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Sustainable user-driven innovation supporting Open Government policies A System Dynamics perspective applied to the Municipality of Palermo

LA DOTTORESSA
Monica Sichera

IL COORDINATORE
Chiar.mo Prof. Carmine Bianchi

IL TUTOR
Chiar.mo Prof. Carmine Bianchi

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ABBREVIATIONS

AgID	Italian Digital Agency
API	Application Programming Interface
APP	Application for mobile and web
CLD	Causal Loop Diagram
CSV	Comma Separated Values
DCAT	Data Catalog Vocabulary (W3C)
DPM	Dynamic Performance Management
EFTA	European Free Trade Association
EPSI	European Public Sector Information Platform
EU	European Union
GFOSS	Geographic Free and Open Source Software
ICT	Information and Communications Technology
LOD	Linked Open Data
IDRC	International Development Research Centre
MS	Member State
NEF	New Economic Foundation
NGOs	Non-Governmental Organizations
NPM	New Public Management
OD	Open Data

ODC	Open Data Chain
ODDC	Open Data in Developing Countries
ODRN	Open Data Research Network
OECD	Organization for Economic Cooperation and Development
OGP	Open Government Partnership
PA	Public Administration
P&C	Planning and Control
POI Data	Points of Interest
PPP	Public-Private Partnership
PSI	Public Sector Information
TAIs	Transparency and Accountability Initiatives
R&D	Research and Development
RSS	Rich Site Summary
SFD	Stock and Flow Diagram
SMEs	Small and Medium-sized Enterprises
SPC Data	Public Connectivity System and Cooperation (Linked Open Data)
XML	eXtensible Markup Language

ABSTRACT

Going beyond a technocratic e-government paradigm, this research aims at analyzing how, through the two-ways interaction supported by Web 2.0 technology, skilled external collaboration and knowledge-sharing between citizens and public administrations can offer new ways of citizen participation, enhancing political decision-making process and public value creation. Particularly, the purpose is to investigate how skilled citizens can serve as contributors to tasks that are traditionally performed by designated civil servants and now are outsourced to an undefined, generally large group of people, in the form of an open call for contributions. To this end, we have conducted a field research in order to identify and evaluate what is currently taking place in the Municipality of Palermo in the framework of citizen sourcing[1] which may be realized by enhancing sharing knowledge and information flows through citizen engagement in order to reach a sustainable service improvement and therefore build or restore trust in local government. In the framework of Performance Management, the System Dynamics perspective will be followed with the aim of supporting municipal management to keep under control key-variables driving performance in the ongoing open innovation process.

[1] http://en.wikipedia.org/wiki/Citizen_sourcing

INTRODUCTION

In the early 1990s the phrase *Smart City* was coined to signify how urban development was turning towards technology, innovation and globalization to meet the challenges of cities within a global knowledge economy. However, the more recent interest in smart cities can be attributed to the strong concern for **sustainability** and to the rise of new Internet technologies, such as mobile devices (e.g. smart phones and tablet), the semantic web, cloud computing, and the Internet of Things (IoT)[2] promoting real world user interfaces.

It is expected that smart city solutions, with the help of instrumentation and interconnection of mobile devices, sensors and technologies, allowing real-world urban data to be collected and analyzed, will improve the capability to forecast and manage urban flows and push the collective intelligence of cities forward.

Smart cities have this modernization potential because they are integrated social, physical, institutional, and digital spaces, in which digital components improve the functioning of socio-economic activities, and the management of physical infrastructures of cities, while also enhancing the problem solving capacities of urban communities.

A recent public consultation held by the European Commission on the major urban and regional development challenges in the EU has identified three main priorities for the future cohesion policy after 2013, in particular: research, innovation, and upgrading of skills to promote the knowledge economy.

Therefore, a city can be defined as '*smart*' when investments in human and social capital and traditional (transport) and modern (ICT) communication infrastructure lead to sustainable economic development and a high quality of life, with a wise management of natural resources, through participatory governance. [3]

However, to achieve these goals, city authorities have to undertake policies and strategies that create the physical-digital environment of smart cities, assuring the long-term sustainability of smart cities. Environmental sensors measure parameters such as air quality, temperature or noise levels; telecommunication networks reflect connectivity and the location of their users; transportation networks manage digitally the mobility of people and vehicles as well as products in the city, just to give a few examples.

---

[2] The **Internet of Things** (**IoT**) is the interconnection of uniquely identifiable embedded computing devices within the existing Internet infrastructure. Typically, IoT is expected to offer advanced connectivity of devices, systems, and services that goes beyond machine-to-machine communications (M2M) and covers a variety of protocols, domains, and applications. (http://en.wikipedia.org/wiki/Internet_of_Things).

[3] http://en.wikipedia.org/wiki/Smart_city

Today, consequently, it is becoming increasingly relevant to explore ways in which **such data streams can become tools both for citizens and governmental authorities taking decisions within the city**.

To deliver a good quality of life, however, cities have to understand that smart technologies need to work both ways: not just for citizens but through citizens. Therefore the promise of smart sustainable cities won't be fulfilled without citizens involvement the participation and collaboration of whom is needed to boost the development of their own city. Improvements in technology combined with the habit of carrying a smartphone wherever we go, make real-time reporting and story-telling about a city so much easier, allowing authorities to enhance the smartness of their communities, by engaging them and so enable changes in behavior.

In this regard, useful applications and services seem to be emerging from user co-creation processes. Recent paradigms promote a co-creative role of users in the research and innovation process, such as open innovation, Web 2.0 as well as Living Labs[4]; the latter being a concept originating from the work of William Mitchell at MIT and currently considered as user-driven open innovation ecosystems.

Within the territorial framework of cities and regions, the main goal of the Living Labs is to develop a sustainable collaborative process between local authorities, citizens and the communities of developers bringing up the idea of **'co-production'** which is central to implementing '**open innovation' for building the 'smarter city'**.

In the context of smart cities, indeed, the added value for citizens to participate in 'co-production', through having access to creative communities, is that they have a real incentive to become more involved as 'co-producers' of the content and the services available in the smart city, and that they acquire new skills, employment opportunities, and service choices that address their real needs and wishes, potentially leading to a better quality of life and to better places to live in.

Two different layers of collaboration can be distinguished. The first layer is collaboration within the innovation process, which is understood as an ongoing interaction between research, technology, applications development and practical utilization.

The second layer concerns collaboration at territorial level, driven by urban and regional development policies aiming at strengthening the urban innovation systems through creating effective conditions for sustainable innovation.

Further to this last thinking, the "***urban value creation system***" can be considered as being shaped by four determinants: 1) physical and immaterial infrastructure, 2) networks and collaboration, 3)

[4] http://en.wikipedia.org/wiki/Living_lab

entrepreneurial climate and business networks, 4) demand for services and availability of advanced end-users.

Additionally, the value creation system is affected by policy interventions aimed at stimulating the building of networks, the creation of public-private-people partnerships, and the enhancement of innovative conditions.

The challenge in this layer is to create a collaborative approach to innovation ecosystems based on sustainable partnerships among the main stakeholders from policy, research, business and citizen groups and to achieve an alignment of local, regional and European policy levers and resources.

Therefore, from the perspective of smart cities, managing innovation at urban level becomes a task of managing the portfolio of resources and to foster inter-sectoral linkages.

Actually, smart city innovation management aims to manage the portfolio of "innovation assets" **by creating partnerships among actors that govern these assets**, **by fostering knowledge and information flows**, and **by providing open access to resources** made available to users and developers.

RESEARCH OBJECTIVE

The object of this research is to investigate how skilled citizens can serve as contributors to tasks that should be normally performed by civil servants and that are nowadays outsourced to an undefined, generally large group of people, in the form of an open call for contributions.

Taking into account the financial difficulties arising from the global crisis still ongoing, the citizen engagement will be analyzed as an innovative policy deployed with a view to reaching a sustainable service improvement through the enhanced knowledge-sharing allowed by web 2.0 technologies. To this end, a field research has been conducted to identify the cause-effect relationships between the open government policies, (Transparency, citizen Participation and Open Data) currently taking place in the Municipality of Palermo, and their impact in terms of service effectiveness, i.e. public value, analyzed as a way to build or restore trust in local government policies.

Since enhanced connectivity, nowadays, sets the stage for more openness and participation, this research, starting from a theoretical framework focusing on the emerging role of users and developers in providing increasing knowledge exchange, will analyze the main forms of citizen sourcing that the Municipality of Palermo has arranged inside the still ongoing open innovation process. Further to that, this study will focus on citizen participation in the context of interactive environments based on Web 2.0 technologies, e-service applications (e.g. social networks) and particularly in the context of the Living Labs, all together seen as tools capable of designing and fostering the open innovation process.

To this end, in the framework of the Open Government process lately adopted by the Municipality of Palermo, in accordance with the national Digital Agenda[5] and the local Plan of Transparency 2013/2015, the municipal Open Government strategy will be analyzed as a case study. This is an innovative policy which is dealing with the inflows and outflows of information aimed to share knowledge between citizens and the municipal Administration as a tool to accelerate innovation and improve public value through citizens' engagement. Particularly, we'll focus on the Open Data policy that the Municipality of Palermo pursues, through the co-creative approach of the Living Lab Palermo, in accordance with the EU project of Smart Cities.

METHODOLOGY

Combining a Dynamic Performance Management approach with the methodology of System Dynamics we will be able to identify the main strategic resources, the main performance drivers and the end results as well as the relevant relationships between the core variables, capturing and governing the complexities of the system studied.

Mainly, this research aims at demonstrating that framing dynamic complexity through System Dynamics (SD) modeling may support a better understanding of the driving forces of a territory's performance. To this end, some 'learning scenarios' will be generated for evaluating strategies and testing policies designed to improve the performance of open data policies over time.

The data needed for the above goal have been obtained through:

- online survey, framed in the form of structured questionnaire administered to citizens and stakeholders, to highlight some key data about the current perceptions of Open Government in the territory of Palermo;
- interviews to get feedbacks from users and information from policy makers and managers dealing with the Open Government process in the Municipality of Palermo.

The responses from the users will be useful to explore how their perceptions about the outputs and the outcomes achieved by the Municipality have changed over time and this will be useful as a way to let emerge a possible gap between the Municipality's current level of performance and the users' expectations to be filled by authorities. Moreover, to make the Living Lab's key actors' knowledge and expectations explicit, participation in group meetings (such as: Living Lab Palermo, Open Data's community, Electronic Town Meeting, First meeting for Participation, Transparency and Open Data, etc.) has been used as method to frame problems from multiple perspectives.

[5] http://www.agid.gov.it/agenda-digitale/agenda-digitale-italiana

The main research question is: Can Open Government generate an effective, efficient, inclusive Public Administration offering higher levels of service effectiveness for both users and citizens and so ensure a sustainable development in a participatory society?

The subsequent questions are:

1) How does the Municipality of Palermo manage the knowledge and experience of citizens, users and external actors as part of the Open Government process to support public policy design?
2) What is the role played by the key-actors involved in the Open Government process? And how do they support public policy design to better orient local administrators in providing citizens with higher service effectiveness?
3) How may the Dynamic Performance Management approach help local administrators and key-actors to frame and manage the ongoing open government process?
4) Which are the main causal relationships underlying the Open Government process? And how can System Dynamics support management to keep under control key-variables driving performance in the Open Government process?

RESEARCH HYPOTHESIS

Since the goal of this research is to identify the main outcomes arising from the analyzed openness process and recognized by the existing literature for their contribution to improved services to citizens, the purposes of this study will focus on how such outcomes (public value) can help build/restore trust in the ongoing openness process.

Trust is indeed identified as an important public outcome, as it arises from user's satisfaction with public services and therefore from the public sector's ability to improve performance in achieving its own goals. Trust, furthermore, may be recognized as one of the main issues in the early stages of setting up smart citizens' networks. With respect to what has been outlined so far, this thesis aims to understand the relationships between 'open government policies' and 'public value creation' in the Municipality of Palermo. In this respect, decision makers (both politicians and managers) as well as the users must accept their own responsibilities in contributing to foster public value.

Particularly, the participation of the users (citizens, business and other stakeholder) appears to be crucial for the development of new sustainable policies.

Measuring open government impact, analyzed in terms of transparency, availability of open data and citizen participation policies, to evaluate the outcome of the hypothesized cause-effect relationships is not an easy task because of the immaterial values involved. Nonetheless it is

important to capture the feedbacks underlying such Open government's effects on the shared knowledge between actors.

Starting from the Dynamics Performance Management approach (as outlined in chapter 3), the hypotheses emphasized by literature as fundamental in generating public value in Open Data issues can be made explicit as follows:

- H1 Information Value: this will be positively influenced by Living Labs (understood as bottom- up model approach) therefore the higher information value will increase the development of Apps to improve services effectiveness.
- H2 Living Labs will positively affect stakeholders' involvement and consequently effectiveness in contextualizing municipal information in new Living Labs events.
- H3 Living Labs will negatively affect (i.e. diminish) potential meaning's conflicts in opening municipal information and therefore will increase the pressure to contextualize information through new Living Labs events.
- H4 Information value will positively affect public value, in terms of perceived trust in the open government process, and therefore increase pressure in opening information process.

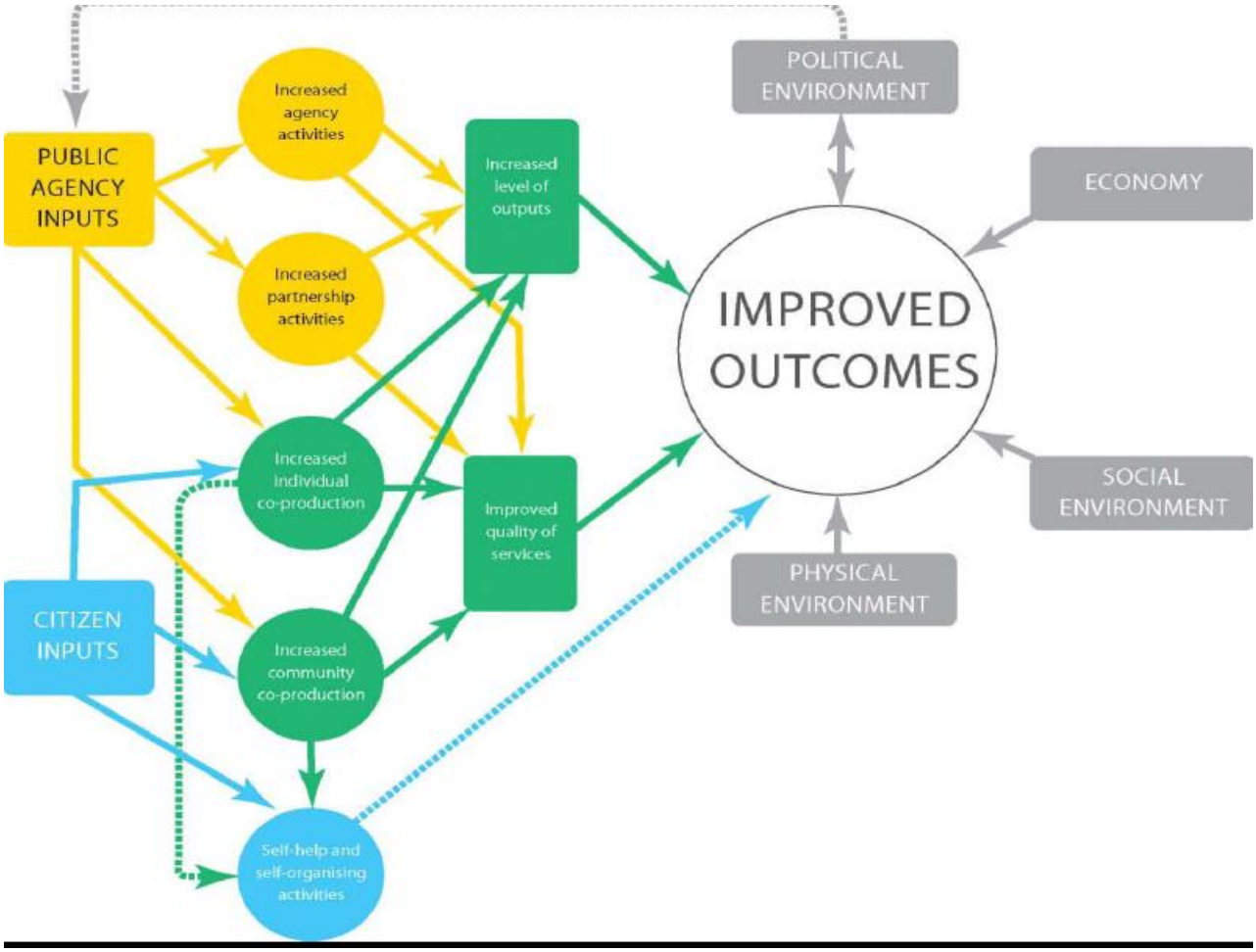

Figure 1
Tony Bovaird, INLOGOV, Social Enterprises, Procurement and Role of Local Government, 2010

CHAPTER 1 - OPEN GOVERNMENT

1.1 TOWARDS OPEN, TRANSPARENT AND PARTICIPATIVE GOVERNMENT

The Web is more than just a communication tool since its technical structure seems to embody the characteristics of the *grassroot* movements, facilitating the exchange of information "bottom up". Internet is at the same time means and a place of communication, but is also the material infrastructure on which is based the organizational form that characterizes contemporary society: **the network**.

The scenario in which it engages this new technological and social paradigm brings with it many questions about changes involving the increasingly difficult relationship between citizens and politics. It is necessary to rethink and reinvent the concepts and instruments, both government and democracy, in the light of changes in place.

So far have been following two general models: the communities created by citizens for citizens in a bottom up approach and the initiatives promoted by public administrations to spread institutional information. According to the OECD, would be the present moment of difficulty and serious economic and financial crisis to be able to drive towards smarter and more transparent government.

The report emphasizes the centrality of the concept of openness (opening) that has recently gained great visibility in public services, realizing, when applied to the activities of public administrations, to the processes of Open Government. **The term Open Government points to a doctrine that provides for the opening of governments and public administrations to new forms of transparency and citizen participation in public affairs.**[6]

Open Government provides that all the activities of governments and public administrations should be open and accessible in order to ensure public control. This becomes the new challenge for the creation of e-government processes truly effective and oriented to a real interaction between citizens, between administrations and between citizens and administrations.

The transition to the Open Government undoubtedly characterizes a new phase of public management across the network. The first acts in favor of the Open Government have been promoted by Barack Obama in 2009, during the presidential campaign strongly characterized by the use of the Web2.0 and social platforms networking.

[6] Cfr. Wikipedia: http://it.wikipedia.org/wiki/OpenGovernment

The Open Government thus emerges as a new public administration model created to reconnect rulers and the ruled and to restore trust.

According to Pizzicannella[7], to do so you need to implement three principles: transparency, participation and collaboration.

The administration should be:

1. **Transparent,** because transparency fosters and increasing the accountability providing citizens with information about the activities of the administration. Public Administration will also foster the feedback from users that can indicate what information is particularly useful.
2. **Participative**, because the citizen participation enhances the administration effectiveness and improves the decisions quality. Citizens therefore need to be involved in decision making process and be able to contribute their "collective knowledge and information."
3. **Collaborative,** because this involves citizens directly in the administrative activities. Rethinking the efficiency and the effectiveness of administrations in terms of co-production seems to open a different perspective, which implies that users are directly involved in the service provision as holders of knowledge and skills, and in which the quality of the public service is monitored during the entire process, rather than being measured only at the end.

Starting from Obama's Open Government philosophy therefore it is possible to shine a light on the benefits of open innovation for the Public Sector, specifically for the Municipality of Palermo, focusing on transparency, participation and collaboration with external contributors, particularly with citizens.

Terms, such as co-creation, mass customization, interactive value creation, or open innovation represent the increasing success of new practices (predominantly internet-based) and give evidence that the general public can constitute a source of knowledge and therefore of enhanced innovational strength. *But what does this mean for the public sector? What does this mean for its organizations, for its sectors and administrations within the politic-administrative system?* [8]

An essential purpose of the so-called "New Public Management" (NPM) reform of the past 20 years was to understand the citizen as a customer of public services, and to orient the organization processes toward the clients' expectations. Public administrations of local administrative bodies

[7] R. Pizzicannella, *Co-production and open data: the right mix for public service effectiveness?* In Draft papers. 10th European Conference on eGovernment. Limerick, Ireland 2010, available on-line: http://pizzican.files.wordpress.com/2010/05/eceg2010_paper.pdf

[8] Hilgers Dennis, Piller Frank T, *A Government 2.0: Fostering Public Sector Rethinking by Open Innovation in Innovation management, online magazine*, http://innovationmanagement.se/wp-content/uploads/2011/02/A-Government-2.0-Fostering-Public-Sector-Rethinking-by-Open-Innovation.pdf

changed from a bureaucratic organization to services providers focusing on transparency, responsibility, client orientation, and a perceptible result of public task performance for the citizenship. In this framework, the citizen should be viewed as a principal and tax payer, but also as customer or user of public services. Flanking this aspect, the e-government reforms during the last few years emphasized the digitalization of administrative processes regarding quality, time, and efficiency with entirely new chances concerning the design of new organizational structures and procedures, but also concerning the communication with third-parties in the outside relationship. As a result, many administrations have started to build up a systematic innovation management.

Consequently, the question arises whether public management, in terms of "Citizensourcing"[9], should also include the knowledge and experience of clients, users, and external actors into the public innovation and value creation process: *can citizens act as contributor to public tasks that are traditionally performed by an administrative employee (mostly a civil servant*)? After a period of reforms based on customer orientation, *is there nowadays a need for more customer/citizen integration, or even a collective value creation between a public administration and its stakeholders that can positively influence the political decision procedure*?[10]

In this respect, "Open, transparent and participative government in the sense of providing free access to (non-sensitive) government information and data collected and managed by government organizations as part of their administrative activities has become a priority for many OECD governments in parallel to chasing efficiency and effectiveness gains. Politically it has become increasingly important for governments to ensure that especially the far-reaching decisions taken almost overnight in order to address the immediate challenges of the financial and economic crisis in 2008 gain acceptance and support. Providing tools for opening up governments and using this transparency to allow citizens to scrutinize decisions and challenge implementations of policies, make governments more accountable[11]".

Indeed setting-up policies for access to public sector information and data has been ongoing for several years, for example within the European Union[12].

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[9] Hilgers Dennis, Piller Frank T, *Citizensourcing: Applying the Concept of Open Innovation to the Public Sector*, The International Journal of Public Participation Volume 4 Number 1 January 2010, available on line: http://c.ymcdn.com/sites/www.iap2.org/resource/resmgr/imported/Journal_10January_Vol4_No1_6_Hilgers%26Ihl_Citizensourcing.pdf

[10] Hilgers Dennis, Piller Frank T, *A Government 2.0: Fostering Public Sector Rethinking by Open Innovation in Innovation management*, op. cit.

[11] *Towards Smarter and more Trasparent Government*-OECD e-Government Project, 25 March 2010, on line: http://www.oecd.org/gov/public-innovation/44934153.pdf.

[12] *Directive 2003/98/EC of the European Parliament and of Council of 17 November 2003 on the re-use of public sector information*, on line: http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2003:345:0090:0096:EN:PDF .

However, the newest push for open and free access to all (non-sensitive) public sector information and data as seen in a number of OECD countries has created a new momentum to reconsider information and data organization government-wide. The countries have taken measures, on the one hand, **to improve trust with citizens** (giving citizens the chance to view the "raw" and "unfiltered" data that governments build their political and managerial decisions on) and, on the other hand, to provide businesses free access to information and data assets that have previously been held by the government but not made easily available for commercial use. In other words, following policies of open and transparent government has several advantages:

(i) an increase in the possibilities of making governments more accountable for their actions;

(ii) the opportunity to provide businesses with ways to create new economic activities through the use of public information and data collected for administrative purposes by the public sector;

(iii) a way to introduce a visible tool to consolidate how public information and data are organized and stored.

In addition, the increasing importance of Web 2.0 and the uptake of electronic social networking by the population have driven an increasing number of governments to explore the potentials and challenges of using these novel channels for citizen dialogues and for service delivery. Becoming more user-centric in service delivery – whether those users are citizens or businesses – is highly prioritized by governments due to the direct connections to the possibility of "**doing more for less**". Applying a focused channel management strategy to public service delivery and moving capable users of public services towards the less expensive digital delivery channels, could increase governments" possibility of freeing-up resources (monetary or human resource-wise) for other purposes[13].

1.2 WEB 2.0 AS COLLABORATION PLATFORM FOR CO-CREATION IN PUBLIC SERVICE

Governance and administrative are gradually adjusted to the new potential offered by modern cyberspace (mainly Internet-based). Cities in particular, where the interaction between citizens and

[13] Rethinking e-Government Services: User-centred Approaches, 2009, OECD, Paris, France available on line http://www.oecd.org/gov/public-innovation/rethinkinge-governmentservicesuser-centredapproaches.htm.

government is more direct, have recognized that ICT offers many opportunities for the public domain to realize many efficiency gains and to enhance the democratic interaction with citizens[14]. Generally speaking, the benefits of e-Governance[15] may be assessed on the basis of an improvement in efficiency (e.g., cost reduction or costs avoided), in effectiveness (e.g., higher range of services offered to citizens) and in good governance (e.g., gain in trust of citizens due to de-bureaucratization). The growing importance of ICT in everyday life, business activities and governance prompts the need to incorporate ICT policies in local democracy (Servon and Horrigan 1997 [16;] Cohen and Nijkamp 2004 [17]) by enhancing social innovation, which is still in an early stage. In this respect, **the European Commission (2005a[18], 2005b[19]) has argued that Europe needs efficient, effective, inclusive and open governments in order to offer high quality services for citizens and business**.

In several countries new research initiatives are planned to explore and exploit the benefits of e-governance, such as EU Intelcities Program (see Curwell et al. 2005)[20]. This is an EU program in the domain of networked governments and businesses and aims to explore and create a new and innovative set of e-government services to meet the needs of both citizens and businesses by providing interactive local on-line applications and services to citizens from the perspective of social inclusion and broad access (e.g. open data, free WI FI). The final goal would be to foster a better city government, to offer better urban (e-)services, to enhance local democracy and to improve urban decision- and policy-making from a participatory.

Specific area that has attracted a great deal of attention is the provision of municipal information and services through ICT applications (mainly via the Internet):

- **the first goal is the improvement of services to the citizens, and the supply of more efficient services;**

[14] Enzo Bivona, Lanfranco Marasso, Marco Alessi, Ivan Ficano, Marco Burgarello, Giorgio Cavaliere, *Using System Dynamics to Assess a Web 2.0 Governance Model for Public Service Delivery*, in: Conference Proceedings of the 29th International System Dynamics Conference. Washington DC, July 24- 28, 201.

[15] In the sequel of this study we will use the term e-governance, which will be interpreted as the use of ICT, combined with organizational change and new skills to improve public services, increase citizens' participation and enhance public policy-making, sometimes in combination with private sector initiatives.

[16] Servon L. J. & Horrigan J. B., *Urban poverty and access to information technology: A role for local government*, Journal of Urban Technology, vol. 4(3), 1997, pp.61-81.

[17] Cohen G. & Nijkamp P., *City, ICT and Policy, Investigaciones Regionales*, vol. 4, no. 1, 2004, pp. 29-51.

[18] European Commission, Signposts towards e-Government 2010, DG Information Society and Media, Brussels, Communication, November 2005a.

[19] European Commission, Fifth Annual Survey of Online Government Services in Europe, DG Information Society and Media, Brussels, Communication, March 2005b.

[20] Curwell S., Deakin M., Cooper I., Paskaleva-Shapira K., Ravetz J., Babicki D., *Citizens' expectations of Information cities: implications for urban planning and design*, Building Research and Information, 33, 2005 1, S. 55-66.

- **a second goal is supplying information about the city to potential investors, inhabitants or,**
- **a third goal, is to increase public participation in local processes by better information and possibilities to react, on-line, to proposals in the city agenda (e-governance).**

E-governance is therefore expected to benefit the community by drawing together the public sector, civil society and international actors, as well as by improving consultation with, and participation by, all spheres of society and achieving a more transparent and participatory process of territorial governance and decision-making (Navarra and Cornford 2006, 2012; Navarra, 2010, forthcoming)[21].

Of course, for such benefits to be realized it is necessary that the urban 'information space' is open and efficiently organized, in ensuring an enhancement of the innovative and socio-economic potential and in favoring sustainable development in a participatory society (Lash 2003)[22].

Pratchett (1999)[23] particularly stresses that ICT have the potential to fulfill three complementary roles of local authorities: local democracy; public policy making; and direct services delivery.

The specific results from the Intelcities research in the form of policy lessons and recommendations from and for the cities concerned indeed were the following:

- involve citizens and local communities on a stable basis in the use of ICTs through distributed points of access, easy-to-use technologies and services, social programs of inclusion and effective/efficient service responses (increased community value);
- promote public-private partnerships with national and, most importantly, local IT operators to increase efficiency and also achieve tailor-made solutions as well (on a competitive basis, as in the case of re-use of solutions and knowledge developed – local markets for ICT solutions);
- invest in networking (specially among cities and local authorities) to spread and re-use positive solutions and best practices as well as to pool resources for experimentation (sustainability);
- foster qualified knowledge management strategies within governments – and between governments, business and communities – in terms of ICT-based content creation and management, information and process transparency.

Nordfors et al. (2009)[24] highlighted some of the benefits a PA can achieve through e-government, i.e.:

[21] Bianchi C., Navarra D., *Enhancing Performance Management and Sustainable Development through e-government policies in Urban Areas A System Dynamics Approach*, Paper presented at the 2013 ASPA Conference - New Orleans, March 15 – 19, 2013.

[22] Lash S., *Critique of Information*, Sage, London, 2003.

[23] Pratchett L. (1999), *New technologies and the modernization of local government: An analysis of biases and constraints»*, Public Administration, 1999, pp.731-750.

- Increase of value from the public services delivery;
- Reduction of costs;
- Redesign of both the organization and the processes.

Nevertheless, in recent years, e-government initiatives launched by PA have shown a low impact on citizens for a number of reasons. Very often public services are delivered through a large number of different sectors, not always connected each others, in many cases such services do not produce the expected results.

Consequently, **e-Governance presupposes open and interactive communication channels aiming at improving citizen participation in decision making processes**. If this condition is not met, it will end up with a lack of transparency, loss of trust and quality of official information sources, with information overload, and emerging trends towards new forms of e-bureaucracy. There is **a major challenge for governments to ensure a balanced and efficient set of e-mechanisms that stimulate the trust and accountability of the public sector and to create an added value to society.**

In order to improve the above mentioned public value, in the last decade Public Administrations (PA) have introduced new governance models to design, implement and deliver public services to citizens. Such models have been also driven by the New Public Management (NPM) movement, which, as said before, contributed to increase the pressure on PA, of both central governments and communities, to design more citizen-centric oriented services aimed to improve PA outcomes, efficiency and accountability.

A key-lever on which PA can act on to reach the above goals is the use of WEB 2.0 technologies, which can enhance a successful collaboration between citizens and PA.

In this respect, Governments, on a side, and citizens, on the other side, are increasing their pressure towards goals achievement (efficacy), and to properly balance the value of the resources invested compared with the services provided to communities (efficiency).

Two are, in particular, the phenomena that have driven PA toward a more citizen-centric oriented services delivery:

- a philosophy of citizen-centric governance and service delivery that emphasizes outcomes and performance rather than focus only on the outputs of the internal processes, and
- the diffusion of the Internet and new digital technologies that underpin electronic government (e-government) and widen opportunities for open data service.

[24] Nordfors L., Ericson B., Lindell H., Lapidus J. (2009), eGovernment of Tomorrow – Future scenarios for 2020, VINNOVA –Verket för Innovationssystem/Swedish Governmental Agency for Innovation System, Vinn ova Report VR 2009:28, ISBN: 978-91-85959-87-7, op. cit. in Enzo Bivona et al., *Using System Dynamics to Assess a Web 2.0 Governance Model for Public Service Delivery*, op. cit.

This innovative approach, that is widely diffusing is the use of Web 2.0 (Wyld, 2007[25]; Chhabra and Kumar, 2009[26]), allows PA to make online environments highly user-centric and to involve the citizens directly from social networks or from online communities rather than creating generic portals and wait for the people use them. Reaching out to citizens in their communities will also allow governments to take advantage of the collective intelligence of the citizens, through feedback on services, suggestions for improving the design of services and for efficiently provide them to different groups of citizens. Web 2.0 is essentially based on the phenomenon of social computing that began to manifest with the creation of online communities. According with Bivona, it can be claimed that the creation of value through the online community can be reached in many ways: with the creation of content, with the design of products or services or even with the identification of target segments, of their expectations and needs. Web 2.0 is different from the first Web 1.0 because the content is created and controlled by the Internet users on the network, which are no longer just recipients of information but become producers. They collaborate in the creation of products and services online, downloading content and applications from other websites and creating combinations of such data in creative ways.

The main differences between Web 1.0 and 2.0 are listed in the following **figure**:

[25] Wyld, D. (2007). The Blogging Revolution: Government in the Age of Web 2.0. IBM Center for The Business of Government (www.businessofgovernment.org/pdfs/WyldReportBlog.pdf), op. cit. in Enzo Bivona, Lanfranco Marasso, Marco Alessi, Ivan Ficano, Marco Burgarello, Giorgio Cavaliere, *ibidem.*

[26] Chhabra S., Kumar M. 2009. Integrating E-Business Models for Government Solutions: CitizenCentric Service Oriented Methodologies and Processes, IGI Global, Hershey, op. cit. in Enzo Bivona, Lanfranco Marasso, Marco Alessi, Ivan Ficano, Marco Burgarello, Giorgio Cavaliere, *ibidem.*

Transition from Web 1.0 to Web 2.0

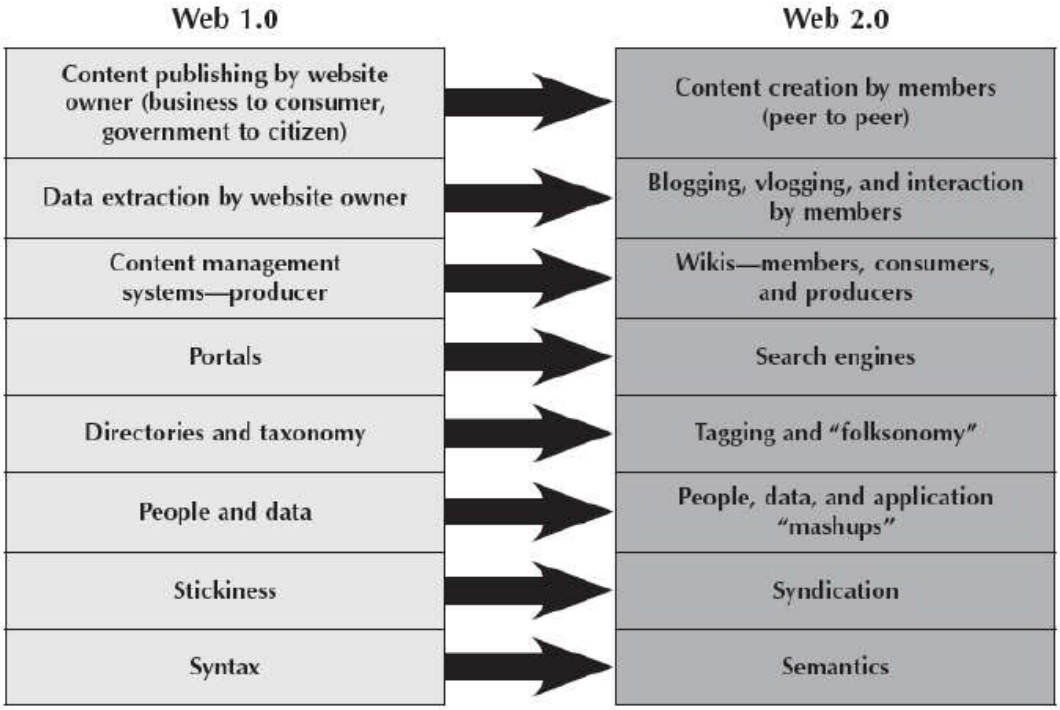

Figure 2
Source: Enzo Bivona et al., Using System Dynamics to Assess a Web 2.0 Governance Model for Public Service Delivery.

The use of Web 2.0 by the PA has been classified by Ai-Mei Chang and Kannanin (2008)[27] in three types presented in order of increasing citizen involvement (see the following **figure 3**):

A Framework for Government's Use of Web 2.0

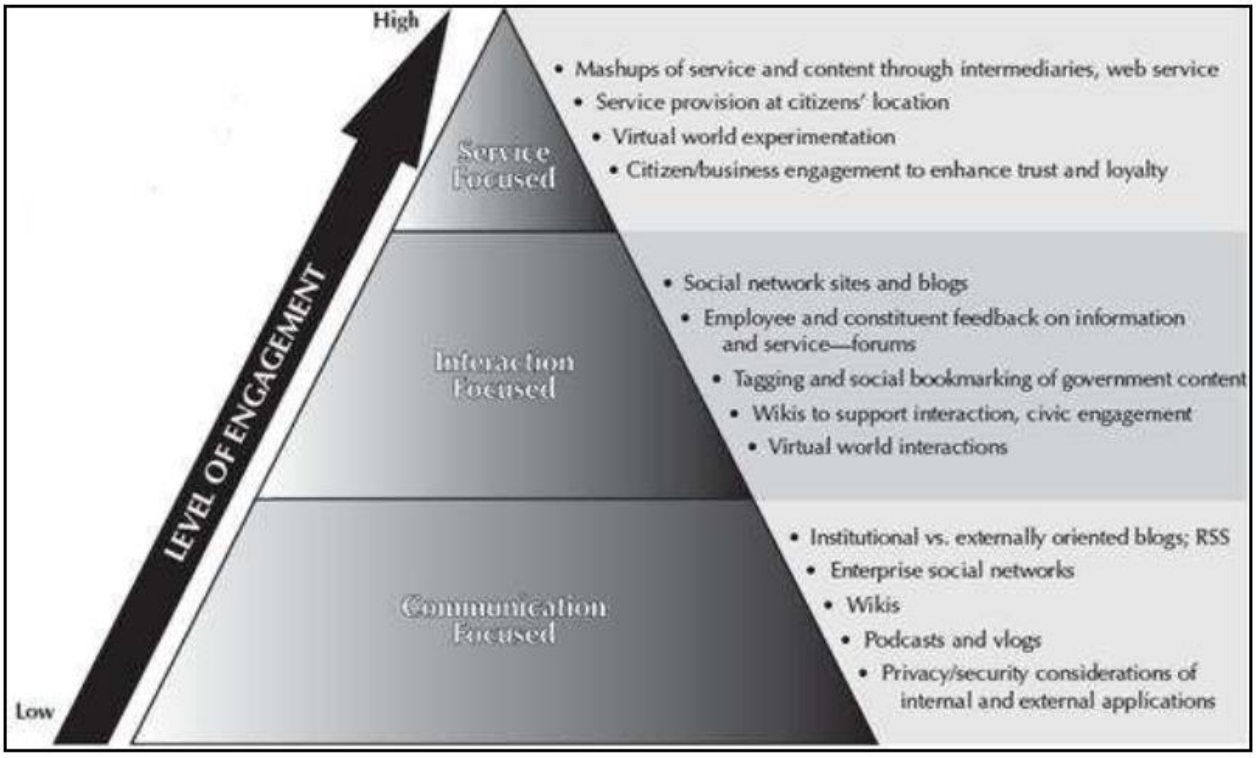

Figure 3
Source: Enzo Bivona et al., Using System Dynamics to Assess a Web 2.0 Governance Model for Public Service Delivery.

- Communication-focused, which is aimed at the quick dissemination of information from PA to citizens and is the easiest mode of implementation;
- Interaction -focused, which aims to interact with citizens in order to incorporate feedback on adopted policies, on services delivered and their design, on PA plans and on the information provided;
- Service-focused, is the level of usage of Web 2.0 more difficult to implement successfully. The main objective is to provide superior, efficient and personalized services through design experiments to get at an early stage all the feedbacks from citizens. Today few public bodies are using the Web 2.0 in this way, but actually it can provide more value to the community.

The power of the Web 2.0 collaboration is that it can give relevance to and involve service consumers in the conceptualization, design and deployment of services and, hence, it introduces a win-win situation between service consumers and providers. Service consumers, now become

[27] Ai-Mei Chang, Kannan P. K. (2010), Leveraging Web 2.0 in Government, EGovernment/Technology Series, IBM, op. cit in : Enzo Bivona, Lanfranco Marasso, Marco Alessi, Ivan Ficano, Marco Burgarello, Giorgio Cavaliere, *ibidem.*

'prosumers'[28] (providers and consumers at the same time), obtaining what they want, and service providers acquiring precious input that allows continuous enhancement and progress in modern services (e.g. open data platform provides data to citizens for using them (as consumers) and for re-using them (as providers).

Nowadays, a Public Administration (PA) that does not take into account its citizens during the design process of public services most probably in the future will decrease its role in satisfying citizens' needs and consequently their trust. In order to support PA to play an active role in delivering services citizen-oriented, PA needs a governance model in order to implement service delivery that take into account the following principles:

- **Transparency** on the public service delivery decision making.

The citizens will know, among others, the public service standards expected to be achieved, the cost of each service, identity of service providers, and outputs and outcomes to be achieved before the service is actually deployed;

- **Accountability** of service providers to the citizens.

The citizen will know, among others, the department which implements the service, the department which delivers the service, the beneficiaries of the service, and the relationship between them before the service goes to operation;

- **Empowerment** of stakeholders by appropriately making the above information (cost, sectors, etc) available to Web 2.0 social media for them to provide responsible and substantiated feedback on services' delivery, e.g., which services want to see take precedence in implementation vs. others.

Empowering and appealing population in the conceptualization and design of public services by innovatively extracting and feeding their opinions and wishes in the decision making process could only enhance feedbacks towards government and PA, in terms of responsiveness, competitiveness, efficiency, effectiveness, satisfaction, and, definitively, trust.

A new governance model is not only an essential condition for a free and open interaction, but also a very important means to prevent abusing the system and to fight corruption, getting in conflict with the duty to serve the citizenry as a whole.

Developing a governance model can increase trust of citizens in the service delivery decision making process by respecting the principle of open PA. Citizens of Open PA have higher confidence and trust among each other and with the PA, resulting that in lower disputes on services

[28] Marshall McLuhan and Barrington Nevitt suggested in their 1972 book *Take Today*, (p. 4) that with electric technology, the consumer would become a producer. In the 1980 book, *The Third Wave*, futurologist Alvin Toffler coined the term "prosumer" when he predicted that the role of producers and consumers would begin to blur and merge.Toffler's "proactive consumer" prosumers were common consumers who were predicted to each become active to help personally improve or design the goods and services of the marketplace, transforming it and their roles as consumers. On line in http://en.wikipedia.org/wiki/Prosumer.

delivery priority setting, in higher degrees of public service adoption, in lower public service delivery costs, in better service innovation and in citizens loyalty to the public service.

1.3 POTENTIAL BENEFITS OF INTERACTIVE DIGITAL GOVERNMENT

There has been a shift toward more networked forms of governance over the past several decades, with increased expectations that government at all levels will work with multiple actors to deliver services or to formulate policy solutions, including individual citizens, civic groups and nonprofit organizations (Pierre and Peters 2005[29]; John 2001[30]; Denters and Rose 2005[31]).

An anticipated benefit of more participatory and interactive government online is increased civic engagement on the part of citizens (Scott 2006[32]; Leighninger 2012[33]; Ganapati 2011[34]). This may be conceptualized as higher levels of citizen knowledge, discuss, interest and participation in government and community affairs (Mossberger, Tolbert and McNeal 2008)[35]. Customization of information through web 2.0 features such as RSS feeds[36] or social networks like Facebook or Twitter may allow lower information costs through sharing and alerts, and, like e-government in general, they provide convenient and round-the-clock access to information.

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[29] Peters, B.G. (2001). The future of governing. University Press of Kansas: Lawrence, Kansas, op. cit. in Mossberger Karen, *Connecting Citizens and Local Governments? Social Media and Interactivity in Major U.S. Cities*, Presented at Public Management Research Conference, Madison, WI, June 21, 2013, available on line: http://www.union.wisc.edu/pmra2013/Paper%20Submissions/New/Connecting%20Citizens%20and%20Local%20Governments%20Social%20Media%20and%20Interactivity%20in%20Major%20US%20Cities.pdf

[30] John, P. (2001). *Local governance in Western Europe. London*: Sage Publications, op. cit. in Mossberger Karen, ibidem..

[31] Denters, B. and Rose, L.E. eds. (2005). *Comparing local governance: Trends and developments*. Houndmills, Basingtoke, Hampshire: Palgrave Macmillan, op. cit. in Mossberger Karen, ibidem..

[32] Scott, J.K. (2006). *"E" the people: Do U.S. municipal government web sites support public involvement?* Public Administration Review 66(3): 341-353, op. cit. in Mossberger Karen, ibidem.

[33] Leighninger, M. (2012). *Using online tools to engage – and be engaged by – the public*. IBM Center for the Business of Government/Deliberative Democracy Consortium. Washington, D.C., op. cit. in Mossberger Karen, ibidem.

[34] Ganapati, S. (2011) *Uses of public participation geographic information systems applications in egovernment*. Public Administration Review 71(3): 425-434, op. cit. in Mossberger Karen, ibidem.

[35] Mossberger, K., Tolbert, C.J., & McNeal, R.S. (2008). *Digital citizenship: The internet, society, and participation*. Cambridge, MA: MIT Press, op. cit. in Mossberger Karen, ibidem.

[36] **RSS** (**Rich Site Summary**); originally **RDF Site Summary**; often called ***Really Simple Syndication***, uses a family of standard web feed formats[2] to publish frequently updated information: blog entries, news headlines, audio, video. An RSS document (called "feed", "web feed",[3] or "channel") includes full or summarized text, and metadata, like publishing date and author's name. RSS feeds enable publishers to syndicate data automatically. RSS feeds also benefit users who want to receive timely updates from favorite websites or to aggregate data from many sites. (http://en.wikipedia.org/wiki/RSS).

For all of these reasons, features that provide greater interactivity online may offer resources for civic engagement, whether that is through customization of information, one-way feedback, or two-way interactions.

In this framework, social media[37] applications are new types of information production and sharing tools, which are used in digital environments (Mergel, 2011)[38]. Social media practices in the public sector include the use of online social networking services, such as Facebook, YouTube, Twitter, blogs or other digital media sharing sites to support the organization's mission, service delivery and relationship management (Mergel, 2011).

Public administrations use social media with different purposes: to carry out recruiting tasks, to reach citizens and other stakeholders, to share information with other public organizations, to promote citizen participation in public issues or to improve transparency.

Social media potential is therefore the result of, among other, 1) the new available capacities that enable the search of information and knowledge resources, 2) the opportunities to link, which give rise to the development of complex and valuable social networks, 3) the possibilities to publish, which make easier the exchange of opinions, experiences, and knowledge, and 4) the development of information structuring, that facilitates information sharing and effective use in a specific field.

Both the engagement and social networking approaches are participatory. The networking approach emphasizes dialogue, however, whereas engagement invites co-production of content without necessarily engaging participants in dialogue.

Social media therefore offer new platforms where citizens can interact with each other, and can see responses from government officials. At the same time, together with the adoption of social networks and other social media formats, it can be seen a more general willingness in local government to experiment with technology for dialogue with citizens, apart from new social media.

In this framework, Open data portals have emerged to foster greater transparency and customization of information but they could be regarded not as common as social media use, nevertheless they reflect the collaborative ethic of Web 2.0, where users are encouraged to improve applications and to share them freely (O'Reilly 2010)[39].

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[37] Mila Gascó-Hernández, Charlotte Fernández-Ple, *Open Government and social media strategies: a new management technique or a real contribution to strengthening democracy?*, Institute of Public Governance and Management ESADE – Ramon Llull University, Barcelona, Spain.

[38] Mergel, I. (2011). "*A mandate for change": Diffusion of social media applications among federal departments and agencies*". Paper presented at the 11th Public Management Research Conference (PMRC). Syracuse, NY, June 2nd-4th, op cit. in Mila Gascó-Hernández, Charlotte Fernández-Ple, ibidem.

[39] O'Reilly, T. (2010). Government as platform. In Lathrop, D. and L. Ruma, eds., 11-39, Open Government: Collaboration, Transparency and Participation in Practice. O'Reilly Media. Available [online]: http://shop.oreilly.com/product/9780596804367.do

The portals may include an wide-ranging mix of information, including the locations of police and fire stations, employee salaries, crime data, budgets, building permits, restaurant inspections, parking information, and more. City may post raw data, or otherwise encourage users to develop applications that make the information more accessible.

Many cities with open data portals held contests for the development of applications (see Milan, Rome, Torino and Palermo portals, for example). This form of co-production or collaboration applies to a relatively small group of citizens who have the requisite technical skills, but other types of collaboration are possible. Some cities establish a reputation system on the portal that allows residents to comment on and score datasets for improving access processes and the quality of the data. Additionally, open data portals may involve tools for customizing or visualizing data in different ways, emphasizing interactivity and responsiveness (Robinson, Yu and Felten 2010)[40]. Information presented in formats that attract attention and involve citizens could also be expected to contribute to civic knowledge and interest (Lupia and Philpot 2002)[41].

The rapid diffusion of social network use among local governments, and the emergence of open data portals therefore present new *possibilities* for transforming relationships between government and citizens through more open government and citizen participation.

Local governments are trying to reflect on the need to do more outreach to citizens, to bring them to the data portals, social media, and the city websites in general. But, if two-way interaction is to occur on social networks, participation online will require time and management by government so that the barriers may be institutional rather than technical (e.g. in the case of digital divide). Anyway, social media, open data portals and other interactive features online promise to raise new challenges and opportunities for local public administrators and elected officials to provide more open government and opportunities for citizen participation.

1.4 INNOVATION AND IMPROVEMENT OF PUBLIC VALUE

Starting from the assumption that most if not all organizations need to innovate because the wider world is dynamic, then it is necessary to understand more about how innovation is fostered, supported, sustained and implemented in the public sector. Increasingly, innovation is as much a 'bottom-up' and 'sideways-in' process as a 'top-down' process. Recent research from Borins

[40] Robinson, D.G., H. Yu and E.W. Felten. (2010). Enabling Innovation for Civic Engagement. In Lathrop, D. and L. Ruma, eds., 83-89, Open Government: Collaboration, Transparency and Participation in Practice. O'Reilly Media. Available [online]: http://shop.oreilly.com/product/9780596804367.do, op. cit. in Mossberger Karen, *Connecting Citizens and Local Governments? Social Media and Interactivity in Major U.S. Cities*, op. cit.

[41] Lupia, A. and Philpot, T.S. (2002). More than kid stuff: Can news and information web sites mobilize young adults? Paper presented at the annual meeting of the American Political Science Association, August 31-September 2, Boston, op. cit. in Mossberger Karen, ibidem.

(2001)[42] suggests that: *bottom-up innovations occur more frequently in the public sector than received wisdom would have us believe. The individuals who initiate and drive these innovations are acting as informal leaders…Politicians and senior public servants create organizational climates that will either support or stifle innovations from below*.

As argued by Jean Hartley[43], what little research there has been on innovation in the public sector has tended to focus mainly on service delivery**. <u>There is relatively little about innovations in governance</u>**. <u>There is a lot written about new forms of governance, but these issues are not generally discussed from an innovations perspective (i.e. in what ways is the shift an innovation, how does the innovation emerge and how is it sustained?).</u>

Some evidence suggests that organizations which implement major innovations successfully are more open to, and have the structures and cultures to support, further innovation (for example Newman et al., 2000[44]; Downe et al., 2004[45]). In this respect, there is an important difference in innovation between private and public sectors. In the private sector, successful innovation is often seen to be a virtue in itself, as a means to ensure competitiveness in new markets or to revive flagging markets. <u>In public services, however, innovation is justifiable only where it improves public value in the quality, efficiency or fitness for purpose of governance or services</u>.

One element of the context of complexity for public service organizations is that they are embedded in society, producing not only benefits (and obligations) for individuals but also providing public goods and services, establishing collective efficiency, and creating collective rules and purposes. So analysis <u>of innovation needs to consider not just the immediate improvements in service quality and fitness for purpose, but wider issues of public value</u>. According with Borins[46], the creation of public value, in the most general sense, is indeed linked to individual and societal interests and to the institutional forms and actions of government, therefore to analyze the effectiveness of government initiatives needs to focus on public value proposition. This proposition is implied, for example, in the principles of opening government, increasing transparency, participation, and collaboration, as well as in numerous previous efforts and policies.

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[42] Borins S. (2001), *The Challenge of Innovating in Government* (PricewaterhouseCoopers Endowment for the Business of Government, Arlington, VA), p. 475.

[43] Jean Hartley, Innovation in Governance and Public Services: Past and Present in PUBLIC MONEY & MANAGEMENT JANUARY 2005.

[44] Newman J., Raine J. and Skelcher C. (2000*), Innovation in Local Government: A Good Practice Guide* (DETR, London).

[45] Downe J., Hartley J. and Rashman L. (2004), *Evaluating the extent of inter-organizational learning and change through the Beacon Council Scheme*. Public Management Review, 6, 4, pp. 531–553.

[46] Borins S. (2001), *The Challenge of Innovating in Government*, op. cit.

In this respect, the mentioned *Open Government Directive* issued on December 8, 2009 moved attention to the principles of **transparency, participation, and collaboration** to the foreground of public value. The Directive instructed federal agencies to implement these three principles by broadening access to government information, improving the quality of government information, and creating and institutionalizing a culture of open government that focuses on involving people with insight and expertise and forming collaborations with researchers, the private sector, and civil society[47].

It can be highlighted several methods useful to assist public administrations in the pursuit of these open government goals and to make better decisions about designing and implementing open government initiatives that deliver public value. These initiatives have the potential to increase citizen participation and collaboration in new ways provide opportunity to use emergent technologies to create new collaborative models and make service programs more responsive and effective.

The goal of making government more open is consequently became central to a wide span of public reforms and improvement efforts. Openness in terms of greater transparency can stimulate improvements in performance, accountability, and integrity across any aspect of government. Enhanced participation and collaboration with citizens enhances trust and confidence in government and engages stakeholders in creating better, more efficient services.

In the light of above, it is possible to provide a six basic kinds of effects linking the characteristics of open government initiatives with their value impacts:

- → **Efficiency** – changes in the outputs or goal attainment with the same resources, or obtaining the same outputs or goals with lower resource consumption.
- → **Effectiveness** – changes in the quality and/or quantity of the desired outcome.
- → **Intrinsic enhancements** – changing the environment or circumstances of a stakeholder in ways that are valued for their own sake.
- → **Transparency** – changes in access to information about the actions of government officials or operation of government programs that enhances accountability or citizen influence on government.
- → **Participation** – changes in frequency and intensity of direct citizen involvement in decision making about or operation of government programs or in selection of or actions of officials.
- → **Collaboration** – changes in frequency or duration of activities in which more than one set of stakeholders share responsibility or authority for decisions about operation, policies, or actions of government.

[47] *Open Government and Public Value: Conceptualizing a Portfolio Assessment Tool*, Center for Technology in Government at the University at Albany, 2011, available on line: http://www.ctg.albany.edu/publications/online/pvat/PVAT_ConceptualizingtheTool.pdf .

More in detail, according to Borins, it can be claimed that the public value assessment begins by distinguishing between the *intrinsic value* of government as a societal asset and the *instrumental value* of government actions and policies that deliver specific benefits directly to individuals, groups, or organizations. This distinction extends the idea of public value beyond traditional financial and other private returns and is broader than estimates of aggregate economic or social benefits to a society. **This broader view includes public value resulting from greater integrity and transparency of government that leads to increased trust and satisfaction with the government overall.** The public value way of thinking presented here aims at viewing the processes which support or which undermine innovation in public sector as a set of complex, nonlinear interactions among the operations of a government department or program, the legitimacy and support for the government, and how each of these shape and are shaped by public perceptions.[48] As argued by Jean Hartley, starting from performance data about public service will be possible to explore the relationships between innovation and improvement and their sustainability over time. There are considerable opportunities to examine changes over time, taking into account the impact of early performance losses, learning curves, improvements or further decline. Better understanding could help in providing realistic promises to citizens and users of services, and contribute to building trust in public service organizations.

[48] Borins S. (2001), *The Challenge of Innovating in Government*, op. cit.

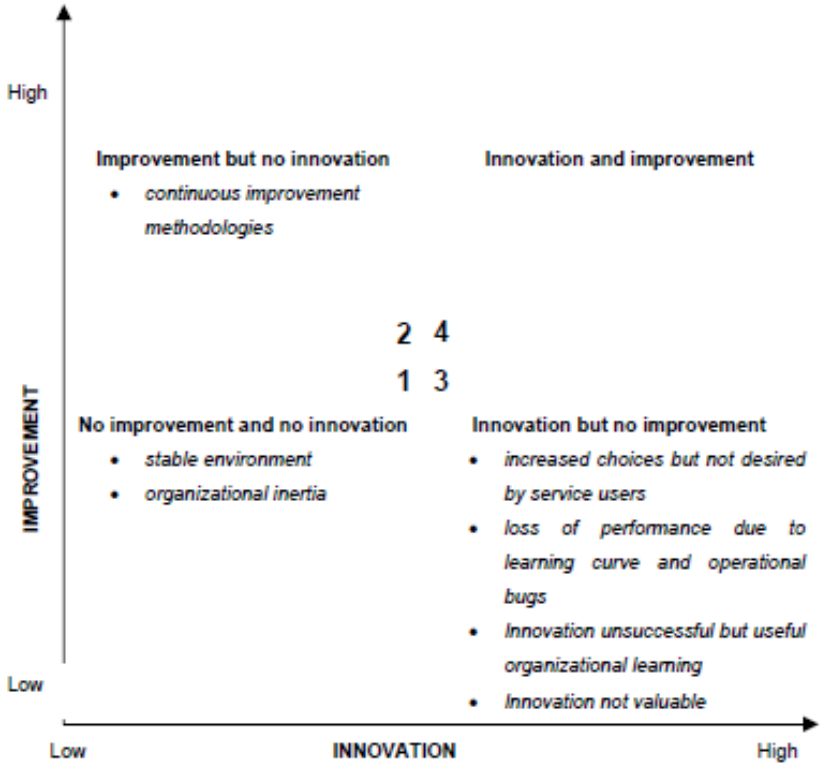

Figure 4
Source: Jean Hartley, *Innovation in Governance and Public Services: Past and Present*

The mainstream discourse suggests that innovations in Public Administration can greatly contribute to increase cost efficiency and the effectiveness of policy implementation via public-private partnerships and related e-governance innovations. Examples of the latter include volunteered geographic information activities (e.g. Wikimapia, OpenStreetMap), public initiatives (e.g. Spatial Data Infrastructures, Geo-portals) and private projects (e.g. Google Earth, Microsoft Virtual Earth, and other 3D models). These initiatives are producing an overabundance of spatial data but this availability has not yet been aptly put in use to increase the effectiveness of territorial governance and urban planning and for providing feedback for the development and performance assessment of territorial policies in diverse areas of urban governance for sustainable development (Navarra, forthcoming).[49] Likewise spatial information has not been widely used for the successful execution of public tasks, the coordination of government agencies and activities, information and services provision to citizens. Yet there is no clear comprehensive or holistic methodology in place about how to enhance performance management, monitor and assess progress towards sustainable

[49] Bianchi C., Navarra, op. cit., p.7

territorial performance in urban areas via the parallel improvements in public sector innovation and in the implementation of EU policies and guidelines (Navarra and van der Molen, 2012).

