D8.4 CURRENT DIDIY SUPPORT AND AWARENESS IN EUROPE

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Executive summary

Deliverable D8.4, Current DiDIY support and awareness in Europe, proposes a critical overview on the current role that Digital DIY has in "digital competences" programs, Digital Agendas and other relevant policies of EU member states, and on the already available best practices in Digital DIY promotion and policy making in the EU and the corresponding results.

The Deliverable aims at providing inputs for further work inside the DiDIY Project, presenting to the relevant stakeholders the activities and the topics on which the Project is working and on which it welcomes more feedback and cooperation, and stimulating public discussion on Digital DIY all across Europe.

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0.0	28/10/15	FKI	First, incomplete draft.
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1.0	31/10/15	LIUC	Approved version, submitted to the EC Participant Portal.

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1. Introduction

The goals of the DiDIY Project (see www.didiy.eu/project/objectives) include supporting both *education and policy making on Digital DIY*, through models and guidelines driven by *social and cultural strategies, not technology***.** This Deliverable is a summary of studies performed, in that context, on:

- support and awareness of Digital DIY in "digital competences" programs, Digital Agendas and other relevant policies of EU member states, in order to avoid overlapping of activities, and find most pressing areas;
- best practices in DiDIY promotion and policy making in the EU and the corresponding results, when already available.

In detail, the report aims to provide useful inputs for:

- *further work* inside the DiDIY Project itself;
- *reaching out,* that is presenting, to all the stakeholders in Digital DIY, from makers to public institutions, schools etc, the activities and topics on which the DiDIY Project is working, and on which it welcomes more feedback and cooperation;
- above all: stimulating *public discussion on the same topics all across Europe*.

Chapter 2 summarises support and awareness of Digital DIY in some EU-level digital, or digital-related, programs and studies. Chapter 3 looks at the same topics in several areas of European society, presenting a few projects and best practices, but also some general issues that should be taken into account in the future, both by the project and by stakeholders in Digital DIY. The conclusions are in Chapter 4, which summarises the most interesting findings, potential partnerships and synergies with projects backed by other EU programs. The final chapter also suggests areas in which further actions, from study to public discussion, are needed both inside and outside the DiDIY Project, starting from EU institutions and national/local administrations of Member States.

1.1 Limits of the report

The material studied in the preparation of this report has been collected from May to October 2015 mainly through three channels:

1. first of all, direct requests for information to all parties listed in the DiDIY dissemination plan, and similar parties discovered after the publication of that plan;
2. next, online searches;
3. finally, direct requests, by several members of the DiDIY team, to their professional contacts.

Feedback from the first two channels was lower, and less diverse than expected, both geographically and thematically (as an example, there was no relevant feedback from NGOs).

As far as online searches go, and as shown in other parts of this report, this is due to the fact that relevant information often is, so to speak, "hidden" in many different keywords and programs, that are lexically identified in (sometimes greatly) different ways, from "Social Innovation" to "Youth on the Move" and "Collective Awareness". Consequently, discovering that such programs and their results are, or should be, also relevant for Digital DIY is not evident at all by narrow searches.

The language barrier also was a significant obstacle, which may explain partly why answers from the first channel have been, so far, less than we hoped. On one hand, this may be considered, in and by itself, as a finding of the study, that is as evidence that support and awareness for Digital DIY in European institutions and civil society is low. On the other, low response is also due to Digital DIY being a topic harder to define, and therefore present, than the DiDIY team itself expected at the beginning of the project (as also discussed in the Deliverables "Foundational interpretation of DiDIY" (April 2015) and "Knowledge Framework - Initial version" (June 2015); www.didiy.eu/project/results). The situation is made even more complicated by the fact that Digital DIY has so many fields of applications, from arts to healthcare, food storage and weapons, that, at least potentially, one may search and find hooks for it, or declare that there should be such hooks, in almost every EU programme.

The consequence is that the analysis is restricted to what could be directly studied in English or Italian, or to feedback received by third parties across Europe speaking the same languages. In spite of these limitations, we are confident that this version of the report already provides an overview of current "Digital DIY support and awareness" that is complete, and relevant enough, to be useful for the purposes stated above.

1.2 Definitions

Atoms-Bits Convergence (ABC): the phenomenon related to the cultural, economic, technological processes of integration of physical and informational components ("atoms" and "bits"), such as digital fabrication or networks of sensors and actuators.

Digital Do-It-Yourself: a new socio-technological phenomenon which stems from the widespread availability of digital devices that support the convergence of physical ("atoms") and informational ("bits") components (ABC), as well as the growing accessibility of related knowledge and data through open online communities. The term "Digital Do-It-Yourself" is abbreviated "DiDIY", which is also the name of this Project (www.didiy.eu).

Fab Lab (fabrication laboratory): a small-scale workshop offering (personal) digital fabrication. A fab lab is generally equipped with an array of flexible computer controlled tools and various materials, with the aim to make "almost anything". This includes technology-enabled products generally perceived as limited to mass production (from Wikipedia).

Hackerspace (also referred to as a *hacklab*, *makerspace* or *hackspace*): community-operated workspace where people with common interests, often in computers, machining, technology, science, digital art or electronic art, can meet, socialize and collaborate (from Wikipedia).

Makers culture and movement: a technology-based extension of DIY culture that intersects with hacker culture, but is more concerned with the creation of new devices (opposed to tinkering with existing ones), and encourages cookbook re-use of reference designs (adapted from Wikipedia).

2. EU programs and projects

The European Union institutions, and their counterparts in Member states, are already carrying on many programs that are related in one way or another, to Digital DIY. Since the DiDIY Project looks at Digital DIY as a phenomenon that impacts on, and should be driven by, social and cultural strategies, not technology, many of those programs are not, in spite of the Project name, those about "digitisation" of Europe. The following paragraph shortly describes the main (from the DiDIY point

of view) characteristics and findings of some of these programs and studies, which also are the reasons why the DiDIY Project is interested in continuing its study, and to explore possibilities of cooperation.

2.1 EU Digital Agenda(s)

The Digital Agenda of the European Union,[1] as well as the corresponding documents and programmes of Member States and Regions, do not focus on, or even make specific mentions of, Digital DIY and Atom-Bits Convergence (ABC), or of topics strictly related to them, like FabLabs, Makers, desktop manufacturing and so on.

The Digital Agenda main objective "is to develop a digital single market in order to generate smart, sustainable and inclusive growth in Europe, and it is made up of seven pillars."[2] In this context it is striking that the Digital Agenda Pillar VI: *Enhancing digital literacy, skills and inclusion* only refers to the use of the Internet.[3] In its Pillar VII on the benefits for EU Society, "*[t]he Digital Agenda focuses on ICTs capability to reduce energy consumption, support ageing citizens' lives, revolutionises health services and deliver better public services. ICTs can also drive forward the digitisation of Europe's cultural heritage providing online access for all.*"[4] Again the Agenda scope seems not to include digital manufacturing (at least in DIY fashion) and ABC.

The same scope is directly reflected by the *Digital Economy and Society Index* (DESI),[5] which is used to measure the progresses of national Digital Agendas and is composed of five factors: Connectivity, Human Capital, Use of Internet, Integration of Digital Technology, Digital Public Services. Of those factors, only the definitions of the second and fourth one mention, but *not* as mandatory requirements, skills directly related to Digital DIY and ABC.

Human Capital includes "*skills that empower the workforce to take advantage of technology for enhanced productivity and economic growth.*" Integration of Digital Technology measures, among other things, "*the digitisation of businesses and their exploitation of the online sales channel. By adopting digital technology businesses can enhance efficiency, reduce costs and better engage customers, collaborators and business partners.*".

In practice, on one hand there is no doubt that many of the actions carried on in Europe to implement Digital Agendas defined as above may greatly benefit Digital DIY and ABC, even when they are not prerequisites to also get those benefits. To a certain extent, the opposite is also true: a country where Digital DIY is very common and ABC a significant component of the economy would almost surely be quite advanced also from the Digital Agenda point of view.

At the same time, it may be possible, for a EU country or region, to achieve very high DESI scores without having any significant amount of Digital DIY/ABC activity and competence. The same observation may also apply to other "digital" programmes and projects mentioned in the rest of the

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1 http://ec.europa.eu/digital-agenda.

2 https://ec.europa.eu/digital-agenda/en/digital-agenda-europe-2020-strategy.

3 https://ec.europa.eu/digital-agenda/en/our-goals/pillar-vi-enhancing-digital-literacy-skills-and-inclusion. See also: https://ec.europa.eu/digital-agenda/en/skills-jobs.

4 http://ec.europa.eu/digital-agenda/en/our-goals/pillar-vii-ict-enabled-benefits-eu-society.

5 https://ec.europa.eu/digital-agenda/en/desi.

report. In fact, this may be an interesting finding in its own right, as far as "support and awareness" of Digital DIY go.

2.2 Other EU programs

2.2.1 Main EU digital or hardware-related programmes

The same considerations made about the Digital Agenda seem valid also for EU-level main papers and programmes about Smart Cities, the Digital Single Market and the Internet of Things. In the first case, the focus is much more on (centrally planned and managed) integration of centralized public infrastructure, and there is no explicit mention of ABC, in DIY fashion or not: "*The smart city concept goes beyond the use of ICT for better resource use and less emissions. It means smarter urban transport networks, upgraded water supply and waste disposal facilities, and more efficient ways to light and heat buildings.*"[6]

Even the *European Innovation Partnership on Smart Cities and Communities* defines its overarching goal, in its Strategic Implementation Plan[7] thus: "*This partnership strives at a triple bottom line gain for Europe: a significant improvement of citizens' quality of life, an increased competitiveness of Europe's industry and innovative SMEs together with a strong contribution to sustainability and the EU's 20/20/20 energy and climate targets. This will be achieved through the wide-reaching roll out of integrated, scalable, sustainable Smart City solutions – specifically in areas where energy production, distribution and use; mobility and transport; and information and communication technologies are intimately linked.*".

