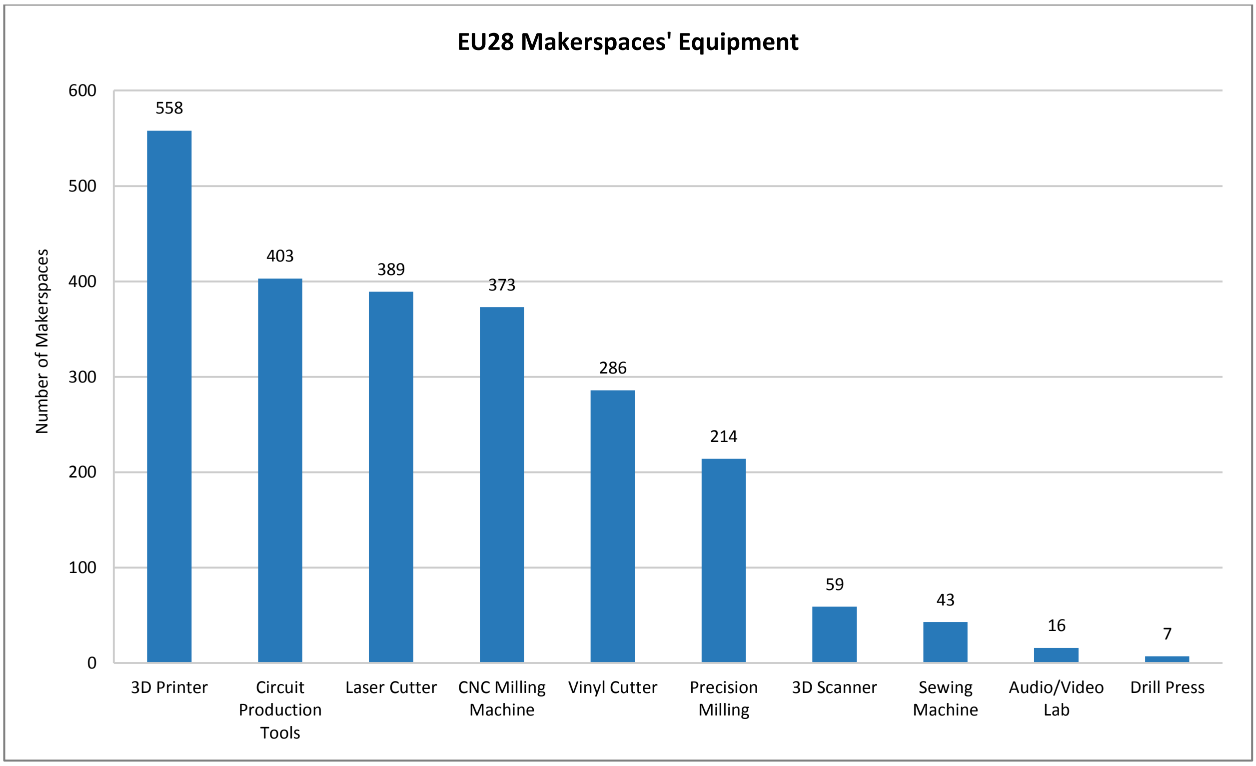


Figure 14: EU28 Makerspaces' most common equipment.

Table 12: Data quality box for Figure 14.

Data Source	JRC STS Makerspace Database: Data collected by the authors from multiple online sources (see section 3.1).
Data Year	Data collected from Jan. 2016 to Dec. 2016
Data Status	Processed data
Data Type	Numeric (integer)
Data Items	Data from 618 makerspaces (missing data for 208 makerspaces)

5 Final Remarks

In this research study, the authors took on the venture to assess and quantify the dimension of the maker movement across the EU28, by investigating the distribution and activity of Makerspaces. The work conducted was based on the assumption that Makerspaces are the physical representations of the maker movement and follows a broader investigation that has been conducted by the authors on related topics.

The data collected provides an initial glimpse of the dimension of the maker movement in Europe. It shows that this is not a homogeneous movement, both in terms of spatial distribution and identity. It must be clear however, that these data must be seen as a snapshot of the movement regarding the year of 2016.

Two types of makerspaces were identified, FabLabs and Hackerspaces, with predominant implementation in EU28. Noticeably, the absolute number of FabLabs and Hackerspaces is relatively close, with 397 FabLabs (48%) being identified against 327 Hackerspaces (40%). Western Europe countries have a higher number of makerspaces with France, Germany and Italy accounting for more than half of the makerspaces in EU28. It is also interesting that all major capital cities in EU28 have at least one makerspace, illustrating the spatial spread of the movement to all countries in the EU28 and pertinent cities.

In terms of temporal evolution, based on the data collected, the number of makerspaces in EU28 has been growing significantly since 2007-2008 event though it is perceptible a decline in the number of new makerspaces per year in the last 3 years (2014-2016). The most likely scenario is that a saturation point was reached and the creation of new spaces is now more constrained (and consequently the number of makerspaces in EU28 might gradually stabilize).

In order to fully understand the dimension, spread and motivations of the maker movement, the authors aim to make the dataset publicly available, and invite the spaces to freely update it.

There are several issues that the authors deem to be interesting to analyse further making use of different types of social research methodologies:

1. Cross country comparisons of historical and cultural dimensions of the development of makerspaces in EU28;
2. Expectations and promises of these spaces viz. à viz. different types of societal challenges (from job creation, education to environmental activism);
3. The future of these spaces and their relationship to ideas of innovation, scientific research, circular economy and leisure economy, amongst others;
4. Governance and ethical aspects of activities in some of the fields (such as synthetic biology).

From a policy perspective, the result of these enquiries can help with better understanding how these types of grassroots movements contribute to decentralised approaches to address societal issues both at global and local levels.

6 References

Anderson, C. (2012). *Makers: The New Industrial Revolution*. London, UK: Random House Business Books.

Blikstein, P. (2013). Digital Fabrication and “Making” in Education: The Democratization of Invention. In J. Walter-Herrmann & C. Büching (Eds.), *FabLabs: Of Machines, Makers and Inventors* (pp. 203–222). Transcript Verlag.

Burke, J. (2014). Making Sense: Can Makerspaces Work in Academic Libraries?

Castells, M. (1996). *The rise of the network society: volume i: the information age: economy, society, and culture*. *Recherche* (Vol. 61). http://doi.org/10.2307/1252090

Cavalcanti, G. (2013). Is it a Hackerspace, Makerspace, TechShop, or FabLab? Retrieved June 29, 2016, from http://makezine.com/2013/05/22/the-difference-between-hackerspaces-makerspaces-techshops-and-fablabs/

Davies, R. S. (2016). Participation as pleasure: Citizenship and science communication. In *Remaking Participation: Science, Environment and Emergent Publics. ed. / Jason Chilvers; Matthew Kearnes. Abingdon, Oxon* (pp. 162–177). Routledge, 2016.

Dougherty, D. (2012). The maker movement. *Innovations*, *7*(3), 11–14.

Dougherty, D. (2013). The Maker Mindset. In M. Honey & D. E. Kanter (Eds.), *Design, make, play: Growing the next generation of STEM innovators* (pp. 7–12). Routledge.

Gandini, L. (1993). Fundamentals of the Reggio Emilia approach to early childhood education. *Young Children*, *49*(1), 4–8.

Gershenfeld, N. (2005). *Fab: The Coming Revolution on Your Desktop - From Personal Computers to Personal Fabrication*. New York, NY, USA: Basic Books.

Hatch, M. (2013). *The Maker Movement Manifesto: Rules for Innovation in the New World of Crafters, Hackers, and Tinkerers*. *McGraw-Hill* (Vol. 44).

Hippel, E. Von. (2005). *Democratizing Innovation*. Cambridge, MA, USA: MIT Press.

Kuiken, T. (2016). Governance: Learn from DIY biologists. *Nature*, *531*, 167–168. http://doi.org/10.1038/531167a

Kurti, R. S., Kurti, D. L., & Fleming, L. (2014). The Philosophy of Educational Makerspaces. *Teacher Librarian*, *41*(5), 8–12.

