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Digital Social Innovation

Second Interim Study report

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Future
Everything

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Second Interim Study report

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Learn about digital social innovation

New Ways of Making

Open Democracy

Collaborative Economy

Funding Acceleration and Incubation

Awareness Networks

Open Access

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Executive Summary

Innovation policy and the need to reinvent policy to foster Digital Social Innovation in Europe
The Study on Social Innovation in a Digital Agenda focuses on mapping and assessing Digital Social Innovation (DSI) activities, *"a type of social and collaborative innovation in which final users and communities collaborate through digital platforms to produce solutions for a wide range of social needs and at a scale that was unimaginable before the rise of Internet-enabled networking platforms"*.
This report is mainly focused on the output of WP3. The objective of work package 3 is to identify, compare, and evaluate the most salient innovation strategies in the field of digital social innovation. While digital social innovation is growing rapidly, there is little collected public knowledge around what best practice looks like, how networks of innovators might work together in order to amplify the impact of DSI, and what policies, funding models, and strategic approaches can best enable DSI to scale.

The nature of innovation has changed dramatically over the past decade due to globalisation, the widespread diffusion of ICT, the Internet and the rise of social media, the emergence of new global innovators such as China, Brazil and India, and the pressure to engage in open and interactive innovation processes. In light of these transformations, there is the need to rethink policies designed to nurture and orchestrate innovation. The challenge is to exploit the collaborative power of open networks (networks of people, of knowledge, and connected things) and to harness the collective intelligence of communities in order to tackle big social challenges.

In order to assess DSI policy strategies the report has adopted an open innovation philosophy that takes into account the interplay of different policy and research domains, while analysing experiences and best practices within the European Union and around the world. Also, the report has adopted an innovation ecosystem approach by addressing six different constituencies that represent the views of the different actors involved: (1) the open hardware and free software communities, (2) the community of developers, (3) innovation labs, including Fab labs, Living Labs, Hackerspaces and Makerspaces (4) the open data and open knowledge community, (5) smart citizens, and (6) the open democracy community, including civil society and new social movements.

Innovation is no longer seen as a linear step-by-step process in which R&D activities automatically lead to innovation and commercialisation of new products, but as a complex, dynamic, and interdependent process of many organisations and stakeholders: Policy (at all levels) can play a key role in creating coordinated strategies, common governance frameworks, and new instruments to enable an innovative response to challenges in specific domains. Although European Union interventions in the innovation field have been considerable and diverse, their potentially powerful effect on producing change and encouraging innovation has been limited. Edler et al (2013), who summarise the Compendium of Evidence on the Effectiveness of Innovation Policy Intervention Project, led by the Manchester Institute of Innovation Research (University of Manchester) and funded by Nesta, conclude that there is not much evidence of impact and, although the effects of innovation policies and programmes show variations across policy domains and within specific areas, there is still a need to make sure that innovation policy will support societal challenges and economic growth better in the future. **In summary, there is a need to reinvent European innovation public policies to guarantee transformational impact.**

The advent of new connecting technologies has opened up new perspectives for policy making. Though digital networks can give rise to new forms of collective intelligence and can increase democratic participation into policy debates, the actual influence they exert on policy decisions remains unclear. The reality of policymaking can often be laborious, lengthy and involve lots of compromises along the way. But inclusive policymaking should begin with **engagement with those who are likely to be affected by the end policies.** Thus, in formulating new policies ideas for Digital Social Innovation for the Digital Agenda and Europe 2020, we adopted a participatory methodology trialled by Digital Futures, a DG Connect project developed to addresses key policy issues by piloting a new approach to policy making; namely Policy Making 3.0.

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Research that has happened to date

This section provides an overview of research that has happened on the project to date. The research has four main outputs, the 1st interim study report (published in December 2013), the 2nd interim study report (this report), the final study report (to be delivered in November 2014,) and the DSI dynamic mapping shown on the www.digitalsocial.eu website, which engages, builds and maps the DSI community.

The project's most substantial challenge is to develop a crowdmapping facility based on open and linked data with visual identity functionalities that the that attract the DSI community and increase the engagement in the network from the 640 current organisations to between 800 – 1000 organisations (see section below on mapping platform). Tanks to the open data mapping facility, in combination with our hybrid iterative strategy of case study interviews, workshops, and events relevant to the communities, we believe we can map DSI organisations and explore the DSI Network effect in a way that has hitherto not been possible. In order to analyse the relationship data from the mapping, we are adopting **social network analysis** to detect patterns of relations and argue that the causal success of DSI located in the social structure. By studying behaviours as embedded in social network structures, we will be able to explain macro and meso-level patterns that show the dynamics in which DSI organisations and their initiatives create scalable results and what DSI organizations are in need of help.

1st interim study report

The first interim study report, published in December 2013, described our work on defining digital social innovation through investigating more than 250 case studies of digital social innovation services, support organisations and activities. We provided in-depth case studies of 36 organisations/projects. The report presented interim findings and conclusions and highlighted next steps for the research project. The report showed that civil society organisations, non-profit NGOs, social movements, and civic innovators (developers, hackers, designers) are key stake -holders in support of innovation for social good. In the research we distinguished between innovation by non-institutional actors that are not taken into account in traditional innovation analysis, and innovation by institutional organisations and the public sector that supports and enables them to scale. The 1st Interim Study Report also investigated how this process can lead Europe to embrace new innovation models and experimentation, as too often in the past civil society organisations were ignored or left behind in the top-down technology pushes or large top-down innovation programmes.
The analysis of practice enabled us to develop the framework which has been used to capture data on DSI organisation via www.digitalsocial.eu . We highlighted 6 areas that capture key dimensions of the phenomenon under investigation: **(i) New ways of making ; (ii) Open democracy; (iii)The collabporative economy; (iv) Awareness networks enabling sustainable behaviours and lifestyles; (v) Open Access; and (vi) funding, acceleration and incubation.** Data is aslo categorised by:

- **A typology of organisations** (e.g. Government and public sector organisations, businesses, academia and research organisations, social enterprises, charities and foundations; and grassroots communities);

- **The way these organisations are supporting DSI** (e.g. such as undertaking research, delivering a service, organising networking events and festivals etc.);

- **The main technological trends** the organisations and their activities fit under (open data, open networks, open knowledge, open hardware);

- **The area of society the organisations and their activities operate and seek an impact in:** The DSI field does not have fixed boundaries; it cuts across all sectors (the public sector, private sector, third sector and social movements) and cuts across domains as diverse as (1) health, wellbeing and inclusion; (2) innovative socio-economic models (3) energy and environment; (3) participation and open governance, (4) science, culture and education; (5) public services.

Finally, the 1st interim study report demonstrated the prototype method for undertaking a network analysis of strong and weak DSI network in Europe, based on the open data set on organisations captured on www.digitalsocial.eu

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Mapping and Engaging the DSI community

As outline in more details in the engagement summary an ongoing focus has been to engage with and understand the DSI community through events, workshops, social media blogs and articles. Highlights of activities include 640 organisations with 695 projects mapped on www.digitalsocial.eu; 590+ followers of the @Digi_Si twitter account; 15+ events and workshop on DSI including workhops at the international Fablab Conference in Barcelona and Participation Practitioners Forum in Warsaw and more than 25 blogs and articles written on DSI including articles in The Guardian (UK) and Empodera (annual Spanish publication on ICT and social innovation).

Co-designing DSI policies

We have been experimenting participatory methodology to engage practicioners, experts and policy makers in the generation of DSI policy policy ideas, issue and future scenarios. We created a Toolkit to run bottom-up policy workshops (p.54), and used the open democracy platform Your Priority to debate online DSI key policy ideas: https://dsi-workshop-2014.yrpri.org

An experimental policy workshop was held in Brussels at DG Connect premises on February 3rd 2014. This experimental format encouraged policy-makers to go beyond the more standard approach of deploying consultation documents and showed how policy-related events that do happen can be much more participative in the generation of potential ideas through a more user-centred approach to policy-making. The workshop brought together over 70 DSI practitioners, experts, and policy makers from different European countries. As main outcome of the workshop, **9 DSI policy areas** were identified and over **30 DSI policy ideas** emerged. Crowdsourced ideas were clustered together according to key common themes, and generated some of the main policy issues and potential areas for intervention, such as **Distributed architectures** (including the need for open data distributed repositories, distributed cloud, distributed search, and distributed social networking); **The Future of privacy, data protection, trust & ethics,** emphasising the need for privacy-aware technologies; **Open & Big data for the Social Good**, by defining sensible governance modalities for big data thorugh a large collaboration between public and private actors; **Public federated identity management for the entire EU; Open access, open standards, and Copyright reform;** and finally **Mobilising Collective Intelligence to grow a new Digital Commons.**

Finally, after reviewing the literature on open innovation, defining what an innovation ecosystem is and analysing the different communities of such ecosystem, and after running partecipatory policy idea generation experiments, some preliminary recommandations have been identified to improve innovation policies in Europe. There is room at all levels to support digital social innovation. Each administrative level may play different roles. Innovators act locally but they may belong to wider and transversal networks. Local governments should, for example, offer local (economic) incentives for local innovators belonging to local communities. At the other end, European policy makers could strengthen the link among communities, support local and national governments, or coordinate transnational actions. But action is needed at all levels.

Next steps

The key priority for the project is to deliver a successful high impact final study report, culminating with our final DSI event with more than 400 DSI policy makers, experts and practitioners in Brussels, December 16, 2014. To do this our key focus over the next three months will be to, continue our social network analysis to better understand the needs and opportunities to nourish and scale DSI in Europe. We will also deepen our research in to policies and strategies that can support DSI in Europe, building on the work presented in this report. Finally, we will continue our work on engaging and mapping the DSI community, with the aim of having minimum 800+ organisations mapped by the end of the project.

1. Introduction

An overview of the Study on Social Innovation in a Digital Agenda

The Study on Social Innovation in a Digital Agenda focuses on mapping and assessing Digital Social Innovation (DSI) activities, *"a type of social and collaborative innovation in which final users and communities collaborate through digital platforms to produce solutions for a wide range of social needs and at a scale that was unimaginable before the rise of Internet-enabled networking platforms".*

The potential in using digital technologies to enable better and more social innovation is an area that presents significant opportunities to leverage the power of European talent by fully engaging stakeholders, citizens, civil society, and communities (including non-institutional actors such as "geeks" and "hackers") in the innovation process, taking advantage of the "network effect" caused by the spread of the Internet and the Web throughout society.

The DSI study's objective is to analyse, experiment and pioneer evidence on the economic and societal potential for, and impact of, Digital Social Innovation for Europe. This is in the context of rapid ICT and societal transformations, and the importance of driving open digital ecosystems that can foster and scale DSI initiatives as a strategic choice in future research and policy programmes. The study will do so through the following steps:

- **Defining and understanding the potential in Digital Social Innovation (WP1)**. This has been done in Interim Report 1

- **Crowdmapping DSI organisations and projects to engage stakeholders while experimenting and pioneering (WP2)** via new online mechanisms that can enhance the collaboration between DSI organisations, making visible their relational networks and their practices. This is on-going. The Project is documenting practical evidence of the economic and societal impact of DSI from in-depth case studies of digital social innovation implementations. This was reported in Interim Report 1 As stated earlier, many of these actors are difficult to identify using traditional means due to the tendency of the Internet to be used for much wider and diffuse innovation by civil society actors, many of whom operate outside traditional institutional frameworks.

- **Assessing grassroots innovation strategies (WP3)** to identify and compare different research and policy strategies in European Research programmes. This analysis is presented in this report.

- **Providing policy recommendations (WP5)** on research, strategy and policy aspects of DSI – such as governance models, business model innovation and collective incentives, stakeholders' engagement models, research instruments and impact assessment methodologies – in relation to the Digital Agenda and Horizons 2020. This will be presented in the Final study report.

An overview of this report

This report is mainly focused on the output of WP3. The objective of work package 3 is to identify, compare, and evaluate the most salient innovation strategies in the field of digital social innovation.

While digital social innovation is growing rapidly, there is little collected public knowledge around what best practice looks like, how networks of innovators might work together in order to amplify the impact of DSI, and what policies, funding models, and strategic approaches can best enable DSI to scale. There is great potential to exploit digital network effects both in social innovation activity and in new services and approaches that generate social value;but much of this potential isn't yet being realised.

The nature of innovation has changed dramatically over the past decade due to globalisation, the widespread diffusion of ICT, the Internet and the rise of social media, the emergence of new global innovators such as China, Brazil and India, and the pressure to engage in open and interactive innovation processes. In light of these transformations, there is the need to rethink policies designed to nurture and orchestrate innovation. The challenge is to exploit the collaborative power of networks (networks of people, of knowledge, and connected things) and to harness the collective intelligence of communities in order to tackle big social challenges.

The development of open data infrastructures, knowledge co-creation platforms, wireless sensor networks, decentralised social networking, and open hardware, can potentially serve collective action and awareness.

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However, to date it has failed to deliver anticipated solutions to tackle large-scale problems, and the growth of digital services has resulted in an imbalance between the dramatic scale and reach of commercial Internet models and the relative weakness of alternatives. These alternatives mainly fill marginal niches and are unable to gather a critical mass of users that can adopt the services.

The main question is, therefore, whether digital social innovation can provide fundamentally new forms of power that are capable of tackling large-scale social, and even global crises, while empowering citizens and allowing democratic participation.

In order to assess DSI policy strategies the report has adopted an open innovation philosophy that takes into account the interplay of different policy and research domains, while analysing experiences and best practices within the European Union and around the world. Also, the report has adopted an innovation ecosystem approach by addressing six different constituencies that represent the views of the different actors involved: (1) the open hardware and free software communities, (2) the community of developers, (3) innovation labs, (4) the open data and open knowledge community, (5) smart citizens, and (6) the open democracy community, including civil society and new social movements.

The analysis of this report is divided into the following seven sections:

- **Crowdmapping platform for the DSI community**: A description of the latest development of the DSI open data mapping website

- **Engaging the DSI community:** an overview of the engagement strategies to involve the DSI community, outreach and communitcation activities.

- **Innovation policy and the need to reinvent policy:** In this section we address the need Europe has for innovation and we emphasise the role public administrations play when it comes to promoting innovation in Europe. We refer to the changes around innovation policies and innovation frameworks.

- **The concept of innovation ecosystems:** In this section we analyse in-depth the concept of open innovation. We refer to its usefulness back in 2000. We also refer to the current change of context and, therefore, to the need to "adjust/adapt" this open innovation concept to capture grassroots communities. We then introduce the concept of innovation ecosystems, which we argue is much more appropriate nowadays.

- **Communities in the innovation ecosystem:** The innovation ecosystem does not only involve companies and does not only aim to generate profit; it is a concept that is about maintaining communities and enabling processes in a continuous way. In this section, we briefly describe six important communities/constituencies that are part of the European innovation ecosystem: the open source community, the developers' community, the innovation labs community, the open/big data community, the smart citizen/civic society community, and the open democracy community.

- **Macro analysis of communities:** In this section we conduct a macro analysis of the identified communities. Our aim is to understand how they function and how they work. We are particularly interested in their weaknesses for these could turn into areas to focus public policy on. In particular, for each of the communities, we refer to focal actors, enablers, governance, and failures.

- **Micro analysis of communities:** In this section we conduct a micro analysis of the identified communities. We refer to instruments, motivations, and incentives. These will be able to feed directly into policy making
.
- **Bottom-up participatory policy development:** In this section we present the results of the participatory DSI policy workshop we ran in Brussels in February 2014, together with a preliminary analysis on the main DSI policy ideas and themes. We created a Toolkit to run bottom-up policy workshops.

- **Exploring the DSI network effect:** A emergent analysis of the network data, looking at the type of DSi communities, the distribution of DSI in Europe, and the conditions for scaling DSI.

- **Recommendations on innovation policies:** After comparing the two analyses conducted, gaps between what is happening and what should be happening are identified. As a result, in this last section, we come up with ideas of new tools and policies addressed to cover such gaps.

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2. Dynamic crowdmapping of the DSI community

We have redesigned the crowdmapping website and increased the numbers involved in the DSI network. At the heart of the DSI research is www.digitalsocial.eu, a dynamic and crowdsourced map of organisations that work on digital social innovation. In the DSI Network Data-Set, there are a total of 590 organisations with 645 projects as of August 2014. Most, if not all, of the case studies mapped on digitalsocial.eu take place via the Internet or are highly enabled by new technology trends such as open networks, open hardware and open data infrastructures.

The new front page has been redesigned to inspire visitors to learn about DSI and join the map.. It now looks like this:

The main purposes of the DSI site are to:

- **Learn about DSI and get inspired**. Showing citizens and the general audience the potential of DSI, being able to explore projects and organisations in the field, learn about new technology trends, learn about emerging digital social innovation areas, and explore case studies examples.

- **Discover funding opportunities and support** that are available from investors, incubators, accelerators or policy makers. Funders can also discover great DSI projects on the living map that they might want to invest in

- **Find potential partners** to collaborate with or interact with and discover other interesting DSI projects.

- **To enable members of the DSI community to enhance and visualise their networks** of collaborators and to raise their visibility.

The dynamic map below shows the working connections between the various digital social innovators and will enable both practitioners and policymakers to understand what services, standards or digital projects are being developed, and what is the density of DSI activities in Europe. In time, the site will be an open database of relational links between DSI organisations and projects, case studies and potential funding opportunities.

In the new redesign, we focused on communicating the meaning of DSI, and enabling people to explore the mapping facility in a user-friendly way, through the improved UI and visualisation interface. We also clearly highlighted the 6 DSI areas that capture key dimensions of the phenomenon under investigation (new ways of making; open democracy; collaborative economy, awareness networks; open access, and funding, accelerating and incubating).

We then created a new visual layout for the 36 DSI case studies that are showcased in on the website and also directly on the DSI map. Users are able to filter organisations, projects and case studies with a new improved and easy to visualise filtering interface. DSI organisations can create their own profile, and are able to visualise their organisation network, their projects, and their collaborators across Europe. We also created statistical visualisations showing all the relevant dimensions in the data, such as EU countries with most DSI projects; a matrix with the number of projects by technology focus and DSI areas, the number of DSI projects in each European City; emerging technology trends and methods; organisation type; project type; and area of society where DSI projects have an impact.

We agreed that we will notdevelop a Recommendation Engine for now (a tool to help people identify potential organisations for collaboration and funding opportunities) as this is outside the scope of what we can do within our current resources. This development to turn digitalsocial.eu to a fully functional networking and crowdmapping platform for the DSI community will be discussed in detail in the final report as part of the DSI sustainability plan.

We also discussed the need to have the survey/joining form translated in to French and Spanish. However, as we don't have the resources to do get the developer to do a translated version of the survey on the site, we provided French and Spanish organisations the opportunity to take the survey in French or Spanish with a link to the translated survey. We will then create a profile on the site for the French or Spanish organisation using the survey data.

Figure 1. A view of the European section of the map. At this scale organisations are clustered to show how many exist in the vicinity. Case studies are clearly visable as different icons.
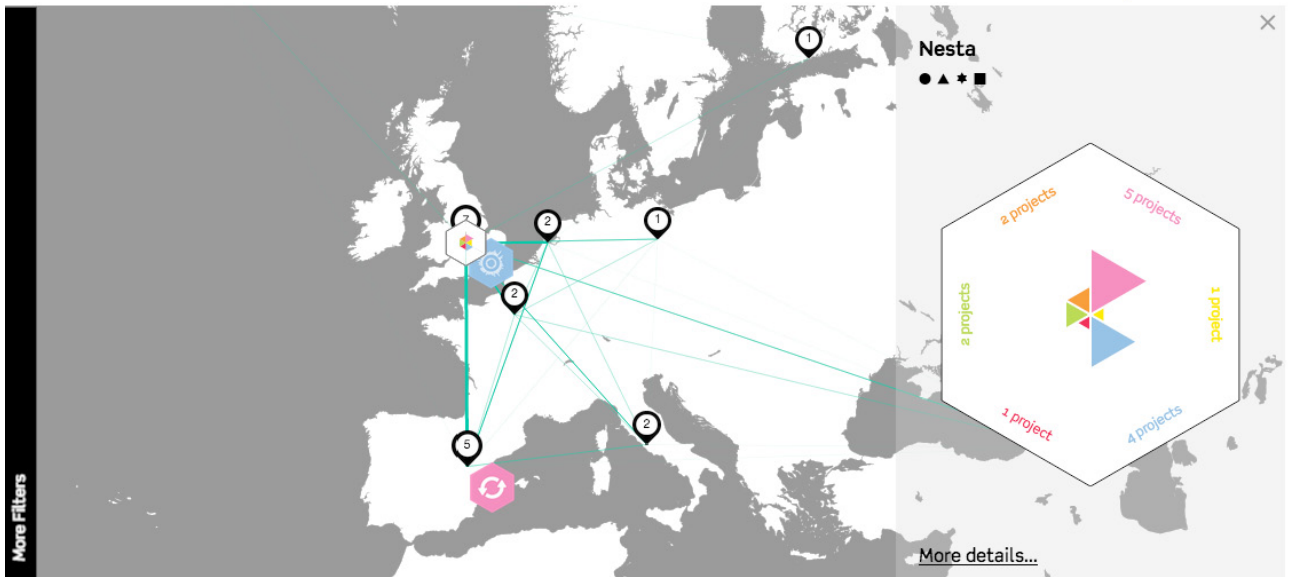
Figure 2. View of the map when an organisation has been selected. A pop-up box appers on the right hand side of the screen which contains a visualisation of the organisations DSI activities and the organisations network is dsplayed on the map.
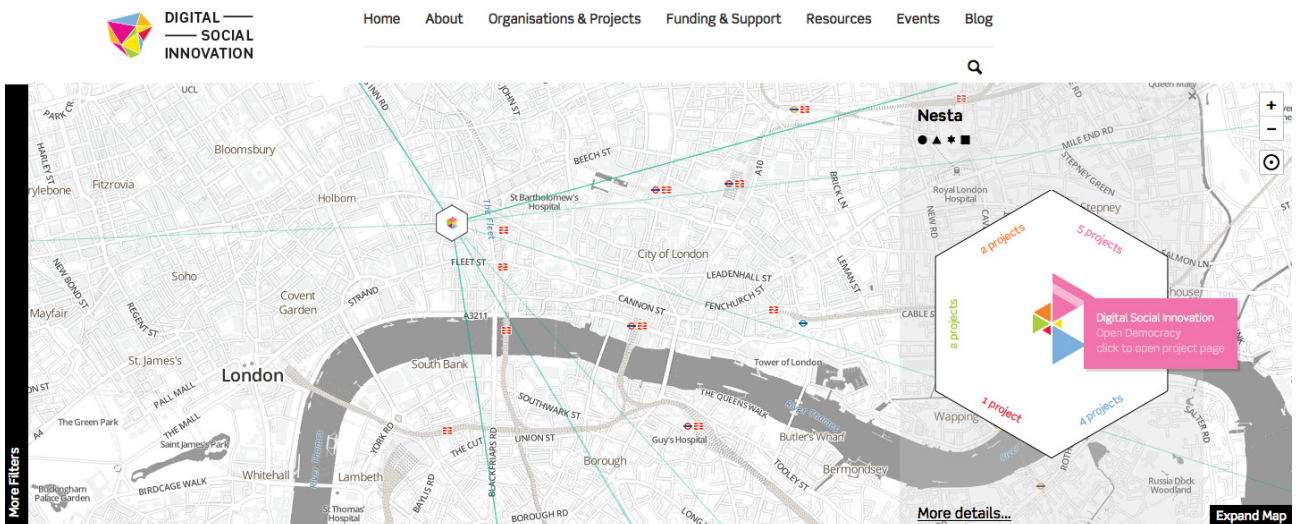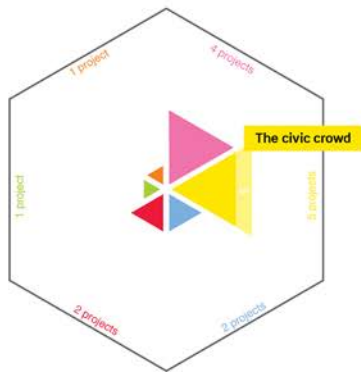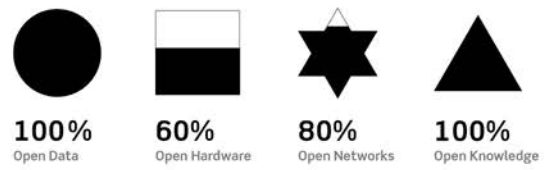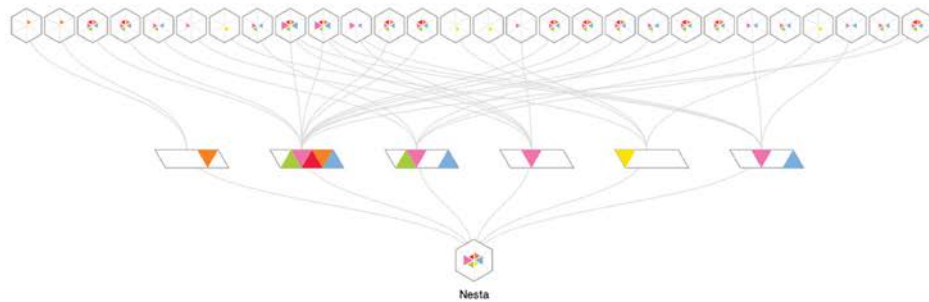
Figure 4 An org profile contains basic information on the organization and the DSI project its involved in.