Such targets may also be reached with Digital DIY, but managing, e.g., urban transport networks, or "*wide-reaching roll out of integrated, scalable solutions*" seem to call for implementations that are centrally designed and managed, with tightly integrated platforms usually available only by large suppliers, much more than they call for implementations built (even in their physical components, that is by ABC) and managed by self-organizing citizens.

The *Digital Single Market Strategy*[8] is made up of three policy areas or "pillars":

- better online access to digital goods and services: helping to make the EU's digital world a seamless and level marketplace to buy and sell;
- an environment where digital networks and services can prosper: designing rules which match the pace of technology and support infrastructure development;
- digital as a driver for growth: ensuring that Europe's economy, industry and employment take full advantage of what digitalisation offers.

Even here, we have goals that *may* be reached via Digital DIY, but such approach is in no way required, and may not even be the best one (e.g., in the third pillar) to reach the objectives declared.

The Internet of Things (IoT) concept is, in and by itself, much more focused on ABC than the others, but the current high-level IoT vision in Europe, as described as follows, seems more oriented towards growth and employment, and on citizens as end users, than on DIY approaches, or

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6 http://ec.europa.eu/digital-agenda/en/smart-cities.

7 http://ec.europa.eu/eip/smartcities/files/sip_final_en.pdf.

8 http://ec.europa.eu/priorities/digital-single-market.

contributions, to reach the same goals: "*Internet of Things (IoT) seeks to merge physical and virtual worlds creating 'smart environments' to improve EU citizens' lives. The European Commission supports IoT innovation and future deployment. Internet of Things (IoT) represents the next step towards the digitisation of our society and economy, where objects and people are interconnected through communication networks and report about their status and/or the surrounding environment. IoT can also benefit the European economy generating economic growth and employment.*"[9].

The same observations apply to the *European Digital City Index*,[10] a part of the European Digital Forum that describes how well different cities across Europe support digital entrepreneurs. The purpose of the index is to provide information about local ecosystems and a tool to benchmark cities, to assist policy makers who must decide where more resources are needed. Such a goal can certainly overlap with the goals and practices of the Makers Movement, and more specifically with the Digital DIY/ABC sphere. However, at least in theory, it is not guaranteed.

In a nutshell (but we will return on this point in the final chapter) all the programmes above do not exclude the possibility to implement at least parts of them with solutions based on Digital DIY, or that also favour its diffusion. As an example, it is much certainly much easier to become Makers and practice Digital DIY in cities where broadband Internet access is granted, digital skills are easy to acquire and the whole environment is rich of smart sensors and digital services, that is of suggestions and stimuli for Digital DIY creativity. Such an outcome, however, would be more a byproduct, however positive, of those programmes, than one of their intentional goals, which as we have seen have different priorities and development models. Therefore, we may conclude that support and awareness of Digital DIY is not among the main characteristics of those programmes.

It also seems reasonable to expect that most national and regional versions and implementations of the same programs will share the same characteristics.

2.2.2 Youth-oriented programs

Youth on the Move[11] is a flagship initiative, launched in 2010 as part of the Europe 2020 strategy[12] to "*unleash the potential of young people to achieve smart, sustainable and inclusive growth in the European Union*". Namely, Youth on the Move aims to improve young people's *education and employability,* to reduce high youth unemployment and to *increase the youth-employment rate* – in line with the wider EU target of achieving a 75% employment rate for the working-age population (20-64 years) – by:

- making education and training more relevant to young people's needs;
- encouraging more of them to take advantage of EU grants to study or train in another country;

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9 https://ec.europa.eu/digital-agenda/en/internet-things.

10 https://digitalcityindex.eu.

11 http://ec.europa.eu/social/main.jsp?catId=950&langId=en and also http://europa.eu/youthonthemove/docs/communication/youth-on-the-move_EN.pdf.

12 http://ec.europa.eu/europe2020/index_en.htm.

- encouraging EU countries to take measures simplifying the transition from education to work.

The *European Youth Guarantee*[13] tackles youth unemployment. It aims to ensure that all young people under 25 – whether registered with employment services or not – get a good-quality, concrete offer, adapted to each individual need and situation, within 4 months of them leaving formal education or becoming unemployed. According to the European Commission website,[14] Youth Guarantee has started in all EU countries and is "*probably one of the most rapidly implemented*" structural reforms in Europe. However, the Indicator Framework for monitoring the Youth Guarantee[15] makes no explicit mention of, nor it contains indicators that may be directly linked to, Digital DIY/ABC skills and activities.

At least potentially, however, the activities, policies and results of both these programs seem right in the scopes of the "Organization and Work" and "Education and Research" tracks of the DiDIY Project.

2.2.3 New skills for new jobs

The *New skills for new jobs* EU Agenda[16] and the Europe 2020 flagship initiative with the same name,[17] define and implement the European Commission's agenda for better skills upgrading, anticipation and matching. Despite the similarities in names, the flagship initiative has a much wider scope than the Agenda, and includes flexicurity, job quality and working conditions and job creation. Skills development forms one of the four main areas of the flagship.

Apparently, there is no explicit mention, in the two websites already quoted in this paragraph and also in the associated portal www.newskillsnetwork.eu, of Digital DIY keywords like Open Hardware, fablab or 3D printing. Further analysis and direct contact are needed to verify if this is actually the case, both in the main programme and in its branches in the EU Member States, because this is definitely one initiative that should help spread awareness of the potential of Digital DIY/ABC skills to increase one's job opportunities.

2.2.4 Platform against Poverty

The *European platform against poverty and social exclusion*[18] is another flagship initiatives of the Europe 2020 strategy for smart, sustainable and inclusive growth. It is designed to help EU countries reach the headline target of lifting 20 million people out of poverty and social exclusion, by working in the following five areas:

- delivering actions across the whole policy spectrum such as the labour market, minimum income support, healthcare, education, housing and access to basic banking accounts;

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13 http://ec.europa.eu/social/main.jsp?catId=1079.

14 http://ec.europa.eu/social/main.jsp?catId=1090&langId=en.

15 http://ec.europa.eu/social/BlobServlet?docId=13402&langId=en.

16 http://ec.europa.eu/social/main.jsp?catId=958.

17 http://ec.europa.eu/social/main.jsp?catId=822&langId=en.

18 http://ec.europa.eu/social/main.jsp?catId=961.

- better use of EU funds to support social inclusion;
- promoting robust evidence of what does and does not work in social policy innovations before implementing them more widely;
- working in partnership with civil society to support more effectively the implementation of social policy reforms;
- enhanced policy coordination among EU countries.

While there is no explicit mention of Digital DIY/ABC topics in the description of these areas, it is evident that this Platform is another initiative to follow in the future of the DiDIY Project, for basically the same reasons for which the Project should have more contacts with the "New Skills for New Jobs" programme.

2.2.5 Innovation Union

The *Innovation Union*[19] is yet another EU flagship strategy. Unlike the previous ones, this initiative is considerably closer to the DiDIY context, even if it does not spells it explicitly, and with the general caveats described at the end of this report. The Innovation Union mission, in fact, is the creation of an innovation-friendly environment that "*makes it easier for great ideas to be turned into products and services that will bring our economy growth and jobs*". The "Making Our Good" paper discussed in the next section points out the central role granted to social innovation in this and in the "Platform against Poverty" initiative, as it resulted in "a *wide number of regulatory and non-regulatory actions, including the Social Business Initiative, the European Social Entrepreneurship Funds (EuSEFs) Regulation, the launch of Social Innovation Europe, the Social Innovation Competition and the Social Investment Package*" which also deserve further study.

2.3 A few examples from Italy

In spite of what may seem to be the case, there surely are, across Europe, many cases of local and regional public administrations that, by direct funding or other means, do support Digital DIY and ABC as considered by the DiDIY Project, and as such should be studied, and possibly promoted, by the Project itself. To make this activity possible, that is to stimulate direct contacts with as many such projects as possible, we present here three cases from Italy, highlighting those of their characteristics that make them specially interesting for the DiDIY Project and, depending on how they will develop, potential examples of Best Practices in the same field.

To begin with, the Italian Ministry for Economic Development has issued a decree[20] in February 2015 to finance, with amounts from 100 K to 1.4 MEuros projects lasting at least two years and aimed at the creation of:

- centres for development of open source software and open hardware, that would transfer knowledge to schools, citizens, artisans and microbusinesses;
- incubators of innovative initiatives in the world of digital artisanship;
- centres offering digital fabrication services to artisans and microbusinesses;

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19 http://ec.europa.eu/research/innovation-union.

20 http://www.sviluppoeconomico.gov.it/images/stories/normativa/decreto_ministeriale_17_febbraio_2015.pdf.

- creation of new artisan activities or manufacturing networks based on digital fabrication technologies.

The decree also specifically states that the chosen projects should, among other things:

- promote non conventional production and commercial processes;

- share, in "open mode" information, documentation and data about the design and production processes.

In September 2015, the Italian Ministry for Economic Development announced[21] that the deadline for presenting projects was extended to October 15, 2015. For this reason, at the time of writing there is no further information about the projects presented. However, this, and similar calls in other EU States are exactly what the DiDIY Project should follow, in order to discover how and how much they actually use and promote Digital DIY, as defined by the Project itself.

The same consideration applies to a similar activity born in the local Digital Agenda of the Italian Region of Veneto. In that context, in December 2013 the Region of Veneto decided to launch several projects, all financed with EU structural funds, including one for promotions of fablabs,[22] eventually announced in June 2015[23]. From the point of view of the DiDIY Project, that announcement is interesting both for some of its motivations and assumptions: "*it would be wrong to think that the Digital Agenda is only about reorganizing internal bureaucratic processes and/or online public services […] The [regional] Digital Agenda must be useful to the growth of the Country and include support of productive sectors, by assigning to the Public Administration the task to promote and accelerate growth, because only growth can bring more employment and profits.*".

The project has a budget of 2 MEuro for creation of about twenty fablabs, and linking them with the local artisan manufacturing sector, in order to match the artisan experience and skills with makers innovation capabilities, and thus change the way in which the same businesses operate. All these actions are supposed to happen with constant support and supervision by the Region, and the conditions for participating fablabs include inclusiveness and participations, that is be really open to all the communities around them, and become themselves new ones, focused on innovation.