1.5 CITIZENSOURCING: APPLYING THE CONCEPT OF OPEN INNOVATION TO THE PUBLIC SECTOR

Theories of innovation suggest the process of product and service development is becoming more open, placing more emphasis on external knowledge and involving a wide range of external actors to achieve and sustain innovation.[50] The growing success of open innovation practices in many firms raises the question of whether these principles can be transferred for the reinventing of public sector organizations. Going beyond a technocratic e-government paradigm, but with the support of Internet technology, external collaboration and innovation between citizens and public administrations can offer new ways of citizen integration and participation, enhancing public value creation and even the political decision-making process.

Treating citizens as customers has been one of the key elements in transforming public services, and has been considered a core element of the (New) Public Management reforms worldwide over the last two decades. Governmental and local administrations and public authorities are being transformed from bureaucratic organizations into public service provider, which are managed with a strong emphasis on transparency, accountability, service orientation and perceivable output and outcome devoted to the welfare of the citizens.

The latter are regarded as constituents and taxpayers in the political-administrative system (Svara, 2001[51]; for different degrees of direct/participative democratic involvement see Bowler & Donovan 2000[52]; Frey 1994[53]) but also as customers/users of public services (Dunleavy & Hood, 1994[54]; Pollitt & Bouckaert, 2004[55]). In consequence, concepts of Public Value (Moore, 1995)[56],

[50] Hilgers D., Ihl C. (2010), *Citizensourcing - Applying the Concept of Open Innovation to the Public Sector*, International Journal of Public Participation (IJP2) Vol. 4, No. 1, Jan. 2010, S. 67-88, on line: http://c.ymcdn.com/sites/www.iap2.org/resource/resmgr/imported/Journal_10January_Vol4_No1_6_Hilgers%26Ihl_Citizensourcing.pdf

[51] Svara, J.H. (2001). *The Myth of the Dichotomy: Complementarity of Politics and Administration in the Past and Future of Public Administration*. Public Administration Review, 61(2), 176-183, op cit. in Hilgers D., Ihl C. (2010), ibidem.

[52] Bowler, S. & Donovan, T. (2000). *Demanding Choices: Opinion, Voting, and Direct Democracy*, University of Michigan Press, 2000, op cit. in ibidem.

[53] Frey, B.S. (1994). Direct democracy: Politico-economic lessons from Swiss experience. The American Economic Review, 84(2), 338-342, op cit. in ibidem.

[54] Dunleavy, P. & Hood, C. (1994). *From old public administration to new public management*. Public Money & Management, 14(3), 9-16, op cit. in ibidem..

[55] Pollitt, C. & G. Bouckaert. (2004). Public Management Reform. 2nd ed. Oxford: Oxford UP, op cit. in ibidem.

eGovernment (Stowers, 2000)[57], Good Public Governance (Pierre & Peters, 2000)[58] and Performance Management (Holzer & Kloby, 2005)[59] have animated the discussion concerning public sector modernization.

Many public sector innovations and reforms are, then, focused on giving citizens more 'customer voice', more choice, and the service quality they deserve.

In the following, will be amplified the view of a citizen as a mere customer by taking the developments in the private sector into consideration, which systematically integrate the knowledge and experiences of customers, users, and external performers into the innovation and value creation process. In the private sector, integrating customers into the innovation process entails a host of new concerns, concepts and managerial decisions, but also offers large benefits concerning the market-performance of products and services, and activates continual and sustainable innovation.

Many mature companies, in fact, are learning to leave innovation to their consumers, users, and specialized communities in these times of rapid innovation and a growing "do it yourself" (DIY) culture. These companies have recognized that the public is a source of business value: each time a customer contributes a new idea or develops a new product, the company increases its intellectual assets and, therefore, its market value (Lukensmeyer & Torres, 2008)[60]. The idea is that by incorporating a much larger variety of ideas and knowledge into new product and service development, the performance of this process will improve, and the resulting products will have a better fit with the market requirements. In consequence of the open innovation paradigm as a strategy within a firm's innovation management, different methods of open innovation may be identified. However, probably the most impressive realizations of open innovation are the so called open innovation platforms (Terwiesch & Xu, 2008)[61]. Tapscott and Williams denominate in their book "Wikinomics" such platforms as "ideagoras" – marketplaces for ideas, innovations and

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[56] Moore, M. H. (1995). Creating Public Value Strategic Management in Government, Harvard University Press, op cit. in ibidem.

[57] Stowers, G. N. L. 2000. Becoming cyberactive: State and local governments on the world wide web. Government Information Quarterly. 17(1), 113-114, op cit. in ibidem.

[58] Pierre, J. & Peters, B., G. (2000). Governance, Politics and the State, New York, op cit. in ibidem.

[59] Holzer, M. & Kloby, K. (2005). Public performance measurement. An assessment of the state of the-art and models for citizen participation. International Journal of Productivity and Performance Management, 54(7), 517-532, op cit. in ibidem.

[60] Lukensmeyer, C. J. & Torres, L.H. (2008). Citizensourcing: Citizen Participation in a Networked Nation. In Yang, K. & Bergrud, E. (eds.) Civic Engagement in a Network Society: 207- 233. Information Age Publishing: Charlotte, North Carolina, op cit. in ibidem.

[61] Terwiesch, C. & Xu, Y. (2008). *Innovation Contests, Open Innovation, and Multiagent Problem Solving*. Management Science, 54(9), 1529-1543, op. cit. in ibidem.

solutions (Tapscott & Williams, 2006)[62]. The resulting input from an open call to a community to solve a given problem results in the higher quality of the input (compared to solving the problem internally), allowed by the platform through which input is garnered and arising from expanding inclusion through self-selection. The economic benefits of allocating tasks to external contributors therefore result from two things: either lower costs in solving the task are involved (e.g. contributors already know the solution or have specific knowledge required to solve the task) or they have higher motivation (involvement, challenge, enjoyment) for working on the task. This new kind of interactive value creation is based on new mechanisms of self-selection, self-motivation and self-integration of the potential contributors. For the company, self-selection of the contributors indeed involves no costs for screening, identifying and allocating tasks to the actors. The open call for participation in a non-restricted network of participants, which has been linked with the term "Crowdsourcing" (Howe, 2008)[63], it enables the firms to overcome the "local search bias" and to tap into new knowledge sources often unknown. The scientific and practical discussion of this kind of "Democratizing Innovation" (von Hippel, 2005)[64], which engages many different external actors in entrepreneurial research, indicates a potential that the public sector (with its heterogeneous stakeholders) may profit from as well. The connection of participation and integration in the relationship between a government and its citizens may, in this context, be enlarged so that citizens may actively participate in public value-creation and in a refined decision-making process.

The exercising of political authority and the use of institutional resources for managing a society's problems and affairs are inseparably linked with the focus on the citizens and the nation's common welfare, and require persistent dialog and interaction between citizens and their government.

In this context, "*Citizensourcing*" (term first introduced by Lukensmeyer & Torres, 2008)[65] describes the design and configuration of a new relationship between a government and its people, based on a set of emerging practices and principles applied from the private sector. In the following, we define Citizensourcing as the act of taking a task that is traditionally performed by a designated public agent (usually a civil servant) and outsourcing it to an undefined, generally large group of people in the form of an "open call."

By nature public institutions are embedded in a democratic setting of co-determination, transparency, and participation and instruments such as tendering, co-determination, or outsourcing

[62] Tapscott, D. & Williams, A. D. (2006). Wikinomics: *How Mass Collaboration Changes Everything*, Brentford: Portfolio Books, op. cit. in ibidem.

[63] Howe, J. (2008). *Crowdsourcing: Why the Power of the Crowd Is Driving the Future of Business New York,* Random House Inc, op cit. in ibidem.

[64] von Hippel, E. (2005). *Democratizing Innovation*. Cambridge, MA: MIT Press, op cit. in ibidem.

[65] Lukensmeyer, C. J. & Torres, L.H. (2008). *Citizensourcing: Citizen Participation in a Networked Nation*, op. cit.

are not new at all. Public administrations have to realize that it can imply advantages to cooperate with external contributors beyond the own organizational borders, integrating external knowledge systematically into the internal decision making and public value creation process. Radical innovation and changes generally take place in times of crisis and an amplified pressure to act. In times of increased system mistrust, decreasing ability to act because of public indebtedness, constantly poor polling rates, and missing trust in public (bureaucratic) processes, it needs to think about new ways of the division of labor also in the public sector – not only, but especially in times where the reduction of staff seems to be the predominant strategy to consolidate the public budget.

In the light of the above, the concept of "open government" offers new ways of interactive public value creation and citizen co-creation by systematically integrating external actors (beyond civil servants and addressing the public at large, including out of area experts/non-experts) into the governmental and administrative processes.

The question arises as to how external input, information and community-spinning can be employed for public matters and public problem solving, and how citizens can systematically be invited to participate.

To answer all the above questions, it is possible to offer a structural overview of the benefits of the joint principles of Citizensourcing and open innovation, linked with the nearly ubiquitous use of Internet technology, to the governmental and public sphere.

A framework for Citizensourcing has to include the following three dimensions:

1. **Citizen Ideation and Innovation**: This first point focuses on the general potential of knowledge and creativity within the citizenship to enhance the quality of the common good by applying methods such as idea- and innovation-contests through open innovation platforms where citizens can interact with e.g. their local administration by reporting defects and problems.

These might be basic infrastructure issues (street lighting, traffic and road infrastructure, construction defects, regulatory offenses, etc.). This system of notification and complaints offers a first and fair approach for revealing citizens' needs and demands. It treats them as customers and users of public services, offering them space for complaints and suggestions for improving the offered quality. In the context of eGovernment, it enables a feedback function for the citizens and a fast and efficient access to their local service administration.

On the higher level, the public administration can tap the knowledge and creativity of its citizens by conducting idea and innovation competitions. In this context, the authorities have to phrase problems and innovation questions, which are then deployed on innovation platforms and probably linked to a monetary reward or incentives structure (e.g. contest to develop App).

2. **Collaborative Administration**: The second point explicitly addresses the integration of citizens for enhancing existing public administrative processes. Experiences from firms' user innovation and user-generated-content indicate new tasks and processes for public organizations. Citizensourcing indeed offer a big opportunity to support internal administrative processes by systematically integrating external actors into these processes (Alford, 2009[66]; Brudney & England, 1983[67]; Whitaker, 1980[68]). In this respect, traditionally and legally prescribed administrative tasks can be enhanced with the right specialized knowledge needed in this administrative process.

In this regard, Web 2.0 technology is a peer to peer platform used to facilitate discussion among groups of volunteer experts. Users can upload documents, participate in discussion forums, rate other user submissions, add research references or invite others to contribute. Peer to Peer Platform reveals that citizen masses can support public task fulfilling, and can improve administrative processes with regard to quality and speed (e.g. relatively simple web-based GoogleMaps application (mashup). Such increased responsiveness is especially attainable in all public proceedings where external knowledge and traditional feedback-cycles and public hearings are required by law. Nevertheless, it illustrates ultimately that in a time of high complexity of public problems new infrastructures and collaboration models can increase the effectiveness of value creation and have to be taken into consideration in order to get ready for the demands and (economic) challenges of 21st century democratic governance.

3. **Collaborative Democracy**: This level summarizes new ways of collaboration to improve public participation within the policy process, including the incorporation of public values into decisions, improving the quality of decisions, building trust in institutions and educating and inform the public (e.g. structured by the model of Beierle & Cayford, 2002[69] concerning institutional settings/context, enhanced processes and improved results)[70].

The concepts presented thus far have discussed the instrumental value of integrating citizens into both decision making and implementation of public policy to improve both output and outcome

[66] Alford, J., *Public Sector Clients: From Service-Delivery to Co-production, Basingstoke*, Palgrave Macmillan, 2009, op cit. in Hilgers D., Ihl C. (2010), *Citizensourcing - Applying the Concept of Open Innovation to the Public Sector*, op. cit.

[67] Brudney, J. L. & England, R.E., *Toward a definition of the coproduce concept*, Public Administration Review, 43(1), 59-65, op cit. in ibidem.

[68] Whitaker, G. P., *Coproduction: Citizen participation in service delivery*. Public Administration Review, 40(2), 240-246, 1980, op cit. in ibidem.

[69] Beierle, C. & Cayford, J. (2002). *Democracy in Practice: Public Participation in Environmental Decisions*. Washington, DC: Resources for the Future, op cit. in ibidem.

[70] We still need to make note that there is (still) a certain form of intellectual elitism at play in this approach. Not all citizens have access or know how to use it proficiently enough for these techniques, acknowledged as a limitation of democratic claims made here.

performance. In the traditional categorization of citizen engagement and empowerment (King & Martinelli, 2005)[71], however, this only reflects the bureaucracy-citizen interface (administration), such as citizen integration in the co-creation and innovation of public goods and services. The question remains of whether these ideas can improve and modernize the system of public governance, and political decision-making process as well.

Citizensourcing in this context refers to the political-citizen interface (politics) with regard to legitimacy, directing to appropriate priority setting, government accountability and transparency. It is the old question of setting up an accountable democracy and sustained participation, meaning that people should be consulted or involved in the activities that affect them (Warren 1999)[72].

In consequence, the policy cycle of program and agenda planning, execution, and appraisal should be opened up for citizens' contributions. It would enable a broader influence on policy outcomes, as having more individuals involved would increase transparency and accountability, and keep the government closer to the consent of the governed (Leighninger & Bradley, 2008)[73]. This may lead to synergistic benefits, such as enhancing civic education, strengthening the ties between citizens and government, increasing a government's political legitimacy, minimizing the inclination of conflicts, and improving the prospect of successful policy implementation.

Meanwhile, a wide range of online citizen communities have emerged, whose goals align closely with those of different parts of government and departments, these community spaces offer high benefits, comparable to the approach of private companies that use communities as a source of user-generated ideas and for facilitating product and service innovation. For government agencies, it means that the political sphere has to attain a better understanding of citizens' needs, and encourage effective collaboration between policymakers and citizens for a sustainable political agenda setting. Another aspect in this context is the opportunity to collaborate within the process of drafting laws and bills, suggesting that civic appreciation and compliance may be higher when citizens have participated in the evolution. Using a Wiki style of editing, citizens can edit their demands and proposals into laws, helping agencies in transition to Internet-based rulemaking as an opportunity to improve the quality and efficiency of public services. This kind of "Wiki Government" (Noveck, 2009)[74] is finally facilitating public and private efforts to realize e-rulemaking's potential for an

[71] King, C.S. & Martinelli, A.S. (2005). *Innovations in citizen engagement and empowerment: beyond boundaries*. The Public Sector Innovation Journal, 10(1): 41-49, op cit. in Hilgers D., Ihl C. (2010), *Citizensourcing - Applying the Concept of Open Innovation to the Public Sector*, op. cit.

[72] Warren, M.E. (1999). Democracy and Trust. Boston, M.A., Cambridge University Press, op cit. in ibidem.

[73] Leighninger, M. & Bradley, B. (2006). *The Next Form of Democracy*. *Nashville, TN*, Vanderbilt Univ. Press, op cit. in ibidem.

[74] Noveck, B. (2009). Wiki Government: How Technology Can Make Government Better, Democracy Stronger, and Citizens More Powerful. Brookings Inst. Press (forthcoming), op. cit. ibidem.

increased citizen understanding and participation in a government's policymaking process, by inducing public participation beyond the traditional "notice-and-comment" processes. The following **figure 5** offers a summary of the successful Citizensourcing practices mentioned before.

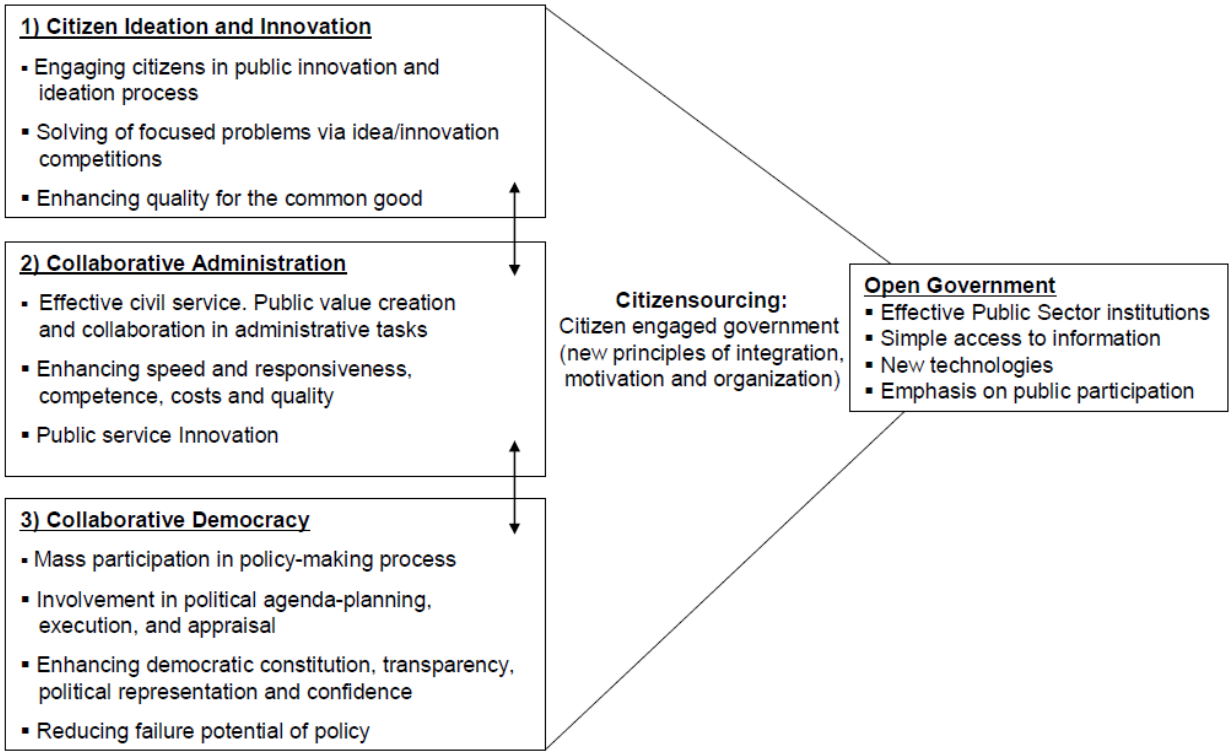

Figure 1: Framework for citizen engaged governance

Figure 5
Source: Hilgers D., Ihl C. (2010), *Citizensourcing - Applying the Concept of Open Innovation to the Public Sector*

1.6 INNOVATION IN PUBLIC SECTOR: FROM NEW PUBLIC MANAGEMENT TO NETWORK GOVERNANCE

There are many definitions of innovation in the public sector, in this respect Mulgan and Albury's (2003)[75] definition is particularly interesting as it emphasizes the idea that innovation is not just a new idea, but a new practice. This is in fact one of the differences between invention and innovation. Depending on the innovation scope, the type of innovation can be: *Product innovation* (new products) and *service innovation* (new ways in providing service to the users). Innovations in the public sector normally have a focus on service innovations. Other types are *process innovation* (new ways in which organizational process are designed), *strategic innovation* (referring to new goals or purposes of the organization), *governance innovation* (new forms of citizen participation and democratic institutions) and *innovations through networks* of professionals and managers.

[75] Geoff Mulgan and David Albury, Innovation in Public Sector, 2013, on line: http://www.childrencount.org/documents/Mulgan%20on%20Innovation.pdf

It is interesting to mention that in praxis it is possible to find more than just one type of innovation (Sørensen and Torfing, 2012[76]; Hartley, 2005[77] ; Roberts and Bradley, 1991[78]).

Benington and Hartley (2001)[79] have characterized three competing paradigms of governance and public management which may be conducive to particular ways in which innovation is both generated and adopted. The three paradigms are shown in figure 6. The first two may be familiar as 'traditional' public administration and 'New Public Management' (NPM), while a third paradigm is based on evidence of emerging patterns of governance and service delivery, which is called 'citizen-centred governance', or 'networked governance'.

Figure 1. Competing paradigms: Changing ideological conceptions of governance and public management. (*Source*: Benington and Hartley, 2001.)

	'Traditional' public administration	*'New' Public Management*	*Networked governance*
Context	Stable	Competitive	Continuously changing
Population	Homogeneous	Atomized	Diverse
Needs/problems	Straightforward, defined by professionals	Wants, expressed through the market	Complex, volatile and prone to risk
Strategy	State and producer centred	Market and customer centred	Shaped by civil society
Governance through actors	Hierarchies Public servants	Markets Purchasers and providers Clients and contractors	Networks and partnerships Civic leadership
Key concepts	Public goods	Public choice	Public value

Figure 6

Source: Jean Hartley, Innovation in Governance and Public Services: Past and Present, in PUBLIC MONEY & MANAGEMENT, JANUARY 2005.

Each paradigm may be linked to a particular ideology and historical period. However, they can also be seen as competing, in that they coexist as layered realities for politicians and managers, with particular circumstances or contexts calling forth behaviors and decisions related to one or the other

[76] *Sørensen, E. and Torfing, J., Collaborative Innovation in the Public Sector*, The Innovation Journal: The Public Sector Innovation Journal, Volume 17(1), 2012, article 1.

[77] Hartley, J., *Innovation in Governance and Public Services: Past and Present*, *Public Money and Management*, 2005, Vol. 25, pp. 27-34.

[78] Roberts, N. and Bradley, R., *Stakeholder Collaboration and Innovation: A Study of Public Policy Initiation at the State Level*, 1991, *Journal of Applied Behavioral Science*, vol.27, No. 2, pp. 209-227, op. cit. in *Sørensen, E. and Torfing, J., Collaborative Innovation in the Public Sector*, op. cit.

[79] Benington, J. and Hartley, J. (2001), *Pilots, paradigms and paradoxes: Changes in public sector governance and management* in the UK. International Research Symposium on Public Sector Management (Barcelona), op. cit. in. Hartley, J., *Innovation in Governance and Public Services: Past and Present*, *Public Money and Management*, op. cit.

conception of governance and service delivery. This is not a normative framework, because each conception has both strengths and weaknesses for society.

The different conceptions of governance and public management outlined above have implications for the role of policy-makers, managers and the population in innovation.

These are explored in figure 7:

Figure 2. Innovation and improvement in different conceptions of governance and public management.

	'Traditional' public administration	*'New' Public Management*	*Networked governance*
Innovation	Some large-scale, national and universal innovations	Innovations in organizational form more than content	Innovation at both central and local levels
Improvement	Large step-change improvements initially, but less capability for continuous improvement	Improvements in managerial processes and systems. Customer focus produces quality improvements in some services	Aiming for both transformational and continuous improvement in front-line services
Role of policy-makers	Commanders	Announcers/commissioners	Leaders and interpreters
Role of public managers	'Clerks and martyrs'	Efficiency and market maximizers	'Explorers'
Role of the population	Clients	Customers	Co-producers

Figure 7

Source: Jean Hartley, Innovation in Governance and Public Services: Past and Present, in PUBLIC MONEY & MANAGEMENT, JANUARY 2005.

The public administration approach, evident particularly in the post-war period and up to the early 1980s, is largely based on a legislative, bureaucratic and rule-based approach to public service provision. The population is assumed to be fairly homogeneous, and the definition of needs and problems is undertaken by professionals, who provide standardized services for the population. Power and authority lies with government, and the provision of welfare and regulatory services is assumed to emanate from the state, through elected representatives. Both national and local politicians have a central role in innovation—developing radical new policy frameworks, and building the support among citizens and their parties for the enactment of those innovations in legislation. The political and professional domination of innovation, working within the organizational form of a bureaucracy, leaves users of services as clients, with little say about services.

A different approach to innovation is seen in the approach now known as NPM and developed from the 1980s onwards in the UK, New Zealand and elsewhere. Underpinned by a different set of assumptions in neo-liberal economics and a particular form of management theory, the innovations

arising through this approach focus particularly on organizational forms, processes and a 'customer' focus.

In a nutshell, according with Cris Hood in his article "A Public Management for all Seasons?"[80], it is possible identify some doctrinal components useful for describing the essential elements of NPM which consists of:

1. Increasing the responsibility of decision makers in the management of public resources;
2. Introducing the use of appropriate performance indicators in order to clearly define the objectives that have to be pursued effectively and efficiently;
3. Fostering the decentralization of production by replacing the complex state machine with smaller and more manageable peripherals units;
4. Introducing competitive mechanisms aimed at reducing costs and increase the levels of service quality;
5. Simplifying the administrative process by strengthening the role of policy makers and recognizing a greater emphasis on the concept of performance expressed in terms of both outcome and output.

Regarding the regulation of relations between institutional bodies of different types, the reference go to the "principle of vertical subsidiarity", while, regarding the relationship between public and private entities for the satisfaction of social and economic needs the reference go to the "principle of horizontal subsidiarity".

This latter trend has led the public administration towards the paradigm of Public Governance, which constists in governing through networked relationships, highlighting the interplay between public actors and innovative policy tools. The term Public Governance in the most recent literature is indeed intended to indicate the capacity of public administration to move towards cooperation between public and private entities and to a more immediate and direct inclusion of citizens in the processes of elaborating and implementing public policies.

In this respect, the main features of the Public Governance can be summarized as follows:

1. Public-Private Partnership (PPP) which express the need to promote forms of public/private cooperation in the field of local public services;

2. Joined-Up Government. which is intended to create synergies between all the different stakeholders in order to promote a more efficient and effective use of public resources and the production of more integrated services for final clients;

[80] Hood C., *A Public Management for all seasons?*, Public Administration, Vol. 69 Spring 1991 (3-19).

3. Network Management. which aims at increasing the capacity of public administrations to better govern the relationship with all the actors operating in the same socio-economic system.

Therefore, what is becoming central in a modern public administrations is to be able to interpret promptly the needs of the community in order to ensure their satisfaction through the creation of network of relations with the other actors operating in the same socio-economic environment.
This means that it is changing the shape of the public sector and how to manage a government in which achieving policy goals to produce public value increasingly depends on how they engage and manage external partners and less on what public officials produce themselves. In particular, governance by network represents the confluence of further influential trends that are changing the shape of public sectors worldwide:

- → **The digital revolution**: recent technological advances that enable organizations to collaborate in real time with external partners in ways previously not possible;
- → **Consumer demand:** increased citizens demand for more control over their lives and more choices and varieties in their government services, to match the customized service provision technology has spawned in the private sector.[81]

In any case the concept of Public Governance, intended as inclusive of network governance, represents the natural evolution of the NPM. In fact, "the principles of efficiency and cost-effectiveness of operations and those of autonomy, accountability and planning and control of the performance are interpreted in a way which is not limited only to the internal perspective of the public administration but also extends to the relationship between public administration and citizens"[82].
In this new broader perspective, the fundamental themes of NPM such as the accountability of all public actors are interpreted in the light of the **principle of transparency of the administrative action.** Moreover, this perspective implies a different way of conceiving the principle of legality of administrative action, that don't have to be identified as the mere compliance with the formal procedures but considered in terms of effectiveness and efficiency of administrative action in relation to the purposes for which it is preordained. [83]

[81] Stephen Goldsmith, Susan Crawford, *The responsive City. Engaging communities through Data-Smart Governance*, Jossey- Bass, 2014, p. 10, op. cit.

[82] Meneguzzo M., *Ripensare la modernizzazione amministrativa ed il New Public Management. L'esperienza Italiana: innovazione dal basso e sviluppo della governance local*e, Azienda Pubblica, 1997, Vol. 6, pag. 589-597.

[83] Bianchi C. 2012. *"Enhancing performance management and sustainable organizational growth through system dynamics modeling".* In *"Systemic Management for Intelligent Organizations: Concepts, Model-Based Approaches, and Applications",* Groesser, S. N. & Zeier, pag. 143-161.

The public sector increasingly take on customer roles which give them a voice, as users, in service scope and content. Innovation under networked governance revitalizes the leadership role of policy-makers in translating new ideas into new forms of action.

For their part, the role of public managers is to nurture innovation as they become:

…explorers commissioned by society to search for public value. In undertaking the search, managers are expected to use their initiative and imagination. But they are also expected to be responsive to more or less constant political guidance and feedback (Moore, 1995, p. 299)[84].

In the light of the above, the public sector is seen more and more to have a larger role as co-producers of service and innovation.

1.7 USER AND COMMUNITY CO-PRODUCTION OF PUBLIC SERVICES

In recent years, there has been a radical reinterpretation of the role of policy making and service delivery in the public domain. Policy making is no longer seen as a purely top-down process but rather as a negotiation among many interacting policy systems. Similarly, services are no longer simply delivered by professional and managerial staff in public agencies but are co-created by users and their communities who are playing a large role in shaping decisions and outcomes.

Moreover, there is a need for a new type of public service professional: "the coproduction development officer, who can help to overcome the reluctance of many professionals to share power with users and their communities and who can act internally in organizations (and partnerships) to broker new roles for coproduction between traditional service professionals, service managers, and the political decision makers who shape the strategic direction of the service system"[85].

According with Bovaird, services will be chosen for theoretical arguments advanced in the literature in order to highlight some of the key characteristics of each type of coproduction relationship with a particular emphasis on how coproduction can allow both improved information flows and greater resource mobilization.

Traditional conceptions of service planning and management are now outdated and need to be revised to account for coproduction as an integrating mechanism and an incentive for resource mobilization — a potential that probably is still greatly underestimated.

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[84] Moore, M.H., *Creating public value: strategic management in government*, Harvard University Press, 1995, Cambridge.

[85] Bovaird Tony, *Beyond Engagement and Participation: User and Community Coproduction of Public Service,* Public Administration Review , 67(5); 846-860, September | October 2007.

However, coproduction in the context of multipurpose, multi-stakeholder networks raises important public governance issues that have implications for public services reform.

This research, as a starting point, aims to explore the wide range of ways in which users and communities now contribute to both policy making and service delivery. Whereas traditional public administration saw public servants acting in the public interest and New Public Management suggested ways in which service providers could be made more responsive to the needs of users and communities, the coproduction approach assumes that service users and their communities can — and often should — be part of service planning and delivery.

This is a revolutionary concept in public service. It has major implications for democratic practices beyond representative government because it locates users and communities more centrally in the decision-making process. Moreover, it sheds light on the way emergent strategies are developed at the front line in public services. Finally, it demands that politicians and professionals find new innovative ways to interface with service users and their communities. Indeed, public service planning and management need to be revised in order to take into account the potential for coproduction relationships among multiple stakeholders.

Tony Bovaird suggests the need to reconceptualize service provision as a process of social construction in which actors in self-organizing systems negotiate rules, norms, and institutional frameworks rather than taking the rules of the game as given.

According to Tony Bovaird, therefore we can point out different types of co-production:

- **Co-planning** of policy –e.g. deliberative participation, *Planning for Real, Open Space*
- **Co-design** of services –e.g. user consultation, *Innovation Labs*
- **Co-commissioning** services –e.g. devolved grant systems, *Community Chest*
- **Co-financing** services –fundraising, charges, agreement to tax increases
- **Co-managing** services –leisure centre trusts, community management of public assets, school governors
- **Co-delivery** of services –expert patients (*peer support groups*), meals-on-wheels, *Neighbourhood Watch*
- **Co-monitoring and co-evaluation** of services –tenant inspectors, user on-line ratings.[86]

The co-production concept has been introduced in the 70's to describe an approach in service delivery with high level of user involvement/engagement. A general definition of co-production is

[86] Bovaird Tony, *Social Enterprises, Procurement and Role of Local Government*, INLOGOV, 2010.

given by Olstrom (1996, p. 1073)[87] as "the process through which inputs used to produce a good or service are contributed by individuals that are not 'in' the same organization".

Recently co-production has gained a renewed interest, in particular in the field of the public service (Bovaird, 2007). One of the elements that has driven this renewed interest is the technology innovation, in particular ICT, that give citizens more control and allows for new ways of interaction and involvement in public sector activities (Löffler, E., 2009)[88]. A working definition of co-production has been given by the NEF (new economic foundation) specifically for public service delivery "Co-production means delivering public services in an equal and reciprocal relationship between professionals, people using services, their families and their neighbours. Where activities are co-produced in this way, both services and neighbourhoods become far more effective agents of change." (Boyle & Harris, 2009)[89].

Co-production therefore has the effect of blurring the distinction between provider and user of the public services, and "the central idea in co-production is that people who use the service are hidden resources, not drains on the system, and that no service that ignores this resource can be efficient" (Boyle & Harris, 2009).

To examine the effectiveness, co-production seems to open a different perspective. It implies that the users, as repositories of knowledge and expertise, are directly involved in the service provision, and the quality/effectiveness of the public service is "embedded" in whole delivery process rather than being measured only at the end. This intuitively suggests that through co-production, services of higher effectiveness can be delivered.

An important point concerns the scope of co-production. In Pollit et al. (2006)[90], the co-production is seen as one of the phases of the service life-cycle (see figure 8).

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[87] Olstrom, E. (1996) "*Crossing the Great Divide: Coproduction, Synergy and Development*"; World Development 24(6): 1073-87, op. cit. in Roberto Pizzicannella, *Co-production and open data: the right mix for public service effectiveness?*, op. cit.

[88] Löffler, E. (2009) "A future research agenda for co-production: Overview paper"; paper commissioned by the LARCI. http://www.communities.idea.gov.uk/c/2882116/doclib/get-file.do?id=2952926, op. cit. in Roberto Pizzicannella, ibidem.

[89] Boyle, D. & Harris, M. (2009) "The Challenge Of Co-Production"; NEF (New Economic Foundation) discussion paper; December. http://www.neweconomics.org/publications/challenge-co-production, op. cit. in Roberto Pizzicannella, ibidem.

[90] Pollitt, C., Bouckaert, G. and Löffler, E. (2006) "*Making Quality Sustainable: Codesign, Co-decide, Co-produce, Co-Evaluate*"; 4th Quality Conference Report; Tampere, September 27-29. http://www.4qconference.org/liitetiedostot/4qc_sr_report.pdf , op. cit. in Roberto Pizzicannella, ibidem

The shift to co-design, co-decision, co-production, and co-evaluation (from Pollit et al., 2006).

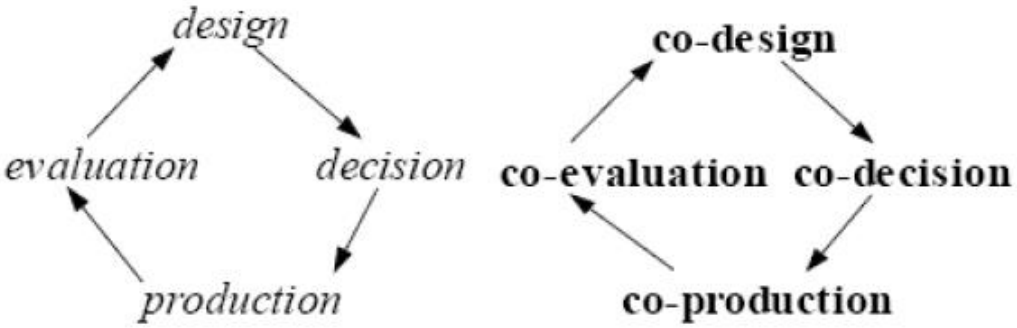

Figure 8
Source: Roberto Pizzicannella, *Co-production and open data: the right mix for public service effectiveness?*

The author considers this perspective too limiting. In accordance with the definitions mentioned above (co-production as a process), and from the perspective of co-production as a way to engage citizens and exploit their knowledge, collaboration (has primary characteristic of co-production) cannot be constrained only in the actual delivery phase of the service. For this reason, the term co-production in this research is interpreted in a more broad sense (see figure 9).

The scope of co-production

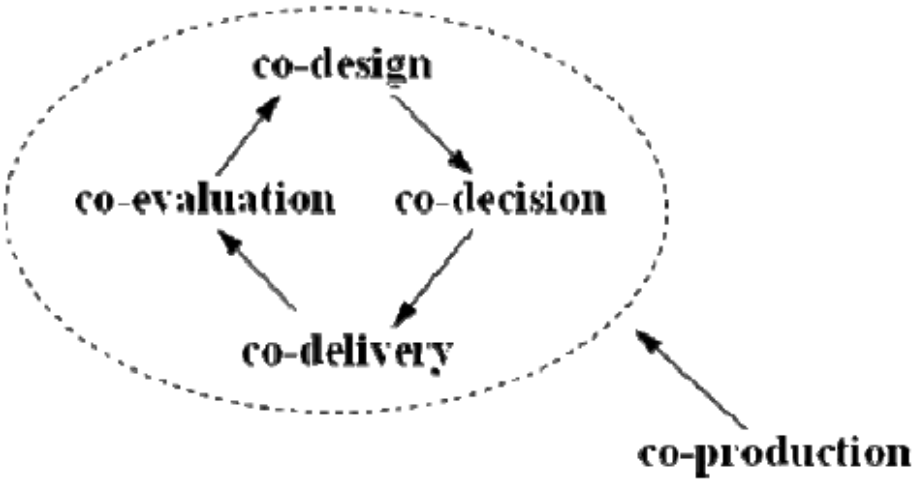

Figure 9
Source: Roberto Pizzicannella, *Co-production and open data: the right mix for public service effectiveness?*

In consideration of these challenges, the question arises whether the administrations at the different local administrative levels and at the end the whole political-administrative system is ready for this

transformation. Recent literature discusses this topic as "government 2.0", as a new way of interactively creating public value and directing to a new kind of citizen cooperation by systematically integrating external actors into the process of governing and administrating. Within this context, Barack Obama proclaimed in his first speech to his administration the statement of an **Open government** ("A clear commitment changing the way government works with its citizens: Government should be transparent, participatory and collaborative").

In an initial step, open innovation implies transparency [91]. All public sector organizations are actively and promptly requested to publish all relevant political and administrative processes (such as parliamentary processes; legislative procedures; development of important administrative instructions; public tendering; procedures that affect the budget and budget management) on all levels of administration. Apart from the constant requirement of efficiency and effectiveness of administrative processes, transparency and the feeling of possible participation are actually values that are particularly important in the public area.

In a second step, transparency turns into participation.

According to Dennis Hilgers and Frank T. Piller, the common creation of rules, laws, and norms ("e-rulemaking") combined with prior published government information and data generally can be taken much further: governments and administrations should promote citizen participation on political decisions and political opinions on all levels. The dialogue between citizens and government increases the acceptance of government actions and therefore it enables the process of building and/or restoring trust. At the same time it fosters sustainable participation, and consequently alludes to a new concept of democracy.

Specific characteristics of these new **participation processes** are, for example:

→ **People's budget:** Active citizen integration into budget decisions of the city council and consolidation concerning the utilization of funds. This includes discussions about objectives regarding the budget allocation, the intended outputs and outcomes, and the collaborative measurement of results by common evaluation.

→ **Virtual town hall meetings:** (or so-called "Electronic Town Meeting"): e.g. citizens are included into the process of public decision-making by discussing problems concerning all political areas, and presenting the discussion results to the political decision-makers.

[91] Dr. Dennis Hilgers, Frank T. Piller ,*A Government 2.0: Fostering Public Sector Rethinking by Open Innovation*, in http://www.innovationmanagement.se/wp-content/uploads/2011/02/A-Government-2.0-Fostering-Public-Sector-Rethinking-by-Open-Innovation.pdf

→ **Political agenda setting:** Party programs, public strategies, and mission statements are increasingly created in publicly and participatory.

→ **Political monitoring:** Monitoring of politicians and their misbehavior in the sense of a "representative watching".

In a third step, participation changes to a collaborative or interactive public value creation. Certain procedures in the administrative system can be designed much more effectively in terms of an open collaboration process. Beyond technocratic e-government reforms, one main issue in administrative reforms nowdays is to enhance the intra-administrative cooperation on the one hand, but also with organizations beyond the administrative borders, like other public agencies, companies, networks but also the citizenship.

Currently there are many examples of this development, four of them have become prominent:

Urban planning: Planning and designing of public space by those people who live and work in it. A good example for integrating creative citizen input may be an approach based on Wiki and blogs where citizens can comment and work on, as well as individually design, the future development of the urban landscape.

Public innovation and ideas competitions: it consists in offering rewards for solutions to specific problems, for example: the contest "Apps for Democracy", where software programs entered the platform within 30 days, enabling citizens to access published government databases, and offering an added value for citizens.

Public maps and continuous open improvement: The publication of public official maps enables citizens to transmit suggestions for improvement and notifications of claims in real time, for example, autonomously reporting potholes and damaged infrastructure (via photos), in order to mobilize the road maintenance depots: the website FixMyStreet receives approximately 1000 notifications of claims per week (www.fixmystreet.com). In this respesct, Social Street, a community on Facebook[92], has created its own iPhone application[93], which is one of the most downloaded apps, which enables citizens to report claims (via photos) related to waste collection in order to accountable the local public agency which provides the service.

[92] https://www.facebook.com/socialstreetpa?fref=ts
[93] http://socialstreetpalermo.it/up/

1.8 LIVING LAB: A CHALLENGE IN TERMS OF DECISION-MAKING, MANAGEMENT AND GOVERNANCE

Internet and broadband network technologies as enablers of e-services become more and more important for urban development while cities are increasingly assuming a critical role as drivers of innovation in areas such as social inclusion, safety, health, environment, culture and business. Therefore the main issue arising from the above is the following: how cities can evolve towards sustainable innovation ecosystems?

Increasingly, **cities and urban areas are considered not only as the object of innovation but also as innovation ecosystems empowering the collective intelligence and co-creation capabilities of user/citizen communities for designing innovative living scenarios**.

Creating a smart community with smart government, smart citizens and smart developers is identified as the most effective instrument for achieving the goals of creating innovative and dynamic relationships in a smart city. Shared research and innovation resources as well as partnerships and cooperation strategies among main stakeholders, providing access to such resources, are needed to constitute the urban innovation environments.

In this framework, the Living Lab introduces new ways of managing innovation processes which can be viewed as both an innovation setting and an innovation approach.

Living Lab driven-innovation ecosystems indeed may evolve to constitute the core of Public-Private-People-Partnership ecosystems providing opportunities to citizens of different expertises/backgrounds and businesses to co-create, explore, experiment and validate innovative scenarios.

The definition of Living Lab given by the web is that "*a Living Lab is an open innovation environment in real-life settings in which user-driven innovation is the co-creation process for new services, products, and societal infrastructures. Living Labs encompass societal and technological dimensions simultaneously in a business- citizens -government- academia partnership*." (2)

The term Living Lab has been introduced to the public discussion by the Finnish prime minister during his term as EU president in 2006. His aim was to launch a new innovation instrument in reply to the apparent innovation performance lack of Europe, the so called Lisbon Agenda, for turning advanced levels of research into measurable economic growth. After the creation of the network of European Living Labs (ENoLL), this instrument was given a political body and institutional frame.

During the design of the concept, Living Lab has been defined as an **environment** (Ballon, Pierson, and Delaere 2005[94]; Schaffers et al. 2007), as a **methodology** (Eriksson, Niitamo, and Kulkki 2005)[95] and as a **system** (CoreLabs. 2007)[96]. Depending on which, complementary, perspective one takes into account the multiple dimensions of the 'Living Lab' concept, the number and diversity of stakeholders involved and the numerous issues related to this approach, certain themes come into focus. With the environment perspective, objects such as technological platforms and user communities come to the forefront. With the methodology perspective, they are the processes, such as data transfers and methods for user involvement, that are highlighted.

A Living lab, in any case, constitutes an experiential environment, which could be compared to the concept of experimental learning, where users are immersed in a creative social space for designing and experiencing their own future. As is well known, **learning and innovation are closely linked:** by sharing knowledge and responsibility in a co-management framework, participants collaborate to create a setting for learning, that in turn has the potential to create innovation.

This is the reason why more and more, Living labs are also used by policy makers and users/citizens for designing, exploring, experiencing and refining new policies and regulations in real-life scenarios for evaluating their potential impacts before their implementations.

Recently, the term "co-creation" has been introduced in order to deal with the open innovation when citizens and users are involved in the ecosystem. Consequently, **co-creation and open innovation are two sides of the same coin – but need different tools and responsibilities**.

Co-creation processes can be considered as a means to stimulate smart policies and services leading to increased public value creation opportunities. But co-creation also increases the complexity of the open innovation network and thus the need of **network governance**.

An effective Smart City policy indeed needs to coordinate the processes of joint planning between the services of the municipal administration, citizens, businesses and associations users of services and ultimately the community of application developers. On this concern, **Living Lab introduces some challenges in terms of decision-making, management and governance**.

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[94] Ballon, P., Pierson, J., & Delaere, S. 2005. Test and Experimentation Platforms for Broadband Innovation: Examining European Practice. In *Studies on Media, Information and Telecommunication (SMIT) Interdisciplinary Institute for BroadBand Technology (IBBT)*. Brussels: Vrije Universiteit Brussel, op. cit. in Seppo Leminen, *Coordination and participation in Living Labs Network*s, Technology Innovation Management Review, November 2013, available on line: http://timreview.ca/sites/default/files/article_PDF/Leminen_TIMReview_November2013.pdf .

[95] Eriksson, M., Niitamo, V.-P., & Kulkki, S. 2005. State-of-the-Art in Utilizing Living Labs Approach to User-Centric ICT Innovation – A European Approach, available on line: http://www.vinnova.se/upload/dokument/verksamhet/tita/stateoftheart_livinglabs_eriksson2005.pdf

[96] Birgitta Bergvall-Kåreborn and Anna Ståhlbröst, *Living Lab - An Open and Citizen-Centric Approach for Innovation*, International Journal of Innovation and Regional Development.

Living Labs, as an emerging approach based on a User-Driven model of innovation, can play an important role in speeding up actual value creation from the innovation process through addressing the actual user needs taking place through co-creative processes that involve researchers, local authorities, SMEs, associations, and individual citizens.

The benefits for the different types of stakeholders to deploy user-driven open innovation and Living Lab methodologies can be summarized as follows[97]:

→ For the users in their role as citizens and the community: to be empowered to influence the development of services and products which serve real needs, and to contribute to savings and processes improvement through their participation in the innovation lifecycle.

→ For the SMEs: to be capable of developing, validating and integrating new ideas and rapidly scaling-up their local services and products to other markets.

→ For larger companies: to make the innovation process more effective by partnering with other companies as well as end-users, which are rooted in active user experiences.

→ For research actors, the economy and the society: to stimulate business-citizens government partnerships as flexible service and technology innovation ecosystems; integrating technological and social innovation in an innovative culture; increasing returns on investments in ICT R&D and innovation.

→ For Policy Makers and local development agencies: to harmonize national and regional initiatives in the domain with a view of optimizing public and private investments in the targeted market, to deliver common process for validating market offer in the targeted market and supporting innovation and additional demand creation and to attract further investments, especially private equity and venture capitals. Functioning as Public-Private Partnerships, especially at regional and local level, living labs provide advantages over "closed labs": they stimulate new ideas, provide concrete research challenges and allow for continuous validation of research results.

The successful implementation of Living Labs approach can be monitored on the basis of the following metrics:

-Number of SMEs mobilized;

-Number of citizens involved in the activities of the Living Lab;

-Number of new, innovative, added-value products and services validated at local level;

-Amount of funding mobilized, additional with respect to the initial investments done by the local Development Agency and suitable for ensuring long term sustainability;

-Number of Venture Capitals and Private Equity Funds involved;

[97] Roberto Santoro; Marco Conte, *Living Labs in Open Innovation Functional Regions*, ESoCE-Net, Via Cortina d'Ampezzo 164, 00135, Rome – Italy {rsantoro,mconte}@esoce.net.

-Number of links established outside the specific Functional Region, in view of promoting the access to both new competences and markets for the specific sector targeted;
-Number of stakeholders involved, relevant to the specific targeted market and to SMEs involvement in the development of the relevant products and services.

1.9 CO-PRODUCTION AND OPEN DATA: THE RIGHT MIX FOR PUBLIC SERVICE EFFECTIVENESS?

Current methods in measuring public service effectiveness are mainly based on evaluating the reduction of **administrative burden** and **customer satisfaction**, which do not really reflect the issue of effectiveness, as underlined by R. Pizzicatella[98]**. In this research the concepts of co-production and open data are presented and discussed with respect to their relevance to public service effectiveness**. The two concepts (and the correspondent practices) indeed share the belief that a high level of involvement of citizens is needed to ensure better services, opening up new perspective when effectiveness of public services is concerned.

In recent years in effect a concept/approach has got high attention in the domain of public services: "openness". In its application to the governmental activities it is generally referred as open government. "*Open government is the political doctrine which holds that the business of government and state administration should be opened at all levels to effective public scrutiny and oversight*" (definition from Wikipedia)[99]. Essentially the open government approach asks for opening the government activities **to ensure transparency and accountability**. In a number of EU countries this has been tackled promoting participation and engagement of citizens in the processes of political decision-making.

Although open government is a relatively old concept, and it's often linked with the adoption of "free of information" legislations, it has gained a renewed attention in the recent years (especially in the EU) with its connection to the issue of Open Data. "*Open Data is a philosophy and practice requiring that certain data are freely available to everyone, without restrictions from copyright, patents or other mechanisms of control*" (definition from Wikipedia)[100].

Open data approach asks for the availability of the large amount of information detained/produced by the public sector in a free and open format. The idea has both economic motivation ("The MEPSIR study (2006) contracted by the Commission, for example, puts the overall market size for the re-use of PSI (Public Sector Information) in the European Union at €27 billion." (EU

[98] Roberto Pizzicannella, *Co-production and open data: the right mix for public service effectiveness?*, op. cit.

[99] http://en.wikipedia.org/wiki/Open_government
[100] http://en.wikipedia.org/wiki/Open_data

Commission, 2009)) and more general basis (the data are produced and maintained by use of public resources, so they have to be "publicly available").

But probably the most important motivation of open data is based on the belief that by "freeing" the huge amount of public owned data it will unlock the creativity of civil society and individuals in producing services of public interest.[101] Examples of such kind of services are already available in some EU Member States (see the report of a workshop held in Brussels on "Public Services 2.0", Osimo et al., 2009)[102].

Open data/Open government approaches have been encompassed by a number of important countries (US, UK, New Zealand) that adopted legislation or other regulatory initiatives to enforce public agencies to make their data available online in open format and to promote their (re)use. For example, the data.gov.uk website make available a large number of UK government data and is collecting ideas and applications, developed by individuals, that make use of such data.

Meanwhile, the approach to openness is also the basis of the "open declaration on European public services" presented at the 5th Ministerial eGovernment Conference in Sweden (November 2009). The declaration is built on the three core principles of transparency, participation and engagement to "ask the European governments and the European Commission to incorporate these principles in their eGovernment action plans and ensure that Europe's citizens enjoy the benefits of transparent, participative, empowering government as soon as possible" (Open Declaration, 2009)[103].

The open data approach seems to have at its heart the recognition of the high potential that users (citizens) represent in term of knowledge and willingness to participate in the improvement of public services. In fact, the emerging interest in open data is also due to the dramatic growth in sophistication and use of the so called social-computing applications (Osimo, 2008[104], Huijboom et al. 2009[105]) that open augmented possibilities of collective efforts in expressing need and finding answers to social issues.

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[101] Open Data White Paper Unleashing the Potential, Rt Hon. Francis Maude, 2012.

[102] Osimo, D., Campbell, D., Kerr-Stevens, J., Bishop, C. and Bryant, L. (2009) "Public services 2.0 - Web 2.0 from the periphery to the centre of public service delivery - report from the workshop"; September. http://www.epractice.eu/files/ePractice%20Workshop%20Report%20on%20Public%20services%202.0_Web%202.0%20from%20the%20periphery%20to%20the%20centre%20of%20public%20service%20delivery_0.pdf, op. cit. in Roberto Pizzicannella, *Co-production and open data: the right mix for public service effectiveness?*, op. cit.

[103] https://eups20.wordpress.com/the-open-declaration/

[104] Osimo D. (2008) "Web 2.0 in Government: Why and How?"; JRC Scientific and Technical Reports EUR 23358 EN. 2008. ftp://ftp.jrc.es/pub/EURdoc/JRC45269.pdf , op. cit. in Roberto Pizzicannella, ibidem.

[105] Huijboom, N., Van Den Broek, T., Frissen, V., Kool, L., Kotterink, B., Meyerhoff Nielsen, M. and Millard, J. (2009) "Public Services 2.0: The Impact of Social Computing on Public Services"; Punie, Y., Misuraca, G., Osimo, D. (eds) JRC Scientific and Technical Report series EUR 24080 EN – 2009. ftp://ftp.jrc.es/EURdoc/JRC54203.pdf , op. cit. in Roberto Pizzicannella, ibidem.

In the light of above the objective of this research is to reflect on the issues of co-production and open data and to investigate to which extent the combination of co-production and open data can contribute to public service effectiveness. In the current effectiveness measurement practices one of the characteristics is indeed the sharp distinction between service provider and user and this maybe is one of the reasons of the difficulty in defining and measuring their effectiveness.

Both co-production and open data rely on the principle of deeper engagement of citizens and more in general of civil society in the "government affairs". They promote the idea that the participation of the "user" can dramatically improve the quality of the "product" of public administration (whether services or policy decisions). The users of the services are considered hidden resources that can collaborate with public sector professionals in delivering services of their interest.

Both co-production and open data aim at blurring the distinction between the "inside" and "outside" of the public sector, removing the sharp distinction between providers and users of public services and promoting the collaboration between the two groups. They offer a dramatic change of perspective in considering public service effectiveness and pose a significant question: **are co-production and open data the right ingredients to achieve more effective public service delivery models?**

In this respect, the main issues can be summarized as follows:

1. Establish/build a comprehensive definition of effectiveness in public service. This is not only a question of formality, but a real need to clearly distinguish the concept of effectiveness from other related ones, like for example, quality and efficiency (in the domain of public services).
2. Understanding possible relations between co-production and open data. As has been argued previously, co-production and open data share the belief that a major involvement of users increases possibility to provide better services.

In this context two possible relations can be considered (figure 10)

Possible relations between co-production and open data

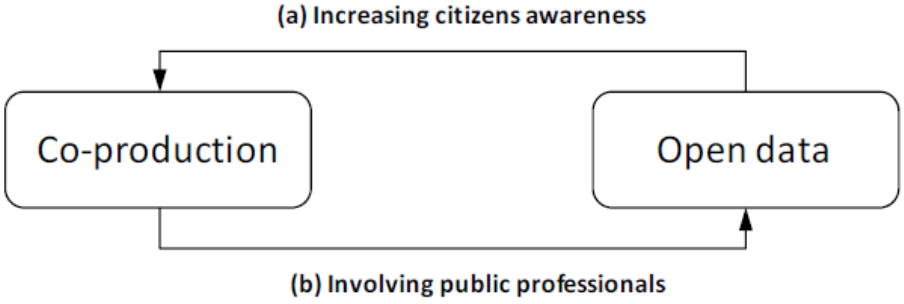


Figure 10
Source: Roberto Pizzicannella, *Co-production and open data: the right mix for public service effectiveness?*

a. One relation to explore is the positive impact that open data can have on co-production practices. In other words, can the access to large amount of public data make the citizens more aware and more willing to participate in service delivery?

b. Another relation concerns the possibility to apply co-production approach in services proposed/created by the users (e.g. Apps development). Today, in general, the public services are conceived/decided by the professionals in the public sector, based on the tasks and duty that the institutional/legal framework assigns to government. Open data gives the possibility to users and their community to create their own services.

And furthermore:

3. How the mechanisms underlying co-production and open data can be combined to enhance the effectiveness of public service delivery? In other words, are there delivery models based on use of co-production and open data that can provide more effective public services?
4. Investigating if and how social computing applications enable the combination of co-production and open data.

The overall set of issues/questions listed above are interlinked. They are represented in figure 11 to provide a consistent framework of inquiry aimed at developing the following case study where the mechanisms/concepts of co-production and open data will be deeply analyzed in order to derive a System Dynamics model able to show these inter-linkages.

The relations among the identified research issues

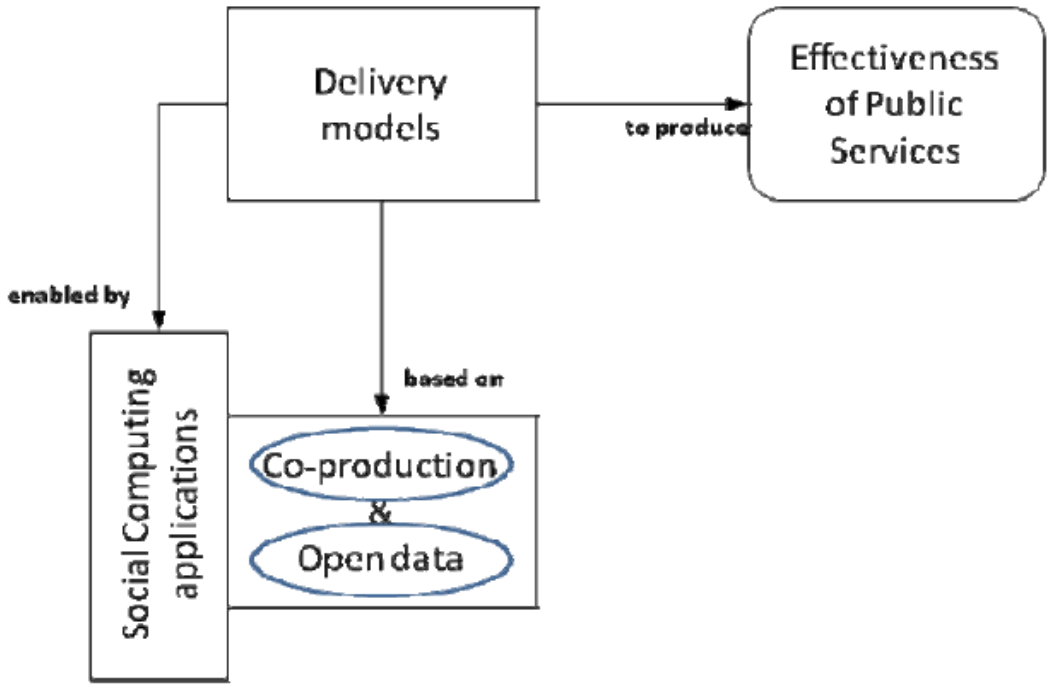


Figure 11

Source: Roberto Pizzicannella, *Co-production and open data: the right mix for public service effectiveness?*

CHAPTER 2 - OPEN DATA GOVERNMENT AND LEGISLATIVE FRAMEWORK

2.1 DEFINITION OF OPEN DATA

Government information and data are common resources, managed in trust by government. They provide a platform for public service provision, democratic engagement and accountability, and economic development and innovation. A commitment to open data involves making information and data resources accessible to all without discrimination; and actively engaging to ensure that information and data can be used in a wide range of ways.

Open Data (OD) are therefore data of public interest that should be available to the public to use and reuse as they wish, without restrictions from copyright, patents or any other mechanisms of control. The philosophy behind open data is that information becomes more valuable as it is shared, less valuable as it is not available[106].

The Open Data movement started to gain traction worldwide some years ago and since then there have been dozens of new government initiatives flourishing all over the world every year, frequently building on the top of previous transparency and reuse of public sector information efforts. [107] Nevertheless, after several years of efforts we can still consider Open Data a *new concept*. Although it is an idea that has been gaining increasing political relevance, its potential and implications for governance are only starting to be articulated and real impact evidence is just starting to arise.