Lindtner, S., Hertz, G. D., & Dourish, P. (2014). Emerging sites of HCI innovation. *Proceedings of the 32nd Annual ACM Conference on Human Factors in Computing Systems*.

Martin, L. (2015). The Promise of the Maker Movement for Education. *Journal of Pre-College Engineering Education Research Journal of Pre-College Engineering Education ResearchJ-PEER Journal of Pre-College Engineering Education Research*, *5*(5), 1–30. http://doi.org/10.7771/2157-9288.1099

Menichinelli, M., & Ranellucci, A. (2014). *Censimento dei Laboratori di Fabbricazione Digitale in Italia*.

Morozov, E. (2014). Making It - Pick up a spot welder and join the revolution. Retrieved June 23, 2017, from http://www.newyorker.com/magazine/2014/01/13/making-it-2

Nascimento, S., Guimarães Pereira, Â., & Ghezzi, A. (2014). *From Citizen Science to Do It Yourself Science*.

Passebon, P. (2014). Un fablab stimule la créativité de Renault. Retrieved June 22, 2017, from https://www.industrie-techno.com/un-fablab-stimule-la-creativite-de-renault.30151

Pettis, B., Schneeweisz, A., & Ohlig, J. (2011). *Hackerspaces - The Beginning*. OpenSource. Retrieved from http://wayback.archive.org/web/20130831005537/http://hackerspaces.org/static/The_Beginning.zip

Ravetz, J., Guimarães Pereira, Â., & Nascimento, S. (2015). *Do It Yourself Science : Issues of Quality*.

Richterich, A. (2016). "Do not hack". Rules, values, and communal practice s in hacker- and makerspaces. Selected Papers of AoIR 2016: The 17 th Annual Conference of the Association of Internet Researchers.

Rosa, P., & Guimarães Pereira, Â. (2016). *JRC Thinkers " N " Tinkers Makerspace Concept Note*.

Sheridan, K., Halverson, E. R., Litts, B., Brahms, L., Jacobs-Priebe, L., & Owens, T. (2014). Learning in the Making: A Comparative Case Study of Three Makerspaces. *Harvard Educational Review*, *84*(4), 505–531. http://doi.org/10.17763/haer.84.4.brr34733723j648u

Sleigh, A., Stewart, H., & Stokes, K. (2015). *Open Dataset of UK Makerspaces - A User's Guide*.

Susan B. Barnes. (2008). *From Counterculture to Cyberculture: Stewart Brand, the Whole Earth Network, and the Rise of Digital Utopianism* (review). *Technology and Culture*, *49*(3), 824–826. http://doi.org/10.1353/tech.0.0067

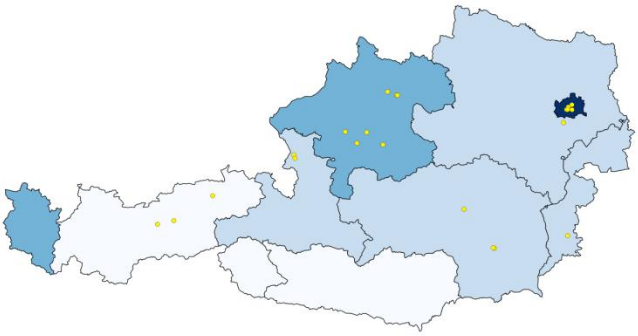
Taylor, N., Hurley, U., & Connolly, P. (2016). Making community: the wider role of makerspaces in public life. In *CHI '16: Proceedings of the 2016 CHI Conference on Human Factors in Computing Systems* (pp. 1415–1425). http://doi.org/10.1145/2858036.2858073

William Barrett, T., Nagel, R. L., Grau Talley, K. P., Wilczynski, V., Tom Byers, Tina Seelig, Sheri Sheppard, A., Weilerstein, P., … Quintero, C. (2015). Makerspaces and Contributions to Entrepreneurship. *ASEE Annual Conference and Exposition, Conference Proceedings*, *122nd ASEE*(122nd ASEE Annual Conference and Exposition: Making Value for Society), 24–31. http://doi.org/10.1016/j.sbspro.2015.06.167

Countries Infographics

23 Makerspaces in Austria

Location



Key
- Makerspace

Population density (per km2)
- 2 - 63
- 63 - 106
- 106 - 191
- 191 - 481
- 481 and above

Typology

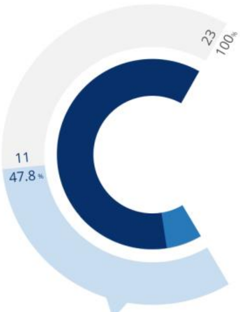
FabLabs	26.1 %	6
Hackerspaces	34.8 %	8
Other makerspaces	39.1 %	9

Total 23

represents **2.8 %** of the makerspaces in EU28

2.70 makerspaces per 1 000 000 inhabitants

Economy



makerspaces with
- 10 Monthly fee
- - Fee based on machine use
- 1 No fee

Data available for 11 makerspaces

Average monthly fee 26.8 EUR/month

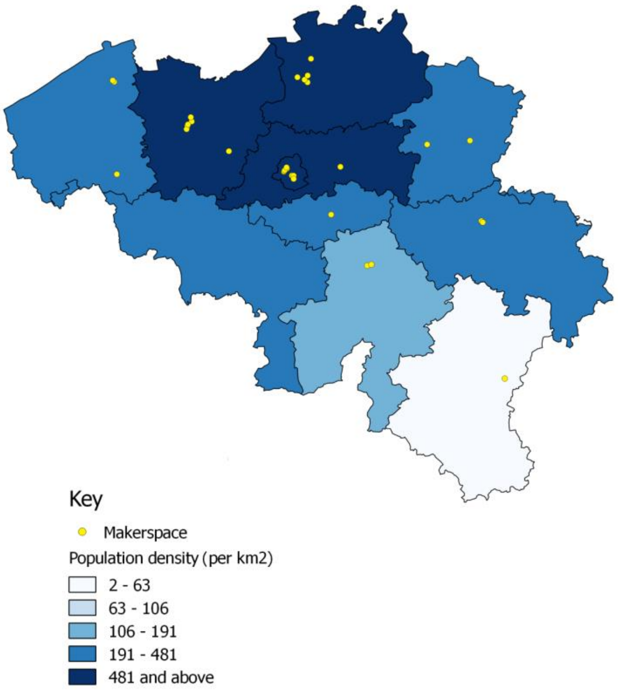
Main Interests

1. Digital Fabrication
2. Art
3. Electronics

Source: Rosa, P. et al. (2017): Overview of the Maker Movement in the European Union, JRC Technical Report.

32 Makerspaces in Belgium

Location



Typology

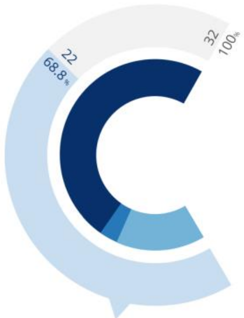
FabLabs	43.8 %	14
Hackerspaces	43.8 %	14
Other makerspaces	12.5 %	4

Total 32

represents **3.9 %** of the makerspaces in EU28

2.86 makerspaces per 1 000 000 inhabitants

Economy



makerspaces with

- 16 Monthly fee
- 1 Fee based on machine use
- 5 No fee

Data available for 22 makerspaces

Average monthly fee

23.4 EUR/month

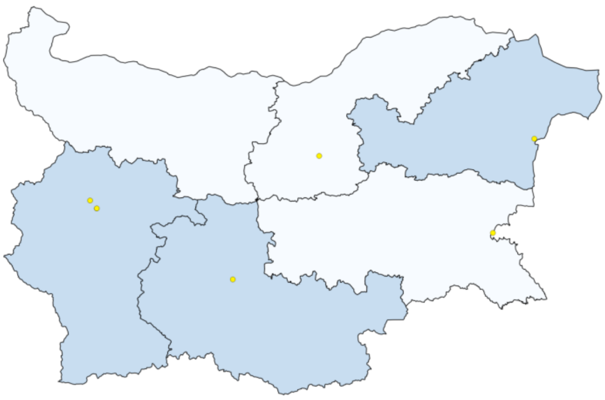
Main Interests

1. Digital Fabrication
2. Electronics
3. Programming

Source: Rosa, P. et al. (2017): Overview of the Maker Movement in the European Union, JRC Technical Report.