Another initiative in the same Region that may result in promotion of Digital DIY is the Veneto HOMER Open Data Action Plan,[24] released in June 2014 and co-authored by one of the authors of this report. The actions proposed in the plan include contests for open hardware micro-platforms for environmental monitoring, explained as follows: "*it is possible, with very limited resources, to collect and publish online environmental Open Data of great general interest. For this reason the Region will promote contests for the development of similar platforms, entirely built with Open hardware, file formats and protocols, that can directly be reused for the same measurements by the*

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21 http://www.sviluppoeconomico.gov.it/index.php/it/per-i-media/notizie/2033356-reti-di-impresa-per-l-artigianato-digitale-prorogato-il-termine-finale-di-presentazione-delle-domande.

22 http://www.agendadigitale.eu/infrastrutture/566_cantiere-veneto-l-agenda-work-in-progress-sta-cambiando-faccia-al-territorio.htm.

23 http://www.chefuturo.it/2015/06/rete-fablab-veneto-bando.

24 http://homerproject.eu/images/Docs_/Publications/OD_PLANS/Veneto_Region_OD_Action_Plan.pdf.

other HOMER members, in order to collect homogeneous data across the whole Mediterranean area.".

2.4 EU-sponsored studies and Research Projects

Much research has already been done, in the last years, in fields on which Digital DIY/ABC will, or may have, a significant impact. This section presents three results of such researches, whose content, and related communities, may be particularly relevant for this Project. The goal is the same as in the previous section, that is provide examples of what the DiDIY Project is working on, and reaching out to other activists, researchers and other stakeholders in the same fields.

2.4.1 "Making Good our Future" Policy Paper

Making Good our Future - Exploring the New boundaries of Open & Social Innovation in Manufacturing[25] is part of Social Innovation Europe, an initiative funded by the European Union. Published in May 2015, this paper, called "Making Good" for brevity from now on, is interesting for the DiDIY Project, because it analyses "opportunities which are crystallising at the cross roads between social innovation, open source ICT and manufacturing". More in detail, "Making Good" attempts to explore "*how social innovation and open source principles can inform manufacturing by enhancing productivity, creating more rewarding jobs, generating private and public value and, eventually, embedding new democratic practice at the core of industrial production*".

The paper identifies three dimensions for this kind of innovation in manufacturing:

- democratisation of making;
- supply chains for good: full transparency of the sources of materials used in manufacturing and the conditions of production in the supply chain;
- corporate citizenship,

and highlights the potential of maker manufacturing to contribute to the Juncker Agenda.[26] Speaking of the second dimension, "Making Good" authors also recommend further investigation, with funding from the H2020 and COSME programmes, of:

- technology for transparency which facilitates real-time reporting across the supply chain;
- new models of governance which use information from the supply chain as a basis for effective collaborative decision making processes, taking into account economic, social and environmental factors.

The second argument is closely linked to the issues discussed in Chapter 3 of this report. The paper also contains other pointers and observations useful as starting points for further studies and actions about support and awareness for Digital DIY. One of such observations, on which we will return in the Conclusions, is that: "*While acknowledging the potential of social innovation for the private sector, the European Commission frames it principally in terms of worker participation and workplace innovation. We argue that this potential needs to be understood and sustained in a wider*

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25 https://webgate.ec.europa.eu/socialinnovationeurope/sites/default/files/sites/default/files/SIE%20-%20Making%20Good%20our%20Future%20-%20May%202015.pdf.

26 http://juncker.epp.eu/agenda. One relevant part of that agenda, quoted in the "Making Good" paper itself, is "*my first priority as Commission President will be to strengthen Europe's competitiveness and to stimulate investment for the purpose of job creation*".

framework, in which manufacturing industries are considered to have a central role in addressing the great social challenges Europe faces. These include an ageing population, migration, unemployment, poverty, raising inequality and climate change.".

On the same topic, "Making Good" mentions other problems, to which Digital DIY may contribute solutions: *"The Commission plan For a European Industrial Renaissance,[27] adopted in January 2014, [must] address some important drivers of change which are already modifying the global socio-economic framework, with significant repercussions for manufacturing. These drivers include the increasing scarcity of raw materials, the ageing population, big data and the availability of ICTs which allow for the automation of a wide range of routine tasks, mass customisation and on-demand services."*

The authors of the paper also claim that: *"sustaining the emerging maker manufacturing model through targeted policy measures and funding will be important to achieve the objective of the Europe 2020 Strategy of promoting smart, sustainable and inclusive growth, and to accelerate the transition of the traditional manufacturing sector towards advanced manufacturing."*.

Finally, the paper includes several positions and arguments about the role of the European Commission, that are related to the study field, and starting assumptions of the DiDIY Project about Digital DIY impacts and opportunities in the workplace: *"The European Commission plays a major role in preventing established market players from abusing their position [...] The new EU CSR (Corporate Social Responsibility) strategy should foster the participation of new entrepreneurs and micro-businesses representatives in the governing bodies of established platforms [...] The Commission could play a fundamental role in sustaining emerging entrepreneurs by funding maker labs and social labs where the necessary capacity building and equipment could be made available […] We recommend the Commission to provide funding – including by encouraging Member States to use structural funds at this scope – for the creation of networked shared infrastructures such as maker labs and fab labs, where innovators are empowered to learn and work locally and, at the same time, benefit from a global network of knowledge. Interaction with traditional manufacturers and large companies should be encouraged in these hubs."*.

2.4.2 D-Cent: Decentralised Citizens ENgagement Technologies

D-CENT[28] (*Decentralised Citizens ENgagement Technologies*) is *"a Europe-wide project bringing together citizen-led organisations that have transformed democracy in the past years, and helping them in developing the next generation of open source, distributed, and privacy-aware tools for direct democracy and economic empowerment"*. In the context of the EC's Collective Awareness Platforms programme (CAPS) D-CENT, NESTA and others published in May 2015 a report titled "Managing the commons in the knowledge economy". Among other topics, the paper explicitly mentions the Makers Movement in a way close to the assumptions of the DiDIY Project, acknowledging that: *"The strength of the maker movement is found in the way in which it has managed to translate the potential of a bit, the elementary units in the digital world, i.e. the immateriality of the software, into the capacity to arrive at the atom, that is to the production of material goods. This capacity relies on the recovery of forms of co-operation of software commons extending the principles of copyleft to the advancement of technological knowledge tied to Open*

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27 http://ec.europa.eu/growth/industry/policy/renaissance/index_en.htm.

28 http://dcentproject.eu.

Source Hardware (OSH). Each individual, as maker, can co-operate with thousands of individuals and spread his savoir faire through an ever denser network of makerspaces. In this way, collaborative work is becoming the drive of innovation in the manufacturing industry itself changing it from the bottom up.".

2.4.3 Growing a Digital Social Innovation Ecosystem for Europe

The NESTA report titled "Growing a Digital Social Innovation Ecosystem for Europe"[29] was commissioned by the European Commission, DG CONNECT and published in February 2015. This report, from now on abbreviated as "Growing DSI", aims to "*explore the potential of digital tools that can effectively empower citizens, communities and social entrepreneurs to solve societal problems*", and also produced an online Map of Digital Social Innovators.[30] Its starting observations include the fact that "*there has been much less systematic support for innovations that use digital technology to address social challenges. Digital technologies are particularly well suited to helping civic action: mobilising large communities, sharing resources and spreading power. A growing movement of tech entrepreneurs and innovators in civil society are now developing inspiring digital solutions to social challenges [...] We call this Digital Social Innovation (DSI):*

- *new forms of social innovation are needed to create synergies between the social and the technical, which create new forms of value that are not limited to economic value, but that result in large-scale social impact. The challenge for Europe is how it might acquire the competitive advantage in social innovation by developing*

- *distributed innovation ecosystems, rather than 'winner takes all' marketplaces whose dominant players set the terms of innovation and competition.".*

The report states that many (digital social) innovations can be understood as manifestations of four main technological trends – Open Hardware, Open Networks, Open Data and Open Knowledge – and looks at "New Ways of Making" defined as "*an ecosystem of makers [that] is revolutionising open design and manufacturing. 3D manufacturing tools, free CAD/CAM software and open source designs are now giving innovators better access to tools, products, skills and capabilities they need to enhance collaborative making*".

The authors of the report also define eleven DSI trends to watch, pointing out that "*although you can read about each one separately, many of the most exciting innovations come from combining several of these trends to form entirely new systems*". At least five of these trends, emphasized in the following list, certainly overlap with the scope of the DiDIY Project: Crowdfunding, Crowdmapping, Crowdsourcing, *Networks that sense*, *Open hardware*, Data: Big, Open and Linked, *Open source code sharing*, *Open Licensing*, Citizen science, Learn for free, *Collaboration Spaces*.

About Open Hardware it is interesting to note that the report seems to define it as (only!) equal to digital electronics hardware, when this is not complete; in fact, it the definition of Open Hardware also includes open designs for, e.g., purely mechanical hardware: "*Open Hardware: projects [that] make digital hardware available for people to adapt, hack and shape into tools for social change.".*

The final Key Findings of the reports that are most relevant for the DiDIY Project are:

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29 http://www.nesta.org.uk/sites/default/files/dsireport.pdf.

30 http://digitalsocial.eu.

- the majority of social innovators in Europe are disconnected from the big networks;
- the largest and more interconnected community is focused around open hardware and open networks, and there is a large focus on awareness networks and new ways of making;
- the open knowledge cluster is the second largest, with a focus on collaborative economy.

3. Digital DIY in European Society

Digital DIY may have impacts on, or require support and awareness from, all components of society. This chapter shows how this is already happening, or should happen, in some of those sectors. With some examples, mainly but not exclusively from Italy, we present best practices and new projects to follow in the future, but also some general issues that require further study by the Project, and support, or at least more attention and discussion in the future, by the same sectors, and in general by European lawmakers and administrators, at all levels.