The full Open Definition[108] gives precise details as to what this means. To summarize the most important:

»» **Availability and Access**: the data must be available as a whole and at no more than a reasonable reproduction cost, preferably by downloading over the internet. The data must also be available in a convenient and modifiable form.

»» **Reuse and Redistribution**: the data must be provided under terms that permit reuse and redistribution including the intermixing with other datasets.

»» **Universal Participation**: everyone must be able to use, reuse and redistribute - there should be no discrimination against fields of endeavor or against persons or groups. For example, "non-

[106] Wikipedia, Definition of Open Data, from: http://en.wikipedia.org/wiki/Open_data (accessed 18 January 2013)

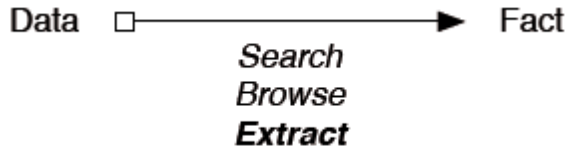
[107] Epsi platform, A year of Open Data in the EMEA region, 2013

[108] Open Data Handbook, Definition of Open Data, from: http://opendatahandbook.org/en/what-is-open-data/index.html (accessed 18 January 2013)

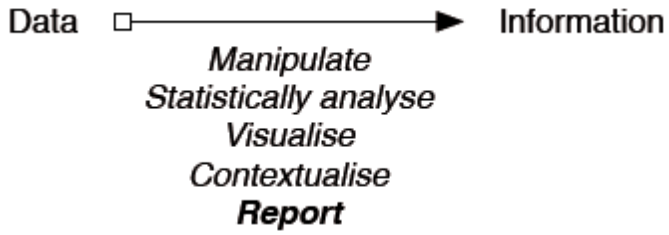
commercial" restrictions that would prevent "commercial" use, or restrictions of use for certain purposes (e.g. only in education), are not allowed.

The ends to which open data is put are diverse, in this respect, Tim Davies puts forward five distinct processes of Open Government Data (OGD) use in the open data portal data.gov.uk [109]:

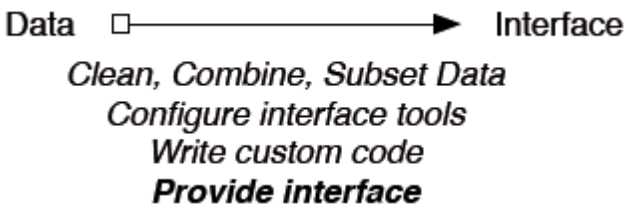
- **Data to fact**: often underestimated in accounts of 'data for developers', individuals may seek out specific facts in a newly open dataset. These facts may support their engagement in civic or bureaucratic processes, or in business planning. Facts could be found through online interfaces, but also by browsing downloaded Excel spreadsheets.



- **Data to information:** creating a static representation and interpretation of one or more data sources. Leading to visualizations, blog posts, infographics and written reports.

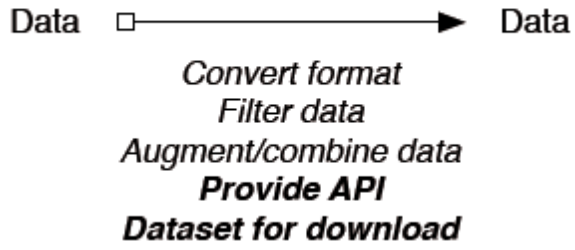


- **Data to Interface:** creating a means to interactively access and explore one or more datasets. For example, creating a searchable mapping mash-up, or providing a tool to browse a large dataset and crowd source feedback or scrutiny. Interfaces often also include 'static' interpretations of data (data to information), showing particular summary statistics or algorithmically derived assessments of underlying data.

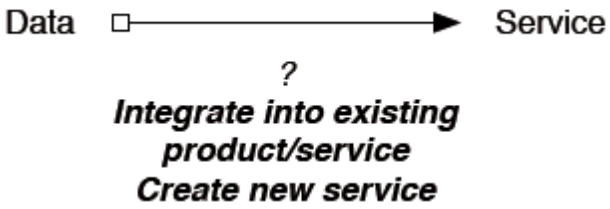


[109] *Tim Davies, Open data, democracy and public sector reform. A look at open government data use* from data.gov.uk, August 2010, available on line: http://www.opendataimpacts.net/report/wp-content/uploads/2010/08/How-is-open-government-data-being-used-in-practice.pdf .

- **Data to data:** sharing derived data (either simply an original dataset in a new format, or data that is augmented, combined with other data, or manipulated in some way. A whole dataset may be shared, an API[110] onto a dataset created, or an interface that makes it easy to download subsets of a large dataset.



- **Data to service:** where OGD plays a 'behind the scenes' role in making some online or offline service function. For example, the use of boundary data to route messages reporting potholes to the responsible authority.



Furthemore, looking at the motivations of OD users, six sets of drivers for engaging with OD goverment can be identified:

- **Government focus:** wanting to better understand government and to promote efficiency and accountability;
- **Technology innovation focused:** interested in creating new platforms and tools, and in semantic-web/linked-data technology;
- **Reward focused:** seeking recognition and/or profit;
- **Digitizing government: s**eeking technologically driven improvements in efficiency and efficacy of government;

[110] In computer programming, an **application programming interface** (**API**) is a set of routines, protocols, and tools for building software applications. An API expresses a software component in terms of its operations, inputs, outputs, and underlying types. An API defines functionalities that are independent of their respective implementations, which allows definitions and implementations to vary without compromising each other. A good API makes it easier to develop a program by providing all the building blocks. A programmer then puts the blocks together in http://en.wikipedia.org/wiki/Application_programming_interface .

- **Problem solving:** using OD goverment to meet specific challenges;
- **Social/public sector enterprise:** using OD government to provide services in/to the public sector.

According to Tim Davies it is therefore possible highlight the following implications:

1. Data is not just for developers: direct access to trusted sources of facts is valuable for many individuals: either to be able to look up a specific fact, or to work with a dataset in familiar desktop software (e.g. Excel) in order to write s report or analyze the data for making a decision.

2. OD policy changes the gatekeepers, and the role of civic actors: with mainstream media, independent citizens, companies and different levels of government are all afforded the possibility of advancing their own interpretations and representations of data. Government, however, can retain some gate-keeping power by setting the categories and structure in which data is recorded and released.

3. OD policy supports innovation in public services: although it is not yet clear that there are strong models for the use of OD in allowing communities to collectively debate and drive local change. Social and commercial entrepreneurs play a core role at present in turning OD policy into new services or inputs into public services.

4. A focus on digitizing government underlies much OD use, and can lead to concerns of politics, power and justice being under-valued in the development of OD infrastructure: a focus on idealized digital infrastructures also risks loosing site of practical end-uses of OD, thus care must be taken to identify and work with real use-cases, and civic and democratic use-cases, in considering how OD use is further developed.

Furthemore, publishing open data is not just about technology. In this respect, Tim Berners-Lee's[111] set out a series of approaches that open data initiatives can take to publish data on the web (5 stars Scale).

[111] http://5stardata.info/

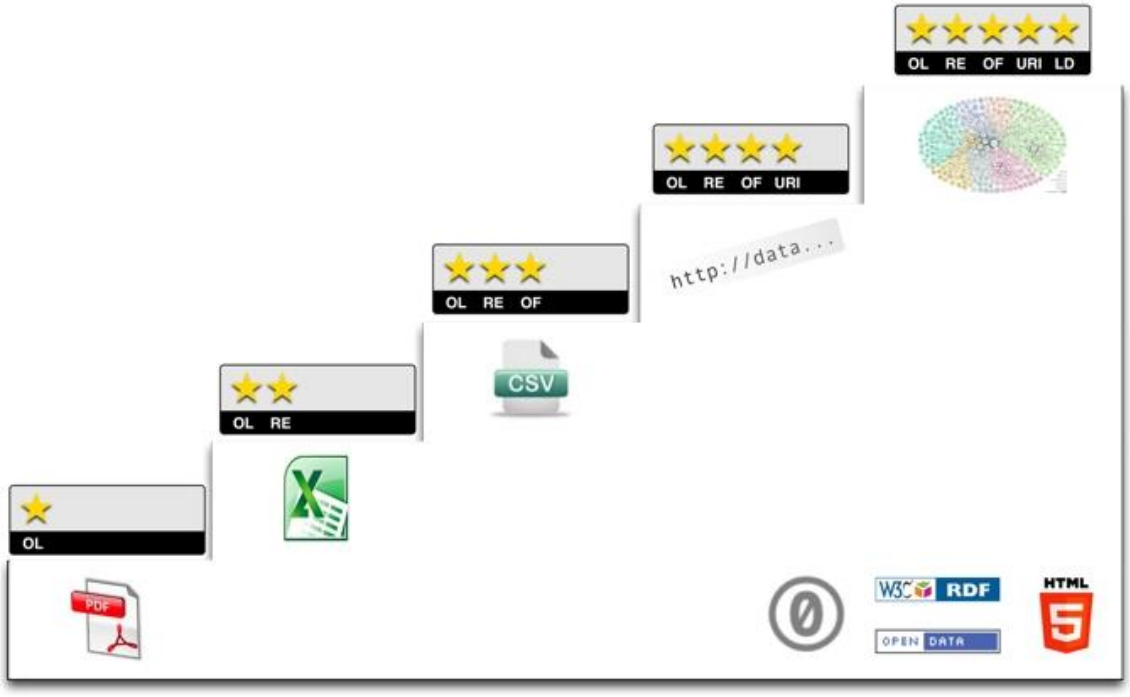


Figure 12
source: http://5stardata.info/

No star means the data is not available under an open licence, even if it is available on-line[112]

★ **One star** means that data is accessible on the Web. It is readable by the human eye, but not by a software agent, because it is in a 'closed' document format, and therefore cannot be easily re-used.

★★ **Two stars** mean that data is accessible on the Web in a structured, machine-readable format. Thus, there-user can process, export and publish the data easily, still depending however on proprietary software like Word or Excel.

★★★ **Three stars** mean that re-users will no longer need to rely on proprietary software (like CSV instead of Excel). Accordingly, re-users can manipulate the data in any way, without being confined to a particular software producer.

★★★★ **For stars** mean that the data is now in the Web as opposed to on the Web through the use of a URI[113], a Uniform ResourceIdentifier. As a URI is completely unique, it gives a fine-granular control over the data, allowing for things like bookmarking and linking.

★★★★★ **Five stars** mean that the data is not only in the Web but is also linked to other data, fully exploiting its network effects. Through this interlinking, data gets interconnected whereby the value

[112] http://www.epsiplatform.eu/sites/default/files/The%205%20stars%20of%20Open%20Data_MdV_PR2.pdf

[113] In computing, a **uniform resource identifier** (**URI**) is a string of characters used to identify a name of a resource. Such identification enables interaction with representations of the resource over a network, typically the World Wide Web, using specific protocols. Schemes specifying a concrete syntax and associated protocols define each URI. The most common form of URI is the uniform resource locator (URL) in http://en.wikipedia.org/wiki/Uniform_resource_identifier.

increases exponentially, since it becomes discoverable from other sources and is given a context (e.g., through links to Wikipedia).

In the light of the above, it can be argued that public sector bodies at all levels of government collect, create, produce, maintain and disseminate a wide variety of information, called Public Sector Information (from now PSI), mainly arising with the carrying out of their institutional activity.

PSI can be divided into two distinct categories, as follows:

»» **Dynamic PSI** (updated on a continuous basis & associated with public sector operations)

»» **Static PSI** (an established record such as an archive, not directly associated with the functioning of the government).

Given the pervasive availability of such information and content in digital form and the increasing use of information and communication technologies (ICT) by secondary users, PSI is becoming an increasingly valuable resource for the production of innovative value-added goods and services, as well as a source of knowledge for the wider population.

There is indeed a wide range of benefits to be gained from improving access to PSI and facilitating its re-use, including:

»» The development of new products built directly on PSI;

»» The development of complementary products such as new software and services;

»» The reduction of transaction costs[114] in accessing and using such information;

»» Efficiency gains in the public sector itself; and increasingly

»» The crossing of different public and private information to provide new goods and services.

A study conducted by Deloitte for the European Commission[115], based on case studies of public sector bodies across Europe, demonstrated that improving access to PSI and lowering charges can lead to more economic activity, market dynamism, innovation and employment, but also to significant efficiency gains for the public sector.

Even though it is difficult to quantify the economic impact of opening PSI in urban area involved in the openness process, given the absence of robust data, the PSI market is estimated to be in the range of EUR 70 billion and EUR 40 billion - total direct & indirect economic impact respectively, in the then EU25+ Norway. In the HOMER[116] Regions the PSI market has been valued at around

[114] Transaction costs have been broadly defined by Steven N. S. Cheung as any costs that arise due to the existence of institutions. For Cheung, if the term "transaction costs" were not already so popular in economics literatures, they should more properly be called "institutional costs".[5][6]

[115] http://www.lapsi-project.eu/sites/lapsi-project.eu/files/PSI%20alliance%20slides.pdf

[116] Harmonising Open data in the MEditerranean thorough better access and Reuse of public sector information (HOMER), Socio-economic impact studyin the Med area, Study team: Eliza Loucaidou, Monica Ioannidou Polemitis (ed) Christina Themistocleous (Deloitte Limited), final report, march 2013, available on line: http://homerproject.eu/docs/Homer_Socioeconomic_Study_FV3.pdf .

EUR 3.3 billion for 2013 and is likely to increase to EUR 3.6 billion in 2014, compared to the total EU27 PSI market size of around EUR 39 billion in 2013 and EUR 42 billion in 2014.

This indicates that amidst the economic and social crisis across the Continent, with most countries of the MED area being officially in recession and struggling to find ways to cope with worsening economic conditions and growing unemployment, OD initiatives and portals can play a catalytic role in fostering innovation, growth and employment. Recognizing the largely untapped economic potential of opening up PSI, more and more public sector bodies and governments in Europe are committing to make public data more widely available and re-usable. They are supporting open government through legislation and practical measures, such as the production of data in machine-readable formats and the creation of data portals.

Nevertheless, in the light of the study conducted by the European Commission, the degree of initiative and the awareness of OD issues are uneven across the EU. Barriers stemming from the current regulatory framework of Member States and different levels of implementation, the insufficient awareness among stakeholders of the value of OD and the slow uptake of innovative technologies do not allow the maximum benefits to be reaped from the new opportunities that data and evolving technologies might offer.

2.2 EU-LEVEL OPEN DATA POLICY CONTEXT

In order to enable Europe to reap the potential benefits of its PSI and OD, the European Commission has driven the EU's public sector information policy since the 1990s.

In this respect, this section provides an overview of current key policy instruments and initiatives at EU-level.

-The PSI Directive 2003/98/EC

In 2003, the EU adopted the Directive 2003/98/EC[117] on the re-use of public sector information (hereafter the "PSI Directive), in order to enable better access to PSI.

It applies to all EU Member States as well as to the European Free Trade Association (EFTA) countries (Norway, Iceland and Liechtenstein).

The Directive has four main objectives: (a) to stimulate the further development of a European market for PSI-based services; (b) to enhance the cross border use and application of PSI in business processes; (c) to encourage competition in the internal market; and (d) to address divergence as to re-use rules between Member States.

[117] European Commission (2003), Directive 2003/98/EC, European Parliament and Council Directive of 17 November on the reuse of Public Sector Information, available on line: http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2003:345:0090:0096:EN:PDF .

A study conducted by Helm and Zenc[118], the "Directive impact matrix", presents a conceptual model with three "Directive impact typologies: the "*Closed shop*", the "*Battlefield*" and the "*Playground*" with typical examples of information which fall under each typology.

The closed shop typology refers to the type of PSI the production of which is in the core of public task (such as cadastral information) and the entire value chain up to the distribution level is controlled by the public sector. On the other hand, the battlefield concerns OD generated by the public sector (such as weather information), but due to their huge importance and potential for re-use, there is fierce competition between the public and private sector. The third area of the Directive having an impact is the so-called playground, where PSBs may decide to either step in (i.e. taking on board additional tasks within the value chain) or step out (i.e. simply providing the data for free & leaving the value adding completely to the private sector).

The Directive impact matrix

		Value added by the public sector body	
		Low	***High***
Impact of the three driving elements in the Directive value chain	***High***	*The playground:* government stepping in (e.g. legal information)	*Battlefield* (e.g. weather information)
	Low	*Closed shop* (e.g. cadastral information	*The playground:* government stepping out (e.g. traffic information)

Figure 13

Source: HELM Group and Zenc (2006), Measuring European Public Sector Information Resources (MEPSIR), (Directorate General for the Information Society, European Commission)

-The European Commission's "Open Data Package"

In its 2009 review of the PSI Directive's implementation, the EC concluded that, even though progress had been made, Member State (MS) action was insufficient and too fragmented to unlock the full potential of PSI for the EU economy. Therefore, MS were called to focus their efforts on full and correct implementation and application of the Directive.[119]

In order to deal with this fragmentation, the EC proposed a comprehensive "Open Data Package, which includes both legislative and non-legislative measures.

[118] HELM Group and Zenc (2006), Measuring European Public Sector Information Resources (MEPSIR), (Directorate General for the Information Society, European Commission), p.11, cit. in Harmonising Open data in the MEditerranean thorough better access and Reuse of public sector information (HOMER), Socio-economic impact study in the Med area, ibidem.

[119] European Commission (2009): Re-use of Public Sector Information ‐ Review of Directive 2003/98/EC, (Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions), COM(2009) 212 final.

On 12 December 2011, the European Commission presented an "Open Data Package" consisting of:

»» A European Commission Communication on Open Data;

»» A proposal for a revision of the PSI Directive; and

»» New European Commission rules on re-use of the documents it holds.

The European Commission's Communication on Open Data reviews existing initiatives in the area of PSI and Open Data, identifies barriers and proposes concrete steps to unlock the potential of Europe's public sector resources.

-Revision of the Public Sector Information Directive

The update of the European PSI directive (EU, 2013) was formally adopted by the European Parliament on the13th of June 2013. When fully implemented by the member states in the following 24 months since its entry into force, the new rules would:

→ Create a new **genuine right to re-use** all non-personal public information for commercial and non-commercial purposes, not present in the original 2003 Directive;

→ Significantly **expand the reach of the Directive** in the cultural area to include libraries, museums and archives for the first time;

→ Establish that public sector bodies can **charge at the most the marginal cost** for reproduction, provision and dissemination of the information. Although, in exceptional cases, full cost recovery (plus a reasonable return on investment) will remain possible;

→ Oblige public sector bodies to provide **more transparency about charging rules** and conditions;

→ **Improve the complaints mechanisms** to ensure its independence;

→ Promote the adoption of **standard automatable licenses** for all agencies within the same Member State.

→ Encourage the availability of both -data and metadata -in **open standards and machine-readable formats**; and

→ Introduce new rules on digitalization agreements, which will support **public and private partnerships** whilst also protecting the interests of the general public.

-The European Commission steps forward

Continuing with previous efforts on Open Data and PSI re-use from the European Commission (Iglesias, 2012), started with the launch in beta version of the European Union Open Data Portal open-data.europa.eu. The portal is the new single point of access to a growing range of data from EU institutions as well as other bodies and agencies, easing the search and reuse of data to citizens and industry for commercial or non-commercial purposes.

This open data catalogue is part of the Commission's three-fold *'Open Data Strategy for Europe'*(EC, 2013) **opening its data assets** to the public to promote innovative use and unleash their economic potential. At the same time, it also aims to help foster the transparency and accountability of the EU bodies.

The other two parts of the overall strategy are focused one stablishing a **level playing field for open data across the EU**, and backing the different activities by funding **research** into improved data-handling technologies.

Among current measurements towards these objectives, we could currently highlight the following ones:

- **DCAT Application profile and the Open Data Support programme**

The **DCAT Application profile for data portals in Europe** (JoinUP, 2013) is a joint initiative of two Directorates-General of the European Commission -DG CONNECT and DG DIGIT-and the EU Publications Office in the context of the Interoperability for European Public Administrations (ISA) programme (ec.europa.eu/isa/). DCAT-AP is a specification based on theW3C Data Catalogue Vocabulary specification (W3C, 2013) to describe public sector datasets in order to meet the specific application needs of data portals in Europe. Its basic use case is to **enable the exchange of dataset descriptions among data portals** as well as cross-data portal search for data sets. The objective is to make public sector data more searchable across borders and sectors.

The DCAT-AP is also being used in the context of the Open Data Support service (joinup.ec.europa.eu/community/ods/). This *pan-European* initiative by the European Commission has the purpose of improving the visibility and **facilitating the access to datasets within and across borders**.

- **The Horizon 2020 R&I Programme and other Open Data related services**[120]

The just launched first call for projects under the new Horizon 2020 Research and Innovation programme of the European Union (ec.europa.eu/programmes/horizon2020/) represents the **consolidation and continuation of prior commitments to funding research and innovation activities related to Open Data and PSI-reuse**. This includes **specific challenges for Open Data and Big Data** related actions to build innovative data products and services, among others (Horizon 2020, 2013).

In addition, the European Commission continues requiring different services to support its Open Data policies. Last time it was with the purpose of **measuring the progress as regards the size and the trends of the European data economy** through a better understanding of the market development, as well as the economic, societal and environmental impacts of the value extraction from data. The European Commission made a call for tenders (SMART, 2013) where the specific objectives are threefold:

→ Providing **facts and figures** on the size and trends of the European data market.

→ Providing **stories** about various aspects of the European data market; including quantitative facts and figures not yet covered by the indicators listed in the previous specific objective.

→ Further **development of the community** of relevant stakeholders in the EU in order to be able to effectively address the two previous specific objectives.

- **The Open Data Research Network**

The Open Data Research network (ODRN, 2013) is a collaborative project, coordinated by the Web Foundation and the International Development Research Centre (IDRC), that exists in order to:

→ **Connect researchers** focused on open data from across the world;

→ Bring together **information** and **news** related to research into the implementation and impacts of open data initiatives;

→ Host focused **research projects** into open data;

The network is open to all researchers interested in open data, and has a particular focus on research into the global South. One of the reference research projects in 2013 was the first edition of the Open Data Barometer. Between 2013 and 2015 the Open Data Research network is also hosting the *'Emerging Impacts of Open Data in Developing Countries (ODDC)'*project(WF, 2013): a multi-country **research** and **capacity building** programme.

[120] The Horizon 2020 Framework Programme for Research and Innovation, available on line: http://ec.europa.eu/programmes/horizon2020/

The overall intention of this research project is to establish practical knowledge about effective strategies for employing open data to achieve four specific goals:

1. Explore how open data improve governance, supports citizens' rights, and promotes inclusive development;

2. Support **knowledge sharing**, **policy learnin**g and **evaluation** based on the research findings;

3. Develop and test **common methods** for assessing the context, strengths and weaknesses of open data initiatives over time;

4. Identify global standards, platforms and infrastructures too pen data **impact** upon its usage.

-The Open Government Partnership: Government and Civil Society working together

The World Bank has joined forces with the Open Data Institute and the Open Knowledge Foundation in a 3-year project (WB, 2013)designed to help policy makers and citizens in developing countries understand and exploit the benefits of open data. The main objectives are:

1. Support developing countries to **plan**, **execute** and **run** national open data initiatives;

2. Increase re-use of open data in developing countries through creating **data standards**, **guidelines**, regional **networks** and data **demand**; and

3. Grow the base of credible evidence on the impact of open data for development.

The project will include scoping the state of open data; assessing the readiness of countries to open up and use their data; training government officials, other policy makers, and civil society; undertaking research and producing guidelines on the best use of open data and producing case studies of impact.

Finally, the Open Government Partnership has identified several thematic working groups to contribute peer exchange and learning where governments and civil society can work together. Its mission is *"To hold the promise of using open data to transform the way government and societies* ***work together*** *to analyze and solve challenges; helping OGP governments implement their commitments and develop more ambitious and innovative action plans related to open data".*

Accordingly to the invitation to participation (Walker et al., 2013), this new OGP Open Data Working Group aims to:

→ Serve as a **guiding voice** on open data issues to help OGP governments implement their action plans and develop ambitious new commitments.

→ Increase **awareness** of open government data issues across the OGP.

→ Amplify and broaden the **evidence** base for open data reforms.

→ Gather and strengthen existing **resources.**

→ Engage with the broader global open data **community.**

The working group first convened on the side of the OGP Summit in London last October. Topics that were discussed during the meeting included:

1. **Open Data measurement**–the need to better understand the impacts of open data.

2. **Capacity building**–what's yet to be achieved and were the gaps are.

3. **Data standards**–how to cross-link between information silos to achieve greater impact.

4. **Developing and implementing stronger open data commitments**–is there a need for a common set of principles?

Non-legislative action at EU-level

Complementary to its legislative action described above, the EC undertakes a series of non-legislative actions in order to realize the full economic and societal potential of Europe's PSI. Non-legislative measures can be categorized along three strands: (1) **awareness raising and networking actions**, (2) **co-funding Research & Development & Innovation (R&D&I)** as well as (3) **Information and Communication Technologies (ICT)** deployment support services.

Awareness raising and networking actions:

»» The PSI Group is a Member States' expert group for the exchange of good practices and initiatives supporting public-sector information re-use.

»» The European Public Sector Information Platform (EPSI) is a web portal that provides news on European developments, good practices, examples of new products and services, and legal cases concerning PSI re-use.

»» The LAPSI Network24 analyses legal issues related to PSI, fosters debate among researchers and stakeholders and will produce a set of guidelines for access and re-use policies and practices.

Before going deeper into the details of the Open Data strategy carried out by the Municipality of Palermo, we should look first at some of the main global conclusions from the 2013 open data snapshot report provided by the OpenData Barometer on how different countries and regions face different challenges in pursuing OGD:

- While OGD policies have already reached a majority of the countries, the availability of truly open data remains low, with **less than 7%** of the dataset surveyed in the Barometer published both, in bulk **machine-readable** forms and under **open licenses**.

- Leading countries with a good political backing for OGD are currently focusing their investments on **data infrastructures**, **capacity building** and communities' **engagement**.

- Intermediate countries have some of the main components of an OGD initiative already in place but, at the same time, they usually **fail on providing a good range of valuable datasets** and also present some **weakness in different key open data policy foundations**, such as right to information or data protection.

- Those in the lower part of the ranking have not usually started their Open Data initiatives yet, and may also lack the basics to do so at the moment.

Various studies and reports conducted on behalf of the European Commission (EC, 2013)[121] also showcase how businesses and citizens still face several difficulties in finding and re-using public sector information.

	READINESS	IMPLEMENTATION	IMPACT	OVERALL
Europe	68.97	50.12	35.34	51.50
United Kingdom	100.00	100.00	79.91	**100.00**
Sweden	95.20	83.14	71.95	**85.75**
Norway	91.38	70.98	46.15	**71.86**
Denmark	83.54	70.20	55.73	**71.78**
Germany	74.50	63.14	53.81	**65.01**
France	79.39	64.31	39.07	**63.92**
Netherlands	85.92	67.06	21.42	**63.66**
Iceland	62.99	52.94	26.45	**51.01**
Estonia	72.38	49.41	24.00	**49.45**
Finland	91.19	41.18	40.87	**49.44**
Spain	67.48	49.41	21.13	**48.19**
Austria	68.56	39.22	48.62	**46.03**
Italy	50.39	42.75	45.69	**45.30**
Russia	54.43	40.39	48.86	**44.79**
Switzerland	65.11	41.57	26.80	**43.24**
Czech Republic	61.83	40.00	35.36	**43.18**
Portugal	60.38	38.04	19.25	**38.63**
Ireland	61.81	32.55	23.92	**35.76**
Belgium	72.01	28.63	25.64	**34.80**
Greece	43.95	27.84	12.30	**27.59**
Turkey	41.92	31.37	0.00	**27.58**
Hungary	32.42	28.63	10.51	**26.09**

Open Data Barometer rankings for Europe on a 0-100 scale (higher values are better)

Source: The Open Data Barometer 2013 Global Report - World Wide Web Foundation and Open Data Institute.

Figure 14

2.3 OPEN DATA NATIONAL LEGISLATIVE FRAMEWORK

In this section we provide an overview of national legislation and policies regarding Open Data and PSI re-use, as well as reference to any national portal or information sharing services, or relevant national projects.

Italy currently produces 8,000 datasets in an open format, published by central and local public administrations on their web portals. Compared to the 3,000 datasets available in September 2012,

[121] http://www.opendataresearch.org/dl/odb2013/Open-Data-Barometer-2013-Global-Report.pdf

the increasing trend shows to what extent the Italian public administration is actively responding to Open Data needs. The actively responding to Open Data needs.

To support this trend, Italian legislation has recently introduced an "**Open Data by default**" principle: when no license is associated with the published data, the data available on public administration Web portals are implicitly considered "open" for re-use.

In order to provide an overview of national legislation and policies regarding Open Data and PSI re-use we can start with the recent national legislation that resulted in the creation of the Agency for Digital Italy (AgID), identified as the Italian PSI enabler. In this context, AgID publishes annually three key documents on PSI: an Agenda including the national policies and strategies, a set of Guidelines directed to public administrations for the implementation of the strategies included in the Agenda and a Report assessing the status of development of PSI in Italy with respect to the strategies defined in the Agenda. The first version of the Guidelines and the Agenda has been published in August 2013.

Amongst other countries, Italy was the last member state to implement the PSI directive (2010), five years after the deadline of the 1st July 2005 set in the PSI directive. The PSI directive was transposed into the Italian Legislative Decree 24.1.2006, n. 36. According to EU Commission request, Italy adopted the law 4.06.2010, n. 96, which modified the Italian Legislative Decree 14.1.2006, n. 36.

Since June 18, 2013 Italy joined the United States, Japan, Germany, France, United Kingdom, Canada and Russia to the Charter of Open Data G8 (Open Data Charter) in which member countries are committed to adopt opening information policy in their government.

The Italian Open Data license (version 0.1) is open for feedback and is compliant with Creative Commons 2.5 and the Data Commons. Social media policies or guidelines could not be identified for the Italian government. The government has a broader eGovernment Strategy (e-Gov 2012 Plan) which includes elements of open government and Open Data.

National Law references are:

- → **D.LGS 36/2006** (modified by Law 96/2010) to transpose EU Directive 89/03;
- → **D.LGS 82/2005** Codice dell'Amministrazione Digitale (Digital Administration Act);
- → **DL 179/2012** Decreto Crescita 2.0, approved with L. 221/2012. Article 9 of decree-law no. 179/2012 defines a legislative framework that enhances access to and reuse of Public Sector Information (PSI) by introducing, among the rest, a clear definition of "Open Data" and a general principle of openness by default;
- → **D.LGS 33/2013** "Reorganization of the legislation Concerning the obligations Relating to the advertising and transparency for Disseminating public information".

→ **Guidelines** for the public administrations; to support the implementation of the strategies included in the Agenda (AgiD)

The article 9 of decree-law no. 179/2012 defines a legislative framework that enhances access to and reuse of Public Sector Information (PSI) by introducing, among the rest, a clear definition of "open data" and a general principle of openness by default.

The Agency for Digital Italy [AgID] is identified as the Italian PSI enabler. In this context, AgID publishes annually three key documents on PSI: an Agenda including the national policies and strategies, a set of Guidelines1 to support public administrations in the implementation of the strategies included in the Agenda and a Report assessing the status of development of PSI in Italy with respect to the strategies defined in the Agenda. A first version of the Guidelines and the Agenda has been published in August 2013.

Within this renewed regulatory framework, Italy is experiencing a wide participation of Public Administrations and of social communities to open data activities.

The Italian Department for Public Administration is involved in a number of international initiatives related to open data and open government (e.g., the Open Government Partnership) in collaboration with other Ministries and Agencies operating in these fields.

One third of Italian regions manage an infrastructure for local data. Moreover, several initiatives at regional and local level, including tenders, funding and competitions, are aimed at stimulating open data projects, encouraging commercial reuse, also with a special focus on storytelling and civic monitoring initiatives.

At the level of independent civil society initiatives, various Italian movements of hackers, students and citizens concerned move their interest to stimulate local bodies to share Open Data and promote re-use data culture. Comunity of **Spaghettiopendata**[122], **Wikitalia**, **Stati Generali dell'Innovazione**, **GFOSS** (Italian Association for Free Geographic Information), the **Open Ricostruzione** project that represent individuals citizens movements that collect Italian Open Data and use them for data journalism and setting up hackathons by re-using the data.

For instance, such initiatives as **OpenPompei**, **OpenRicostruzione** and "**OpenCoesione**" expressly target at strengthening a link between the public administration and the society by raising awareness (through access and use of open data) on how the administration manages a specific budget or a process.

[122] Spaghetti Open Data is a national network of citizens interested in the issue of public open data in order to make it easy the access and reuse . Useful to power the discussion on how making it easily accessible information of high quality, basing on the data and not on the views. Palermo was been proposed by local open data community as seat of SOD in 2014 for emphasize the important social consequences and the economic and cultural benefits resulting from release and use of open data useful to develop the regional innovation strategy inside the European programming 2014/2020.

OpenCoesione defines Italian Open Government strategy on cohesion policy aimed at increasing transparency in the use of funds, improving decision making and policy design, increasing involvement of stakeholders in ensuring efficient and effective use of funds and encouraging the creation of new tools and services. The OpenCoesione initiative is promoted by the National Department for Development and Economic Cohesion and its implementation involves several Central and Regional public entities so that the Open Government strategy is spread across different levels of Italian Government. The strategy is in line with the national framework of Italy's Digital Agenda as well as with EU Structural Funds Regulations, which oblige Member States to provide public information on beneficiaries and operations funded, and give in 2014-2020 programming period specific indications on formats and re-use of information .

Transparency is pursued giving public access and ease of comparison on projects allowing citizens to evaluate if and how implemented projects meet their needs and whether financial resources are allocated effectively. Users can either download raw data available in open format or navigate through interactive diagrams itemized by expenditure categories, places and type of intervention, as well as browse to pages on individual projects and subjects involved. OpenCoesione portal also publishes statistical open data on local economic and social context in order to assure comparable information at territorial level used as proxy to general results of cohesion policies.

The final aim of OpenCoesione initiative is to encourage greater **public participation** and **collaboration** by opening high value data and offering a large number of variables at the project level. This has resulted so far in the launch of an independent platform for civic monitoring (**www.monithon.it**)[123] that allows to publish multimedia reports of visits of groups of interested citizens.

A pilot project for civic engagement of high schools is also being launched: with "**A scuola di OpenCoesione**" (literally "At school of OpenCoesione") students will acquire digital competencies and greater awareness on cohesion policies and will be supported in producing narratives of their territories/neighbourhoods, arising from local cohesion projects.

Mention must be made also of the major contribution to the national debate on open data made by various civil society groups, such as **Spaghettiopendata** (a vivid community debating the status of initiatives around open data in Italy and occasionally organizing *hackathons* and *events);* the **Italian Association for Open Government**; **Linked Open Data Italy**, **Stati Generali dell'innovazione**, **Wikitalia** (which is also committed to raising funds and tutoring local administrations for civic hacking projects).[124]

[123] http://www.monithon.it/

[124] http://www.agid.gov.it/sites/default/files/allegati_tec/LG_Val_PSI_v1.0.pdf

It is also interesting to mention the use of social media as Facebook and twitter where operate various online discussion groups in the field of Open Data (Open Data Bologna, Open Data Ferrara, Open Data Romagna, Open Data Sicilia, Open Data Venezia, Open Data Bari, Open Data Milano, Open Data Torino, Trentino Open Data, Open Geo Data Italia, Open Ricostruzione).

Their contributions are crucially important for the future trends of Open Data culture, for developing new market and startup business ideas in the national context.

In order to have an instant and complete overview to provide a synoptic picture of the "state of the art" of the Open Data in the National context we mention the web page and infographics edited by the staff of dati.gov.it.[125]

In addition, in collaboration with the **Italian Observatory for Smart Cities**, a systematic survey has been started to analyze the state of implementation of the open data infrastructure for Smart Cities and Communities. In order to provide a normative and technical architecture for Italian Smart Cities, AgID[126] and Anci[127] are currently working on fostering openness for economic growth, reuse and transparency goals, within the advanced framework established with the decree-law no 179/2012.

Although public administrations are independent in the production and publication of open data, AgID drives both central and local public administrations towards the adoption of a process that envisages opening high quality public data. In doing so, AgID defines the Agenda, which delineates the main direction of the Italian public sector information enhancement process. In line with the recommendations included in both the Italian and European Digital Agendas, the Agenda identifies the basic open data principles, the objectives and an implementation plan for the production and release of public open data. It thus represents the reference point for the various national measures aimed at making governmental data available in an open format, facilitating their (re)use by citizens and businesses and possibly fostering economic and social growth. The Agenda is annually updated according to the forthcoming open data scenario (e.g., new standards, data demands, international initiatives).

Furthermore, Italian legislation has recently introduced an "**open data by default**" principle: when no license is associated with the published data, the data available on public administration Web portals are implicitly considered "open" for re-use. The application of this principle will likely

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http://www.spaghettiopendata.org/
http://www.linkedopendata.it/
http://www.statigeneralinnovazione.it/online/
http://www.wikitalia.it/

[125] http://www.dati.gov.it/
[126] http://www.agid.gov.it/
[127] http://www.anci.it/

increase the number of data that may be re-used (also for commercial purposes) although it might not guarantee that the information is technically in a nonproprietary, machine-readable format and accompanied by relevant meta-data.

Most of the Italian open data datasets are catalogued by dati.gov.it[128] , i.e., the Italian open data portal. In addition, Italy has launched the SPCData[129], the linked data space of the Italian public administration. It currently includes around 16,600 interlinks to some of the Linked Open Data made available by a limited number of Italian public administrations, also interlinked to the Web of Data.

Italy plans to extend SPC Data in order to let it become the Linked Data hub of the Italian public administration, as stated in the Agenda.

→ **Open Data Action Plan: Italy**

A part from quite a lot of activity at the local and regional level throughout the year, the **first Italian G8 Open Data Action Plan** was drafted in October 2013 within the framework of the G8 Open Data Charter[130] in order to share information with international partners and exchange knowledge on respective national open data policies.. The plan not only describes the current state-of-the-art in the country, but also introduces new commitments in the field.[131]

This document introduces the commitments in the open data field and it describes what has been done so far. The action plan was also followed by an update in the national catalogue dati.gov.it,as well as by some new detailed guidelines such as a new reference *Vademecum*.[132]

The Action Plan was drafted by the Department for Public Administration in cooperation with the Agency for Digital Italy (AgID) and with the collaboration of the following Public Administrations and Agencies:

- Ministry of the Interior
- Ministry of Economy and Finance
- Department of Legal Affairs of the Prime Minister's Office
- Department for Development and Economic Cohesion - Ministry of Economic Development
- Revenue Agency
- National Statistics institute - Istat
- Institute for Environmental Protection and Research - ISPRA

[128] http://www.dati.gov.it/, cit.
[129] http://spcdata.digitpa.gov.it/index.html
[130] https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/207772/Open_Data_Charter.pdf
[131] http://www.funzionepubblica.gov.it/media/1104831/piano_azione_g8_open_data.pdf
[132] http://www.digitpa.gov.it/sites/default/files/allegati_tec/LG_Val_PSI_v1.0.pdf

- Regions

-FormezPA also contributed to drafting the document.

Italy, as all G8 countries, presented this Plan on the 31st of October 2013 in order to put the document up for consultation afterwards. During this period, the Plan will be made available on the website of the Department for Public Administration www.funzionepubblica.gov.it.

This process is intended to acquire public input on the Action Plan as envisaged in the Open Data Charter.

The Italian National Open Data Portal, dati.gov.it, already catalogs and presents the four key datasets according to the G8 Open Data Charter and two high value datasets. The national portal catalogs and publishes approximately 15% of the open datasets made available by Italian public administrations (about 1,000 out of 8,000).The Italian Government is committed to enhancing the Dati.gov.it portal.

Italy commits to publishing the key datasets identified in the G8 Open Data Charter according to the following action plan which will be completed by 2015.

Dataset	Current availability	Future planned availability (accessibility and granularity)	To be completed by
National Statistics	published	available as structured data in a non proprietary format and under an open government license	December 2014
National Maps	published	available as structured data in a non proprietary format and under an open license	December 2015
National Elections	unpublished	will be published after the next election	December 2014
National Budget	Already published data refer to 2008-2013 and concern only the Budget Law and Final Accounts detailed by: •Ministry •Mission and Programme •Economic nature of expenditure (according to SNA/ESA 95 basis)	Plans are to publish all main budget documents with a further breakdown at a level of: • Expenditure line-items ("budget chapters") • COFOG classification • Responsible government department (in addition to the information on the Ministry, mission and expenditure programme, and economic nature of expenditure). The 2012 Final Accounts by end of 2013. Thereafter, data on Budget Bill 15 days after of presentation, Budget Law by end of January t+1; Annual correction by end of September t and Final accounts by July t+1. Moreover, annual datasets concerning the receipts and payments made by public administration treasurers/cashiers are being published, aggregated by type of administration. Data are available as structured data in a non proprietary format and under an open government license	July 2014

Figure 15
Publication of 4 Key Datasets[133]

[133] http://www.funzionepubblica.gov.it/media/1104831/piano_azione_g8_open_data.pdf

Italy is committed to publishing, along with the key datasets, a number of high value datasets listed in the G8 Collective Action Plan. These datasets were recognized as highly valuable for improving democracy and encouraging innovative re-use of data.

Dataset	Current availability	Future planned availability (accessibility and granularity)	To be completed by
Legislation	published	available as structured data in non proprietary format; the use is free of charge	October 2014 (integrating the DB with the acts published from 1933 to 1945)
Environmental pollutants	published	available as structured data in non proprietary format and with improved granularity	December 2015
OpenCoesione: the national web portal on public investment projects financed by 2007-2013 national and EU cohesion policy resources	published	available as structured data in a non proprietary format and under an open license	Ongoing and evolving

Figure 16
Publication of High Value Datasets[134]

→ **Open Data status in Italy**

Italy currently produces and manages over 8,000 datasets in open format, published by central and local public administrations on their web portals. Compared to the 2,000 datasets issued in an open format by Italian public authorities in March 2012, the increasing trend shows to what extent the Italian public administration is actively responding to Open Data needs, but however, their quality level (measured on the Scale of Tim Berners-Lee) was poor (less than 4 stars). A year and a half later, the amount of open data available quadrupled, rising to nearly 8,000, with a substantial improvement of data quality[135].

[134] Ibidem
[135] http://www.dati.gov.it/content/infografica

Data quality as well as quantity and availability are deeply taken into consideration in the Agenda and in the Guidelines. In particular, several actions are being adopted to improve these aspects. These actions can be summarized as follows:

- **Data quality**: two quality models for data and metadata respectively have been proposed in both the Agenda and Guidelines. In particular, the well-known 5 stars data model has been enhanced in order to better show the benefits that high-quality datasets bring in terms of data access and services that can be developed.

- **Data quantity**: all data from public administrations have to be open at least to 3-stars level.
The Agenda published last August by AgID[136] includes an initial set of key datasets – to be made available with high technical standards - concerning Public Administration organization; official classifications; health performances; events and places of culture, etc.

- **Availability:** the Agenda encourages administrations to open their datasets in a linked open data form, thus fostering their availability. In addition, the Guidelines propose a set of core metadata to be common to all published datasets. This metadata approach can possibly increase data availability as it becomes easier to find and understand data.

[136] http://www.agid.gov.it/dati-pubblici-condivisione/open-data

Figure 17
Source: http://www.dati.gov.it/content/infografica

From National legislation and policies it is possible to derive the governance of public data in municipal territory. The common principles shared in the municipal regulatory contest can be summarized as follows:

→ local authorities data are **community's real common good**;

→ transparency commitment towards citizenship to guarantee equal and non-discrimination conditions to public information access;

→ improve citizen's quality of life with more participation and shared knowledge;

→ the enhancement of local information patrimony;

→ promote "collective creativity" and new opportunities for the business with open licenses and data reuse for commercial goals;

→ promote a cultural revolution where citizens, business world, and all actors of civil society can be closer to public administration;

→ enriching the trend evolution of Linked Open Data (LOD) and strengthen "machine-readable" data to support a Value-Added Service Providers

2.4 CHALLENGES AND CURRENT BARRIERS

Several barriers and challenges for the adoption of the Agenda have been identified.
These can be ranked as follows according to their impact:

1. **Cultural and Political**: the awareness of the economic and social potential of open data is still relatively low. Public administrations tend to be reluctant to change their usual approach to work and do not necessarily perceive their role in terms of data producers. Moreover, adopting new forms of collaboration and participation with businesses and citizens in order to improve the public sector still requires a strong political commitment. The demand for open public data among active social communities, journalists and business is also still limited. Hence, it is rather difficult to understand what kind of data is most relevant.

2. **Technical:** specialized skills and expertise are required to open data at a high-quality level.

3. **Economic:** new initiatives and projects require investment in financial and human resources that often are lacking.

4. **Legal and Administrative**: at the moment, there are regulatory limits for charging data users (particularly in the area of map data). In this regard, the Italian government, with the recent open data regulation, created the conditions to support the free use and re-use of all data, with some exceptions to be clearly identified by AgID.

5. **Data Quality**: the amount of data published should not be used as a measure of success of open data policy. Apart from technical standards, open data should serve open services and processes so they must be of the highest quality in terms of well-known characteristics, which include completeness, consistency, timeliness and accuracy. Quality of open data is only assured by correct production and publication methodology and processes.

6. **Data Quantity:** the quantity of public data in open format is constantly increasing. The Italian Government supports this positive trend through activities for the promotion of common standards, initiatives on the ground with local communities, the exchange of good practices and training concerning the Digital Agenda.

Regarding the challenges, it is necessary to emphasize the need to foster the participation of users and stakeholders and the engagement of all civil society in the openness process of data.
AgID interacts with different players, both public (e.g. administrations, research institutions) and private (e.g. companies, civil society), thus acting as a broker to facilitate the growth and progress of the Italian open data supply.

In this context, the Guidelines released by AgID propose an operational model consisting, among other things, of a number of steps that administrations can follow to develop and plan open data initiatives. The model highlights the internal and external engagement needed to pursue an open data culture and practice. Following this model, Italian public administrations are encouraged to promote events such as **hackatons**, **app challenges** and **app showcases**.

Additionally, as part of the G8 - Open Data Charter, the Italian Government commits to fostering an open data culture among civil society, developers and users through:

I. constantly updating documents such as the Agenda and the Guidelines;
II. organizing the second edition of the competition Apps4Italy in 2014;
III. developing webinars to spread the open data and Open Government culture.

In this framework, **sharing and reusing** are two important practices carried out especially at local level, where resources are limited. In Italy, regional administrations set up so-called federated portals that host data from municipalities and local organizations. In this way, knowledge, experiences and tools can be effectively shared between public administration.

Moreover, the Italian Government is committed to promoting the **sharing of knowledge**, tools and experiences through the following specific actions:

I. **publication of an experience paper** documenting the status of open data in Italian regions (a preliminary version of such paper was recently published on AgID's web site)[137];

II. **publication and regular updating of a web site**[138] collecting local experiences and good practices that deserve visibility at national level;

III. **strengthening online open data communities**, in **particular innovatoripa.it**[139], the online platform where, in the last two years, a thematic discussion group on open data has been very active thanks also to the constant presence of the administrations that manage the national portal Data gov.it.

IV. **dissemination of an open data culture** through the use of social media (e.g. the Twitter account @datigovit[140] has approximately 2,500 followers, and the hashtag #OpenDataItaly, related to the Open Data Italy days is highly followed).

[137] http://www.agid.gov.it/sites/default/files/leggi_decreti_direttive/regolamenti_e_direttive_locali_open_data_regioni_agg_cisis.pdf
[138] http://esperienze.formez.it/
[139] http://www.innovatoripa.it/
[140] https://twitter.com/DatiGovIT

2.5 THE EMERGING IMPACTS OF OPEN DATA POLICY

The public sector collects, creates, produces and disseminates a wide range of information from legal and administrative information, business and economic data, to geographic and meteorological information. Public sector information (PSI) directly generated by public institutions is any kind of information that is produced and/ or collected and held by a public body as part of its public task. The Organization for Economic Co-operation and Development (OECD) defines PSI as "information, including information products and services, generated, created, collected, processed, preserved, maintained, disseminated, or funded by or for the Government or public institution"[141]. Information generated by public administrations and public sector bodies (PSBs), is a key resource for the knowledge society, given its quality and variety. Therefore it is widely accepted that PSI constitutes a valuable raw material which can be re-used by third parties in added-value information products and services.

a) Obstacles

There are currently a number of barriers to a European Union (EU)-wide availability of OD for re-use. These can be summarized as follows:

»» **The legal frameworks for OD are complex and fragmented across EU Member States** (MS). In addition, the licensing policies of different OD portals or even of different PSI holders are often incompatible.

»» **The awareness of OD policies and their potential benefits is still very limited** in many MS, especially in the Mediterranean.

»» The quantity of data sets published is relatively limited as compared to those potentially available for publication.

»» There are very few datasets which are currently published according to state of the art semantic technologies (Linked OD).

»» There is insufficient know-how and uptake of technically interoperable solutions (e.g. architecture, metadata, data formats, etc.) and Linked OD in public administrations.

»» There are difficulties in addressing multilingualism, not only at the level of user interface, but in particular when dealing with cross-lingual search, access and re-use of metadata and data.

[141] OECD Working Party on the Information Economy (2008), Recommendation of the Council for Enhanced Access and More Effective Use of Public Sector Information [C82008)36], p.4.

b) Benefits

There is a wide consensus that OD has many benefits to both the society and the economy of a country. The key benefits of OD which can be highlighted are the following[142]:

»» **Greater transparency of government decisions and accountability**.

»» **Greater civic engagement and participation**.

»» Increased efficiency within public sector bodies, which own and publish OD.

»» Stimulating business **innovation** and entrepreneurship through the creation of new products and services.

»» Reduction of transaction costs in accessing and using PSI.

»» Economic stimulus and large direct economic benefits.

In their research framework on the emerging impacts of Open Data in developing countries, Tim Davies, Fernando Perini and José M Alonso draw attention to three main 'domains of governance' through which decisions may be taken or implemented: the political, the economic and the social. Different disciplinary lenses can be applied to explore how governance is operating in each of these domains:

The political domain focuses attention on the exercise, shaping and control of state power. Political science approaches are particularly valuable here to explore how the opening of data may affect the established balance of power between institutions, and how greater access to information for citizens does or doesn't lead to political pressure for change.

The economic domain focuses attention on both market mechanisms as a tool of governance (distributing decision making through markets), and on the regulation or promotion of markets, as well as internal economic efficiencies for government from better data use. Where economic theory can help explore how the introduction of data into markets could promote better outcomes, business studies can also contribute to an understanding of the conditions under which open data does or doesn't result in innovations. In looking at the economic domain, critical attention can also be drawn to whether open data empowers smaller market players, or whether established and wealthy individuals and firms are able to gain the greatest return from open data (Heusser, 2012)[143]. Whilst governance of the economic domain (usually driven from the political domain) may be imposed upon all actors in a market, and the rules set through these processes affect market outcomes,

[142] Tim Davies, Fernando Perini, José M Alonso, *Exploring the Emerging Impacts of Open Data in Developing Countries***,** programme, ODDC Working Papers , July 2013, available on line: http://www.opendataresearch.org/sites/default/files/posts/Researching%20the%20emerging%20impacts%20of%20open%20data.pdf .

[143] Heusser, F. I. (2012), *Understanding Open Government Data and addressing its Impact*, op. cit. in ibidem.

governance carried out through the economic domain is generally distributed without central control or 'designed' outcomes.

The social domain invites a particular focus on the inclusion of marginalized groups, and on the capacity of individuals and communities at the grassroots to exercise influence over their own lives, without necessarily deploying either political or market power. Social science and community informatics approaches (Gurstein, 2007)[144] may be particular appropriate here, encouraging the embedded study of how open data affects social relationships and existing processes and practices of governance.

Within each of these domains it is possible to identify different hypothesis or 'theories of change' about how open data might affect a governance system. In this respect, the existing literature on Open Data emphasizes that the impact of OD policies can be large and multidimensional. It is highlighted that OD can have a transformative effect on government, with public administrations increasing their efficiency, offering their public data for better informed citizens, improved services and fostering collective knowledge (intelligence).

In the light of above, it is therefore possible to identify three broad categories that capture the mechanisms through which commentators suggest open data might bring about change. These are:

I. **Transparency and accountability** (Political domain): open data will bring about greater transparency, which in turn brings about greater accountability of key actors, leading to them making decisions and applying rules in the public interest;

II. **Innovation and economic development** (Economic domain): open data will enable non-state innovators to improve public services or build new products and services with social and economic value; open data will shift certain decision making from the state into the market;

III. **Inclusion and empowerment** (Social domain): open data will remove power imbalances that resulted from asymmetric information, and will bring new stakeholders into policy debates, giving marginalized groups a greater say in the creation and application of rules and policy.

[144] Gurstein, M. (2007), *What is community informatics (and Why Does It Matter)?* (Volume 2.). Polimetrica, op. cit. in ibidem.

These outlined theories of change have distinct primary areas of focus:

Key theory of change	Key focus	Key disciplinary traditions/Streams
Open data will bring about greater **transparency** in government, which in turn brings about greater **accountability** of key actors to make decisions and apply rules in the public interest;	The State (political domain)	Political science, public administration, legal studies
Open data will enable non-state innovators to improve public services or build innovative products and services with social and economic value; open data will shift certain decision making from the state into the market, making it more efficient;	The Market (economic domain)	Economics, business models, regulation
Open data will remove power imbalances that resulted from asymmetric information, and will bring new stakeholders into policy debates, giving marginalised groups a greater say in the creation and application of rules and policy;	The "Excluded" (social domain)	Social science, community informatics

Figure 18
source: Tim Davies, Fernando Perini, José M Alonso, *Exploring the Emerging Impacts of Open Data in Developing Countries.*

These theories of change are not mutually exclusive. In any governance setting you might find different routes being explored by different actors – as when, for example, one group might choose to use open data on public transport to hold existing service providers to account (transparency and accountability), whilst others may use the data to build commercial mobile applications that help travellers to find the fastest route, or check on the times of buses and trains (innovation and economic development). The above 'theories of change' or hypothesis will be analyzed in the light of existing literature as follows:

→ **Transparency and accountability**

Although transparency and accountability are frequently discussed together, they are distinct concepts. The pairing have become a mainstay of governance, where deficits of accountability can leave those in power able to practice corruptly, and to serve their own, rather than the public interest.

Transparency is an essential ingredient for accountability (Joshi, 2012, p. 4)[145], but is rarely a sufficient condition for it (Kuriyan, Bailur, Gigler, & Park, 2012)[146]. Accountability involves the

[145] Joshi, A. (2012), *Do They Work? Assessing the Impact of Transparency and Accountability Initiatives in Service Delivery*. Tbc, op. cit. in ibidem.

[146] Kuriyan, R., Bailur, S., Gigler, B.-S., & Park, K. R. (2012), *Technologies for Transparency and Accountability*, Washington DC., op. cit. in ibidem.

capacity to "*elicit justification, render judgment and impose sanctions*" on those with power (Joshi, 2012). Whilst accountability relationships may be established internally by key stakeholders in a governance system, in the context of open data the pairing of transparency and accountability suggests a focus on allowing external actors, citizens in particular, to play a role in holding power to account.

Open data has generally been articulated as a form of proactive transparency, where governments or other actors choose to publish data, in contrast to reactive transparency as invoked in Right to Information (RTI) laws where citizens ask for access to information (Janssen, 2012[147]; OKF – Open Knowledge Foundation & Access Info, 2011[148]).

Open data is not, however, identical to transparency. Heald, amongst others, argues "Openness might… be thought of as a characteristic of the organization, whereas transparency also requires external receptors capable of processing the information made available" (Heald, 2006 quoting Larsson, 1998)[149]. A related point has been made by Gurstein, noting that having data online under open licenses does not mean that everyone has effective access or can make 'effective use' of the data.

Citizens may face barriers of technology, literacy, education or social capital that prevent them effectively receiving and processing information that might have been made available (Gurstein, 2011)[150]. The way in which data is published, the context it is put in, the support on offer to enable access and use, and the presence of intermediaries, all affect how far open data will lead to increased transparency.

Where open data has led to greater transparency, another set of intervening relationships may determine how far it leads to accountability.

Transparency has the potential to enable new accountability channels, and to affect the operation of existing channels. For example, the use of open data in data journalism has the potential to strengthen the capacity of existing media to hold government to account, and to support the emergence of new media players. Similarly, individual citizens taking on the role of reviewing government spending from the comfort of their own computers.

In this study by exploring theories of change for open data impacts, participants particularly highlighted how public availability of data could empower 'good' civil servants to oppose corrupt

[147] Janssen, K. (2012). Open Government Data and the Right to Information: Opportunities and Obstacles. The Journal of Community Informatics, 8(2), op. cit. in ibidem.

[148] OKF - Open Knowledge Foundation, & Access Info. (2011). *Beyond Access : Open Government Data & the Right to (Re)use Public Information*. Madrid, op. cit. in ibidem.

[149] Heald, D. (2006). Varieties of Transparency. Proceedings of the British Academy, 135, 25–43, cit. in ibidem.

[150] Gurstein, M. (2011). Open data: Empowering the empowered or effective data use for everyone? First Monday, 16(2), cit. in ibidem.

practices within their institutions. (Perini, 2012)[151]. It is possible also that transparency creates more 'accountable' behavior without the need for actual accountability mechanisms to be exercised, as when knowing information on their actions will be made public, and that indiscretion *could* be discovered encourages officials to behave better (Meijer, 2007)[152].

However, the existing transparency literature also highlights the possibility of adverse affects from greater transparency, as more openness can create perverse incentives, limit space for free discussion in politics, lead to 'gaming' of the data, can contribute to surveillance of citizens by the state, or can shift power to distant institutions rather than to citizens (Ballingall, 2011[153]; Heald, 2006, 2011[154]; Murray, 2011[155]). Although there has been considerable research into transparency and accountability in the development sector, the locally situated nature of most Transparency and Accountability Initiatives (TAIs) means that cross-cutting research is limited and widely established findings about what makes for effective TAIs, or what conditions lead to positive or negative outcomes, are few (Calland & Bentley, 2012[156]; Joshi, 2012; Mcgee & Gaventa, 2011[157]).

As yet, most TAI literature has not explicitly focused on open data. However, over the coming years, greater connections will be drawn between work on ICT enabled TAIs and open data. As a 2011 report from the Transparency and Accountability Initiative notes, "online and mobile technology tools are beginning to change the transparency and accountability field", supporting a number of more rapid and responsive accountability projects (Avila, Feigenblatt, Heacock, & Heller, 2011)[158], and increasingly the exchange of well structured machine readable datasets plays an import roles in these projects. Fung et al. highlight in particular the possibility that *"Targeted transparency could gain effectiveness through better understanding, design and information technology",* although noting that *"…we are only beginning to grasp the ways in which public*

[151] Perini, F. (2012). Workshop report: Fostering a Critical Development Perspective on Open Government Data. Brasilia, op. cit. in ibidem.

[152] Meijer, A. J. (2007). Publishing public performance results on the Internet. Government Information Quarterly, 24(1), 165–185. doi:10.1016/j.giq.2006.01.014, op. cit. in ibidem.