Statistical info graphic of the DSI organizations on the Map Statistical info graphic of the DSI organizations on the Map

London 53
Amsterdam 17
Barcelona 14
Manchester 13
Paris 12
Sheffield 10
Berlin 10
Brussels 9
Madrid 7
Glasgow 6
Helsinki 5
Belfast 5

Belfast 5

Eindhoven 4
Vienna 4

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OrganizationType

122	95	69	62	24
Enterprise Charity or Foundation	Business	Organization or Community Network	Academia and Research	Government and Public Sector

ProjectType

83	41	40	33	21	19	18	14
Delivering a Web Service	Education and Training	Research Project	Network	Event	Advocating and Campaigning	Incubators and Accelerators	Advisory or Expert Body

9	9	6
Maker and Hacker Spaces	Others	Investment and Funding

Cities

Total: 253

Technology Method

Total: 160

171	135	109	98	74	68	60	53
Social networks	Social media	Crowdsourcing	Open Data	Mobile apps	Open source	Online peer support	2P - distributed exchange networks

53	52	50	49	43	36	34	34

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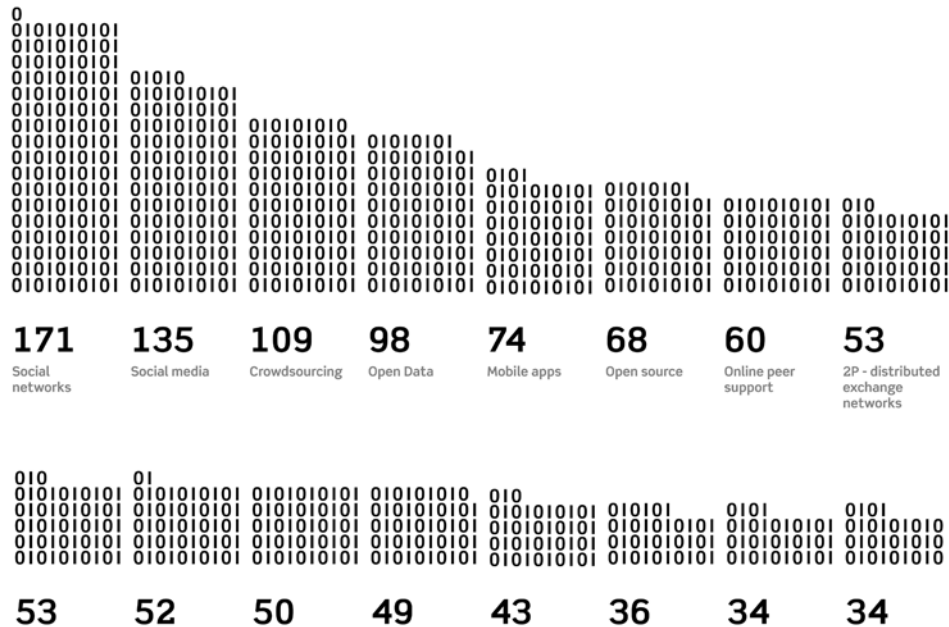
Areas of Society
Total: 255

153	147	100	98	93	90	82	68
Education and skills	Participation and democracy	Culture and arts	Health and wellbeing	Work and employment	Neighbourhood regeneration	Energy and environment	Finance and economy
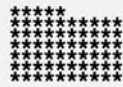
65	9	9	9	6	6	5	47
Science	Technology	Education	Participation	Community	Health	Innovation	Others

Technology Focus

212	161	156	52
Open Knowledge	Open Data	Open Networks	Open Hardware

Figure 4 A range of dynamic visualisations display various statistical information about the dataset.

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3. Engaging the DSI community

Below we summarise the primary activities that have been undertaken to date to engage the EU DSI community and encourage people and organisations to map their organisations and activities on www. digitalsocial.eu.

Disseminating the research

The primary way in which we have sought to spread the word about DSI and www.digitalsocial.eu is writing content that outlines the purpose of the research, what we are trying to achieve and why we would like DSI organisations to engage with the project.

One way of doing that has been through guest blogs and articles - where we have placed a DSI related blog on another network's or organisation's blog:

• Samfundsagenda (DK) - **Realising the Potential in Digital Social Innovation**

• Social Innovation Europe (EU wide) - **What happened at the Digital Social Innovation Workshop, Brussels, 3rd February & Put your organisation on the Digital Social Innovation map**

• EUCLID (EU Wide) - **Crowdmapping digital social innovation activities in Europe**

• TEPSIE (unpublished) – To be published blog for the Tepsie social innovation research project on mapping the DSI community.

• A short chapter on DSI in the upcoming publication on ICT enabled social innovation by the **Spanish Empodera network.** They are currently translating a editing the book with an aim to publish in July 2014.

• Ouishare (EU wide) **New funding and Research to support grassroots innovation** (also published on Nesta and D-CENT website.

In addition to the guest blogs we have done a large number of blogs, communicating the project on the Nesta blog and digitalsocial.eu blog. A sample of these include
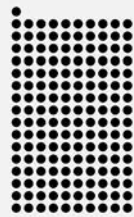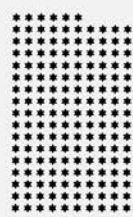
• **Digital social innovation: ground-up policy making** 1.000+ readers to date

• How to run a "bottom-up" policy development workshop

• Are you a digital social innovator? Come join our new network and get on the map

• We need your help understanding digital social innovation across Europe

Lists have proved the best way of getting a lot of attention around the project and our crowd map with a general audience. We have done two of these to date.

• Digital Social Innovation - 11 trends you should know about - from crowdsourcing to open hardware. (published on Nesta website) 6.000+ readers to date

• **10 Digital Social Innovators to Watch** (published in the Guardian) 8.000+ readers to date

The 1st interim study report has been well received and recognised as a valuable contribution to defining and understanding digital social innovation. To date the interim study report has had more than 10,000 readers on web / Isuu (combined figures from www.waag.org and www.digitalsocial.eu sites)

Social Media + other Media outreach

Twitter
- To date we have done the majority of our engagement with the DSI community via the DSI twitter account @Digi_Si. The twitter account has proven an effective channel for both engaging new organisations and projects to join the map and communicate new events and calls. As the number of followers grow the effect of this will increase accordingly.

- The account now has more than 500+ followers with new followers joining every day.

- In addition to @Digi_So we have also continuously promoted the project via the Nesta (50.000+ followers) and Waag (8.000+ followers) twitter accounts.

Your Priorities Platform

- To support the further development of policy ideas for DSI following the outcome of the DSI policy workshop in Brussels, February 3 (see below) we partnered with the Citizens Foundation team behind the Iceland Your Priorities platform for crowdsourcing policy ideas to develop a bespoke platform for crowdsourcing DSI policy ideas - https://dsi-workshop-2014.yrpri.org/.

Direct email and newsletter mentions

- **Newsletter mentions:** We have promoted the project and project content through the Nesta (44.000 readers) and Waag society newsletters. Building on this we have had a number of external organisations with extensive social innovation networks mention the research in their newsletter, including Social Innovation Europe, Social Innovation Exchange and the EUCLID network - the European network of civil society leaders.

- **Identifying and reaching new DSI networks and communities**
  Though looking at the www.digitalsocial.eu network map we identified a number of European countries with little or no representation on the map. These included the Czech Republic, Germany, Greece, Lithuania, Poland and Slovakia. Through desk-based research, and using the criteria set out in the report, we identified a list of key DSI actors and network nodes that working on DSI in these particular regions. The make-up of these actors was diverse, consisting of digital makers, educational institutions with digital collaboration programmes, etc. but each reflecting the typologies of digital social innovation referenced in the report. After identifying contacts at these organisations, we reached out to them, sending out an email to offer an insight into the project's objectives and inviting them to map their organisation at DigitalSocial. eu, and to join the DSI network. Where possible we connected also by telephone or via social media. Given the focus on digital collaboration, invitees were requested to refer our details on to any partners or other actors known to them, and we requested they keep us informed of any project and event updates or funding opportunities that might be of interest to the larger community.

Events

Throughout the project the project partners have done a number of workshops presentations and other events on digital social innovation. Participating in and contributing to the events where the different DSI communities meet, such as the Open Data community at the Open Knowledge Conference and the Maker community at the Fab10, has helped us test our research findings and recommendations as well as engage DSI organisations in the crowdmapping on digitalsocial.eu

- **Open Knowledge Conference, Geneva, Switzerland. 16-18 September 2013**
  Afternoon session themed '*Digital Social Innovation in Europe: crowdmapping actors and networks*' with presentations and panel discussion from European DSI experts. The primary focus of the session was to engage the DSI community in kicking off the DSI research and get their views and inputs to the big questions the research project is trying to answer. For this purpose the afternoon was split in to three sessions focusing on *1) The potential in digital social innovation 2) Who are the digital social innovators?*

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and 3) Supporting and growing digital social innovation in Europe, what needs to change?

- **Digital Agenda Assembly 2013, Lithuania - 6-8 November 2013**
  Participated at ICT2013 in Vilnius, which was attended by more than 6000 top ICT professionals from industry, academia, research as well as policy makers and EC official with the purpose of discovering the latest advances in EU funded ICT research and discuss the future of ICT funding. The DSI team took part in panel session and presented project ambitions with the aim to engage the ICT community in the research.

- **CCC Congress, Hamburg - December 2013**
  CCC Congress, Hamburg - December 27-30th 2013
  This event was one of Europe's largest gatherings of hackers and makers, with over 8,000 people in attendance. There was a strong focus on privacy, decentralization, and data protection. Harry Halpin (IRI) presented a lightning talk on Digital Social Innovation to an audience of nearly one hundred, which encouraged a number of German organizations who were not on the map to join and started a discussion over the possible support that could be provided by the European Commission with organizations such as the Wau Holland Foundation and the Tor Project. Also, two hundred flyers, created by IRI for the event, were given out.

- **DSI policy Workshop Brussels, Belgium. February 3 2014**
  One day workshop at the European Commission which brought together 75+ DSI policy makers, experts and practitioners from across Europe to discuss and develop policy ideas for supporting digital social innovation. The main outcome of the workshop was a set of clusters of policy ideas which were fed in to the projects work package three, focusing on developing policies for DSI.

- **Smart City Expo, Barcelona - 19-21 November 2013**
  Presentation on '*civic hacking and the nature of digital social innovation*' which to an audience of policy makers, practitioners and big telecommunications companies made the case for embracing the smart citizen and highlighted how DSI can address current issues with the top down driven Smart Cities agenda. Suggested several lines of action for city officials to become smarter in their use of technology to solve the cities problems inspired by the DSI research.

- **Personal Democracy Forum - 13-14 March 2014**
  Personal Democracy Forum Conference, Warsaw, Poland. March 14, 2014. Attended Personal Democracy Forum Warsaw and promoted the Digital Social Innovation mapping to hacker communities and regional organisations including sponsors of the festival 'Tech Soup' who promoted the map to their regional network. Discussions focused on how to support the particular challenges of the region when it comes to open data and also in encouraging more women to participate in learning to code through open workshops and support networks.

- **Future Everything Festival, Manchester, UK. 31 March 2014**
  Workshop with DSI practitioners on how to achieve and demonstrate lasting impact. The workshop revolved around the social innovation toolkit developed by Nesta which is designed to enhance the impact of (digital) social innovation. Through a demo of the toolkit the workshop explored how to help practitioners demonstrate impact and sought feedback on how to further develop toolkit to meet the needs of the DSI community.

- **Ouishare Fest: The Age of Communities, Paris, May 5-7th 2014**
  Ouishare is the largest conference in France focussing on the collaborative economy. Francesca Bria participated in a workshop on Collective Awareness Platforms and the collaborative economy in Horizons 2020, together with the European Commission. The DSI mapping website and the overall research was presented during a dynamic debate about policy and funding instruments for bottom up innovation. Harry Halpin (IRI) gave a 30 minute presentation of DSI to an audience of 50 people at the Mapping the Collaborative Economy session. We demonstrated how the website worked and how organisations could be added, and went over some of the high points of the final report regarding the potential of digital social innovation in Europe. Also presenting was Thomas Dönnebrink (Ouishare), Matt Scales (ZeroWaste SA),

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Mira Luna (Sharing Cities Network). Over 500 copies of a specially printed postcard for DSI, translated into French by IRI, were given out at the conference. This resulted in members of the Ouishare network and Francophone community engaging with DSI.

- **Participation Practitioners Forum, Warsaw, Poland. May 29-30, 2014**
  Workshop at the Participation Practitioners Forum in Warsaw with 40 participants focusing on Digital Social Innovation and civic participation, and how best to engage the Polish DSI community. The discussion focussed on how to bridge the gap between leading digital practice and tools identified in the DSI research and the often low tech or offline activity currently used by the majority of Civic Participation Practitioners in Poland.

- **Flok / Buen Conocer Summit. Quito, Ecuador May 27 – 30 2014**
  The summit brought together 198 experts (157 domestic and 41 international) in order to generate policy proposals to boost the productive exchange matrix in Ecuador. The Summit, which was attended by community and regional leaders from around Ecuador and politicians from different administrations, aimed at finding the transition from a system based on 'finite resources' (natural resources) to one of 'infinite resources' (knowledge) economic model. The new society oriented towards the common good and based on the National Plan for Good Living, is called "Social Knowledge Economy".

- **International Conference of Social Innovation, Lodz, Poland June 17, 2014**
  Presentation to 75 people predominantly from the Eastern European Social Innovation Community on the DSI research. Discussion centred around lessons between the TEPSIE Social Innovation Research Project and findings from the DSI research and how data analysts from Lodz University of Technology could access and analyse the open data set on US DSI organisations and projects hosted on www.digitalsocial.eu.

- **FAB10 conference, Barcelona, Spain. July 3-6, 2014**
  Workshop at the Fablab community 10th anniversary gathering in Barcelona. 30 participants engaged in mapping out social action applications for makerspaces and Fab-Lab communities. Workshop exercises showed that aspirations and ideas to create social impact projects require more development and support to engage with those beyond the FabLab community more effectively if they are to become useful products and services. The discussions also highlighted the need to begin more strategic mapping of the impact created by FabLabs to inform the shape of that future support..

Liaising with other research projects and networks.

To avoid overlapping with other research projects, and to make the most of collective resources, we have engaged extensively with other related research projects to both engage their networks and access the data they have captured. This includes:

- Coordination with CAPS projects and CHEST. On 4 Feb 2014 DSI was represented at the first CAPS concertation meeting. The CAPS project representatives collaboratively mapped the synergies between the CAPs projects including involving CAPS projects in mapping their projects on www.digitalsocial.eu. Chest is considered to be the CAPs project with the strongest links to DSI. The Chest project website (www.chest-project.eu/) has a description of the DSI project along with the project logo and a link to www.digitalsocial.eu, just as we have used www.digitalsocial.eu and the @Digi_Si account to promote the Chest funding options for digital social innovation

- **TEPSIE ICT enabled social innovation research:** EU Funded research collaboration between six European institutions aimed at understanding the theoretical, empirical and policy foundations for developing the field of social innovation in Europe. One stream within this research (Work Package 8) focusses on online networks and ICT enabled social innovation.

  Shared case studies and have fed in to research through interviews and participating in events.

- **Nominet Trust 100.** Research project and website which list 100 short case studies of social innovations using digital technologies.
  Exchanged the two long lists of 300+ potential case studies developed for the NT100 research project and the DSI 1st interim study report. Ensured that all of the NT100 case studies are represented on the www.digitalsocial.eu map.

- **Young Foundation:** Research project Turning up the Dial: Digital Social Innovation in Northern Ireland which highlights ways in which the voluntary and community, private and public sectors and high-tech experts in Northern Ireland can capitalise on the potential for digital technology for social good.

  Fed in to case study selection and got support to engage DSI community in Northern Ireland.

- **Digital technologies and social innovation:** a critical perspective Research project exploring the complex interrelationship between digital technologies and social innovation. Focus on of how digital technologies act as an enabler to social innovation, and how digital technologies constraint and create the need for social innovation. Conducted as part of a research fellowship supported by Economic and Social Science Research Council, The Open University Business School, the Society for the Advancement of Management Studies and the UK Commission for Employment and Skills (UKCES).

Future engagement work planned

The engagement we have done to date and the redesign of the website has been successful in helping us map 500 organisations and establish the research project and the term Digital Social Innovation within the community. However, we are very aware that we need to continue our engagement work to increase our reach in to the DSI community.

Social Media

In addition to continuing our on-going work on engaging DSI organisations via twitter we will more actively tap in to and promote www.digitalsocial.eu in relevant LinkedIn and Facebook groups working on digital social innovation.**pcoming events**

We will be attending a number of events in the coming months:

- **Open Living Labs summer school 2014. Amsterdam, Netherlands. 2 - 5 September 2014.**
  Workshop on barriers to scale for digital social innovation and how these can be overcome with representatives from the international network of living labs.

- **Digital Social Innovation day at Nesta, London, UK. 8 October 2014**
  Half day event in London, where we with practitioners will explore what the big challenges organisations working on Open Data, Open Networks, Open Hardware and Open Knowledge need to overcome to scale their work and how they can do this.

- **Crowdsourcing Week, Copenhagen, Denmark October 14 - 15, 2014**
  Curating a session at the Crowdsourcing week Scandinavia event, focusing on Digital Social Innovation to an audience of corporate executives, government officials and entrepreneurs.

- **SIX and TEPSIE Social Innovation final event Lisbon, November.**

- **Final DSI event. Brussels, Belgium, December 16th 2014**
  Organised in partnership with the CAPS projects the final DSI event will present the findings from the research project to a high level audience of policy makers, practitioners and members of European Parliament.

Other media

- **Short film on digital social innovation.**
  We are currently in the midst of commissioning a short film (5 minutes) on Digital Social Innovation. The film will feature leading thinkers on social innovation and the practitioners we have engaged through the case studies. To overall purpose is to explain in simple terms what we mean by DSI and what the potential is in using digital technologies for social innovation. From previous experience this will really help to engage more people and get them on the map.

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4. Assessing Innovation Strategy" (WP3): Innovation policy and the need to reinvent policy

4.1 Innovation Policy at a European level

Innovation is no longer seen as a linear step-by-step process in which R&D activities automatically lead to innovation and commercialisation of new products, but as a complex, dynamic, and interdependent process of many organisations and stakeholders: Policy (at all levels) can play a key role in creating coordinated strategies, common governance frameworks, and new instruments to enable an innovative response to challenges in specific domains.

Innovation policy is defined as public intervention to support the generation and diffusion of new products, processes or services. Public policy can accelerate and enable developments that are societally desirable, such as those that aim at supporting long-term R&D investment and economic growth, whilst reducing income inequalities, and increasing competitiveness. Public intervention can also happen along three pillars of 1) market failures (information and incentive asymmetries, externalities) and 2) system failures (mainly concerned with connectivity and individual and organisational capabilities) as well as the need for 3) framework conditions and public action to establish markets.

Innovation and innovation policy are not new to the European Union. The current economic and financial crisis is an opportunity to propose a new model for European innovation. Delivering on the Europe 2020 objectives of smart and inclusive growth depends on research and innovation as key drivers of social and economic development and environmental sustainability. The Digital Agenda for Europe2 [1], Innovation Union3 [2], and Horizons 2020 [3] present an integrated approach to help the EU economy become more competitive, based on sustainable and inclusive growth fuelled by energy and resource efficiency. Europe is now focused on providing an innovative response to societal challenges such as globalisation, aging population, youth unemployment, resource constraints and so forth. GDP slow-down since mid-2011, environmental disasters, climate change, an ageing population, and growing unemployment will require innovative solutions that challenge traditional ways of doing things, such as moving from closed innovation models to open and collaborative innovation that can unleash the power of social production and collective intelligence.

In the European context, innovation has been often linked to competitiveness and, in this respect, the European Union innovation message has been present during the last decade in several policy documents aimed at boosting competitiveness such as the Renewed Social Agenda, the Integrated Lisbon Guidelines for Growth and Jobs 2005-2008 and 2008-2010, the Strategic Guidelines and Regulations on Cohesion Policy (2007-2013), the second pillar of the Common Agricultural Policy, the Sustainable Development Strategy for an Enlarged EU, the 2020 Vision for the European Research Area, the Innovation Union (a Europe 2020 Initiative), the European Information Society for Growth and Employment, and the Digital Agenda (a Europe 2020 Initiative).

Many programmes and supporting schemes have been used in this period. For instance, the European Regional Development Fund to promote regional cohesion, the European Social Fund, the Open Method of Coordination, the European Agricultural Fund for Rural Development, the Framework Programmes for Research and Technological Development, the Lifelong Learning Program and other education and cultural programs (such as Youth in Action or MEDIA), and the Competitiveness and Innovation Framework Programme are only a few examples.

Generally speaking, the European Commission has supported innovation and social innovation by means of funding. But other tools have also been used. The document "Empowering people, driving change: Social Innovation in the European Union" refers to instruments which cut across various European programmes, such as:

- **Knowledge sharing and dissemination:** Some examples include building of knowledge and good practice bases and repositories, European exchange platforms, and the building of cooperation networks to share practices and develop collaborative processes. Specific initiatives include the broadband portal[4] or the ePractice portal[5].

- **Participative processes for stakeholders in the preparation and implementation of policies:** Some examples of multi-stakeholder processes that have already been implemented include the Healthy Democracy process[6] and the Thematic Networks of Twinned Towns & Citizens Meetings[7].

- **Policy coordination and capacity building:** This includes initiatives aimed at increasing the level of coherence, consistency and integration of polices carried in different regions and Member States. Some interesting examples include the organization of learning seminars, the establishment of clusters of policy makers, or the establishment of learning communities.

- **Supporting studies, research and evidence of good practice for policy planning and policy development and for advancing knowledge on social innovation:** Some initiatives regarding this tool are evidence building (such as the European Union Youth Reports - http://ec.europa.eu/youth/policy/implementation/report_en.htm) and social platforms (such as Social Polis - http://www.socialpolis.eu/).

- **Support of social experiments:** This implies the engagement of various actors and stakeholders in designing and putting in practice novel ways to tackle a social demand. Some projects that use this approach include Medlab (http://www.medlivinglab.eu/), HerO (http://urbact.eu/en/results/results/?resultid=1), or epSOS (http://www.epsos.eu/).

- **Support of social entrepreneurs and enterprises:** An example of an interesting project launched under this category is Erasmus for Young Entrepreneurs (http://ec.europa.eu/enterprise/policies/sme/promoting-entrepreneurship/erasmus-entrepreneurs/index_en.htm).

- **Infrastructure and enabling factors:** This tool aims at contributing to developing a climate that is conducive to learning through social innovation and transnational exchange as well as the infrastructure to back it up. Several initiatives have taken place in this respect, such as investing in developing a high-speed broadband in rural areas or setting up cross-border regional projects to shorten the digital divide.

Although European Union interventions in the innovation field have been considerable and diverse, their potentially powerful effect on producing change and encouraging innovation has been limited. Edler et al (2013), who summarise the Compendium of Evidence on the Effectiveness of Innovation Policy Intervention Project, led by the Manchester Institute of Innovation Research (University of Manchester) and funded by Nesta, conclude that there is not much evidence of impact and, although the effects of innovation policies and programmes show variations across policy domains and within specific areas, there is still a need to make sure that innovation policy will support societal challenges and economic growth better in the future. In summary, there is a need to reinvent European innovation public policies to guarantee transformational impact.

The European Competitiveness Index 2013, which measures, compares and examines the competitiveness of Europe's regions and nations[8], also shows that new innovation policies are needed in Europe in order to bridge the gap among countries and to boost competitiveness in many European regions:
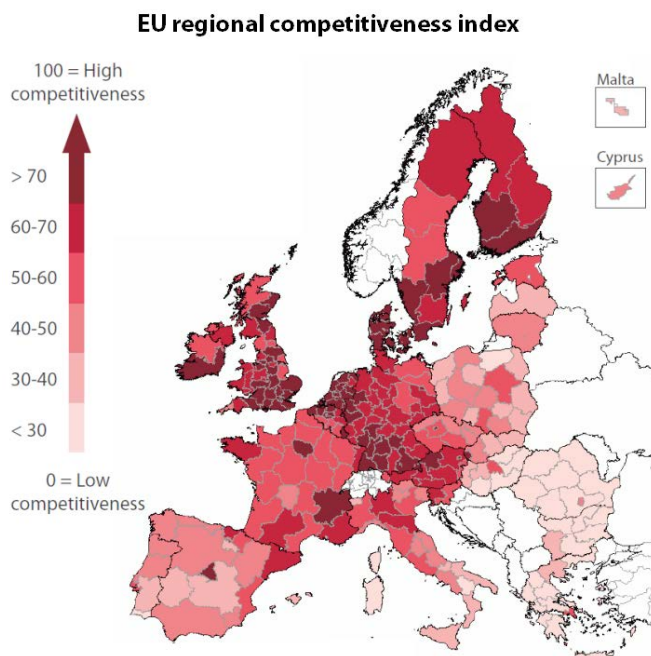

Figure 5 EU regional competitiveness index. Source: European Commission

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Digital Innovation in the Digital Agenda and Horizon 2020

Europe has started down the path of making digital innovation part of its agenda. On December 2010, Neelie Kroes, Vice-President of the European Commission responsible for the Digital Agenda gave a speech named "Unlocking the digital future through Open Innovation" during the 4th pan European Intellectual Property Summit, in which she clearly stated that openness is central to success in the digital revolution and that Europe should invest in user-driven innovation.