3.1 Financial services

The First Report on the impact of Digital Technologies on the Italian Manufacturing System[31] was released on October 16, 2015 at the beginning of Maker Faire Rome. After warning that the transition to such technologies and the related trends may "*not be macroeconomically painless [...] and have [negative] impacts on employment levels*" the report affirms the need for everybody, including banks, to be ready to face this complex challenge and minimise those impacts. The statement is supported by one of the findings of a survey included in the report itself: the second and third factor that "*prevent or slow down the adoption of 3D printing*" would be the investments for tools (42% of answers) and, respectively, software (38,1%). Consequently, says the report, it is necessary to work more, and better, to build a new culture of financing for investments and innovation.

Maker Faire Rome also hosted a panel in which Giovanni Bossi, CEO of Banca IFIS, a bank which operates exactly in that sector, acknowledged both that "*today's banks are the farthest thing from the Makers Movement that one may imagine*", and that it is high time to change this situation.

In and by themselves, both the report and Mr Bossi's statements are *not* directly transferable, or relevant to the world of Digital DIY, for two reasons: first, most DIY activities, digital or not, are personal activities, not businesses. Second, even the DIY activities and services that are for profit, or may require financing, from setting up a makerspace to self-building the tools for one's own artisan shop) often are, so to speak, "off the radar" of both the report, and of that panel. The survey, in fact, was limited to companies with at least 1 MEuro of profits in 2013, and the panel topic, "Digital Ateliers. Reshaping the know-how economy"[32] was how to support Makers to start a business. At the same time, these things indirectly may be a proof, that requires further study, of several important things.

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31 http://www.ilmessaggero.it/docs/make_in_italy.pdf.

32 http://www.makerfairerome.eu/en/events/?ids=315.

First, that the potential for economic growth and company profitability of Free/Open Source Software and Open Hardware, that is for collaborative, "really DIY" equipment, is still largely unknown and not fully exploited.

Second, even taking into account "traditional" microcredit offerings (if and when they are available), that financing for actual Digital DIY activities and services may be even harder to achieve today, than it is for organizations that already have a non-negligible for-profit activity, or are deliberately set up, and work, specifically to reach that status. Therefore, unless public funding is declared to be the only solution, actual Digital DIY may require other forms of financial support, still to be defined, on which work has not even started yet.

Finally, the report and discussions from Maker Faire Rome may be a proof that the general situation has changed in a promising way, with respect to what it was even only three or four years ago. Today, traditional financial institutions in Europe, at least those with strong links to regional areas, may have realised something more than the mere facts that Makers exists, and that banks need to support Makers in order to keep the whole economy afloat.

The Makers that banks and similar organizations would prefer as customers are, obviously, the ones strongly oriented towards building their own, highly profitable company, and there is nothing wrong with that. However, the same organizations may have also started to realise that even those Makers grow up and practice (that is, need, at least initially) in environments that do not have those priorities and goals, be they schools or not-for profit makerspaces. In other words, financial institutions may conclude that much more effort in financing those other environments soon is a necessary prerequisite to have more "customers" tomorrow.

3.2 Schools

The presence of Makers/Digital DIY activities in schools, especially in the first years, is a relatively new phenomenon in European schools, and still, in general, at the experimental stage. In the context of the DiDIY Project, studying and proposing such activities, as well as evaluating their medium/long term outcome, replicability and so on, is the task of Work Package 4,"Education and Research". Again in the spirit of presenting the DiDIY research approach, receiving more feedback and stimulating general discussion, here are some introductions of Digital DIY in schools that seem to be particularly interesting from the DiDIY point of view.

Maker-like activities in primary schools, like those in Little Genius,[33] Scuola Primaria Stoppani,[34] or the "Physical Computing" part of the ICT Lab proposal by INDIRE,[35] may be also useful for studying the general impact of DiDIY on creative society, which is another track[36] of the DiDIY Project.

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33 http://www.didiy.eu/resources/little-makers-fablab-5-11-yrs-old.

34 http://www.agendadigitale.eu/competenze-digitali/1315_i-maker-che-incontrano-la-scuola-possibili-percorsi-d-innovazione.htm and www.associazionescuolastoppani.com/gruppi-di-lavoro/gruppo-nuovi-progetti-e-iniziative-speciali.

35 http://avanguardieeducative.indire.it/wp-content/uploads/2014/10/AE_ict_lab.pdf.

36 http://www.didiy.eu/didiy-creativity.

In high schools, projects like Fablab at School[37] are interesting first of all because they are specifically conceived to work as R&D laboratories for local artisans and small businesses. An equally interesting characteristics of this project is that even the financing, via crowdfunding, of each single fablab must be designed and managed in DIY style by the students of the corresponding school. Initiatives like the FaberSchool[38] in the Italian Province of Varese, which is promoted by the local federation of artisan businesses (Confartigianato Imprese Varese) seem managed in a less DIY manner, and with a narrower goal, that is forming skilled technicians for local businesses. However, they are worth looking at as examples of cooperation between local Makers, schools and industry associations.

3.3 Crafts and Agriculture

3D printing and similar tools and technologies made popular by fablabs and makerspaces are also entering artisans and craft shops of all kinds, from ceramics to jewelry and shoes. This, however, is also a sector in which the rapidly growing support and awareness of Digital DIY is often limited to the mere usage of those tools, not to the whole culture that made them popular, and thus created new applications and a wide market for them (that is, made those tools also affordable by independent artisans).

We refer to the fact that, while creativity and a DIY mindset surely abound, by definition, in the crafts and artisan sector, this doesn't mean that the same skills and attitudes also apply to relatively alien tools like 3D printers. Consequently, we may and should see and study, in the near future, many more cases like the deal signed in 2014 in Italy by Confartigianato,[39] some credit institutions and Roland DG Mid Europe, a leading producer of tools for digital manufacturing and desktop fabrication: thanks to that deal, members of Confartigianato get better financing to buy Roland 3D printers, and free training when they do buy them. In other words, here is a scenario in which many non-digital (or pre-digital?) Makers, that is creative people, whose profession consists of personally designing, building or fixing all sort of products, will likely use the spearheads of a movement born out of creativity and DIY... as turn-key black boxes, as any other mass-produced tool. Of course, there is nothing inherently wrong in such developments. It may even be a proof that the Makers movement has come of age, and is unavoidably maturing, or evolving, into something else. In any case, it is another area that deserves further study.

There are many independent experiments in DIY precision agriculture by both Universities and enterprising winemakers, and farmers in general. Instructions to build Arduino-based milking machines are available online,[40] and vibrant Digital DIY communities like Farmhack.org co-develop and share designs and usage reports for devices like Chicken Coop Sensors or Watering systems for rotational grazing. This said, external, that is from non-Makers organizations, support and awareness of Digital DIY opportunities for European Agriculture seem much behind what is available in the craft sector.

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37 http://www.fablabascuola.it/il-progetto.html.

38http://faberschool.comingtools.com/

39 http://news.biancolavoro.it/stampanti-3d-confartigianato-accordo-pmi.

40 https://nicegear.co.nz/blog/milking-cows-with-arduino-part-1.

3.4 Manufacturing industry

The already cited Report on the impact of Digital Technologies on the Italian Manufacturing System[41] includes answers from Italy to a survey ran on Italian companies with incomes over 1 MEuros in 2013. The executive summary of the report states, among other things, that technologies that play an important role also in the Digital DIY scene, like 3D printing and robotics, are already present in a significant part of the Italian manufacturing sector, even in "traditional" sectors like fashion or furniture. Also relevant is the fact that 3D printing, according to the report, is contributing to change business models and customer management, pushing even traditional companies to work with their end customers, with a peer-to-peer attitude.

3.5 Retail and Multinationals

There is a big conceptual barrier, if not a permanent conflict, between commercial retail and multinationals on one side, and DIY, digital or not, on the other. This is well described with the words[42] of Peter Troxley, Research Professor at Rotterdam University of Applied Sciences on the topic of the Revolution in Manufacturing, and board member of the FabLab Benelux Foundation since 2012: *"The Second Industrial Revolution has very much been about globalization, about centralization of decision power with big corporates, big companies [...] Very much a top-down approach. What we see in FabLabs is a contrary movement which is bottom-up. But corporates are not stupid, they quickly notice that this bottom-up trend has a lot of power. [On the Internet] when all the big giants like Google and Facebook emerged, we had a massive centralization. I think [...] in the FabLab world [...] we have to be really, really alert to any attempt to centralize and move that into the hand of top-down corporations [...] I think we have to counteract that [...] Actively!"*.

In fact, even if at a different level than that described by Troxley, that is to stop rather than "controlling" them, at least one multinational recently moved against DIYers empowered by the Internet. In mid 2014 Ikea demanded that the IkeaHackers website, where users share pictures of their modified or repurposed IKEA products, for trademark infringement and for running ads, be shut down, or at least changed its name. Pretty quickly, however, after being strongly criticized,[43] IKEA contacted the webmaster to "seek a new way forward"[44] stating that they "very much appreciate the interest in our products" and eventually renounced to their claims.

In spite of such episodes, or maybe just because of them, we cannot exclude yet that at least certain types of retailers and multinationals may contribute in an interesting way to increase support and awareness of Digital DIY in Europe. Those companies, in fact, may have the potential, and the financial means, to really bring Digital DIY to the masses, in ways that minimize both its entry barrier and its overall environmental impact (by maximizing the sharing of machinery, if not its ownership, and minimizing its maintenance costs).

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41 http://www.ilmessaggero.it/docs/make_in_italy.pdf.

42 http://plugnmake.com/peter-troxler-video-interview.

43 http://boingboing.net/2014/06/15/ikea-bullies-ikeahackers-with.html.

44 http://www.trademarksandbrandsonline.com/news/ikea-seeks-truce-with-ikeahackers-net-4002.