[153] Ballingall, R. (2011). Is There a Case For Limiting Democratic Openness? Public Policy and Governance Review, 2(2), 52–62, op. cit. in ibidem.

[154] Heald, D. (2011). When Transparency meets Surveillance: External Monitoring of Country Public Finances. 1st Global Conference on Transparency Research (pp. 19–20). Newark, New Jersey, op. cit. in ibidem.

[155] Murray, A. (2011). Transparency , Scrutiny and Responsiveness : Fashioning a Private Space within the Information Society.The Political Quarterly, 82(4), 509–514. doi:10.1111/j.1467-923X.2011.02245.x, op. cit. in ibidem.

[156] Calland, R., & Bentley, K. (2012), *The Impact and Effectiveness of Accountability and Transparency Initiatives: Freedom of Information*, Tbc, op. cit. in ibidem.

[157] Mcgee, R., & Gaventa, J. (2011). *Shifting Power? Assessing the Impact of Transparency and Accountability Initiatives*, op. cit. in ibidem.

[158] Avila, R., Feigenblatt, H., Heacock, R., & Heller, N. (2011). *Global mapping of technology for transparency and accountability: New technologies*, op. cit. in ibidem.

policies can harness information to reduce serious risks and improve important services" (Fung et al., 2007).[159]

→ **Inclusion and empowerment**

Opening up access to data can help to address asymmetries of information between companies and officials and citizens, NGOs and grassroots groups. With open data there is the possibility for local communities to build up their own understandings and interpretations of key issues, and for intermediaries to contextualize information in ways that make sense to diverse groups, including citizens at the grassroots. Through print-outs, mobile phone-based services, offline access, community radio and participatory workshops (De Boer et al., 2012)[160] data can be taken to local settings, empowering previously marginalized groups, and can provide the basis for feedback loops that enable local communities to shape the knowledge base on which policies are based (e.g. Srinivasan, 2012)[161]. However, as Gurstein has noted, open data alone does not necessarily equate to empowerment, and there is a risk that a '**data divide'** is created, where data only empowers the already empowered (Gurstein, 2011). Whilst evidence from the UK suggests that open data has engaged a number of new actors in thinking about public services and governance (Davies, 2010)[162], little work has been done to map out the users of specific open data, and to explore how far open data is supporting greater inclusion in policy making and governance processes.

There is an important distinction to draw in looking at the impacts of open data on marginalized groups. Open data may support better outcomes for the marginalized by, for example, addressing corruption and empowering local parliamentarians to secure a better deal for their constituencies. Or it may work by supporting the direct engagement of grassroots communities in working with, interpreting and responding to data about their situation. In the first model, marginalized groups may benefit, but are still primarily the objects of development: it is only when data directly empowers marginalized groups that they become subjects of the development process (Perini, 2012;

[159] Fung, A., Graham, M., & Weil, D. (2007). Full Disclosure: The Perils and Promise of Transparency (1st ed., p. 300). Cambridge University Press, op. cit. in ibidem.

[160] De Boer, V., Leenheer, P. De, Bon, A., Gyan, N. B., Van, C., Gu, C., Tuyp, W., et al. (2012). RadioMarche: *Distributed Voice- and Web-interfaced Market Information Systems under Rural Conditions*. Lecture Notes in Computer Science, 7328, op. cit. in ibidem.

[161] Srinivasan, S. (2012). *Mapping the Tso Kar basin in Ladakh*. The Journal of Community Informatics, 8(2), op. cit. in ibidem.

[162] Davies, T. (2010, September 29). Open data, democracy and public sector reform: A look at open government data use from data. gov. uk. Practical Participation.

Powell et al., 2012[163]), actively shaping it around their own needs, whether through engagement in policy and political debate, or being able to access knowledge and information that they can use to directly improve their lives. There is also a distinction to be drawn between individual and community empowerment effects of open data. For example, Bates argues that the UK open data agenda has developed to support the marketization of public services, in which citizens are cast as consumers, offered data to help them make individual choices, but in which the potential of collective action to secure social provision of appropriate public services may be side-lined (Bates, 2012)[164]. The conventional articulation of open data initiatives, as involving raw data, technical intermediaries, and only then, end-users, makes tracking the inclusion impacts of open data challenging. However, by widening our focus to include cases of demand-driven open data projects, where grassroots communities have asked for open data, we can explore how far having access to data, as opposed to solely documents, or local knowledge about a situation, impacts upon empowerment at the grassroots.

→ **Innovation and economic development**

Markets can be both a focus of, and a tool of, governance. In this section, it will be addressed the use of open data as a policy intervention in the economic domain first, before turning to the role of data in governing economic activities.

In markets, decision-making and implementation tasks are distributed widely across semi-autonomous actors, making use of signals such as price to allocate effort and resources. Open data has been described as "digital fuel of the 21st century" (Kundra, 2012)[165], a raw material that can support new economic activity and lead to dramatic breakthrough innovations. Arguments concerning the economic potential of government data were key drivers for open data initiatives, particularly in the EU, where many studies argued that billions of euros in potential economic activity were being lost through the ways governments managed their data, either not providing any

[163] Powell, M., Davies, T., & Taylor, K. C. (2012). *ICT for or against development? An introduction to the ongoing case of Web3*, op. cit. in Tim Davies, Fernando Perini, José M Alonso, *Exploring the Emerging Impacts of Open Data in Developing Countries*, op. cit.

[164] Bates, J. (2012). "This is what modern deregulation looks like" : co-optation and contestation in the shaping of the UK's Open Government Data Initiative. The Journal of Community Informatics, 8(2), op. cit. in ibidem.

[165] Kundra, V. (2012). *Digital Fuel of the 21st Century: Innovation through Open Data and the Network Effect*. Public Policy. Cambridge, Mass, op. cit. in ibidem.

at all, or providing it for a fee (Dekkers, Poleman, Te Velde, & De Vries, 2006b[166]; Newbery et al., 2008[167]; Pollock, 2009[168]; Uhlir, 2009[169]).

Whilst some of this economic value may come from large scale Public Sector Information (PSI) re-user firms creating products with government data, such as maps or improved weather reports, many advocates of open data have focused on the potential for open data to be used by Small and Medium Enterprises (SMEs), predominantly in the technology sector, to create new products or find new niche markets (Fioretti, 2010)[170], tapping into the 'long tail' of government data and market needs (Anderson, 2006)[171]. The release of open government data to stimulate domestic technology industries, and the creation of new '**start up'** firms is a strategy evident both in the UK (HM Government, 2012b)[172], Kenya (World Bank, 2012)[173] and the US (Kundra, 2012) amongst other open data initiatives. Whether or not then open data generates economic returns; who these returns accrue to within a country; and whether standardized data enables cross-border trade in services built on top of data; are all issues important to track in understanding how open data can operate as a tool of economic policy.

Governments may also release open data to stimulate innovation in the delivery of public services. Open government data initiatives have often been linked to Tim O'Reilly's notion of 'Government as a Platform' (O'Reilly, 2010) in which government acts as a provider of data upon which dynamic entrepreneurial actors outside the state can innovate to provide better, more efficient or more customized public services. This taps into an argument about the greater innovative capacity of the private over the public sector, ideas of user and open innovation (Von Hippel & Von Krogh,

[166] Dekkers, M., Poleman, F., Te Velde, R., & De Vries, M. (2006b), MEPSIR - *Measuring European Public Sector Information Resources*, Study - 2006, op. cit. in ibidem.

[167] Newbery, D., Bently, L., & Pollock, R. (2008*). Models of public sector information provision via trading funds*, op. cit. in ibidem.

[168] Pollock, R. (2009, May). The Economics of Public Sector Information. Retrieved March 4, 2010, from http://econpapers.repec.org/paper/camcamdae/0920.htm , op. cit. in ibidem.

[169] Uhlir, P. (2009). *The Socioeconomic Effects of Public Sector Information on Digital Networks: Toward a Better Understanding of Different Access and Reuse Policies*: Workshop Summary (p. 105). Washington, D.C.: National Academies Press, op. cit. in ibidem.

[170] Fioretti, M. (2010). *Open Data, Open Society*. Work (pp. 1–65). Pisa, op. cit. in ibidem.

[171] Anderson, C. (2006). *The Long Tail: Why the Future of Business is Selling Less of More* (p. 256). Hyperion, op. cit. in ibidem.

[172] HM Government. (2012b). *Open Data White Paper: Unleashing the Potentia*l. London, UK: HM Government, op. cit. in ibidem.

[173] World Bank. (2012). *Project paper on a proposed additional credit to the Republic of Kenya for a Kenya Transparency and Communications Infrastructure Project*, op. cit. in ibidem.

2009[174]; Von Hippel, 2005[175]), and the view that both commercial and not-for-profit enterprise can act as intermediaries delivering public service (Mayo & Steinberg, 2007)[176]. The widely cited 2008 'Apps for Democracy' contest by the United States District of Columbia has suggested that through awarding just $50,000 in prizes in an apps contest, developers outside the government put together 47 applications that would have cost $2.6m if developed internally (UN - United Nations, 2010) although some have raised questions about the sustainability and actual realization of this value (Nichols, 2010)[177].

In seeking to secure some of the innovation and co-production benefits of open data the Kenya Open Data Initiative has focused on steps to create an 'eco-system', connecting data providers in government with entrepreneurs and ICT trained young adults (World Bank, 2012). This suggests the hypothesis that enabling open data to drive public and private sector innovation requires more than datasets alone. Understanding the conditions that are conducive to data-enabled innovation, and the kinds of policies that can promote is, is an important area for research. Equally, critical research is needed to assess how far open data enabled innovation serves widespread social needs, or is only able to deal with certain kinds of problems. In theory, better-governed markets should lead to more sustainable and equitable economic growth.

Research may also take into account questions of environmental sustainability, looking at how open data might impact upon governance of the environmental impacts of economic activity.

From the replies to the survey that for the purposes of this study has been published on the website of the city of Palermo (see section 5.1.4 DATA COLLECTION), was drawn to the following t**able 1** summarizing the scores given to the potential effects of the policy of open data, as well as perceived by the users who participated to answer the administrated questionnaire:

SCORE	TRANSPARENCY	SHARING KNOWLEDGE	LIVING LABS EVENTS	CITIZEN EMPOWERMENT	SERVICE QUALITY IMPROVEMENT	CIVIC MONITORING	APPS DEVELOPMENT	STARTUP	INTERISTITUTIONAL COMMUNICATION
5	27,59%	27,59%	28,74%	13,79%	22,99%	24,14%	24,14%	14,94%	24,14%
4	11,49%	10,34%	6,90%	12,64%	8,05%	9,20%	12,64%	16,09%	14,94%
3	4,60%	3,45%	5,75%	14,94%	10,34%	8,05%	3,45%	9,20%	6,90%
2	1,15%	1,15%	1,15%	1,15%	1,15%	1,15%	2,30%	2,30%	1,15%
1	13,79%	13,79%	13,79%	13,79%	13,79%	13,79%	13,79%	13,79%	14,94%

Table 1

[174] Von Hippel, E., & Von Krogh, G. (2009). Open Source Software and the "Private-Collective" Innovation Model: Issues for Organization Science. SSRN eLibrary. MIT Sloan Research Papers. doi:10.2139/ssrn.1410789, op. cit. in ibidem.

[175] Von Hippel, E. (2005). Democratizing innovation. the MIT Press, op. cit. in ibidem.

[176] Mayo, E., & Steinberg, T. (2007). Power of Information Review, op. cit. in ibidem.

[177] Nichols, R. (2010). Do apps for democracy and other contests create sustainable applications. Government Technology. Retrieved March 6, 2013, from http://www.govtech.com/e-government/Do-Apps-for-Democracy-andOther.html?page=1 , op. cit. in ibidem.

CHAPTER 3 - METHODOLOGY

In between the eighties and the nineties, almost globally, in the public sector was initiated a deep process of reform coming out by the need to make better use of the limited economic resources available, especially at municipal level, to meet the growing needs of their communities.

This process of reform derived by the new perspective of governance and management of public services offered by two innovative movements: The New Public Management (NPM) and the Public Governance. After analyzing in the previous sections the main characteristics and the contribution in terms of the evolution of governance systems offered by both NPM and Public Governance, already investigated in terms of Public Network Governance, in this chapter, will be introduced the issues of performance measurement and performance management in the public sector. Particularly, highlighting how the traditional mechanisms of P&C does not allow to understand, and therefore to govern, the dynamic complexity of a given social system. On this regard, as Bianchi claims, "*in order not to render illusory the efforts made by governments to the adoption of formal P&C systems is, therefore, necessary to adopt a non-mechanistic perspective, precisely a strategic-learning oriented perspective*"[178]. More in detail, this type of learning aims to provide decision-makers operating at different levels in a political organization "an awareness of the causes underlying the phenomena on which their actions are designed to intervene"[179].

Afterward, will be highlighted the need to integrate the traditional mechanisms of P&C with the instruments provided by dynamic performance management in order to govern the dynamic complexity that, differently from static complexity, is characterized by "*uncertainty and unpredictability of the causal relationships among the variables which produce the observed phenomenon*"[180]. Following this perspective, will be introduced the methodology of System Dynamics (SD) as a noticeable tool in the hands of decision makers in order to create conceptual maps able of identifying the key variables of the system and the behavior produced by their interaction and therefore make computer simulations aimed at highlighting the processes of accumulation or depletion of strategic resources in a reference system along time horizons of medium and long term. Furthermore, through the use of System Dynamics methodology will be possible to capture non-linear relationships among the variables to allow decision-makers to fully understand the sources of uncertainty both inside and outside of the public institution in order to

[178] Bianchi C. 2012. *"Modelli concettuali e strumenti operativi per la valutazione e il miglioramento della performance nell'erogazione dei servizi pubblici in una prospettiva di soddisfazione dell'utenza"*

[179] *Ibidem*

[180] Cosenz F. 2011. *"Sistemi di governo e di valutazione della performance per l'azienda università".* Giuffrè, Milano, pp. 53-70.

govern and undertake a learning oriented process directed to the development of policies and strategies aimed at improving the performance according to a perspective of sustainability. On this respect, will be highlighted the potential offered by the Dynamics Performance Management (DPM) approach arising from the combined adoption of System Dynamics methodology applied to the Performance Management. Lastly, will be analyzed the case study related to the Open government policy in the Municipality of Palermo exploiting the contributions that System Dynamics methodology is able to offer to better understanding of the opening process in terms of outcome (public value) produced by citizen involvement in providing innovative services, achieved through developing applications (Apps) arising from open data fitness to re-use.

3.1 PERFORMANCE MANAGEMENT

Every organization faces the common challenge of continuously improving its performance. Public sector performance is influenced by a numerous factors and does not depend only on the human and financial resources allocated, but also on the organizational environment. More specifically, performance measurement is the process that, through the definition and detection of data and indicators, seeks to acquire relevant information on the results of an organization. This process is a powerful tool for decision makers in order to obtain information on the public organization and, consequently, to verify the degree of implementation of programs and public policies.

Abedian suggests that "performance management is basically concerned with measuring, monitoring and evaluating performance and then initiating steps to improve performance where it is warranted"[181].

In the light of the above, the phase of performance measurement logically precedes that of performance management. In fact, in order to be able to address the performance towards the achievement of specific strategic objectives, it is necessary to build adequate measurement systems that can provide information on the multiple dimensions through which the performance should be evaluated. According to Ruffini, in a time of global financial crisis in which the public financial capacity is strongly depleted "the need to improve the quality of public services while simultaneously containing public expenses is strongly perceived by citizens"[182].

In the perspective of attributing greater attention to the results of administrative action, has been therefore developing the idea that the transparency of the measurement systems are fundamental for two reasons:

[181] Abedian I et al. 1998. *"Trasformation in action".* University of Cape Town press, pp. 12-43.

[182] Ruffini R. 2009. *"L' evoluzione dei sistemi di controllo nella pubblica amministrazione",* Franco Angeli, Roma, pp. 34-60.

1. The public sector reforms aimed at stimulating the responsibility for results at both managerial and political level;

2. A growing need for accountability of public administrations. As pointed out by Otley[183], "Accountability forms the cornerstone of performance management systems". On this regard, the pressure towards the development of accountability in the public sector came mainly from:

→ The crisis of the trust relationship between civil society and public administration;

→ The increasing lack of economic resources in the system.

These reasons show that performance measurement systems must reflects two dimensions and information values:

1. an internal dimension aimed at providing information to decision makers in order to assess and implement programs and policies and to support managerial decisions;

2. an external dimension aimed at fostering external control by non-administrative entities entrusted with the task of realizing an external control of the activities of public institutions.

To measure the performance of a public administration it is therefore necessary to collect data and information with respect to three specific objects: input, output, and outcome:

1. The **input** is the set of productive factors acquired by the organization and used in the production of goods or provision of a service. The productive factors can be financial, human and material depending on the type of goods or services. They can be expressed in monetary or non-monetary terms.[184]

2. The **output** is the sum of the results achieved by any operating unit in terms of quantity and quality of goods produced and/or services provided. In order to evaluate the degree of efficiency of the services provided by an operational unit or a public institution, it is essential to consider the characteristics of the output through a dual perspective: the required quality and the social value of the service that have to be provided. Given that efficiency indicators linking input parameters with output parameters, any problems of inefficiency can therefore be found in the relationship between the levels of the inputs related to that of the outputs.

[183] Ferreira A., Otley D. 2009. *"The design and use of performance management systems: an extended framework for analysis".* Management accounting research, Vol. 20, pp. 263-282.

[184] Aristigueta M. 2008. *"The Integration of Quality and Performance".* International Handbook of PracticeBased Performance Management, Sage Publications, New York.

3. The **outcome** is the impact that the output and in general all the activities carried out by the operating unit or the public institution has on the stakeholders. The outcome (public value) in the public sector is related to the activity that the public administration puts in place to meet the needs of the community and therefore it is essential to know if these needs have been satisfied.

According to Buckmaster "outcome measurement can be used effectively as a tool for learning by providing feedback to managers as well as to improve the accountability and programme evaluation of a department"[185] [186]

In this framework, may be useful to underline two important concepts that can be used to accomplish the activity of evaluating the performance of a public institution: the concepts of efficiency and effectiveness[187]. **Efficiency** measures the ability of an operating unit to maximize the relationship between inputs used and results obtained in achieving the defined objectives and related goals.

The distinction between **goals** and **objectives** allows to introduce two different approaches to the concept of **effectiveness**:

1. The effectiveness of management which concerns the inner sphere of the public organization and measures the achievement of managerial objectives defined during the phase of programming. So the measurement is made by comparing the planned **targets** and the values actually accomplished.

2. The social effectiveness which concerns the relationship between the public organization and the external environment and measures the organization's ability to meet the needs of the community through the production of goods and services. Social effectiveness measures the ultimate effect of the activities carried out by the public institution and, therefore, the degree of achievement of the strategic objectives set in the planning stage.[188]

According to Borgonovi, effectiveness can be defined as "*coherence between quantity and quality of the product, considered as an intermediate result of the administrative activity, and the quantity and quality of needs whose satisfaction is the end result*"[189]. On this respect, in order to ensure the effectiveness of the activities of a public institution, it is essential to orient all the activities of the

[185] Buckmaster N. 1999. *"Associations between Outcome Measurement, Accountability and Learning for Nonprofit Organizations"*, The International Journal of Public Sector Management, Vol. 12, pag. 186-197.

[186] Dorsh J., Yasin M. 1998. "*A framework for benchmarking in the public sector. Literature review and directions for future research"*, International Journal of Public Sector Management, Vol. 11, pag. 91-115.

[187] Curristine T., et al. 2007. "*Improving public sector efficiency: challenges and opportunities"*, OECD Journal on Budgeting, Vol. 7, pag. 5-38.

[188] Heinrich CJ. 2002. "*Outcomes–based performance management in the public sector: implications for government accountability and effectiveness"*, Public Administration Review, Vol. 62, pag. 712-723.

[189] Read more in Borgonovi, *"Principi e sistemi aziendali per le amministrazioni pubbliche",* Etas Milano, 2002.

organization toward the definition of managerial objectives that need to be consistent with the strategic objectives. Will therefore be necessary to build an appropriate system of performance indicators that can enable decision makers to assess at any time discrepancies between the objectives defined at the political level and the activities actually implemented, in order to undertake timely the appropriate corrective actions.

OECD defines performance indicators as a "*variable that allows the verification of changes in the development intervention or shows results relative to what was planned*"[190]. Performance indicators are therefore used to observe progress and to measure actual results compared to expected results.

We can argue that performance management systems represent an evolution of the traditional instruments aimed at supporting the activities of planning, control and reporting of the public institutions. In fact, the concept of performance management expand the boundaries of corporate results by focusing on the outcomes of the organizational system taken as a whole.

Performance management has to be therefore considered as a noticeable instrument in the hands of decision makers in order to govern social environments characterized by a high level of dynamic complexity[191]. According to Bianchi "designing a P&C system to support decision makers to assess performance management in a sustainability perspective is the core of dynamic performance management"[192]. In fact, the introduction of the dimension of the creation of public value determines the need to adopt a model of performance management able to "evaluate the performance on the basis of a multidimensional perspective"[193].

On this respect, the next section will be dedicated to the introduction of the dynamic performance management as an instrument that enable decision makers to acquire a more systemic perspective of the performance. This implies that, besides the dimensions of technical and economic efficiency, must be also considered the framework of transparency in order to ensure the economic, social and environmental sustainability of the implemented policies.

[190] For further informations, checks http://www.oecd.org/env/indicators-modelling-outlooks/37551205.pdf

[191] Read more in Bianchi C. 2004. *"Sistemi di programmazione e controllo per l'azienda "Regione".* Giuffrè, Milano; Cosenz F. 2011, op. cit.

[192] Bianchi C. 2012. *"Enhancing performance management and sustainable organizational growth through system dynamics modeling".* In *"Systemic Management for Intelligent Organizations: Concepts, Model-Based Approaches, and Applications",* Groesser, S. N. & Zeier, pp. 143-161.

[193] Mastrogiuseppe P., Petrelli M. 2010. *"La misurazione e la valutazione della performance organizzativa".* IPSOA, Milano, pp. 21-58.

3.2 DYNAMIC PERFORMANCE MANAGEMENT

The configuration of a performance management system allows to focus on the use of strategic resources aimed at ensuring the highest level of satisfaction of citizens-users.

According to Bianchi, performance management systems specifically contributes to:

→ Improve the **accountability** of decision makers in reference to **transparency** in communication both inside and outside of the public institution;

→ Facilitate the strategic dialogue and communication between the many operative units that composes the structure of the public organization;

→ Focus more on the achievement of planned results rather than the compliance with formal procedures;

→ Improving decision-making processes at both central and peripheral level;

→ Acquire a greater propensity towards innovation, productivity and staff involvement of in the managerial process;

→ Focus more attention to the quality of services provided in order to increase the image of the public institution;

→ Increase the motivation of employees through greater clarity in the definition of the respective roles and responsibilities and the incentives achievable.[194]

In this framework, Bianchi has identified three complementary perspectives of performance management:

1. **The objective view:** The objective view is focused on the identification of the core object of the whole process carried out by a given public institution in order to provide a service/product to both internal and external clients, underling the contribution of each department to the value chain. As pointed out by Bianchi, "the design of a performance management system requires that the chain of final and intermediate products delivered to both internal and external clients be fully mapped. It also requires that the underlying processes, responsibility areas, assigned resources, and policy levers be made explicit. These design requirements can be described as an objective view of performance management. Such a view implies that products generated by management processes and activities are made explicit"[195].

2. **The instrumental view**: The instrumental dimension "aims to the definition of appropriate performance indicators related to strategic resources used and to the end results achieved. More

[194] Read more in Bianchi C. 2004. *"Sistemi di programmazione e controllo per l'azienda "Regione".* Giuffrè, Milano.

[195] Bianchi C. 2012. *"Enhancing performance management and sustainable organizational growth through system dynamics modeling".* In *"Systemic Management for Intelligent Organizations: Concepts, Model-Based Approaches, and Applications",* Groesser, S. N. & Zeier, pp. 143-161.

precisely, is defined instrumental because allows decision makers to identify the relationship between the use of strategic resource and end results through appropriates levers of intervention linked to critical success factors that can be used to influence expected results" [196].

3. **The subjective view:** "The subjective view provides a synthesis of the previous two views, because it makes explicit, as a function of the pursued results, both the activities to undertake and the related objectives and performance targets to include in plans and budgets for each decision area"[197].

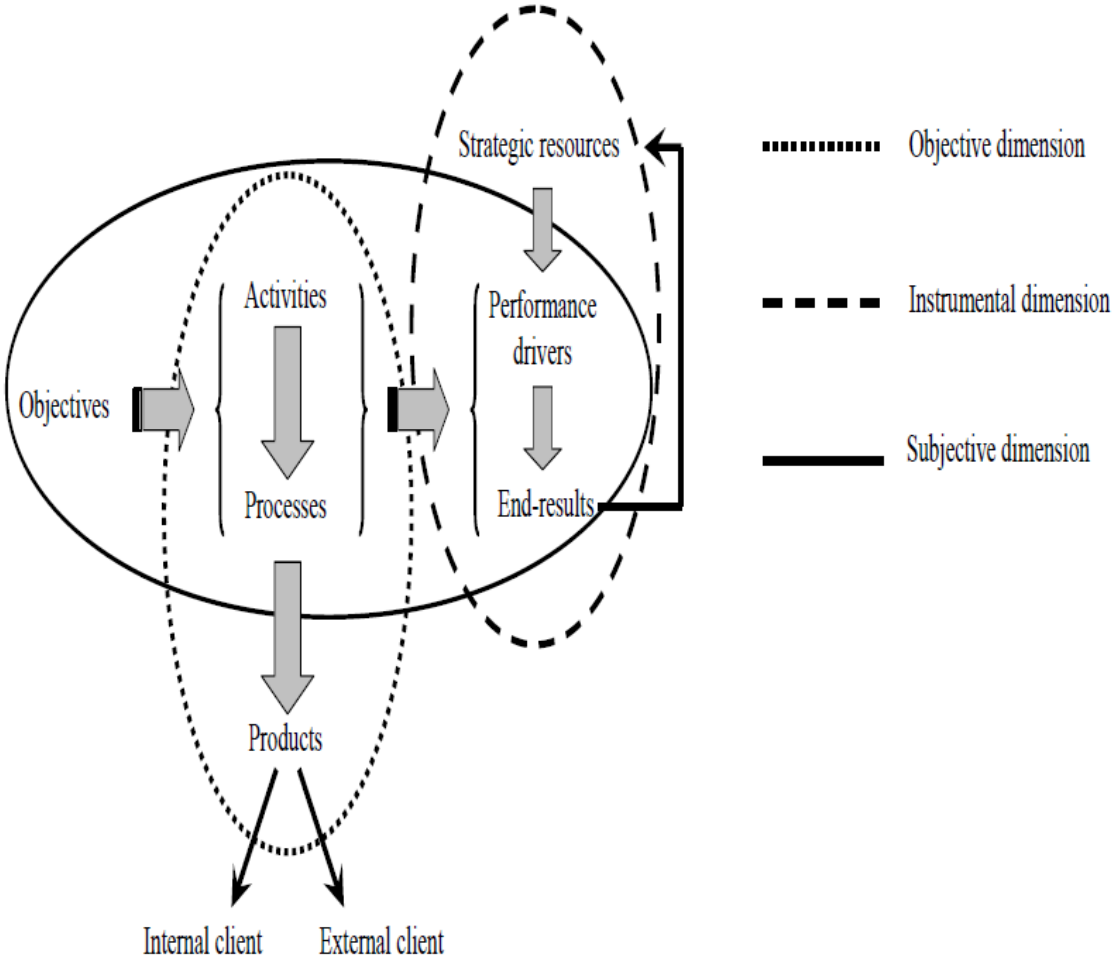

Figure 19
The three views for designing a performance management system in public institutions (source: Bianchi, 2010)

Moreover, as Bianchi claims, "conventional financially-focused P&C systems have been considered lacking in relevance, since they are not able to provide information that can support either dynamic complexity management, the measurement of intangibles, the detection of delays, adequate under-

[196]Bianchi C. 2012, op. cit.

[197] Bianchi C. 2012. op. cit., pp. 143-161

standing of the linkages between the short and the long term, and the setting of proper system boundaries in strategic planning". Therefore, "to provide decision makers with proper lenses for interpreting such phenomena, understanding the feedback loop structure underlying performance, and identifying alternative strategies to adopt so as to change the structure for performance improvement"[198], it is careful to integrate the traditional P&C systems, limited to a pure static perspective, with the dynamic performance management approach, in order to govern properly dynamic complexity, to foster sustainable growth and monitor crisis prevention.

In the light of the above, it is therefore necessary to provide instruments able to support the govern of dynamic complexity in the public administration, characterized by uncertainty and unpredictability. In order to perceive the causal relationships between the variables determining the observed phenomenon, it requires:

1. The identification and understanding of non-linear relationships between the different variables of the system;

2. The identification of time delays in cause-effect relationships;

3. The comprehension of the short and long term trade-offs related to the strategies adopted.

For these reasons, the traditional P&C systems reveal themselves appropriates only when applied to systems of government characterized by static complexity, characterized by a set of variables that interact among themselves according to regular and uniform relationships.

As Bianchi claims, "In order to set performance measures **fostering the generation of value**, according to an outcome and sustainable development perspective in public institutions", critical factors are the following:

1. products/services and clients (i.e. users). More in general, the entire administrative processes that leads to the delivering of the final product;

2. **end-results** measuring final targets, and the corresponding **performance drivers**, to promptly detect and affect the symptoms of change in performance. Such indicators should provide a basis to settle proper incentive mechanisms, driving managers efforts towards desired outcomes;

3. both responsibility areas and policy levers capable to have an impact on results.

In this respect, a public institutions that deliver a public service should primarily take into account:

I. how a given set of products/services is delivered;

[198] Bianchi C. 2012. *"Enhancing performance management and sustainable organizational growth through system dynamics modeling".* In *"Systemic Management for Intelligent Organizations: Concepts, Model-Based Approaches, and Applications",* Groesser, S. N. & Zeier, pp. 143-161.

II. who is accountable for the achievement of results directly and indirectly associated to the provision of the products/services;
III. where and when to intervene through proper corrective actions to bring back public utilities towards the achievement of predetermined goals.

In the light of above, a major implication of dynamic complexity refers to a difficult identification of the drivers related to the processes impacting on the performance of public institutions. To overcome such limitation, it is therefore necessary to adopt a dynamic performance management view in order to design and implement performance management systems aimed at pursuing sustainable development in public institutions.

On this respect, in the case study will be showed how modeling feedback relationships between end-results, performance drivers and strategic resources may support decision-makers in managing and measuring the performance of the Municipality of Palermo in the field of the Open Government process. More specifically, focusing on desired results (target), intended not simply in terms of outputs but mainly as outcome oriented, the related performance drivers and the strategic resources will be identified. The identification of the key performance drivers represents a fundamental element because only through leveraging on them will be possible to generate an impact on desired results. Based on the drivers therefore the necessary resources are planned. Goals are seen as the instrument of the process and for this reason the view is called the instrumental view.

To implement this view, it is important to detect performance measures related to both end-results and performance drivers. According to this view, the end-results are seen as efficiency/effectiveness measures of results, aimed at achieving the final products. Drivers are used to affect end-results according to the expected direction in a time horizon. Performance measures associated to the drivers are normally related to processes directed to the accomplishment of intermediate products. On this regard, Bianchi distinguishes two different and related levels for measuring and managing organizational performance under the perspective of sustainability, i.e.: an institutional and an inter-institutional level (Bianchi, 2010).

As regards to the institutional level, performance is analyzed as an output/outcome of the policies adopted and the actions undertaken by decision makers. On the other side, the inter-institutional level consider performance as an outcome of the policies adopted and the actions undertaken by decision makers of different but inter-related organizations or of different parts of the same organization.

In the light of the above, the Dynamic Performance Management (DPM) framework may be implemented as follows.

Firstly, strategic resources can be identified as stocks (or levels) of available tangible or intangible resources in a given time. Secondly, are identified the corresponding inputs and outputs influencing stock levels over time (inflows and outflows). The identification of the strategic resources and of performance drivers, the most important factors that are influencing their change, is essential to shed light on the different key areas on which is possible to intervene to improve organizational performance. Finally, the end-results are identified as a measure of the efficiency and effectiveness expressed in terms of volumes or impact. More specifically, end-results represent the flows affecting the accumulation process of the corresponding strategic resources.

Following this perspective, it is therefore possible to implement a strategic performance management framework which intends to "support the whole cycle of strategy formulation, execution, measuring performance and brining corrective actions and thus bringing dynamism in the framework. For this purpose it is also necessary to integrate the DPM approach with instruments capable of governing the dynamic complexity and to support the continuous process of strategic learning of decision makers[199].

In this study, this instrument consists in the application of the System Dynamics methodology. The SD approach begins with defining problems dynamically and uses different tools to reach its goals and to support decision-making processes. The tools are both qualitative (causal loop diagrams, stock and flow diagrams) and quantitative (formal stock and flow diagrams). For the present research, SD modeling has been found appropriate to develop a dynamic performance management model for the case study of Open Government process outgoing in the Municipality of Palermo, which will be described in the following chapter. The figure below shows how from the combination of DPM and SD methodology, it is possible to identify clearly the end results and the performance drivers from which they are affected in order to influence the strategic resources of the system. Decision-makers therefore will be enabled to better identify and measure key-performance indicators and to effectively influence policy levers to pursue a sustainable development of the Open Government policy over time.

[199] Read more in Sterman J. 2000. *"Business Dynamics. System thinking and modeling for a complex world".* Irwin/McGraw Hill, Boston; Homer J., Hirsch G. 2006. *"System Dynamics Modeling for Public Health: Background and Opportunities"*; Bianchi C. 2004. *"Sistemi di programmazione e controllo per l'azienda "Regione".* Giuffrè, Milano; Morecroft J. 2007. *Strategic Modelling and Business Dynamics*, Chichester. John Wiley, New York; Cosenz F. 2011. *"Sistemi di governo e di valutazione della performance per l'azienda università".* Giuffrè, Milano.

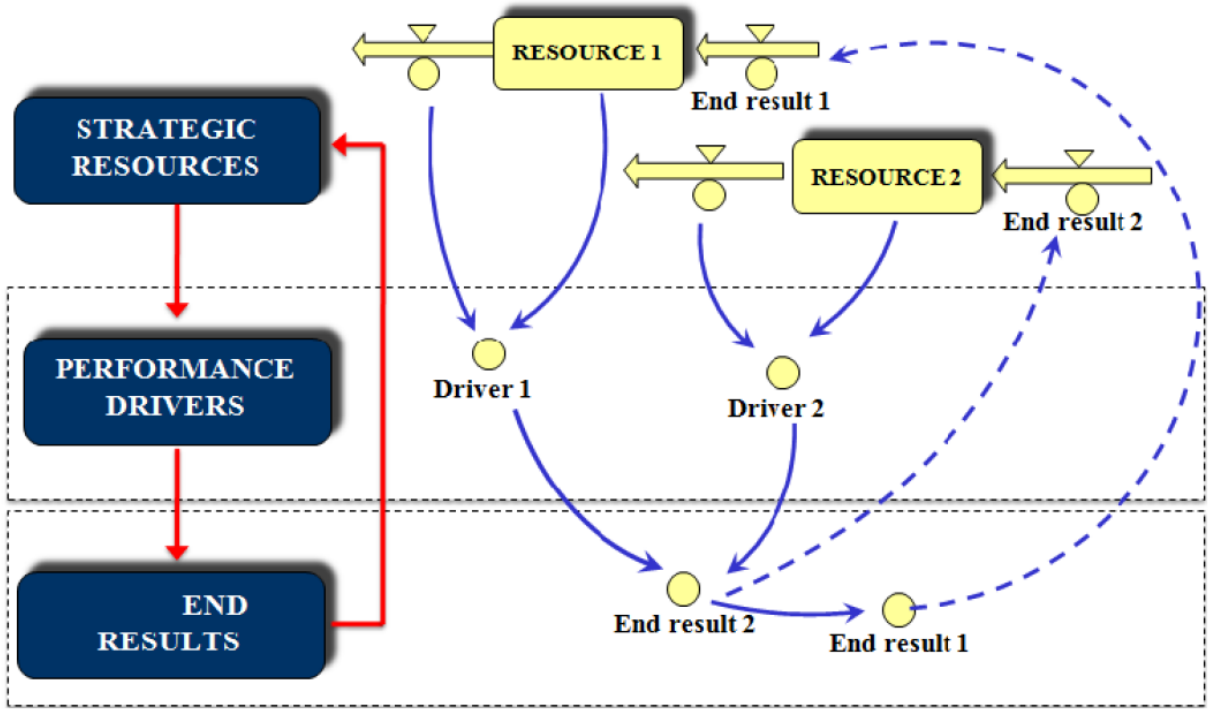

Figure 20
The Dynamic Performance Management view to foster sustainable growth in public institutions (source: Bianchi 2010).

3.3 SYSTEM DYNAMICS METHODOLOGY

The methodology of System Dynamics (from now SD) was founded in the late fifties at the Massachusetts Institute of Technology on the initiative of the engineer JW Forrester.[200] After years of application regarding the most varied sectors, the SD methodology is now considered as a well founded methodology to investigate the nonlinear behavior of complex systems and for deciphering the mental models of decision makers. More specifically, the methodology of System Dynamics is an approach to the study and management of complex dynamic systems characterized by the existence of feedback mechanisms that allows to highlight and to make understandable:

→ the logic through which the key variables of the system interact with each other;

→ the different areas in which the relevant system is considered to be highly sensitive to the actions of decision makers;

[200] For further information, checks Morecroft J. 1988. *"System dynamics and microworlds for policymakers*". European Journal of Operational Research, Volume 35, Pag. 301–320;Sterman J. 2000. *"Business Dynamics. System thinking and modeling for a complex world".* Irwin/McGraw Hill, Boston; Melão N., Pidd M. 2001. *"A conceptual framework for understanding business processes and business process modelling".* Information Systems Journal, Vol.10, pag.105–129; Bianchi C. 2001. "*Processi di apprendimento nel governo dello sviluppo della piccola impresa. Una prospettiva basata sul'integrazione tra modelli contabili e modelli di system dynamics attraverso i micromondi".* Giuffrè, Milano; Bianchi C. 2004. *"Sistemi di programmazione e controllo per l'azienda "Regione".* Giuffrè, Milano; Morecroft J. 2007. *Strategic Modelling and Business Dynamics,* Chichester. John Wiley, New York; Milling P. 2007. "*A brief history of system dynamics in continental Europe"*. System Dynamics Review, Vol. 23, pp. 215-218.

→ the different scenarios that arises as a result of the simulations carried out on the different policies implemented.

In fact, due to nonlinearity and to the lack of consideration of the temporal factor, it is possible that the effects of the policies previously adopted conflicting with those expected in such a way that make useless any efforts to drive the state of a system towards the desired one. Policy resistance can occur when unintended consequences compromise the intended outcome, so that interventions fail to achieve it[201]. In other instances, actions allow to achieve the planned outcome, but at a significant cost in terms of unintended consequences.

The reason of this deviations often is due to the bounded rationality of decision makers, determined from past experiences, that tends to make them lose the systemic vision.[202]

In systems characterized by dynamic complexity, with a plurality of causal links between the key variables and a high degree of uncertainty, the mental models interferes with the ability of decision-makers to understand objectively the phenomena observed. This requires the elaboration of "conceptual maps" aimed at identifying the key variables and their relationships in order to create simulation models that allow decision makers to implement a process of strategic learning to govern the complexity of the system under observation.[203]

As remarked by Grobler[204] "learning takes place when people use the formal model and—by simulation experiments—gain insights into the relation between structure and behavior of the system".

Through the system dynamics models it is therefore possible to understand and interpret the logic of behind all systems which are characterized by: (see Bianchi, 2009)

1. a structure characterized by counterintuitive dynamics due to the cognitive limitations of the decision makers and the scarcity of information available;

2. levers that can be used by decision-makers that can be used by decision makers in order to govern the complexity of the system and adopt policies aimed at pursuing the desired objectives previously settled;

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[201] More in particolar, according to Sterman "Policy resistance arises because we often do not understand the full range of feedbacks operating in the system. As our actions alter the state of the system, other people react to restore the balance we have upset. Our actions may also trigger side effects". Sterman J. 2000. *"Business Dynamics. System thinking and modeling for a complex world".* Irwin/McGraw Hill, Boston, pag. 10-15.

[202] For further in formations regardint the concept of bounded rationality, checks Simon H. 1991. *"Bounded rationality and organizational learning"*. Organization Science, Vol. 2, pag. 125-138.

[203] Bianchi C. 2001."*Processi di apprendimento nel governo dello sviluppo della piccola impresa. Una prospettiva basata sul'integrazione tra modelli contabili e modelli di system dynamics attraverso i micromondi".* Giuffrè,

[204] Grobler, A. 2004. "*A Content and Process View on Bounded Rationality in System Dynamics*". Systems Research and Behavioral Science Syst. Res.Vol. 21, p. 319-330.

3. sensitivity of the results to the effect of exogenous variables;

4. a frequent opposite behavior of the variables in the short versus long run

5. the presence of significant delays regarding the possibility of observing the effects of the policies adopted.

Through the use of SD, decision makers can develop conceptual maps that allow to understand which are the key variables of a system and, consequently, how acting on them to orientate the system towards the desired direction. Subsequently, to the phase of definition of the boundaries of the relevant system follows that of the identification of the relationships between the key variables which enable the development of a simulation model that encompasses the policy levers through which decision makers can influence the performance. According to Bianchi, System Dynamics differs from traditional methods of analysis because, on the basis of the comparison made between the simulation models and the reality, "allows the decision makers to continuously review the assumptions previously made to extrapolates keys of interpretation that allow to understand and deal suitably with the complexity of the phenomenon observed" (Bianchi, 2009). Simulations aims at showing how the key variables respond over time to the policies adopted, thus enabling decision makers to acquire a great awareness of the delays and of the exogenous constraints which characterizes the system under analysis. All this means that the contribution of SD methodology does not result in the mere identification and suggestions of policies to be applied but rather in the understanding of the relevant components of the system and of the dynamics that may occur over time.

The use of the SD methodology involves a series of steps which can be summarized in the following points:

1. Identification of a problem;

2. Development of dynamic hypotheses and causal maps to explain the cause of the problem;

3. Realization of a computer simulation model can reproduce the system relevant to the root of the problem;

4. Analysis of the model to verify that it is able to reproduce the behavior observed in the real world;

5. Processing and testing in the model alternative policies designed to alleviate the problem;

6. Implementation of the optimal solution.

According to Moxness we can summarize these phases by making reference to the acronym P'HAPI. More specifically, according to the P'HAPI method the application of SD methodology can be divided in the following phases:

P) Problem. This phase is devoted to the identification of the problematic behavior over an appropriate time horizon;

H) Hypothesis. This step is characterized by the formulation of hypothesis regarding the system structure that is responsible for the problematic behavior;

A) Analysis. This step is directed to testing the hypothesis previously formulated considering both the structure and the behavior of the problem observed. This phase ends approving or rejecting the hypothesis previously formulated. Models must be tested under extreme conditions, conditions that may never have been observed in the real world.

P) Policy. This phase is directed to the identification of alternative policies aimed at solving or alleviating the problem. According to Sterman "Policy design includes the creation of entirely new strategies, structures, and decision rules. Since the feedback structure of a system determine its dynamics, most of the time high leverage policies will involve changing the dominant feedback loops by redesigning the stock and flow structure, eliminating time delays, changing the flow and quality of information available at key decision points, or fundamentally reinventing the decision processes of the actors in the system. The robustness of policies and their sensitivity to uncertainties in model parameters and structure must be assessed, including their performance under a wide range of alternative scenarios".

I) Implementation. Specifically, this phase aims to concretely realize the suggested interventions and strategies.[205]

System dynamics models are developed by building structures made up of causal circuits between the variables of the relevant system. The basic elements from which aggregation originates the structure of a dynamic system are precisely the feedback loops. In first approximation, a feedback circuit can be defined as "a chain of two or more variables that affect each other" [206].

These causal circuits allow to understand the motivations that constitutes the basis of the existence of a specific phenomenon, highlighting the drivers and levers of intervention that can be used to influence the state of the system. More in particular, the relationships between the variables that form these causal circuits can be distinguished in:

[205] Moxnes, E. (2009). Presidential address: Diffusion of System Dynamics", System Dynamics Society. Proceedings of the 27th International Conference of the System Dynamics Society, Albuquerque accessed at: http://www.systemdynamics.org/conferences/2009/proceed/papers/P1449.pdf

[206] Wolstenholme E. 2003. *"Towards the definition and use of a core set of archetypal structures in system dynamics".* System Dynamics Review, Vol.19, p. 7–26

→ Direct relations. In this type of relationship, graphically indicated by the symbol "+", to an increase / decrease of a variable corresponds to an increase / decrease of the linked variable;

→ Indirect relations. In this type of relationship, graphically indicated by the symbol "-", to an increase / decrease of a variable corresponds to an decrease / increase of the linked variable.

Based on the polarity of the causal circuits, determined by the dominance of a direct or an indirect relationships between variables, it is possible to distinguish between:

→ Reinforcing loops. In this case the variables are linked in such a way that the results of their interference determines a trend of exponential growth or decay of a given phenomenon;

→ Balancing loops. In this case the relationship among each variable is structured in such a way that the results of their interference tends to reach an equilibrium point at a certain time.

Nowadays, given the increasing attention recognized to the three interconnected dimensions of social, environmental and economical, is greatly felt the need to develop appropriate tools that can support public managers in understanding and addressing the dynamics of the relevant system towards the overcoming of the limitations imposed by the traditional strategic management tools[207].

In this respect, SD methodology, as a noticeable tool to usefully contribute to the implantation of a strategic learning-oriented process, is aimed at supporting decision-makers by providing them informative instruments capable of ensuring a better understanding of the principal causes impacting on the performance of the public institution of which they are responsible.
More precisely, system dynamics models allow decision-makers to:

1. make explicit their mental models;

2. proceed to a mapping of business processes from a perspective of selective analysis of the key variables of the system;

3. identify and monitor the causal links existing between the key variables of the system in order to fully understand the origin and causes of a given phenomenon;

4. identify the non-linear relationship between the key variables of the systems;

[207] Armah F., et al. 2010. "A Systems Dynamics Approach to Explore Traffic Congestion and Air Pollution Link in the City of Accra, Ghana". Sustainability Journal, Vol. 2, pp. 252-265.

5. perceiving and taking into account the delays existent between causes and effects in the analysis of a given phenomenon;

6. simulating, through the use of apposite software, the effects that the policies adopted produces along of a long-term time horizon.

On this respect, it has to be specified that SD methodology provides policy makers with two different modeling approaches, the qualitative and the quantitative. In the following sections these approaches will be analyzed in a more analytical way in order to highlight their respective characteristics and the different contribution that they are able to provide for the understanding of the dynamics of the relevant system.

3.3.1 QUALITATIVE MODELING APPROACH (CAUSAL LOOP DIAGRAM)

The qualitative research is an approach typically related to the field of social sciences. In fact, the overall purpose of this approach is to lead to the identification and understanding of all those factors and those motivations that drive the performance and behavior of social organizations towards a given direction. More specifically, the main function of a qualitative analysis is to conduce a preliminary survey of the problems aimed at understanding their causes and to provide a systemic perspective on the functioning of the system.

In this respect, Forrester states that "There are cases with uncertainties in concepts, pressures and decisions, in which can be difficult building a quantitative model. In such cases it might be the case to restrict the analysis to a qualitative level, that is, to use a non-simulation System Dynamics approach in which insights are provided inferring rather than calculating the behavior of the system over time"[208].

In System Dynamics the qualitative analysis is realized through the elaboration of a specific type of model called Causal Loop diagram (from now CLD). The CLD's are graphical maps which allows to make explicit the causal relations between the variables belonging to the same reference system and to identify which feedback mechanisms produce the dynamic behavior that characterizes the system under analysis. The CLD's reveal themselves extremely effective instruments since they:

- → Provide an preliminary graphical description and an highly intuitive interpretation of the problem investigated;
- → Allow to represent in a concise and effective way the assumptions made in relation to possible causes considered to be at the base of the dynamics analyzed;

[208] Forrester J. 1971. *"Counterintuitive behaviour of social systems*" Technology Review, Vol.73, pp. 3-24

→ Highlight clearly the fundamental feedback mechanisms related to the problem taken into consideration;

→ Allow to investigate, explain and formalize the mental models of the decision makers involved;

→ Facilitate the process of communication and sharing of knowledge between all the different members that compose a social system.[209]

The figure below shows the qualitative representation of a system under study. As can be seen, the logical relationships are represented by a "+" sign in the case of a direct relationship of a "-" sign in the case of an indirect relationship.

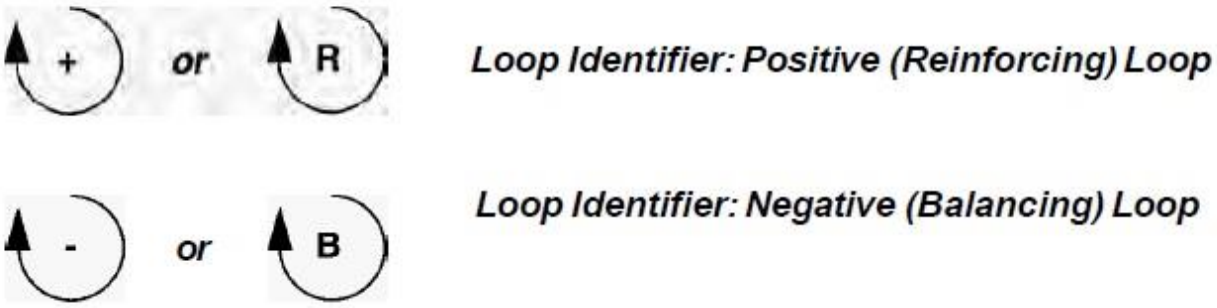

Figure 21
Source: Sterman J. 2000. *"Business Dynamics. System thinking and modeling for a complex world".* Irwin/McGraw Hill, Boston.

The qualitative models, for the fact of not including the use of quantitative data, do not give rise to any computer simulation but are useful for understanding the cause-effect relationships in the observed system. In any case, in order to expand the level of understanding and intelligibility offered by a qualitative modeling approach it is possible to combine this approach with the quantitative one in order to gain a greater understanding of the role of each variable in the system under analysis. This is possible by creating a qualitative model which highlights graphically also the stocks and the flows which characterize the quantitative approach analyzed forward.

[209] Read more in Morecroft J. 1988. *"System dynamics and microworlds for policymakers*". European Journal of Operational Research, Volume 35, Pag. 301–320 Sterman J. 2000. *"Business Dynamics. System thinking and modeling for a complex world".* Irwin/McGraw Hill, Boston; Bianchi C. 2001."*Processi di apprendimento nel governo dello sviluppo della piccola impresa. Una prospettiva basata sul'integrazione tra modelli contabili e modelli di system dynamics attraverso i micromondi".* Giuffrè, Milano; Ford A. 2009. "Modeling the Environment". Island Press. Washington DC.

3.3.2 QUANTITATIVE MODELING APPROACH (STOCK AND FLOW DIAGRAM)

In the System Dynamics methodology the quantitative analysis is realized by using a type of model called Stock and Flow diagram (from now SFD). More in particular quantitative models are realized by making use of specific software (e.g. iThink, PowerSim, Vensim, ecc.) that allows, once have reconstructed the relationships between the variables of the system and placed the quantitative values, to obtain a graphical simulation of the dynamics that characterizes the system under analysis along a well defined time horizon. More specifically, simulations aims at showing how the key variables respond over time to the policies adopted and enable decision makers to be aware of the delays and of the exogenous constraints which characterizes the system under analysis.

The variables that are used to draw a quantitative simulation model can be classified into:

1. Stock

Stock variables express the level of the key resources of the system under investigation in a given period of time. More specifically, the stock variables represent the strategic resources from the use of which it is possible to reach the fulfillment of the result to which the organization is intended;

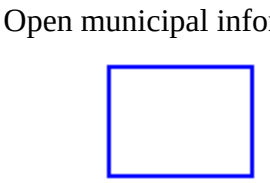

Figure 22
Example of stock variable

2. Flows

Flow variables allow to identify the processes of accumulation and depletion of the stock variables with reference to the time horizon adopted for the simulation. In other words, the variables flows represent the final results that affect the increase or the decrease of the strategic resources;

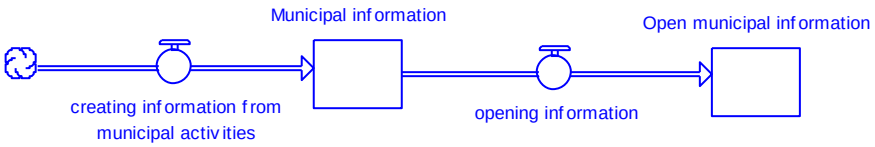

Figure 23
Example of flow variable

3. Auxiliaries.

Auxiliaries variables have the main purpose of increasing the comprehensibility and significance of the model. Within a simulation model the performance drivers are represented by using auxiliary variables.

Pressure to hide conflicting information

Figure 24
Example of auxiliary variable

3.4 COMBINING OF DYNAMIC PERFORMANCE MANAGEMENT AND SYSTEM DYNAMICS METHODOLOGY TO GOVERN DYNAMIC COMPLEXITY

On the basis of the analysis conducted in the previous sections, it can be stated that the SD methodology can reduce the limitations arising from the mere application of the traditional tools of performance management in order to govern the dynamic complexity.

Combining the SD methodology with the so-called instrumental view of Dynamic Performance Management (DPM) approach, it is therefore possible to identify the key variables of the reference system and their relationships, the initial stock of resources and their processes of accumulation and depletion and the performance drivers on which decision makers can leverage to drive the organization towards a learning-oriented strategic process of change aimed at ensuring the sustainable growth of the organization. SD simulation models indeed allows decision-makers to clearly understand the feedback mechanism that composes the system under analysis and to take into account the time delays existents between the causes and effects of a policy. On the basis of what has been said, the adoption of the SD methodology is therefore complementary to the traditional P&C systems. In fact, while the traditional P&C systems provides to decision makers information about the economic and financial performance of the organization, SD methodology, being oriented to a dynamic approach, provides a more extensive and comprehensive perspective of all the other areas that is important to consider to measure the performance.[210] On the basis of this synergy, decision makers will be able to acquire a global vision of the reference system and therefore of the policies that need to be adopted to ensure the effective and efficient achievement of

[210] Read more in Bianchi C., Bivona E. 2004. "*Il governo del capitale intellettuale attraverso il raccordo tra modelli contabili e di System Dynamics - Una prospettiva di programmazione e controllo per l'area Organizzazione e Sistemi".* Agf editore, Udine; Bianchi C. 2004. *"Sistemi di programmazione controllo per l'azienda Regione".* Giuffrè, Milano; Cosenz F. 2011. *"Sistemi di governo e di valutazione della performance per l'azienda università".* Giuffrè, Milano.

the strategic objectives. In order to obtain information pertaining to the level of achievement of strategic objectives and how the organization running its operations it is therefore necessary to create a system of indicators specifically calibrated on the different key variables to be monitored in order to assess performance. More specifically, this measurement system, based on conceptual maps and feedback loops, allows to analyze in depth the phenomenon occurred and the causes that determined them. Furthermore, from a circular perspective of movement, this system of measurement should be able to allow to identify possible levers of intervention that decision makers can use to drive the system towards the desired state. Through the use of system dynamics simulation models, policy makers have the opportunity to test the effects of policies and therefore to know in advance all the potential effects, both of long and short-term, which may arise from the implementation of these. Moreover, the measuring performance system has to be conceived in such a way to allow the elaboration of a continuous learning-oriented process by decision makers.

In order to be able to constantly analyze the possible alternative policy options. Moving in this direction means to activate that particular process that several authors defines double-loop learning[211]. The single-loop learning indicates an instrumental learning that changes strategies of action or the underlying assumptions without changing the values that are the basis of a theory of action. The double-loop learning however, indicates a typology of learning that generates a not only in the strategies and assumptions, but also of the values of the theory in use"[212].

In conclusion, a SD model aimed at supporting the management of the performance of a given organization, firstly, has to defines the strategic objectives of the organization and, secondly, any eventual discrepancies between the actual state of the system and the desired one through appropriate performance indicators. In fact, as pointed out by Bianchi performance indicators are directly linked "to the combination of customer/product and to the underlying processes for which it is necessary to identify precisely the different areas of responsibility and the potential levers of intervention of the system under analysis and then define the cause-effect relationship which will finally result in the causal circuits of the system dynamics simulation model"[213]

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[211] For further information regarding the concept of "Double loop learning", checks Argyris C. 1976. "*Single-loop and Double – loop models in research to decision making".* Administrative Science Quarterly, Vol. 21, pp. 363-370; Argyris C., Schön D. 1995. *"Organizational Learning II: Theory, Method, and Practice".* FT Press,New York, pp. 89-142; Greenwood J. 1998. *"The role of reflection in single and double loop learning"*. Journal of advanced nursing, Vol. 27, pp. 1048-1053; Sterman J. 2000. *"Business Dynamics. System thinking and modeling for a complex world".* Irwin/McGraw Hill, Boston; Blackman D., et al. 2004. *"Does double loop learning create reliable knowledge?"*. The Learning Organization, Vol. 11, pp.11 -27.

[212] Argyris C., Schön D. 1995. "Organizational Learning II: Theory, Method, and Practice". FT Press,New York, pp. 89-142.

[213] Read more in Bianchi, C. 1996. *"Modelli contabili e modelli dinamici per il controllo di gestione in un'ottica strategica".* Giuffré, Milano.

CHAPTER 4 DYNAMIC PERFORMANCE MANAGEMENT APPROACH APPLIED TO THE OPEN GOVERNMENT PROCESS IN THE MUNICIPALITY OF PALERMO

There is still no clarity/consensus on the role technology can play when pursuing open government and on the relationships between open government and transparency, accountability and trust. This is very important because many initiatives, particularly those related to opening data, have been based on political discourses that have established direct links between these concepts. In this respect, the Municipality of Palermo recently has developed an innovative policy aimed at supporting the design and gradual implementation of services and solutions in which citizens can be engaged by opening up data. This can be understood as the will to realize over time a kind of "social pact of digital citizenship", intended as opposition to the knowledge divide, among local authority, University, businesses, social groups and stakeholders which can become able to engage in the process of access to information and knowledge sharing. In this framework, access to information is intended as an affirmation of the principles of transparency and open data not only in order to guarantee new citizenship rights but also to improve a sustainable development of new services in the urban area. In particular, it should be pointed that an Open Data policy needs time to deliver impact, and a critical mass of published high-value data are needed before any outcome is visible. Opening high-value data moreover requires political strength and stable, sustained investment (although not necessarily high).

This chapter will be therefore devoted to the case study of the Municipality of Palermo concerning the policy of Open Government in action. Specifically, the first section will be dedicated to Open Government policy early started by the municipal Administration, starting from its own mission which consists in the building and/or restoring the trust of citizens. In this framework, will be then identified the strategic objectives to achieve as part of the Open Government strategy, investigated so far from a theoretical point of view: Transparency, Participation and Open Data. The Open Data process, in particular, will be analyzed as a link between the objectives of transparency and participation in view of the impact that it can produce on increasing the public value, particularly in terms of service effectiveness.