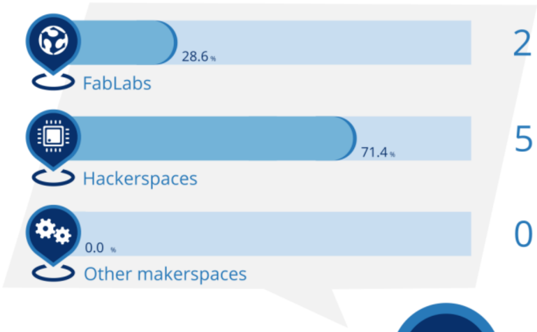
7 Makerspaces in Bulgaria

Location



Key
Makerspace
Population density (per km2)
2 - 63
63 - 106
106 - 191
191 - 481
481 and above

Typology



Total 7

represents **0.8 %** of the makerspaces in EU28

0.97 makerspaces per 1 000 000 inhabitants

Economy

makerspaces with

- \- Monthly fee
- \- Fee based on machine use
- 1 No fee

Data available for 1 makerspace

Average monthly fee

Data not available

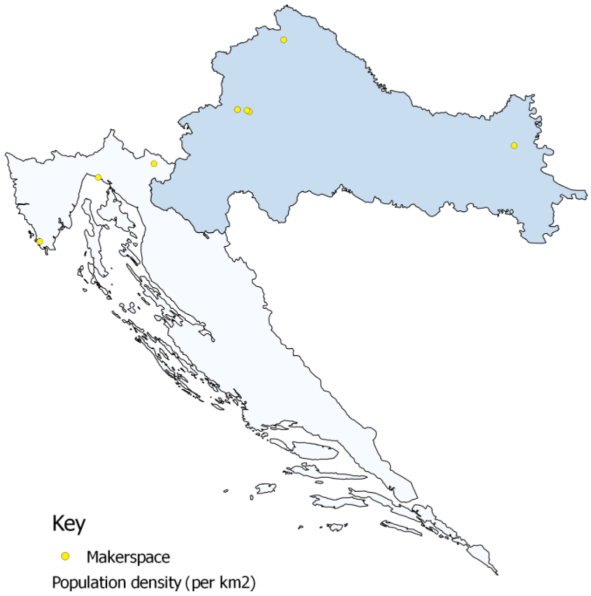
Main Interests

1. Programming
2. Arts
3. Biohacking

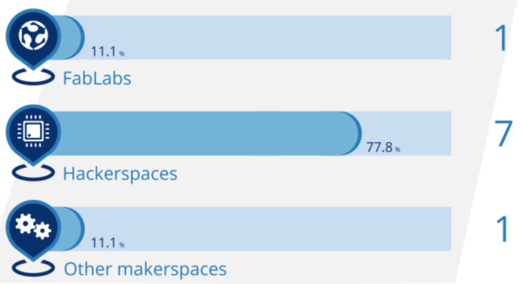
Source: Rosa, P. et al. (2017): Overview of the Maker Movement in the European Union, JRC Technical Report.

9 Makerspaces in Croatia

Location



Typology



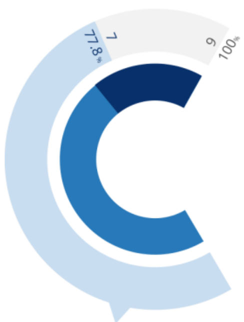
Total 9

represents **1.1 %** of the makerspaces in EU28

2.12 makerspaces per 1 000 000 inhabitants

Economy

makerspaces with



- 2 Monthly fee
- 5 Fee based on machine use
- \- No fee

Data available for 7 makerspaces

Average monthly fee

5.4 EUR/month

Main Interests

1. Digital Fabrication
2. Education
3. Programming

Source: Rosa, P. et al. (2017): Overview of the Maker Movement in the European Union, JRC Technical Report.

2 Makerspaces in Cyprus

Location

Key
- Makerspace

Population density (per km2)
- 2 - 63
- 63 - 106
- 106 - 191
- 191 - 481
- 481 and above

Typology

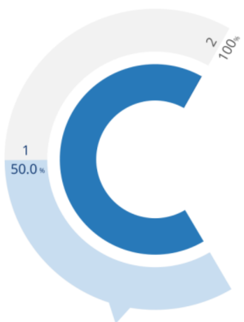
FabLabs	0.0 %	0
Hackerspaces	50.0 %	1
Other makerspaces	50.0 %	1

Total 2

represents **0.2 %** of the makerspaces in EU28

2.33 makerspaces per 1 000 000 inhabitants

Economy



makerspaces with
- \- Monthly fee
- 1 Fee based on machine use
- \- No fee

Data available for 1 makerspace

Average monthly fee
Data not available

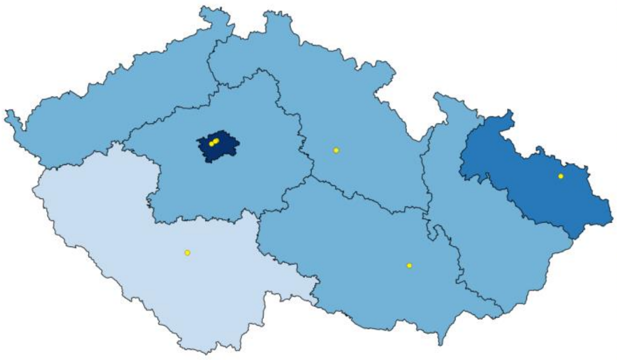
Main Interests

1. Programming
2. Electronics
3. Art

Source: Rosa, P. et al. (2017): Overview of the Maker Movement in the European Union, JRC Technical Report.

7 Makerspaces in Czech Republic

Location



Key

- Makerspace

Population density (per km2)

- 2 - 63
- 63 - 106
- 106 - 191
- 191 - 481
- 481 and above

Typology

FabLabs	0.0 %	0
Hackerspaces	100.0 %	7
Other makerspaces	0.0 %	0

Total 7

represents **0.8 %** of the makerspaces in EU28

0.67 makerspaces per 1 000 000 inhabitants

Economy

makerspaces with

6	Monthly fee
-	Fee based on machine use
-	No fee

Data available for 6 makerspaces

Average monthly fee

16.5 EUR/month

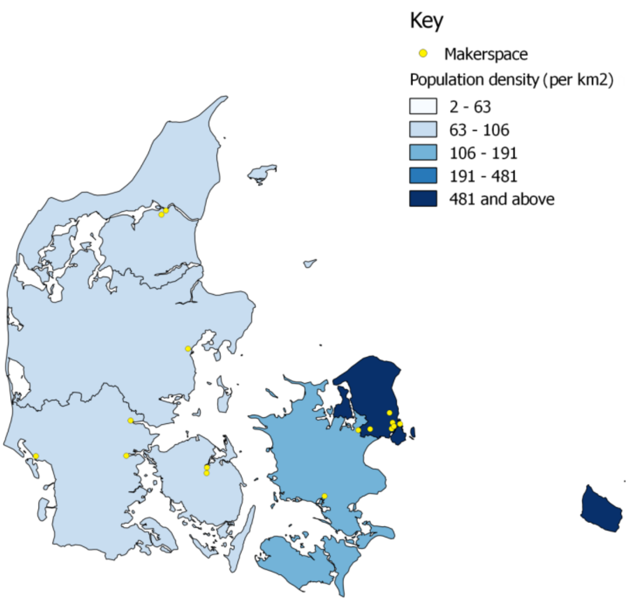
Main Interests

1. Electronics
2. Programming
3. Digital Fabrication

Source: Rosa, P. et al. (2017): Overview of the Maker Movement in the European Union, JRC Technical Report.