A first example is the Makerland store opened in Italy inside an Auchan mall.[45] Other fablabs are trying to make similar proposals to local IKEA stores.[46] Meanwhile, in France, it has been giant DIY retailer Leroy Merlin to open[47] in October 2015 the first TechShop[48] in all of Europe, with these declarations: *"TechShop is a playground for creativity. Part fabrication and prototyping studio, part hackerspace and part learning center, TechShop provides access to over $1 million worth of professional equipment and software, comprehensive instruction and expert staff:*

- *at TechShop you can explore the world of making in a collaborative and creative environment;*

- *customers may buy materials at Leroy Merlin, and customize them in the Techshop, whose machines would allow may more people [to perform DIY activities that] 'you couldn't do at home';*

- *members have open access to design software, featuring the entire Autodesk Design Suite.".*

The CEO of Leroy Merlin, stated in the same occasion that Makers are the edge of a new DIY sector, which will be important to the future of Leroy Merlin, and that he hopes that TechShop at Leroy Merlin becomes a place for people "*to create, manufacture, and share their projects, some of which may become innovative products*". We will return on these statements in the final chapter.

3.6 Healthcare

Two fairly different stories, one from Spain and the other best narrated by means of an example from Greece, give a good idea of what can happen (already happening, actually) when people become aware of the potential of Digital DIY applied to DIY healthcare, and organize themselves to support it.

In Spain, the Catalan collective GynePunk[49] wants to "decolonize the female body" and for this reason developed, among other things, a tool kit for emergency gynecological medicine, which can be helpful: "*for immigrants without health coverage, for refugee camps, but also for sex workers, organized or not*" and also "*to bypass the public health system, in order to avoid doctor's appointments without sufficient finances or the proper insurance*". The kit consists of a centrifuge a microscope and an incubator that are used to analyse body fluids, in order to detect urinary and other genital fungal infections. An Open Source 3D printable speculum, has also been developed as part of a general effort to "*democratize and liberate the instruments and protocols used in obstetrics and gynaecology to allow low-cost diagnostics*".

At the other end of Mediterranean, the Metropolitan Community Clinic of Helliniko-Argyropoulis (MCCH),[50] Greece, has been saving lives since 2011 even if it is "technically illegal",[51] and in the near future may continue to do it also thanks to Digital DIY/ABC technology. MCCH provides

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45 http://www.didiy.eu/blogs/digital-artisans-reshaping-craftmens-work-through-digital-do-it-yourself.

46 Reported to M. Fioretti at Maker Faire Rome, 2015.

47 http://makezine.com/2015/10/23/shiny-new-techshop-opens-paris.

48 http://www.techshop.ws.

49 http://www.makery.info/en/2015/06/30/gynepunk-les-sorcieres-cyborg-de-la-gynecologie-diy.

50 http://www.mkiellinikou.org.

medical exams and other healthcare services only to people who do not have access anymore to the Greek public healthcare system, because they have been unemployed for more than one year. MCCH was founded in 2011, when some doctors first realized that, as a consequence of the deep financial crisis in Greece, "people would die". MCCH does not accept money donations, only medicines, tools and other free services. The utility bills of the building in which MCCH operates are paid by the City Administration. Organization-wise, MCCH is a self-managed group of about 300 volunteers, that operates without any formal status or identity. By the letter of the law, MCCH does not exist, but in Greece there are other 67 clinics like it.

In October 2015, inspired by communities like MCCH, social enterprise Edgeryders, several research institutes, the City of Milan and the WeMake makerspace, teamed up to try to answer this call: *What if we could come up with a system that combines the access to modern science and technology of state- and private sector-provided care to the low overhead and human touch of community-provided care?*

The answer is a consortium called OpenCare,[52] that, starting in January 2016 as a two-year, 1,6 MEuro project, supported by the European Commission through the Horizon 2020 Collective Awareness Platforms programme, will:

- collect experiences of community-driven care services;
- validate them through open discussion, both online and offline;
- augment them with state-of-the-art maker technology (3D printing, laser cutting, biohacking, etc);
- combine everything learned into the design and prototype of next generation community driven care services.

3.7 Religious institutions

While most religions are generally much more conservatives than other parts of European society about issues like marriage or sexual education, in the social/economic field they give great importance to themes like subsidiarity, mutual support, sharing, etc, which are also relevant in the Makers movement. As an example, an overview of those affinities for the Catholic Church, which for the most part may be equally valid also for other Christian confessions, and other religions as well, is in the 2013 essay titled "Catholics Social Doctrine and the Openness Revolution: Natural Travel Companions?".[53] The initial paragraph of its conclusions may be enough, as far as the topic of this report is concerned, to make the point that religious institutions, may play, at least in theory, an important support role for Digital DIY in Europe: *"subsidiarity [may be] summarised as 'whenever people can do something by themselves, help them to do so! [...] Catholic Social Doctrine [...] has always strongly proposed a society built on solidarity, subsidiarity, and common good. Such a society should help the poor by empowering them through government that is small in assistentialism but "big" in fair rules. Through active participation (at all levels, from family to*

51 http://www.cottica.net/2015/10/27/care-by-communities-il-sistema-sanitario-ombra-della-grecia-senza-denaro-e-organizzazioni-formali.

52 https://edgeryders.eu/opencare/welcome-to-opencare.

53 http://mfioretti.com/2013/04/minneapolis-catholics-and-the-openness-revolution.

State) and distributed ownership of means of production, that society should serve the real needs of all its members, both at the spiritual and at the practical level.".

By and large, however, religious institutions across Europe still seem quite unaware of this "affinity".

3.8 Last but not least: feedback from Makers

Throughout the preparation of this report we have asked, in the course of email conversations with many Makers, fablabs, Linux User Groups and Digital DIY artisans or entrepreneurs from all over Europe, questions like:

- how much public awareness and "official support" in your city/region for your (which are also mine, by the way!) ideals, by administrators and general public?

- how costly and/or hard it is to set up and operate a fablab open to everybody, from the fiscal/regulatory/legal point of view? do you have to pay special fees, how much? what permissions did you need, how long did it take to get them?

- did you have to get some mandatory training/certification? do you get tax discount, or other similar support?

- what are your interactions with local schools and businesses, especially non high-tech ones? for example, have you been invited to teach 3D printing in schools? or by groups of senior citizens, displaced workers seeking for re-qualification?

- do you help associations of farmers, carpenters, electricians, and similar to train their members to use Arduino and Open Hardware in their jobs?

- do banks in your country have financing programs just for Makers/Open Hardware startups?

- what local administrations, schools, small/medium business associations and other organizations, that are not makerspaces, fablabs or similar, are already officially promoting Open Hardware, 3D printing and other Digital DIY activities, in any way, in your local community, including but not limited to: training, sponsoring meetings, changing local regulations, offering spaces, etc?

Here is, again as input for further research and invitation to provide more feedback, an edited summary of the most interesting answers among the ones that we received.

- "[In this Fab Lab] we are getting this and similar request about projects mapping, researching the make, DIY, open movements in Europe almost on a daily basis. It seems there are more people 'studying' the movement (or at least more money goes into this research) than people actively 'doing' the things."

- [from Switzerland] "Cost... depends. We have a DIY comminity and a makerspace in Zurich active since 2006. Completely self-funded in the beginning, income through workshops, small cultural funds (mostly from Migros Culture Percentage[54]). Most work is volunteering. Legally no big issues, organized as a 'verein', a very simple Swiss model of a legal organisation, non-profit. Below certain turn-around (under 100 kCHF per year) we don't have to pay tax in Switzerland. We have a small membership fee of 50 CHF per year, but

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54 http://m12.migros.ch/en/our-responsibility/society/migros-culture-percentage.

that includes cheaper participation to workshops and camps.[55] So we don't really make money with that. We have been trying to integrate Open Hardware approaches to teach nanotechnology and related stuff since 2008, but had a hard time convincing the relatively conservative engineering environments in Swiss universities."

- [From Spain] "There are not fees to setup a lab beyond the private investment on machines and training. You can think about that investment in powers of ten (inspired by the Eames): 10 k mini fablab, 100 k standard fablab (most of the inventory as listed in: http://fab.cba.mit.edu/about/faq), 1 M super fablab with extended capabilities (large 3D printers, robots, water jet cutters, etc). Investment is required for training for mainly two reasons: joining the Fab Academy program (5 kUSD in tuition fees) or providing custom training for local staff. As far as permissions go [...] I guess you need permission as an education institution and/or light industry production facility."

- [from Italy] "I see confusion about insurance coverage and penal responsibility in the case that a user of an hackerspace or fablab gets hurt using a non-certified machine and, as a consequence of that, a lot of painful bureaucratic hassles and loops to get those certifications. I believe it would be extremely useful to have (i) a method and one list of instructions, in a flowchart-like format, that allowed non-bureaucrats to understand all the relevant norms and comply with them, and (ii) one (public?) organism that can help makers to do it (it's impossible to spend 3 thousand Euro to have a professional certify a self-built printer paid 300 Euro!)."

3.9 Political parties

Judging by the lack of mentions in the accessible (language-wise!) online documents and Makers communities, the programs of the main political parties in Europe can be probably divided in two main categories: those which do not deal with digital issues at all, and those which include, all or parts of EU and national Digital Agendas, plus positions about other "mainstream" digital themes, like Net Neutrality, online censorship and copyright protection, or commitments to use more Open Standards and Free/Open Source Software in Public Administrations. Digital DIY specific themes are not explicitly mentioned.