In reference to the Municipality of Palermo, the willingness to implement an Open Data policy, in fact, is closely related to the achievement of the following objectives which will be deeply analyzed in the next sections:

→ **Transparency:** the Municipality of Palermo takes into account the needs of the citizens wishing to better understand public action of their elected representatives. To do that, they must

have free access to the data produced by public authorities and be able to share it with other citizens making the government **accountable** to them.

→ **Social and commercial value:** by opening up its data**,** the Municipality of Palermo aspires to encourage the creation of new innovative services with both commercial and social added value;

→ **Participation and commitment**: the Municipality of Palermo wishes to implement more participatory initiatives, which could encourage and involve the feeling concerned and interested by public action.

The second section, in particular, will be devoted to the identification of the specific objectives and related performance indicators planned to implement a sustainable Open Data policy.

Further of that, in the third section, the analysis will focus deeply on the Open Government Data implemented by the Municipality of Palermo so that the following section will be devoted to the Dynamic Performance Management approach through which it will be able to identify all relevant relationships among the main strategic resources identified: transparency, accountability, services effectiveness and trust arising from the policies of Open Government in the Municipality of Palermo. Finally, it will be developed a System Dynamics model by focusing on the cause-effects relationships more specifically related to the process of opening data and on its impacts on public value.

4.1 CRITICAL ISSUES IN THE OPEN GOVERNMENT PROCESS

The current crisis has forced governments to make urgent and swift decisions with limited engagement of the public in the decision-making process. Being accountable, transparent and responsive during the implementation of solutions to the crisis is imperative to maintain public trust. OECD, "Government at a Glance, 2009"[214].

Figure 25
source: adapted from http://unpan1.un.org/intradoc/groups/public/documents/un-dpadm/unpan038684.pdf

[214] http://www.oecd.org/gov/43926778.pdf

In this respect, according to Francisco Longo, it is possible underline the openness contribution to good governance[215]:

→ **Strengthens democracy**

• Contributes to punish misgovernment;

• Exposes abuse of power;

• Offers greater protection to minorities, providing better opportunities to popular participation.

→ **Improves economic performance**

• High levels of transparency, effective parliamentary oversight, and high standards of corporate ethics are related to a higher rate of GDP growth (D. Kaufmann, World Bank Institute);

→ **Improves government performance**

• Better regulatory quality, budgetary management, and public expenditure processes (OECD)

→ **Maintains and restores public trust**

More particularly, the individual aspects of open government can be analyzed as follows:

MORE TRANSPARENCY -understanding as means to exposing government to a greater public scrutiny through:

-Freedom of information

Access to information, a precondition for public scrutiny. It implies that governments publish information extensively and limits access only in cases of: **a)** public interest requiring confidentiality (i.e. for public security reasons); or **b)** protection of individuals' right to privacy.

-Openness regarding government performance

Public access to data bases including performance measures. Publication of reports on government results. Massive use of ICTs to gather and publish information in a useful way to make the Administration accountable to citizens.

-Information on future decisions

Allowing public scrutiny of past government actions requires the publication of : a) strategic plans; b) legislative timetables; c) forthcoming projects; d) upcoming consultations. It is specially important in periods where governments are compelled to make tough choices and unpopular decisions.

[215] Francisco Longo, *Challenges to and Opportunities for Public Administration in the Context of the Financial and Economic Crisis*, Institute of public governance and management, available on line: http://unpan1.un.org/intradoc/groups/public/documents/un-dpadm/unpan038684.pdf .

MORE TRANSPARENCY - understanding as means to facilitating citizens' access to public processes through:

-E-government

A high level of readiness to develop and implement e-government services is a prerequisite for a high performing public sector that delivers integrated services, making life easier for citizens and business.

E-government can significantly lower the barriers for citizens and businesses by:

a) reducing costs;

b) overcoming physical distances;

c) providing unrestricted access to government information and online services.

-Service charters

As a way to improve the quality of public services, charters define service standards, response times, opening hours, redress mechanisms, and other elements that well informed users should know when interacting with government.

-Reduction of administrative burdens

Administrative simplification allows to reduce the transaction costs of dealing with government. One stop shops, both physical and electronic, are means to facilitate and simplify the access for the public.

MORE PARTICIPATION understanding as means to making the government responsive to new ideas, demand and needs through:

-Expanding public consultation

The crisis compels governments to reach greater consensus on public decisions. New ways of engaging a wider range of actors throughout the policy-making process must be sought.

These efforts are not intended to replace, but rather to complement, the representative democracy and the key role of elected governments and parliaments in the policy process.

-Developing the potential of e-consultation

New tools for online consultations include: government consultation portals; e-mail lists; online discussion forums; and online mediation systems to support deliberation. These are new tools in policy-making.

MORE ACCOUNTABILITY[216]

Times of crisis inevitably require public officials to focus on priority objectives and action. Such times require the reassessment of the spending priorities achievable by managing the expectations generated within and outside government through**:**

1) **HIERARCHICAL ACCOUNT ABILITY** which is achieved with:

-Performance management

Introduce management-by-objectives systems. Assess performance—at all levels—in relation to previously defined targets and measures. Develop management information systems to support performance management system.

-Managerial accountability

Employee accountability based on organizational and individual performance. Introduce incentive mechanisms (including sanctions) linked to performance.

-Professionalize public employment

Constructing merit-based employment systems—including competitive access, working conditions guaranteeing impartiality—is a fundamental prerequisite for attaining professional, corruption-free public administrations.

- Strengthen the ethics of public employment

Based on a merit-based system, public administrations can develop an ethics of public employment around the concept of responsible public professionalism. Government have the challenge to strengthen the ethical infrastructure of public-sector organizations.

2) **POLITICAL ACCOUNTABILITY**

The number of civil society organizations with a sector-specific (e.g. environmental) or particular interest in ensuring the government openness (e.g. anticorruption, good governance) has risen significantly. Open governments should enhance their capacity for monitoring government action.

The innovative use of e-tools to collect and disseminate publicly available information, and their capacity to raise public awareness via the media, make them a force to be reckoned with.

Further to that, in order to improve trust by achieving a better governance through openness contribution, the Municipality of Palermo, as required by current law, has developed the three-year Plan of Transparency, highlighting the criticality and the tools that will be used to achieve the strategic objectives identified therein.

[216] Definition and typology in Romzek & Dubnik, 1987, *Accountability in the Public Sector: Lessons from the Challenger Tragedy*. Public Administration Review, 47, 227-238.

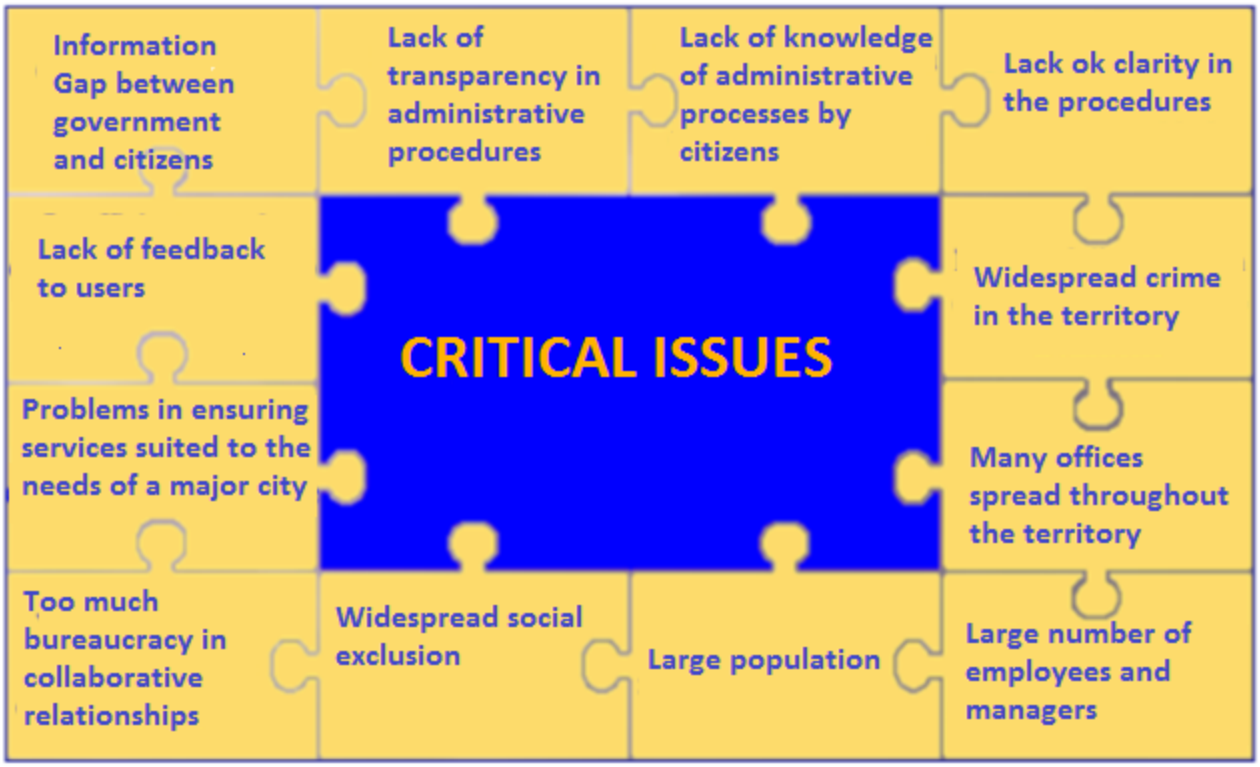


Figure 26
Source: Three-year plan of Transparency 2014/2016 of the Municipality of Palermo

From a deeply reading of the Three-year plan, it can be seen that its MISSION is aimed at RESTORING TRUST in the municipal administration through improving transparency and commitment towards citizenship to guarantee shared knowledge and equal and non-discrimination conditions to public information access, allowing more citizen involvement.

The enhancement for transparency thus becomes the keystone to improve services and competitiveness; stimulate economic growth, particularly through the embracement of Open Data solutions, ensuring that the developed Open Data solutions and standards are re-used as widely as possible. In response to the Digital Agenda, the Municipality of Palermo therefore has carried out remarkable open government initiatives and worked to redefine its relationship with citizens and with each other stakeholder.

Further to that**,** in the following paragraph will be analyzed the strategic objectives related to the stated mission of the Administration.

4.1.1 STRATEGIC OBJECTIVES: TRANSPARENCY, CITIZEN PARTICIPATION, OPEN DATA

The three-year plan of Transparency 2014/2016 of the Municipality of Palermo underlines that trust between governments and citizens is essential for good governance and participation. In order to build trust, governments need to communicate in a transparent way about past and future decisions and actions. Governments however, should not only inform but also involve citizens.

The ideas and opinions that they put forward in policy-making and implementation processes, provide valuable input for improving the quality of local policies and services.

Essential to a strong democracy, in fact, is government that is accountable to its citizens. Providing people with access to information therefore may lead to improved confidence in the decision making process and restore community trust.

The following table summarizes the goals and actions to be pursued to achieve the strategic objectives set out in the three-year plan of transparency:

Goals	Actions to achieve this include:
Restore integrity and accountability in the Municipality of Palermo.	• improve the capability of local administration to provide strategic and innovative policy in order to meet public expectations; • train the municipal workforce to manage innovation processes in order to foster the participation of citizens; • foster a public service culture citizen oriented in which individual responsibility and the achievement of results are strongly valued; • guarantee innovative and better ways to provide high-quality services to citizens through the front office feedbacks and the back office performance.
Improve innovation within the municipal organization to shape a modern forward–thinking local administration that supports new ideas to improve services and efficiency.	• Develop and implement a sector wide innovation action plan to foster an innovative culture across the organization.

Table 2 Source: adapted from the three year Plan of Transparency

In the light of the above, this section will be devoted to analyze the emerging model of Open Government carried out by the City of Palermo by engaging stakeholders in the service design and delivery and by empowering citizens in the decision making process in order to build/restore their trust in the municipal Administration. To this end, among the above elements that generally qualify the Open Government, will be considered the following policies put in place according to the Plan of Transparency aimed at achieving the related strategic objectives:

1) Transparency

2) Participation

3) Open Data

1) Improve government Transparency by increasing access to government information

Transparency is a complex construct with a long history that implies increased government openness to public scrutiny, increased citizens' access to government information and engagement in the decision-making process, and making public administrations more transparent to their citizens through facilitating access to information, knowledge sharing and collaboration. More in detail:

- A transparent government is a government that is **accountable** and that delivers information to citizens about its strategies, plans, and performance.
- A collaborative government is a government that involves citizens and other external and internal actors in the design, delivery and evaluation of public services.
- A participative government is a government that promotes citizen engagement in political processes and, particularly, in the design of public policies.
- A government that prioritizes the use of two key tools: open data (data that are available in standardized and structured formats, that are machine-readable, and that are guaranteed to be freely available over time) and open action (the use of web 2.0 tools and, particularly, of social media and blogging).

The community has the right to openness, transparency and accountability when it comes to government decision making and information. A government that is open, honest and accountable to its citizens will increase confidence in the decision making process and restore community trust. Greater public access in fact fosters collaboration, increases efficiency and fosters a public sector that values and shares information. At the same time it is important to ensure appropriate safeguards are in place to protect privacy and confidentiality.

Transparency Goals	Actions to achieve this include:
Increase the public availability of Government information, according to the Legislative Decree n. 33/2013.	• Develop a three-year plan of Transparency to increase access to government information. • Expand the Publications on the institutional website in order to include all information required by law as 'open access'.

Table 3 Source: adapted from the three year Plan of Transparency

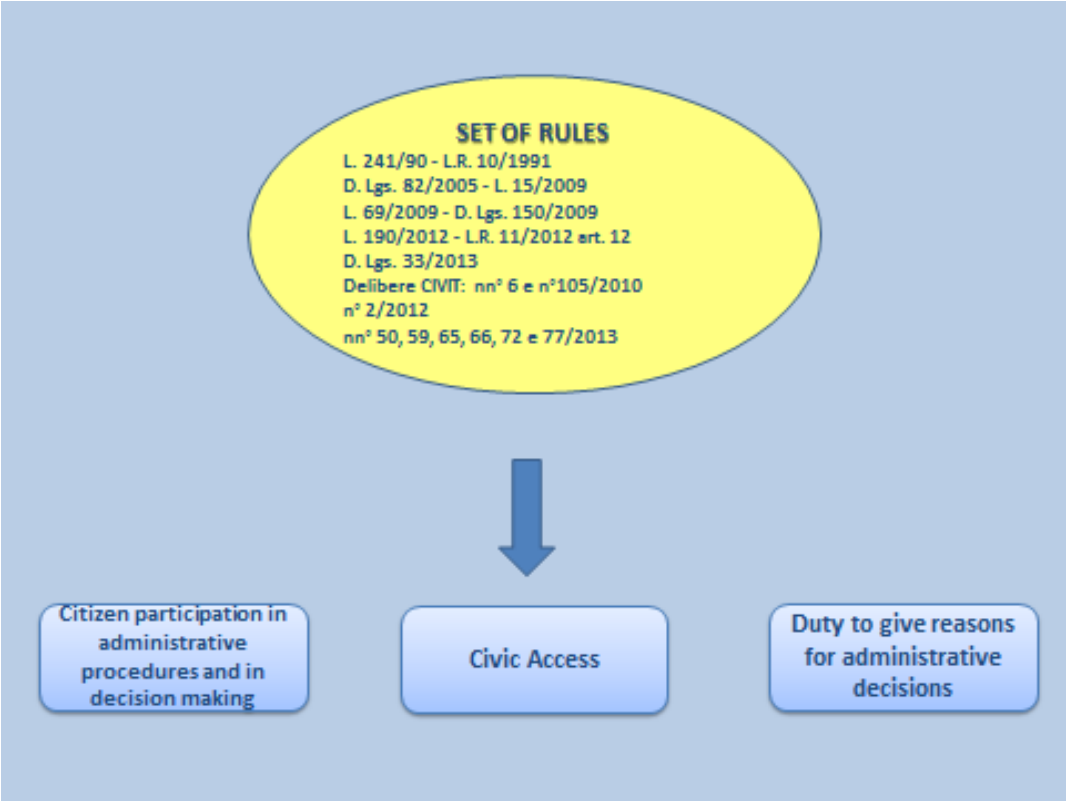


Figure 27
Source: Three-year plan of Transparency 2014/2016 of the Municipality of Palermo- Set of rules

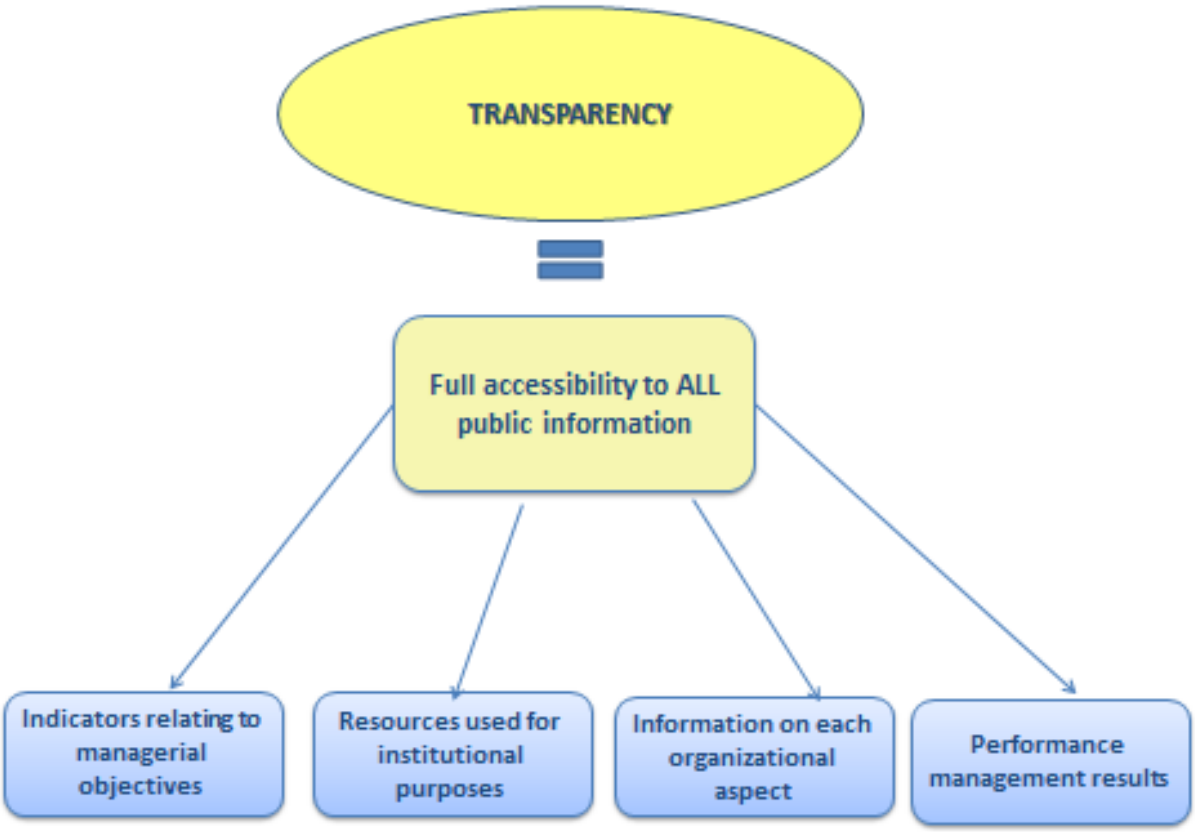
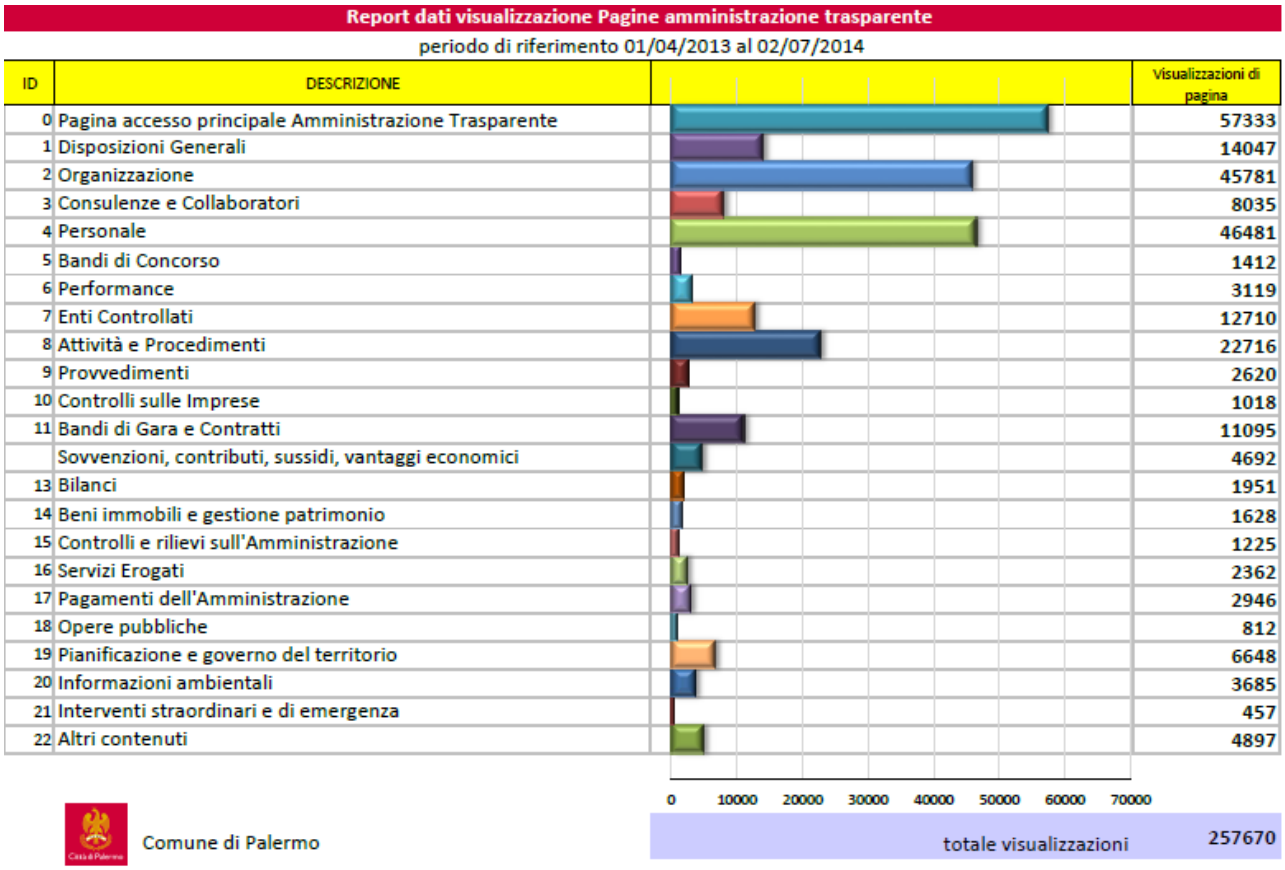


Figure 28
Source: Three-year plan of Transparency 2014/2016 of the Municipality of Palermo

The Municipality of Palermo administers an official Web Portal that provides various information relating to governmental procedures and transactions, which are of interest to citizens or businesses. This portal is mainly informative and responds to the public task of informing the citizens about government procedures and services offered provided according to the laws in force on transparency. More in detail, in the **Transparent Administration section,** inside the institutional website, there is a fairly large number of information, published in conformity with existing legislation, as can be seen in the following table that shows the number of views of the different types of documents, in the period between April 2, 2013 and July 2, 2014.



Report dati visualizzazione Pagine amministrazione trasparente

periodo di riferimento 01/04/2013 al 02/07/2014

ID	DESCRIZIONE	Visualizzazioni di pagina
0	Pagina accesso principale Amministrazione Trasparente	57333
1	Disposizioni Generali	14047
2	Organizzazione	45781
3	Consulenze e Collaboratori	8035
4	Personale	46481
5	Bandi di Concorso	1412
6	Performance	3119
7	Enti Controllati	12710
8	Attività e Procedimenti	22716
9	Provvedimenti	2620
10	Controlli sulle Imprese	1018
11	Bandi di Gara e Contratti	11095
	Sovvenzioni, contributi, sussidi, vantaggi economici	4692
13	Bilanci	1951
14	Beni immobili e gestione patrimonio	1628
15	Controlli e rilievi sull'Amministrazione	1225
16	Servizi Erogati	2362
17	Pagamenti dell'Amministrazione	2946
18	Opere pubbliche	812
19	Pianificazione e governo del territorio	6648
20	Informazioni ambientali	3685
21	Interventi straordinari e di emergenza	457
22	Altri contenuti	4897

Figure 29
Source: First day of Transparency, Participation and Open Data, July 8, 2014 [217]

The content, however, is not always updated regularly and it is possible the case that information provided in the institutional website is outdated or and/or in a format that does not facilitate its re-usability. This demonstrates that even though there is a chance to get a wealth from the PSI owned by the public sector, this data are strictly controlled by the administration and is not being generally supplied in raw, re-usable formats for re-use purposes. On this concern, it should be highlighted that the data published in the transparency section in the institutional website ensure formal compliance with the law on transparency, but it does not guarantee the re-usability of data and therefore the possibility of creating public value through their re-use by citizens and business. In this regard, if one analyzes the "Compass of transparency", a tool used by the Department responsible for measuring the transparency in the Public Sector (Funzione Pubblica)[218], it may be noticed that this only provides a measure of the formal observance of the law itself. The Municipality of Palermo, however, has started to provide business, geographic, legal, meteorological, social data and transport information in an open format according to the open data guidelines, which will be analyzed later.

[217] http://www.comune.palermo.it/noticext.php?id=4378#.VI3K7yuG_-s
[218] http://www.magellanopa.it/bussola/page.aspx?s=verifica-aministrazione&qs=nKJi%7cABlalD2z4HIFmdo1g%3d%3d

Participation: Involve the community in decision making on municipal policies, services and projects. Increase opportunities for people to participate in the way the local administration makes decisions. By devolving decision making as close as possible to the people and places affected by decisions, people are able to take more control over their choices and opportunities and shape their own futures. Governments that listen to their citizens are more responsive to their needs. Giving people a real say on issues that are important to them gives greater motivation to take responsibility and improves community outcomes.

It is possible summarize citizen participation activities around six aims:

1) Informing and educating the general public about important policy issues;
2) Improving government decisions by improving the information flow from citizens to decision makers;
3) Creating opportunities for citizens to shape and in some cases, determine public policy;
4) Legitimizing government decisions by ensuring that the voices of those impacted by government policy have been heard, considered, and addressed;
5) Involving citizens in monitoring the outcomes of policy for evaluation; and
6) Improving the quality of public life by restoring the trust and engagement of citizens.

Participation Goals	Actions to achieve this include:
Making it easier for citizens to interact with local administration through, innovative and engaging tools, leads to better informed communities, increases opportunities for participation and supports the development of services and policies that best meet the needs of the community.	• Establish Service to provide: —a customer–friendly Municipal web platform for citizen participation (e-participation platform)[219] and accountability (CittÁperta, Transparent administration web-section)[220]. —Increase the number of submissions received from the community (Geoblog).[221] • A redesigned institutional website where communities can have their say on Municipal plans to improve services and quality of life[222]. • Electronic Town Meeting (ETM)[223]

Table 4 Source: Three-year plan of Transparency 2014/2016 of the Municipality of Palermo

[219] http://partecipa.comune.palermo.it/
[220] https://servizionline.comune.palermo.it/portcitt/jsp/OMHome.jsp?sportello=portcitt
[221] http://www.comune.palermo.it/geoblog.php
[222] http://www.comune.palermo.it/
[223] http://www.comune.palermo.it/partecipa.php?sel=5

Participatory policy (TOP-DOWN): The Municipality of Palermo creates *new spaces and institutional arrangements for participation*, both online and face-to-face. Such initiatives create opportunities for participation in policy development, and will often involve institutional reforms that ensure the results of public participation are fed into decision-making processes.

Among the participatory processes activated by the Municipality, the study will be focused particularly on the Electronic Town Meeting (ETM), developed in the context of the European Living Labs.

- **ETM**[224]

Electronic Town Meeting is an experience of deliberative democracy[225].

It has several distinct elements – from a carefully planned recruitment strategy to the final report – that make it a complex forum for public decision-making that can allow interaction and discussion, at the same time, of hundreds of people to address issues of public concern and take a position on local policies.

The process focuses on discussion and deliberation among citizens rather than speeches, question and answer sessions or panel presentations. In preparation of a Town Meeting, participants receive detailed, balanced background discussion guides to increase their knowledge of the issues under consideration.

During the Town Meeting diverse groups of citizens participate in round-table discussions (ten people per eight table), deliberating in depth about key policy, resource allocation or planning issues. Each table discussion is supported by a trained facilitator who ensures that participants stay on task and work democratically to identify shared concerns and priorities.

Technology stewardship in the planning and design of a Town Meeting transforms the individual table discussions into synthesized recommendations representative of the entire assembly: ideas are submitted per table, using networked computers. This input is then grouped into areas of common concern by a 'theme team', and emerging themes are reflected back to the assembly using video projection. Each participant is able to vote anonymously on specific proposals according to their informed, individual preferences using wireless polling keypads.

Subsequently, a report of the proceedings of the Town Meeting is made available to participants, decision-makers and the media at the end of the day.

During a Town Meeting the entire group responds to the strongest themes generated from table discussions and votes on recommendations to decision makers. Decision makers actively engage in

[224] https://etmpalermo.wordpress.com/

[225] Torres, Lars Hasselblad. (2007), *Citizen sourcing in the public inter*est, Knowledge Management for Development Journal 3(1): 134-145 www.km4dev.org/journal

the meeting by participating in table discussions, observing the process and responding to citizen input at the end of the meeting. Before the meeting ends, results from the discussions are compiled into a report, which is distributed to participants, decision makers, and the media as they leave. An additional benefit of the model is that it often contributes to the formation of new networks that seek out their own ways to stay connected, monitor the process, and take local action.

The Town Meeting model provides the several distinct benefits to citizens and decision makers over many commonly accepted practices such as public hearings and open meetings.

These benefits include:

• The meeting provides an effective way for *general interest citizens* to have a voice in the public decisions that impact their lives;

• The scale of these meetings attracts substantial *media attention* and *political leadership*, often increasing momentum and interest in a proposal, process or issue;

• The format gives citizens an opportunity to *learn more* about important public issues, hear a diversity of perspectives and understand critical trade-offs;

• The *use of technology* provides an effective, efficient way to measure the degree of public support for proposals; and

• The report, distributed at the end of the day, immediately *identifies priorities*, areas of agreement and specific recommendations.

There are limits to which most participatory processes – including a Town Meeting – can be adapted to achieve fully effective public involvement when they come from outside of government. Only through authentic engagement by conveners and decision-makers will knowledge shared and commitments developed be applied to policy design, implementation, and evaluation. This is one of the major challenges to successful implementation of the model: convincing the main stakeholders of the benefits of participatory decision-making.

One way by which these effects can be addressed is by applying technology to improve access to information for decision-makers and participants; through more efficient information collection and dissemination, more informed decisions can be made.

However, the only way to convince people of the benefit arising from the participatory process is to give an effective feedback to the people who employ their time sharing their knowledge in order to improve the quality of life in their city.

More specifically, the pilot project of the Electronic Participation Tools for Spatial Planning and Territorial Development started in the city of Palermo in June 28, 2011 within the European PARTERRE consortium aimed at enhancing direct participation of citizens, stakeholders and civil society in the decision-making processes regarding spatial planning and environmental assessment,

both at the local and regional level where specific decisions are taken and applied and at the national and EU level where the policy frameworks for Europe's territorial development are defined.

The goal of Parterre, through the testing of an Electronic Town Meeting in Palermo, is to see if and how this instrument is actually be able to make accessible the definition of strategic objectives shared from the bottom not only in the strategic plans (already experience made across the region with results below expectations), but also in the planning and participatory processes. Parterre takes the opportunity of the startup process of the new master plan of the city and its connected Strategic Environmental Assessment. The constraints of the Palermo's PRG are expired, so the Municipality of Palermo must start the new planning process starting from the 'general guidelines', This is a paper of political orientation (non-technical) pertaining to the City Council and municipal Constituencies, from which must derive the technical choices of the plan.

In Palermo, since the beginning there was the involvement of movements and associations with the University so that some citizens' associations have been mobilized first to exploit the Castle / Palace Maredolce in Brancaccio and then to address and try to solve the problems of quality of life in the Second District of the Municipality of Palermo and soon their meetings were included in the activity of the Sicilian Territorial Living Lab (TLL Sicily).

The latter, **TLL Sicily, is a Living Lab** aimed to take a census of innovative activities in the region, with a view to a possible participation as pilot projects organized within the following European trans-national projects in progress[226]:

1. MedLab: Mediterranean Living Lab for Territorial Innovation, aims at the integration of approaches "user and demand-driven" in the regional innovation policies; the pilot project in Sicily is on the use of Web 2.0 technologies in the processes of strategic planning and participatory planning.
2. SMILIES: Small Mediterranean Insular Light Industries Enhancement and Support, aimed at testing new innovation policies for small businesses and micro-manufacturing in the islands of the Mediterranean; a call for expressions of interest will select innovative projects to accompany the project development and networking of the subjects.
3. HABITATS: Social Validation of INSPIRE Annex III Data Structures in EU Habitats, develops standards for the geographic representation of natural habitats through pilot projects which are experimented in the real contest; Sicily is starting with two initiatives in the Parco delle Madonie.

[226] http://www.nuovenergie.org/materiali/MEDLAB_Sicilia_occasioni_innovazione%20_sociale_territoriale.pdf

4. PARTERRE: Electronic Participation Tools for Spatial Planning and Territorial Development, in the framework of public participation required by law (e.g. VAS, strategic plans, etc..), will test two innovative tools: the Electronic Town Meeting developed in Tuscany and DEMOSplan developed in Hamburg.

European network ENoLL

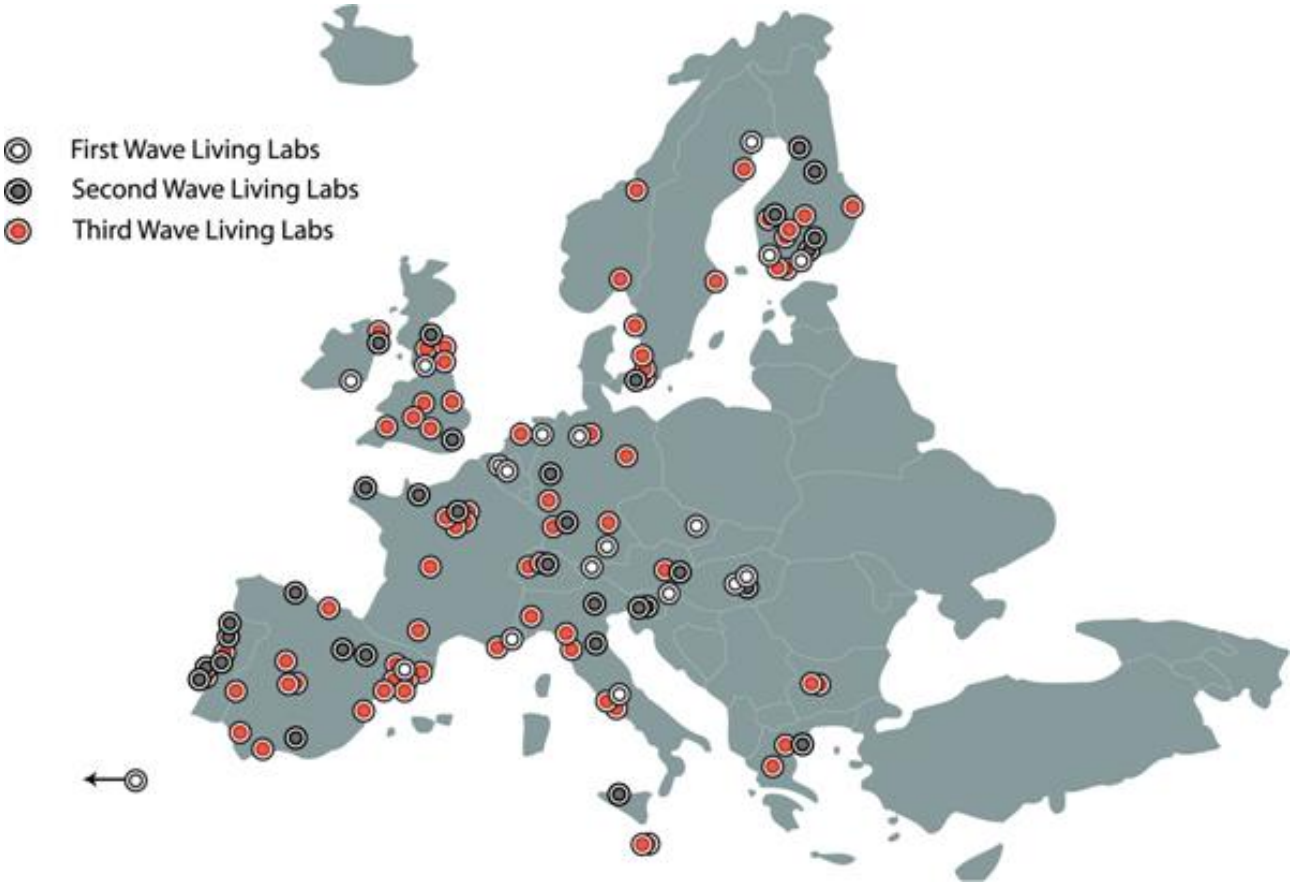


Figure 30

Italian Network: INoLL

Figure 31

- **GEOBLOG**[227]

Among the activities planned by the Administration of Palermo, summarized in the above tables, in the website of the Municipality it has been provided a tool (Geoblog) for citizen participation where problems in the local environment can be reported. Geoblog, in fact, is a prominent experiment aimed at fixing the complaint process, reveals how using the tools of the social web and broadcasting geo applications for open review can create a model for participatory administration. In the context of eGovernment, it enables a feedback function for the citizens and a fast and efficient access to their local service administration. Geoblog allows users to make their report on a map to share information and increase the feedbacks to the submissions received from the community in order to improve the effectiveness of the services offered by the municipal company (RAP) that provides the services of waste collection, maintenance of roads and drains.

[227] http://www.comune.palermo.it/geoblog.php

The report is then quickly passed to the relevant local authority, who may fix the problem. Geoblog is therefore an example of how official data provided online can foster interaction and dialog between a municipality and its citizens.

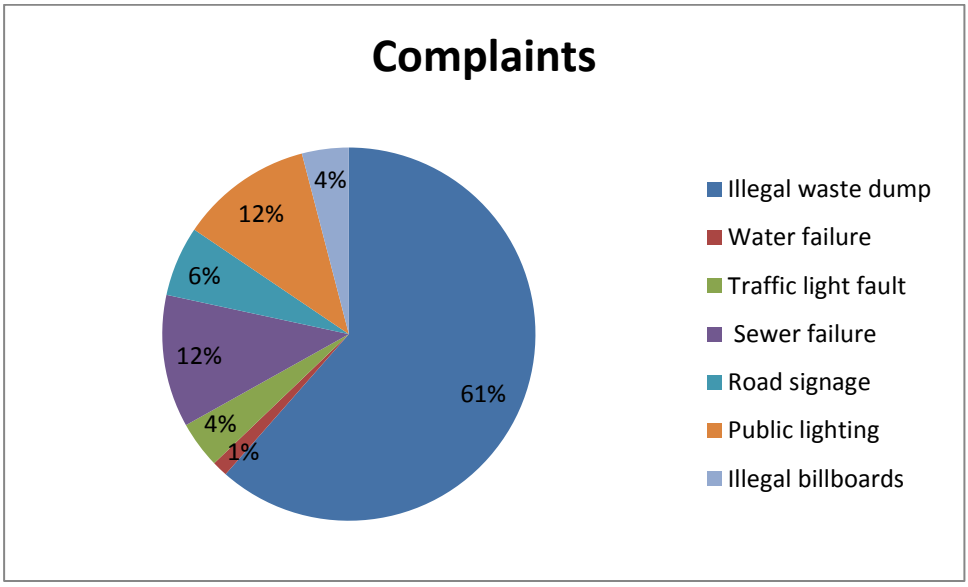


Figure 32
Source: http://www.comune.palermo.it/geoblog.php

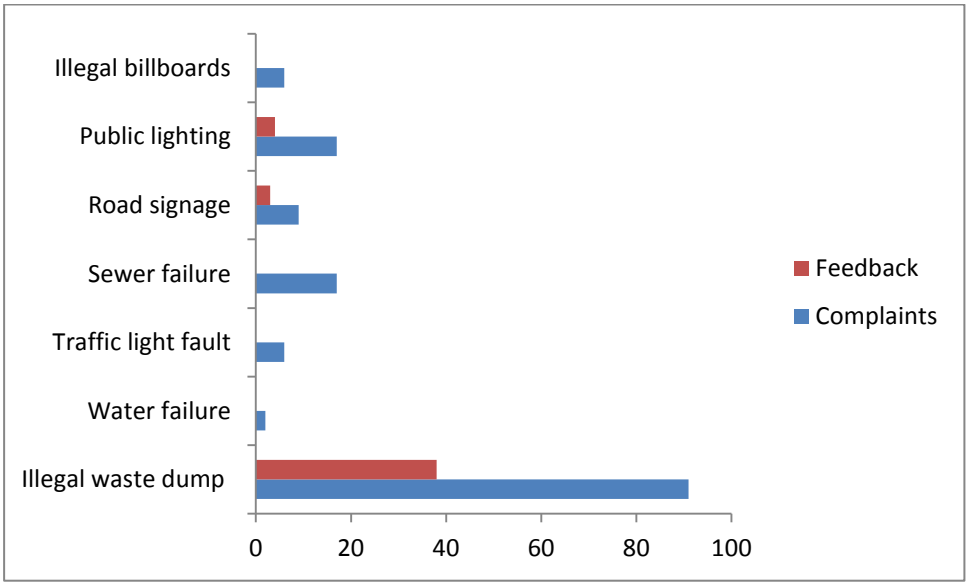


Figure 33
Source: http://www.comune.palermo.it/geoblog.php

At the same time, however, the above charts show how the lack of feedbacks from the Administration leads to a progressive lack of confidence in the instrument from citizens. If we analyze the complaints, in fact, it can be seen that after an initial success of the initiative, reports from citizens were locked for months.

Participatory policy (BOTTOM-UP):

Citizen engagement has already been described as: providing information as a service; getting feedback on services and policies; consulting with stakeholders; and facilitating dialogue amongst citizens and various interest groups (the government as a platform model) to solve complex problems that affect urban quality of life.

The participation of citizens, however, is not just limited to participation policies planned and implemented by the local administration (top-down), but also by pressure from below from stakeholders and citizens (bottom-up) who care improvement of services and the quality of life in the city.

In this respect, in the Municipality of Palermo, from December 2012 has started a joint working between authorities and citizens[228] to implement a shared processing of the new Charter of the Municipality of Palermo aimed at defining guidelines so that the City will be guided by the principles of transparency and participation and recognition, protection and enhancement of the common goods. The draft of the new legislation, which will drive the action of the Administration and the relationship between government and citizens, was presented by engaged citizens to the mayor of the City in a public meeting in May 4, 2013.

The draft of the new Charter of the City was published online on the website of the Municipality for thirty days from May 4, 2013 to allow all citizens, as individuals or group, to make comments, suggestions, criticism. Subsequently, the City Council will debate and adopt the final text.

In particular, the Title II - Transparency and Participation provide as follows:

I. efforts of the Administration to implement the 'transparency' understood as total access to information and documents in its possession, through the institutional website;
II. implementation of the 'participatory tools' of citizens in decision-making, already present in the Charter of the City, such as:
    a. The Register of free associations
    b. Consultative Committees, temporary and permanent (thematic, territorial, of purpose etc.).
    c. Town meetings
    d. Advisory referendum
    e. Instances
    f. Petitions
    g. Popular initiatives

[228] Proposal submitted by "Bene Collettivo", a group which coordinates the engagement of many associations and free citizens, http://www.benecollettivo.it/ .

III. Introduction of 'direct democratic instruments' such as:
    a. Participatory budget
    b. Citizen-demanded referendum (abrogative, rejective) and citizen-initiative

IV. And introduction of participatory planning tools such as:
    a. Strategic planning
    b. Five-year planning
    c. Participatory urban planning

Title IX - Common goods

I. Specification of the notion of common goods
II. List, care, management, use of assets owned by the public (municipal goods)
III. Safety and development of property not owned by the public but essential to the community

Figure 34
Source: http://www.benecollettivo.it/

2) **Open data policy**: **Open data is one way of informing and/or providing citizen engagement** therefore the policy of open data can allow to realize all the elements constituting of the Open Government strategy analyzed until now. Decision makers and managers, in fact, are held

to higher levels of accountability through the publication of Open Data on the basis of which can be developed participatory performance measurement tools (also known as 'social monitoring').
Public data may be understood as a fundamental shift that impacts both the control of public action, the operation of local democracy and the development of innovative services.

Open Data Goals	Actions to achieve this include:
Providing up–to–date information when customers need it, will improve the way people use government services and help them make more informed decisions.	• Increase the number of datasets providing real time information about municipal services (e.g. information on live urban traffic, information on urban pollution, live bus time, etc.). • Increase the number of mobile phone applications (Apps) that allow people to access municipal open data by providing real–time information as customers need it. • Increase the number of Living Labs events[229] for stakeholders involvement (e.g. Contest ApPalermo) [230] .

Table 5 Source: Three-year plan of Transparency 2014/2016 of the Municipality of Palermo-

In the framework of the Open Government policies carried out by the Municipality of Palermo, this study aims to highlight the strategies and actions in the short and medium term for the creation of economic growth and services deriving from exploitation of PSI (Public Sector Information)[231],

[229] https://www.facebook.com/groups/207959762737919/208245552709340/?notif_t=group_activity#_=_
[230] http://www.comune.palermo.it/opendata.php?ext=2
[231] While the terms PSI and Open Data are used quite often without distinction (thus overlapping most of the times), a strict definition of PSI according to the PSI Directive rules would reveal certain discrepancies among the two. Moreover, one should keep in mind that both the PSI directive and the so-called Open Data Movement provide a core of rules and principles that may be practically implemented in a slightly different way within different countries and different existing legal frameworks.

For further information: http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32003L0098:EN:HTML
http://www.oecd.org/internet/ieconomy/36481524.pdf
http://www.oecd.org/internet/ieconomy/44384673.pdf
http://ec.europa.eu/digital-agenda/

arising from the development of policies for opening data. It is clear that the present scenario is characterized by a steady reduction in the budget, and in contrast, a continuous increase in the need for new and more efficient services to the community, actually aspiring to become smart-cities, requires to public administrations the opportunity to use their data as an indispensable tool for economic growth and social development. The municipal guidelines, worked out by the open data's local community, proposed interventions that will encourage the development of applications and services by businesses, citizens and civil society taking advantage of the economic potential of public data networking with all other stakeholders in the area and the implementation of regulatory instruments such as pre-commercial procurement or public-private partnership.

The Municipality of Palermo, the first municipality implementing an OD program in Sicily, is actively working on this field. So far the Municipality of Palermo has opened hundreds of datasets through an OD section in its institutional web site (http://www.comune.palermo.it/opendata.php) and believes that these tasks are needed to ensure the compliance to the new digital agenda on PSI which requires that all PAs open by default their datasets.

In line with the value and function attributed to public information by the EU (Directive 2003/98/EC of 17 November 2003), and aware of the positive impact that the spread of data can have a level of transparency and efficiency of the PA, as well as active participation of citizens in the life of the PA, the Municipality of Palermo has strongly demonstrated its desire to establish a system for managing and sharing data. The will to structure and organize a municipal system for open data is manifested through the early involvement of key stakeholders and partners.

The process of stakeholder involvement has occurred in the early stage of the opening process started just under bottom-up pressure. The stakeholder participation in the process, in fact, has produced the open data guidelines, a comprehensive document that benefits the whole community in Palermo, embarking on an irreversible path towards the participation and collaboration between the municipal Administration and the citizens. The guidelines are not specific to Palermo municipality and they have been released with the creative commons license: CC BY-SA. At the moment, in fact, the guidelines are providing the basis to support the development of Open Data activities in the Matera and Lecce municipalities as well as in the province of Enna.

In this respect, in the next section we will analyze in detail the content of the guidelines, focusing also on the participatory process that led to its elaboration.

4.1.2 THE BOTTOM-UP PROCESS IN DEVELOPING OPEN DATA POLICY

A best practice of citizen participation

The Guidelines for the Municipal Open Data process, issued in December 2013 and approved with the Resolution n. 252[232], of the municipal government, confirmed the priorities planned in the Digital Agenda in reference to the promotion of e-Government and sets out the improvement of transparency in the relationships between Public Administrations and citizens, also "through the usage of Open Data, defined as an approach to management of information and data owned by public institutions and entirely implemented through ICT technologies".

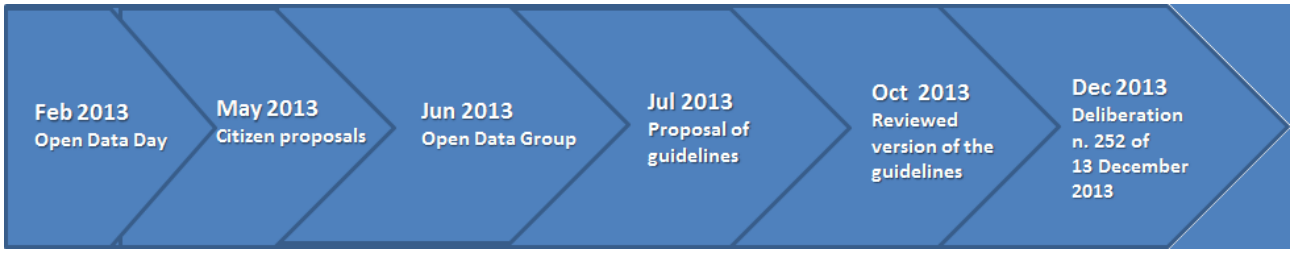


Figure 35
Source adapted from: Marco Alfano, Andrea Borruso, Giulio Di Chiara,Gerlando, Gibilaro, Francesco Passantino, Ciro Spataro, Davide Taibi[233]:

The Municipality of Palermo, through the development of the open data guidelines, defines the road map to support the development of Open Data activities.

Main aims of the guidelines:

- → describe the principles and criteria to be adopted for implementing Linked Open Data approaches and describe procedures, methods and timelines for collecting, cataloging and publishing the data held by municipalities in Open Data format;
- → suggest the operational paradigm that municipalities should adopt in order to achieve their objectives with respect to the principles of transparency, efficiency and accountability of the public administration and promote active participation of citizens in the life of the city;
- → support the activities of Palermo municipality in opening its public data and publishing them as Linked Open Data;
- → define a general approach, so that their applicability is not limited to the context of the city of Palermo.

[232] http://www.comune.palermo.it/js/server/uploads/_17062014112345.pdf

[233] Marco Alfano, Andrea Borruso, Giulio Di Chiara, Gerlando Gibilaro, Francesco Passantino, Ciro Spataro and Davide Taibi.), *The process of developing Open Data guidelines for the city of Palermo: A best practice of citizen participation*, LOD 2014 (Linked Open Data Day) conference, 20th February 2014, available on line: http://www.w3c.it/events/2014/lod2014/slides/paper35-slides.pdf

Strategies and actions

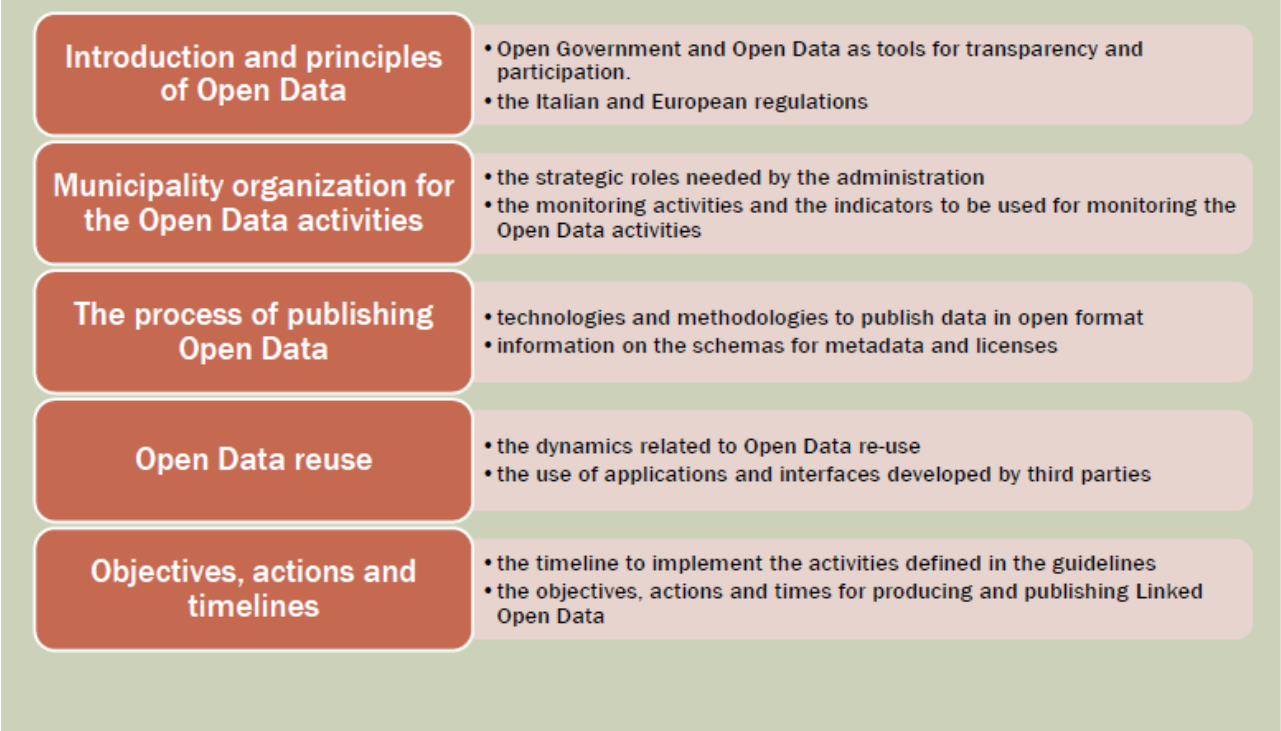


Figure 36
Source: Marco Alfano, Andrea Borruso, Giulio Di Chiara,Gerlando, Gibilaro, Francesco Passantino, Ciro Spataro, Davide Taibi[234]

In the following sections further information is presented related to the Open Data status for the Municipality of Palermo, the vision of the Administration with regards to open data (OD) and the action plan needed to implement said vision, monitoring indicators for its implementation, the critical success factors, potential risks and mitigation methods.

First, an overview is provided with regards to the existing legal framework on public sector information and other related legal issues such as copyrights and the protection of personal data and the processes already in place to revise this framework in order to be fully compliant with the relevant EU Directives, already analyzed in the previous chapter. This section also gives an overview of the landscape in the Municipality of Palermo mainly on how the Admistration shares information with the general public (transparency).

More in detail, the next section 4.2 provides an overview on the plans of the Administration in the field of open data focusing on the short and medium/long term action plan for the implementation of the vision outlined in the Open Data guidelines and presents some good examples of private initiatives that re-use public sector information. Subsequently, section 4.2.1 explores also the main technical, legal and administrative obstacles for open data implementation as well as specific

[234] Marco Alfano, Andrea Borruso, Giulio Di Chiara, Gerlando Gibilaro, Francesco Passantino, Ciro Spataro and Davide Taibi.), *ibidem*.

actions as to how to overcome them. Section 4.2.2 presents the vision of the Municipality of Palermo with regards to open data and outlines the vision's general and specific objectives. Measurable targets are set for each objective. Section 4.2.3 presents the mechanisms that will be created for the implementation and monitoring of the legal provisions that will be outlined in the harmonizing law on PSI re-use and outlines the main monitoring indicators that will assist in the evaluation of the achievements and track data usage to evaluate the evolution and impact of the open data initiative. Finally, in Sections 4.2.4 and 4.2.5 the critical success factors of the initiative are identified and presented and the risks associated with the implementation of the action plan and the related mitigation methods are outlined.

4.2 OPEN DATA LANDSCAPE IN THE MUNICIPALITY OF PALERMO

→ VISION

The policy maker's vision is to achieve better outcomes in public services and governance by putting into action the Open Data potential through new strategies and programs focused on transparency. More specifically, the municipal Administration aims to involve all the components of the urban area society, from civil servants and activists to small and medium enterprises and all its citizens in order to pursue a greater local awareness of Open Data and of their benefits, starting with the economic ones, both in terms of savings for Public Administrations, and as generators of wealth and economic opportunities[235].

In order to implement the vision the Municipality of Palermo should move towards a positive transformation of its policies and process based on transparency and engagement of stakeholders for cost savings and better services efficiencies. High quality data, easily accessible and usable can contribute to social and economic development as long as the Open Data ecosystem, enterprises and citizens, will be able to take advantage of the potential of Open Data.

As a consequence, the Municipality of Palermo will:

- → make aware the civil society that social engagement based on Open Data, can stimulate the public administrations to deliver better services and cost effectiveness;
- → stimulate an economic progress of Open Data by eventually subsides firms according to UE laws;
- → invest in research, education and encourage firms to reuse PSI.

[235] e.g. https://www.facebook.com/swpalermo?ref=ts&fref=ts
https://www.facebook.com/groups/207959762737919/208245552709340/?notif_t=group_activity#_=_

Concerning the first point a new habit must be put in place and a new engagement in public collaboration, based on transparency and finally Open Data driven decision making.

Concerning the second point it should be noted that at this stage of the economic crisis it's difficult to foresee a direct effect of Open Data on the Municipal economy with a tangible impact on the volume of business activity or the creation of new firm that reuse PSI in innovative ways. Nonetheless, the Municipality of Palermo will push in the long term in order to encourage municipal entrepreneurs to start investments in OD incrementing the valorization of PSI for re-use in new products and services and turning public data into new business opportunities (e.g. Push's activities)[236].

More in particular, a metropolitan approach proposes fundamental issues of modern policies who driving territorial attractiveness, transparency, innovation, new services and strengthen the economic dynamism and the digital ecosystem. The territorial approach is to get to boost innovation and implementation of new services to the population. It has to develop a culture of innovation around digital services built from open public data released and improve digital literacy planning. In the same time it will develop transparency and clarity of public action.

In the light of the above, it is possible to summarize the key elements underlined in the municipal Guidelines according to Homer's study in order to outline the vision set out in the policy makers' agenda:

-Common objectives:

Create new public services and tools with which citizens can improve their quality of live, at the same time that municipal Administration is increasing the Open Data knowledge between the public.

-Quantity of Open Data sets: the currently municipal open data catalog must be increased. The portal must be regularly updated with new data sets and updates of them and its functionality can evolve to meet everyone's expectations and fulfill its objectives of transparency and stimulating innovation.

-Data set quality: It is an objective to ensure not only more data quantity, but also improved mechanisms in place for quality. Assurance always in compliance with EU and national legislation while minimizing the financial burden on the municipal budget.

-Enabling interoperability: It is important to improve the ability of making systems and public organizations work together. Beside the information technology and systems engineering services

[236]**PUSH** is a no-profit civic startup. PUSH fosters **communities** ,**public administrations** and **local governments** to be an active part in the process of **urban renewal**. http://www.wepush.org/tag/to2/

to allow for information exchange, organizational factors must be taken into account for the system performance.