16 Makerspaces in Denmark

Location



Typology

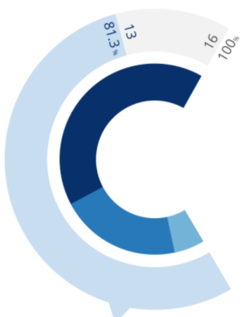
FabLabs	43.8 %	7
Hackerspaces	56.3 %	9
Other makerspaces	0.0 %	0

Total 16

represents **1.9 %** of the makerspaces in EU28

2.84 makerspaces per 1 000 000 inhabitants

Economy



makerspaces with

- 8 Monthly fee
- 4 Fee based on machine use
- 1 No fee

Data available for 13 makerspaces

Average monthly fee

18.2 EUR/month

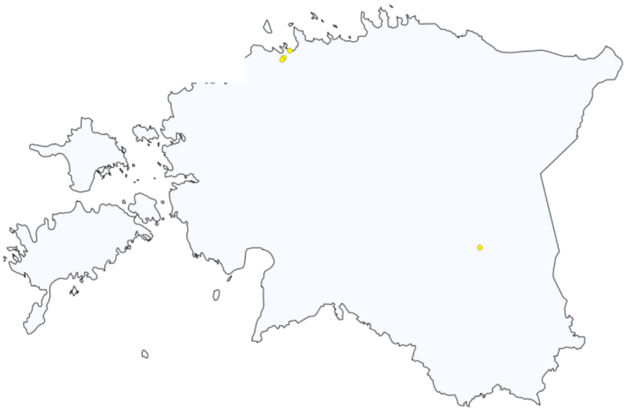
Main Interests

1. Digital Fabrication
2. Electronics
3. Programming

Source: Rosa, P. et al. (2017): Overview of the Maker Movement in the European Union, JRC Technical Report.

4 Makerspaces in Estonia

Location



Key
- Makerspace

Population density (per km2)
- 2 - 63
- 63 - 106
- 106 - 191
- 191 - 481
- 481 and above

Typology

Type	%	Number
FabLabs	0.0 %	0
Hackerspaces	75.0 %	3
Other makerspaces	25.0 %	1

Total 4

represents **0.5 %** of the makerspaces in EU28

3.04 makerspaces per 1 000 000 inhabitants

Economy

makerspaces with

- 2 Monthly fee
- 1 Fee based on machine use
- \- No fee

Data available for 3 makerspaces

Average monthly fee

27.5 EUR/month

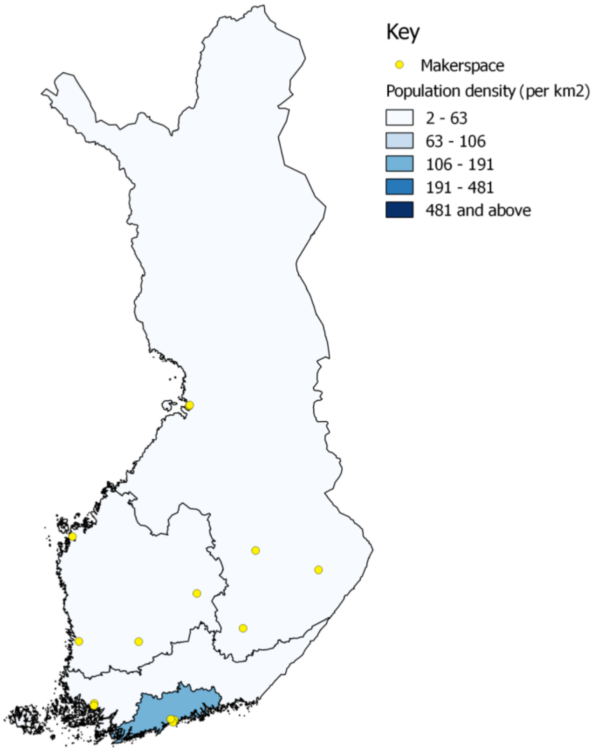
Main Interests

1. Programming
2. Electronics
3. Digital Fabrication

Source: Rosa, P. et al. (2017): Overview of the Maker Movement in the European Union, JRC Technical Report.

14 Makerspaces in Finland

Location



Typology

FabLabs 21.4 % 3

Hackerspaces 78.6 % 11

Other makerspaces 0.0 % 0

Total 14

represents **1.7 %** of the makerspaces in EU28

2.57 makerspaces per 1 000 000 inhabitants

Economy

makerspaces with

- 10 Monthly fee
- 1 Fee based on machine use
- 2 No fee

Data available for 13 makerspaces

Average monthly fee **28.5 EUR/month**

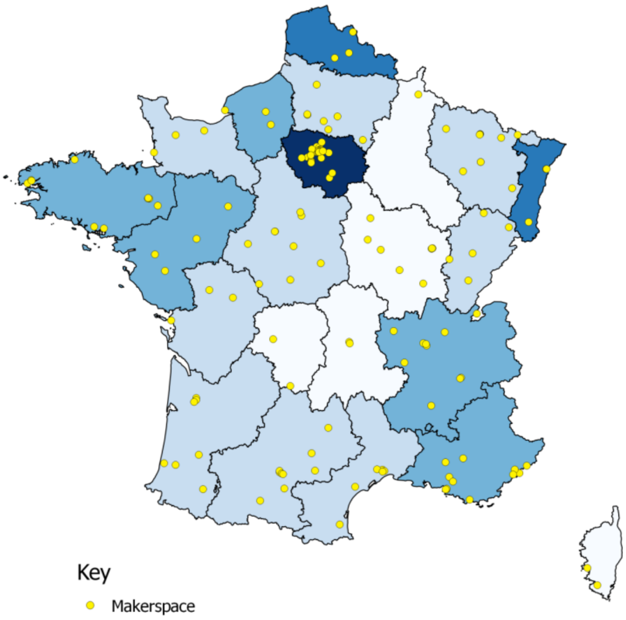
Main Interests

1. Digital Fabrication
2. Electronics
3. Programming

Source: Rosa, P. et al. (2017): Overview of the Maker Movement in the European Union, JRC Technical Report.

158 Makerspaces in France

Location



Typology

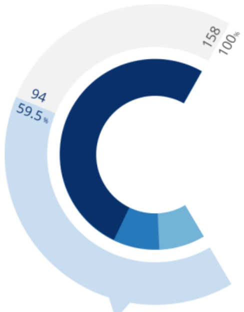
FabLabs	72.2 %	114
Hackerspaces	21.5 %	34
Other makerspaces	6.3 %	10

Total 158

represents **19.1 %** of the makerspaces in EU28

2.40 makerspaces per 1 000 000 inhabitants

Economy



makerspaces with

- **72** Monthly fee
- **11** Fee based on machine use
- **11** No fee

Data available for **94** makerspaces

Average monthly fee

21.1 EUR/month

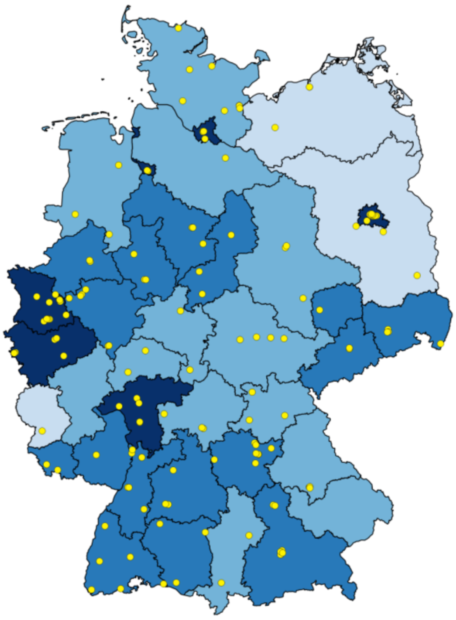
Main Interests

1. Digital Fabrication
2. Design
3. Programming

Source: Rosa, P. et al. (2017): Overview of the Maker Movement in the European Union, JRC Technical Report.

151 Makerspaces in Germany

Location



Key

- Makerspace

Population density (per km2)

- 2 - 63
- 63 - 106
- 106 - 191
- 191 - 481
- 481 and above

Typology

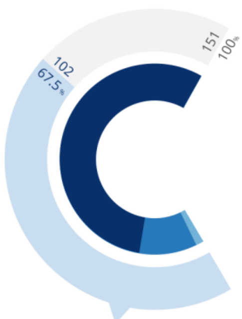
FabLabs	27.8 %	42
Hackerspaces	60.9 %	92
Other makerspaces	11.3 %	17

Total 151

represents **18.3%** of the makerspaces in EU28

1.87 makerspaces per 1 000 000 inhabitants

Economy



makerspaces with

- 85 Monthly fee
- 15 Fee based on machine use
- 2 No fee

Data available for 102 makerspaces

Average monthly fee

16.2 EUR/month

Main Interests

1. Programming
2. Digital Fabrication
3. Electronics

Source: Rosa, P. et al. (2017): Overview of the Maker Movement in the European Union, JRC Technical Report.