Interestingly, this lack of explicit support and awareness may be common also in European Pirate Parties, which are much more interested than the others in "digital" issues, knowledge sharing and peer-to-peer organizations, and whose member are surely more receptive than the average to Digital DIY issues. Fact is:

- as of October 27, 2015, searching for fablab, or Open Hardware, or Makers in sites like young-pirates.eu yields no result;
- a direct request on the Italian Pirate Party forum, [56] got the answer that it has no explicit, official positions about Makers and Digital DIY;
- asked if "pirate parties anywhere in EU have explicit positions/proposals about Open Hardware?", Rick Falkvinge, founder of the first Pirate Party in Sweden and currently an
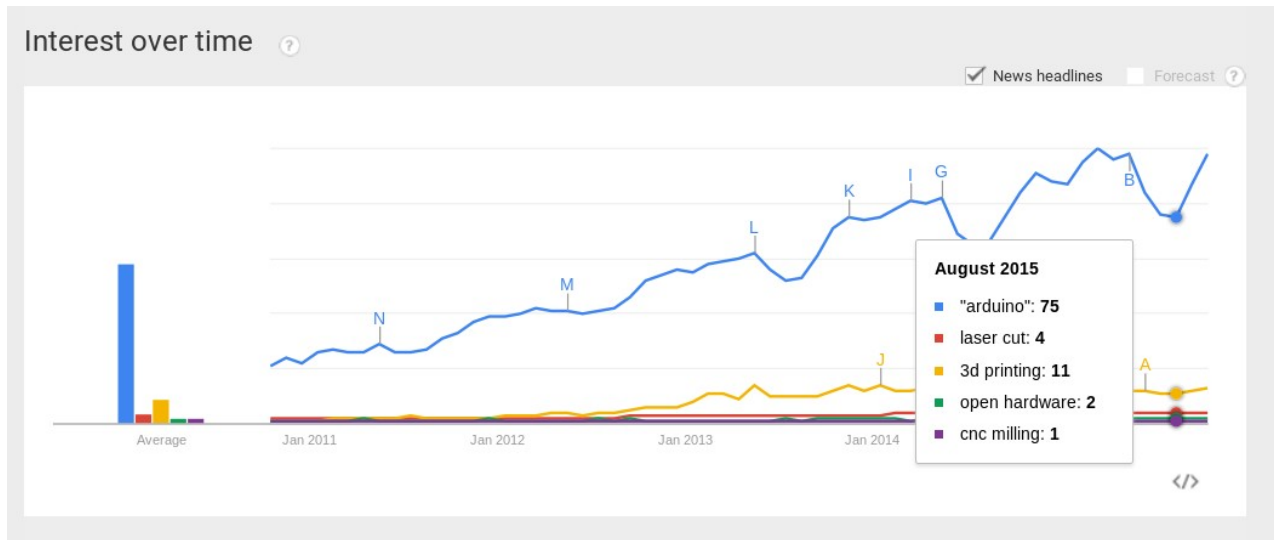
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55 http://mechatronicart.ch/mechartlab.

56 https://forum.partito-pirata.it/t/quale-supporto-e-azioni-concrete-per-il-fai-da-te-digitale/523/16.

evangelist in the pirate movement at large, answered[57] "I am not aware of having seen that. It would be logical to adopt, but that level of detail is beyond my horizon".

3.10 General issues

3.10.1 A look at "Digital DIY" searches

While not being a real analysis by any means, a quick check at the Google search trends in the October 2010/October 2015 period seems to confirm what was already implicit in other parts of this report, and in all its sources. The general interest, awareness and media coverage of the Digital DIY phenomenon has sensibly increased in the last five years, but only for some parts of it. In the chart Arduino and 3D printing, that is the same two (classes of) products that still get the lion's share of most Maker Faires, receive much more attention than other Digital DIY tools and techniques, like laser cutters and CNC milling machines, that in the long/medium term may have an equal, if not bigger impact, on economy and society.

3.10.2 Fab Labs and Makerspaces, but not Tool Libraries?

Another hint that the actual awareness of Digital DIY in the general public and media, at least in Europe, is quite low, comes from looking at Tool Libraries. These are organisations, already relatively popular in the USA, that (from Wikipedia) "*allow patrons to borrow tools, equipment and 'how-to' instructional materials, functioning either as a rental shop, with a charge for borrowing the tools, or more commonly free of charge as a form of community sharing. The services offered by a Tool Library, typically performed by volunteers and community service workers, are tool lending for non professional use (e.g., personal or volunteer/community improvement projects) and tool management, from routine maintenance to lending control, just like a book library.*".

Strictly speaking, Tool Libraries are not Digital DIY organisations, nor are high-tech as makerspaces and fablabs. At the same time, digital networks, CAD software and online communities create many more occasions to subscribe to a Tool Library, and borrow its tools, than it was possible to have in the pre-WWW era. An example of what we mean is that today, thanks to

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57 https://twitter.com/mfioretti_en/status/658926858923327488.

software like SketchChair,[58] everybody can design their own custom chair, or download printable layouts of the pieces to cut to build one of average size; and then actually saw and refine them with the tools borrowed by such libraries. In Europe, however, as of October 2015 there are today hundreds of makerspaces and fablabs but, according to Wikipedia, only eight Tool Libraries: two in Belgium, one in Slovenia, four in Sweden and one in UK.

3.10.3 Awareness among young people: the Maker Faire case

An important observation related to awareness of Digital DIY is in the "Growing DSI" report: "*The people and organisations working on digital social innovation may not identify themselves as social innovators, and are often in very different communities from those who traditionally work on social innovation, such as established charities and social enterprises.*".

The lack of answers from NGOs to the contact requests sent as part of the DiDIY dissemination plan may be related to this separation. Another example may be what happened at the 2015 Maker Faire in Rome. In the week before the Faire, some students and researchers of La Sapienza University, that hosted the event inside its main campus, heavily criticized the management of both the University and the Faire. On October 16th, the students gathered to protest besides the main entrance of the campus, and eventually the police charged them.[59] The protest appears due to two main classes of reasons: one, outside the scope of this report, is about the impacts of the Faire on teaching, exams and other activities inside the Campus during the event, and of the way those impacts were communicated. The other set of reasons, which are on topic here, may indicate a possible fracture between Makers and students. Namely, a lack not only of reciprocal knowledge, interest and understanding, but maybe even of the will to acknowledge and try to fix it. One of the protesters wrote, on the Fabber Facebook group,[60] that the protest was also about the substantial hijacking of the Faire, and by extension of the whole Makers Movement, by corporate giants that sponsored this edition (the list includes Google, Microsoft, Intel, and Eni): "*this type of event is going in a different direction than it was initially, that is: sharing, freedom from patents, democratization of knowledge [...] Makers, who do research and innovation bottom-up, collaboratively, should be interested to fight this appropriation, and build a new model of technological development, that is for everybody, not just for those who can afford it.*".

In fact, a post by the protesters[61] says, with reference to the corporate sponsors and to the spaces reserved to them in the campus, that "*[in a country where a youth unemployment rate is 45% and research is dying] it is even more serious that inside a public University is proposed a model of knowledge that is supposed to immediately become business, instead of free, and freely shared, collaborative research*". About the "other side", Faire participants observed that the makers with the attitude quoted below "*seem sincere and passionate. But they don't express even when explicitly*

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58 http://sketchchair.cc.

59 Two discussions about the protests and the charge, from which we excerpted all the quotes in this paragraph unless otherwise noted, are at http://nettime.org/Lists-Archives/nettime-l-1510/msg00034.html (English) and www.facebook.com/groups/fabberintialia/permalink/976572735741364/ (Italian).

60 http://www.facebook.com/groups/fabberintialia/permalink/976572735741364.

61 https://www.facebook.com/permalink.php?story_fbid=1509583306020425&id=1506859936292762.

asked – any thought, apart from the corporate slogans, about the transformation of labour, of the evolution of the industry, on privatization and enclosure."

Several makers who attended the Faire, either online or speaking with us, rejected these critiques altogether, answering that:[62]

- "we are the real revolutionaries, much more than you";
- "[the protesters] are not interested in the Faire, simply because they're not interested in innovation";
- "had the Faire not come into their campus, they would still ignore that Makers, 3D printing and this whole community exist";
- "trying to explain them what Makers are really about was like talking to a wall. They did not want to listen, just protest";
- "innovation without business does not exist".

There is no doubt that not all the Makers at the Faire share these positions and that not all the students or researchers of La Sapienza agree with the protest. There were many students who publicly sided with the Makers, and vice versa. However, speaking of support and awareness for Digital DIY, it seems worthwhile to verify if and how much the attitudes above, on both sides of the "fence", are actually common across Europe.

3.10.4 "Customer" safety and "product" responsibility

In the DiDIY Project the in-depth study of this area is the task of Work Package 6[63] and, especially when reproduction of weapons and other hazardous products is concerned, of the Ethics Transversal Activity.[64] This section simply describes some of the areas in which there should be more support and general awareness, because they will create demand for them anyway, in the near future.

"Assisted making" as in the TechShop/Leroy Merlin case will first of all create almost identical problems, but on a quite larger scale, to those already faced today by print or copy shops, when they are asked to print copyrighted or also "controversial" material. A good example of this scenario would be the USA company Office Depot, that in September 2015 "refused to print copies of a pro-life prayer, on the grounds that to do so violates company policy".[65] Accused of religious discrimination, the company explained that the refusal came instead from the parts of its policy against graphic material or hate speech.[66]

There is no reason not to expect similar controversies happening when "customers/makers" will demand, in venues like Techshop, to 3D print or customise materials they just bought in the DIY store, in ways that raise similar issues. Of course, this is also the easiest area to deal with, that is the

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62 This is a sample of the [translated!] answers or of their most relevant parts, received in person by us, or read in the already cited forums.

63 http://www.didiy.eu/didiy-rights-and-obligations-legal.

64 http://www.didiy.eu/ethics.

65 http://www.breitbart.com/big-government/2015/09/10/office-depot-refuses-to-print-copies-of-pro-life-prayer.

66 http://www.lifenews.com/2015/09/11/office-depot-backs-down-from-censoring-pro-life-flyer-apologizes-to-customer.

one in which current laws are more prepared, so to speak, to handle the situation. The same may be said, at least as far as services like the TechShop/Leroy Merlin one are concerned, about possible violations of "Intellectual Property", that is, requests to reproduce trademarks, patented products, or copyrighted material. Theoretically, large companies like those may even be able to reach agreements with copyright collection societies for, e.g., letting customers pay extra to laser-engrave a Disney character on a piece of wood. Still, these are issues on which there seems to be not enough support and awareness at the moment, at least in the European media and general public.

However, from the point of view of the DiDIY Project, the main topics on which there is a need for more support from lawmakers and institutions on one side, and for general awareness (even among makers) on the other, are the ones around safety and product responsibility/liability regulations. Quoting again from the LeRoy Merlin article, Techshop had the knowledge, space and financial means to "lock a ShopBot [CNC tool] inside a cage, as required by French law", and also adding "new safety innovations, like a set of sensors", to their water jet tool. Even ignoring individual, at-home Digital DIYers, do all European makerspace and fablabs, have the knowledge necessary to handle these situations, not to mention a complete view of all the regulations they are supposed to comply with? In general, do current laws and regulations, in Europe and other places where Digital DIY is already a thriving phenomenon, make it possible for such players to operate?