-Awareness: it is important to afford opportunities and tools for awareness raising regarding Open Data. To strengthen the knowledge of the social an economic value of PSI for private sector and citizens in order to encourage the participation of citizens in Municipal´s decision-making.

-Sustainability: To ensure the Open Data strategy's sustainability is important to guarantee a balance or match between the supply and demand for applications and services. In that sense it is necessary to be focused on user needs through a active listening about the information needs and a test about the market of services demanded. Establish permanent communication mechanisms that allow make suggestions, is also important.

4.2.1 OPEN DATA OBSTACLES & RECOMMENDATIONS FOR ADJUSTMENTS TO OVERCOME THEM

The importance of Open Data has been acknowledged to all levels of the Italian Public Administration. As just one example, we may quote article 9 ("Digital documents, Open Data and Digital Inclusion") of the national Law Decree nr. 179/2012, the so-called "Growth 2.0 Decree"[237].
However, lack of detailed regulations for implementation of the same norms and/or the absence of sanctions for not applying them make it difficult to mandate specific actions or deadlines, both inside and outside Public Administrations.
These implementation and organizational weaknesses come together with the difficult current state of State, Regional and other local public budgets, which makes it so that the only "possible" source of funding, not just for this Open Data policy but for innovation in general, consists of European structural funds coming from research programs (ex. Horizon 2020)[238] or cross-border cooperation (ex. Open-DAI)[239].
Nevertheless, knowledge of OD is typically isolated within relevant departments and branches of municipal administration. A majority of municipal employees still know nothing or very little about OD and usually just those specific individuals working on technology and Open Government are more familiar with the concept. This suggests that, as achieving data disclosure policies required a combination of both legislative and persuasive tactics, government-wide outreach and training will be a necessary step forward for the OD success.

[237] http://www.governo.it/backoffice/allegati/69396-8138.pdf

[238] http://ec.europa.eu/programmes/horizon2020/

[239] http://open-dai.eu/

Furthermore, it is up to the discretion of each department head to decide whether information will be provided. Once the information is placed into the portal, the information provided will have to be current and thus updated regularly. In order for this to be achieved, the various Departments (data owners/producers) will have to be committed to providing information regularly. An important step in securing this commitment would be a legislation able to include the legal obligation of Departments to maintain data catalogues and to publish and update their datasets on the Open Data portal.

In this respect, municipal departments may be culturally more ready or more open to implement OD policy than others. Where there is a high cultural resistance to openness, Open Data are viewed as a simple transparency operation due to law. In this case, it is not so easy convincing them that the data are common goods.

In the current scenario instead the different stakeholders usually face political resistance from several municipal offices unwilling to release data. This lack of a good freedom of information frameworks is also to a certain extent inhibiting the development of OD.

Part of the problem comes also from the low availability of credible impact studies that can prove the theory of change for OD. The OD community would benefit immensely from such evidence base. This study, in fact, focuses on the theme of the Open Data (OD) policy carried out in the Municipality of Palermo even in order to stimulate awareness related to the positive impacts on the public value creation arising from the re-use of PSI. To this end aimed at analyzing the sustainability of the strategy itself, in the following sections, it will be identified the specific obstacles, benefits and impact linked to PSI access/re-use of the open datasets.

In the light of the above, one of the challenges remains to explain what steps are needed to open up datasets. The problems do not end once data are made public, then data quality is also an issue (from data being delivered just in the form of scanned images to spelling mistakes, inaccurate metadata; incomplete and old data or missing information). All this has a direct impact on potential re-use, which is ultimately needed to convince Administration that the release of data is worthwhile and beneficial.

Public education and outreach are other critical components of OD, as citizens must know about the existence of this resource before it gains optimum public value. This requires building a stronger local OD community and encouraging networking amongst civil society organizations and the administration.

In addition, it will be imperative to conduct numerous training sessions, either in groups or one-to-one discussions, for the civil servants who will be charged with the duties related to the provision of PSI through the portal.

In this section thus it will be explored the main technical, legal and administrative obstacles for open data implementation as well as specific actions as to how to overcome them as outlined in the Homer's study. Particularly, it will summarized the criticalities emerging from the analysis of the Open Data status for the municipal administration also taking into account the results coming from the survey conducted in the municipal website (see section 5.1.4 DATA COLLECTION), that at the moment will be analyzed to understand what are in the community's perception the main actions that should be taken by the Municipality of Palermo to improve its Open Data's policy, as summarized in the following **table:**

SCORE	DATASETS COMPLETENESS	UPDATE TIME	LINK TO EXTERNAL DATASETS	OPEN DATA PORTAL	PRIVACY	OPEN DATA EVENTS	OPEN DATA CULTURE
5	28,41%	25,00%	19,32%	18,18%	23,86%	19,32%	24,14%
4	6,82%	6,82%	9,09%	13,64%	9,09%	13,64%	12,64%
3	3,41%	7,95%	10,23%	5,68%	5,68%	6,82%	8,05%
2	13,64%	2,27%	3,41%	3,41%	3,41%	1,14%	3,45%
1	5,68%	14,77%	15,91%	17,05%	14,77%	15,91%	14,94%

Table 6

The obstacles related to the open data implementation will be further analyzed below, categorized into technical, legal/policy and management/governance obstacles. The related recommendations for adjustments therefore basically consist in the elimination of each obstacle or missing condition and will constitute the outcomes devised by the open data guidelines.

These obstacles can be seen from a two-fold perspective: the data supply, i.e. the challenges faced by the data owners (municipal departments) and the data demand, i.e. the re-users.

The following information mainly was drawn also from two sources:

- Interviews (webmaster and data producers).
- The results of the survey administered among Open Data users and re-users, submitted online in the institutional website of the Municipality of Palermo, (text will be attached as appendix A to this study).

From the supply side (publishers), the main challenges are the following:

→ Right now a lot of data held by Administration are in a non-digital format.

→ In the cases where data are held in a digital format, there are no interoperability specifications because there is a huge range of **competing vocabularies and taxonomies** for describing and classifying datasets.

→ Big efforts are required for **keeping data and the associated metadata up-to-date**.

→ There are several **domain-specific metadata needs** not being covered by current standards

→ There is lack of awareness among data owners/producers of the potential benefit to the private sector from the re-use of PSI.

→ There is no clear view on which data are more likely to be re-used or has a higher return on investment potential.

→ There is no one-stop-shop for the provision of PSI.

From the demand side (re-users), the challenges are as follows:

→ A general lack of overview of **existing and available datasets**. The availability of truly open data – i.e. open and machine-readable - remains low in comparison with the huge total amount of data managed by the Administrations.

→ Data are often of **low quality**, **outdated, unstructured** and/or **not machine-readable**. This joins with a general lack of good quality and accurate metadata.

→ **Different vocabularies and taxonomies** when searching for datasets.

→ **Lack of provenance** information.

→ Still there are **no clear business models** for re-using Open Data.

→ There is resistance by many municipal departments to release/publish the data they collect/own.

With regard to the process of data publishing, it should be pointed out, that it has an iterative incremental life cycle, which is based on the continuous improvement and extension of the Data resulted from performing several iterations. A sustainable Open Data policy indeed cannot be conceived without providing the link between data publishers and data consumers. Continuous feedback is necessary to optimize the process of data reuse.

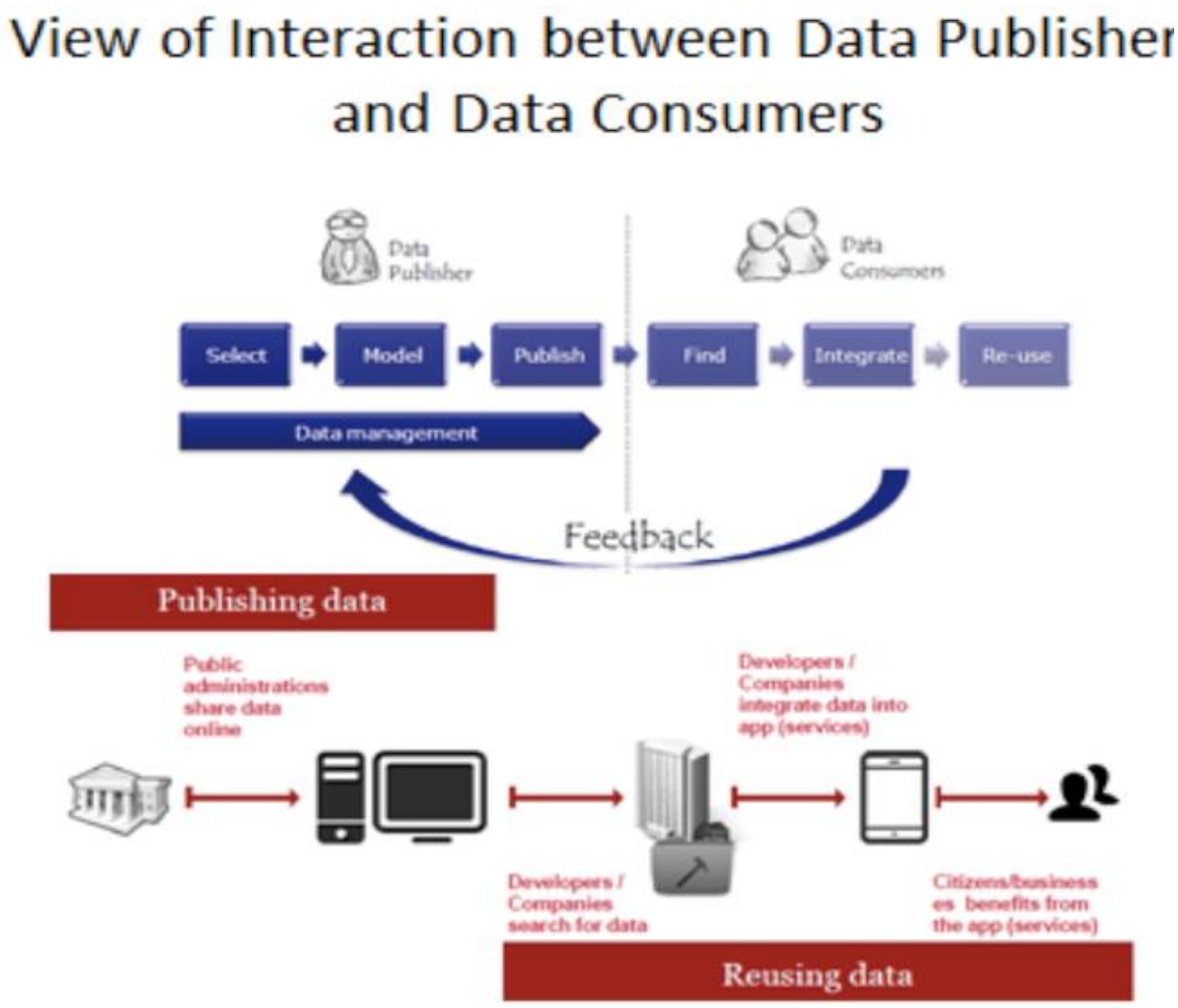


Figure 37
Source: Corsica's Open Data Action Plan 2014-20120 (Homer)[240]

In the light of the above, more specifically, several barriers and challenges for the adoption of the municipal policy on OD have been identified, such as:

→ **Cultural and Political**: the awareness of the economic and social potential of open data is still relatively low. Public administrations tend to be reluctant to change their usual approach to work and do not necessarily perceive their role in terms of data producers. Moreover, adopting new forms of collaboration and participation with citizens and businesses in order to improve the public sector still requires a strong political commitment.

The demand for open public data among active social communities, journalists and business is also still limited (as reported by the webmaster during the interview) Hence, it is rather difficult to understand what kind of data is most relevant (see the above table1).

[240] http://homerproject.eu/images/Docs_/Publications/OD_PLANS/Final_actionplan_corsica.V1.pdf

Certainly, the culture of Open Data is taking place especially thanks to the efforts of the community of open data's users/re-users, but there is still a strong tendency to think of the PA likes acting to comply with legal obligations rather than citizen-oriented in response to their needs, yet there is not much awareness of the transaction's value. The Guidelines issued in December 2013, created the conditions for overcoming the above situation and the working group on Open Data still is working in order to further inform colleagues and encourage the dissemination of the concept and value of open data. To date, the main objective is to efficiently manage all the administrative procedures related to the data request and complaint submission tools available to citizens to dialogue with the PA and influence their choices.

→ **Technical obstacles and recommendations**

Key technical obstacles to the achievement of the Open Data strategy vision of the Municipality of Palermo can be summarized as the following:

- data is often still collected and managed in non-digital form, let alone machine readable formats;
- for native digital data, there are often no interoperability specifications nor metadata;
- data update is not scheduled regularly;
- lack of a process of a structured quality assurance process.

Furthermore, managing big amounts of data is a difficult task where we will need machine assistance to be able to explore and extract meaning from it. At the same time, **quality and availability of metadata** are two variables that directly affect data **discoverability**.

Metadata standards are a key component for the harmonization of Open Data initiatives. By using a common metadata schema to describe datasets and sharing metadata it is possible to obtain a two-fold benefit:

- Data publishers increase discoverability and thus re-use of their data.
- Data re-users can uniformly search across platforms without facing difficulties caused by the use of separate models or language differences.

More specifically, specialized skills and expertise are required to Open Data at a high-quality level in the PA. In this respect, in the Municipality of Palermo the technical work has been normally contracted to SISPI S.p.A. the in-house IT support company of the Municipality of Palermo.

Regarding the process of Open Data, the guidelines have provided, firstly, the creation of an Open Data Team that carries out a cross-connection among municipal departments. In fact, the team is made up of the management of the key areas involved in the process of opening data: the General Secretariat, responsible for the policy on transparency of the Municipality, the manager responsible

for the policy of participation and the manager responsible of the municipal technological innovation process. The guidelines, moreover, establish to identify within each organizational unit: an operator responsible for the content and another one charged from a technical point of view who will take care of choosing information to be made available in open data format and its release on the institutional website. To this end, the Municipality of Palermo, has prepared training courses for about 100 units staff that will be administered by the same stakeholders who participated in the definition of guidelines and who have given their willingness to provide their performance in free of charge.

So far, however, municipal departments and services, provide information and data that they hold or collect in a non-homogeneous and not-organized manner. It is up to the discretion of each department head to decide whether information will be provided and even then it is up to the Department to decide how to provide this information. What is more, a lot of the data within the departments is still collected and managed in non-digital form let alone machine readable formats. And even where the data are digital, there are no interoperability specifications and only those published on the web site have some metadata.

A technical obstacle for the successful implementation of the open data strategy for the Municipality of Palermo is also the fact that there is no a PSI web portal which may act as a one-stop-shop to allow the access to the PSI and at the same time it may host the users' s datasets in order to share them as well as the re-use cases. A web portal like this is referred to as a priority by the local Open Data's community, as it emerges from the data collected from the survey. Another priority may be considered the implementation of the regional portal so that it can enable interoperability at the regional level. In this regard, the Municipality of Palermo has signed an agreement between municipalities of the metropolitan area, called the Pact of Ventimiglia, which will lay the basis for developing a territorial strategy for Open Data policy. At the same time, the community of Open Data has created a Facebook profile, called Open Data Sicilia[241], in order to aggregate innovative regional users who have been identified through the initiative called MizzicApp.[242]

[241] https://www.facebook.com/groups/opendatasicilia/?fref=ts
[242] http://siciliahub.github.io/mizziCAP/

→ **Legal & policy obstacles and adjustments**

Key legal and policy obstacles to the achievement of the municipal Open Data strategy vision can be summarized as the following:

- Open Data should be thought as a natural output of any administrative process, if not impeded by proscribing conditions (e.g. privacy, sensitive data), to be clearly declared and notified before implementation;

→ **Data Quality and Quantity**: The amount of data published should not be used as a measure of success of open data policy. Apart from technical standards, open data should serve open services and processes so they must be of the highest quality in terms of well-known characteristics, which include completeness, consistency, timeliness and accuracy.

Quality of open data is only assured by correct production and publication methodology and processes, that have not yet been clearly defined.

Indeed the quantity of public data in open format is constantly increasing, but still unclear the relevance of the datasets to be given highest priority on opening. According to the community that answered to the informal interviews, the reason arises from the fact that has not yet been started by the Municipality of Palermo a census of the information available to be released and at the same time it has not been triggered an organizational process effectively able to give a feedback to requests made by users.

In the following section we will provide a framework to measuring success in the open data strategy according to the main references provided in this field at national and European level.

4.2.2 VALUE PROPOSITION OF OPEN DATA: A FRAMEWORK FOR MEASURING OUTCOMES

Government services to the public must be effective and efficient, and satisfy the needs of the public therefore performance measurement helps to have a logical framework to build a result chain.

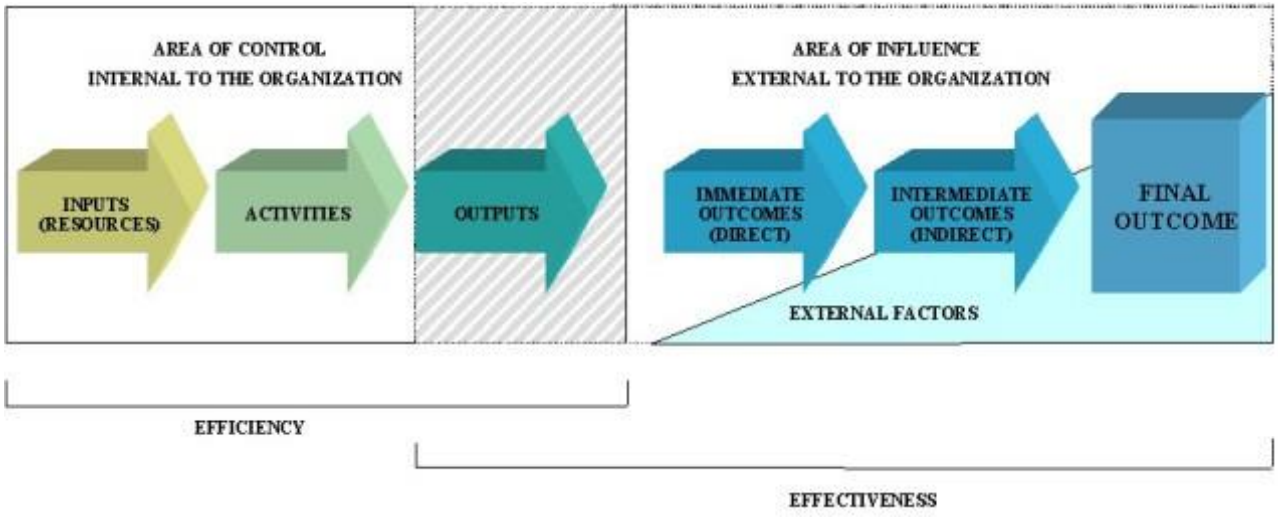


Figure 38
…. 'results chain'---------- SOURCE

According to the above image it is thus necessary to point out that there are two types of 'success' or 'value' in results-based management (result chain): efficiency and effectiveness. **Effectiveness** is the extent to which planned activities have had the desired impact. However, in the public and non-profit sectors, efficiency is also very important. **Efficiency** can be defined as the cost to obtain these results. Best practice shows that success should be measured in terms of effectiveness, efficiency and satisfaction, both internally to government and externally to public.

Since there may not be proven yet the public value arising from Open Data policy because it is a new policy, **scenarios** might provide an opportunity to capture open data policy success in the improvement of public value. At this end, in the framework of a Dynamic Performance Management approach, in the next section, learning scenarios will be developed through System Dynamics modelling aimed at testing Open Data policies. In particular, in support of the above claim, performance drivers will be highlighted as levers in the decision maker's hands to manage Open Data process.

→ **Measuring effectiveness**

The government's goal is to achieve set desired (long-term) outcomes in order to contribute to a better quality of life for citizens. Each department has a mandate to meet certain needs of the public, among them, socioeconomic development, public safety and environmental protection.

In this respect, providing structured data proactively allows:

- Citizens to create visualizations that communicate the information in various ways and related to various things in order to identify gaps and trends on which to make informed decisions about their quality of life.
- These visualizations or the original data can help potential entrepreneurs and businesses identify gaps and couple it with other sets for insights (market intelligence) that improve ability to earn a living and provide a necessary service, as well as understand where and how to promote that service.
- Groundswell: individuals and organizations to self-organize (crowdsource) to solve a problem or improve a situation.

The data can also be provided directly by the citizens, for example by acting as detectors of services failure. At the time, to this end the Municipality of Palermo uses Geoblog, but it presents some critical issues highlighted above. However, there are some initiatives that are managed only by the citizens, such as the mobile App that has been developed by a social community built on Facebook: Social Street. This App works in a very simple way because it allows citizens to take pictures of contaminated sites of the city and enter the alerts into a geo-referenced map. This initiative has been so successful that the municipal Administration had to sign an agreement protocol to allow citizens to draw up and spread regular reports in order to monitor the feedback from the Administration itself.

In the light of the above, open data allows:

- An individual: might mash it up with a map, and color code it by risk level, making it easier to prioritize what should be cleaned up first.
- Academia/researchers/non-profits: might realize an opportunity to invest in a certain technology to address a certain type of contamination that is prevalent or has potential business application.
- Business/entrepreneur: might propose a solution on how to tackle clean up, and propose doing so through grants from the government.
- Community association/other level of government: might partner with municipal administration to clean up areas in their neighbourhood for a nominal fee or in exchange for

another service, such as a permit to build a park or designate the area protected in an attempt to avoid future contamination. (e.g. in the decree "Unlock Italy", will be a discount on local taxes for engaged citizens who take care of common assets).

→ **Measuring efficiency**

Municipal money is on loan from the taxpayers and therefore, decision makers must demonstrate reasonable spending to deliver services to citizens.

In this respect, providing structured data proactively allows:

- Departments to spend less to deliver the same/improved service (current savings)
- The starting point to respond more quickly/easily/cheaply to changes in technology and citizen expectations (future savings).
- Individuals to choose to pull information into other systems (e.g. mobile device, feed-reader, a widget) where it's most convenient for them to access and return to later.
- Governments to partner with other departments, levels of government, non-profits or businesses to provide services that offer higher value to citizens.

→ **Measuring satisfaction**

As a public service, the Open Data policy must provide a level of satisfaction to all involved, since it exists to meet a public need.

In this respect, providing structured data proactively allows:

- Citizens to engage in a more meaningful way with government to help make decisions/create policy and services together about quality of life issues such as trade-offs between environmental degradation and economic prosperity.
- Employees to have interesting work packages that is meaningful and uses upper brain functions, relegating rote tasks to automation.

In the light of the above, in the next section, it will be analyzed the value chain arising from the Open Data policy that outlines the inter-linkage between engaged citizens and better service effectiveness leading to improved trust in the public service provision.

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4.2.3 VALUE MODEL OF OPEN DATA

On the one hand, opening information enables the establishment of better control mechanisms for **transparency**, as well as opportunities for enhanced **participation** and **collaboration** of citizens, promoting a more efficient democratic system.

Furthermore, better use of data produced by governments, can help to foster the **economy**, serving as a basis for a wide range of new digital products and services, and ultimately generating a value for society as a whole. At the same time, Municipality will also improve the **efficiency** of its internal processes, especially with regards to internal operations and exchanges within the own administration or with any other external bodies. Given this wide spectrum of opportunities, it is inarguable then that openness and reuse of public sector information (PSI) is becoming an important area of future.

In this respect, the Municipality of Palermo is the holder of a wide range of useful government data which have the potential to empower citizens with information, advance research and enable improved investment decisions. Releasing this data, in fact, enables users to make better connections for commercial and other reuse so that they can create shared value unlocking opportunities in municipal community and economy.

More specifically, the basic notion is that a municipal initiative must create value to be successful. Value is seen not only from a revenue/cost perspective, value also includes the tangible and intangible benefits for a society.

The Open Data value-chain is undoubtedly a win-win project for every government, at national or local level. In this respect, the Municipality of Palermo is becoming aware of the value of open data as an important asset held by sectors across the internal organization. Open Data, in fact, enable the Administration in supporting new services and emerging innovative businesses in order to enhance a sustainable economic growth, through improved policy decisions and lower cost of service delivery.

Nevertheless, it cannot be just put data on the web and then the positive impacts will materialize immediately. Quite the opposite, Open Data implies much more than simply web sites providing some data and it has not being designed for sprinters, but as a long-term target. To fully recognize the benefits of Open Data it must be shared in ways that are easily discoverable, useable, or understandable by the public. At the same time, it will need to continuously engage with the broad stakeholders ecosystem that are the only ones able to make the expected benefits reality.

More specifically, it may argued that Open data requires a new way to think about data and how it is used in order to demonstrate the value of open data and build open data capabilities to support this improvement.

In order to develop a culture that supports the release of government held data and encourages commitment to open data principles, the Open Data Guidelines includes the development of policies and tools to assist municipal Sectors to provide useable and valuable data to the community, whilst upholding the highest standards in privacy, security and integrity in respect to the data hold. Opportunities are provided for Local Government, University, the community and entrepreneurs to collaborate, participate and build on shared knowledge and connections to improve open data outcomes across the territory of Palermo.

It should be highlighted that an Open Data strategy has been lacking for the Municipality of Palermo so far. However, thanks to the new municipal Administration, elected in May 2012, Palermo has shown its willingness to pursue the Open Data implementation as a tool required to extend the spread of control to make accountable decision makers in a e-democracy approach and thus improve the quality of the public administration in general.

This section describes the Open Data guidelines that the Municipality of Palermo will implement over time in order to take advance of the potential of an Open Data policy in terms of transparency and quality of the public administration and to exploit the possible economic development that Open Data bodes.

Open Data is a long term objective. In order to be successful, it must be shared with all the local stakeholders and, most of all, it is essential to increase the awareness of the positive impact of Open Data as contributor to the socio-economic development of the territory.

In order to maximize the benefits of Open Data, not only must be largely available, freely usable and fully compliant with quality and usability standards. It is required to engage the overall ecosystem of public administrations, citizens, enterprises and associations in such a way that the continuously productive usage of Open Data will provide added value in the long period. The Open Data guidelines outlines the route that the Municipality of Palermo needs to pursue in order to reach such objective.

Taking into account that the Municipality of Palermo produces, harvests, and manages big quantity of data on a daily basis, Public Sector Information can be considered as a hidden asset which as far as it is not exploited in a productive way. As a matter of facts, PSI has a high economic value that should be disclosed and fostered as leverage for economic and social development, incentive for the knowledge economy, innovation and transparency. Given such premises, the definition and adoption of a specific strategy appears crucial for the production and the release of standard and

interoperable Open Data. Furthermore, it is also extremely important to nurture and stimulate the whole ecosystem, e.g. citizens, enterprises, organizations and associations, in order to increase the reuse of Open Data and to facilitate the development of new services and enterprises. However, several barriers still persist at this time, which prevent from the free availability of Open Data.

While the Italian legislation already embraces the "**Open by default**" principle, the Municipality of Palermo will practically move towards this goal in the medium-long term by pursuing a policy of valorization of Open Data availability in standard formats, providing interoperability and high quality.

According to the perceptions emerged from the questionnaire administered online, in fact, Open Data valorization is supported, among others, by the following summarized principles:

- → the data **belongs to the community**;
- → opening the data greatly enhances the administration **transparency**;
- → a better knowledge contributes to increase both the **civil participation** in the decision-making process and the citizens' **quality of life**;
- → access to the information encourages **collective creativity**
- → all previous points help in creating opportunities for **new business and jobs**;
- → data opening often follows a **flywheel process**: when administrations start providing valuable data and services, the community is inspired to put in place the principles and practices that turn the flywheel faster and faster until it gains momentum that is unstoppable in achieving organizational goals.

Nowadays, data complexity and quantity are increasing dramatically on a constant basis. Among the most relevant challenges are: the quality of data, the integration between different sources (even referenced in multiple languages) and its timeliness. The Municipality of Palermo believes that the key is the reengineering of the business processes and the Information System, to include Open Data production as an intermediate result of any complex workflow in the municipal organizational processes.

In the light of the above, in the following sections will be developed and analyzed in detail the Action Plan arising from the application of the Open Data policy's guidelines.

4.2.4 ACTION PLAN

The Municipality of Palermo has not yet developed a formal plan of action to implement a strategy of Open Data sustainable over time. However, based on certain key principles (data quality, timing, reusability, stakeholders engagement, indicators for monitoring) established by the guidelines, in this section it will be developed a suitable Action Plan (articulated in the strategic objectives, operational objectives, targets, actions for the short and long-term indicators) integrated with reference to interviews administered to policy makers and responsible managers, asking them about strategies, goals and challenges for implementing open data policy, and by referring, furthermore, to the best practices developed in this field within the European project Homer[243].

The guidelines themselves provide that an Action Plan for Open Data adoption, together with technical guidelines, will be issued by the above mentioned working group composed of higher responsible managers in this field (Open Data Team). The guidelines provide also a timeline of 6 months for the Action plan to be released. The technical guideline must identify the technical and legal instruments that will be used in order to set the data fully open and interoperable in the municipal territory.

The Action Plan for the Municipality of Palermo's Open Data policy should be composed by a set of principles of guidance of PSI publication and objective to pursue in order to develop the PSI market. The overall goal is to allow the complete interoperability of the PSI and the development of new services and applications in accordance with:

1. PSI EU directive 2003/98/CE;
2. Italian law D.lgs. n. 36/ 2006 that adopt the EU directive;
3. Italian Code for the Digital Administration (D.Lgs. 7 March 2005, n. 82);
4. Italian Law n.18 October 2012, n. 179, that set the "open by default" principle: data and documents are to intends as open;
5. Italian digital Agenda and the Italian Digital Agency guidelines that set the technical principle and the "best practice" reference
6. Guidelines for the Municipality of Palermo

The above legislation and guidelines lead to the principles stated in the Municipal Open Data guidelines. PSI publication must be:

1. available for automatic processing with open standards;
2. provided with Open licenses;

[243] Harmonising Open data in the Mediterranean.

3. free of charge or granted at marginal cost, or otherwise in accordance with the Italian Administration Code;

4. metadatable;

5. high quality; data quality at a minimum level or above must be granted, also granted is data completeness and originality. Data will be updated with a specific frequency indicated as a metadata;

6. disaggregated unless differently disposal in accordance with privacy law;

7. in open standards in order to allow for maximum reuse; proprietary standard should be avoid.

Further of that, more specifically, the strategic goals can be defined as follows:

Goal Header: Open government data to promote efficiency, effectiveness, and economic growth.

Goal Statement: Unlock the value of government data as a municipal asset by adopting a management approach that inventories and prioritizes the opening of departmental information resources through user engagement and entrepreneurs.

Making public information resources easy to find, accessible, and useable not only promotes transparency and accountability, but improves government efficiency and effectiveness and fuels entrepreneurship and innovation, contributing to job creation and economic growth. (the goal will be further refined to include a measurable and time-bound goal statement and with specific metrics developed with the municipal budget).

Brief Goal Description: Openness in government strengthens our democracy, promotes the delivery of efficient and effective services to the public, and contributes to economic growth. Open government data have taken many forms. Making information resources easy to find, accessible, and useable can fuel innovative solutions to our toughest problems, catalyze job growth, and enable socially beneficial research and services.

The impact of open government data can be felt in the daily lives of the citizen.

For example, beginning to make the Global Positioning System (GPS) freely available to the public, this decision has fueled a vast array of private sector innovations. Similarly, beginning to make weather data available for free public electronic download. Entrepreneurs used the data to create weather newscasts, websites, mobile applications, insurance products, and more, generating new revenue.

In summary, it can be drawn the following table summarizing the key points of the strategic goals of the open data policy:

STRATEGIC GOALS	
1	Enhance opportunities for transparency, improved services, participation of citizens in Government´s decision-making and competitiveness in order to stimulate economic growth through the embracement Open Data solutions.
2	Ensure the Open Data strategy's sustainability, ensuring a balance or match between the supply and demand for applications and services.
3	Develop and maintain strong and effective partnerships across central and local government, ensuring that developed Open Data solutions and standards are re-used as widely as possible.
4	Enhance information technology and systems engineering services to allow for information exchange, taking into account organizational factors to guarantee the system performance.
5	Afford opportunities and tools for awareness raising regarding Open Data. To strengthen the knowledge of the social and economic value of PSI for private sector and citizens.

Table 7

-STRATEGIC OBJECTIVES

Strategic objectives are long-term organizational goals that help to convert a mission statement from a broad vision into more specific plans and projects. They set the major benchmarks for success and are designed to be measurable, specific and realistic translations of the mission statement that can be used by management to guide decision-making.

Strategic objectives are usually developed as a part of a two- to four-year plan that identifies key strengths and weaknesses and sets out the specific expectations that will allow the company or organization to achieve its more broad-based mission or vision statement.

The following objectives should be pursued for achieving the aforementioned strategic goals through specific measures to overcome technical obstacles; governance and management obstacles; legal and policy obstacles; economic obstacles, as well as explicit measures to enhance added value from PSI re-use:

→ Enhance transparency

Data openness is a key component of any transparency public policy. In the current information-demanding society, governments and public administrations have the responsibility of putting data at citizens' disposal in order to improve trust and accountability.

→ Increase economic wealth

Opening data generates economic value and wealth to society. Businesses and private citizens are able to use the data to enrich and generate new applications and services. To facilitate this, the

Municipality of Palermo promotes the publication of data in open, accessible, standard and reusable formats.

→ **Better quality and efficiency of public data**

The opening of data is a catalyst for radical improvement of public data management systems and processes. In many cases the authorities do not directly face the problem of good information classification and organization due to not having to report information systematically. The Open Government Data movement requires a better organization of inner data management, given rise to more efficient and better-organized systems.

→ **Improve interoperability**

Thanks to the generalization of open data initiatives **interoperability is also a question that is getting momentum** given the need of unification for the formats and means used by administrations when they offer information to the general public. Open Data users of any kind have great interest in analyzing and relating datasets from different archives. However, it is often difficult to compare data between different initiatives. There may be additional difficulties related to multilingualism (cross-lingual search, access and re-use of metadata and data). Nowadays, there is sufficient know-how and uptake of technically interoperable solutions (e.g. architecture, metadata, data formats, etc.) to enable interoperability between public administrations or third parties.

This harmonization task is being led by some international bodies such as the Open Government Partnership[244]; the Global Open Data Initiative[245]; the Open Data Charter[246]; the Partnership for Open Data[247]; or the World Wide Web Consortium (W3C)[248].

→ **Promote dissemination**

Additional dissemination services are necessary in order to reach a wide variety of stakeholders and let them get the most of data accordingly to their needs and skills. To that end, the Municipality of Palermo should distinguish between technical users, that frequently look just for direct access to raw data and additional tools for data mining, and any others with no technical skills, where value-added services are provided to help them access data more intuitively. Open Data applications, built on the municipal datasets by the stakeholders, should be also showcased in order to promote and encourage further reuse.

[244] http://www.opengovpartnership.org/country/italy
[245] http://globalopendatainitiative.org/
[246] https://www.gov.uk/government/publications/open-data-charter
[247] http://theodi.org/odp4d
[248] http://www.w3.org/

→ **Intensify participation**

Participation has also been considered a key component since the very beginning of Municipality of Palermo Open Data policy.

The awareness of Open Data policies and their potential benefits is still very limited. A smooth transition is needed for government from political will to open up data, to arranging it legally, technically and organizationally, as well as covering the costs involved. It is very important that the Open data vision percolate down from the political level to the Public Administration organization.

Another transition is needed also for re-users from gaining access to data, to interpreting and understanding the data, to finding ways to re-use the data and establishing organizational structure and business models for re-use.

The initiative has been designed to encourage participation through different collaborative spaces where anybody could help to shape future data publication priorities accordingly to those data sets that draw public interest and thus provide higher potential reuse:

→ Public data has significant potential for re-use in new products and services;

→ Addressing societal challenges, having more data openly available, will help municipal Administration to discover new and innovative solutions to improve public service effectiveness;

→ Achieving efficiency gains through sharing data inside and between public administrations;

→ Fostering participation of citizens in political and social life and increasing transparency of government (European Commission, 2011).

-STRATEGIC ACTIONS

→ **Access to data**

A first-priority action is to identify core reference data and achieve their open release. The quantity of data sets published by the Municipality of Palermo' s open data section in the institutional website is relatively limited as compared to those potentially available for publication. Some of this **hidden data** is continuously becoming freely available but too much of it remains locked up. A long-term evolution of this approach would be an Open Data by default global policy. As for the short term, it is essential to make data available in open standard formats.

When Open Data is being released, it should be done without bureaucratic or administrative barriers, such as registration requirements, which can deter people from accessing the data. Clearance of legal issues must be guaranteed, including licensing or privacy questions, as well as intellectual property rights; copyrights and database rights.

→ **Data quality and measurements**

Open Data should be provided with a reasonable high and controlled level of quality. Moreover, documentation should be provided for any publicly available item, from the datasets to the software produces (APIs, apps, etc.). Ensuring quality and documentation is then the first sub-objective. Strictly related to such objective is the need for quantifying both the quality of the data and services and their impact on the community. Another objective is then the design, deployment and usage of metrics to evaluate the Open Data quality and impact.

→ **Harmonization and Interoperability:**

-*Developing an Integrated Approach for collecting Administrative Data* in order to unify methods for collecting data and creation of data sets overcoming drawbacks regarding many different formats.

-*Improvement of Internal Government Data Sharing* in order to allow better communication between municipal administrative departments. As it is mentioned main obstacle is low informatics level of knowledge in municipal administration, huge amount of data stored in different incompatible electronic formats, and even more data stored on papers. Electronics data formats are mostly non adequate for online presentation, searching and reuse. Overcoming all of these drawbacks will improve Data Sharing.

-*To adopt systems, tools and processes* which ensure that data is released in an open, interoperable, reliable, trusted, efficient, cost effective manner and always in compliance with EU and national legislation whilst minimizing the financial burden on the municipal budget.

→ **Engagement**

Participate in the definition of common high priority thematic datasets to be released by Public Administration in accordance with the Italian Digital Agenda Agency. In order to identify data to be published a process must be defined aimed to:

- → Identify the location of the data owned by the administration;
- → Identify the dataset;
- → Identify the dataset that can be valuable for the stakeholders.

In the definition of the core data, a publication priority will be defined in cooperation with external stakeholders. As an example, according to the feedbacks provided by the above mentioned administered survey (see section 5.1.4 DATA COLLECTION), a first list of data could be in the following table:

DESIRED DATASETS	SHARE OF CUSTOMER RATING
TRASPORTS	47,13%
GEODATA	43,68%
ENVIRONMENT	42,53%
TRASPARENT ADMINISTRATION	42,53%
CIVIL PROTECTION	40,23%
URBAN INFRASTRUCTURE	37,93%
SPORT AND LEISURE	37,93%
LANDSCAPE AND ARTISTIC HERITAGE	36,78%
URBAN PLANNING	35,63%
HEALTH	35,63%
CIVIC ENGAGEMENT	34,48%
ROAD TRAFFIC	34,48%
SAFETY	33,33%
MUNICIPAL BUILDINGS	32,18%
BUSINESS AND COMMERCE	28,74%
TAXES	28,74%
ANIMALS	27,59%
POLICY AND INSTITUTIONS	26,44%
MUNICIPAL COMPANIES AND SERVICES	25,29%
STATISTICS	25,29%
ECONOMY	24,14%

Table 8

-OPERATIONAL OBJECTIVES (TARGETS)

Operational objectives, also called planned objectives, are set out with strategic objectives and provide a means for management to break down a larger strategic goal into workable tasks:

1) "Access to data"

→ *Develop and maintain Data Inventory*

To effectively manage government-wide open data efforts, departments must have a clear and comprehensive understanding of what information resources exist.

All municipal departments are required to develop an internal Data Inventory that accounts for all datasets used in the department's information systems, to the extent practicable.

2) "**Data quality and measurements**"

→ *Assign roles and responsibilities to strengthen the culture of data management*

The Open Data Policy requirements establish a management approach that values information as an asset throughout its life cycle, designed to transform the collection and use of government data to better serve citizens. In addition to building or modernizing information resources to maximize interoperability and information accessibility, departments must maintain internal and external data inventories, enhance information safeguards, engage users for input, and clarify information management responsibilities.

Managing information as an asset will increase operational efficiencies, reduce costs, improve services, support mission needs, and increase public awareness of valuable government information. Departments should, when necessary, clarify the roles and responsibilities, in particular for promoting the effective and efficient design and operation of all major Information Resource Management processes within their department as well as clarifying roles and responsibilities for promoting efficient and effective data release practices. In addition to ensuring that data released to the public are open and designating a point of contact to assist in open data use, departments must communicate the strategic value of open data to internal stakeholders and the public as well as engage entrepreneurs and innovators across sectors to encourage the use of municipal data. Department's staff must also work with department's components to scale best practices from offices which excel in open data practices across the municipal organization.

Measuring successful implementation requires both quantitative and qualitative information due to varying stages of information management maturity across departments and the evolving nature of successful citizen engagement. The milestones and metrics, to be developed, reflect a cultural shift

in data management that institutionalizes processes and systems to regularly inventory, open, improve, and derive value from government data.

The Municipality of Palermo should continue to work with experts across the government, private sector, academia, and civil society to develop and iterate metrics for open data impact measurement based on iterative learning and experimentation.

3) Harmonization and Interoperability

→ *Make data discoverable to the public*

To educate the public on what data assets are available and open, the Open Data Policy requires departments to improve the discoverability and usability of data assets and publicly communicate open data progress. All departments must publish a list of all datasets that are or could be made available to the public. This list should be a subset of the municipal's Data Inventory at institutional website.

→ *Prevent inappropriate disclosure of sensitive information*

The Open Data Policy requires departments to strengthen measures to ensure that privacy and confidentiality are fully protected and that data are properly secured. In particular, departments must develop policies and processes that allow only the appropriate data to be made available publicly ensuring that each department conducts a complete analysis of issues related to privacy, confidentiality, security, trade secrets, contractual agreements, and any other issues that could preclude public disclosure of information collected or created.

4) "Engagement"

→ *Prioritize and release valuable data through public engagement*

Opening government data can unlock great value in datasets. Identifying and engaging with key data consumers to help determine the value of the multitude of municipal datasets can help departments prioritize those of highest value for quickest release, where appropriate. All municipal departments will be required to solicit public input and reflect on how to incorporate consumer feedback into their data management practices.

Departments may develop criteria at their discretion for prioritizing the opening of data assets, accounting for a range of factors, such as the quantity and substance of user demand, internal management priorities, and municipal mission relevance. As consumer feedback mechanisms and internal prioritization criteria will likely evolve over time and vary across departments. Departments

should share successful innovations in incorporating consumer feedback through interdepartmental working groups and Project Open Data to disseminate best practices.

In summary, it can be drawn the following **Table 9** summarizing the above key points.

Main targets include an expectation to increase the quality, quantity and re-use of the data that is being released, as well as the necessary measurements to advance towards an open by default general policy. This may require a series of more detailed targets as following:

Strategic GOALS	**Strategic Objectives**	**Targets**	**Actions**	**Monitoring Indicators** (per year)
1	Define the basic principles and organization for the starting of the open data process to enhance transparency, improved services, participation of citizens, competiveness in order to stimulate economic growth.	1) **Access to data**	1a) Develop and adopt a common set of principles (technical and legal guidelines) accepted by local stakeholders to facilitate their search and allow maximum reuse.	1a) Milestones established by the Open Data's guidelines 1a) **Number of datasets** (exposed) 1a) **Number of datasets** (released) 1a)**Update frequency** 1a) Number of dataset views 1a) **Number of Open Data downloads.** 1a) **Number of users' requests per dataset**. 1a) **Number of feedbacks per datasets' request**.

			1b) Create new public services and tools with which citizens can improve their quality of live by developing open data applications.	1b) **Number of re-use cases** (apps, analysis, services). 1b) Number of businesses, students, hackers, startups who have reused Open Data. 1b) **Downloads of applications and other projects reusing the data.** 1b) Number of startup and private companies exploiting open data commercial value (PSI) and using OD for their commercial products and services. 1b)% Increased local GDP based on open data business. 1b) Number of users' datasets hosted in Open Data section. 1b) Pre-commercial procurement tool launched per year

2	Definition of publication process and identification of datasets to be published in the Open Data portal with related services.	2) **Data quality and measurement provided by** adopting a standardized Open Data generation process.	2a)Define an Open Data Working Group of functionaries of all the departments in order to engage in the OD strategy 2b) Choose the staff appointed to identifying, reviewing, and prioritizing publishable state data for publication 2c)To assume systems, tools and processes which guarantee that data is released in an open, interoperable, reliable, trusted, efficient, cost effective manner, Data Quality Control (QC), aimed at estimating the Open Data policy's impact.	2a) Team Open Data 2b) Number employees in charge of managing of content. 2b) Number employees in charge of updating data. 2b) Training calendar for about OD portal and ICT as well as personal data protection law. 2b)Number employees trained on open data. 2c) Set of indicators that control the Open Data quality. 2c) Set of indicators for a better understanding of the impacts of Open Data. 2c) Annual Open Data impact report

			2d) Conduct a preliminary comprehensive inventory of all existing data. 2e)Identify and make available more core high-value datasets by getting feedback on the potential interest of data. 2f)Develop and maintain strong and effective partnerships ensuring that developed Open Data solutions and standards are re-used as widely as possible.	2d)Data Inventory 2e)**Number of higher-value datasets** published as Open Data. 2f) Number of stakeholders[249]. 2f) Number of partnerships and networks. 2f) Number of meetings (e.g. Open Data day, Spaghetti Open Data, Transparency day).

[249] e.g., https://www.facebook.com/groups/opendatasicilia/?fref=ts

3	Improvement of efficiency through sharing data inside and between public administrations to achieve greater impact	**3)Harmonization and Interoperability**	3a) Process re-engineering to develop an internal integrated procedure (interoperability) for collecting administrative Data, creating datasets and Open Data publications. as the result of an integrated business process.	3a) Number of procedures identifying, reviewing, and prioritizing publishable state data for publication. 3a)Number of data sets checked for compatibility between departments. 3a) Interoperability guidelines in accordance with national and European standards. 3a)Training calendar regarding interoperability specifications. 3a) Open services and integrated interoperable platforms (cloud) designed through a smart use of databases (OD). 3a) Reduction of PA administrative costs, timing of procedures. and activation of reorganization processes.

			3b) Serve as a federation point for other local initiatives ensuring increment of data in existing number of Open Data available through a federation approach. .	3b) Number of local agreement (e.g. Patto di Ventimiglia)[250] 3b) Number of portals to be federated (e.g. IT platform shared with the University of Study of Palermo). 3b)Number of Linked Open Data released and used in interoperability mode.

[250] http://www.comune.palermo.it/noticext.php?id=4666#.VJAP5SuG_-s

4	Increase the awareness of Open Data policies and their potential benefits at all levels promoting better practices and broader dialogue and networking to strength the engagement between governments and civil society through sharing knowledge and training.	**4)Engagement**	4a)Engagement	4a)Number of workshops[251], conferences and communication campaigns to promote Municipal OD portal and the social and economic value that PSI can reach. 4a) Number of projects, useful ideas where open data reuse has been successful and have had profits (benchmarking). **4a)Number of Living Labs: (**Citadel on the move, Startup weekend, H**ackatons, Contests** ApPalermo **and call for tenders).**
			4b)Education	4b) Guidelines for data users. 4b) Number of training course on the usage of datasets. 4b) Number of users trained on open data (e.g. School of Open coesione).

[251] e.g., http://www.comune.palermo.it/noticext.php?cat=1&id=4617#.VJApriuG_-s

In light of the above table 9 it is possible to summarize the operational objectives in the following main short and long-term actions:

Short term Action	Long term Action
Access to Data -Develop the Open Data indicators specifications. → Data gathering and analysis for the previously established monitoring indicators. → Collection of use cases and best practices to measure impact of Open Data policies. → Analysis and conclusions extracted from external actors feedback. → Participation in the definition of common indicators according to the Italian digital agenda. -Definition of a series of guidelines to support data users and providers: → Data modelling. → Best practices for data publication. → Management of the data catalogue. → Techniques and tools for data reuse. o Make available a toolkit of resources for data re-users.	→ Progressive improvement towards the most appropriate formats following the five-star scale defined by Tim Berners -Lee. → Progressive data semantization and global enrichment with external references (Linked Data)[252]. → Convert the municipal catalog into a single point of access to all data related to the municipality, no matter what the original source could be (as outlined in the feedbacks from the survey administered)
Data quality and usage indicators -Design and adopt a Data Quality Control (QC) process. → Analyze and improve current data management processes. → Gather feedback on current data quality from data re-users. → Enable crowdsourcing tools to improve data quality collectively.	

[252] In computing, **linked data** (often capitalized as Linked Data) describes a method of publishing structured data so that it can be interlinked and become more useful through semantic queries, in http://en.wikipedia.org/wiki/Linked_data .

Organize dissemination and awareness events. → Conduct training in a range of different formats to fit different needs: seminars, workshops, conferences etc. → Promote apps contests (aka hackathons, hackfests or datafests) for the generation of innovative ideas that might turn into useful applications and services. → Conduct public consultations on the type of data to be released, as well as about other aspects such as formats, apps, etc. → Conduct informal workshop sessions aimed at smaller groups in which similar profiles are put together in order to share experiences and identify common problems to address the usual concerns that arise in these initiatives. → Organize frequent round table sessions for social participation and networking where both, citizenship and companies, will be able to share experiences with the Administration, without any hierarchical differences. → Preparation of internal awareness days to facilitate the involvement of the different areas. → Specific training sessions aimed at reducing resistance to change and analyze in detail the underlying reasons to find suitable solutions (change management). → Formal communication of the initiative throughout every area within the Municipality of Palermo. → Annual meeting with stakeholders (Institution, partners) to improve the approach.	→ Promote communities of interest, where a group of people with different motivations, knowledge and profiles is put together around a common interest in a specific topic.

Harmonization and Interoperability → Analyze local and national Open Data frameworks. → Develop harmonization and interoperability guidelines → Adopt common ontology and vocabulary in accordance with national and European interoperability and standards	
Engagement **Develop guidelines for data users.** → Definition of a series of guidelines to support data users and providers: o Data modelling. o Best practices for data publication. o Management of the data catalogue. o Techniques and tools for data reuse. → Make available a toolkit of resources for data re-users. **Education** Create different educational itineraries and materials to accommodate different roles (project manager, data scientist, developer, etc.) in cooperation with university and schools.	→ Build a thematic interactive online community making use of news feeds, blogs, and social → Setup of an online platform for e-learning. → Support specialized technical forums.

Table 10

4.2.5 MONITORING AND IMPLEMENTATION-EFFECTIVENESS EVALUATION

In an Open Data process, given the evolving nature of technology and demand, it would be extremely inaccurate and hardly useful to conceive a detailed long-term plan (five years); then, it is useful to refer to the iterative four-step management method used in business for the control and continuous improvement of processes and products as PDCA (Plan/Do/ Check/ Act). The short term action must be followed, reviewed and adjusted accordingly in the next 3 years after the first 2 (short term)[253].

[253] http://www.qualitapa.gov.it/fileadmin/mirror/t-autoval/Linee_autov_miglioramento.pdf

Basic indicators are therefore necessary to get an estimation of achievements and track data usage to evaluate the evolution and results of the Open Data initiative. A series of quantitative and qualitative indicators are proposed to enable the evaluation of the open data policy and monitor activities. In order to be effective, such indicators should be recorded with an appropriate periodicity and allow comparison with the historic records. Ideally indicators should also be made public and not only reserved for internal use.

In the Municipality of Palermo, the role of monitoring the correct implementation of the OD action plan is assigned to an intersectoral working group ('Team open data'). The Municipality of Palermo will carry on the actions described in its guidelines, giving the highest priority to those that have the greatest impacts on other, selecting the datasets to be released according to the MoSCoW method[254].

In the following table 11 realized by the drafters of the municipal guidelines, are summarized the objectives achieved so far in comparison with to the targets set in the guidelines themselves:

OBJECTIVES	TIME SCHEDULED	ACHIEVED	ACHIEVED IN TIME
Creating Team Open Data The Open Data team is the group that promotes the use and dissemination of Open Data. It consists of the Managers of Area, or their delegates.	January 2014	YES	NO
Appointment of Responsible Open Data (Data Manager) The Open Data Manager sets strategy for opening data collected and analyzed and the dissemination of data.	January 2014	YES	NO
Appointment of Head of Service Owner of the database The Owner of the database coordinates the activities on Open Data for its Department; receives the community's instances on publishing data.	January 2014	YES	NO
Appointment of a Technical Referent of the database and a Content Referent of the database appointed by Head of Service Both figures assist the Head of Service in the dissemination of the culture of Open Data.	February 2014	YES	NO
Enabling of account in the Open Data website section to holders of databases and referrals technical and thematic Accounts allow holders of databases and the technical and thematic referrals to publish independently file of public data in open format.	February 2014	NO	NO

[254] http://en.m.wikipedia.org/wiki/MoSCoW_Method

Census data collections (dataset) created by the municipal structures according to the specific skills and activities	March 2014	NO	NO
Analysis of the collected data (dataset) and prioritization of publication The Open Data team meets to analyze the tabs of the census collected and classify the dataset.	April 2014	NO	NO
Cleaning up and creation of the dataset with the highest priority for publication in Open Data	May 2014	NO	NO
Publication of databases with the highest priority (Must) with a format of at least 3 stars The stars indicate a quality model in the cataloging of data (1 to 5). The format 3 stars gives the possibility to perform processing on data without being forced to use proprietary software.	May 2014	NO	NO
Biannual meetings of the open data's Team for the monitoring of open data policy of the City The semi-annual monitoring report must be emailed by the Head open data to the mayor and the aldermen and published on the web portal.	June and December evey year	NO	NO
Creating a specialized search engine for the Open Data section In this way, users can perform targeted searches on the data you want to know or use.	June2014	NO	NO
Creating active links on the keywords used to classify the dataset	July 2014	NO	NO
Creating a web page with examples of reuse	October 2014	NO	NO
Creating a web page that collects applications developed from data published by the City	December2014	NO	NO
Creating the conditions required so that the dataset can be published in a format of 4 and 5 stars The formats of 4 and 5 stars representing the highest degree of usability of the data. Allow you to point to the data or to a set of data from one application or access it in a program that can then process it in different ways (4 stars) and dynamically link together multiple datasets (5 stars).	December2014	NO	NO

Source adapted from: http://opendatasicilia.it/2014/12/17/opendata-al-comune-palermo-il-punto-un-anno-dalle-linee-guida/

The above table shows that only part of the guidelines' objectives was achieved and never on time. In any case, especially in the medium and long term, the Municipality of Palermo should work in order to guarantee compatibility and integration of all the actions of its developing Action Plan, both in accordance with the Three-Year Plan of Transparency and integrity, and with future initiatives and projects related, for example, to Thematic Objectives 2 (Digital Agenda), 3 (SME competitiveness) and 11 (Administrative Transparency) of the European Cohesion Policies 2014-2020.

But an action plan strategy, alone, is not enough. Its implementation should also be monitored through indicators in order to measure the effectiveness reached with actions carried out. Some quantitative and qualitative indicators must be thus defined to measure the OD strategy results.

The following indicators should be registered every four months (according to the municipal performance planning) in order to be able to have a monitoring control across the time.

The indicators for monitoring municipal policy on Open Data described in the guidelines are the following:

- → number of datasets published each semester by each municipal department;
- → update rate of the dataset published by each municipal department, every six months;
- → frequency of publication of datasets by topic;
- → number of downloads per Open Data published; percentage of downloads per datasets, by topic (e.g..: mobility - culture), in six months;
- → datasets most required by citizens/business (not yet published in the web portal); percentages for subject, in six months;
- → number of datasets published following a request from the citizens/businesses (feedbacks); timing of publication from the date of request;
- → number of applications generated by developers arising from a released dataset, in the period of a semester;
- → six-month report on the main critical issues arising in the Open Data process, published in the open data portal to assess the municipal transparency;

In addition, in the Homer's study, it is proposed that the indicators are revised in the first year after the strategy implementation and that specific targets are set using collaborative processes. Ideally indicators, in fact, should also be made public and not only reserved for internal use.

At the same time, these indicators can be exposed according its issues in order to check the progress government initiatives and public open participation. Also these quantitative indicators will be useful in order to review the need to strengthen dissemination strategies.

Until there are not enough information to set a baseline with measurable targets, the positive trend of increased number of opened datasets and number of downloads per year will continue to be regarded as the main aim. At the moment, the following **Table 12** summarizes the indicators relating to the activities of short-term (two years) and some of these indicators will be used in the case study to measure the effects of the process of open data government on the public value improvement.

MONITORING	INDICATORS
Total Number of datasets opened per year	**Dataset indicators** Dataset identified per topic; dataset published per topic; dataset identified/published ratio; dataset with open licenses; dataset with structured reusable formats; Digital information available/reusable dataset formats; dataset with non-proprietary formats; free datasets; time since last dataset publication (days); time since last dataset update (days).
Number of known business cases & start-ups reusing Open Data	**Community indicators** per topic; % visits; dataset downloads; %app available; %dataset request; %fulfilled request; request/attended request; comments.
Statistic about Open Data site usage	Total number of visits and page views, new visitants, top visited pages, average visit time, frequent search terms, visitants origin, landing pages, exit points, etc.); main tendencies (top ten datasets, formats, topics, apps, etc.); Social Network activity (followers, visits, interactions, etc.).
Indicators related to social and economic dynamics	Open Data value: % per five stars value model Number of applications developed to re---use the data; apps downloads Share of applications and other projects reusing the data developed by players.
Indicators related to the trust on open innovation	Evaluation of general impact of the municipal OPENDATA approach on public value.
Funding of action plan with EU calls for proposals (e.g. HORIZON2020, Territorial Cooperation)	Number of EU proposals submitted; Number of EU funded proposals.

Table 12

More in detail, the above indicators can be grouped according to the following typologies:

→ **Data indicators**

With this series of quantitative indicators, we will be measuring the degree of internal municipal progress and participation in the Open Data initiative. These indicators will serve to identify advanced areas with respect to data releasing, as well as those that are delayed in order to assess overall progress of the initiative.

Topic	*# of datasets identified*	*# of datasets published*	*identified/published ratio (percentage)*	*# of datasets with open license*	*# of datasets with structured reusable formats*	*# of datasets with non-proprietary formats*	*# of free datasets*	*Time since last dataset publication (days)*	*Time since last dataset update (days)*
Geoportal data			%					d	d
Public Administration budget			%					d	d
Environment and Energy data			%					d	d
Transportation data			%					d	d
Epidemiology data			%					d	d
Education			%					d	d
Global Development			%					d	d
Accountability and Democracy			%					d	d
Health			%					d	d
Science and Research			%					d	d
Statistics			%					d	d
Social affairs and welfare			%					d	d
Transport and Infrastructure			%					d	d
Total/Average			*%*					*d*	*d*

Figure 39
Source: Corsica's Open Data Action Plan 2014-20120 (Homer) [255]

[255] http://homerproject.eu/images/Docs_/Publications/OD_PLANS/2014_06_26_Action_Plan_Sardegna.pdf

→ **Community indicators**

Through these indicators, we will be measuring the level of dynamism and engagement of the system, whose existence and participation will be key for a successful Open Data initiative. These quantitative indicators will be useful in order to assess the need to strengthen dissemination strategies.