7 Makerspaces in Greece

Location

Key

- Makerspace

Population density (per km2)

- 2 - 63
- 63 - 106
- 106 - 191
- 191 - 481
- 481 and above

Typology

FabLabs	14.3 %	1
Hackerspaces	85.7 %	6
Other makerspaces	0.0 %	0

Total 7

represents **0.8 %** of the makerspaces in EU28

0.64 makerspaces per 1 000 000 inhabitants

Economy

makerspaces with

1 Monthly fee

2 Fee based on machine use

- No fee

Data available for 3 makerspaces

Average monthly fee

20.0 EUR/month

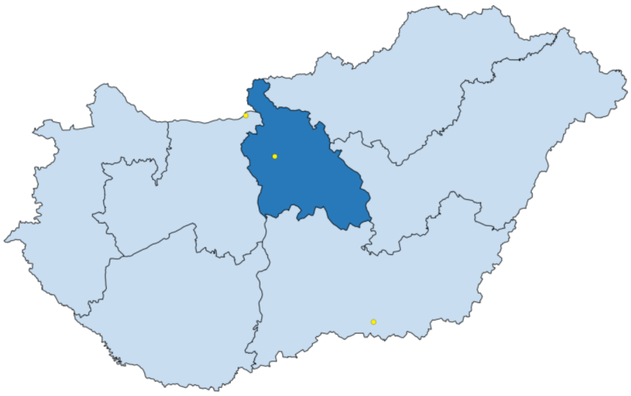
Main Interests

1. Digital Fabrication
2. Programming
3. Electronics

Source: Rosa, P. et al. (2017): Overview of the Maker Movement in the European Union, JRC Technical Report.

3 Makerspaces in Hungary

Location



Key
- Makerspace

Population density (per km2)
- 2 - 63
- 63 - 106
- 106 - 191
- 191 - 481
- 481 and above

Typology

Type	Share	Number
FabLabs	0.0 %	0
Hackerspaces	100.0 %	3
Other makerspaces	0.0 %	0

Total 3

represents 0.4 % of the makerspaces in EU28

0.30 makerspaces per 1 000 000 inhabitants

Economy

makerspaces with
- Monthly fee: -
- Fee based on machine use: -
- No fee: -

Data available for 0 makerspaces

Average monthly fee

Data not available

Main Interests

1 -

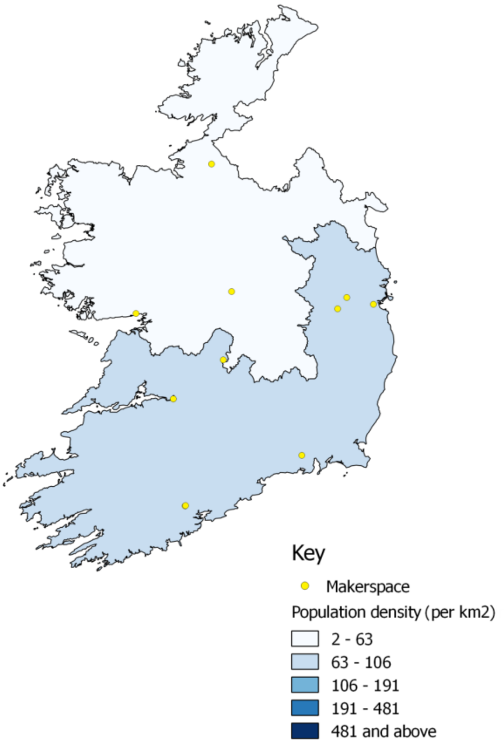
2 -

3 -

Source: Rosa, P. et al. (2017): Overview of the Maker Movement in the European Union, JRC Technical Report.

13 Makerspaces in Ireland

Location



Typology

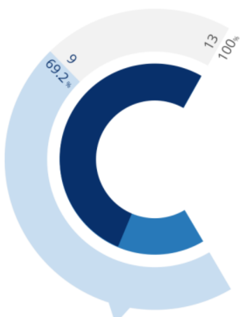
FabLabs	30.8 %	4
Hackerspaces	53.8 %	7
Other makerspaces	15.4 %	2

Total 13

represents **1.6 %** of the makerspaces in EU28

2.82 makerspaces per 1 000 000 inhabitants

Economy



makerspaces with

- 7 Monthly fee
- 2 Fee based on machine use
- \- No fee

Data available for 9 makerspaces

Average monthly fee

29.3 EUR/month

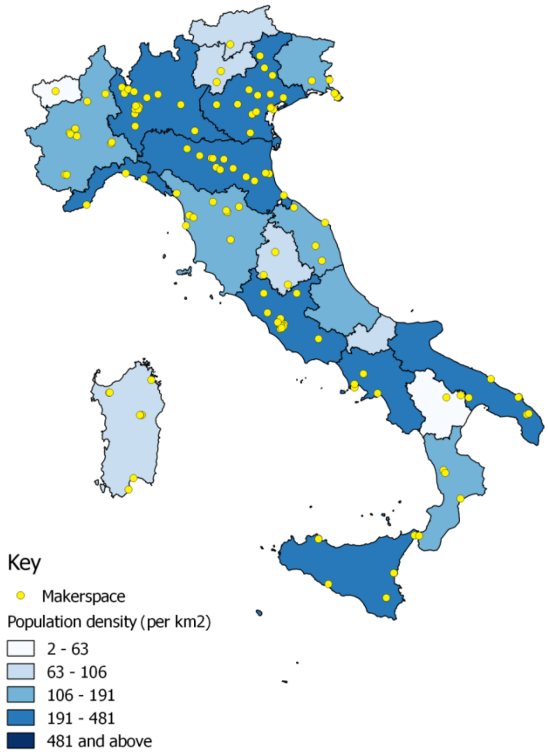
Main Interests

1. Digital Fabrication
2. Programming
3. Electronics

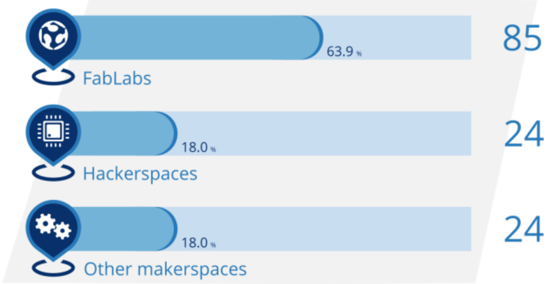
Source: Rosa, P. et al. (2017): Overview of the Maker Movement in the European Union, JRC Technical Report.

133 Makerspaces in Italy

Location



Typology



Total 133

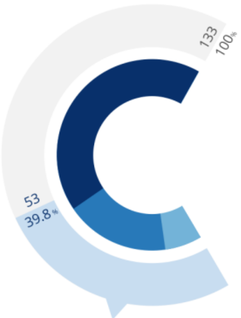
represents

16.1 %

of the makerspaces in EU28

2.19 makerspaces per 1 000 000 inhabitants

Economy



makerspaces with

34 Monthly fee

14 Fee based on machine use

5 No fee

Data available for 53 makerspaces

Average monthly fee

11.9 EUR/month

Main Interests

1 Digital Fabrication

2 Electronics

3 Design

Source: Rosa, P. et al. (2017): Overview of the Maker Movement in the European Union, JRC Technical Report.