Digital DIY activities, when done for personal, non-commercial use enter in exemptions that many copyright, patent, design right and trademark legislations have, thereby allowing such uses under certain conditions. This is typically the case in fablabs and makerspaces. Could similar exceptions also exist when it comes to safety, and product liability? Work Package 6 of this Project will shed more light on that. In the meantime, we are going to summarise some of the issues we will have to deal with.

An Italian article published in June 2014[67] makes, among others, the following remarks about 3D printing[68] and Italian/EU laws and regulations:

- 3D printing involves a printer, some software, sometimes a scanner (that is all the respective manufacturers/authors), plus design files from different sources;

- in general, according to the Italian "Consumer Code" (Codice del Consumo) and other laws, if more people are responsible of some damage, they should all refund it, in parts proportional to the "size of those parts of the risk that can be referred to each of them". But this "size of parts of the risk" is quite an hard concept to apply to 3D printing that is done with all possible combinations of DIY and non-DIY components and procedures (e.g., using a commercial, factory-assembled and tested 3D printer versus one built at home from an assembly kit, or manufacturing its parts with another 3D printer;

- some 3D printers currently (October 2014) on sale raise legitimate doubts about their compliance with existing safety regulations, both in "personal" and in "professional use" scenarios;[69]

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67 http://www.assinews.it/articolo.aspx?art_id=23934, June 2014.

68 Of course, the same remarks apply, almost identically, to most other Digital DIY techniques.

69 Links or pictures of one of these printers are in the article.

- on one hand, tool manufacturers are fully responsible, in case of accidents, when they explicitly guarantee to their customers that the tools themselves comply with legal requirements about prevention of accidents; on the other, it may not be enough for the same manufacturer, if it wants to comply with all regulations, to simply get the CE mark, or include "instructions for safe use" or, with assembly kits, explicit declarations that whoever assembles the tool is the sole responsible for providing it with appropriate protection (as with TechShop did in Paris with their ShopBot and water jet);

- in the Insurance Industry the only ones who have publicly declared to have started the study of these problems are colleagues in Zurich of London, whose "Manifesto" takes into account the results of a report released by the Mayer Brown firm in May 2013.[70]

The situation is even more complex when people build the tools parts by themselves, using other Digital DIY tools. In general, even when existing regulations are adequate to such scenarios, the corresponding procedures and fees may not be sustainable for certain makerspaces. As already mentioned, in an email reply as part of this study, a Maker wrote "Does it make (economic) sense to spend three thousand Euros to certify a 3D printer that I could build myself with three hundred Euros of raw materials and parts?"

At a higher level, support and awareness of Digital DIY in society and institutions is even more lacking, in the sense that, rather than laws being too complex, some of the very legal concepts behind them may be inadequate, and unable to cope with a society in which Digital DIY really is a mass phenomenon. Apparently, instead,[71] mentions (but little more) of certain issues only appear in academic articles from the United States, while Europe seems still stuck at the "don't ask, don't tell" stage, at least at the institutional level. Quoting from "Product Liability Law in the World of 3D Printing":[72]

- in the essay, titled "3-D Printing and Product Liability: Identifying the Obstacles"[73], Engstrom argues that, "*if home 3D printing really does take off, Product Liability (PL) litigation as we know it may, in large measure, dry up. And, if it doesn't, the technology threatens to unsettle the theoretical justification for product liability law's development.*";

- [if] you injure yourself with a defective 3D printed slingshot, who is responsible and how can it be proven? If I printed it and sold it to you, should I be held accountable? If you printed it yourself, should ACME Corp take the blame or should the person who designed the .stl file? Engstrom indicates that any of the above parties might be difficult to pin the blame on, given current liability law;

- [in comments to the same article] "*There's another party: the filament provider. A design might work well with one material but not another, or a particular blend of plastic might have different characteristics*".

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70 "Why 3D printing is blurring the boundaries with product liability" - November 2013, http://insider.zurich.co.uk/2013/11.

71 "Apparently" means "within the limits of this study, as explained in section 1.1".

72 http://3dprintingindustry.com/2013/11/14/product-liability-law-world-3d-printing, November 2013.

73 http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2347757, October 2013.

A more recent paper by Allison Harris, dated February 2015 and titled "The Effects of In-home 3D Printing on Product Liability Law"[74] points out, among other things, that:

- home printing brings the consumer into the supply chain, in effect merging two supply chain components;
- there are two kinds of use scenarios to consider for in-home printing and production... when the consumer constructs and prints his or her own design.... the retailer role has been eliminated. Another subset of this use scenario would be when a user downloads, customises, and prints a design from an online community... The resulting ambiguity identifies a weakness in the supply chain that will most likely cause future disputes between designers;
- [in general "*This shift will transform the consumer-manufacturer relationship, which is the foundation behind product liability law, and the current path to in-home 3D printing does not conform to the administration of product liability law [...] In order to overcome some challenges accompanying in home use of 3D printers, I recommend the institution of a clearinghouse of 3D printing design files to help restore the institution of product liability law, protect the general public.*";
- by holding companies liable, we avoid a "buyers beware" society (Schneier 2009). The Open source environment lacks a comparable party with an advantageous position for accepting liability. The evolution of Open Source CAD file sharing has led to a "buyers beware" online community. This issue poses a serious threat to the general consumer by destabilising the foundation of product liability law.

It goes without saying that if Digital DIY becomes a mass phenomenon, that is, if the number of practitioners, and their average lack of skills (compared to the first generations of makers) greatly increase, these will become serious problems. The opposite side of this coin is that there may be new, big market opportunities for Insurance Companies willing to enter this new market, if properly supported by laws that balance both their for-profit nature and the general need for true Digital DIY in society.

For all these reasons, we believe that there is an urgent need, if Digital DIY is to bring the greatest possible benefits to European society, for more study and public discussion on this topic, which we obviously want to support, and participate in.

4. Conclusions, Recommendations and Best Practices

Digital DIY is already happening all over Europe, but it is still relatively confined to makerspaces, fablabs, highly innovative small businesses and similarly "specialist" environments. The DiDIY Project objectives[75] include fostering a Digital DIY-based human-centric development in Europe. In such a society, general support and awareness of Digital DIY should be so granted and obvious, to paraphrase the D-Cent report, as daily usage of a laser printer to print on paper is today. If that is the

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74 http://www.sciencepolicyjournal.org/uploads/5/4/3/4/5434385/harris_new_ta1_1.2.2015_lb_mg.pdf. For more coverage of the same issues, cf. "3D Printing Offers New Risk Challenges", http://www.riskandinsurance.com/3d-printing-offers-new-risk-challenges and "3D Printing and Public Policy", http://www.ip-watch.org/2015/07/09/3d-printing-and-public-policy.

75 http://www.didiy.eu/project/objectives.

goal, even with all the caveats and limits described in section 1.1, it seems possible to provide with this report several preliminary conclusions. They are preliminary as all of them require the Project to do further research, and are:

1. Digital DIY is – to use the language of the EU programs mentioned in section 2.4 – one form of Digital Social Innovation (DSI);

2. as in the case of other DSI, promotion of Digital DIY requires a combination of top-down actions and bottom-up approaches. However, there may be important differences between Digital DIY and other forms of DSI, that should be considered when promoting it;

3. as a consequence of the whole study, and considering the previous point, there already is a draft set of Best Practices for Makers and local public administrations wishing to promote Digital DIY in their community;

4. at least in the long term, Digital DIY needs specific support and awareness, in the form of new or reformed laws, regulations and a supporting public mindset, because of all the issues implicit in highly distributed, spontaneous production of physical objects;

5. there are important differences, maybe not fully acknowledged yet, between Digital DIY and other "Digital-focused" programs, practices and developments promoted by the European Union.

The next five sections explain and comment each conclusion of the list above.

4.1 Digital DIY, (Digital) Social Innovation and other synergies

The DiDIY Project works for a *human-centric development in Europe*. In this report we have shown that there are important points of contact with EU-sponsored research projects, and other European initiatives, in fields like Social Innovation and Collective Awareness. Projects like OpenCare show that it is urgent for the Project to also look at other EU programs about healthcare and social services in general. Finally, Chapter 3 shows why the Project must continue the attempts to reach out both to the sectors of society described there and, even more, to those that are not there, because it has not been possible yet to establish direct contacts. These sectors include, but are not limited to, NGOs in general, artists and all "creative" professions, as well as "minorities"/disadvantaged categories like, just to name a few, senior citizens, women, immigrants and NEET[76] citizens.

Another area from which interesting input for the Project may come are all the Open Government/Open Data projects and communities that are based on usage Open Hardware and sensors, or other Digital DIY/ABC activities.

4.2 Top-down actions, bottom-up approaches and scaling

The findings in Chapter 2, and in general all those about legal and regulatory issues described in this report, show that there definitely is a need for action at the top level, that is EU- and Member States lawmakers and institutions. The "Growing DSI" report implicitly confirms, when noting that: "*most policy influencing DSI will be at national, regional and local level [...] However, the European Commission has also very relevant competences, and some regulatory and policy issues are cross-sectoral and should be harmonised and coordinated at EU level.*".

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76 Young people "Not (engaged) in Education, Employment or Training".

The overall low level of Digital DIY awareness in society, described in Chapter 3, together with the lack of answers so far from NGOs and other stakeholders, proves that bottom-up approaches, partly covered in the next section about Draft Best Practices, are equally needed to make Digital DIY bring positive, sustainable change to European society.

Something that is less clear at this point, and therefore requires further specific analysis, is how much, how and why those actions, approaches should be interconnected and scalable, from local to State and EU level. The "Growing DSI" report, for examples, says that "*the reason digital social innovation has not yet scaled is because the 'long tail' of smaller European DSI Networks is still heavily disconnected, with 687 organisations out of 930 (74 per cent) that have no links to other organisations. Many of these organisations are also in countries without much support, such as those in Eastern Europe. Looking at the data, if we want a single scaling European DSI network, [more interconnection] is needed*", and raises the following questions: is one "single scaling European network" also needed for Digital DIY, to make it prosper? if yes, at which level?