The recently launched Open Data Strategy for Europe[9] established a level playing field for open data across the EU[10] that should encourage disruptive innovation by unlocking the value of public data. Since then, Mrs Neelie Kroes launched the "No Disconnection Strategy"[11] to support decentralised infrastructures for the Internet as a means of effectively empowering citizens and democratic participation. EC-funded research has also made many steps in the direction of distributed and citizen-centric innovation. This has been enabled by changes in policy to support the creation of innovation ecosystems and partnerships that can play a central role in the development of Future Internet platforms, thereby shaping the evolution of the Internet and of social spaces.

In recent years, new methods to foster entrepreneurship and innovation have grown rapidly across the world. For instance new methods of better supporting the growth of innovative startups have emerged, driven by investors and successful tech entrepreneurs such as accelerator and combinator programmes.[12] Early evidence suggests they have a positive impact on the economy and society, creating powerful networks and fostering better digital entrepreneurship.[13]

The real question is how these positive beginnings can scale to enable new forms of social innovation to emerge to tackle societal challenges, such as unemployment, clean and renewable energy provision, poverty, to improve public services such as education and health, and to promote new fair and sustainable economic models.

To answer these challenges the European Commission has promoted various policy and research actions, including envisioning different kinds of Internet infrastructure in the Future Internet programme.

Considering the level of complexity that the Internet Ecosystem has reached, and the potential significance of the interactions between Internet and societal developments, **a systemic, holistic and multi-disciplinary approach** is needed.[14] Only by adopting a multidisciplinary research approach that encourages researchers from various disciplines to work together, can issues such as trust and security, privacy, net neutrality, e-democracy, and e-governance be tackled. Future Internet developments should, therefore, include technologically-led research, together with business models and socially and environmentally conscious approaches, as reflected in the Internet Science Network of Excellence funded by the European Commission.[15]society in Future Internet development to achieve these goals is one of the main goals of this study.

DG CONNECT activities in this area can be summarised under two broad approaches, encompassing several initiatives:

- **Top-down and systemic approaches:** The most relevant initiatives are the European Innovation Partnerships[16], Smart Cities[17], the Future Internet Public-Private Partnership Programme (FI-PPP)[18], and the European Cloud Computing Strategy[19]. Their main goals are to promote and standardise pan-European technology platforms, as well as the integration of the relevant policy, legal, political and regulatory frameworks. As clearly outlined in the Digital Agenda for Europe, these are prerequisites for the creation of a European online **Digital Single Market** (DSM). The development of the **Future Internet** is mainly addressed through a number of mainly technical objectives and projects, such as the **FI PPP**[20] and the **5G infrastructure PPP**[21]. Other relevant activities are on ICT for health, inclusion, government, sustainable growth, energy and sustainability,[22] learning, tele-care applications and so forth. There are also a number of projects in the areas of eInclusion, eHealth, participatory planning,[23]and eGovernment[24] [25]. Furthermore, a EU Big Data strategy is becoming a priority for the competitiveness of European industries, and it presents a strong focus on fostering a European Data-driven Economy[26]. In this framework the EC is promising to launch a launch a **multi-million euro Public Private Partnership on big data** with industry towards the end of this year. The focus is business driven, with little attention to societal challenges or to the inclusion of civil society actors and bottom-up approaches. However, the call for the creation of an **open data incubator** within Horizon 2020 aims to help SMEs set up supply chains, and to get access to cloud computing and legal advice. Further support, investment advice and funding for SMEs and young companies is also available through the Commission's **Startup Europe** programme for web and tech entrepreneurs. Other activities are happening in the **Internet of Things (IoT)** arena, where the **IERC-**

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Internet of Things European Research Cluster[27] coordinating the different IoT projects funded by the European research framework programmes.

- **Bottom up and grassroots approaches:** A counterpoint to the top-down strategy is the bottom-up, human-centred, grassroots approach that is characterised by emergent forms of community intelligence demonstrated by newly connected bottom-up innovation eco-systems. At a time when the Internet has become so central in our societies, it is important that bottom-up approaches (based on the involvement of users) more often complement traditional top-down approaches that can help build resilience through user empowerment;for instance in energy, mobility, government services, technology design, quality of care, education and working patterns. One of the risks of Future Internet is that big industrial players (mainly US-based) will reinforce their dominant position by implementing platform lock-in strategies, enforcing extensions of copyright and patents, and discriminating network traffic. Furthermore, by re-centralising computing, data storage and service provision according to the cloud paradigm there is a risk of closing the innovation ecosystem in favour of incumbents or dominant players, and thus eventually restricting user-driven innovation. There is tremendous potential value in the emergent Digital Social Innovation sector.[28] Relevant initiatives that employ a bottom-up approach towards SI are **The Collective Awareness Platform for Sustainability and Social Innovation (CAPS)**[29], Web entrepreneurs, young entrepreneurs in the field of active and healthy ageing, digital champions, innovation camps and so on. Many activities are also promoting and exploring the potential of open data, open Access, and the digital commons. In particular it is the forthcoming research area in DG CONNECT that addresses the need to facilitate SI processes and collective decision making through **platforms that foster collective intelligence (CAPS)**[30]. The potential for crowdsourcing, community-based innovation, or collaborative innovation in the Internet domain should be thoroughly explored. These platforms can gather and integrate information in order to allow participation and citizens' feedback, as well as integrating peer information to improve social cohesion and collective wellbeing. Furthermore, there are systemic initiatives in the areaof **Open Access**,[31] such as **Global System Science**[32], providing scientific evidence to support and civil society to collectively engage in societal actions and policy making. Another relevant initiative within the broader domain is **Digital Science**[33], which has synergies with DSI because and **Art & ICT**[34], which promotes a conscious dialogue between technology, the Arts and societal issues to expand our understanding of technology in today's societies. Finally, new initiatives launched in Horizon 2020 on **Human-centric Digital Age**[35] and **Responsible Research and Innovation**[36], aim to promote societal engagement, gender equality and gender in research and innovation content, open access, science education and ethics across all research initiatives.
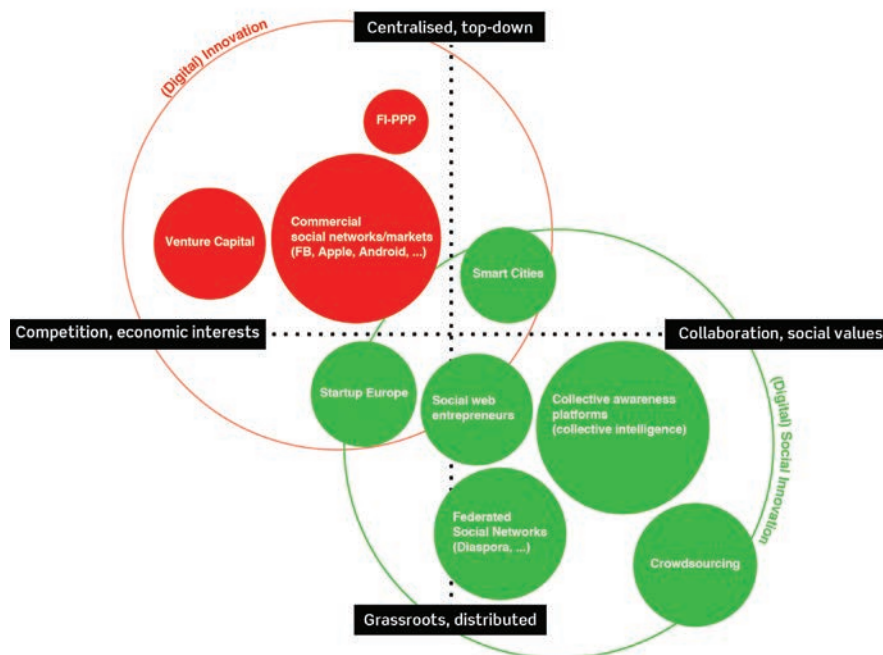

Figure 6 Grassroots Innovation in Europe: adapted from Sestini, F 2012 presentation Collective Awareness Platforms for sustainability and social innovation

4.2 The concept of innovation ecosystems

According to Chesbrough (2003), open innovation is a paradigm that assumes that firms can and should use external ideas as well as internal ideas, and internal and external paths to market, as the firms look to advance their technology. It implies innovating with partners by sharing risk and sharing rewards. Chesbrough (2003) and Forrester (2004) define the main divergences between the principles of closed and open innovation (see Table 1).

	Closed innovation	Open innovation
Corporate ethos	"Not invented here" We can do it, we will do it Creation of the best idea internally	Best from anywhere Choosing the best ideas among internal and external ideas
Role of customers	Passive recipients	Active co-innovators
Core competency	Vertically integrated product and service design	Core competitive differentiation and collaborative partner management
Innovation success metrics	Increased margins/revenues, reduced time to market, market share within existing market	R&D ROI, breakthrough product or business models
Attitude towards intellectual property	Own and protect Do not share internal intellectual property	Sharing internal intellectual property can be profitable Buy/sell: the corporation is a knowledge broker using both licensing and commercial development to monetize intellectual property
Role of R&D and operations	Internal R&D is the only way to create profit Discover, design, develop, and market in-house inventions	External R&D can also create profit and value Use the third partners for discovery, development and delivery of products Optimize performance of own assets through both in-house and external development; do enough R&D internally to recognize external significant R&D
Advantages	First movers advantage	Having better business models is more important than being a first mover
Employees	Professional employees inside the company	Working with professional within inside and outside the company

Table 3: Comparison between closed and open innovation

Despite open innovation being born in relation to the industry and the business world, several authors think this theory can be easily implemented in different fields. Today information technology is opening up new opportunities to transform governance and redefine government-citizen interactions, particularly within cities (Chan, 2013; Pyrozhenko, 2011; Almirall & Wareham, 2008).

The open innovation perspective adds value to the policy-making cycle. Open and iterative problem solving oriented models of public policy innovation are significantly different from traditional public policy innovation. Open public policy innovation implies a lifecycle-oriented perspective towards openness, which spans both the early creative stages of ideation and the latter stages of experimentation and implementation. It is not just concerned with mechanisms to source creative ideas from scientists and creative talents but is also interested in the later stages of experimentation and implementation. Brunswicker et al (forthcoming) differentiate between closed and open public policy processes (see Table 2)

	Closed public policy	Open public policy
Problem-solving process	Linear stages of solving public policy problems	Integrated and lifecycle oriented problem solving activities ranging from problem exploration to policy implementation
Problem-solving knowledge	Knowledge from inside governmental boundaries and designated experts (technocrats)	Knowledge and information from inside and outside the organizational boundaries of governments
Decision making principle	Rationale and based on traditional information sources	Behavioural, design-led and data-driven
Network structure	Centralized and hierarchical	Decentralized and digitally connected

Table 4: Closed versus open public policy innovation processes

Several policies may benefit from open public policy innovation. De Jong et al (2008) give some examples and refer to RTD policies, interaction-oriented policies, entrepreneurship policies, science policies, education policies, labor market policies, and competition policies.

However, the open innovation perspective assumes that innovation is the result of complex and intensive interactions between various actors. Thus, innovation happens in innovation ecosystems, that is, integrated and interdependent environments where companies, scientists, policymakers, governments, users, developers, citizens, and other communities can interact productively to promote radical change. Innovation in these ecosystems is usually supported by new developments in information and communication technologies.

The resources, facilities, and competences shared among the various actors form the core of ecosystems and define their innovation potential. The complexity of the innovation ecosystem is further amplified by the fact that the networks are increasingly open and cross-border by nature, and they are governed by open business models.

As the table below shows, nowadays, open innovation does not only involve companies or does not only aim at profit making; it is a concept that is about maintaining communities and enabling processes in a continuous way.

2003	2014
Dyadic relationships company to company	Multiple relationships (ecosystems)
Own the innovation	Innovation of others
Buy & license	Foster & enable
Intellectual property	Governance business models
Intermediaries for search	Intermediaries for enabling processes and maintaining communities
Incubators	Accelerators
Competing with your own products and services	Competing with the ecosystem
Governments as service providers: resources to regulate (zero-sum game)	Governments as platforms orchestrators: resources to leverage on (non zero-sum game)
Governments as service providers: developed in-house, always fall short, high cost, no sharing, local offer, fragmented	Governments as platforms orchestrators: co-developed with users and communities, free and not free, empowering entrepreneurship, driven by innovation, stimulating growth

Table 5: Open innovation 2003-2014 - Source: Almirall (2013)

4.3 Communities in the innovation ecosystem

In this section, we will refer to six specific communities that have a core role in the European innovation ecosystem. This typology of communities matches the main technology trends emerging in the grassroots innovation space (e.g. open data, open knowledge, open hardware, open networks), and identifies the key

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communities that are enabling new forms of digital innovation.

The open hardware and free software communities

The open source community is a broad-reaching community of individuals who share an open source philosophy/culture, described by Wikipedia as the creative practice of appropriation and free sharing of found and created content. The open source culture is therefore one in which fixations (works entitled to copyright protection) are made openly available. Participants in the culture can modify those products and redistribute them back into the community or other organisations.

Although in the beginning of the movement, a difference between hardware and software did not exist, nowadays, we distinguish between the open source software community and the open source hardware community. The individuals who participate in the former support the use of open source licenses that make software available for anybody to use or modify as its source code is made available. The open source software community is formed by programmers who support the open source philosophy and that contribute to the community by voluntary writing and exchanging programming code for software development. There are several examples of software that have been developed under an open source philosophy. Some of them are Mozilla, Apache, OpenOffice.org, or PHP.

The open source hardware community is formed by individuals that design hardware (that is, tangible artefacts: machines, devices, or other physical things) and make it publicly available so that anyone can study, modify, distribute, make, and sell the design or hardware based on that design. Often, individuals gather around specific organisations or projects. This is the case for Arduino, an open source electronics prototyping platform based on flexible, easy-to-use hardware and software, which is intended for artists, designers, hobbyists and anyone interested in creating interacting objects or environments.

The community of developers

Developers are individuals who develop a new IT product or service. They come up with an idea of an IT-based product or service and want to commercialise it. That is why, often, this community is also considered as a community of entrepreneurs or start-ups. Because they are usually very small, developers that frequently gather around innovation clusters or events, such as Silicon Valley, the F6S network, or Fest-UP, Barcelona's start-up festival.

Innovation Labs: Living labs, Fablabs, Maker spaces

According to Almirall & Wareham (2008), living labs are commonly public-private partnerships committed to communities that contribute to their funding. Also, they provide a wide range of services and play diverse roles in the quest for articulating user involvement, from support to entrepreneurial lead users to needs-finding or user experience services. Actually, their goal could be described as the creation of "innovation arenas" where multiple actors can experiment in an open, real life environment. As a result, living labs are a great place for open innovation.

There is a large number of living labs in Europe with a variety of different characteristics. Some focus on a particular technology such as mobile communications, others focus on a particular industrial sector, others focus on groups of services to local citizens. We can therefore speak of urban labs (living labs methodologies and spaces applied in a urban context, such as Barcelona Urban Lab or the Lorraine Smart Cities Living Lab) or fablabs (technical prototyping platforms for innovation and invention, providing stimulus for local entrepreneurship, such as Ping in Nantes, Aalto FabLab, or Fabulous St. Paulis in Hamburg), just to give a couple of examples.

Also, there is a tendency nowadays for small groups of living labs in different regions of Europe to join forces by sharing knowledge, services and even developments based on win-win strategies to pave the way for co-selling developments and services on the European or global market, rather than just in their local regional market. These living labs usually set up networks around specific issues, such as rural topics, e-democracy, or energy efficiency.

The open data and open knowledge community

Torkington (2010) suggests five types of people that are interested in open data: 1) governments who want to see a win from opening their data, 2) transparency advocates who want a more efficient and honest government, 3) citizen advocates who want services and information to make their lives better, 4) open advocates who believe that governments act for the people, therefore, government data should be available for free to the people, and 5) people who are hoping that releasing datasets will deliver economic benefits to the

country.

In this report, the open/big data community refers to the set of governments, usually at the local level, that decide to open their data. Their goal is usually two-fold: on one hand, they aim at being more transparent; on the other, they pursue to increase economic value by involving developers and entrepreneurs. The commonly accepted premise underlying these objectives is that the publishing of government data in a reusable format can strengthen citizen engagement and participation and yield new innovative businesses.

There are many examples of cities that have opened their data. One of the most interesting is Helsinki, which has become the most successful open data city in the world. Through and entity called Helsinki Region Infoshare[37] Helsinki and three of its neighbouring cities publish all of their data in formats that make it easy for software developers, researchers, journalists and others to analyse, combine or turn into web-based or mobile applications that citizens may find useful. There are other local governments around the world that are successfully developing open data portals. In the United States, the cities of Chicago, San Francisco, Philadelphia, and New York are only a few examples worth mentioning. British Columbia in Canada, the region of Piedmont in Italy, and Metropolitan Rennes in France have also set up open data websites at the regional level that can be considered good practices.

Smart citizens

Crowdsourcing is an online, distributed problem-solving and production model that has grown in use in the past decade. Estellés-Arolas & González-Ladrón de Guevara (2012) specifically define it as a type of participative online activity in which an individual, an institution, a non-profit organisation, or company proposes to a group of individuals of varying knowledge, heterogeneity, and number, via a flexible open call, the voluntary undertaking of a task.

While many of the successful cases of crowdsourcing have been related to companies, cities are also beginning to benefit from crowdsourcing methods to gather input from residents and apply the information they receive to make tangible improvements to communities and neighbourhoods. Some cities participate cooperatively in initiatives led by the private sector through web-based platforms. Others are taking the initiative to license tools and apps that bring local residents into the ideation and decision-making processes that lead to developments and actions to improve communities.

Smart citizens are those individuals who take part in crowdsourcing initiatives to improve policies or to co-develop public services. These are active and engaged citizens who want to play a role in building their own city, sharing information and knowledge, creating a network and getting involved in decision-making and implementation processes. There are many examples of this collective intelligence or communities of smart citizens. One of them is Challenge.gov[38] a collection of challenge and prize competitions, all of which are run by more than 50 agencies across federal government. These include technical, scientific, ideation, and creative competitions where the US government seeks innovative solutions from the public, bringing the best ideas and talent together to solve mission-centric problems. Another pretty different one is FLOK Society in Ecuador[39] a networked participatory process and open research project to create policy proposals and political actions to transition Ecuador to a social knowledge economy.

The open democracy community

Beyond crowdsourcing (and co-producing/co-creating/co-managing g/… for that matter) public services, citizens and organiszations can also get involved in the political decision-making process (that is, in the policy-making process) or in any other established political/democratic processes. What has, in the past, traditionally be known as e-participation is now referred to as open democracy or crowdsourcing democracy. Within this framework, the open democracy community gathers individual and organisational political activists that want to contribute to the evolution of democracy in the electronic age.

There are many examples of open democracy initiatives and activists. Crowdsourcing was used in Iceland in 2010 and 2011 in the constitution reform process. Participatory budgeting is a process of democratic deliberation and decision-making, in which ordinary people decide how to allocate part of a municipal or public budget. Although originally started in Porto Alegre (Brazil), nowadays, several cities worldwide are engaged in this process. Interesting cases are those of local governments in the UK, the cities of Calgary and Toronto in Canada, or the city of Chicago in the United States. Another example is that of the 15M movement in Spain, which has been defined as a series of on-going demonstrations that started back in 2011 and that have become stronger by means of intensely using social media and civic digital platforms.

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4.4 Macro analysis of communities

In this section, a macro analysis of the communities that have been identified and described in section above is conducted. Our aim is to understand how these communities function and how they work. We are particularly interested in their weaknesses, for these may turn into areas of public intervention through policy development. In particular, for each of the communities, we will refer to focal actors, enablers, governance, and failures. Table 4 summarizes the content of this section.

Communities	Focal actors	Enablers	Governance	Failures
Open source hardware and software	Open source activists	Firms supporting open source activists Communities Open source platforms	Peer governance	High entry barriers (technological skills) Lack of conflict-resolution mechanisms Tension between hierarchy and equality
Developers	Developers Entrepreneurs	Tech events Accelerators/incubators Venture capital firms Tech blogs and magazines	Decentralized Cluster governance	High entry barriers (technological skills) Lack of interconnection between developers Lack of visibility
Innovation labs	Innovation labs themselves	Networks	Networked Formal enabling/servicing structures	Lack of interconnection between different types of labs Cost of being a network member Difficulty to involve the community
Open/big data	(Local) governments	Competition organizers Networks of developers Open data evangelists	Top-down (governments decide what, when and how to open)	Lack of standardization Lack of reuse Little sharing of good practices Lack of visibility of datasets Apps' discovery problem Internal conflicts in governments
Smart citizens	Citizens	Intermediary organizations providing structure	Project-based Use of social media platforms	Lack of interconnection between citizens and between initiatives Lack of awareness Lack of skills
Open democracy	Political activists	Organizations Evangelists	Distributed Use of social media platforms	Lack of interconnection among groups

Table 6 Macro level analysis of the innovation ecosystem

The open source hardware and software communities

Within this wider community, two movements can be identified: the open source software community and the open source hardware community. In both cases, the **focal actors** are the activists: either they support the use of open source licenses that make software available for anybody to use or modify as its source code is made available (open source software activists) or they support the open source philosophy and contribute to the community by voluntary writing and exchanging programming code for software development (the open source hardware activists).

Firms, organisations, and not-for-profit communities supporting open source activists are considered **enablers** within the open source community. For example, Canonical[40] was created alongside Ubuntu to help it reach a wider market. They ensure that Ubuntu runs reliably on every platform from the PC and the smartphone to the server and the cloud. Along the same lines, the development of Arduino[41] has taken place around a community of Arduino enthusiasts that includes region-specific groups and special interest groups. The community is an excellent further source of support on all Arduino-related topics. The P2P Foundation[42] is a third example of an organisation that supports the open source community and is, therefore, an enabler. It focuses on studying, researching, documenting and promoting peer-to-peer practices in a very broad sense. Among some of its guiding ideas, the P2P Foundation supports the principles developed by the free software movement, in particular the General Public License, and the general principles behind the open source and open access movements. It believes that these principles provide for models that can be used in other areas of

social and productive life. One last example is that of the Open Source Initiative[43], a Californian public benefit corporation, founded in 1998, aimed at educating about and advocating for the benefits of open source and at building bridges among different constituencies in the open source community.

Open source platforms are also enablers within the open source community. The best example of them is GitHub[44] a web-based hosting service for software development projects that use Git, an open source version control. It is home to over 13.1 million repositories, making it the largest code host in the world. Other technological tools get developers in touch and facilitate the exchange of resources and information. It is the case of the Arduino Playground (http://playground.arduino.cc/), a wiki where all the users of Arduino can contribute and benefit from their collective research.

Regarding **governance**, the open source community works under the principles of peer governance, a bottom-up mode of participatory decision-making. According to Coffin (2006), openness, networking, participation and transparency appear as the main characteristics of peer governance. Bauwens (2005) adds equipotentiality and holoptism. The former means that everyone can potentially cooperate in a project, that no authority can pre–judge the ability to cooperate. In open source projects, equipotential participants self–select themselves to the section to which they want to contribute. The latter refers to the ability for any part to have horizontal knowledge of what is going on, but also to have the vertical knowledge concerning the aims of the project. Bruns (2008) also characterizes open source communities as heterarchies, meaning that they operate in a much looser environment, which allows for the existence of multiple teams of participants working simultaneously in a variety of possibly opposing directions.

According to Fogel (2006), the possibility to fork[45] is central to the governance of any open source community, although the author particularly refers to open source software communities. The shared ownership of open source projects allows anyone to fork a project at any time. Therefore, no one person or group has a magical hold over the Project. Since a fork involving a split of the community can hurt overall productivity, Fogel (2006) notes that the potential to fork a programme is the indispensable ingredient that binds developers together.

Finally, Stadler (2008) submits that leadership in open source projects is not egalitarian, but meritocratic. In this respect, Coffin (2006) highlights the necessity for a benevolent dictator, who is the leader of the project and the person who alone has all the power to make decisions. Often, this authority is a natural consequence of the leader being the founder of the project, such as Linus Torvalds for Linux or Jimmy Wales for Wikipedia.

Despite its many benefits, open source communities also experience some **drawbacks**. The following are some of the most significant:

- High entry barriers: anyone can be part of an open source hardware or an open source software community but in order to be actively engaged, good technological skills are needed. That is why many texts and documents refer to individual open source activists as programmers committed to the open source philosophy. The level of contributions or the type/strength of technological skills seem not to matter that much because as previously stated, there is equipotentiality in an open source community.

- Lack of conflict-resolution mechanisms: The case of Wikipedia, and its internal struggle between deletionists and inclusionists, has been widely studied and analysed as an example of an open-sourced peer project characterised by having unclear governance rules and an uncoordinated structure, as well as by lacking a functional conflict resolution process for content dispute. During conflicts, persistent, well–organised minorities can adroitly handle and dominate their opponents. The values of communal evaluation and equipotentiality are subverted by such practices. According to O'Neil (2009), these attributes challenge the sustainability of the projects.

- Tension between hierarchy and equality: Benevolent dictatorship is usually exercised over developers' contributions, which means that this type of leader has little/marginal influence over the behaviour of individual developers. For the leader's decisions to be received as legitimate, they have to be consistent with the consensus of the opinions of participating developers. In this respect, his/her role is not that of a boss or a manager in the usual sense. This results in a tension between hierarchy and equality, which has to do with the degree of control exercised by project administrators over the changes and modifications contributed by the base of developers. This tension is usually stronger in projects which, like Linux, invest one developer (or a sub-group of developers) with the authority to accept or reject contributions by the community of developers.