3 Makerspaces in Latvia

Location

Typology

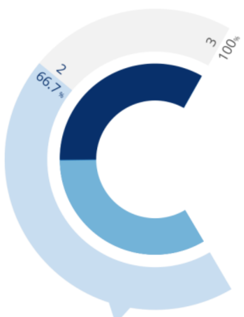
FabLabs	66.7 %	2
Hackerspaces	33.3 %	1
Other makerspaces	0.0 %	0

Total 3

represents 0.4 % of the makerspaces in EU28

1.50 makerspaces per 1 000 000 inhabitants

Economy



makerspaces with

1 Monthly fee

- Fee based on machine use

1 No fee

Data available for 2 makerspaces

Average monthly fee

35.0 EUR/month

Main Interests

1 Digital Fabrication

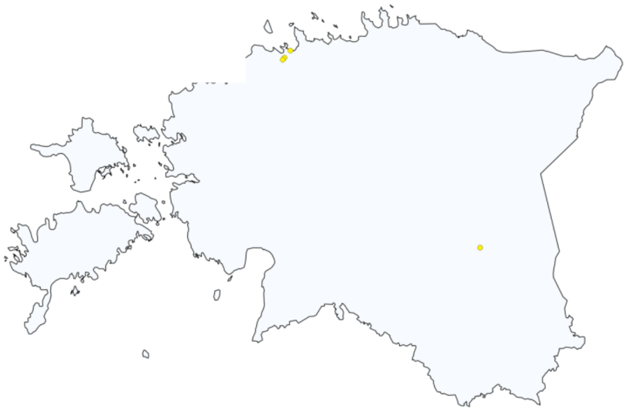
2 -

3 -

Source: Rosa, P. et al. (2017): Overview of the Maker Movement in the European Union, JRC Technical Report.

2 Makerspaces in Lithuania

Location



Key
- Makerspace

Population density (per km2)
- 2 - 63
- 63 - 106
- 106 - 191
- 191 - 481
- 481 and above

Typology

FabLabs	0.0 %	0
Hackerspaces	50.0 %	1
Other makerspaces	50.0 %	1

Total 2

represents 0.2 % of the makerspaces in EU28

0.68 makerspaces per 1 000 000 inhabitants

Economy

makerspaces with

- 2 Monthly fee
- - Fee based on machine use
- - No fee

Data available for 2 makerspaces

Average monthly fee
37.0 EUR/month

Main Interests

1 -

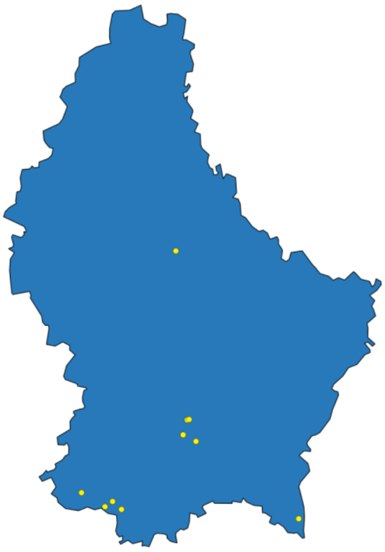
2 -

3 -

Source: Rosa, P. et al. (2017): Overview of the Maker Movement in the European Union, JRC Technical Report.

10 Makerspaces in Luxembourg

Location



Typology

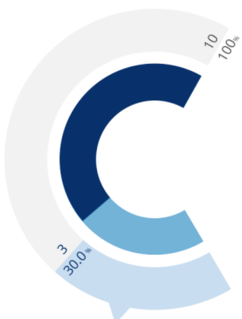
- FabLabs: 20.0 % — 2
- Hackerspaces: 20.0 % — 2
- Other makerspaces: 60.0 % — 6

Total 10

represents **1.2 %** of the makerspaces in EU28

18.19 makerspaces per 1 000 000 inhabitants

Economy



makerspaces with

- 2 Monthly fee
- \- Fee based on machine use
- 1 No fee

Data available for 3 makerspaces

Average monthly fee

6.8 EUR/month

Main Interests

1. Digital Fabrication
2. Electronics
3. -

Source: Rosa, P. et al. (2017): Overview of the Maker Movement in the European Union, JRC Technical Report.

2 Makerspaces in Malta

Location

Key

- Makerspace

Population density (per km2)

- 2 - 63
- 63 - 106
- 106 - 191
- 191 - 481
- 481 and above

Typology

FabLabs	50.0 %	1
Hackerspaces	50.0 %	1
Other makerspaces	0.0 %	0

Total 2

represents 0.2 % of the makerspaces in EU28

4.70 makerspaces per 1 000 000 inhabitants

Economy

makerspaces with

1	Monthly fee
-	Fee based on machine use
1	No fee

Data available for 2 makerspaces

Average monthly fee

4.2 EUR/month

Main Interests

1 Digital Fabrication

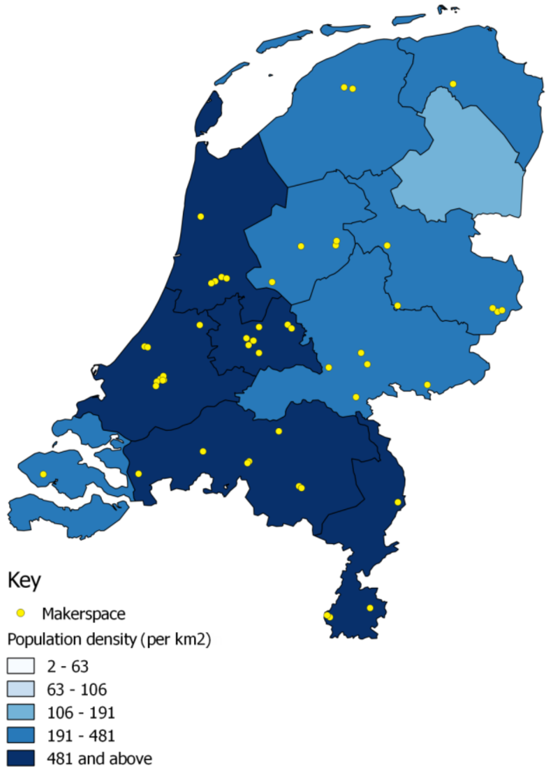
2 Art

3 -

Source: Rosa, P. et al. (2017): Overview of the Maker Movement in the European Union, JRC Technical Report.

54 Makerspaces in Netherlands

Location



Typology

FabLabs 51.9% — 28

Hackerspaces 40.7% — 22

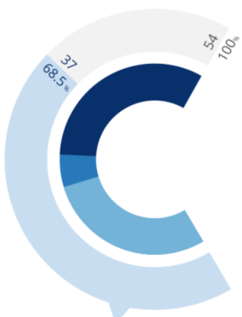
Other makerspaces 7.4% — 4

Total 54

represents **6.5%** of the makerspaces in EU28

3.21 makerspaces per 1 000 000 inhabitants

Economy



makerspaces with

18 Monthly fee

3 Fee based on machine use

16 No fee

Data available for 37 makerspaces

Average monthly fee

43.2 EUR/month

Main Interests

1 Digital Fabrication

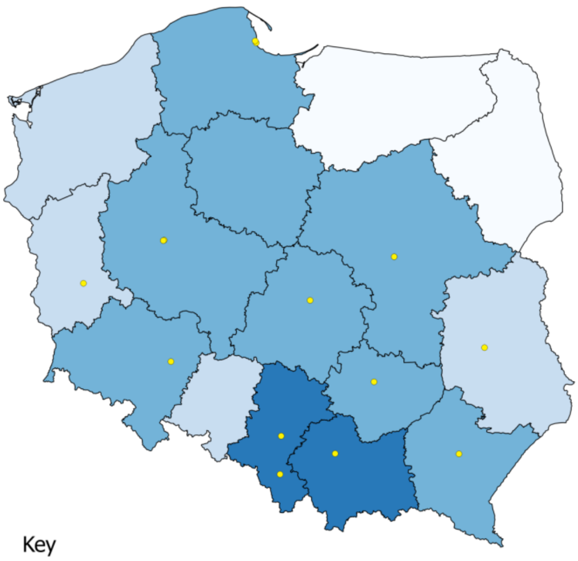
2 Programming

3 Electronics

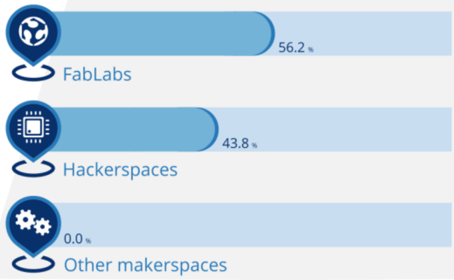
Source: Rosa, P. et al. (2017): Overview of the Maker Movement in the European Union, JRC Technical Report.