Topic	*# of dataset requests*	*# of fulfilled requests*	*# of N/A requests*	*Requested/attended ratio (percentage)*	*# of comments*	*# of dataset visits*	*# of datasets downloads*	*# of apps available*	*Average time to answer (days)*
Business				%					d
Crime and Justice				%					d
Earth Observation				%					d
Education				%					d
Energy and Environment				%					d
Finance and contracts				%					d
Geospatial				%					d
Global Development				%					d
Accountability and Democracy				%					d
Health				%					d
Science and Research				%					d
Statistics				%					d
Social affairs and welfare				%					d
Transport and Infrastructure				%					d
Total/Average				*%*					*d*

Figure 40
Source: Corsica's Open Data Action Plan 2014-20120 (Homer) [256]

→ **Usage and tendencies**

The previous main indicators could be also supplemented with some additional statistics about Open Data site usage (total number of visits and page views, new visitants, top visited pages, average visit time, frequent search terms, visitants origin, landing pages, exit points, etc.); Social Network activity (followers, visits, interactions, etc.); and main tendencies (top ten datasets, formats, topics, apps, etc.).

[256] *Ibidem*

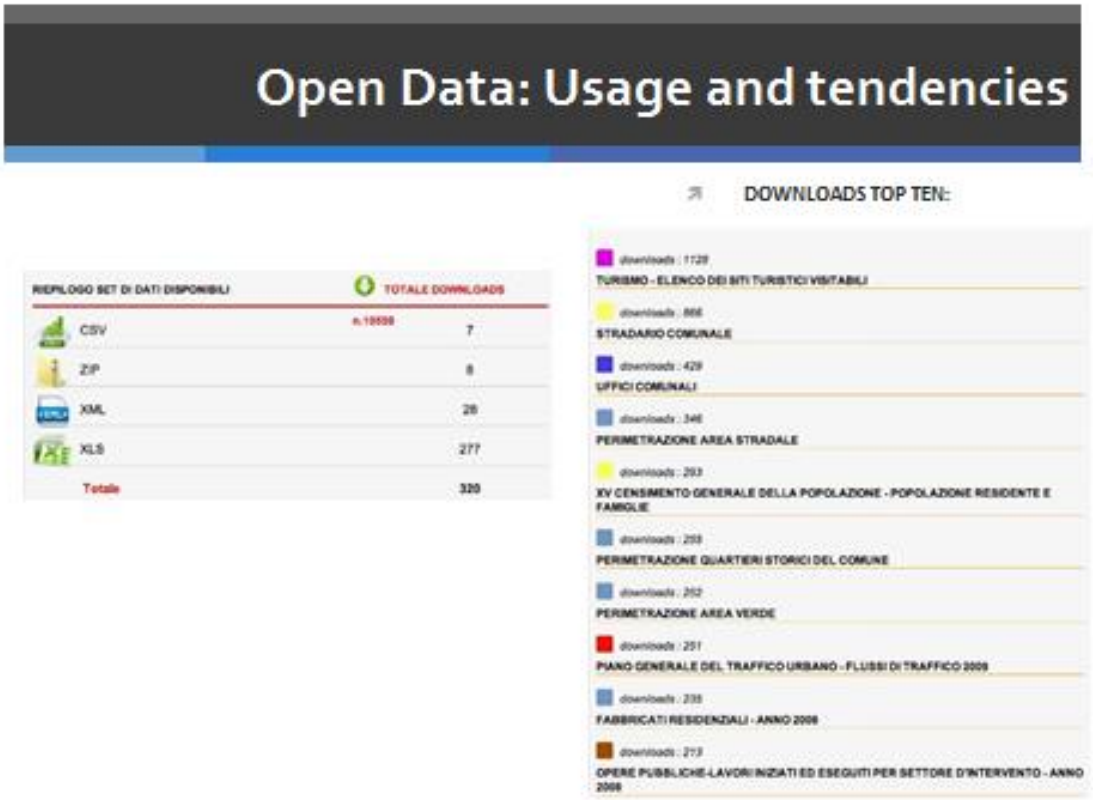


Figure 41
Source: First day of Transparency, Participation and Open Data, July 8, 2014

4.3 THE OPEN DATA STATUS FOR THE MUNICIPALITY OF PALERMO

Following the path traced by the national Digital Agenda, Local governments formally acknowledged Open Data as a strategic/political tool for openness and transparency of decision making and usage of public resources, and the usefulness of the data held by Public Administrations for all businesses interested in developing new products and services.

A direct consequence of such acknowledgments has been the awareness that innovation in the Public Sector cannot be limited anymore to exchange of data and services among administrations: it must be evaluated and oriented also according to the impact it has, also thanks to Open Data, on the economic development of the territories served.

In this regard, the beginning of the Open data policy in the Municipality of Palermo may be seen as a fundamental shift that has allowed to the communities to participate actively at creating public value through applications and services based on the usage of opened data.

In the light of the above, Open Data expectations are big ones, but it will take considerable work to make them a reality. As well as putting more better-quality datasets online, to unleash the real

potential of Open Government Data (OGD) special attention must be paid to the underlying ecosystem. That means considering the technical, legal, social, economic, organizational and political dimensions of Open Data publication and re-use as a whole. Efforts and investments should be made to empower administration and civil society to make better use of available municipal data, as well as to measure the impact of OGD initiatives helping decision makers make the right choices.

Based on the findings in the previous sections, it is possible to identify a set of **critical success factors** for the Municipality of Palermo's Open Data policy which are presented below:

→ **Open data as a means to an end**

The provision of open data is not a goal in itself, rather, the open data portal should be viewed by the data owners/producers as a means to improve their effectiveness and stimulate entrepreneurship and innovation so that good governance is achieved.

→ **Focus on the end user**

Special effort should be placed in the re-usability of published data: even though the general public might not be aware of the open data initiative as such, it is important to create and maintain awareness about the sources and types of information that are available to them.

→ **Engage the community**

Open data are provided, as mentioned above, as a means to an end, i.e. a way to solve problems with the utilization of information held by the public sector. In order to achieve this, the skills of independent developers are required. Simply put, municipal administration cannot meet all the needs that the citizens have, only by the provision of services developed and managed internally. There is a large scope to reach out and involve the community intelligence, with specific initiatives such as contests, challenges, and open innovation services as well as a general culture of openness[257].

→ **Seek feedback from the public**

In order to ensure impact, there should be a continuous effort to improve both the raw data quality and quantity of the data. Furthermore, the open data portal should be carefully designed and sustained over time. In this respect, public consultations should be organized, preferably via online tools, in order to request feedback about the portal interface, content and functionality. What is

[257]European Commission, Information Society and Media, Directorate-General, POPSIS, Pricing Of Public Sector Information Study, Open Data Portals (E), Final Report, October 2011.

more, the public should be consulted about the most needed data and emphasis should be placed on those.

→ **Secure political commitment**

Successful initiatives require top political commitment. OD needs time to deliver impact, and a critical mass of published high-value data are needed before any change is visible. Opening high-value data requires political strength and stable, sustained investment (although not necessarily high).

In order to achieve the above critical success factors, since February 2013, the Municipality of Palermo has published in the website's open data section more than 300 datasets, released in several open and proprietary formats (e.g. Microsoft Word or Excel), mostly under "CC_BY" licenses.

The following figures show the Open Datasets, broken down by format, published in the institutional website and to which categories belong the top ten datasets' downloads.

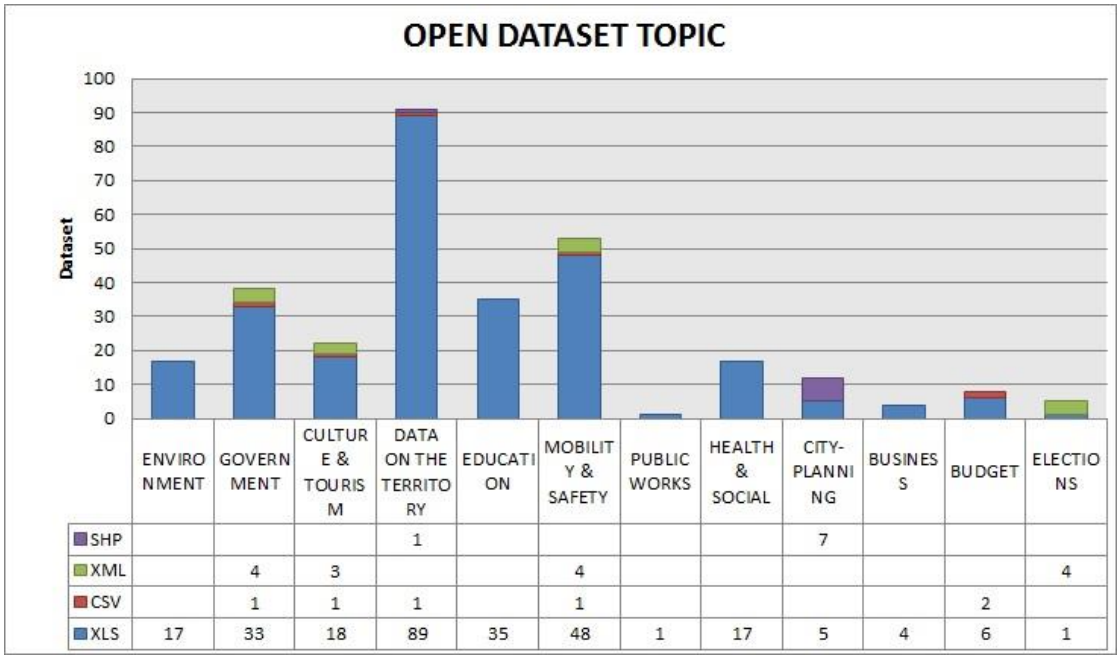


Figure 42
Source: http://www.comune.palermo.it/opendata.php

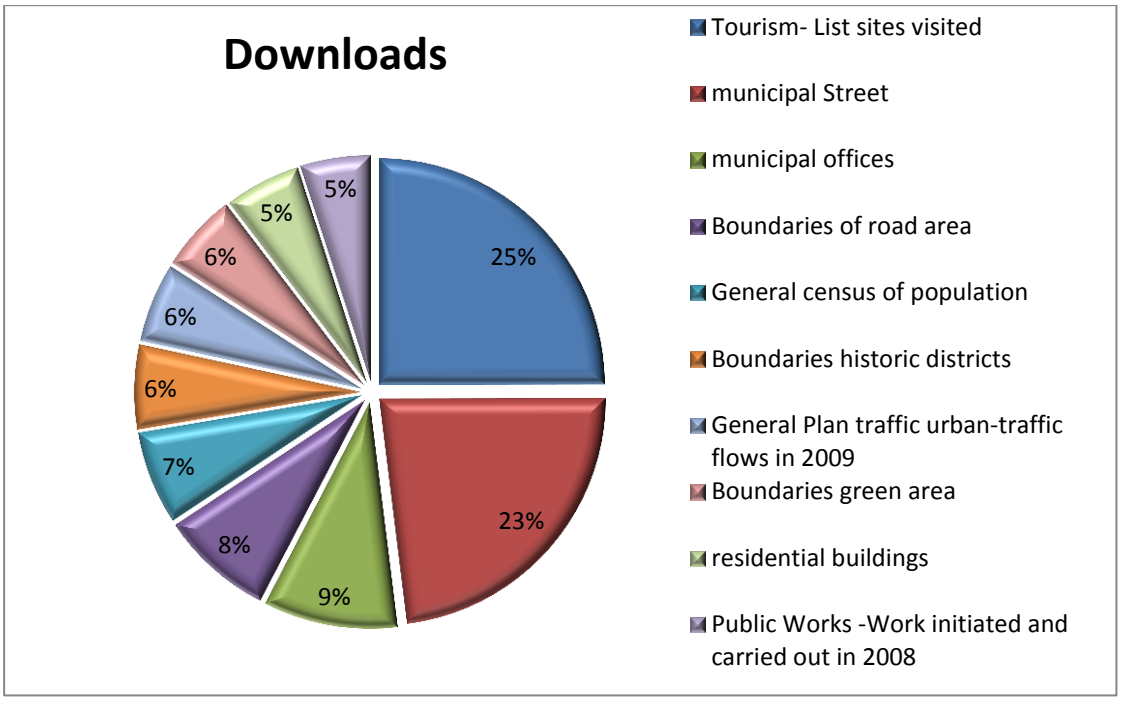


Figure 43
Source: http://www.comune.palermo.it/opendata.php

The dataset downloaded more often are related to the tourism, municipal street and mobility ones.
It seems evident, when looking at the results of the 2014 survey, that the download rates of the several datasets or the number of mobile apps and online services built with those data are not really meaningful indicators of the "*success*" of Open Data policy in the urban area. More than that, it seems necessary to understand which datasets would be more interesting for their potential users. Only with a correct understanding of such needs, in fact, the Public Administration will be able to implement the best actions and policies. It is, in fact, widely accepted that the "diffusion of Open Data methods and of a reuse-based approach to public data should be measured through the number of services of public utility provided by third parties and built with opened public data; percentage and quality of public databases available online as Open Data.

4.3.1 THE STAKEHOLDER COMMUNITY

In the light of the above, it needs to focus on the community of stakeholders, understood both as users, who download data and apps, and as engaged innovative citizens. In this respect, it should be remembered that the process of opening data was started as a bottom-up process.
The municipal Open Data policy, in fact, was enhanced through the initiative of the Living Lab Palermo which has played a key role in pushing the Administration in coordinating and releasing

public data and encouraging its re-use[258]. Living Lab Palermo is a member of the TTL Sicilia and therefore it is part of the European Network of Living Labs (ENoLL) which through the Living Lab approach has demonstrated its effectiveness in promoting the engagement of citizens and businesses in the co-design of innovative ICT services.

More in detail, the workshop #OpenData Day - Palermo opens the drawers, at the International Open Data Day 2013, on February 23, 2013, was the launch event for the Open Data Strategy for the City of Palermo, under the auspices and following the approach and operational co-creative Living Labs Palermo. The approach is based on the outcome of discussions held as part of the International Workshop of the Living Lab Palermo held in July 16, 2012 and the accession of the Municipality of Palermo as Associated with the EU project Smart Cities "Citadel on the Move." [259]

Under the umbrella of the Living Lab Palermo was set up a working group[260] open to examine how to start the process of publication of data sets and involve developers and citizens in the development of scenarios and applications that use this data, in a continuous two-way process that is the structure of the workshop itself. To start this process, the webmaster and the working group of the Municipality, together with the SISPI, the statistical office and Office for innovation, identified the first dataset that became available from the workshop day in a new section of the institutional website:

- Municipal offices with address, phone, etc..
- Demographic data aggregated by district
- Traffic flows in different parts of the city
- The Statistical Yearbook Panormus
- Tourist Attractions municipal
- Shape cartographic
- polling places

The **Open Data community arising from civil society** in the Municipality of Palermo**,** with very active groups that usually engage among each other's or with the administration by means of online channels or in different events, is articulated in the following main groups:

[258] It should however be noted that many crowdsourcing movements such as Wikipedia, Open Street Map, have spread the Open Data approach for several years, before the Administration finally acted.

[259] *Marsh Jesse, Il progetto Citadel, Atelier Studio Associato* International Open Data Day- "The Municipality of Palermo opens its drawers", February, 23, 2013

[260] The working group is the same that, in collaboration with the local administration, led to the adoption of the guidelines for the municipal Open Data policy.

- Google Developers Group (GDG) of Palermo: founded by Francesco Passantino in January of 2010 with the aim of give developers the opportunity to meet and learn (or teach) something new about the universe of information technology and communication in general and Google in particular. The group also participated in the organization of Palermo **Startup Weekend**, the Linux Meeting, 2013, four local editions of the GT study day. Francesco Passantino was invited as a representative of the GDG to some important local events, including the NetNetNet Workshop and Workshop "**Mobility Behaviors: apps**".

  From the foundation to the present have been organized 35 events to contextualize information and as guidance aimed at citizens, students and businesses. The first event saw the participation of 24 people, including developers, analysts, bloggers and entrepreneurs. Today the group has more than 400 members In the world there are GDG 441 (17 in Italy), distributed in 98 countries.

  The following are the main events organized to contextualize the released information or that should be released:

→ Are becoming more frequent activities and entrepreneurial projects that, by sharing space, resources and access to knowledge networks, contribute to the development and innovation of technologies useful to society. Innovative and useful applications for PC, smartphone and tablet may be the new means for the development of tourism, culture, the environment and mobility. Enhancing the public information assets, making it available to citizens and businesses, it can be a method to improve the services and life in the city, in an increasingly smart and sustainable. The purpose of the organized meeting was to present some best practices and promote the contest on Open Data organized by the Municipality of Palermo. (GDG Palermo, held February 10th, 2014, Via Generale Giuseppe Arimondi, 11 Palermo).

→ Workshop PUSH: During the Workshop "Mobility Behaviours: apps" (organized by the PUSH part of the project trafficO2, held November 22, 2013 at Palazzo Steri, Palermo), Francesco Passantino proposed intervention on "Google Maps Mobile ".

→ Workshop GDG Palermo “Information and Communication for the Smart Cities”, held October 28, 2011. The objective of the meeting was to analyze the evolution of communication and Information in the Digital City, evaluating the application of new technologies to the planning to make it more interactive, livable, efficient, attractive, safe, sustainable, comfortable, in a word "smart." Mobile Services, georeferenced maps, social networks and crowdsourcing are some of the issues that experts involved to discuss, describing cases study and research on the creation of a <real city> that, thanks to the network itself can be monitored, listened to, interpreted, managed and planned in real time.

→ Workshop GDG Palermo "Internet delle cose" held settembre 9, 2013.

→ Open Data Sicilia, an informal Web community whose aim is to share knowledge and support local authorities which are actively engaged in a process of opening public data.

4.3.2 THE RE-USE OF PUBLIC SECTOR INFORMATION BY PRIVATE INITIATIVES

Based on the answers to the administrated survey, this study contains information concerning the community' s requests for OD useful to the design and selection of the most appropriate model for the practical implementation of the Directive 2003/98/EC on the re-use of public sector information. In spite of the unfair environment with regards to the availability of public sector information, a few private initiatives have already been developed that provide services based on information published by public authority and / or provided by the active participation of citizens as sensors of service effectiveness[261]:

- http://socialstreetpalermo.it/up/#

Palermo cleaned: map of reports from citizens on urban decay, mainly waste. The data are collected with the help of anonymous citizens. On the map you can view all reports. Each week it will be sent a report to the relevant institutions and the "reclaimed" areas will be eliminated from the map.

- https://play.google.com/store/apps/details?id=net.peppepace.android.infotrafficopalermo&hl=it

Info Traffico Palermo.

- http://www.uriosweb.com/portfolio-item/city-sightseeing/

Through the APP you can know the details of the lines, the exact location and time of the stops. Information is also available on the rates, facilities and news in real time.

- https://itunes.apple.com/it/app/io-riciclo/id763511086?mt=8

I recycle: IoRiciclo allows quick access to the daily details of recycling. Daily you will be informed on the type of waste to be disposed. You can also view information and notices of your municipality and also receive a notification every time you create a new alert.

- http://www.palermobybus.it/

Palermo by bus. Useful to plan transfers and to know in real time the journey to own destination.

- https://sites.google.com/site/palermoapp/home

App and web services.

- https://www.google.it/maps/@38.1134444,13.3506796,14z/data=!5m1!1e1

State of the traffic in the main roads of Palermo - service provided by Google Traffic.

[261] e.g. https://sites.google.com/site/palermoapp/home

https://www.google.com/maps/search/Revisione+Auto+Palermo/@38.1405023,13.3572886,18646m/data=!3m2!1e3!4b1?hl=it

Map of Centres car review in Palermo (googlemap)

- https://sites.google.com/site/palermoapp/home/ambiente

Removing asbestos cement 2010-2013 map for districts

- https://www.google.it/maps/ms?msid=214537898842759636168.0004e9f6b81eb0b1dacae&msa=0&ll=38.164441,13.341479&spn=0.016213,0.033023&dg=feature

Serviced areas of the Parco della Favorita (googlemap)

- https://itunes.apple.com/ca/app/parco-della-favorita-palermo/id666322018?mt=8

Parco della Favorita - App for iOS navigation system built specifically to orient yourself inside the points of interest in the park.

- https://play.google.com/store/apps/details?id=com.casba.appalermo

App Palermo and Environment. Information, initiatives and environmental monitoring activities carried out on the territory of the Municipality of Palermo.

- https://play.google.com/store/apps/details?id=it.magramtia.android.ariapalermo

App AriaPalermo to assess air quality and to find the green areas in Palermo.

- http://www.attivitasociali.palermo.it/index.php?option=com_fabrik&view=visualization&controller=visualization.googlemap&Itemid=274

Map of social welfare services of the Municipality of Palermo.

- http://aborruso.github.io/rischio_centro_storico_palermo/

Map of buildings damaged and / or unsafe in the historic center of Palermo web service.

- https://www.google.it/maps/preview?q=ospedali+vicino+a+Palermo,+PA&hl=it&sll=38.136919,13.346415&sspn=0.042261,0.077162&oq=ospedali+palerm&t=h&hq=ospedali&hnear=Palermo,+Sicilia&z=13

Map of hospitals in Palermo.

- https://www.google.com/maps/search/farmacie+palermo/@38.1405023,13.3572886,12z/data=!3m1!4b1

Map of Pharmacies in Palermo.

- http://demos.citadelonthemove.eu/app-generator/index.php?uid=D8B46653-F8A0-28DE-ADDC-EB9E5913AA56

Map of public facilities (schools and hospitals) in which citizens vote, the number of polling stations for each structure and the way of public facility host sections.

- http://siciliahub.github.io/mizziCAP/

Map of stakeholders for the dissemination of open data in Sicily.

- http://www.palermo.renurban.com/

Reporting inefficiency and initiatives / proposals in Palermo: events, inefficiency, suggestions for improvements. (georeferenced map)

- http://www.epart.it/palermo/default.aspx

Map of reports of inefficiency. The portal will report to the Office of the Public Relations of the city.

- http://www.comune.palermo.it/geoblog.php

The geoportal of the Municipality of Palermo for the reporting of outages (landfills, sewers, street lighting, traffic lights, road signs, billboards terms).

- http://palermo.decorourbano.org/

Urban Decor is a website / app national. Feedback about the map of inefficiencies in the city.

- http://www.amat.pa.it/AmatPalermo/cercalineaev.html

Search bus lines of public transport AMAT (web application)

https://maps.google.it/maps/ms?msid=205554749000045357337.0004c2d5762325c7e6ec4&msa=0&dg=feature

Map of abandoned monuments of Palermo.

4.3.3 OPEN DATA CONTEST

The Municipality of Palermo on 15 February 2014 launched the Contest ApPalermo Open Data, with the final prize amounting to € 37,000, to allow the community to participate in the Open Data innovation by developing applications that, by improving access to municipal information, can increase the number and level of digital services offered to citizens and new business opportunities as well.

Figure 44
Source: First day of Transparency, Participation and Open Data, July 8, 2014

As you can see from the figure above, during the period the contest was carried on, from 14 February to 15 April 2014, there was a sharp increase in visits to the open data website. At the end of the contest, then, the number of visits has gradually come down to go back to the average levels.
On the occasion of the contest community required the releasing of specific dataset and better quality of data to allow hackers to develop applications of greater public value.
As can be observed from the following figure, in fact, during the 2014 were released only 18 new datasets of which 17 just in the period relating to the contest. All new datasets, moreover, were released with higher quality, precisely in xml, that in the scale of Tim Berners Lee has the value of 4 stars, as required by the community.
It follows the list of the apps which have been developed[262]:

PalerMobile
https://play.google.com/store/apps/details?id=net.iubris.palermobile&hl=it

Living Palermo
https://itunes.apple.com/MG/app/id852713008?mt=8&ign-mpt=uo%3D4

Appalermo Ambiente
https://play.google.com/store/apps/details?id=com.casba.appalermo&hl=it

[262] http://www.comune.palermo.it/noticext.php?cat=4&id=5151#.VJL0OSuG_-s

DoveSiVaStasera Palermo
https://play.google.com/store/apps/details?id=com.dovesivastasera

My palermo
http://mypalermo.it/

Palermo onTour
http://www.on-tour.it/
https://play.google.com/store/apps/details?id=org.wepush.ontour&hl=it

A Palermo
https://play.google.com/store/apps/details?id=com.pixweb.apalermo

Vivi Palermo
http://www.vivipalermo-app.it/

Bus Palermo
https://itunes.apple.com/it/app/bus-palermo/id813999349?mt=8

Palermo Tourism
https://play.google.com/store/apps/details?id=com.appandmap.palermotourism

Discover Palermo
https://itunes.apple.com/BE/app/id849310794?mt=8&ign-mpt=uo%3D4

Siti di interesse turistico visitabili- Palermo
http://sitvisitabilipalermo.weebly.com/

Aria Palermo
https://itunes.apple.com/it/app/aria-palermo/id863043632?mt=8

Easy Palermo
http://www.easypalermo.it/

Palermo By Night
http://www.androidpit.com/app/com.elis.palermonight

Parco della Favorita Palermo
https://itunes.apple.com/it/app/parco-della-favorita-palermo/id666322018?mt=8

PANav
https://play.google.com/store/apps/details?id=com.opengisitalia.panav&referrer=utm_source%3DAndroidPIT%26utm_medium%3DAndroidPIT%26utm_campaign%3DAndroidPIT

Delizie di Palermo
https://play.google.com/store/apps/details?id=com.tet.deliziedipalermo&hl=it

Pocket Palermo
https://play.google.com/store/apps/details?id=gabric.appalermo.turismo

The following **figure 45** shows the percentage of app developed for the main topics, the **figure 46** shows the trend of the apps' development over time, showing a sharp growth since February 2012, when it was started the process of opening data in the Municipality of Palermo. The **figure 47**

shows the apps' downloads, highlighting how the issues of greatest interest for the citizens are, one again, those relating to tourism and mobility.

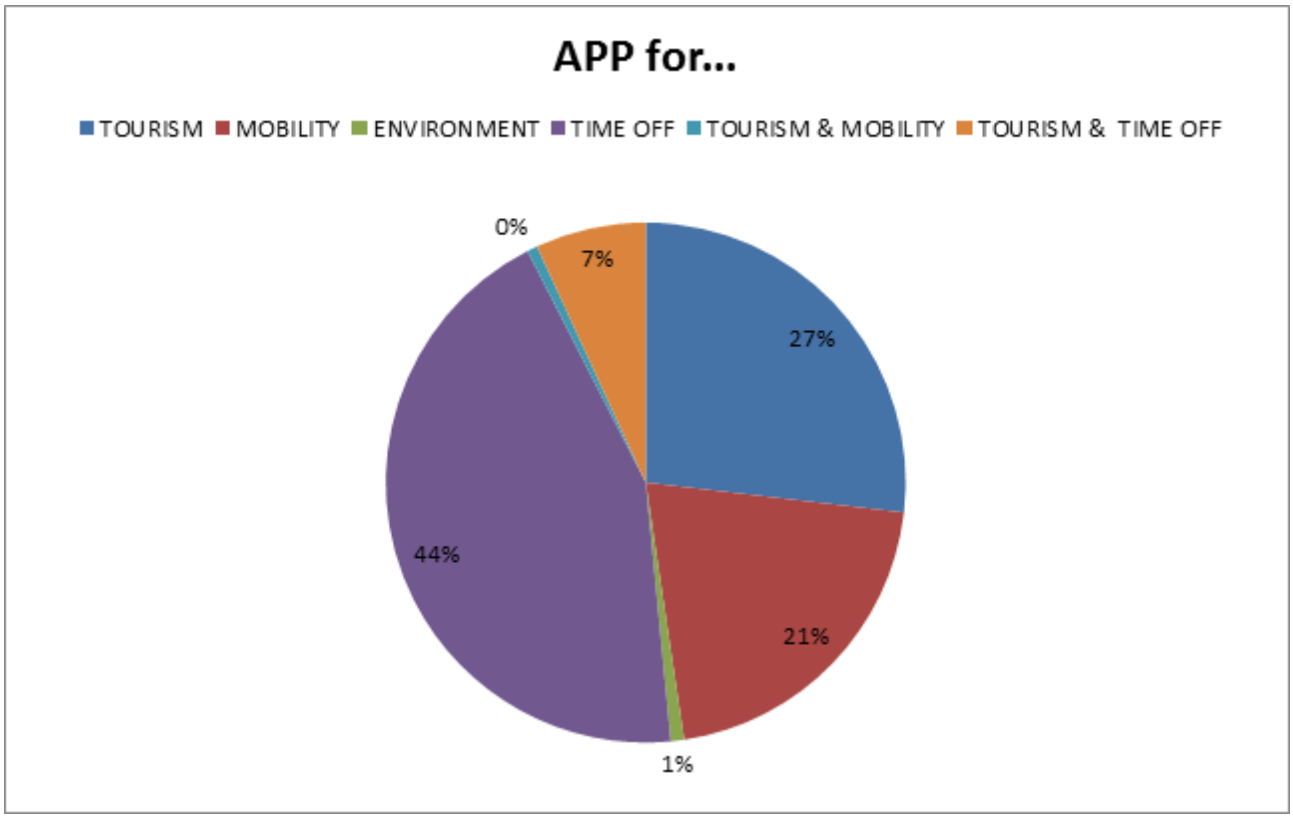


Figure 45

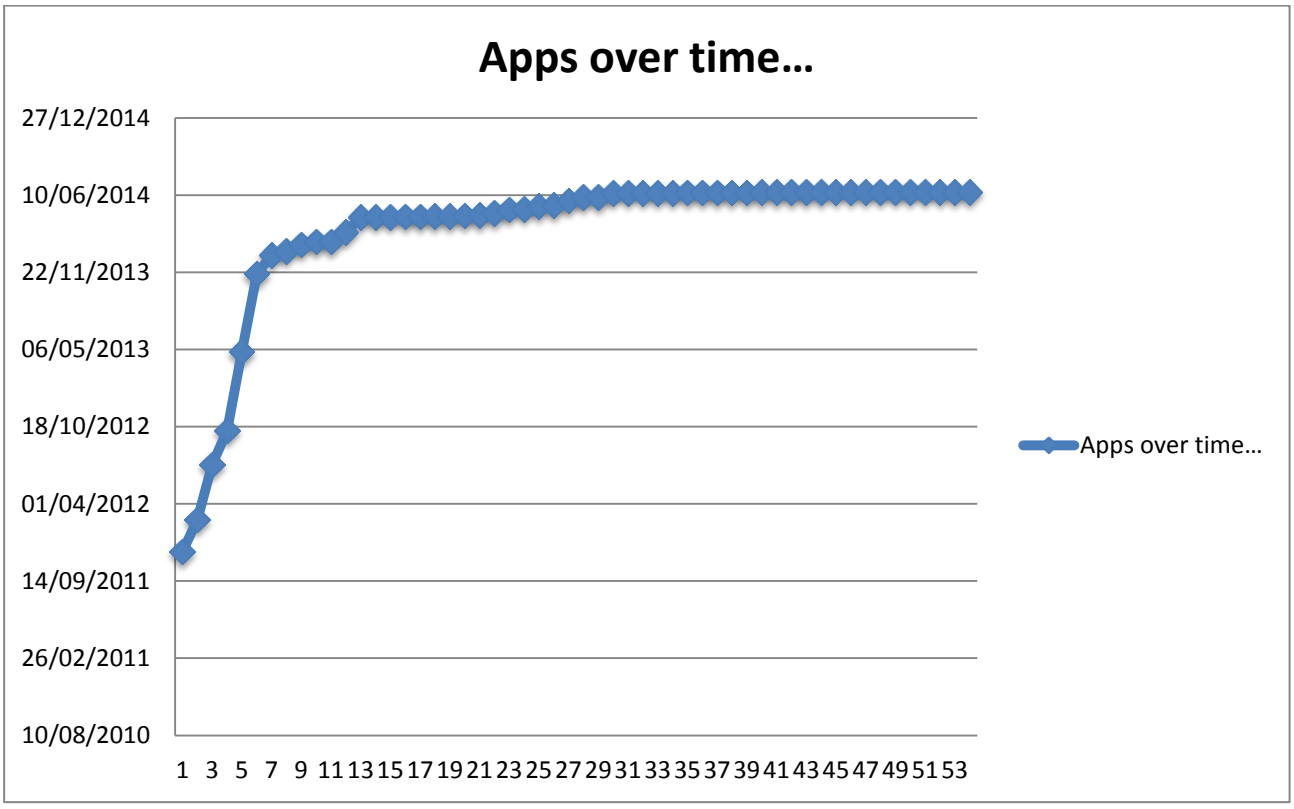


Figure 46

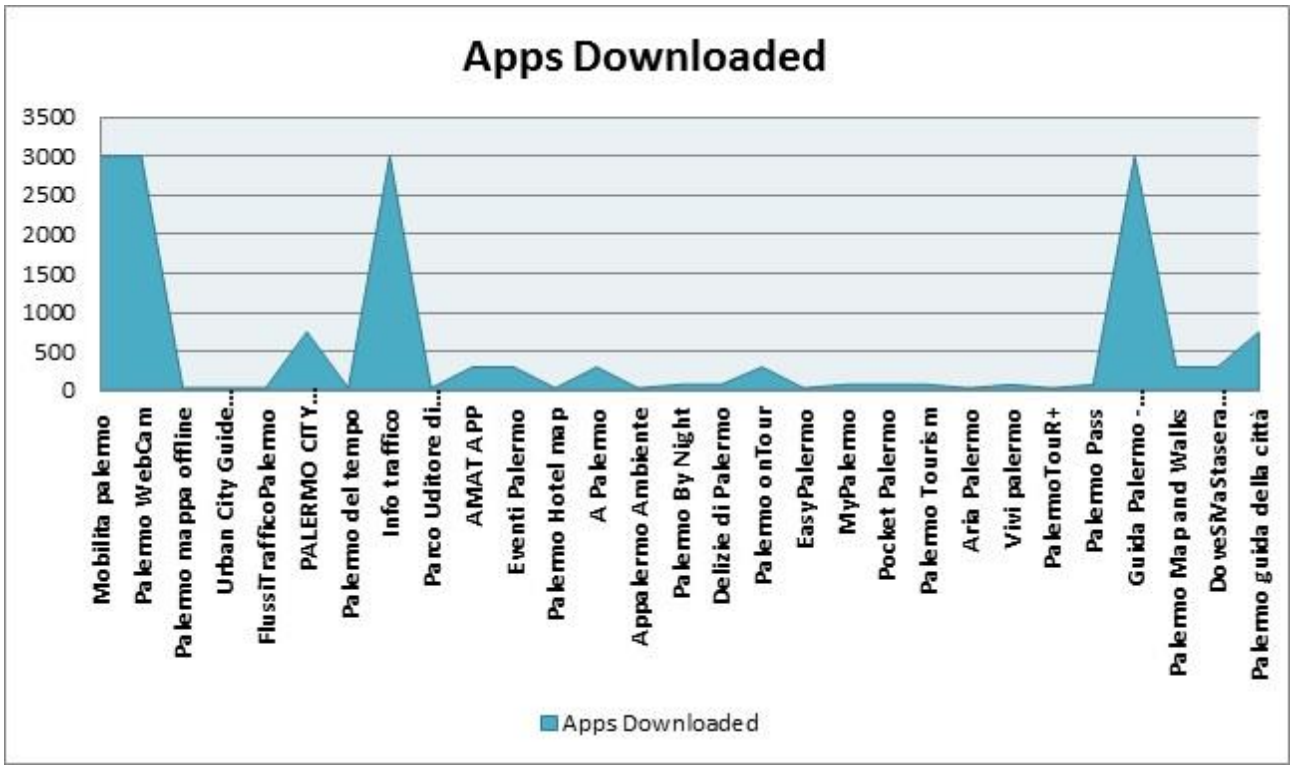


Figure 47

4.3.4 DATA COLLECTION

The collection of data was based on two axes as follows:

a) Review of existing literature in order to identify the common areas with the present study so as to utilize useful findings and compare with the findings of the present research.

To this end, the main difference between this study and the other studies conducted so far is that it focuses on the territory of Palermo and it aims to show the social and economic benefits that derive through the opening of PSI through the methodology of the Dynamic Performance Management.

b) The collection of primary data for the purpose of this study was carried out using qualitative research methods. More specifically, as it has been mentioned above, the usage of an Online survey[263] was adopted, as it was considered to be an appropriate efficient and effective means of penetrating the municipals' stakeholders.

c) Interviews were conducted to various departments in the Municipality that were supposed to have a direct or indirect influence on Open government related activities in the city, as well as to elected officials of the city (politicians). The respondents were asked to evaluate extensively a variety of attributes and aspects related to their opinions about Open innovation as well as their knowledge and satisfaction concerning Open data and citizen participation process.

[263] http://www.comune.palermo.it/questionario_opendata.php

The analysis of the answers highlighted the following results and/or critical issues:

→ limited knowledge of what Open Data are by businesses and citizens, especially as far as their economic development potential is concerned. The Municipality of Palermo economic community is not able yet to see the benefits of Open Data, due to insufficient knowledge and/or lack of related skills;

→ reuse happens just in a few cases and often it is "invisible", meaning that it is limited to downloading datasets for study needs, purely personal interest or other needs internal to one's organization.

→ Limited production of infographics and online or offline services, especially by individuals or private businesses, for commercial purposes or civic interest.

More in detail, the institutional web site " http://www.comune.palermo.it/ " ran the survey among its visitors. The fieldwork period started on ***1 October 2014*** and ended on ***30 November 2014***.

Most of the answers to these questions are given on an ordinal scale (from 1 to 5), measuring the relative degree of agreement or disagreement with different statements. The main goal of these surveys is the definition of which Open Data would be most needed, both to reduce the duration and costs of bureaucratic procedures and to develop innovative products and services.

The questionnaires, that were developed for the purpose of this study, included question areas relevant to each type of stakeholder that may be involved in the open data government policies carried out by the Municipality of Palermo, i.e. OD's user/owner and/ or re-user. The programming of the survey ensured that all the checks and validations were covered so as to enable stakeholders to better comprehend and answer each question and therefore help to increase response rate. The average response rate was calculated at 22, 60% of the reference sample, which has been identified in relation to the number of members of the Facebook group OpenDataSicilia[264] consisting of the local experts in Open Data that at the time of the survey amounted to 385 members. A response by 87 online users, therefore can be considered quite satisfactory taking into account that outside the fieldwork area the notion of OD is still largely unknown. All the data were exported in excel for the data analysis.

[264] https://www.facebook.com/groups/opendatasicilia/?fref=ts

4.4 OPEN DATA GOVERNMENT IN THE MUNICIPALITY OF PALERMO

Opening government represents the result of technical, social, and political developments rising since 2005 (OECD, 2003)[265]. These developments moved into more prominence in 2009 in the US with President Obama's open government directive (2009)[266] and internationally with the UN-sponsored Open Government Partnership (OGP) and the World Bank's Open Data initiatives. Such initiatives to enhance 'openness,' whether in technical, social, or political terms, can introduce important shifts in circumstances—including power relationships, resources, risks, or opportunities. These disturbances can impact the interests of stakeholders and result in conflicts and disturbed routines.

Three influential disturbances include (1) ***technical,*** meaning open data formats, open source, mobility, social media, and linked data, (2) ***political,*** meaning the opening government directive and open government partnership globally, and (3) ***social,*** meaning people's expectations change (i.e., ways of interacting, speed of interactions, etc.), coproduction of services, the increase in users and developers (i.e., civic hackers).

Under the umbrella of opening government, public administrations are once again responding to the perception that the problems faced by governments are increasingly beyond their ability to solve alone. Providing citizens and employees with information is seen as part of the solution, both in the consumption of services and participation in decision making (Taylor, 1998)[267]. Therefore, open government initiatives are introducing a variety of new actors (e.g., advocates, technical specialists, citizens, and other stakeholders) and new technological- and information-mediated activities into the governance of public information resources. One of the goals of opening up government, in fact, is to expand information and access in ways that draw new actors, interests, and influences into government used to improve service effectiveness and decision making (i.e., improve governance) and impact public value.

In the light of above, according with the studies conducted in this area from the Center for technology in Government at the University of Albany (NY)[268], it is possible to claim that in an information polity, the objects of expanding or enhancing access to information are some part or all of an open government initiative. Sets of stakeholders are oriented toward the governance of an

[265] OECD. (2003). Public Sector Modernization: Open Government, Policy Brief. pp. 1-8. Retrieved from http://www.oecd.org/dataoecd/1/35/34455306.pdf

[266] http://www.whitehouse.gov/the_press_office/TransparencyandOpenGovernment/

[267] Taylor, J. (1998). *Governance and Electronic Innovation: Whither the information polity*? Information, Communication & Society, Vol 1, No. 2, pp. 144-162.

[268] Helbig Natalie, Anthony M. Cresswell, G. Brian Burke, Theresa A. Pardo, Luis Luna-Reyes, *The Dynamics of Opening Government Data, White Paper*, Center for Technology in Government University at Albany, June 2012.

open data government initiative because they have an interest in how public information is provided and used.

The concept of public information resources, in this sense, includes both government held and other publically available information resources (data, devices, infrastructure, etc.), as well as instances of social action (such as downloading a dataset, initiating or responding to a freedom of information law request, or attending a government meeting).

Public information resources include both government-held information and other publically available information about a policy problem or domain. This is an important analytical distinction because it allows us to simultaneously think about the governance of 'government-held' information (such as datasets on data.gov) and 'publically-held' information (such as comments, sentiment, patterns of use, geo-coded data).

In this respect, it is important to highlight that many different kinds and sources of information are important for improving government, and while information is an important and valued resource, not all kinds or sources are solely 'owned' by government. Notions of who are the data owners is replaced by conceiving of multiple stewards of public information resources (Dawes, 2010)[269], of which government, citizen, and other stakeholders are included. For example, citizens providing personal information or civic hackers are using and changing the data in some way—each play a stewardship role in governing public information resources. Each stakeholder has potential interests in the characteristics and success of the open government initiative, therefore the various stakeholders are oriented toward steering (consensually or antagonistically) (Corry, 2010)[270] the public information resource. Their interests and capacities for participation in governance make them part of the information polity and oriented as such to governance of the public information resources that make up the open government initiative. The entire collection of stakeholders shares this orientation, but also has possible relationships with other actors. Stakeholders can be members of more than one information polity simultaneously.

[269] Dawes, S. S. (2010). Stewardship and Usefulness: Policy Principles for Information-based Transparency, Government Information Quarterly, Vol. 27, No. 4, pp. 377-383, op. cit. in ibidem.

[270] Collins, G. (2010). Health department revamps restaurant inspection website. Retrieved from http://dinersjournal.blogs. nytimes.com/2010/07/28/health-department-revamps-restaurant-inspection-web-site/, op. cit. in ibidem.

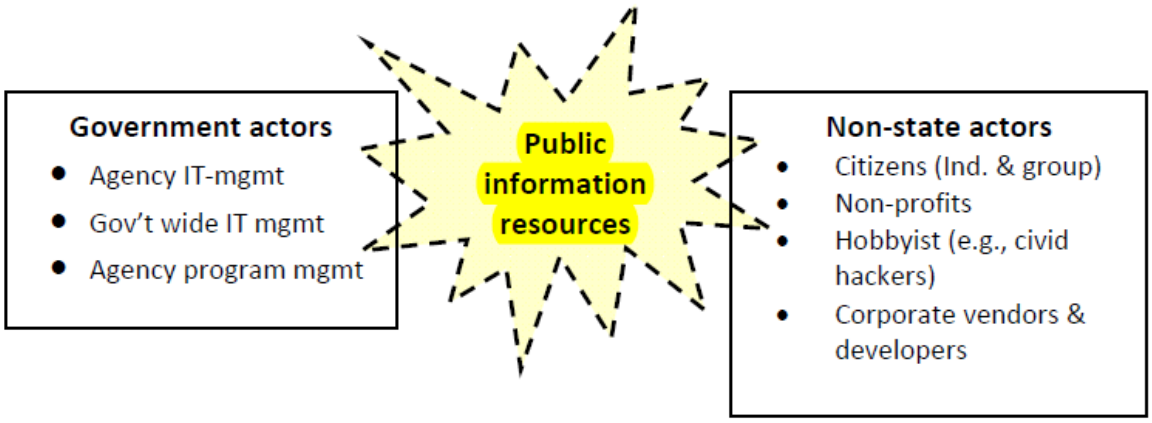


Figure 1 – An open government information polity

Figure 48
Source: Helbig Natalie, Anthony M. Cresswell, G. Brian Burke, Theresa A. Pardo, Luis Luna-Reyes, *The Dynamics of Opening Government Data, White Paper*, Center for Technology in Government University at Albany, June 2012.

Since their interests are affected by how public information resources are governed, the stakeholders are oriented toward the governance of that information. The basic idea is that many diverse stakeholders have interests in how government information is acquired, accessed, and used. The governance of public information resources involves policies, business processes, social processes, technologies, standards, meaning and interpretation, and adding value. In general terms, all of government information acquisition, provision, and use are activities that occur in the polity. For the objectives of this study, however, only open data government initiatives are of interest[271].
In the following sections, therefore, the analysis will be conducted on the open data processes undertaken by the Municipality of Palermo to achieve the objectives relating to the policies of open government.

4.4.1 CITADEL ON THE MOVE

As mentioned previously, the city administration has undertaken to join the EU project Smart Cities "Citadel on the Move"[272], then formally ratified by the adoption of the Deliberation n. 51 of 22.04.2013, whose subject is the following: *membership of the City of Palermo in EU project "Citadel on the move", for the development of policies of Open Data and the creation of applications and useful services to citizens*.

[271] Author E. van Ewijk, Between local governments and communities: Knowledge exchange and mutual learning in Dutch-Moroccan and Dutch-Turkish municipal partnerships

[272] 4. Concluding Statement |Citadel on the Move, 2013.

The choice to participate in this project comes from the fact that the current era of austerity is placing increasing pressure on governments everywhere to do more with less, particularly at the local level where government services have the greatest impact on citizens' everyday lives.

The near ubiquity of mobile devices across Europe presents a potential key to address this challenge. Mobiles provide European citizens on the move with access to data over the Internet and the resulting potential to access any service, anywhere. At the same time Social Media and 'Internet of Things' (IoT) are rapidly joining together to make European cities 'smarter' by enabling people to generate their own data and build the type of mobile services they want and need.

Citadel on the Move believes that a truly 'Smart City' is one that is able to:

1. Benefit from the innovative developments of citizens, Small and medium enterprises (SMES) and other actors from across Europe rather than just within their own cities
2. Harness the power of 100% freely available and easy to use Open Data to unleash the creative potential of citizens to develop smart, interactive and on-demand mobile solutions that can be used on any device, anytime, anywhere
3. Contribute to a multi-national service-oriented ecosystem by providing and sharing mobile technology services with other citizens and cities across Europe

To unleash the true potential of these Smart City trends, however, local government cannot simply rely on technology alone. Instead, public administrations must do part of the work itself by opening up its data and engaging citizens in the creation of new public service oriented applications. Although doing so may sound easy, in addition to the perennial political, administrative and legal constrains which often hamper public sector innovation, local government also faces a number of unique challenges surrounding standards, interoperability and technology, already analyzed in the previous sections[273].

Citadel on the Move, particularly, believes that Open Data and mobile web technology hold the key to making European cities truly 'smart' through the creation and delivery of innovative shared services that can be used across borders and on any platform. Nevertheless, the project has identified a number of issues that still need to be addressed to realize this vision.

→ In the first place, local government must strive to protect the privacy of its citizens without allowing data protection and privacy concerns to become an obstacle to openness. **Citadel on the Move** believes that it can do so by conducting Privacy Impact Assessments before

[273] Obstacles within public bodies include a lack of technical knowledge on publication of Open Data, legal and licensing issues, and lack of resources for publishing Open Data. Obstacles within public bodies include a lack of technical knowledge on publication of Open Data, legal and licensing issues, and lack of resources for publishing Open Data.

opening data sets and embedding Privacy as a Service (PaaS) in its technology design principles.

→ In the second place, local government must realize that it is not enough to simply open data. It must do so in a manner that makes the data accessible and easy to use. In addition to releasing data in open formats, **Citadel on the Move** recommends that local government advances the concept of the 'citizen developer' through the creation and use of mobile application templates that make it easier for citizens with basic technical skills to create service applications of their own.

→ In the third place, local government should adopt shared semantic standards for opening data that enable mobile apps to consume POI data from diverse sources and formats and work anytime, anywhere.

→ Finally, local government should constantly look forward. To ensure that its open data efforts anticipate future change, local government should explore options for interoperability middleware within the context of Open Data Commons.

Citadel on the Move aims to address these challenges by making it possible for local governments across Europe, regardless of their size or resources, to combine 1) Open Access Data and 2) Mobile Technologies to create 'smart,' innovative citizen-generated services that can be used across Europe, thus helping citizens to use open data to create value.

Citadel on the Move therefore unleashes new Open Innovation opportunities across Europe by making it easier than ever before for 'citizen developers' to access and use local open data to build the smart city mobile service applications they want and need.

In the spirit of Open Innovation, Citadel on the Move harnesses the power of open social media tools to pro-actively engage stakeholders in interactive collaboration and exchange. At this end, Citadel on the Move uses the Living Lab methodology, which unites stakeholders in the co-design and creation of services with the open data movement/community, to create a truly open innovation space.

Under **Citadel on the Move's** vision, cities both large and small, citizens and SMEs use new ICT tools and trends to work together in new and more innovative ways to improve urban living across Europe. **Citadel on the Move's** vision statement can be summarized as follows:

To become the European-wide Open Innovation ecosystem that unleashes the power of open access DATA and mobile TECHNOLOGY to help citizens and SMEs to develop interactive mobile solutions for Smart Cities that can be used on any device, anytime, anywhere.

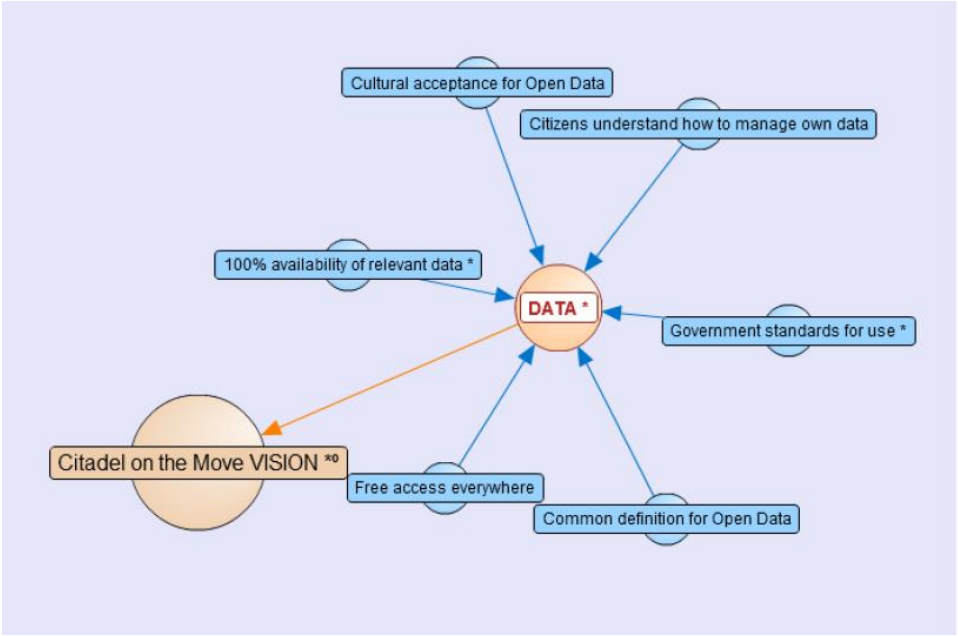


Figure 49
Source: CITADEL – Deliverable D1.1 Project Vision Statement[274]

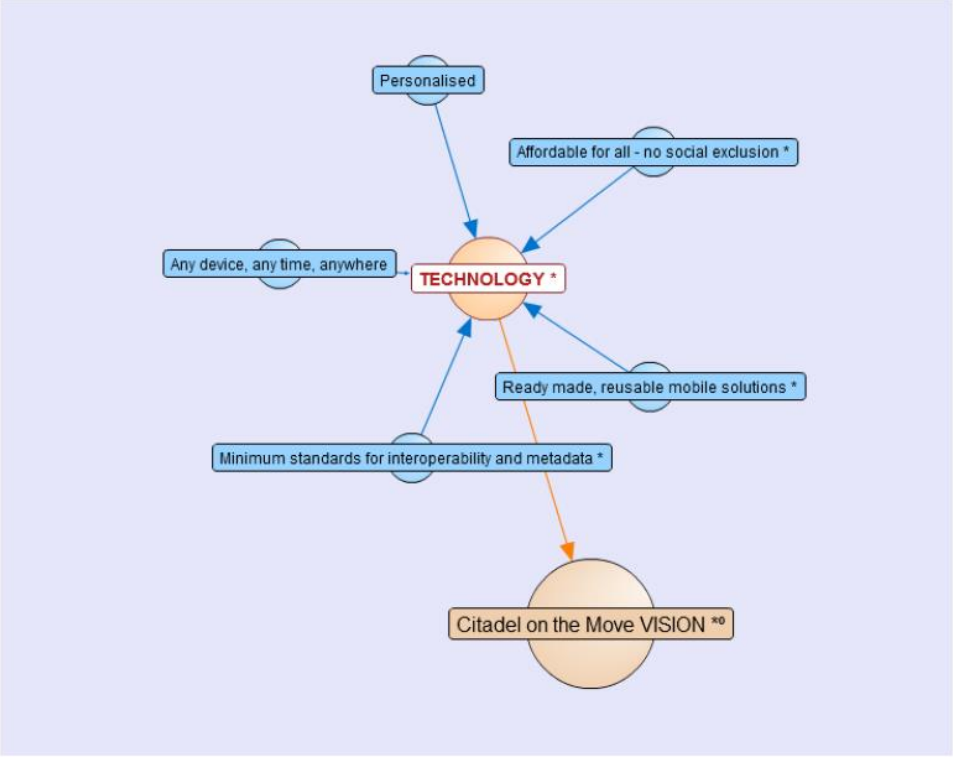


Figure 50
Source: CITADEL – Deliverable D1.1 Project Vision Statement

[274] http://www.citadelonthemove.eu/Portals/0/Images/Deliverables/CITADEL%20D1.1%20Vision%20Statement.pdf

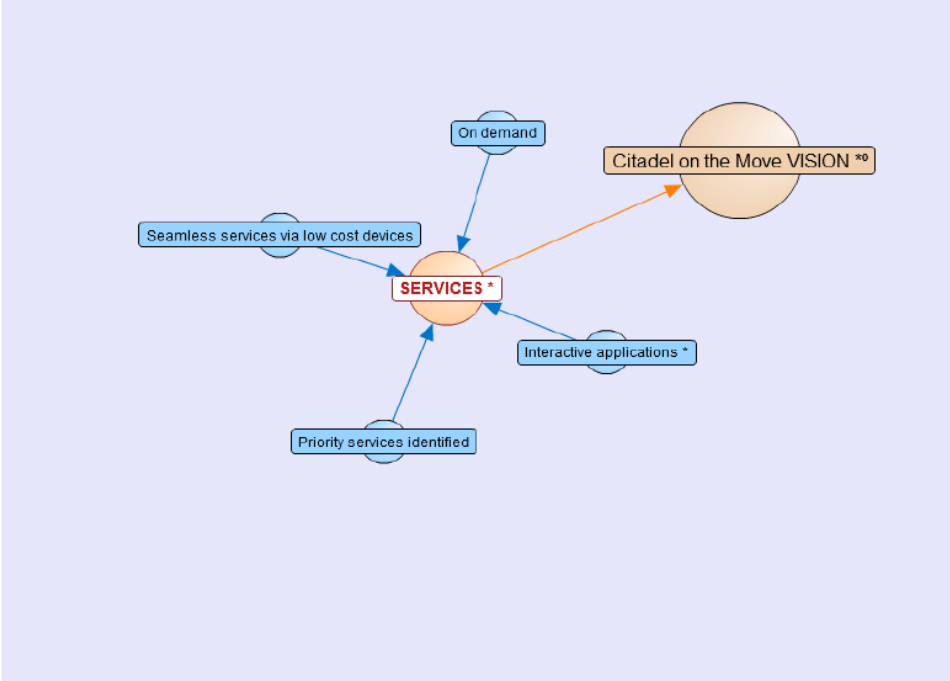


Figure 51
Source: CITADEL – Deliverable D1.1 Project Vision Statement

While the Citadel project holds Tim Burners-Lee's 5-star model as its main reference framework for Open Data, and thus Linked Open Data[275] (LOD) as the objective towards which the Municipality of Palermo ultimately striving, the Administration today is struggling to simply get data published even at two or three star levels (machine-readable files in non-proprietary formats), particularly within the increasing constraints on costs and investments brought on by the financial crisis.

The ODC's primarily **goal** is therefore double:

a. To help data managers get their data online by permitting the release of data at the lowest cost in order to encourage as much of it as possible, while also allowing as broad a use as possible of that data, and

b. To encourage both data managers and application developers (including citizen developers) to think about how they can improve the usefulness and quality of data and accompany them in the process of moving towards the Web of Data paradigm.

Citadel on the Move is thus based around three key principles which the project has identified as strategic guidelines to help drive 'Smart City' innovation:

→ Citizens as Developers

→ Common Approaches to Standards

→ Open Data for Universal Participation.

[275] http://www.w3.org/wiki/SweoIG/TaskForces/CommunityProjects/LinkingOpenData

- **CITIZEN AS DEVELOPERS**

Citadel on the Move seeks to address this challenge by helping local government to provide citizens with new tools to become developers and create public value themselves. In this regard, Citadel's concept of the 'Citizen-developer' is not just a technical concept but a whole new form of empowerment and democratization of internet technologies. Citadel will enable mobile applications to be potentially designed by the same people that will use them, rather than devised in far-away research laboratories. As such these service applications can "belong" to a city and its citizens in a new and more integral way.

- **OPEN DATA FOR UNIVERSAL PARTICIPATION**

Open Government Data is rapidly becoming a new principle for Local Government in helping to a) increase the transparency of administration's actions and b) improve public services through collaboration between the public and private sector.

Open Data means data that can be freely used, reused and redistributed by anyone – subject only, at most, to the requirement to attribute and sharealike.

The key elements of this open data principle, analyzed in detail in the previous sections, can be summarized as follows:

- **Availability and Access**: the data must be available freely, directly accessible via the internet. The data must also be available in a convenient and modifiable form.
- **Reuse and Redistribution**: the data must be provided under terms that permit reuse and redistribution including the intermixing with other datasets.
- **Universal Participation**: everyone must be able to use, reuse and redistribute – there should be no discrimination against fields of endeavour or against persons or groups. For example, 'non-commercial' restrictions that would prevent 'commercial' use, or restrictions of use for certain purposes (e.g. only in education), are discouraged.

The datasets that are opened by public authorities/bodies in the public domain are often referred to as Public Sector Information (PSI). These sources of data are regularly utilized and reused by private businesses that have the technical skills required to build applications using the data. However, in terms of universal participation, whilst Citizen Developers have the opportunity to access PSI, complications arise when sourcing resources to help them utilize the data. The current online open data ecosystem is a fragmented variety of tools, interfaces and toolkits, mostly designed for use in silos, i.e. with a specific data set or application.