The community of developers

In section 5.3, developers were defined as individuals who develop a new IT product or service. They come up with an idea of an IT-based product or service and want to commercialize it. That is why, often, this community is also considered as a community of entrepreneurs or start-ups. Developers and/or entrepreneurs are, precisely, the **focal actors** of this community.

Because developers usually work alone and start-ups are typically very small, they frequently gather around innovation events or networks, which are considered **enablers** of the community. There are several examples of them. Fest-UP[46] is one of them. During one week in May, the start-up community comes together in Barcelona and participates in different activities such as workshops and competitions. Montreal International Startup Festival is another example[47] Since 2011, each year, over 2,000 founders, investors, and analysts converge on Montreal from more than a dozen countries to attend workshops and interactive how-to sessions or to listen to keynote speeches or presentations from founders.

Entrepreneurs and developers also use social networks to get in touch with one another. Some of the most popular social platforms include Entrepreneur Connect[48] and Startup Nation[49]. They read blogs and tech magazines as well. Some of them belong to entrepreneurs themselves like Steve Blank's[50], Joel Gascoigne's[51] or Ryan Carson's[52] Others are maintained by different people, organizations or companies and post interesting messages about marketing (such as Startup Marketing[53]-), venture capital (such as The Startup Lawyer[54]), or technology news (such as The Next Web[55]), to name a few examples.

Accelerators and incubators are another type of enablers. Both accept early start-ups that have a potential commercial viability and they both provide an environment that is meant to serve the needs of a start-up. However, there are a few differences between them. For instance, an accelerator is usually a fixed-term programme that provides start-ups with the network and training they need to grow their businesses. Through its Accelerator, for example, Code for America provides seed funding, office space, and mentorship to civic start-ups[56]. The incubator focuses on providing the prerequisites for a company to develop, such as housing, expertise and business contacts. Further, the costs associated with administrative functions within a company may be subsidized as well. InnoEnergy Highway[57] for example, is a European incubator with interesting attributes: it has six entry points, it is specialized in sustainable energy, and they provide value in four key axes (technology, market, people, and finance).

There are nearly 100 accelerators in Europe. Y Combinator[58] was the first of its kind when it started back in 2005 and its success inspired many others. Nowadays, the biggest names are international start-up accelerators such as TechStars[59] Seedcamp[60]or Startbootcamp[61] But there is an increasing number of big corporation-backed accelerators, such as Wayra from Telefónica[62] or Orange FAB from Orange[63], and a plethora of regional start-up acceleration programs.

Finally, venture capital can also be considered as an enabler in relation to the community of developers and entrepreneurs. Wikipedia defines it as financial capital provided to early-stage, high-potential, growth start-up companies. The venture capital fund earns money by owning equity in the companies it invests in. There are many venture capital firms, many of which usually invest in technology start-ups. Accel Partners[64], Founders Fund[65] ,and Greylock Partners[66] are only a few examples in the United States.

Regarding **governance**, entrepreneurs usually work in isolation. However,s previously stated, they might attend events or join social networks to interact with other individuals or they might gather around other enablers. Anyhow, members of the community tend to cluster round topics. For example, in his book Start-up communities, Feld (2012) refers to the five clusters the start-up community of Boulder (Colorado, United States) is divided into: tech (software/Internet), biotech, clean tech, natural foods, and lifestyles of health and sustainability. Feld (2012) states that these clusters can be considered as networks for their members do not lend themselves to a command and control system. The community is also decentralised. Entrepreneurs and developers may come together at the local level, especially when their interests converge on developments related to a specific geographic setting, such as public service-related apps for a particular city hall.

The community of developers and entrepreneurs is not exempt from failures. The following are some of the most important:

- High entry barriers: Previously, developers have been defined as individuals who develop a new IT product or service. Therefore, they need to have technological skills in order to be able to develop such product or service. People who lack these skills are not able to enter the community. Also, and very related to this issue, last March 2014, the Startup Institute[67], a career accelerator that aims to equip

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individuals with the skills required to work in a start-up, revealed in a survey to 100 firms across the United States and Europe, that staffing issues are holding start-ups back and causing them to fail because they lack the skills to execute on ideas (and, particularly, they refer to technical and technological skills).

- Lack of interconnection between developers: As stated earlier, developers tend to work in isolation. Despite gathering around certain events and activities or participating in social networks, they usually are disconnected and, at any rate, they cluster round specific topics. As a consequence, products and services are the result of individuals' bright ideas and, only to a small extent, of cooperative work
- Lack of visibility: This way of working, combined with the fact of the small size these entrepreneurs have, result in a lack of visibility. Many new IT-products and services just go unnoticed. This has further consequences. One of the most important has to do with funding. Lack of visibility and knowledge usually results in lack of external investors that can make a new business grow. Actually, the Startup Institute's survey reports that the second most popular reason cited for start-up failure is a lack of funding. This lack of visibility has also consequences in terms of capturing value.

Innovation Labs: Living labs, Fablabs, Maker spaces

Living labs have already been described in section 5.3 as commonly public-private partnerships committed to communities that contribute to their funding. They provide a wide range of services and play diverse roles in the quest for articulating user involvement, from support to entrepreneurial lead users to needs-finding or user experience services. Within the innovation ecosystem, there is a wide community of living labs, which are the **focal actors** of such communities.

At the same time, this community includes several types of living labs. One of them is urban labs; living labs methodologies and spaces applied in an urban context. An urban lab is a tool to facilitate the use of public spaces in cities, to carry out tests and pilot programmes on products and services with an urban impact, which are in the pre-market stage and in line with the city government's aims, priorities and lines of action. The idea behind the urban lab is to use the city as an urban laboratory. The recourse to experimentation has become recurrent by implementing the idea of the intelligent/smart city. The city is in this way transformed into an immense "laboratory" of tests and analyses. Marres (2012) explains that, in this context, different cities are carrying out smart urban innovation experiments, linked to environmental protection, the development of new digital applications or services, or green living experiments. One interesting example is that of Barcelona[68]. Barcelona Urban Lab was created to facilitate the use of urban space in the city of Barcelona as an urban laboratory available to companies that need to test their products and services in a real environment. These pilot products and services have to respond to an unmet municipal need and must provide a new service that helps to improve people's quality of life.

Another type of living lab is the fab lab. According to Wikipedia, a fab lab (short for fabrication laboratory) is a small-scale workshop offering (personal) digital fabrication. It is generally equipped with an array of flexible computer-controlled tools that cover several different length scales and various materials with the aim to make "almost anything". There are several fab labs in different parts of the world. Again, it is worth mentioning the case of Fab Lab Barcelona[69], which is one of the most important fab labs in the world. It coordinates the global programme Fab Academy, which provides advanced digital fabrication instruction for students through a unique, hands-on curriculum as well as access to technological tools and resources. Fab Lab Barcelona also develops different types of projects such as IAAC Hyperhabitat, the Fab Lab House[70] or Smart Citizen[71]. Fab Lab Barcelona was founded by the Institute for Advanced Architecture of Catalonia[72] in collaboration with the MIT's Center for Bits and Atoms[73]

Barcelona is home to other fab labs or fabrication athenaeums, which are run by the Barcelona City Hall under the same philosophy than fab labs although with, maybe, a little more emphasis on social inclusion. The City Hall plans to have an athenaeum in each of its districts although, so far, only two have opened their doors (Les Corts - http://ateneulescorts.com/ and Ciutat Meridiana).

Living labs gather in networks, which are the enablers in this community. There are general networks and networks around specific issues. The European Network of Living Labs (ENoLL) (http://www.openlivinglabs. eu/) is an example of the former. It is a community of living labs with a sustainable strategy for enhancing innovation on a systematic basis. Its overall objective is to contribute to the creation of a dynamic European innovation system. It has a Council, which provides strategic guidance to the network. It is also responsible for the implementation of the work programme, in line with the budget. ENoLL has five operational work groups under the Council as well as several thematic subgroups. It offers different types of services to its members depending on the fee they pay: certification, communication and promotion, project development, and

learning and education activities are only a few examples. The Fab Foundation (http://www.fabfoundation.org/) is an example of the latter. It was formed in 2009 to facilitate and support the growth of the international fab lab network through the development of regional fab foundations and organizations. It offers three different programmes to its members: education, organisational capacity building and services, and business opportunities.

Governance of the community actually depends on the networks. It is them that organise the community around enabling/servicing structures, as it has just been described regarding ENoLL and the Fab Foundation. The network is, however formally centralised. For example, the ENoLL office, which is based on Brussels, serves as the contact point for its members. It also offers the basic network secretarial services in order to support the networking activities and information flow among these members. Interestingly enough, in this community, it is the living labs themselves that provide structure and governance to individual users from different communities. That is why Almirall & Wareham (2008) refer to living labs as intermediaries in the innovation process, structuring and providing governance to that participation. According to the authors: "living labs organise users in needs finding exercises contributing to ideation, support them in acting as entrepreneurs, orchestrate the innovation process, organise user contribution in incremental innovation through localisation exercises, or promote societal involvement for a certain platform, product or service. Therefore, playing a more encompassing and systemic role in the innovation process" (Almirall & Wareham, 2008: 24).

Finally, the living lab community also experiences some **failures**. In particular:

- Lack of interconnection between different types of labs: On one hand, despite the networking services offered by enabling structures such as ENoLL, living labs work very independently, serving their local communities. They usually turn to their network in search of training and advice that can help them develop locally. On the other, different networks of living labs do not interact either. They all are living labs but they are specialised and set up networks around specific issues, which are not always connected. Almirall & Wareham (2008) refer to this flaw as the inability to scale due to the limited scalability of the qualitative type of methodologies mostly used and their geographical boundaries.

- Cost of being a network member: Although networks of living labs are enabling structures, they are formal and highly formalised. Becoming part of the network is not free. Being a member and getting advantage of the services it offers depends on the resources the living lab has. Going back to one of the examples depicted in this report, ENoLL, this network has three types of membership that depend on the fees its members pay: effective members (2,500 Euros a year), associated members (5,000 Euros a year), and adherent members (administrative fee of 500 Euros a year).

- Difficulty of living labs in involving the local community: Almirall & Wareham (2008) refer to the difficulty of finding and involving lead users and to capture users' attention. They believe the living labs' business model, still heavily dependent on public funding, contributes to limiting their expansion.

The open/big data community

It has already been stated that the open/big data community includes a set of governments, usually at the local level, that decide to open their data. Governments are, therefore, the **focal actors** of this community. Their goal is usually two-fold: on one hand, they aim to be more transparent; on the other, they pursue an increase economic value by involving developers and entrepreneurs. This report will focus on the governments that mainly foster the second objective and, as a consequence, are primarily interested in yielding innovation and innovative businesses.

Because governments want citizens, businesses and individual developers to use their data, engaging with the local community is key. Innovation is the result of using the data governments open and offer for free. The open/big data community's **enablers** connect (local) governments with those who are potential users and who will boost innovation. One example is that of competitions. Particularly, competitions' organisers make sure developments and innovation takes place by means of using government open data. This is the case of the Open Data Challenge[74], one of Europe's biggest open data competitions. It was organized by the Open Knowledge Foundation, the Openforum Academy and Share-PSI.eu. It offered 20,000 Euros in prizes and received a total of 430 entries from 24 European Union member states. There were several categories: Prize Idea, Prize App, Price Visualization, Better Data Award, Open Data Award, and Talis Award for Linked data. In total, 13 awards were given. There are many other competitions, some of them organized by governments themselves. Apps4Finland[75], for example, is an open data contest that has been running since 2009. It encourages the public sector and other actors to make their data accessible to citizens and

developers. The competition has welcomed new data sources, applications, visualisations and ideas as entries. Apps4Ottawa[76] is another open data contest organised by the City of Ottawa in Canada. Apps for Amsterdam has also been widely analysed. It was an initiative, promoted by the City of Amsterdam, the Waag Society, and the Amsterdam Economic Board, to make accessible as much data of the City of Amsterdam as possible. Developers were invited to send in their applications that used at least one available source of information from the (local) government.

Networks of developers are a different type of enabler. Interaction between developers promotes the use of open data among the members of the network. It also backs up open data individual requests to governments. Usually, networks of developers are virtual. In this respect, social media networks play a significant role. They are a great place for developers to learn from colleagues, find solutions to problems, and improve their own skills. Of particular interest are also those sites devoted to developers' interaction that are embedded in open data portals. Data.gov.uk[77] the open data portal of the United Kingdom, has an "Interact" section, with blogs and forums. At the local level, the open data portal of Chicago is worth mentioning; it has a section aimed at developers[78].

Open data evangelists are also enablers within the open/big data community. There are organisations that encourage the use of open data. In the private world, Socrata[79] is one interesting example. Building on the experience of open data portals developed throughout the United States, it offers an open data field guide that is particularly aimed at government and elected officials. The Open Knowledge Foundation[80] is another example, from the non-profit field, that advocates and campaigns for the open release of key information. It has published an open data handbook that anyone can use but that is especially designed for those who are seeking to open up data. It has also developed an open data index, which assess the state of open government data around the world. Individuals can also be considered open data evangelists: Andrea Di Maio (VP Distinguished Analyst at Gartner), David Eaves (open data innovator and thought leader), Tariq Khokhar (open data evangelist at the World Bank), or Jay Nath (San Francisco's Mayor Chief Innovation Officer) are only a few examples.

Governance of the open/big data community is top down, that is, governments decide what, when and how to open. Some Governments do not interact with other stakeholders and there are many differences between them, both in terms of speed and pace and commitment. As a result, the success of open data portals regarding innovation is very diverse. This does not mean the open/big data community does not have references. There are outstanding good practices, such as the case of Helsinki, to which we have already referred in section 3, other local governments turn to and followbut there is not a formal network of local governments, connected to each other on a regular basis around open data issues. In terms of governance, therefore, we can only refer to the governance of relationships with stakeholders (users, first data providers, the information environment), such as Helbig et al (2012) do, but still in this case, it is each government which decides what governance structure it wants and how it manages stakeholders and relationships between them.

Lastly, a lot has been written on open/big data **failures**. Huijboom & Van den Broek (2012) identified several barriers for open/big data initiatives to progress. After reviewing open data strategies in several European countries, they describe a closed government culture, privacy legislation, limited quality of data, lack of standardisation (due to individual decisions), security threats, existing charging models (some government charge for the data), and uncertain economic impact (it is still not clear what the use/re-use of open data gives rise to).

Other authors have also referred to some of these pitfalls, such as data quality and lack of reuse, two topics that are very related. According to the United Kingdom Public Accounts Committee (2012), businesses and developers are being hindered in making open data products and services due to the poor quality of information being opened up. In this respect, the release of incomplete datasets such as patchy price and performance information for adult social care, plus factors such as inconsistent reporting across local authorities, mean that the data quality does not help developers. Dawes (2012) adds that data quality is generally used to mean accuracy, but that research studies identify multiple aspects of information quality that go well beyond simple accuracy of the data: intrinsic quality (it includes accuracy and objectivity, but also involves believability and the reputation of the data source), contextual quality (it refers to the context of the task for which the data will be used and includes considerations of timeliness, relevancy, completeness, sufficiency, and value-added to the user), representational quality (it relates to meaning and format), and accessibility (it comprises ease and means of access as well as access security).
Actually, according to Kitchin (2013), it is not clear that open data is leading to innovative products that create new markets. This may well be the case with high value datasets such as mapping and transport data, but much less likely with most other datasets. He mentions de Vries et al (2011), who reported that the average

apps developer made only 3,000 USD per year from apps sales, with 80% of paid Android apps being downloaded fewer than 100 times. In addition, they noted that even successful apps, such as MyCityWay[81] which had been downloaded 40 million times, were not yet generating profits. Competitions and hackatons have aimed at making datasets visible as well as at promoting apps development but these created solutions often remain at version 1.0, with little after event follow-up, maintenance or development.

Smart citizens

Smart citizens were previously defined as active and engaged citizens who want to play a role in building their own city, sharing information and knowledge, creating a network and getting involved in decision-making and implementation processes. Individuals are, therefore, the **focal actors** of the smart citizens' community.

The smart citizens' community is linked to what has been known as crowdsourcing. Coined by Jeff Howe in the June 2006 of Wired magazine, it describes a web-based business model that harnesses the creative solutions of a distributed network of individuals through what amounts to an open call for proposals. In other words, a company posts a problem online a vast number of individuals ("the crowd") offer solutions to the problem the winning ideas are awarded some form of reward, and the company mass-produces the idea for its own gain. Brabham (2008) has gone further and has argued that crowdsourcing is a problem solving model that can have profound influence in the way we solve our world's most pressing social and environmental problems. In that spirit, the business model of crowdsourcing is already being applied in non-profit and government projects. The crowd in those projects are the smart citizens.

Basically, the **enablers** of the community are those intermediary organisations, which provide structure and online platforms for citizens to participate. There are many examples. One of them is SeeClickFix, a company that runs a communications platform by the same name[82] for citizens to report non-emergency issues, and governments to track, manage, and reply. SeeClickFix is actually an example of an organisation that tasks the crowd with finding and collecting information into a common location and format. Similarly, the United States Geological Survey's Earthquake Program, a US multi-agency programmme, has a crowdsourcing site, "Did you feel it?"[83] where citizens can report feeling an earthquake.

Also, in the United States, one can find a different type of an enabling organisation, one that tasks crowds with solving empirical problems. It is the case of Innocentive[84], a Massachusetts-based open innovation company that accepts by commission research and development problems in a broad range of domains and frames them as "challenge problems" for anyone to solve.

Enabling organisations provide structure and, therefore, contribute to the **governance** of the community, as smart citizens are not connected to each other. The so-called crowd does not usually interact on a regular basis. They get in touch around projects and by using the platforms offered by the enabling organisations. As Saxton et al (2013) state, the community members are only temporarily connected to the enabling organization for a specific task or project. Thus, the role of such organisation is to define and design processes, policies and mechanisms to achieve specific project-related goals by effectively facilitating user participation. Some of the tools they use are compensation schemes, trust building systems, and voting and commenting.

Online platforms are also tools that are available to smart citizens. Crowdfunding platforms are an interesting example. They serve as an intermediary between the funder and the person or organization looking for funding. Donating, pre-financing, lending and investing are the four funding forms or underlying business models by which the crowdfunding platforms can be subdivided. One of them is Goteo[85]), a social network for crowdfunding and distributed collaboration (services, infrastructure, microtasks, and other resources) for encouraging the independent development of creative and innovative initiatives that contribute to the common good, free knowledge and open code. In this respect, Goteo supports projects with social, cultural, scientific, educational, technological, or ecological objectives that generate new opportunities for the improvement of society and the enrichment of community goods and resources. Many other crowdfunding platforms can be found at CrowdingIn[86], (a directory of crowdfunding platforms operated by Nesta that facilitates individuals or organisations in the United Kingdom raising money from the crowd.

Finally, this community also presents some **failures**, which, as with other communities, mainly have to do with the lack of linkages. Smart citizens are not connected to each other. They usually take part in crowdsourced or crowdfunded projects anonymously. Also, projects are not linked, either. Sometimes, organiations host several initiatives. Federal agencies in the United States, for example, use Challenge.gov to seek from innovative solutions from the public. Although Challenge.gov is administered by the US General Services Administrations, there are many agencies participating and the challenges are quite diverse: from giving suggestions to the

Department of the Interior on how to to improve its performance, to filming a video to prevent distracted driving.

There is also a lack of awareness about what is going on. Those who take part in crowdsourced initiatives are sensitive to this type of ideas-generation/innovative problem-solving processes. But it is hard for the population as a whole to get access to these projects and to know about them, because they are not widely publicised or disseminated. What's more, communication with the crowd is not easy for the organisation aiming to reach out to a group of people it does not know very well. According to Wargon (2014), no matter how well the problem statement is crafted, the result is still a one-sided conversation, where the organisation is pushing information out to participants, with very little actual dialogue. The result is that participants who are working to solve the problem are left to make assumptions, and these assumptions can lead to off-target and out of scope solutions, and therefore less confidence that the organisation will get the solution that it needs.

This situation may get worse as a consequence of lack of skills. For crowdsourcing to work, one needs the "right" crowd. For example, if technical or scientific knowledge is required, one needs to find a crowd of people with the requisite foundational knowledge.

The open democracy community

This last community gathers individual and organisational political activists that want to contribute to the evolution of democracy in the electronic age. It is precisely this set of political activists that are the **focal actors** of the open democracy community. They may act in isolation or as a part of a group. They may be part of informal movements or be formally constituted. But they all want to have a say in the political decision-making process or in any other established political/democratic processes.

There are several types of **enablers** in this community. One of them is organisations that do not lobby themselves but that serve as platforms for individuals and other organisations. Change.org, Inc. is a relevant example in this respect. This company runs a website[87] that provides a free petition tool for more than 70 million users around the world. Its mission is to empower people everywhere to create the change they want to see. MoveOn[88] is another interesting case. It is a non-profit educational and vocational organisation set up in 2001, which mobilises a community of more than eight million Americans who use innovative technology to lead, participate in, and win campaigns for progressive change.

Evangelists are also enablers within the open democracy community. Steven Clift is one of them[89] He keeps a website where he posts articles and news. Chris Quegley is another one. He is the co-founder of Delib[90] an e-democracy company which has been signed up by the coalition currently governing the UK to produce online crowdsourcing projects and platforms. He previously worked for Obama's team in Washington on the Recovery.org project, which monitored the United States' stimulus plan, and showed the American public in 2009 where taxpayers' cash was going and how many jobs it created.

There are different types of open democracy initiatives and **governance** of the community revolves around them. The nature of open democracy initiatives varies depending on who takes the initiative of selecting and suggesting a policy agenda discussed during citizen open democracy/participation processes. According to Lee & Kim (2014), there are government-initiated and citizen-initiated e-participation initiatives. The former tend to be more formal. They are usually planned and last a specific amount of time. The latter may be formal or informal. The might arise around a particular topic and soon die or they might last longer. For example, the 15M movement in Spain started back in May 2011 as a series of protests demanding a radical change in Spanish politics but it is nowadays still alive and growing. We also add that there is individual and collective action in terms of open democracy (Gascó, 2010). Political activists may act individually or may take part in more formalised groups of action. No matter the type of initiative, social media platforms play an outstanding role as a way of organizing and managing the process. One of them is the YouCut Citizen Platform[91], launched in 2010 where policy makers interact with citizens in the stage of evaluating different policy options. The platforms allows individuals to cast votes on upcoming legislation proposed in the United States House of Representatives and to evaluate the different programmes and their potential spending cuts.

In this respect, Coleman & Blumler (2009) refer to an interesting expression: civic commons 2.0. They define it as a way of intersecting networks, pulled together through the agency of a democratically connecting institution. Last, one of the most important **failures** of the open democracy community is the lack of interconnection. Political activism may revolve around many different issues, which may not have anything to do among them. Also, as previously stated, there might be specific participatory projects, well defined and planned, and more informal ones. There are other drawbacks regarding open democracy. The digital divide

and its implications for political equality are potential danger areas for open democracy. Also, the impact of the actions of the open democracy community is not clear. Often, there is limited reliability and acceptability of open democracy decisions. One final example is the use of social media platforms. The nature of government decision and policy making problems (that increasingly become "wicked problems") necessitate stakeholders' participation and consultation, and the web 2.0 social media can play an important role in this direction, and enable the application of crowdsourcing ideas in the public sector. However, the collection of a large amount of citizen-generated content from various social media on a particular decision or policy making problem is not easy to deal with and necessitates the development of appropriate decision support systems.

4.5 Micro analysis of communities

In this section, a micro analysis of the communities that have been identified and described in section 5.3 & 5.4 is conducted. We will refer to instruments, motivations, and incentives. These will definitely turn into areas for public intervention and, therefore, for policy making. Table 5 summarises the content of this section.

Communities	Instruments	Motivations	Incentives
Open source hardware and software	Government contracts and procurement	Creating fast growing platforms (companies) Reducing costs (companies) Capturing value (companies) Reputation/skills/signalling (developers)	Scalability Less cost Increase of profit Contracts/employability
Developers	Seed funding Events Support to entrepreneurs Incubators and accelerators/support to entrepreneurs	Building a company Developing new products/ services	Solving initial support problems Exposure and capital
Innovation labs	Public funding (initial and projects)	Fostering growth Bridging the digital gap Creating innovative societies Providing support to networks and civil society	Extrinsic monetary motivation Opportunities for learning and networking Visibility and reputation
Open/big data	Organization of competitions Support for networking Knowledge sharing and dissemination	New services Generation of economic value Transparency	Political incentives (reputation) Technical support Monetary incentives
Smart citizens	Projects Platforms	Intrinsic motivations, such as personal fulfilment/satisfaction and reputation Making profit	Increase in visibility and reputation Direct payment
Open democracy	Legislation Transparency initiatives Participation projects	Increase in democracy (governments) Reputation (governments) Intrinsic motivations (citizens)	Better electoral results (governments) National and international pressure Personal fulfilment (citizens) Development of projects (citizens)

Table 8: Micro level analysis of the innovation ecosystem

The open source hardware and software communities

In terms of **instruments**, usually, open source products are free. However, related-services might not be. For example, open source software and its supporting code are generally free of cost to download, use and modify. However, individuals and for-profit businesses can charge for specialised training or for developing new extensions of the core code. For instance, R is an open source environment and programming language for statistical computing that is also free of cost. While R offers no cost access to its software and source code, Revolution R Enterprise[92], a proprietary spin-off, markets a faster version of R. The company can process very large data sets and offers, for a fee, training, consulting, and technical support services. Though the services cost money, the cost may still be smaller than what legacy commercial products charge and, if an R user does not need the additional services, then, s/he does not have to pay for them.