16 Makerspaces in Poland

Location



Typology

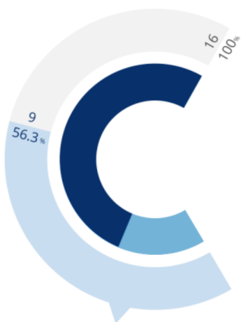


Total 16

represents **1.9%** of the makerspaces in EU28

0.42 makerspaces per 1 000 000 inhabitants

Economy



makerspaces with

- 7 Monthly fee
- \- Fee based on machine use
- 2 No fee

Data available for 9 makerspaces

Average monthly fee

12.7 EUR/month

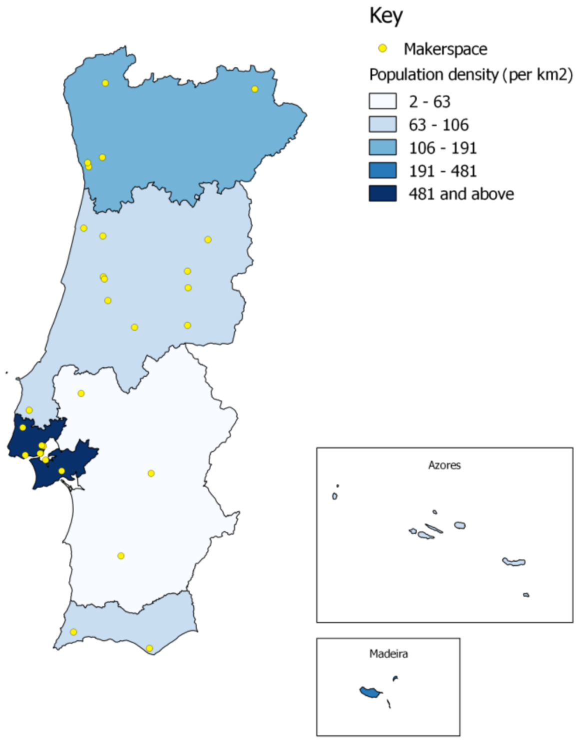
Main Interests

1. Digital Fabrication
2. Programming
3. Electronics

Source: Rosa, P. et al. (2017): Overview of the Maker Movement in the European Union, JRC Technical Report.

29 Makerspaces in Portugal

Location



Typology

FabLabs	48.3 %	14
Hackerspaces	31.0 %	9
Other makerspaces	20.7 %	6

Total 29

represents **3.5 %** of the makerspaces in EU28

2.78 makerspaces per 1 000 000 inhabitants

Economy

makerspaces with

8	Monthly fee
4	Fee based on machine use
-	No fee

Data available for **12** makerspaces

Average monthly fee

9.0 EUR/month

Main Interests

1 Digital Fabrication

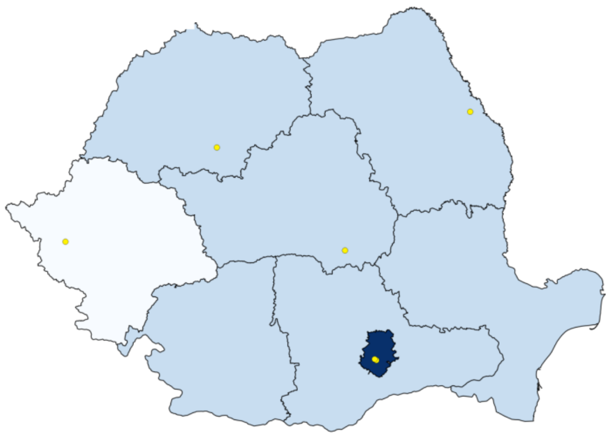
2 Entrepreneurship

3 Design & Art

Source: Rosa, P. et al. (2017): Overview of the Maker Movement in the European Union, JRC Technical Report.

6 Makerspaces in Romania

Location



Key

- Makerspace

Population density (per km2)

- 2 - 63
- 63 - 106
- 106 - 191
- 191 - 481
- 481 and above

Typology

FabLabs	0.0 %	0
Hackerspaces	100.0 %	6
Other makerspaces	0.0 %	0

Total 6

represents **0.7 %** of the makerspaces in EU28

0.30 makerspaces per 1 000 000 inhabitants

Economy

makerspaces with

- 5 Monthly fee
- \- Fee based on machine use
- \- No fee

Data available for 5 makerspaces

Average monthly fee

22.9 EUR/month

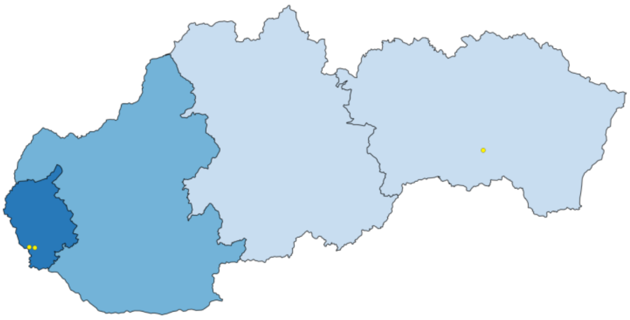
Main Interests

1. Art
2. Digital Fabrication
3. Programming

Source: Rosa, P. et al. (2017): Overview of the Maker Movement in the European Union, JRC Technical Report.

3 Makerspaces in Slovakia

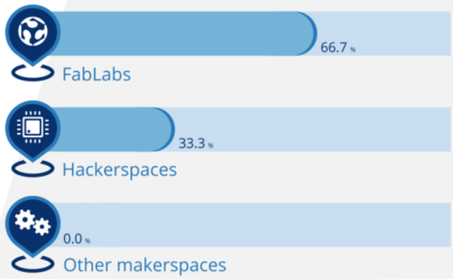
Location



Key
- Makerspace

Population density (per km2)
- 2 - 63
- 63 - 106
- 106 - 191
- 191 - 481
- 481 and above

Typology



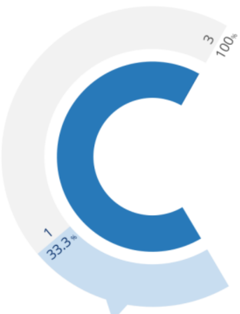
Total 3

represents **0.4 %** of the makerspaces in EU28

0.55 makerspaces per 1 000 000 inhabitants

Economy

makerspaces with



-	Monthly fee
1	Fee based on machine use
-	No fee

Data available for 1 makerspaces

Average monthly fee

Data not available

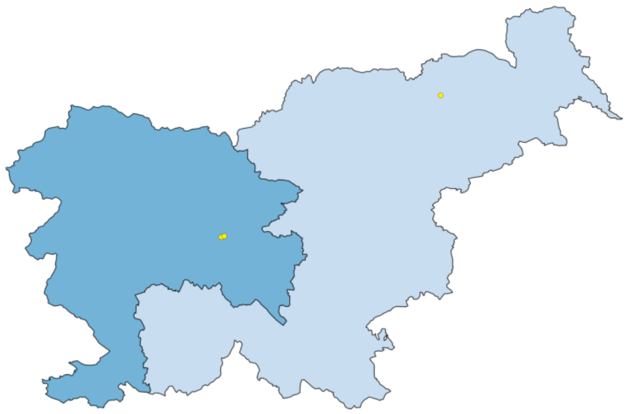
Main Interests

1. Digital Fabrication
2. Programming
3. Design & Art

Source: Rosa, P. et al. (2017): Overview of the Maker Movement in the European Union, JRC Technical Report.