When it comes to laws and regulations, the answer is almost certainly positive, because of course the less contrasts there are between EU, national and regional norms, the easier life is for everybody participating in Digital DIY. The same applies to the sharing of best practices, designs and other knowledge. But when it comes to actual action in the field, in many cases systematic interactions and coordination between one group of makers, and their surrounding community, may be much more important than those between communities, or groups of makers in different areas.

4.3 Draft Best Practices

As anticipated at the beginning of the chapter, here are two *draft* sets of Best Practices derived from this study. Please note that, apart from their draft status, both sets are not meant to constitute a complete reference, simply because that would be outside the scope of this specific report. The suggestions below are published here mainly as invitations, to stimulate "field tests" by Makers and Public Administrations, and to gather from them more input for further research.

4.3.1 For Makers

1. Take care not to repeat some errors of some parts of the Free Software/Open Source movements, i.e., expecting that, or talking like if, everybody that could benefit of Digital DIY becomes a regular contributor of the Digital DIY community and/or participates directly in all or some phases of DIY production, from design to actual manufacturing, of some product that he or she may need. Such an attitude may exclude citizens who, for whatever personal (health issues, age, need to care for relatives) or professional (e.g., full time workers in a clinic like MCCH, or self-employed artisans) may never have, in practice, the time or interest to stay in a makerspace long enough to learn how to operate the software and tools by themselves. Instead, in order to gain mass support for Digital DIY and maintain it over time, even those people should be aware of its benefits. But for this to happen, even those people should have the possibility to benefit from makerspaces. It could be worthwhile, for example, to experiment "make on demand" services, that is ways for people to pay for having something manufactured for them, much like it already happens in ordinary print shops.

2. Make your fablab locally relevant up to the point of being indispensable. Take part in common events, partner up with local players, get closer to universities an encourage maker classes, take responsibility in the neighborhood.[77]

4.3.2 For Public Administrations

(part of what follows comes from the programs described in section "Examples from Italy")

1. Actively help local makers to follow the Best Practices in the previous sections. Quite often, when they do not follow them, is because they find no partner to talk to.

2. 3D printing is, without doubt, an extremely flexible and powerful technology. Do not, however, focus too much on it, as it may obfuscate other technologies that, in your specific City or Region (e.g., rural districts) where simple DIY sensor networks, or even publicly sponsored Tool Libraries with good internet access may be more effective, that is bring more practical benefits, at lower costs and in less time.

3. Listen to all the local stakeholders, create occasions for them to talk with each other, and involve all of them in decisions around, and implementations of, Digital DIY projects and services since the beginning.

4. Actively work to reduce the friction between makers attitudes and bureaucracy.

5. Reuse! Before acting, look at what other administrations like yours are already doing. While and after acting, be sure that everybody documents and shares publicly all the procedures they developed, and all the problems, and solutions, that they encountered.

6. Acknowledge and actively support also the parts of the Digital DIY communities and philosophy that do not aim to become part of traditional economy and markets.

4.4 New laws, regulations and mindsets

This is almost surely one of the areas in which further, more detailed and in depth studies are most needed. This said, Digital DIY production of physical objects creates problems that simply do not exist, or exist at a much smaller scale, when only looking at immaterial services, or in provisioning of physical infrastructures for, e.g., free Wifi or universal broadband access, that are centrally managed by a very small number of players, be they utility companies, private operators or public officials.

If Digital DIY is to become a mass phenomenon, it will unavoidably be (much) more regulated than it is today, at all levels, as the discussion on "Customer" Safety and "Product" reliability shows. This may not be, in and by itself, a serious threat to Digital DIY, as long as two conditions are satisfied. One is that new regulations support it at the small, local level, but leaving it the maximum possible freedom. Norms that seriously limit activities like the ones currently ongoing in small scale, independent fablabs and makerspaces would prevent European society from reaping the most benefits from Digital DIY (assuming that it were possible to forbid or control all "personal

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77 One of the makers that we contacted by email, asked if any local administration, school, SMB association or other organization which is not a makerspace or fablab is officially promoting Digital DIY in your area, answered "This is a big city. I haven't researched it". This is certainly not the norm for the majority of makerspaces and fablabs, and maybe projects like those, in that city, had not been made public yet! This Best Practice is quoted from "The failing of fablabs" and from the comments to it: http://fablab.nl/2013/09/29/the-failings-of-fablabs.

fabrication" activities, after the failure of decades of similar attempts against illegal copying of digital content).

In this context, proposals 3.1.3 and 3.3.7 of the "Making Good" paper may play an important role. In synthesis, these proposals recommend regulatory action to preserve and enhance the democratization of making, and recommend further research about "*post standards driven futures, to model of customer protection which cater for versioning, decentralised quality control, localised production and social design & assembly*". Such research should also aim to solve the "Customer" safety and "Product" responsibility described earlier in this report: investing in an appropriate institutional infrastructure, the European Commission may maximize the potential of the new manufacturing trends for "sustainable growth, rewarding work and expanded public good".

Finally, the importance of Open Standards and file formats should not be ignored: services like those offered by TechShop and Leroy Merlin may introduce many more people to the world of Digital DIY than orthodox makerspaces may ever do, and if that happens it would be a very good thing for those people, as long as, whenever they use those services to design from scratch their own "products", they are guaranteed that they can reuse those designs in any other environment, even using different software. Does the Autodesk software used in those Techshops guarantees this?

In perspective, though, an even bigger issue may be the mindset of the general public, which today usually feels, and not without very good reasons, entitled to effective "Customer" safety and "Product" liability protection. Fact is, and that is why we put those two words in quotes, Digital DIY products are not "products" in the sense that current product liability norms give for granted; and makers are not "customers", but the objects they produce will be more and more frequently used also by other people, who may expect from those objects the same guarantees today given by commercial manufacturers. In general, real awareness, and therefore acceptance, of Digital DIY requires the general public, not just makers, to accept the "Buyer Beware" mentality cited earlier in this report. How this could or should happen, is still an open question.

4.5 EU (Digital) programmes and the nature and priorities of Digital DIY

A recurring, main rationale of many EU and national programs is to foster Europe's economic growth and increase its competitiveness in the global marketplace. The Digital Agenda and other EU "digital programs" focus very much on what it calls the "Digital Economy"[78] and "Digital Single Market".[79] And besides the lack of including ABC type of activities in its scope (it focuses on the "bits", not the "atoms"), it also excludes non-market activities.

This creates another, non-negligible, "support and awareness problem". There is no doubt that many Digital DIY activities can be excellent ways to start and run profitable businesses, create new jobs and contribute to economic growth. The DiDIY Project will also study those activities. At the same time, and almost by definition, both as a mindset and from a practical point of view, much Digital DIY is not about creating new jobs, or profit in general. Sometimes, the contrary is true. This is true at all levels, from the individual who, for fun or to save money, builds from scratch her own home automation system, or learns from ikeahackers.net how to "hack" furniture, to communities like

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78 https://ec.europa.eu/digital-agenda/en/digital-economy.

79 https://ec.europa.eu/digital-agenda/en/digital-single-market.

OpenCare whose mission is to develop and build, in Digital DIY fashion, medical equipment for whole clinics.

In general, it should be observed that sharing knowledge, information, hardware designs, software under free licenses, i.e., as Open Source, constitutes different forms of so called "digital commons". The EC's Digital Agenda, as many national agendas, Smart Cities programmes and similar, focuses mainly on the "market", thereby forgetting the importance of this digital commons for developing prosperous businesses. Like the infrastructure of the internet – mostly a commons infrastructure regulated by open standard protocols and Free Software implementations, the infrastructures for makers consists of FabLabs, Internet of Things data networks, sharing platforms, etc.

More specifically, Digital DIY is typically performed as a non-commercial activity and the sharing of experiences through open communities is considered foundational. As large parts of software are developed as Free Software in commons-based peer production mode, likewise is a large part of Digital DIY taking place following this economic paradigm. That might explain the reason why these activities are not taken into account in the current Digital Agendas, which focus on exchange in the market. However, economic activity in the market typically takes place "on top" of the commons, as value added services. This can be seen in the software and information industry and also in the world of makers.

As Jeremy Rifkin sees it, a growing part of the economy is moving to a zero-marginal cost web, where the collaborative commons plays a much stronger role than the market today.[80]

In a way, and just as a starting point for future analysis, we may say that we have to look for more complete answers to the question "Is more support and awareness for the actual nature of Digital DIY needed... in EU 'Digital' programs?" These issues, as well as proposals to deal with them, are already present in the D-CENT report:

[examples like] the Free Software and Makers' movement, illustrate collective practices that establish new spaces, institutions or norms of participative and democratic sharing. These examples represent practices of re-appropriation and management of the common, new practices of labour, creation and production based on collaboration and sharing.

and in "Growing DSI":

Future DSI policy could also initiate a process where we are able to rethink notions of privacy, trust and collective value creation for the public good in order to strengthen the public domain and the creation of knowledge commons … Any approach to understanding and measuring the impact of DSI on both a macro level as well on a project-based level needs to go beyond GDP to establish what non-financial benefits DSI have or have not helped to achieve.

Another way to put the same issue may be that it is necessary to study if and how, rather than looking only at profitability, business plans, and jobs created by "innovation", Digital DIY support, analyses and policies should focus on:

- evaluation of overall savings and gains including, but not limited to (i) reduced environmental impacts, e.g., when Right to Repair is granted and only parts that are really needed are (locally) produced on demand, and (ii) better access to cost-effective private or social services (cf. the OpenCare case);

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80 Jeremy Rifkin (2014). The Zero Marginal Cost Society – The Internet of Things, the Collaborative Commons & the Eclipse of Capitalism. Palgrave Macmillan. http://thezeromarginalcostsociety.com.

- sustainability plans, not just business plans, for DiDIY projects and communities.

Two slogans that summarize these issues, in a way that may increase general awareness for them, stimulate public discussion and bring more feedback to the DiDIY Project are:

- is Europe really ready for Digital DIY?
- does Europe really want Digital DIY?