In this respect, governments might be interested in signing contracts with open source developers for

governments are, more and more, turning to open source. This has clearly been the case regarding open source software. In January 2011, the Australian Government released an open source software policy and guidance documentation for Australian government agencies to inform their use, modification and development of open source software. In April 2012, the United Kingdom released the second version of the document "Open source software options for government". In December 2013, the Italian government issued final rules implementing a change to procurement law that now requires all public administrations in the country to first consider re-used or free software before committing to proprietary licenses.

Open source hardware is not that popular among governments although there a few interesting examples. We have already referred to the Flok Society in Ecuador[93]. Working with an academic partner, the Government of Ecuador has launched a major strategic research project to "fundamentally re-imagine Ecuador", based on the principles of open source: networks, peer production, and commoning. Ecuador has been the first country in the world which has committed itself to the creation of an open commons knowledge based society. The Public Laboratory for Open Technology and Science (Public Lab[94]), a community which develops and applies open-source tools to environmental exploration and investigation, is another example. During 2013, they distributed 3,000 open hardware kits (the Civic Information Starter Kits), open hardware and software packages for citizen-led environmental data collection supported by a small data platform for analysis and advocacy. This tool enables civic-minded groups to empirically verify government data and inaugurating a new generation of civic information tools to hold government accountable.

In summary, because of governments' interest in open source, contracts and government procurement are important tools within this community.

A lot has been written on the **motivations** of members of the open source communities. Most literature on motivations is based on empirical surveys (Vainio & Vadén, 2006). One popular distinction is to divide the motivations in intrinsic and extrinsic motivations. Intrinsic motivations include open source politics (working on open source to limit the power of large companies, particularly software companies, and because individuals think software and hardware should not be proprietary goods), community identification (for open source development communities are not communities only in a technical sense of the word but also in terms of identity: being part of the community is sometimes part of the developer's identity), and peer-recognition and respect. Extrinsic motivations include user needs (developments take place as a result of a personal need for a tool and, then, it is shared because somebody else with a similar need will probably enhance it and fix its problems) and signalling (being a contributor to the community increases reputation and, eventually, leads to benefits such as getting a job).

Companies have different motivations to be part of the community. Bonaccorsi and Rossi (2004) state that there are significant differences between the set of motivations of individuals and those of firms. In particular, firms emphasise economic and technological reasons for entering and contributing to open source and do not subscribe to many social motivations that are, by contrast, typical of individual programmers. According to the authors, promoting innovation by and small companies seems to be the most important motivation although emancipation from the price and licensing policies of large companies matter as well. Wichmann (2002) adds that reducing costs (development, installation and administrative costs) is also key as it is having better availability of IT specialists. Vici (2008) also analyses firms' motivations to participate in the open source community and states that, at the beginning, and in general, supporting open source was merely justified by the need of answering to the increasing requests of improved quality products. Moreover, contributions and feedbacks from the open source community allow a reduction in R&D costs and an enlargement of the network size, amplifying the positive effect due to network externalities. Adopting open source principles also increases the likelihood of attracting skilled developers and thereby achieving a higher pace of technological development and quality level.

Knowing the instruments the community has interest in as well as knowing what motivates its members let us identify key **incentives** that may increase participation and engagement in the community, strengthening the possibilities for innovation. These key incentives may, therefore, turn into areas for public intervention and for policy making. Avenali et al (2010), in their study on open software and hardware innovation platforms, point to economic incentives (that may result in a increase of profit), such as the economic cost of no participation, the possibility of internalizing the research externalities through specific contracts, agreements and patents, the user's reputation effects on the leadership played in future innovation projects and his/her bargaining power in profit sharing, and the value of re-using. They also refer to the importance of all actions that lead to professional advantages for the contributor, as gaining reputation and, therefore, improving employability.

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Other authors have mentioned scalability. In this respect, government attitude towards the open source community is fundamental and may have an effect in terms of scalability for governments are in a unique position in almost any industry. In the field of software, public services, organisations and territorial administrations collectively represent a major software user with great impact on the software market: when an agency adopts open software, it also forces its contractors to adopt the government's platform of choice so they are eligible to work for them.

The community of developers

The community of developers (mainly apps developers) and entrepreneurs have several **instruments** that are useful and that can improve their work. We have already referred to some of them in section 5.4 as enablers for some of them are also intermediary platforms that provide resources and offer services. That is the case of festivals, hackathons, competitions, and other related events. It is also the case of incubators and accelerators. They may be considered a tool in themselves to make start-ups and incipient businesses grow. But, at the same time they provide services to entrepreneurs that support their development. Incubators, for example, are physical locations that provide a defined set of services/tools to individuals or small companies. This may include specific types of office space, flexible lease terms, access to technology, financing, and technical assistance (such as marketing, legal, finance, human resources, and other business development services). By locating similar or complementary entities in proximity to each other, the incubator may also play a critical role in promoting knowledge transfer, both formally and informally, and, therefore, in boosting innovation.

Other supporting programmes are also important instruments for this community. There are many of them. Some are private and some are public. The European Social Fund, for example, promotes entrepreneurship through financial and business support businesses. Targeted support is provided to women entrepreneurs and disadvantaged and disabled people. Also, Erasmus for Young Entrepreneurs helps provide aspiring European entrepreneurs with the skills necessary to start and/or successfully run a small business in Europe. New entrepreneurs gather and exchange knowledge and business ideas with an experienced entrepreneur, with whom they stay and collaborate for a period of one to six months. The stay is partly financed by the European Commission. In the United States, in January 2011, the Administration Obama launched Startup America[95] harnessing public and private resources to accelerate the success of America's high-growth entrepreneurs. Also, in the United States, private initiatives to support growing businesses can be found. The Knight Foundation[96] is one of them. They have several funding programmes such as the Knight Enterprise Fund (which provides early-stage venture funding for media innovation) and the Knight Prototype Fund (which helps media makers, technologists and tinkerers take ideas from concept to demo; with grants of 35,000USD, innovators are given six months to research, test core assumptions and iterate before building out an entire project).

In India in March 2014, Vodafone launched its developer platform to empower the community of developers. It allows developers to use the Vodafone platform to offer content and customised services to users. It serves as a new monetisation channel for app developers. In the past, Gaana.com, Cleartrip, Vserv, Reverie Language Technology, App Virality, PCloudy and Betaglide have also launched their API and support developers in the app development cycle.

Seed funding is also key for app developers. According to Wikipedia, seed funding is a form of securities offering in which an investor purchases part of a business. The term seed suggests this is a very early investment, meant to support the business until it can generate cash on its own or until it is ready for further investment. Seed funding is probably the hardest money for aspiring start-up entrepreneurs to get. However, according to CB Insights (2014), 2013 was a big year of venture investments at the seed stage. Actually, 2013 saw no drop in the number of active seed venture investors from the high seen in 2012. There are several seed funds. Kickstart[97] is a seedfund that kick-starts companies in the Mountain West of the USA by aligning technology creators, industry, entrepreneurs, and capital sources behind the funding and mentoring of seed investments. Other companies organise events where start-ups are awarded with seed funding. In February 2014, at the Mobile World Congress in Barcelona, IBM promoted its Watson Mobile Developer Challenge, soliciting app developers to submit mobile app ideas based on Watson over the following three months. IBM would choose three winning teams and provide seed funding for their businesses.

Building and growing a company and developing and commercialising new products/ services are the two main **motivations** for developers. The Developer Economic Report Q1 2014[98] particularly refers to mobile apps developers and states that the explosive growth in smartphone adoption has created opportunities for

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developers of every shape or form. This, and the relatively low barriers to entry into mobile development have attracted hundreds of thousands of developers to the app economy. With the exception of some developers that are not in it for the money (as indicated by 16% of the report's sample), most developers or organisations that invest in mobile are in fact looking for a return on their investment.

In this respect, the report explores the two main types of business models that are in place: 1) app as a product, which calls for direct monetisation, via paid downloads, in-app purchases, or contract development and 2) apps as a channel, which aims at indirect revenues via cross-app promotion, brand promotion and e-commerce.

However, while some developers are making it big, the majority are not seeing the returns they were expecting to, to a lower extent, intrinsic motivations also matter. The Developer Segmentation Q3 2013[99] refers to fun and creativity. In fact, it seems that engaging in app development usually arises from personal interest and pursuit of knowledge.

Instruments and motivations give us an idea of what types on incentives matter in this community. Solving initial support and capital problems is crucial. That has to do with funding (pre-seed and seed funding) and, also, with support services. Some organisations have already launched incentive programmes that provide support for entrepreneurs in their initial business developments stages. This is the case of the App.net Developer Incentive Program whose goal is to financially reward the development of App.net applications. But more needs to be done in this field.

Also, growth has to be guaranteed, which means, seed funding is very important but, also, capital throughout later stages is needed. Literature and research has shown that many start-ups fail. A study by Allman Law, conducted in 2013, concluded that 90% of all technology start-ups die about 20 months after having been born. According to John (2014), there are many reasons for this to happen (the Allman Law report refers to some of them: such as user confusion, privacy concerns, premature scaling, the competitive landscape) but the most important reason is that start-ups were not able to monetize their product/service. Thus, incentives for the community of developers and start-ups should address this need of financial and non-financial support.

Innovation Labs: Living labs, Fablabs, Maker spaces

There is quite a lot of consensus about the fact that a living lab is a user-driven open innovation arena or environment based on a business – citizens – government (public-private-people) partnership, which enables users to take an active part in the research, development and innovation process.

Public funding is an important **instrument** at the initial stage of a living lab but also when projects are developed and implemented. Innovation labs are largely dependent on public funding, despite the involvement of private partners. Actually, according to Almirall & Wareham (2008), there are only a limited number of firms willing to participate in a living lab. This business model limits its expansion. But also, access to external (public) funding may be difficult when the projects do not have a perceived value or are not financially sustainable in the short run (Farrall, 2012).

There are several examples of public funding of living labs, particularly at the regional and European level. For instance, iCity in Belgium, which is probably the largest active living lab today, is dependent of regional funding (IBBT and IWT). In the Apulia region[100]), ERDF funds are being used to promote high impact RDI carried out by living labs that effectively respond to specific requirements priory stated by the potential beneficiaries (belonging to public administration and the third sector) who are directly involved in the project partnerships with the task of managing the pilot phase. ERDF funds have also incentivized the work of other living labs, such as PACAlabs[101] and OuluLabs[102]).

National agencies also provide funding. In Finland, TEKES (Finish Funding Agency for Innovation[103]) and SITRA (the Finish Innovation Fund[104]) have already funded many living labs.

Living labs aim to boost innovation. This is their main motivation, one that results in further **motivations** such as fostering economic growth, bridging the digital gap, creating innovative societies, or providing support to networks and civil society. In this respect, it is important to underline that the motivation of a living lab usually is not to be the innovators themselves, but to help coach and facilitate the civil society's ability to innovate.

Specific living labs have specific objectives and motivations. I2cat's is a foundation established as a public-private partnership constituted by three universities, around ten firms and the Secretary for the Information Society of the Autonomous Government of Catalonia[105]. Its motivationsare two-fold. On one hand, traditional research has a prominent status, especially due to the participation of three technological universities. However, a great deal of effort is devoted to experimental innovation.

As stated, innovation labs can help anchor innovation efforts more broadly through networks that have the purpose of facilitating innovation and renewal. In Norway, for example, MindLab[106] runs an innovation agent network of 50 project managers across three government departments, including 15 agencies. Almirall & Wareham (2009) stress the important role living labs play in providing support to networks. They state that living labs establish, manage and coordinate, many times in collaboration with a "lead user", the innovation networks required to transform users' needs into real products and services.

Fostering economic growth is an important motivation as well. The Living Lab for ICT-based Financial Services[107] was created in spring 2010 by Ülemiste City AS and Mindware OÜ. The goal was to create an environment that would bring together various ideas related to ICT-based solutions in financial services, the creators and the end-users, and in co-operation increase the international competitiveness of the Estonian financial ICT solutions. The Financial Services Living Lab aims to make the city of Tallinn an innovative financial center of Estonia. In this respect, the Financial Services Living Lab gives the opportunity to its creators to better test and develop their products. It is meant to benefit the whole financial sector of the country as well as the user. One of the goals of the activity is to support the creation of new exportable products and services and, therefore, to enhance economic growth.

Living labs aim at bridging the digital gap as well. Several of their projects have this motivation. Citilab[108] in Cornellà (Spain), for example, has launched an initiative, Seniorlab, that promotes use of multimedia technology among people over the age of 50. SeniorLabs are actually quite common in living labs.

The analysis of living labs' tools and motivations results in the identification of **incentives** and, therefore, of areas for public intervention. One of the most important is the extrinsic monetary motivation, that is, motivation driven by a monetary external reward. The limitations regarding (public) funding make this incentive particularly important. In fact, European and regional funding agencies have already begun to launch living lab programmes, mostly for promoting living labs grow as a tentative but genuine European way to spur innovation (Almirall & Wareham, 2008).

But living labs also need to gain visibility and reputation in order to attract users to their buildings and platforms. According to Almirall & Wareham (2008), this is relevant because the innovative capacity of a society depends also on soft factors, including the perception of whether something is innovative and its reputation for innovation. This, influences its capacity of aan organisation's abaility to attract innovators and entrepreneurs, whilst promoting and increasing the visibility and networking of locals. This is especially significant in projects with a large amount of public funding, such as the ones where existing living labs are mostly involved.

In addition, because the reward users capture from the process is mostly explained in terms of reputation and a sense of belonging and participating in new and relevant experiments, future user participation will also be affected by the level and success of wider societal awareness. Last, living labs can also provide a clear advantage in terms of regional or city development if they manage to create momentum with real life experimentation on solutions and technologies.

Finally, opportunities for learning and networking are a significant incentive as well. As we already stated in section 4, intermediary organizations or enablers, such as ENoLL, can play a key role in this respect. This means that incentives should not only address individual living labs but also networks of living labs, which give administrative and networking support and which also invest in training and dissemination activities.

The open data and open knowledge community

As was the case with the community of developers, the open/big data community's **instruments** are very similar to the so-called enablers in section X. In particular, in this section we will refer to the organization of competitions, to support tools for networking and for knowledge sharing and dissemination. Competitions aim to bring together the data sets, made available by (local) governments, with the app developers or the community of open data users. Competitions are aimed at developers, researchers, journalists and anyone who has a keen interest in the re-use of open data, as their main goal is to promote the use/re-use of data sets.

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Many open data competitions have been organised throughout the years by (local) governments themselves or by other organisations. In November 2013, for example, the Energy Department of the United States launched a competition to encourage the creation of innovative energy apps built with open data[109]. Several hackathons have been organized since them across the country. In Queensland (Australia), between February and March 2014, the Science for Solutions open data competition took place in order to encourage data visualisations, application development or other unique treatments of the science datasets provided by the Department of Science, Information Technology, Innovation and the Arts of the Queensland Government. In Europe, the City of Stockholm organized in April 2014 what is said to be one of the biggest competitions of open data in the region: the Open Stockholm Award[110].

Competitions award participants with monetary prizes but they are also an important tool for developers' to gain visibility and reputation, as well as to support dissemination of new apps, particularly when prizes are also related to attendance at related events. Tools that support networking activities are also important. In this respect, many open data portals include a section for developers.These same sites can also be an interesting tool in order to share examples of using/re-using open data. Some of them list the apps that have been developed by companies or the public administration itself by means of suing the open data sets. It is the case of Open Data Euskadi in Spain[111], Open Data Vienna[112], or Open Data Toronto[113].

Regarding **motivations**, there is a need to differentiate between (local) governments' motivations and open data users' motivations. We have already approached the latter when analysing the community of developers. Thus, we will now focus on the former. (Local) governments have three important motivations when launching open data portals. First of all, most of them aim at being more transparent. For them, open data enhances transparency because it shows what the government is doing. Increased transparency also relates to other benefits that open data could contribute to, namely increased participation in political life, stronger democracy or e-governance. Much literature and many policy reports are actually based on the assumption that open data is a tool to enhance transparency. In addition, it is often argued that transparency could lead to better accountability of the government. However, several researchers have also challenged the idea that opening data will result in transparency and the idea that transparency automatically leads to more trust in the government. Research has shown that the assumption that open data automatically results in transparency is too simple. There are at least four factors which we believe influence open data transparency: 1) the type of data opened, 2) what one can do with the opened data and how they are displayed, 3) the undesired effects of opened data and 4) the costs of open data transparency apart from the systems, resources, capabilities and other means to make sense out of data.

Offering better and new services is another motivation to engage in open data initiatives. According to Berners-Lee (2012), opening up data is fundamentally about more efficient use of resources and improving service delivery for citizens. More and more, citizens expect city services to be available online. Re-using public sector data can lead to the development of improved, more efficient online public services. Also, merging data and information digitally leads to improved collaboration between city departments and more efficient internal information sharing. This can also lead to improved e-government services being developed by public administrations. What's more, local authorities are actively pursuing open data strategies to collaborate with citizens and the private sector in developing services from this data. Co-created or co-produced public services better meet the citizens' demands. Also, local governments can use their data to provide (real time) information to address issues from traffic congestion to peak load electricity management. Other services such as reporting tools can allow citizens to report local problems to the council just by locating them on maps.

Finally, local governments are also driven by the possibility that companies produce economic value from their public data, creating services and applications from those free data. This means a new market niche, based on digital contain, what helps to create richness and the possibility to offer added value services. Additionally, it promotes the competitiveness among companies, affording the possibility of tendering this public and free information and obtaining a benefit. Indeed, according to the Eurocities Statement on Open Data, opening and re-using public sector information can potentially create economic gains of up to 40 billion Euros annually in the European Union.

Incentives for the open/big data community should take into account the instruments' flaws and the needs of the community in terms of motivations. In this respect, political incentives aimed at increasing the government's reputation are key. Thus, if it is true that opening data does not necessarily lead to more

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transparency, efforts are needed to enhance the links between opening data, increasing transparency and increasing trust and legitimacy. Because reputation from a marketing/image point of view also matters, political incentives in terms of communication, diffusion and knowledge sharing are important as well.

Technical support in order to address the make the most of opened data is another incentive. There are some programmes that offer this type of support. Open Data Support, for example, is a 36-month project of the DG CONNECT of the European Commission to improve the visibility and facilitate the access to datasets published on local and national open data portals in order to increase their re-use within and across borders. To achieve its objective, the programme provides to (potential) publishers of open datasets, three types of services: 1) data and metadata preparation, transformation and publication services that will enable them to share the metadata of their datasets on the pan-European linked metadata infrastructure delivered by the project, 2) training services in the area of (linked) open data, aiming to build both theoretical and technical capacity to European Union public administrations, in particular to favour the uptake of linked open data technologies, and 3) information technology advisory and consultancy services in the areas of linked open data technologies, data and metadata licensing, and business aspects and externalities of (linked) open data.

Certainly, monetary incentives also matter. Funding open data projects may encourage the release of public data. The Cabinet Office and the Department of Business, Innovation and Skills, in the United Kingdom, are, for example, supporting organisations who want to improve their data publication. In this respect, they are helping to unlock data from public bodies by awarding 1.5 million Pounds to projects as part of the Release of Data Fund and the Breakthrough Fund.

Smart citizens

Two are the **instruments** mainly used by those citizens who want to take part in crowdsourcing initiatives: projects and platforms. Both of them are related, assome crowdsourcing platforms revolve around specific projects and others (mainly crowdfunding platforms) display a list of projects that need citizens' input. In section 5.4, we have already referred to online platforms for both crowdsourcing and crowdfunding initiatives. There are several classifications of types of platforms, although there is some overlap between them. One of them is related to the organisation that sets up the platform: a business/firm, a public sector organisation, and a non-profit sector organisation. Howe (2009) also classifies platforms depending on the crowdsourcing approach. He refers to 1) crowd-creation (leveraging the ability and insights of a crowd of people to create new products and services), 2) crowd-voting (where the community votes for their favourite idea or product), 3) crowd-wisdom (using the "collective intelligence" of people within or outside an organization to solve complex problems), and 4) crowdfunding (it offers financing to individuals or groups).

Dawson & Bynghall (2012) use a six-category classification of platforms. The authors refer to 1) distributed innovation platforms (the main concept here is that there are people outside the organisation who have the answer to the organization's challenges), 2) idea platforms (used by organisations to be able to source, gather and filter ideas that are proposed), 3) innovation prizes (increasingly used by organizations to generate ground-breaking ideas), 4) content markets (platforms where people submit their content for people to purchase), 5) prediction markets (that bring together many different opinions from a community of people to predict the future often based on "stock market-type" mechanisms), and 6) competition platforms (that are becoming more popular to source experts and expertise in different areas).

There are many examples of interesting online platforms. Crowdrise[114] is a fundraising platform for charities across the world. It allows individuals to support any charity. OpenIDEO (https://openideo.com/) is an open innovation platform, way to include a broader range of people in the design process through brainstorms, conception and evaluation. OpenIDEO partners with a non-profit to present the community with a social issue "challenge." Community members then contribute to the process by providing feedback each step of the way until a solution is created and supported by the community. A last example is Innocentive[115], which is the global leader in crowdsourcing innovation problems where people compete to provide ideas and solutions to important business, social, policy, scientific, and technical challenges.

Finding what motivates the so-called crowd is essential for success in crowdsourcing activities because it allows for the best incentives to be applied. According to Zhang (2012), there are five **motivations** in this community, including 1) the opportunity to support an attractive idea or the producer the smart citizens know, 2) the altruistic intentions for funding the project, 3) the opportunity to help others realize dreams, 4) the reward-oriented intentions of crowdfunders, and 5) the reciprocity and cross investment between project

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creators and crowdfunders. Another stream of literature (Organisciak, 2008) refers to academia, charity, money, fun, community participation, forced participation, self-benefit from the product, and interest in the content. The first two relate to the goodwill factor. Some potential users will participate in a system not for any returns from the system, but simply for the sake of its success. Wikipedia[116] is the great benefactor from academic interests. The other reasons for crowds to support crowdsourcing systems are much more self-motivated.

It is interesting to mention money. Money is a great motivator although there is a problem with paid-crowdsourcing: the number of people to pay. Also, self-benefit from the content created by the crowdsourced system, which may be direct (when the content created by the effort is of immediate use and value to the individual participating) or indirect.

It can be therefore concluded that, within this community, two types of motivation exist (Smith et al, 2013): intrinsic and extrinsic. Extrinsic motivation is external, or outside an individual. It provides an incentive that the task itself does not provide to the crowd member, such as money or prizes. Intrinsic motivation is internal to an individual and provides benefit to the crowd member who contributes to the actual crowdsourcing task. An example of intrinsic motivation is enjoyment.

Finally, Pilz & Gewald (2003) state that motivations are different in paid and non-profit crowdsourcing communities. Their findings show that many motivational factors apply consistently whether for-profit or for-fun. However, some factors differ significantly; especially extrinsic factors, which are of far more importance in for-profit communities.

Knowing what motivates the crowd and what tools they use give rise to the identification of **incentives** and, therefore, of areas of public intervention. Pilz & Gewald (2013), for example, suggest that one possibility is to provide financial incentives to participants. According to Mao et al (2013), this type of incentives may influence the amount of time devoted to the crowdsourced activity and the quality of work performed. The authors suggest that financial incentives may be used to control trade-off between accuracy, speed and total effort.

Crowdsourcing sites fall into one of two categories in terms of their compensation: pay-on-task or contest/prize. The pay-on-task sites offer a nominal level of compensation for a completed task. MTurk[117] is one example. This Amazon's micro-labour site offers members a chance to perform Human Intelligence Tasks (HIT) for a few pennies per completed task (for example, writing a 350+ English resource article for USD17.50). Contest/prize sites pay significantly more money or offer job contracts, product prototypes and royalties. For example, Namingforce[118] focuses on the creation of product and domain names. Prizes for submitting a winning name range from USD50-USD250. In addition to this, Oram (2010) proposes a payment scheme in crowdsourcing projects: 1) pay for professionals skills and ask for amateur contributions on a volunteer basis, 2) pay for extraordinary skills and accept more modest contributions on a volunteer basis, 3) pay for tasks that are not fun, 4) pay for critical tasks that need attention on an on-going basis.

Increase in visibility and reputation (reputational incentives) matters as well. Praise, publicity, and shame motivate action based on social norms and interactions. Actually, reputation (the social recognition for meaningful and creative work within the crowd), publicity and the sense of community in general (that is, the knowledge that one is contributing to a large project and a common goal) are important non-monetary rewards.

The open democracy community

Transparency initiatives and participation projects are two important **instruments** used by the actors of this community. The first ones are usually implemented by governments. Leaving aside portals that display public open data, previously analysed, governments use transparency portals as well, which give information about different topics, and not only raw data. Transparency portals are very popular in Spain. Local and regional governments have invested in developing such tools. Transparency gencat[119] the transparency portal of the Autonomous Government of Catalonia, and Transparència Terrassa[120] the transparency portal of the Terrassa City Council, are a couple of examples. In this country, International Transparency Spain has developed a methodology to measure the level of transparency of different public administrations. The methodology uses up to 81 indicators related to six transparency areas: 1) information about the organisation, 2) relationships with citizens and society, 3) economic and financial transparency, 4) procurement transparency, 5)

transparency in urban works, and 6) indicators related to the new Spanish Law of Transparency. The indicators aim at evaluating the data and the information public organisations publish on their transparency portals. Other countries have also introduced transparency portals. It is the case of Brazil[121] Chile[122] or the United States (at the state level, for example, interesting portals are the one from Illinois[123] and the one from Indiana[124].