3 Makerspaces in Slovenia

Location



Key
- Makerspace

Population density (per km2)
- 2 - 63
- 63 - 106
- 106 - 191
- 191 - 481
- 481 and above

Typology

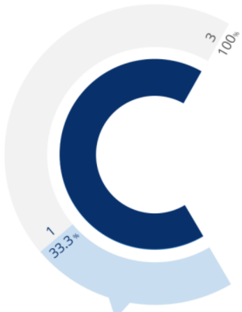
FabLabs	33.3%	1
Hackerspaces	33.3%	1
Other makerspaces	33.3%	1

Total 3

represents **0.4 %** of the makerspaces in EU28

1.46 makerspaces per 1 000 000 inhabitants

Economy



makerspaces with
- 1 Monthly fee
- - Fee based on machine use
- - No fee

Data available for 1 makerspace

Average monthly fee
10.0 EUR/month

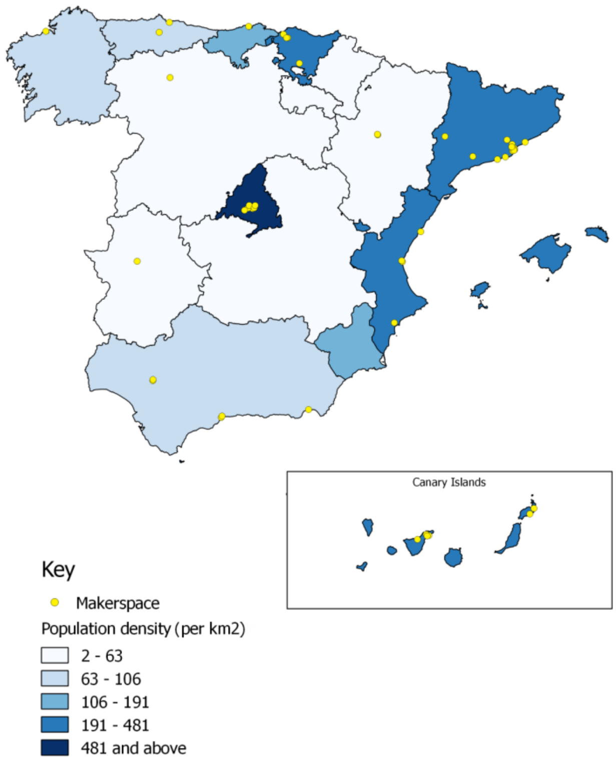
Main Interests

1. Digital Fabrication
2. Art
3. Education

Source: Rosa, P. et al. (2017): Overview of the Maker Movement in the European Union, JRC Technical Report.

51 Makerspaces in Spain

Location



Typology

FabLabs 51.0 % 26

Hackerspaces 37.3 % 19

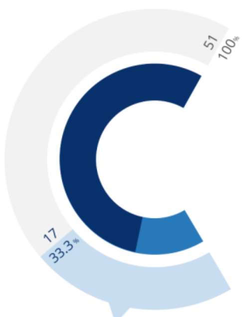
Other makerspaces 11.8 % 6

Total 51

represents **6.2%** of the makerspaces in EU28

1.10 makerspaces per 1 000 000 inhabitants

Economy



makerspaces with

14 Monthly fee

3 Fee based on machine use

\- No fee

Data available for **17** makerspaces

Average monthly fee

32.8 EUR/month

Main Interests

1 Digital Fabrication

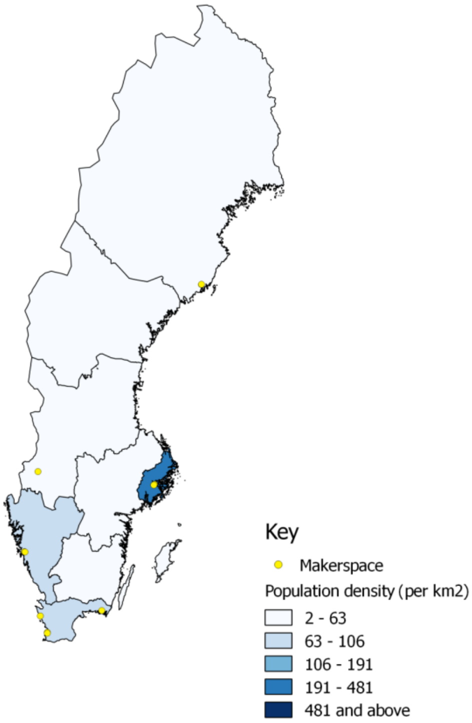
2 Programming

3 Electronics

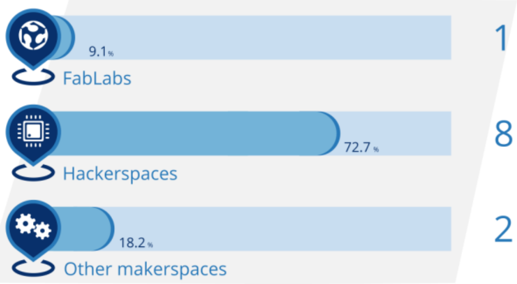
Source: Rosa, P. et al. (2017): Overview of the Maker Movement in the European Union, JRC Technical Report.

11 Makerspaces in Sweden

Location



Typology

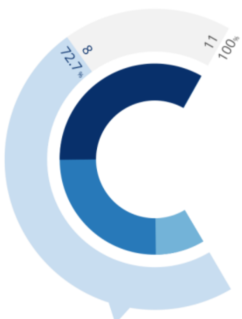


Total 11

represents **1.3 %** of the makerspaces in EU28

1.14 makerspaces per 1 000 000 inhabitants

Economy



makerspaces with

- 4 Monthly fee
- 3 Fee based on machine use
- 1 No fee

Data available for 8 makerspace

Average monthly fee

13.8 EUR/month

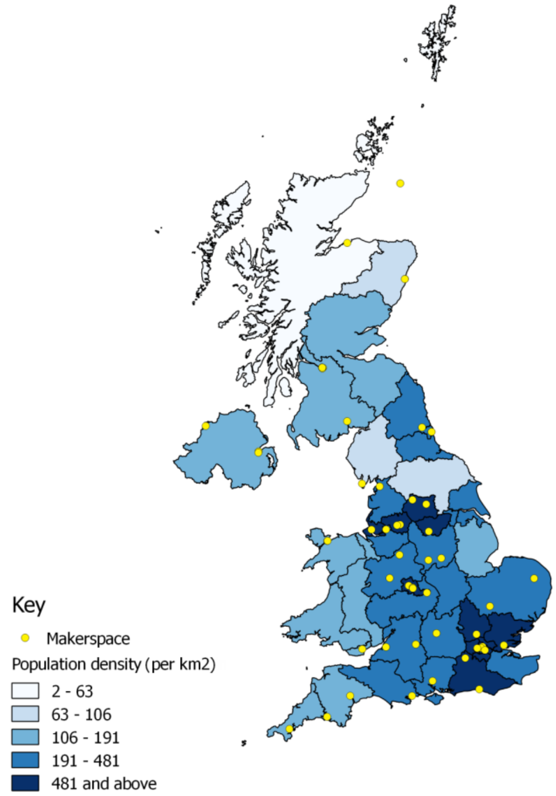
Main Interests

1. Programming
2. Digital Fabrication
3. Electronics

Source: Rosa, P. et al. (2017): Overview of the Maker Movement in the European Union, JRC Technical Report.

57 Makerspaces in United Kingdom

Location



Typology

FabLabs 56.1 % 32

Hackerspaces 31.6 % 18

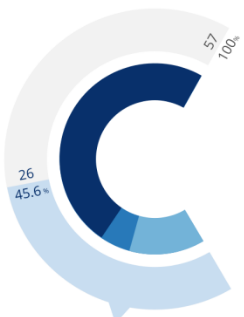
Other makerspaces 12.3 % 7

Total 57

represents 6.9% of the makerspaces in EU28

0.89 makerspaces per 1 000 000 inhabitants

Economy



makerspaces with

19 Monthly fee

2 Fee based on machine use

5 No fee

Data available for 26 makerspaces

Average monthly fee

30.1 EUR/month

Main Interests

1 Digital Fabrication

2 Education

3 Design

Source: Rosa, P. et al. (2017): Overview of the Maker Movement in the European Union, JRC Technical Report.

KJ-NA-28686-EN-N

JRC Mission

As the science and knowledge service of the European Commission, the Joint Research Centre's mission is to support EU policies with independent evidence throughout the whole policy cycle.

EU Science Hub
ec.europa.eu/jrc

@EU_ScienceHub

EU Science Hub - Joint Research Centre

Joint Research Centre

EU Science Hub

Publications Office

doi:10.2760/227356

ISBN 978-92-79-70525-0