Participation projects can be top-down or bottom-up. There are many different projects that require the involvement of political activists. Some may be more formal/organised (such as open consultations), some may be more informal (such as movements that revolve around different social media platforms). Also, Wikipedia refers to specific initiatives/activities such as town hall meetings, opinion polls, participatory budgeting, referenda, protests or voting. More individual engagement may take the shape of e-mails to government officials, signing an online petition or making a political contribution. Participation in such projects is usually facilitated by specific participation platforms, wikis, social media, and blogs.

Legislation is another significant tool that is used by governments. Legislation is particularly related to transparency, although there are some participation laws, particularly at the local level. According to Fumega y Scrolloni (2013), in the last two decades, more than 90 countries have passed transparency/freedom of information/access to information regulations at the national level. Sweden's Freedom of the Press Act of 1766 is the oldest in the world. In many countries, regional and local governments have local laws as well. The content and the quality of such regulations vary immensely. Also, having a law does not mean complying with it (Gascó, 2013). Thus, although a valuable tool, a lot remains to be done regarding regulation of open democracy initiatives.

In terms of **motivations**, governments pursue transparency and participation to strengthen democracy. Openness and transparency are key ingredients to build accountability and trust, which are necessary for the functioning of democracies and market economies. Actually, many studies have been developed under the premise that transparency yields to accountability. At the same time, a more accountable government is a more legitimate one (Sandóval-Almazán, 2011). Finally, legitimacy strengthens public trust in the government (Hood, 2011; Hazell & Worthy, 2010, Jaeger & Bertot, 2010). In sum, in Dror's words (n/a), increasing transparency and openness is a significant component of trying to move towards quality democracy.

Transparency and participation go hand in hand. Citizens need to be informed in order to be able to participate. Michels (2005) states that governments see participation as an instrument to strengthen and support the way representative democracy works nowadays.

Davies (2013) and Janssen et al (2012) also refer to reputation and visibility as motivations for governments to invest in transparency and participation initiatives. In a recent communication, the Government of Pakistan described its motivations to become part of the Open Government Partnership, stating that active participation in this organisation could help improve the government's reputation. In this respect, governments want to be transparent and participative but they also want to be known for being transparent and participative. Thus, motivations related to the image of the organization are also key.

Although (local) governments are important actors in the open democracy community, as stated in section 4, political activists are the focal actors. According to Stepasiuk (2014) and Lee & Kim (2012), intrinsic motivations for the focal actors are much more important than external motivations. They cite different authors who have supported this idea in their research and who have concluded that through citizen participation, citizens are able to promote self-esteem and self-fulfilment and develop the attitudes and skills of citizenship. Also, open democracy initiatives provide an opportunity to be better informed of issues in their community. In this respect, individuals and organisations gain a sense of belonging in their community. Interestingly enough, some authors have approached the topic of motivations of young political activists. Rainsford (2013), for example, discusses a wide variety of motivations, such as defending their specific interests, showing solidarity, or expressing dissatisfaction.

These ideas have been widely supported throughout the literature. Klandermans (2004), for example, formally categorizes these motivations and analytically distinguishes between instrumentality, collective identity, and ideology when analysing political activism motivations. Instrumentality points to motives directed at social and political change of an aggrieved situation or social problem. Broadly defined, instrumental motives are about

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the belief that something can be changed and that participating in a demonstration is an effective means to do so. Motivations stemming from collective identity, on the other hand, emerge from a participants' feel of group belonging and in-group solidarity. Strong feelings of collective identity make collective action participation a goal in itself. Finally, ideological motivations are rooted in an expression of one's views, a search for meaning out of a sense of moral indignation. People do not solely participate to enforce political change, but also to express their anger and grievances, their feelings of injustice and other emotions about a certain issue or situation.

Finally, **incentives** also differ depending on the actor. In the end, it is the possibility of getting better electoral results which is the most important incentive governments can have. It is a virtuous circle indeed: the more transparent and participative, the more accountable, legitimate and trusted and, therefore, the more chances to get better electoral results. Related to this incentive is citizen pressure. Citizens may be demanding greater transparency and participation. Bottom up citizen pressure can play a significant role. Where democratic mechanisms are operating, then citizen pressure can provide incentives for greater transparency and participation. What's more, strengthening bodies that exercise oversight over governance, such as the Ombudsman in certain countries, may also put pressure and give incentives to governments to invest in open democracy initiatives.

Davies (2013) also mentions a different type of pressure: international pressure or funding. This might be from international agencies, as donors fund and require transparency and governance reforms, or it might be from business, and markets, as assessments of doing business in a country are affected by the degree of transparency. International organisations may also give support for governments to be more transparent and participative, providing them with different instruments, as the OECD does[125].

Since political activists mainly have intrinsic motivations, incentives need to address this fact. For example, to strengthen the feeling of belonging to a community, research shows that it is more effective to engage people around specific issues, close to them, or ideology than to promote political participation generically speaking. The real development of proposed projects and ideas is another important incentive in this respect. Noticing that one's contributions make a difference strengthens self-fulfilment and increases participation in the community.

Finally, the literature also distinguishes between collective and selective incentives (Van Stekelenburg, 2013; Samuel, 2004). The former are ends-oriented incentives, which take the form of policy goals. They are related to the desire to affect collective outcomes. The latter are incentives that derive from the activity itself, irrespective of whether it manages to provide the public good or not. Selective incentives are classified according to the different ways in which they affect people's motives and actions. Material incentives are payments or incentives for participating or coercion for not participating. Social incentives are benefits or costs of participating (or not) arising from relationships with other people, either their respect and honour, or the communal pleasures of doing things together. Moral incentives arise from the internal feeling of doing the right thing. A person acting on moral incentives can expect a sense of self-esteem, and approval or even admiration and, therefore, experience personal fulfilment.

5. Bottom-up participatory policy development: co-designing DSI policies

There is a common view that a strong public intervention at EU level is needed to properly support this area of developments which has so far been left to isolated developments, activists and hackers, despite its importance. Recognising its strong social value, besides its strategic contribution to repositioning Europe worldwide would allow a **whole new generation of industrial and social innovation to start in Europe.**

The advent of new connecting technologies has opened up new perspectives for policy making. Though digital networks can give rise to new forms of collective intelligence and can increase democratic participation into policy debates, the actual influence they exert on policy decisions remains unclear. The reality of policymaking can often be laborious, lengthy and involve lots of compromises along the way. But inclusive policymaking should begin with engagement with those who are likely to be affected by the end policies. Thus, in formulating new policies ideas for Digital Social Innovation, we adopted a participatory methodology trialled by Digital Futures, a DG Connect project developed to addresses key policy issues by piloting a new approach to policy making; namely Policy Making 3.0.

Digital Futures is a participatory visioning project aimed to co-develop long term visions (futures) and policy ideas for beyond the Digital Agenda and Europe 2020, looking at three main pillars of the frame work: visions (forecasting and back casting); policies (actions and pillars); and agents (stakeholders in a broad sense, including implementers and decision makers). The Digital Futures vision is based on the metaphor of emergent collective intelligence, according to which stakeholders and policy makers should form a bottom-up social network to co-design policies. The new approach to policy making being experimented with by digital futures supported by the Futurium online platform[126] is characterised by:

- Evidence: using the internet to gather instantaneous real world data from which knowledge is extracted and used to dynamically (re)shape policy actions.

- Participation: using digital media to establish a direct and continuous bridge within and between policy makers and external stakeholders, to gather opinions, improve and validate policy ideas, and ultimately build openness, transparency and legitimacy into the policy making processes.

- Anticipation: using foresight methodologies to embed anticipatory thinking and visioning in policy design, beyond incremental improvements and refinement of current policies.

- Agility: scientific evidence, anticipation and participation in turn enable a more rapid and future-proof development, review and adaptation of policies. Similar to the metaphor of agile development, policies are developed through a series of incremental versions which are continuously monitored, reviewed and adapted as needed, thus improving flexibility and resilience of policy making process.

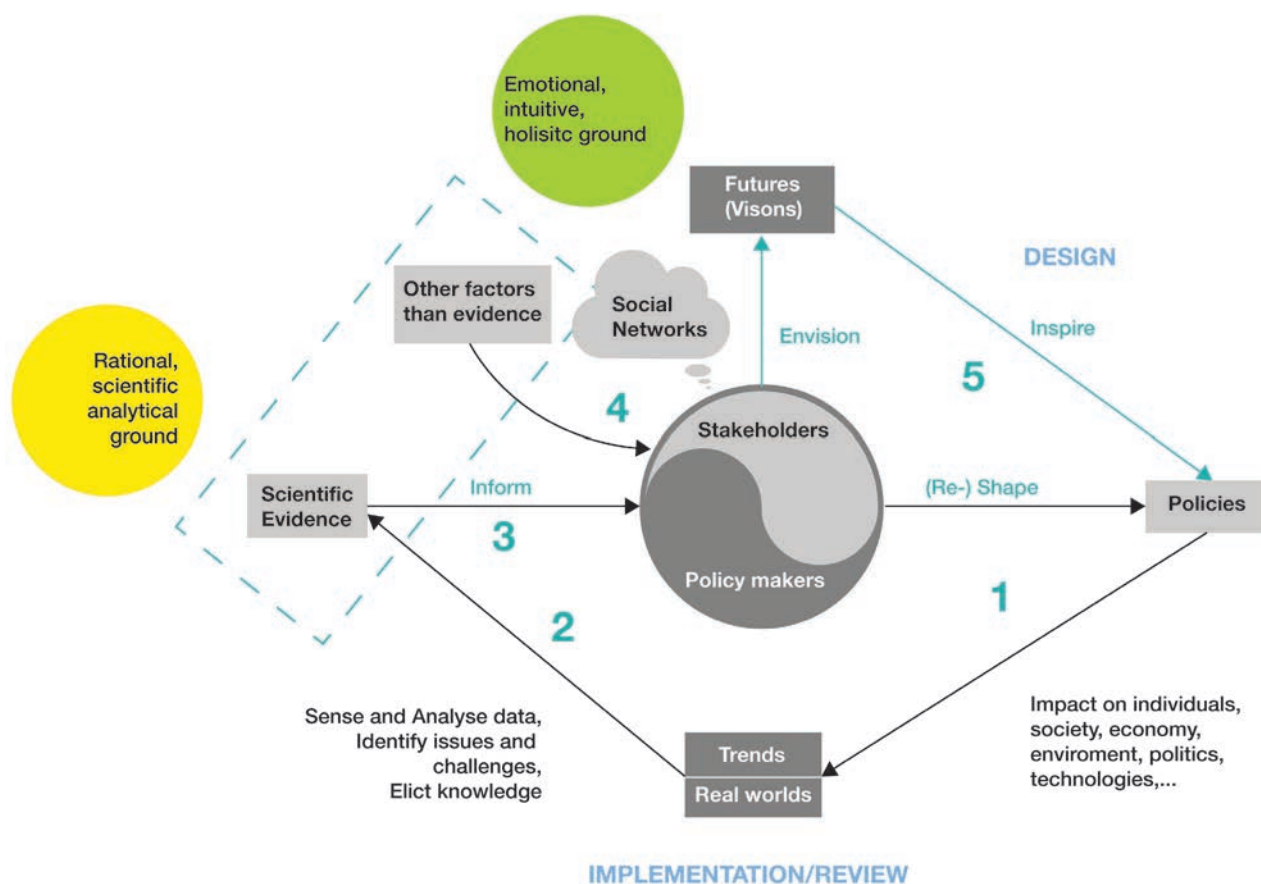This is shown in the Figure below.

Figure 7 European Commission, Policy Making 3.0 http://ec.europa.eu/digital-agenda/en/policy-making-30-0

Following, the methodology supported by the Futurium platform, as part of the DSI policy experimentation, a participatory policy workshop was held in Brussels at DG Connect premises on February 3rd 2014. This experimental approach encouraged policy-makers to go beyond the more standard approach of deploying consultation documents and showed how policy-related events that do happen can be much more participative in the generation of potential ideas. A more user-centred approach to policy-making, if you will.

The workshop brought together over 70 DSI practitioners, researchers, experts, and policy makers from different European countries, and it was very important for the DSI research project to facilitate this kind of connections and experimentation. A high-level programme comprising presentations, discussions, idea generation workshops, and networking was delivered. The energy and enthusiasm of all participants resulted in engaging policy discussions on the emerging DSI field, ranging from topics such as open access and open standards, to new innovation and funding models and decentralised enabling digital infrastructures. Following an holistic Social Innovation framework that identifies six stages of social innovation to achieve impact (see Figure 8), the aim of the workshop was to clarify the goals of policy (see Fgigure 9), and the tools available for both the Commission and others across Europe; and to frame a more detailed discussion on how these could be implemented during brainstorming ideas sessions.
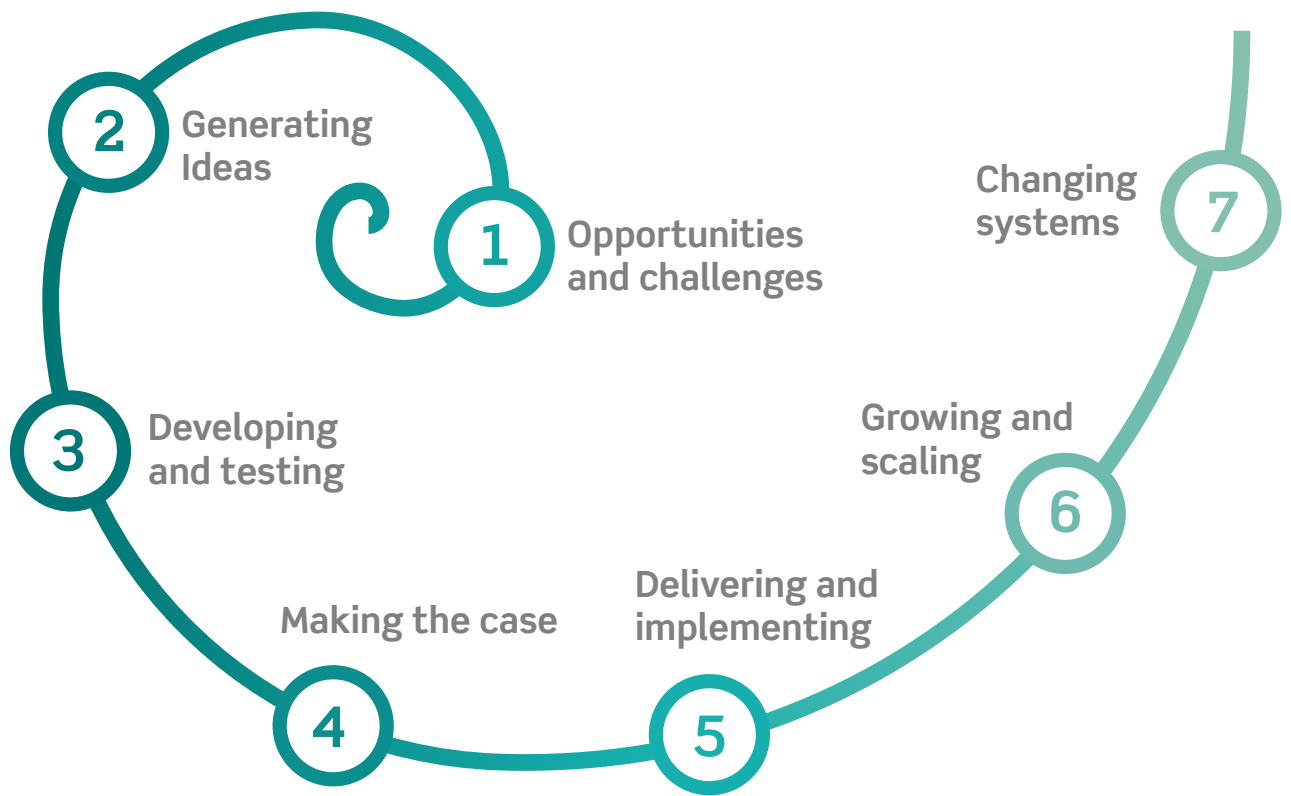
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Figure 8 Source: Murray, R., Caulier–Grice, J. and Mulgan, G. (2010) 'The Open Book of Social Innovation.' London: NESTA and the Young Foundation.

The day started with a live presentation of case studies from **Arduino, Smart Citizens, Provenance, Confine, Goteo and e-democracy site Your Priorities**[127]. The speakers, all leading DSI practitioners highlighted how digital social innovation is often enabled by open data, free software, and open hardware platforms. In many cases, new services cannot be envisaged at the time that these open tools are developed, but they are often driven by users' uptake and community innovation activities. A great example is the Arduino which, as Zoe Romano (Arduino communication manager and head of wearable Unit) showed, has a diverse range of applications from running more efficient cement plants (to reduce energy consumption), to powering digital education tools.

For policymakers, these uses of open systems have implications for how R&I might be funded in the future. Many present at the workshop asked for public funding of innovation to be used in a more open way, and including a strong open access and open standard policy, so as to unlock technologies on which others can build useful services and networks. The traditional emphasis on roadmap-driven programmes and research needs to be complemented by bottom-up initiatives.

The afternoon of the workshop began to crowd-source policy ideas from participants. This focused not just on particular sectors, and levels of governance (from city to global) but also on the different policy tools that might be used such as digital human rights and data as knowledge commons.
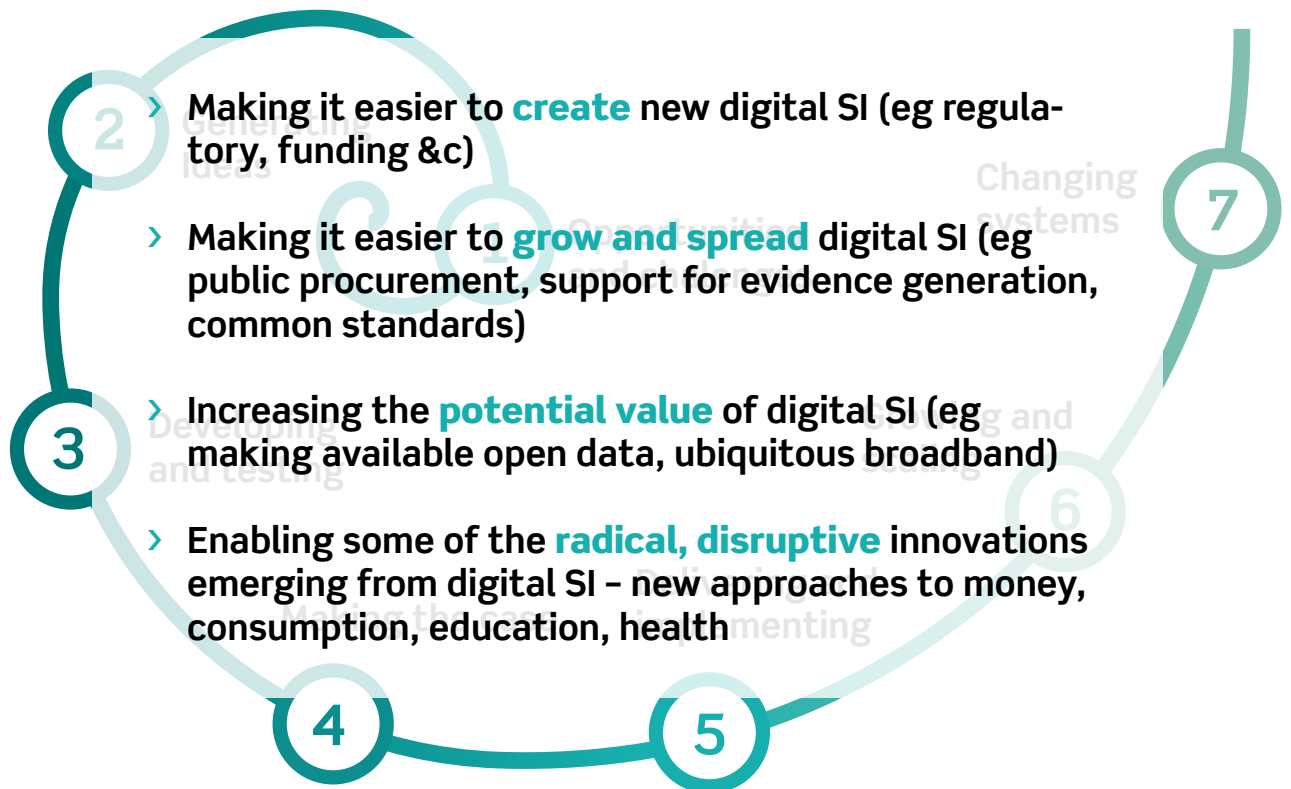
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› Making it easier to **create** new digital SI (eg regulatory, funding &c)

› Making it easier to **grow and spread** digital SI (eg public procurement, support for evidence generation, common standards)

› Increasing the **potential value** of digital SI (eg making available open data, ubiquitous broadband)

› Enabling some of the **radical, disruptive** innovations emerging from digital SI – new approaches to money, consumption, education, health

Figure 9 Policy Goals

5.1 Exploring crowdsourced policy ideas organised by categories

As main outcome of the workshop, 9 DSI policy areas were identified (see the livesketching) and over 30 DSI policy ideas emerged. Ideas were clustered together according to key common themes and the Table below shows the breadth of thinking. These areas of policy were further worked on during the day, with European Commission officials providing their responses to the ideas which emerged. The reality of developing good policy is that it can be rather boring, laborious and is often filled with compromises. But inspired by the passion of the people in the room, this workshop did a good job at bringing people together to discuss how Europe might just be the best place in the world to nurture digital social innovation.

In the spirit of Digital Social Innovation after the workshop the debate continued online using the Your Priorities platform[128] to debate the ideas and to prioritise the ones that could be implemented at EU level. Your Priorities is a web app that allows people to submit new ideas, debate and discuss ideas and vote up or down based on their priorities. The key element of the platform is a simple but powerful debate system to help improve the quality of the online debate. Each point can only be 500 characters and people can mark points as helpful or not helpful resulting in a list of the best points for and against. Both sides of the argument are equally represented in the user interface and this is highly effective in facilitating consensus and in the inclusion of minority arguments.

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The diagrams and the table below show the policy ideas that were generated in the workshop

Figure 10 DSI policy ideas generation

	Crowdsourced Idea	Motivation for Idea
Copyrights and Open Access	Open Standards for social, identity and payment data Many US companies have patents on identity, social and payment data. There is a need to require the European Public Sector and EC funded projects to not fall into this trap and provide open data sets on social, identity and payment.	Many US companies have patents on identity, social and payment data. There is a need to require the European Public Sector and EC funded projects to not fall into this trap and provide open data sets on social, identity and payment.
	Public data sets available to encourage innovation	By ensuring there are open data sets available from the European public sector and EC funded projects will remove barriers from social innovators who often rely too much on Facebook, Twitter ect. for data. It will create more space for innovators to build easier and better tools.
Impact and Measurement	Implement social value model into all policy measurements Put in place new guidelines that create a new social value model for evaluation and measuring policy measurement	Would help change the way policy making happens and will help enable policy makers to look at the bigger picture. This could involve getting EU council to adopt beyond GDP measures.

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Funding models and in- struments	Timefunding, crowdsourcing with time We are studing the way to allow pople to use their time as asset and allow us to give us mutual credit in order to help projects go life. Time its a coin we allready have and can be easly creat- ed with social task like many examples arround the world	To allow us to be able to use our time as currency Time can be used as currency and empowers people with the chance to give and receive credit to lean and be helped by others
	Align EU funding Align EU Regional Fund spending with EU Strategy for DSI /CAPS. Streamline use of funds within a Europeans strategy to help scaling DSI/CAPS initiatives .	Streamlining funding will help increase the num- ber of DSI/CAPS initiatives and provide a holistic frame work to support them.
Digital Human Rights	EU public Digital ID to enable citizens to control their digital ID Create an European wide distributed and standardised public digital ID for all citizens	Powers of companies such as Google and Fa- cebook have a lot of control over an individual's online identity. By creating a standardised public Europe-wide digital ID would ensure individuals have greater autonomy and control over their online identity.
	Guidelines and rules to ensure privacy, fundamental freedoms and rights in the digital environment	Protect individual privacy, rights and fundamental freedoms There is increasingly more personal and social data available online which threatens individual privacy and freedom. By having set guidelines and rules on this data and helping individuals maintain control over their own data will prevent infringements on privacy.
Citizens engagement and feedback	Democratic and distributed social network Social network based on open source code to promote the most interesting news decided by the people, send- ing links and voting. Based on the open source code of Meneame.net, but with a new user interface more similar to actual social networks like Facebook or Twitter. I would call it Yups.com: Yups for the positive votes and Oops for the negative ones. I've started right now the nonprofit project, but all help is welcome to spread the news important for the people, instead other interests.	
Enabling infrastructures	Funding a Public-Private-People Partnership (PPPP) on distributed architectures in order to: create an open decentralised digital ecosystem including open data distributed repositories, distr buted cloud, distributed search, decentralised social networking, public identity management, and encrypted email service.	The internet ecosystem today is highly centralised The current Internet is dominated by a handful of mainly US companies that control all the lay- ers of the tecosystem (app store, cloud, machine learning, devices), and are imposing their rules of the game. Europe needs to invest in future infrastructures that reflect the European values, support SMEs and civic innovators and deliver public good. Distributed, privacy-aware enabling infrastructures can also re-establish trust.
Ecosystems and Innovation labs	Establish an EU Innovation Lab to support, facilitate and foster more innovation and DSI projects	Combat the lack of legitimacy and coordination of DSI initiatives within the EU by creating a space within the EU Commission to support and promo- te DSI.

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| Sector specific regulation /deregulation | Net Neutrality and banning software patents
Banning software patents and continue to campaign for the internet to remain a neutral space. | Keep bottom-up innovation feasible and affordable. Software packages that are patented can be expensive making them less accessible and not affordable to potential individual innovators. Also the internet needs to continue to be a neutral space where creativity can continue to flourish. |
| | Gender Equality in DSI
Promote gender equality in DSI by tackling things such as criteria for funding, visibility ect. | Improve diversity in DSI. DSI disproportionately males dominated. Less diversity can hinder innovation as there is less variety of people doing DSI. |

Table6: Crowdsourced policy ideas

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5.2 The BETA "Bottom-up" policy workshop toolkit:

As outcome of the DSI policy workshop, we have designed a Bottom-up Policy Toolkit for practicioners and policy makers to run participatory policy experiments that can produce innovative policy ideas and solutions:

Step 1:
Get a wide range of people in the room.
The workshop should include practitioners, industry representation, academics and policymakers.

Step 2:
Start with live case studies from practitioners
- people who run services and who know what the problems/challenges/opportunities are. Make sure they represent a sample of the type of practice you are developing policy for and that they focus their presentations on what is important for people in the room. As an example, we asked each of our case studies to each prepare a five minute presentation covering the following:

Project background, including key facts (such as when they were founded, turnover, number of users, size of organisation, employees etc)

What they were trying to achieve with their service, including any evidence they have of impact

Opportunities and challenges

What really helped them get their project of the ground and helped them to scale up their work

What the biggest barriers were

that they faced and how to address them (through policy? Funding?)

If they could make three changes to EU national or local policy and funding mechanisms to better support projects like theirs, what would they be?

You can read an example of one of the presentations here. It is important that you leave at least half-fof the time for participants to ask questions from the presenters.

Step 3:
Frame the development process.
Highlight that there are a range of different policy tools to draw on (Laws, regulation, money, standards, skills) and give some sector-specific examples of policies that created a favourable impact. Point out that they don't all have to be big ideas or need to be expensive to implement, and acknowledge the often serendipitous innovation that emerges. (e.g. DARPA led to the creation of the internet, the R&D funding at CERN led to the invention of the Web) Encourage people to think about:

Who could implement it (European Commission, national governments, municipal etc.)?

Who will benefit? What are the barriers? Who are the enemies of the idea?

Does it need money?

What work needs to be done to flesh it out?

You may also want to promote the importance of evidence-based policy-making as a continual process of understanding what works (and what doesn't).

Finally, it's important to acknowledge that policy may not be able to solve some problems. For example, often huge amounts of value can be created by industry bodies working to develop better standards or terms of trade that don't need governments to get involved at all.

Step 4:
Identify the problems/opportunities.
We asked everyone in the room to individually complete this template to quickly generate ideas:

Step 5:
Cluster the ideas together.
For a room full of 50+ people, this needs about an hour in length. We recommend that the workshop facilitator does this over a lunch break. With a diverse group of people in the room, you are naturally going to get a very diverse mix of ideas. Cluster them by the main problems they are trying to address. If you get more ideas than you have working groups, you can ask participants to 'dot vote' on ideas and choose the most popular themes for the working groups.

Step 6:
Get people into smaller groups to discuss the clustered ideas and further develop the best one or two.
This should take approximately 45-60 minutes. Appoint a facilitator to keep the conversation focused and a rapporteur to report back at the end. We reckon 5 is the minimum number of people needed. More than 12 and you'll struggle to let everyone have their say.

Step 7:
Plenary. Ask people to report back to the re-convened workshop.

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Prime some attendees to give a response to the ideas presented. We asked actual policymakers to give their responses to ideas and we also asked the presenters to give their feedback. Finally, test out with the people who presented case studies in the morning to check the ideas are useful.

Step 8:
Summarise the day and issue a call to action.

Encourage people to take their ideas forward. We're using Your Priorities as a platform to promote the ideas to others. You might want people to

pledge some action. We asked attendees to write their pledge for how they'll develop their thinking on

digital social innovation and told them we'll email their pledge back to them after six months (this keeps people on their toes and allows us to re-engage with them after that time).

Step 9:
End on a high. Thank everyone of course. All through the process, remember the golden rule-oft.

running workshops – find engaging presenters with useful information for their audience, lots of participation, encourage networking, focus on action and good coffee
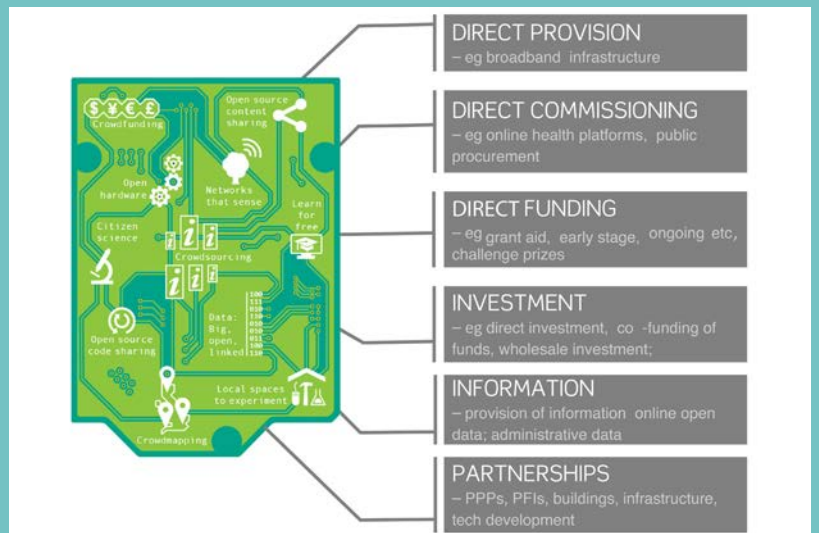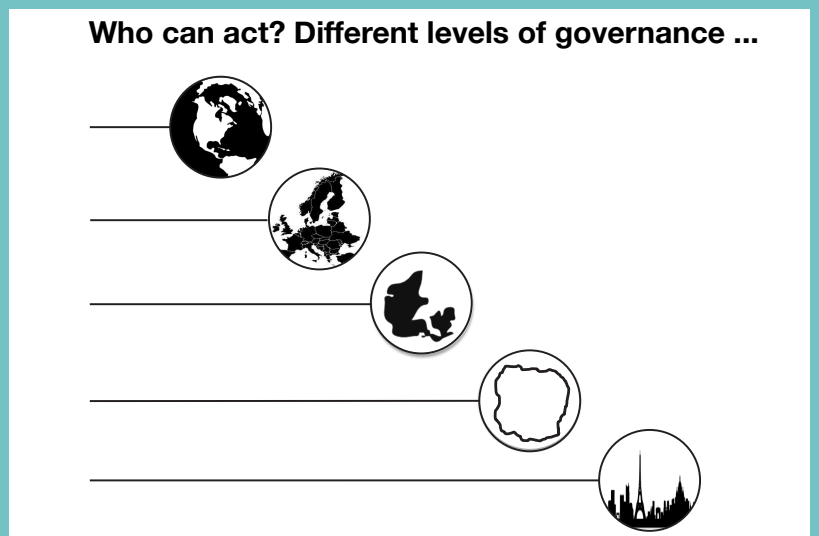

Figure 11 Policy Tools

Figure 12 Governance levels

Figure 13 Policy Idea generation Cards

5.3 Emerging digital innovation policy issues

To summarise the preliminary themes that have emerged from the community of experts and practitioners of DSI, there are a number of perceived future Internet threats (such as concentration of power and surveillance), and six sets of key future policy issues that can start shaping a new DSI research and policy agenda.

A main Internet trend-threat in the current and future Internet ecosystem is recognised today: **an increasing concentration of power** in the hands of a few data aggregators (e.g. over the top players), none of which is located in Europe (Google controlling nearly 82% of the global search market and 98% of the mobile search market, Facebook dominating the Social Networking and Identity Ecosystem, whilst Apple, Amazon and Microsoft controlling the mobile market and cloud-based services platforms).

Furthermore, the Digital economy is now mainly based on business models that aggregate, analyse and sell personal data, turning personal data in what has been defined as the "oil of the Internet economy". Most users have accepted exploitative business models based on privacy infringement and often hidden surveillance mechanisms in exchange for free services. This bargain not only undermines privacy and weakens data protection but also commodifies knowledge, identity, and personal data. European SMEs, developers and social innovators are innovating with cheap open hardware, open source software, open knowledge, open data and analytics faster, and are producing valuable data about people, the environment, biometric and sensor data (as shown in the DSI map[129] but these data are not yet used to enhance the public good at a systemic level.

What needs to happen is to channel more resources and coordinated policy actions to support grassroots and social innovation. There is a common sentiment that a strong public intervention at EU level is needed to properly support these areas of developments which, far from being within the short-term interests of big EU industries, has insofar been left to isolated developers, activists and hackers. Recognising its **strong social value**, besides its strategic contribution to repositioning Europe worldwide, and promoting a coordinated approach to its development, would allow a whole new generation of industrial and social innovation to start in Europe. We outlined here some of the main policy issues and potential areas for intervention:

1. **Distributed architectures:** One big issue is how to provide infrastructural investments such as broadband deployments and pan European digital services that underwrite robust, equal, society-wide access to connectivity. This includes the need for open data distributed repositories, distributed cloud, distributed search, and distributed social networking. It can also include the development of new mobile platforms alternative to Apple or Android) as a kind of "**regulated monopoly**" able to ensure some basic services at European level, on top of which a whole new open ecosystem of services and applications could flourish, in a participatory innovation model, based on open source and open hardware developments.

2. **The Future of privacy, data protection, trust & ethics:** The need for privacy-aware technologies based on trust and ethics is recognised. Recent Snowden revelations and the developments in the security and intelligence services have shown a fundamental weakness in notions of end-to-end security that over-impact the requirements of our systems. A EU platform able to rethink notions of privacy, trust and security by design is needed and related technical solutions that are privacy enhancing 'by design'. It would also render all current intelligence operations against the EU ineffective from the very moment of its implementation. If the environment is unstable and insecure it will be broken. Users should be able to set the terms for controlling their personal data, including data portability. In the IoT there will thus be a social contract between people and objects with ethical implications. An alternative framework is also needed to provide an **open architecture for managing online identity, security, and personal data** in an integrated fashion and based on democratic and participatory processes. The **EU data protection reform package**[130] currently being discussed by Member States is moving in this direction, trying to build a single and comprehensive data protection framework to develop tools and initiatives to enhance citizens awareness, and ensure that businesses receive guidance on data anonymisation and pseudonymisation.

3. **Open & Big data for the Social Good:** The main questions in a data-driven society emerge around new governance modalities for Big Data, collective ownership of data, data portability, and how to valorize data as knowledge commons). Citizens should trust the institutions that control and negotiate their data and take decision on their behalf. Users' social graphs (personal attributes, friends and relationships) and "interest graphs" (what people like and do) are harnessed and sold to advertisers to extract and 'mine' targeted market information. The question is how to assure user control over personal information in an ocean of commercially valuable Big Data. Technical Solutions do not work by themselves, therefore legal and commercial solutions have to be based in technology and integrated with the appropriate policy framework. Defining sensible governance modalities for big data will requires a large collaboration between public and private actors.

4. **Public federated identity management for the entire EU**: Identity Management is becoming a very important issue in the digital economy, since social interaction and relations are increasingly mediated by the network and their instruments. The aggregated data extracted from the analysis of our identities (what companies define as "social graphs") and behavioural patterns of the user, is continuously mined and analysed with the main objective of maximising value extraction (e.g. for marketing, economic competition, and surveillance). A broader investigation and the understanding of the implication of such mechanisms are crucial for the understanding of future bottom-up digital economies. The agency that public or private providers have today on identity is mainly at device level. The device controls which platforms it talks to and the platform determines which services, products or spinoffs are supported. One innovative idea proposed during the policy workshop was to turn the current passport (a piece of paper or plastic with a chip) into an open source mesh-networked device (a chip with a screen). Security will be hardcoded into the device. The device allows talks to only EU platforms (IoT-A, Fi-ware…) and the platform will offer interoperability to preferred non-EU partners. This framework would allows for a 500 million market overnight that is able to build its own open infrastructures for the general interest.

5. **Open access, open standards, and Copyright reform:** Access to knowledge is a founding principle of any open and democratic society. Regulation and policy can play a key role in network neutrality, open standards, open access, and common frameworks preventing abuse of dominant market power. Regarding open access to scientific results the EC is promoting a comprehensive **Open Access policy**[131], so that results of publicly-funded research across EU Research Framework Programmes, namely FP7 and Horizon 2020 can therefore be disseminated more broadly, to the benefit of researchers, innovative industry and citizens. In the area of copyright, the European Commission just published its '**Report on the responses to the Public Consultation on the Review of the EU Copyright Rules**'. This report summarizes the responses (over 11,000) that the Commission had received in reaction to the copyright consultation held between December 2013 and March 2014. The results are very polarised, showing conflicting positions between citizens and institutional users on one side and right holders on the other. Copyright can only work when it is perceived as fair by all stakeholders, seeking the right balance between the interests of creators (to control their work and to be able to make a living of their creativity) and the interests of society (access to information and culture, freedom of expression) (Keller, 2014)[132]. Such patterns in public policy consultations show that stakeholders' involvement is crucial, and that the Commission should engage citizens and other public institutions as genuine stakeholders in discussions about key policy issues and the formulation of policy actions.

6. **Mobilising Collective Intelligence to grow new Digital Commons:** Digital social innovation projects are generating new forms of digital commons, and it is crucial to identify models of organisation of collective resources to achieve sustainability and to scale DSI. New business models based on sharing resources (such as energy, talent and tools), fair distribution of the fruits of collective intelligence, trust and reputation should be experimented and pioneered. Building and governing digital commons honours participation, inclusion, empowerment, equal access, and long-term sustainability. This research is showing possible ways to manage the commons and economic alternatives models based on new institutions of shared, common wealth, grasping the value of networked social production.

5.4 Preliminary Recommendations on innovation policies

After reviewing the literature on open innovation, defining what an innovation ecosystem is and analysing the different communities of such ecosystem, some areas of public intervention have been identified. Thus, in this last section, we will end with recommendations to improve innovation policies in Europe. These recommendations are quite general and have mainly to do with the policy-making framework. In the final study report, we will examine them in-depth.

Our first recommendation is that public policies in innovation have to be innovative. Because of past failures, innovation and innovation policies cannot be thought as they were conceived in the past. The traditional public policy analysis framework has to adapt to the knowledge era, paving the way for the emerging **open public policy innovation model** in which governments make use of external and internal sources of information to develop novel policy solutions. Open public policy innovation represents an iterative problem-solving process in which inflows of knowledge from external actors as well as information about their behaviour equip policy makers with a generative capacity for developing novel policy solutions. Such policy innovations are superior to policy solutions that are developed internally – inside the ministerial boxes.

Secondly, this same philosophy has to be applied to the innovation policy itself. In this respect, a shift from closed innovation inside the boundary of institutions to open and collaborative innovation is required.

Innovation should no longer be seen as a linear step-by-step process in which R&D activities automatically lead to innovation and commercialisation of new products, but as a complex, dynamic, and interdependent process of all organisations and stakeholders: a broad concept of innovation, both research-driven and innovative in business models, design, and services that adds value for users and strengthens overall European added value. Innovation should no longer be the result of top-down push technology strategies but of a **crowdsourced way of working**. In this context, policy (at all levels) can play a key role in creating coordinated strategies, common governance frameworks, and new instruments to achieve common innovation challenges in specific domains. This challenges the traditional role played by governments that, more and more, have to be seen as platforms, that is, as conveners and enablers rather than the first movers of innovation.

Thirdly, innovation policies need to be more **experimental.** This would allow discovering or testing novel instruments, products, or services and thereby propelling broader-based innovation policies. Although, as stated in section 2, the European Union has already implemented some programmes that give support to experimental social innovation, more investment in this area is needed. Policy-making should encourage social innovations to be tested and implemented in specific social settings.

Innovation policies also need to be more **targeted**. Our analyses of the innovation ecosystem communities have let us identify failures and needs of support within each community. Although some of them coincide (lack of funding, visibility, and technical support, or lack of connection, to give a few examples), there is a need to formulate specific objectives for specific communities, tapping into behavioural mechanisms and, therefore, offering their actors the right incentives to push participation in the community and, as a result, to boost innovation.

Innovation policies should **go beyond regulation and funding**. Regulation matters, particularly regarding certain issues as open access, open data, open standards, and public sector information re-use, topics already tackled by the European Commission (see, for example, the Guidelines on Open Access to Scientific Publications and Research Data in Horizon 2020 or the PSI Directive, the Directive on the re-use of public sector information). Actually, we believe, as can be concluded from sections 4 and 5, that digital social innovation is a lot about open knowledge and open data policies. Therefore, regulating open data standardization across Europe or setting up a European open data agency would be interesting ideas.

Funding is critical as well. The analyses of communities have shown that the lack of money hinders innovation within the communities. In this respect, section 5.1 has shown that many different programmes and supporting schemes have been used over time. However, funding programmes are top-down and do not involve actors and stakeholders actively and proactively. Therefore, innovation policies have to address other issues, that complement funding and regulations. Knowledge sharing and dissemination, capacity building, support studies and scientific research, and enabling infrastructures are a few examples.

Of particular importance is **support to enabling infrastructures** (such as open networks and distributed architectures) for they contribute to developing a climate that is conducive to boosting social innovation. Section 5.4 has presented each community's enablers, stressing their roles and characteristics. Although many of these intermediaries offer technical support services and networking activities, a lot remains to be done in order for them to reach a wider audience and to guarantee impact. Europe, for example, needs more civic accelerators but, also, regarding existing infrastructures, more fiscal incentives are needed as well as a legal space that could give more structure and governance and, therefore, make the most of intermediaries and enabling infrastructures.

Our analyses have also identified a gap between the so-called innovators (no matter which community they belong to) and the public sector that has to scale the innovations and fund them. We therefore recommend having public policies aimed at bridging this gap, at **integrating (local) governments and innovators.** Other than e-procurement and contracts, we recommend exploring other types of arrangements.

We finally want to add that innovation policies t. Edler et al (2013) conclude that, despite the existence of studies and evaluations, there is not much evidence on what really works and what does not. Knowing what produces results and what does not would immensely help policy makers to drop those policies that do not have an impact and to improve investment in those that really work. This is, therefore, also a recommendation related to policy making to support digital social innovation.

There is room at all levels to support digital social innovation. Each administrative level may play different roles. Innovators act locally but they may belong to wider and transversal networks. Local governments should, for example, offer local (economic) incentives for local innovators belonging to local communities. At the other end, European policy makers could strengthen the link among communities, support local and national governments, or coordinate transnational actions. But action is needed at all levels.

6. Analysing network data: Exploring DSI Network effect (WP2)

In order to analyse the relationship data from the mapping, we are adopting social network analysis to detect patterns of relations and argue that the causal success of DSI located in the social structure. By studying behaviours as embedded in social network structures, we will be able to explain macro and meso-level patterns that show the dynamics in which DSI organisations and their initiatives create scalable results and what DSI organisations are in need of help. One of the primary problems facing the mapping of an open-ended field such as DSI is how to direct the multiple diverse streams of data from interviews to social media into a central repository capable of giving a "big picture" of European DSI that can provide strategic recommendations for the EC. In combination with our hybrid iterative strategy of case study interviews, workshops, and events relevant to the communities, we believe we can identify and map these actors in a way that has hitherto not been possible.

Social networks are formally defined as set of nodes (or network members) that are tied by one or more types of relations (Wasserman and Faust, 1994). The data collected at http://data.digitalsocial.eu network represents DSI organisations and their social relationships mapped in the form of graph that is a collection of nodes and edges between them. In the case of the DSI social network collected in this study, the nodes in a graph are communities, and the edges represent joint projects. This social network analysis examines the structure and composition of DSI organisations ties in a given network and provide insights into its structural characteristics, such as the centrality of actors in the network; the number of individual connections; the number of communities; the least connected outliers; and the large-scale structural distribution of the ties that exist in the network and so on (Newman 2010).

Through our approach of **mixing open data analytics with human-centric interviews/case-studies,** we can better understand complex phenomena and socio-economic and environmental trends. Thisadvances the mapping of the field and our understanding of how to create new and powerful structural links among existing groups and initiatives. This goes far beyond just making a quantitative and visual picture of a network, but provides qualitative explanations of the European DSI network structure functions, through insight into the otherwise hidden dynamics of DSI that can only be revealed by case-studies and interviews. Furthermore, this visualization of the DSI network, embedded in our website, is interactive and aims at engaging the larger DSI community itself. This means we can use this ever-expanding visualization and network database as a tool for "crowd-sourcing" even more information about DSI in Europe, to prevent the network mapping from going out-of-date.

We will continue to strengthen these communities by using network-driven analysis to build crucial missing links in our open events, such as during the Open Knowledge Conference launch that directly engaged key communities. Finally, this analysis will then feed later work packages such as WP5 and WP6 in order to determine what recommendations on a policy and instrument level are needed for the EC to knit the map of DSI actors into a coherent single integrated EC DSI network, therby achieving the **"critical mass" necessary to harness the collective intelligence of DSI organisations to solve** large-scale European social problems.

6.1 Network Analysis Methods

One of the tasks of this second interim report is to both determine how the current data can help to answer a set of strategic questions around DSI. First, an adequate and rigorous conceptual framework is needed. Only with such a framework can data and hypotheses be interpreted in a sensible manner without projecting pre-conceived, and often wrong, assumptiosn onto the data-set. In particular in the longer term, this requires both an **unbalanced sample**, in which we assume the data adequately reflects the empirical phenomena at hand, and **significance testing**, as network-based data often assumes a non-Gaussian distribution such as a power-law.

Phrasing both the null hypothesis and alternative hypotheses in terms of network theory must be done with care. There must then be enough data to adequately test the hypotheses, using mathematical techniques that can statistically quantify the level of confidence in the proof of the data for any given hypothesis. For non-Gaussian distributions such as power-laws, traditional t-tests against Gaussian distributions and even traditional statistics around averages and means are scientifically invalid134. However, in this second interim report we cannot yet engage in this work, due to the small and mostly disconnected data-set we currently have gathered, where it seems there is a large bias towards the United Kingdom and DSI partners (as should be expected given that the partners have been in charge of outreach). We have, therefore, limited ourselves to a more broad-stroked analysis of the data. From this analysis will come a number of hypotheses that we will more rigorously quantify and test in the final study report.

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In the **DSI Network Data-Set**, there are a total of 581 organisations with a total of 364 activities as of 4 August 2014. This more than doubles (the addition of 296 organisations) from 13 December 2013, where only 285 organizations were involved in the analysis. It seems most of the organisations adding themselves to the map are the result of the outreach effort by partners. We still have concerns that the data-set is heavily biased towards English speakers due the lack of translation of the website into languages outside English. We still believe that many more actors in countries such as Italy, France, or Spain where fluency in English is not to be expected would respond if the survey itself was translated into those three languages. Howver, the website was not designed using standard internationalisation techniques and adding them is outside of the budget allocated for this project. We would argue that future work after the end of the DSI project should allow the website and survey to be available in a number of different European languages, so that the data-set will be a more representative sample of digital social innovation in Europe. We earlier estimated that we need approximately 1,000 data-points, with a fair amount of connectivity. Currently we still have only half the data we need for a full analysis. However, we can "eyeball" the results of the data-set and determine general trends, as well as commence with a basic quantitative analysis.

6.2 What is the distribution of social innovation across Europe?

Is social innovation done by a few large actors (an exponential distribution)? Or a few large actors in concert with a large mass of smaller groups (a power-law distribution?) Or is social innovation more evenly distributed between various actors (Gaussian "normal" distribution)? In order to determine this, for all the organisations we map their **degree**, which is for a given node (organisation) the number of connections (links) it has with other nodes (organisations). Interestingly enough, as shown in Figure 1, the data is mostly disconnected. There are only 136 organizations with connections to other organisations (23%). It appears that the vast majority of DSI organisations in Europe are disconnected from each other. However, this is not surprising because in organic systems there are often non-normal distributions such as "power-law" distributions.

Indeed, if we graph the data-set **of only connected organisations**, we can see a clear "power-law" style distribution arise, with the vast majority of the organisations in networks having only one link with another organisation (dyads) or 3 links (triads) with other organisations (54%), but there appeared to be more organisations with five links (13%) than with only 4 links (7%) so the relationship is not strictly linear. There is then a dip in the number of links, although a surprising number of organisations with 10-20 links (13%) such as "Institute for Network Cultures" and iDrops vzw. At the very top of the list, there are two organizations with more than 20 links (Nesta and FutureEverything), and the most connected organisation (Waag Society) has 37 links. Overall, there is an average degree of 3.985. This shows that while a small number of organisations are heavily networked with a few like Nesta and Waag Society having networks spanning many countries, the vast majority are not and have only partnerships with one or two other organisations. We would hypothesize that the degrees of connection between digital social innovation are a power-law because there are a few heavily connected organisations with over three connections and a vast long tail of not very well connected organisations (89% of entire data has three or less links, including zero links). In the final version of the report, we will do significance testing on this hypothesis with a larger data-set. The distribution of links is given below, where count is the number of organisations and value is the number of organisations in Figure 14. We also then graph the network, where the size of a node is increased by how many connections it has in Figure 15.
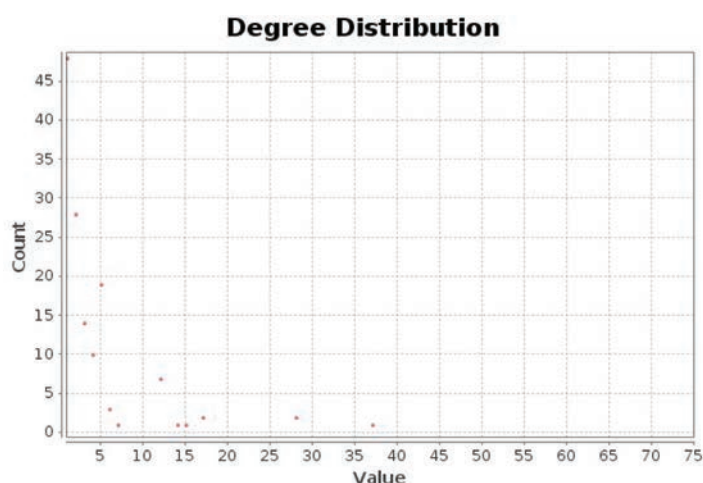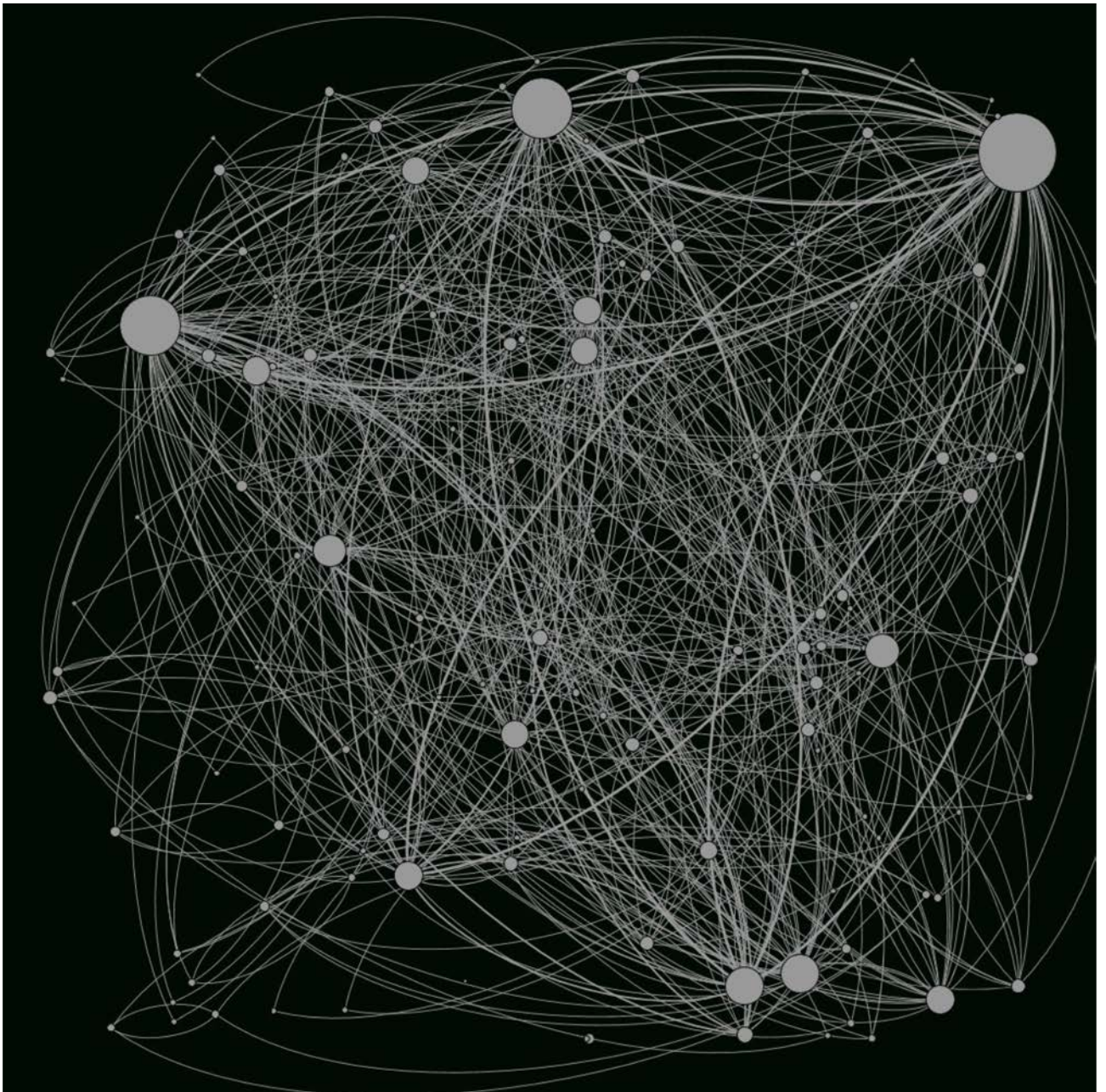

Figure 14 Distribution of DSI Connections in Europe

Figure 15 Visualisation of DSI Network

6.3 What communities of social innovation exist in Europe?

Community detection algorithms can be used to find dense substructures (often called "communities") within a larger and often sparse network. A community exists when a network is partitioned in such a manner that nodes within a community are more densely interconnected than those outside of the network. In particular, to quantify communities we looked at connected components, i.e. graphs where every member was connected. In terms of measurement, the modularity of the DSI network is .62, where modularity is the percentage of the connections that fall within the given community minus the expected such links if they were randomly distributed (Newman, 2006). This reveals that the there are robust communities. Interestingly enough, visually inspecting the communities found in the network of digital social innovation organisations, shown by the Force-Atlas135 diagram in Figure 3, reveals that there are 24 total communities, based on one very large inter-connected community and many very small communities (23) where these small communities do not have connections to the larger "super-community" developing in digital social innovation as well as to each other.

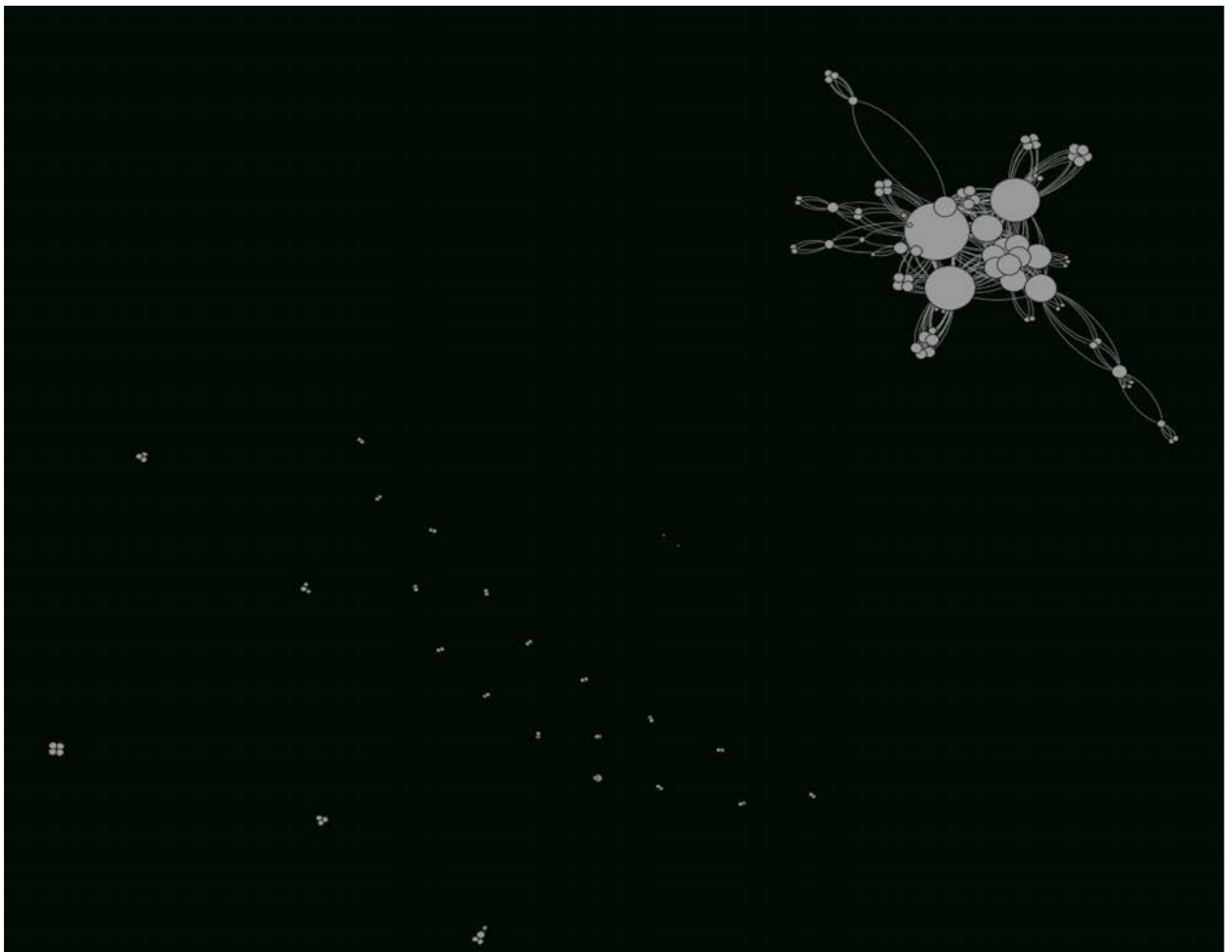**DIGITAL ——
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Figure 16 Diagram of Communities in the DSI network

This is revealing, insofar as we could have imagined that the digital social innovation network could have had three or four disconnected large communities, or that all smaller communities were simply composed on a single lone organisation being linked to another very heavily linked "super-connector" organisation (as would be the case in a graph of links to and from Wikipedia, for example). In detail, there is a clustering coefficient of .887, signalling a fairly high density of interconnections in existing communities (Latapy, 2008). The way to interpret a clustering coefficient is that it is the measurement of how likely it is that the organisations linked to each other are also linked. The super-community itself has some very long connections though, and so connects a number of otherwise disconnected communities through a large number of links, as the network has a network diameter of 7. Not surprisingly, again the "giant hub" or "super-network" of the digital social innovation network in Europe is itself heavily interconnected, and so it is not a single organisation monopolising all the influence, but many smaller ones who start networking with each other via contact with one of the larger super-connector organisations. For example, we can imagine that by contacting an organisation like Waag Society, an organisation that would be otherwise be isolated, such as a FabLab in Hungary, and then find many other FabLabs and start networking appropriately. This naturally leads us to the question of how to join the various communities.

6.4 Which organisations currently bridge the various communities?

Simply measuring centrality may fail to show which organisations act as crucial "bridges" between different kinds of networks. While a few highly connected organisations are important, organisations that connect otherwise disparate communities are crucial. This can be measured by using betweenness centrality, where the centrality of an organisation is measured by counting the number of times a node occurs as a shortest path between two other nodes. Interestingly enough, the **between centrality** shows that while the network diameter is 7, the average path length is 2.78. The betweenness centrality is spread in a very similar way to the degree distribution, which is not surprising, as shown in Figure 17.
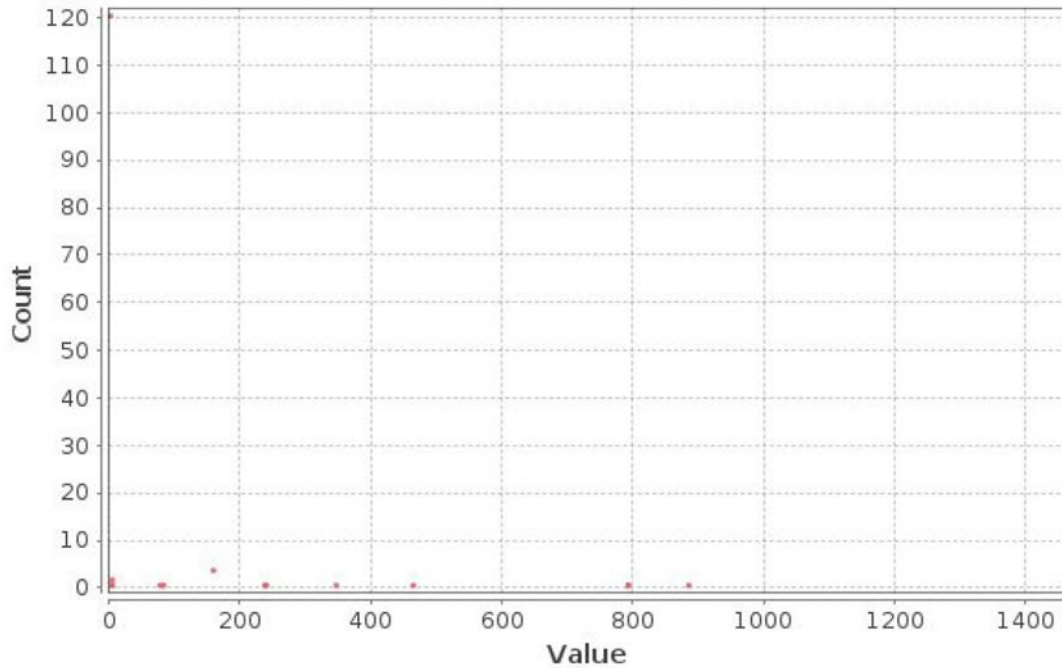
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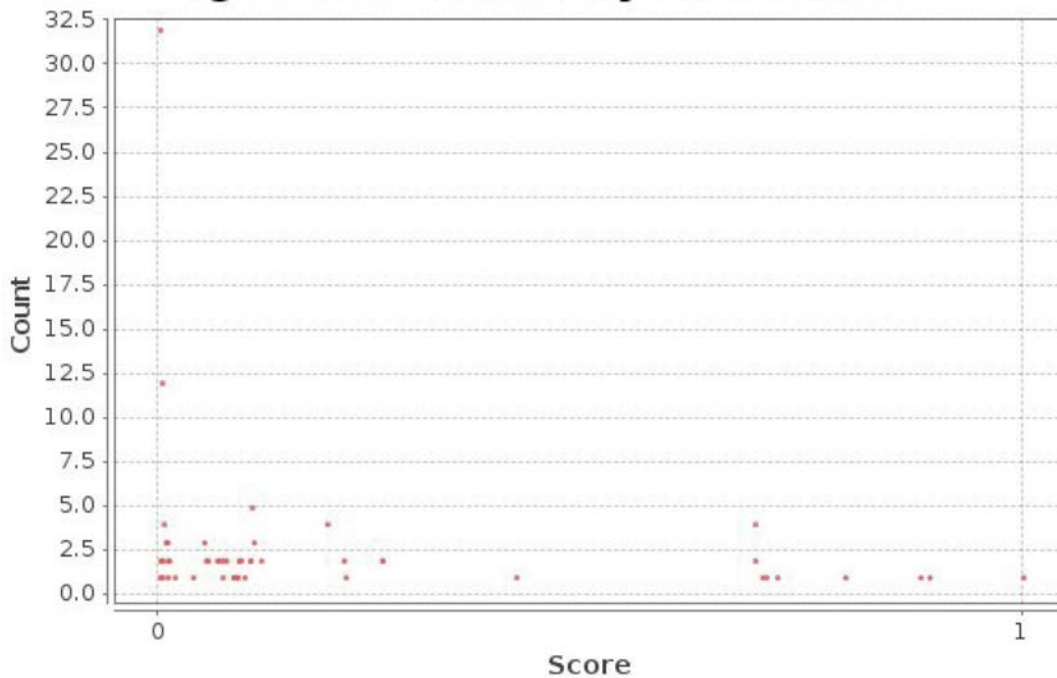
Figure 17 Betweenness Centrality

Figure 18 Eigenvector Centrality

What is more interesting is the **eigenvector centrality**, which shows how well-connected an organisation is to the parts of the network with the greatest connectivity. Thus, even if a organisation is not central with many possible links, it may only be a few links away from dense communities of well-connected organisations. This measure can be thought of as a measure of resilience. As shown by Figure 5, while betweenness centrality is spread very thin, due the networks being quite interconnected in the super-community in Europe, the eigenvector centrality is spread out much more evenly in Europe.

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In summary, what is revealed is that many European social innovation actors are unconnected to each other, as there is only on average 0.93 links per organisational activity when organizations with no links are counted. Also, as mentioned earlier, in particular there are 444 organisations out of 581 (76%) that have no links to other organisations. The network is mostly dyads and triads of organisations. There is not simply a few large clusters that should be bridged, but *many completely isolated and very small networks that need to be connected to the larger single European Digital Social Innovation super-network.* If we take our data at face value, for the most part that does not seem to be happening organically.

This means thatthere is an opportunity for the European Commission to connect the very small networks and lone organisations to the larger super-network. This could happen via European projects or networking events. Given that the larger super-network is very international but nonetheless centred around the United Kingdom and the Netherlands, there should also be more of a push to get the rising smaller networks to meet each other. The creation of the super-community is also likely not merely a linguistic artefact, since it features heavy connections with France. It is also likely not just sampling bias in favour of the partners in the DSI study (although that clearly plays a role). For example, Open Knowledge Foundation and Forum Virium are both not part of the core DSI study team and yet have very dense roles in the super-community. It appears most of the smaller networks are local, such as those in Italy and Spain, and many countries have many disconnected small networks that would be benefit from increased networking, even in countries where more international links are being made, such as Germany. A precise analysis of how the small networks relate to the super-community and their relationship to particular countries and European efforts should be done in the next report.

6.5 What are the conditions for scaling DSI?

First, we have to determine what "scaling" DSI means? Likely it means that there is a dense, resilient network of digital social innovation throughout Europe. However, as has been demonstrated, European digital social innovation is still heavily disconnected. Given the previous analysis, it is still difficult to tell what the conditions for scaling DSI are, but much can be determined by looking at the characteristics in detail that formed the DSI European super-community. We can then determine what the likely attributes are, in terms of funding and other related characteristics, which led the DSI super-community to form in the first place.

We can also do a number of theoretical experiments by determining how a number of other influential well-placed hypothetical connections could be what???, by "bridging" the nodes of disconnected communities and measuring the impact on centrality measurements and re-partitioning the communities. One use of this technique would be seeing if added a new connection between organisations causes a "phase shift" in the level of self-organisation of the network of social innovation in Europe. This qualitative notion of a "phase shift" is normally captured by a network transforming from a non-interconnected network to a small-world network, where the network diameter would be vastly shrunk and the average eigenvector centrality would raise rapidly despite only a small number of links being added. However, we need to wait for a more thorough analysis when data has been added, given that otherwise the experiments will be very hypothetical and possibly erroneous – for example, it is likely that there are other networks that have not been captured yet in this sample, which would vastly change any experiment. However we can "eyeball" that such new connections would still make the point that the most productive "phase shift" would likely large amount of between the super-community and isolated networks that could be brokered by the European Commission. Thiswould likely increase the self-organisation of a single European digital social innovation community???, rather than enabling the continual strengthening of the already rich density of the existing DSI super-community or trying to build a competing super-community.

6.6 Next Steps for Network Analysis

What does this mean for our study? In general, although we have begun a rigorous quantitative network analysis, before doing precise hypothesis testing with significance tests as well as simulations to determine how to maximize DSI scaling, we muct (1) still collect more data and to take into account the fact that (2) our hypotheses, while refined in light of the early results shown here, should be properly quantified. While we have approximately doubled the data we gathered in the first phase, we will need to almost double that amount again to get the kinds of robust results we want, namely to around 1000 organisations. Lastly, ideally these organisations would be interconnected. Also, it is possible that some of the networks are not being entered into the survey due to difficulties with the user-interface. Regardless, the initial network analysis results are already interesting and showing that a single digital social innovation network in Europe is possible, but that lots of work must be done to connect the many disconnected local digital social innovation organisations to the larger European network.

7. Understanding and measuring the impact of Digital Social Innovatio

Just as it is the case with social innovation, digital social innovations need to demonstrate their impact to make the case for scaling and attracting funding opportunities. Even if it is impossible to foresee the precise impact and quantify the multiplier effect of the mapped DSI activities, there is a need to harmonise sound metrics to assess the impact of DSI activities, including the role of ICT networks, number of people/communities involved and "beyond GDP" criteria such as social satisfaction, wellbeing, ecological footprint and social inclusion. In its work on social innovation Nesta has developed its Standards of Evidence framework.136

The five levels of evidence are:

Level	Expectation	How the evidence can be generated
Level 1	You can give an account of impact. By this we mean providing a logical reason, or set of reasons, for why your products/service could have impact on one of our outcomes, and why that would be an improvement on the current situation.	You should be able to do this. yourself, and draw upon existing data and research from other sources.
Level 2	You are gathering data that shows some change amongst those using your product/service	At this stage, data can begin to show effect but it will not evidence direct causality. You could consider such methods as: pre and post survey evaluation; cohort/panel study, regular interval surveying
Level 3	You can demonstrate that your product/ service is causing the impact, by showing less impact amongst those who don't receive the product/service.Z	We will consider robust methods using a control group (or another well justified method) that begin to isolate the impact of the product/ service. Random selection of participants strengthens your evidence at this level; you need to have a sufficiently large sample at hand (scale is important in this case).
Level 4	You are able to explain why and how your product/service is having the impact you have observed and evidenced so far. An independent evaluation validates the impact you observe/generate. The product/ service delivers impact at a reasonable cost, suggesting that it could be replicated and purchased in multiple processes. locations.	At this stage, we are looking for a robust independent evaluation that investigates and validates the nature of the impact. This might include endorsement via commercial standards, industry kitemarks etc. You will need documented standardisation of delivery and you will need data on costs of production and acceptable price point for your customers.
Level 5	You can show that your product/ service could be operated up by someone else, somewhere else and scaled–up, whilst continuing to have positive and direct impact on the outcome and remaining a financially viable proposition.	We expect to see use of methods like multiple replication evaluations future scenario analysis; fidelity evaluation.

This framework is used by Nesta and other organisations involved in developing and/or funding social innovation to:

1. Assess the evidence behind programmes, products and services to see where they are currently placed on the Standards of Evidence, enabling funders (public and private) to understand how confident they can be in social entrepreneurs claims of impact and/or the potential for this.

2. Help social innovations or organisations working with social innovations to structure the evaluation strategy to continue building the evidence behind the intervention and to move up the levels of evidence.

3. To determine future funding decisions, and help funders (private and public) to measure the impact of all the products and services they fund, helping to build an understanding if and how the funded interventions are working, and whether they should receive continued investment.

4. As the basis for understanding and assessing the evidence of impact for a specific intervention or service. One example of this is Nesta's work with the UK Cabinet office on The Centre for Social Action Innovation Fund, which uses the Standards of Evidence to assess social innovations that are considered for support. Add sentence on digital element of the fund.For digital social innovations to be sustainable and to scale, they will need to demonstrate how they can evidence their work and progress from level one and onwards.

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9. Next steps

The activities listed above have been successful in helping us map over 500 organisations, establish the term Digital Social Innovation within the community and to begin to understand the community and how it works. However, we are we need to continue our engagement work to increase our reach in to the DSI community. The remainder of this project will be focused on a number of key activities:

- **Deliver final study report**
  The last deliverable on the DSI Research Project is the Final Study Report, which will be submitted to the Commission in November 2014. The final study report will include lessons from our Research in WP1, WP2, WP3 and WP4 on defining DSI, mapping and analysing DSI organisations and networks in Europe and developing policies to support DSI. In particular the report will set out visions and recommendations for how EU, national, regional and local policy makers and funders of social innovation, can best support the growth of DSI in Europe.

- **Deliver final event in Brussels, December 16th**
  Organised in partnership with the CAPS projects, the final DSI event will present the findings from the research project to a high level audience of 400+ policy makers, practitioners and members of European Parliament. The focus of the event will be twofold, as it will seek to ensure the uptake of the recommendations from the final study report, and ensure the on-going support for facilitating the www.digitalsocial.eu community.

- **Map up to 800 – 1000 organisations on the map at www.digitalsocial.eu** Alongside developing policy recommendations our key priority remains engaging DSI organisations in the www.digitalsocial.eu community. Our aim is to engage 800 – 1000 organisations by the end of the project.

- **Deliver a number of DSI related Events in the autumn 2014.**
  We have a number of events planned for the Autumn 2014 including the Living Labs summer school and Crowdsourcing week. Both workshops will help us test policy recommendations and ensure further engagement from the DSI community.

- **Develop a sustainability plan for www.digitalsocial.eu to continue to grow the DSI community across Europe and beyond**
  It is still unclear who will own and facilitate the www.digitalsocial.eu community, including its social media presence (500+ twitter followers). In addition to the research we will work with the European Commission on developing a sustainability plan for the DSI website and community before the final event on December 16th 2014.

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Endnotes

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9. Competitiveness is defined as the capability of an economy to maintain increasing standards of living for those who participate in it, by attracting and maintaining firms with stable or rising market shares in an activity. As such, the competitiveness of a region will depend on its ability to anticipate and successfully adapt to internal and external economic and social challenges, by providing new economic opportunities, including higher quality jobs.
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40. http://floksociety.org/rutadelbuenconocer/index_en.html
41. http://www.canonical.com/
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44. http://opensource.org/
45. https://github.com)
46. A Project fork happens when developers take a copy of source code from one software package and start independent development on it, creating a distinct piece of software (Wikipedia)
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