Under the ***Citadel on the Move's*** model, governance of the ODC resource becomes a collaborative effort between the local administration, citizen developers and businesses, with the public sector

partner taking particular responsibility to ensure that the process is open and fair. All parties discuss and decide upon the most appropriate Open Data strategies for their city, i.e. which datasets to open and what applications, standards, privacy and security recommendations from ***Citadel on the Move*** should be adopted.

4.4.2 OPEN DATA VALUE CHAIN

In light of the above, it is possible to define the value chain of open data[276] as follow:

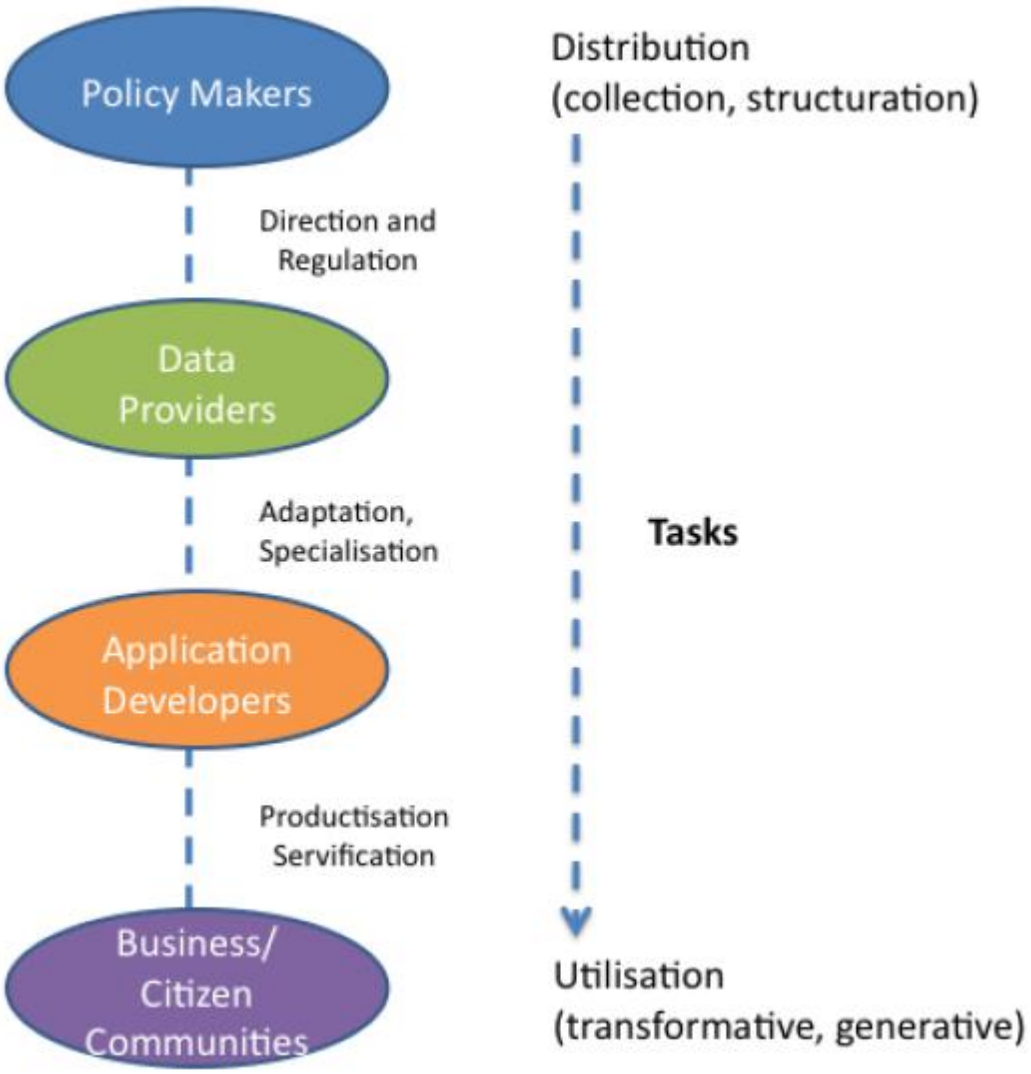


Figure 52
Source: CITADEL – Deliverable D3.1.1[277]

[276] CITADEL Consortium 8 Version 2.3 –.05.2012

[277] http://www.citadelonthemove.eu/Portals/0/Images/Deliverables/CITADEL%20D3.1.1%20Open%20Data%20City%20Charters.pdf

In the above representation, four main actors, or stakeholders' categories, can be identified, in close association with well specific tasks:

• **Policy Makers**, being in charge of the high-level direction and regulation of the whole process, and with specific respect to Data Providers;

• **Data Providers**, usually, though not always, public bodies or agencies (such as public utility companies, statistical offices, chambers of commerce etc.), being responsible for the creation (setup, organization, structuration) of the open datasets, and sometimes also of their adaptation and specialization to the needs of the Application Developers;

• **Application Developers**, usually ICT companies, sometimes under the control of public bodies, otherwise acting on the free market, with the mission of transforming the datasets available into "human readable" forms – either products, or services, or both;

• **Business/Citizen Communities**, including not-for-profit entities and NGOs, who are ultimately beneficiaries of the transformation, generation and utilization of public datasets according to their respective (business / non business) purposes.

Activities beyond raw data creation, collection and aggregation, which can be relevant to value creation include, for instance: data processing, editing and packaging, marketing and delivery. More recently, they also comprised the development of API's, mash-up's and other forms of user friendly – if not user generated – content.

However, as the following picture shows, the previous representation of the value chain may be complicated by adding three forms of interaction between the four stakeholder categories introduced before:

a) Data co-production, deriving from the Business/Citizen Communities themselves, as parallel and additional sources with respect to Data Providers;

b) Application co-design, again reflecting the spirit of freedom and initiative that characterizes most end user communities;

c) And policy co-creation, as joint result of the feedback searched for by the "smarter" Policy Makers and received back from all of the remaining stakeholder categories, after a complex process of Living Lab interaction that is the goal of CITADEL to achieve.

THE CITADEL'S VISION

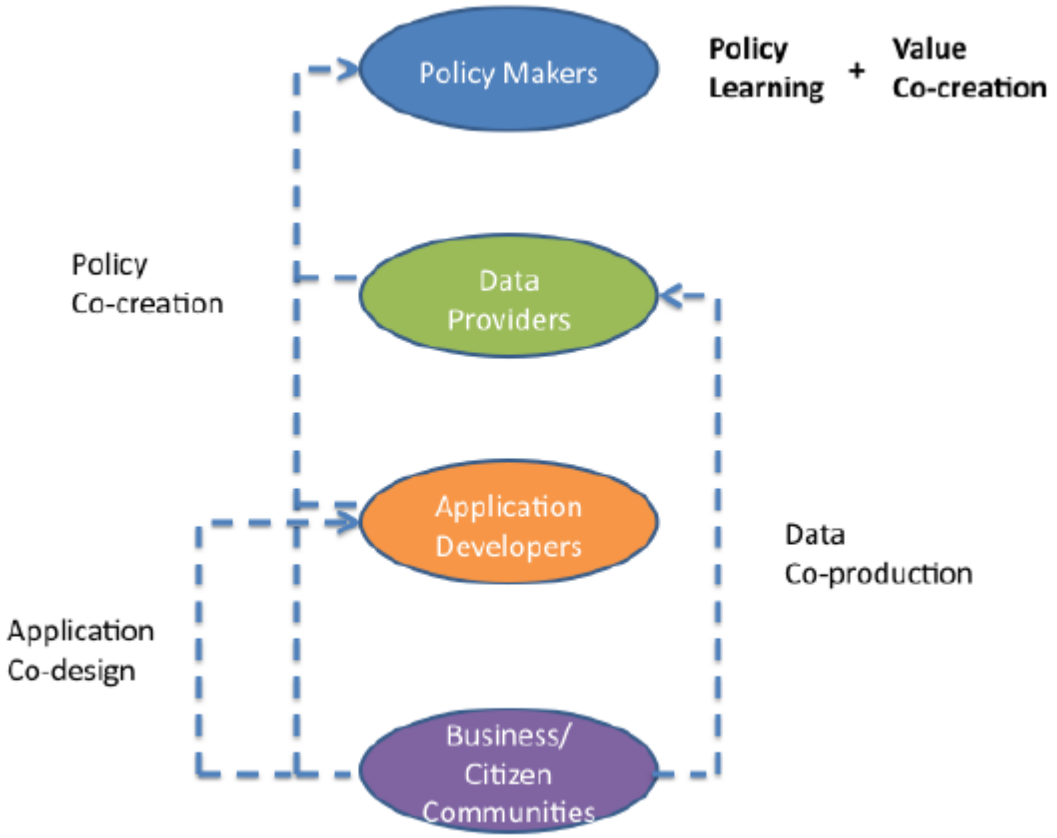


Figure 53
Source: CITADEL – Deliverable D3.1.1

As final outcome of this set of feedback loops and interrelations, two main goals are to (should) be achieved: intelligent policy learning, from the perspective of workflow directors and regulators; and the creation of (additional) value from the disclosure of Open Data and the re-use of Public Sector Information, that what could be reasonably guaranteed using the conventional, one-way logic depicted in Figure above.

The way this outcome becomes feasible can be described as follows. In figure 54, it is added another relevant analytical dimension to Citadel's vision, namely the distinction between technological and social (including also institutional) innovation.

Among the many definitions of the latter, we would like to adopt the following: "*innovative solutions and new forms of organization and interactions to tackle social issues*".

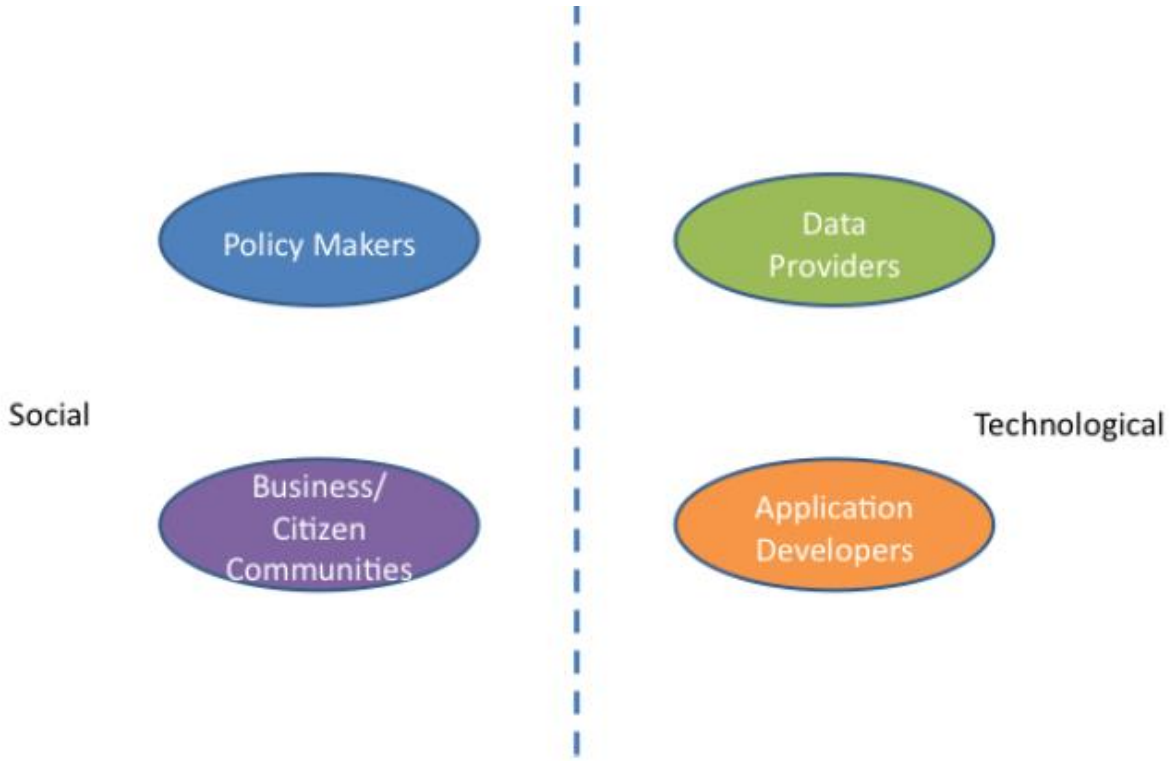


Figure 54
Source: CITADEL – Deliverable D3.1.1

One can notice the addition of the "Impact and Requirements" function from the Business/Citizen Communities to the Policy Makers, in such a way that the linear workflow outlined in the above figure may hold an iterative feature permanently added to it.

In this scenario, Policy Makers act as "prime movers" with respect to the Business/Citizen Communities, in launching and promoting the constitution of the ODGGs. Within this overall framework, it is desired, and somehow expected, that the local Business/Citizen Communities, adequately stimulated and supported, may start defining their range of expectations, desires, and purposes, with respect to the specific utilization examples of the various applications developed, or to be designed and worked out with the integration of the public datasets available or to be made available. This backward process, which also includes the generation of own datasets, whereby citizens and/or businesses themselves act as complementary Data Sources with respect to the Public Sector, should positively influence the strategic behavior of the Application Developers, who could stay more focused on the developments that hold the maximum level of utility, usability and social acceptance. As a by product of this virtuous interaction between prospective end users and solution providers, a new range of access and acquisition protocols should also be foreseen, between the Application Developers and the Public Sector Data Providers. The latter should make reference to

the Policy Makers again, for revised and revamped guidelines concerning pricing and availability of datasets, in relation to the priorities expressed by the ultimate beneficiaries.

Although the proposed representation may look oversimplified (as it does not include, for instance, the cases of user generated or private sector owned datasets, nor it considers application developers as capable of achieving social innovation), most of its heuristic value is given by the integrated ecosystem, as shown in the picture below which identifies four main areas of interaction, with the corresponding feedback loops:

KEY AREAS OF STAKEHOLDER'S INTERACTION

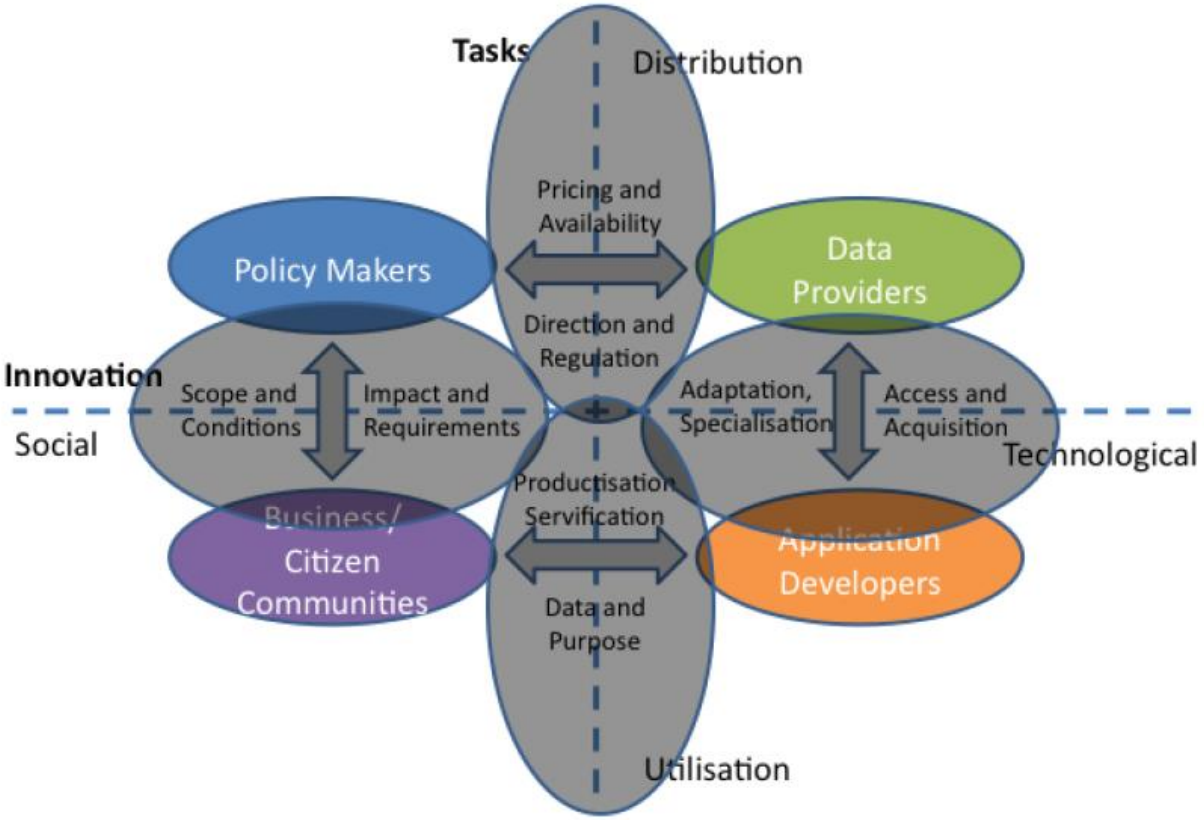


Figure 55
Source: CITADEL – Deliverable D3.1.1

As a result of those interactions, the goals of policy learning and value creation (as per Figure 55 above) should ultimately be achieved.

OUTCOME OF STAKEHOLDER'S INTERACTION

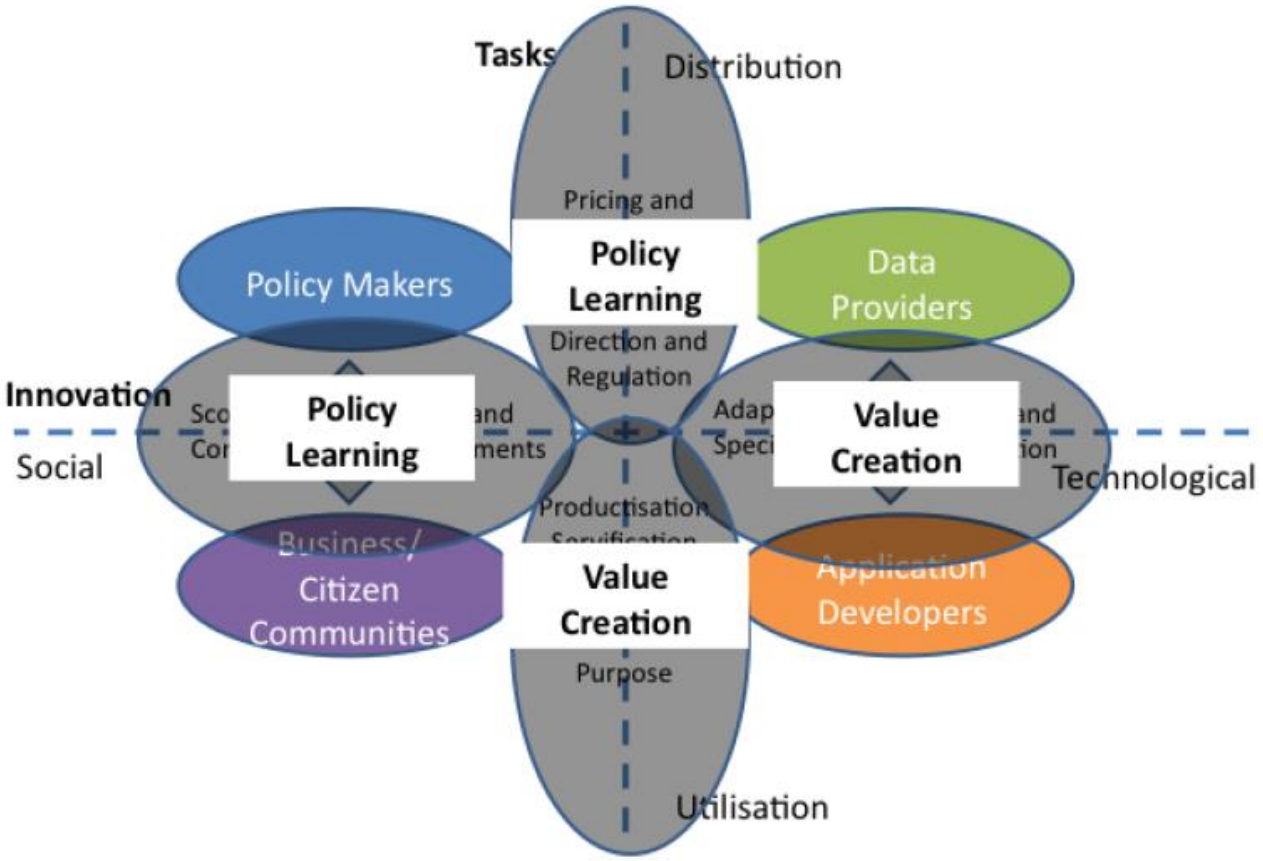


Figure 56
Source: CITADEL – Deliverable D3.1.1

In the next sections, based on the action plan that the Municipality of Palermo intends to achieve in the light of the objectives set by the guidelines developed with the collaboration of the stakeholders and of the objectives suggested by the European projects in which it joined (Citadel on the Move), we will proceed to their analysis in the light of Dynamic Performance Management (DPM). Therefore, the dynamic aspects of information polity activities will be described using system dynamic modeling methods. This modeling approach shows how understanding the dynamic activities related to providing, using, and governing information in the public sector can assist decision making and planning in order to improve public value creation. Afterwards, it will be described an illustrative case example of how open information flows and related relationships are central to the analysis.

4.5 SYSTEM DYNAMICS METHODOLOGY APPLIED TO THE OPEN DATA GOVERNMENT

In this section it will be shown as the Dynamic Performance Management approach may help municipal administrators to frame and manage the ongoing open government process by highlighting which are the main causal relationships and how System Dynamics can support management to keep under control the key-variables driving performance in providing citizens with higher services effectiveness in order to realize its own mission: restore trust[278].

The Open Government policy in the Municipality of Palermo is, in fact, characterized by an high level of dynamic complexity due to the presence of non-linear relationships among the several key variables composing the system under analysis Non-linearity, combined with the bounded rationality of decision makers affects the ability to understand which are the real causes of a given problematic behavior and, therefore, the opportunity to undertake a process of change directed at reversing an identified negative trend. The methodological approach adopted for the purposes of this analysis, constituted by the combination of the SD methodology and the so-called instrumental view of the DPM approach, therefore reveals itself particularly suitable for the analysis of the specific object of this study.

From analysis of the objectives set by the Municipality of Palermo to carry out policies of Open Government, according to Bianchi[279], it can be understood the need for an "approach to overcome the myopic view of relying on a handful of performance indicators". As claimed by Bianchi, to facilitate the change it can be used a System Dynamics approach, "which is adopted to map system structure to capture and communicate an understanding of behavior driving processes and the quantification of the relationships to produce a set of equations that form the basis for simulating possible system behaviors over time. The underlying principle is that if process structure determines system behavior, and system behavior determines organization performance, then the key to developing sustainable strategies to maximize performance is acknowledging the relationship between processes and behaviors and managing the leverage points". As highlighted by Bianchi, the importance of system dynamics comes from the fact that planning & control systems are no longer able to provide information that can support: dynamic complex management, measurement of intangibles, detection of delays, understanding linkages between short- and long-term, and setting proper system boundaries in strategic planning.

[278] Van de Walle, Steven and Bouckaert, Geert, Public Service Performance and Trust in Government: The Problem of Causality (September 13, 2003). Van de Walle, S. & Geert Bouckaert, Public Service Performance and Trust in Government: The Problem of Causality, in: International Journal of Public Administration, Vol. 29 (8 & 9): 891-913. Available at SSRN: http://ssrn.com/abstract=2325327 .

[279] Performance Management in Local Government: The Application of System Dynamics to Promote Data Use.

Furthermore, planning & control systems do not support an understanding of how end-results can be affected by performance drivers, how performance drivers can, in turn, be affected by the use of policy levers aimed to influence strategic resource accumulation and depletion processes, and how the flows of strategic assets are affected by end-results. In order to provide decision makers with proper *lenses* to interpret such phenomena, to understand the feedback structure underlying performance, and to identify alternative strategies to adopt to change the structure for performance improvement, system dynamics modeling has been used. [280]

The following Figure 57 illustrates how the end-results provide an endogenous source in an organization to the accumulation and depletion processes affecting strategic resources.

Dynamic Performance Management View

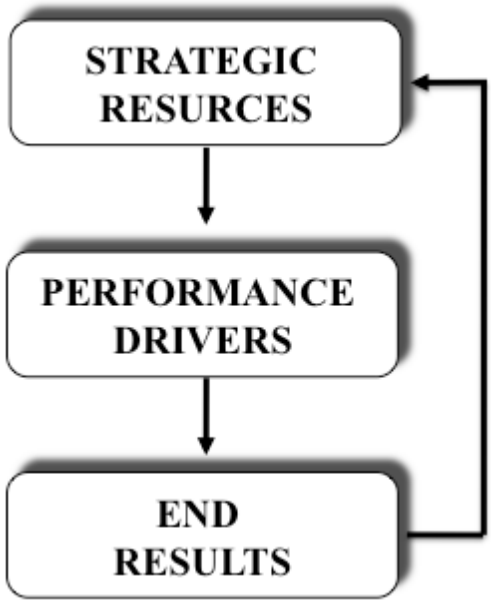


Figure 57
source: Bianchi C.(2012), Enhancing Performance Management and Sustainable Organizational Growth Through System-Dynamics Modelling, chapter 8.

In fact, they can be modeled as in- or out-flows, which change over a given time span the corresponding stocks of strategic resources, as a result of actions implemented by decision makers. Organizational growth therefore can be sustainable if the rate at which end-results change the endowment of corresponding strategic resources is balanced. Such results, in turn, can be affected through performance drivers. Competitive performance drivers are associated to critical success factors in the competitive system. They can be measured in relative terms—as a ratio between the organizational performance perceived by citizens and a benchmark or target. Such a denominator

[280] (Bianchi, 2012; Bianchi & Montemaggiore 2008).

must be gauged in relation to perceived past performance, users' expectations, or even (if relevant) competitors' performance. Also social performance drivers can be measured in terms of ratios between organizational strategic assets and a target, which can mostly be expressed in terms of either stakeholder's expectations or perceived past organizational performance.

Further to that, the following Figure 58 shows DPM instrumental view developed in the framework of the Open Government process in the Municipality of Palermo to highlight how the end results reconstitute or deplete strategic resources through drivers that, in turn, constitute the levers upon which policy makers can act to change the organizational performance over time.

Referring to the analysis so far carried out on the process of Open government that the Municipality of Palermo is building, it can be summarized the following features:

→ it is a process that involves the whole municipal organization, at a cross sector level;

→ it is a process that is governed by three major interrelated policies: Transparency,' Participation and Open Data;

→ under these policies, the government of Open Data can be considered as a linkage between the policies of Transparency and citizens' Participation;

→ the whole process of opening data, in fact, began and continues to be driven by the involving of stakeholders;

→ for the sustainability of the process it is needed a continuous feedback between management and stakeholders.

The performance management approach allows thus to show the above features in the following Figure:

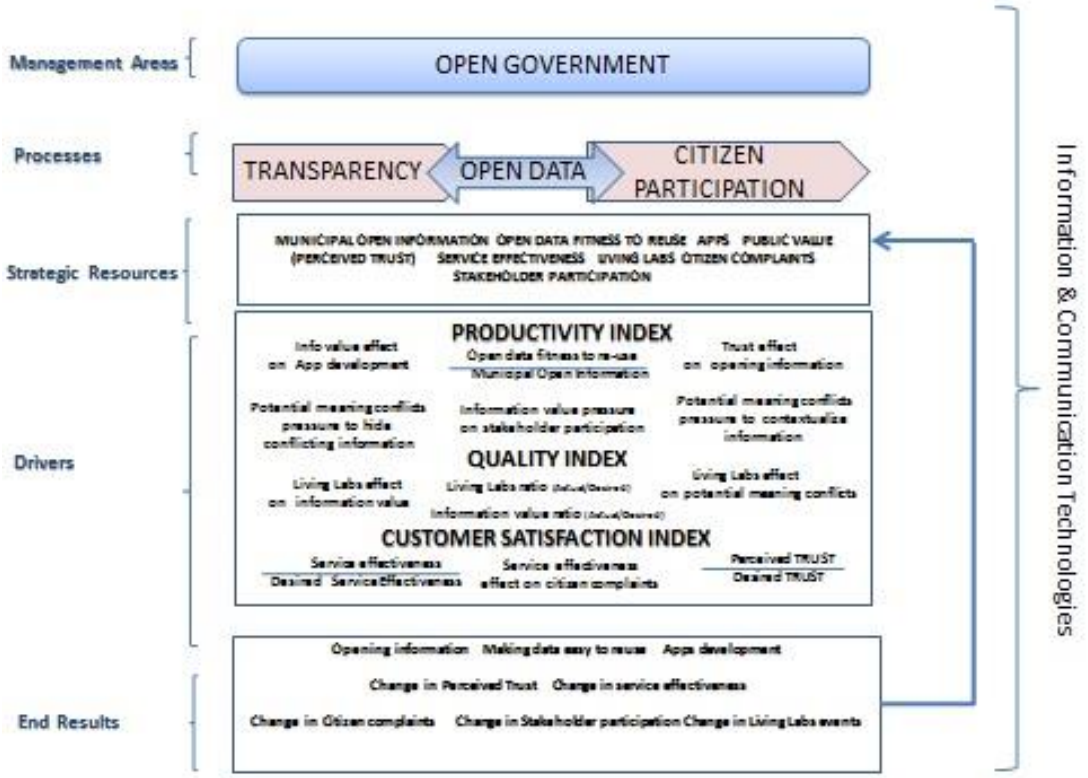


Figure 58
Dynamic Performance Management (instrumental view)

In this respect, the contribution that SD methodology is able to offer in the analysis of the processes of government of Public Administrations is almost boundless. In fact, thanks to its ability to support decision-makers in governing complex systems, SD methodology has been applied several occasions and in relation to various areas of interest with regard to the fields of public policy planning and city management. However, with regard to the specific subject of this work, the scientific contributions available are very limited. The following table contains a, non-exhaustive, list of the most remarkable contributions regarding the application of SD methodology to Open Government process.

Area of interests	Authors
Public Governance in MSWM	Dyson and Chang, 2005; Huang et al., 2001; Ericksson et al 2005; Bovea et al., 2009.
Social sustainability	Fiksel 2006; Docherty et al., 2009; Hirsch et al., 2007; Pires et al., 2011.
Environmental sustainability	Saysel et al., 2002; Shi and Gill, 2005; Leal Neto et al., 2007; Morrisey and Browne, 2004.
Municipal planning	Mashayekhi 1993; Sudhir et al., 1999; Inghels and Dullaert 2009; Pons et al., 2010; Hao et al., 2007.

Figure 59
source[281]: Bianchi C. 2010. *"Fostering accountability in public utilities: the ACQUA spa case-study*"

These studies, considered together, promote the application of the SD methodology as a valuable tool to:

1. Foster the adoption of a systemic perspective in the processes of government of local public services that focus on the concept of creating public value;

2. Consider both the external and the internal perspective in the provision of a public service to the citizens. More specifically, the internal perspective highlights the intra-institutional vision of the organizational system under analysis;

3. Foster an organizational and cultural change in the management of local public services focused on the greater participation and valorization of the role of the citizens/final clients.

[281] Bianchi C. 2010. *"Fostering accountability in public utilities: the ACQUA spa case-study*". In Bianchi C. et al. *"Applying System Dynamics to Foster Organizational Change, Accountability and Performance in the Public Sector: A Case-Based Italian Perspective*". System Research and behavioral science, Vol. 27, pag. 395-420.

4. Enable the adoption of a long term perspective in the evaluation of the economic, environmental and social impact of the policies implemented.

However, despite the valuable scientific contribution offered by these studies, only a few moving towards the perspective of integrating the P&C systems with the SD methodology. In fact, as pointed out in above it is necessary to integrate the SD methodology with the mechanisms offered by the Dynamic Performance Management approach in order to foster an improvement of the processes of government of public institutions according to a perspective of sustainability. Therefore, in the present study the approach which has been adopted is that of combining SD methodology with the Dynamic Performance Management approach in order to reconstruct and fully understand the Open Data Government in the Municipality of Palermo and thus offer to decision makers a conceptual model able to identify the performance drivers upon which to act to undertake a sustainable stakeholder engagement (e.g. sustainable in terms of organizational change, costs, efficiency, efficacy, transparency, trust).

According to Theresa Pardo, therefore, it can be claimed that the municipal management in the field of Open Government is characterized by a high level dynamic complexity:

- non-linearity combined with the bounded rationality of decision makers constitutes an element that makes it extremely difficult to understand the real causes of a system behavior.

To this end, in order to reconstruct the system of governance of the municipal Open Government process and identify the causal relationships which determined its trend, the methodology used has been the System Dynamics.

More specifically, thanks to the application of SD methodology has been possible to create a qualitative model capable of mapping the causal relationships between the key variables of the system and therefore to consider the effective role that both exogenous and endogenous factors play in the determination of the system behavior investigated in this research. In fact, System Dynamics, is a research methodology that allows to create a perfect synthesis between qualitative and quantitative survey techniques in order to gain a comprehensive and exhaustive overview of all the key factors that affect the system under analysis. Furthermore, as can be seen better in the next sections, thanks to the application of SD methodology it is possible to identify all those intangible factors that has substantially contributed to the ongoing process. More specifically, the reference is to all those "soft variables" that is essential to consider in order to govern the dynamic complexity of a given social system[282]. In this regard, as pointed out by Forrester: " The omission of soft

[282] For further information on the concept of soft variables, read more in: Coyle G. 2000. *"Qualitative and quantitative modeling in System Dynamics: some research questions".* System Dynamics review, Vol. 16, pp. 225-244; Linard K. et al., 2002. "*Building a knowledge –based strategy: A System Dynamics model for allocating value adding capacity*". Berrett-Koehler, San Francisco.

variables has a very specific assumed value in the model"[283]. In conclusion, in the next sections will be shown how from the application of SD methodology, combined with the approach of Dynamic Performance Management, will be possible to highlights the principal causal circuits responsible of the Open Government process in the Municipality of Palermo and to identify the performance drivers on which decision-makers can leverage in order to redirect the performance of the organization towards sustainable provision of the service provided (e.g. realizing of Open Data).

4.5.1 UNDERSTANDING THE COMPLEXITY OF OPENING GOVERNMENT: A POLICY-MODELLING APPROACH

Public managers face challenges when implementing Open Data initiatives. These challenges arise due to the multiple interactions between actors, information flows, technologies, and interests. By defining the problem of opening government data dynamically, we are placing emphasis on how processes and relationships change over time.

The Open Government policy includes rapid and unpredictable technological developments, trends and shifting relationships in the social and organizational environment, all at flux with political processes. These environmental and contextual influences interact over time in a variety of ways.

Further to this, this section illustrates how modeling the non-linear dynamics of opening government data systems supports decision making, thinking, learning and planning in open government projects. The goal is to assist public managers with making evidence-based decisions in a complex, unpredictable world.

Following a growing trend that seeks to link tools for scenario design, simulation, and forecasting, a System Dynamics approach will be able to understand the non-linear relationships, complexity, and time dimensions that can allow for a better understanding of the impacts and consequences of technological, political, policy, and managerial choices.

At this end, firstly, the analysis starts by describing a very simple mental model of opening government data, particularly with reference to the studies undertaken in this field by the Center for Technology in Government at the University of Albany (NY). According to this studies, in fact, it can be argued that open data initiatives are frequently described as virtuous cycles, or reinforcing loops. The logic of a virtuous cycle is that, if left unimpeded, it can generate exponential growth or decay. In the case of opening government data, advocates assume that simply supplying more and more data sets freely and in more formats will lead to more and more use. In such a mental model data use leads to value creation, which in turn will motivate government to make more data open

[283] Forrester J.W. 1994. *"System Dynamics, system thinking and soft OR*". System Dynamics Review, Vol. 10, pag. 245-256

and accessible. This reinforcing loop leads to some form of exponential growth in supply and use represented by the solid lines in both graphs in the following figure:

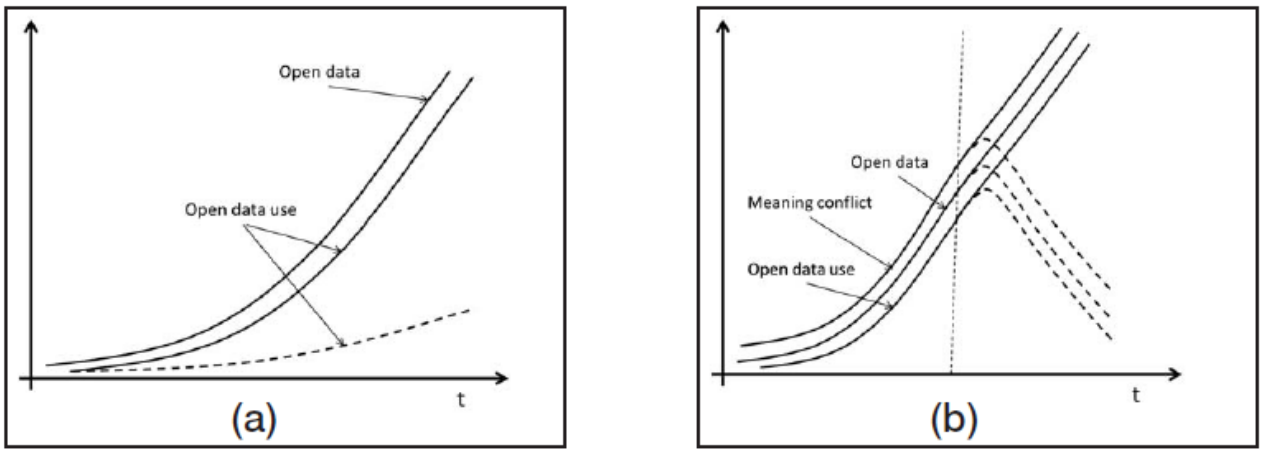


Figure 60
Dynamics of opening government data.

Source: Helbig Natalie, Anthony M. Cresswell, G. Brian Burke, Theresa A. Pardo, Luis Luna-Reyes, *The Dynamics of Opening Government Data, White Paper*, Center for Technology in Government University at Albany, June 2012

What occurs in a real world, characterized by more complex relationships and mental models, however, is different. In a complex system, such as the Municipality of Palermo, in fact, the expansion of freely available data sets and use are constrained by decision making's policies, data management practices, departmental effort, user capabilities, interactions between citizens and data, that create meaning conflict, and relationships with citizens and other stakeholders that, on the contrary, could help to enhance data quality. Over time, according to Theresa Pardo, it can be claimed that these constraints are activated and the result is a set of negative or balancing feedback loops that tend to slow the supply of data and use or reduce it all together.

Most open data strategies look for 'quick wins' in the first few years, but over time, the available set of data that is easily opened will diminish, reducing the number of open datasets stakeholders are looking to use, which will result in a loss of interest in use, less stories of valuable use, and the virtuous cycle slows. As we can see in the following graph, which shows the trend of the data released over the three years 2012-2014, namely from the beginning of the Open Data policy in the Municipality of Palermo.

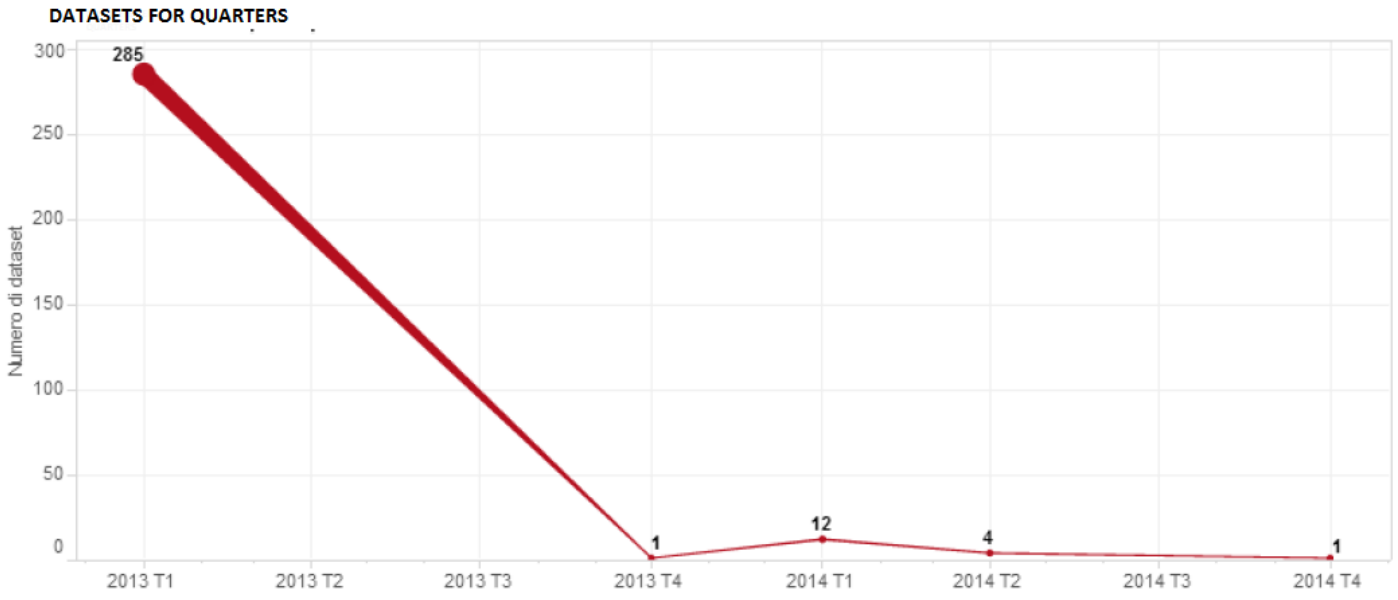


Figure 61
Source:http://opendatasicilia.it/2014/12/17/opendata-al-comune-palermo-il-punto-un-anno-dalle-linee-guida/

In fact, it is more common that data use follows a pattern of behavior more similar to the dashed line in Figure 60 (a), in fact, an esponential growth may be the exception rather than the norm when considering the value creation of opening government data. Likewise, meaning conflict among citizens attempting to use the information counterbalances the virtuous cycle and actually shut down (for a brief time period) the release of data (Figure 60 (b) shows this impact).

In the light of both these assumptions and according to the field research conducted on the process of openness started by the Municipality of Palermo, the model that will be described in the following sections is a conceptual attempt to explain the patterns of behavior of system through Causal Loop Diagram (CLD) and stocks and flows map (SFD). More specifically, the CLD will be used to outline the overall process of the Open Government Data, relying on the relations of cause and effect highlighted in the literature and according to the results of the administrated survey as well. Later, we will reduce the boundaries of the system so that the System Dynamics methodology will be applied to the municipal Open Data policy, particularly, by focusing on the OD's re-use to analyze its emerging effects. Subsequently, System Dynamic learning scenarios will be simulated to show how citizen's involvement (stakeholders), through carrying out Living Labs events, can contribute to reduce **meaning conflicts**, measured as a percentage of the database released, meaning that, the higher the percentage of "meaning conflicts", the lower the response to user's requests submitted to the Administration (in terms of both quantity and quality of datasets) and consequently the feedbacks received. In turns, a lowering in "meaning conflicts" enhances the **value of information**, in terms of the quality of data provided (stars-value scale of Tim Berners Lee). These

two variables are the keys that allow the possibility of reusing available open information to develop Apps. Furthermore, the development of Apps through skilled users involvement provides citizens with the possibility to take advantage from new or improved services without additional costs for the Administration and with a positive impact on the public value. The latter, for the purpose of modeling learning scenarios, mentioned above, will be measured as the change in trust in the Open Government policies undertaken by the local administration in the citizens' perception.

4.5.2 CAUSAL LOOP DIAGRAM

Causal Loop Diagram(CLD)[284], as one of the tool for our research, will provide a qualitative analysis by showing the main interactions among the identified variables within the framework of Open Data Government in the Municipality of Palermo.

In Fig. 62 the CLD shows seven reinforcing loops and four balancing loops.

In the first loop R1 more Open municipal information has a positive impact on Open data fitness to reuse and therefore in Public Value. The latter thus leads to a direct improvement of the Pressure to Open information. More pressure to open information will generate an increase in the effort of making information available, in terms of technical development, which positively affect Open municipal information.

The second loop R2, starting from the Pressure to Open information, shows the positive relationships with the Effort of making Open Data fitness to reuse, always in terms of technical development, and therefore the positive impact on Open Data fitness to reuse. The latter will affect directly Public Value and again the Pressure to Open information. The third reinforcing loop, R3, shows how Open municipal information directly affect the Value of information which in turn has a positive effect on Stakeholder participation and therefore in Living Labs events. Living Labs in turns have indirect relationships with Potential conflict in meaning (i.e. diminish), which has a positive impact on the Pressure to hide conflicting information. The latter, in turn, indirectly affects the effort of making information available (i.e. diminish) and therefore the loop will be closed with the positive impact on Open municipal information. R4, starting from the Value of information, shows how this variable affects positively the Stakeholders' participation and hence Living Labs events which, in turn, directly impact on the Value of information itself. The above Reinforcing Loops thus will be balanced by the following related two Balancing Loops.

[284] "This instrument illustrates and explains feedbacks generate inside the service. Those feedbacks can be either reinforcing or balancing. Reinforcing loops are self-reinforcing. The arrows indicate the causal relationships. The + signs at the arrowheads indicate that the effect is positively related to the cause. Balancing loops are self-correcting. They counteract change. The – signs indicate the effects is negatively related to the cause. All systems no matter how complex, consist on networks of reinforcing and balancing feedbacks" (Sterman, 2012).

The first balancing loop (B1), starting from Open municipal information, shows as the latter affects positively Potential conflict in meaning and then follows the same path we have seen in R3.
This relationship points out how opening information, without contextualize information in living labs through the skilled citizens' involvement, can increase the potential conflicts in meaning between the Municipality and Stakeholders.
The second balancing loop (B2) thus shows the positive relationships among Potential conflict in meaning, Pressure on contextualize information and therefore Living Labs Events. The latter, in turn, negatively affects Potential conflict in meaning (i.g. diminish), by showing that the increase in these events enhances the quality of information released.
In the Loop R5, more Open municipal information increase Knowledge Sharing, improved also by the contribution of research and business but reduced by the negative effects of the digital divide. Knowledge Sharing, in turns, will allow to increase the pressure on Accountability and therefore in public value. From here the path will be the same as the loop R1.
In R6, Open municipal information shows a direct relationships with Citizen complaints, allowed in terms of technical development, which directly affects the Desired Service effectiveness, the Gap in service effectiveness and in turn the service effectiveness itself. The latter therefore will affect positively Public value, in terms of perceived Trust. From here the loop follows the same path explained above in the loop R1.
R7, starting from Value information, will focus on the relationship with App development which, in turn, leads to get greater Service effectiveness. From here the loop follows the same path explained above in the loop R1.
The last balancing in loops, B3 and B4, show respectively: the former, the positive relationships between Citizen complaints and proposals, Desired service effectiveness, Gap in service effectiveness and Service effectiveness which, in turns, has a negative impact on Citizen complaints (i.g. diminish). The Latter B4 is a feedback loop between Service effectiveness and the Gap in Service Effectiveness. As showed in the following figure:

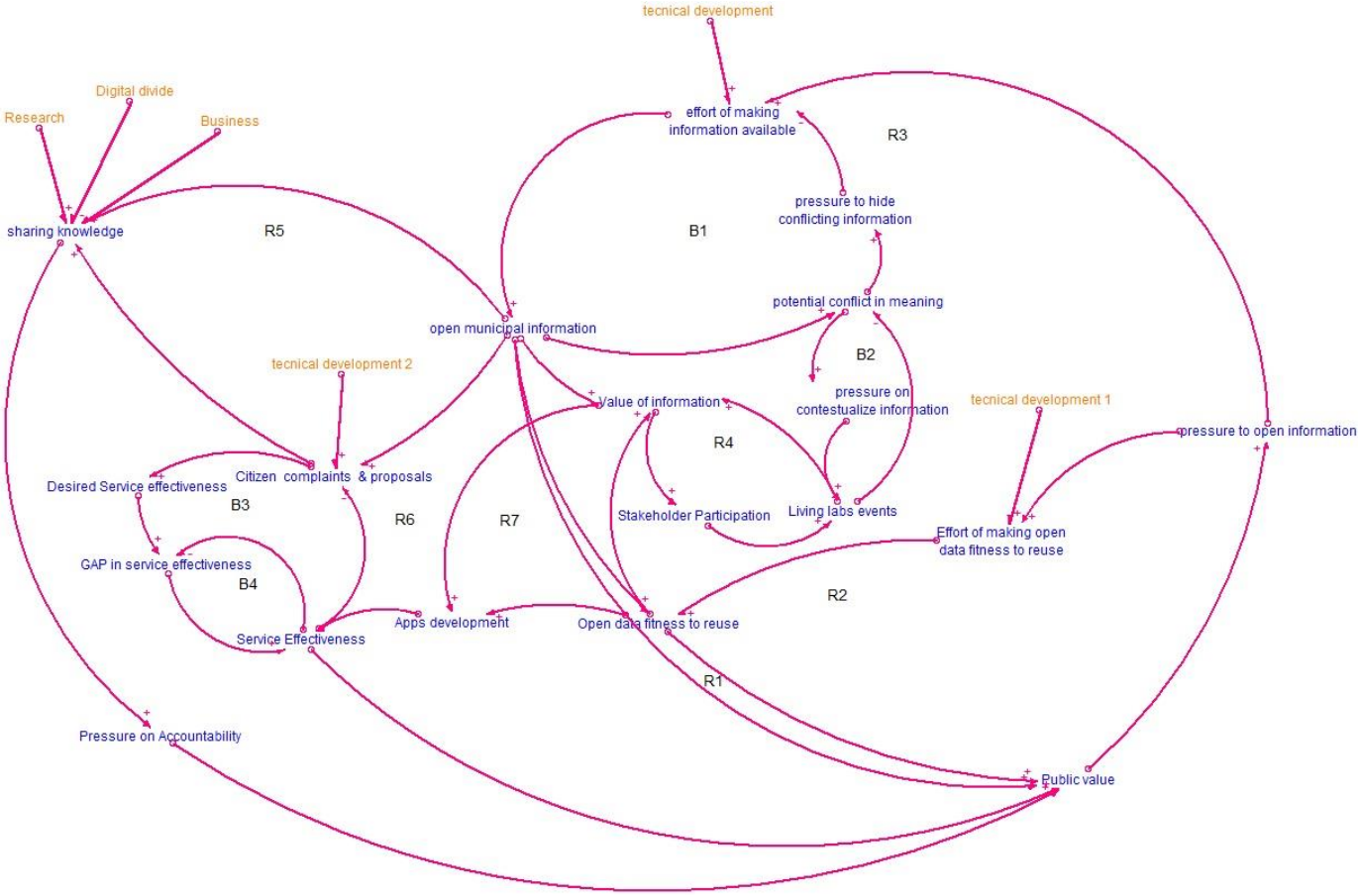


Figure 62
Causa Loop Diagram

4.5.3 CAUSAL MAP TO FRAME OPEN DATA INITIATIVES

System Dynamics is one modeling approach that can assist in uncovering the complexity of Open Data initiatives. This approach uses causal maps to visualize a systems structure and behavior. The basic building blocks of a causal map are stocks, flows and feedback loops. Stocks, represented by 'boxes', as we have already seen, are any entity that accumulates or depletes over time. Flows, represented by 'valves', are the rate at which the stocks change. A variety of factors contribute to the rate at which a stock changes over time. A feedback loop exists when information resulting from some action within the system (endogenous) travels through the system and eventually returns in some form to its point of origin and potentially influences future action. As mentioned in the previous chapter on methodology, a loop can be reinforcing or balancing. If the tendency of the loop is to reinforce the initial action, the loop is called a positive or reinforcing feedback loop. Reinforcing loops are sources of exponential growth or collapse. When positive, they are considered a virtuous cycle. If the tendency of the loop is to oppose the initial action, it can be thought of counteracting or constraining the reinforcing loop which balances or prevents change from happening. System dynamics is a simulation method that works under the assumption that

observed behaviors over time – like the amount of available information or the value generated by this information – are explained by endogenous (internal) feedback processes embedded in the system. System dynamics, therefore, will be chosen as one tool to show how modeling can improve our thinking about Open Government Data initiatives. The following causal Stock and Flow map is a conceptual explanation therefore it presents only a smaller set of important casual relationships and feedback processes, which will be fully developed in the next simulation model. Learning scenarios, therefore, will be designed to explain the behavior observed in this case. In this respect, learning scenarios will be examined to verify the following dynamic hypotheses:

- H1 Information Value (measured on the Scale of Tim Berners-Lee): this will be positively influenced by Living Labs (understood as bottom- up model approach) therefore the higher information value will increase the development of Apps to improve services effectiveness.
- H2 Living Labs will positively affect stakeholders' involvement and consequently effectiveness in contextualizing municipal information in new Living Labs events.
- H3 Living Labs will negatively affect (i.e. diminish) potential meaning's conflicts in opening municipal information and therefore will increase the pressure to contextualize information through new Living Labs events.
- H4 Information value will positively affect public value, in terms of perceived trust in the open government process, and therefore increase pressure in opening information process.

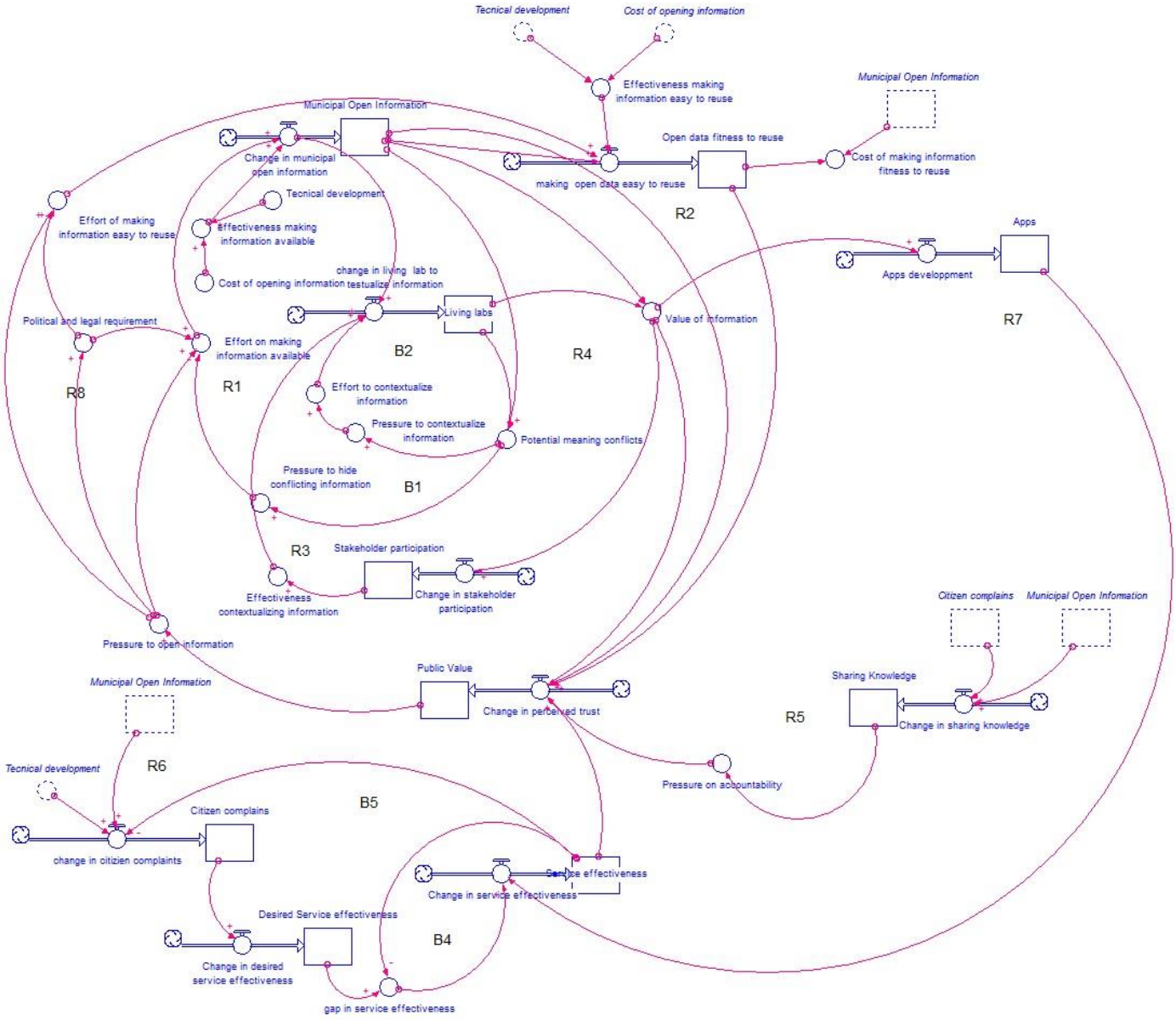


Figure 63
Stock and Flow Map

4.5.4 MODELING THE INFORMATIONAL RELATIONSHIPS BETWEEN GOVERNMENT AND SOCIETY

The many benefits of pursuing Open Government through technology and information centric strategies are noticeable[285]: (a) ***internally*** governments are seeking ways to enhance their own productivity, whether through using citizens to do the work (co-production), providing employees with more knowledge to help lead behaviors, or simply by making more efficient and effective requests for information (e.g., freedom of information requests) and (b) ***externally*** governments are looking to maximize citizens' potential to make government accountable and drain wasteful spending (e.g., citizen auditors), provide citizens with more choice (e.g., smart disclosure), or stimulate economic development through the public re-use of government data. However, research and practice also raise caution about the negative aspects, such as the risk (or reality) of creating a new type of information divide or stimulating changes in behaviors that make things more secretive than open (e.g., relying on confidential classification to avoid openness).

According with Theresa Pardo, it may be claimed that a System Dynamic approach to analyzing information polities around open government initiatives contributes to our understanding of open government initiatives in a couple of ways. First, thinking about key dynamics and activities in the system allowed us to identify potentially important factors, such as the **context of information** and how current Open Government policies lack of emphasis on this factor may explain low levels of use in general. On the other hand, by thinking about the dynamics of new technical developments, such as the ease of opening information and making it more fit to re-use, we can see the possible impact on public managers. That is, the primary focus on technology distracts public managers from a focus on context, thereby increasing the focus on posting machine-readable data sets in a way that does not necessarily create public value. Below, will be followed an initial conceptual model which also suggests that involving key stakeholders is important to improve the chances of creating public value through opening information, although involving them also implies the initial cost and effort associated with engaging them in the project will be higher, sacrificing efficiency. However, not involving them in early stages of the project implies the risk of running into other political and economic costs related to fixing the information after it has been released.

The key objective of the research, in fact, is to improve understanding of what shapes the value generated through opening government initiatives. That understanding can guide the way forward, particularly in the area of governing public information, so that public managers can work

[285] Natalie Helbig, Anthony M. Cresswell, G. Brian Burke, Theresa A. Pardo, Luis Luna-Reyes*, *Modeling the Informational Relationships between Government and Society A Pre-Workshop White Paper*, Center for Technology in Government University at Albany, June 2012.

successfully with employees, civic hackers, citizens and other stakeholders to create new ways of collecting, integrating, disseminating, and using information in pursuit of improved governance.

In order to answer the above research question, according to the conceptual model suggested by Teresa Pardo, it is noted that the modelling process starts with opening municipal data—making available to the public the information. In this respect, the following Figure[286] shows an initial representation of this process, where the box **Government Information** represents the accumulation of government records created from government activity.

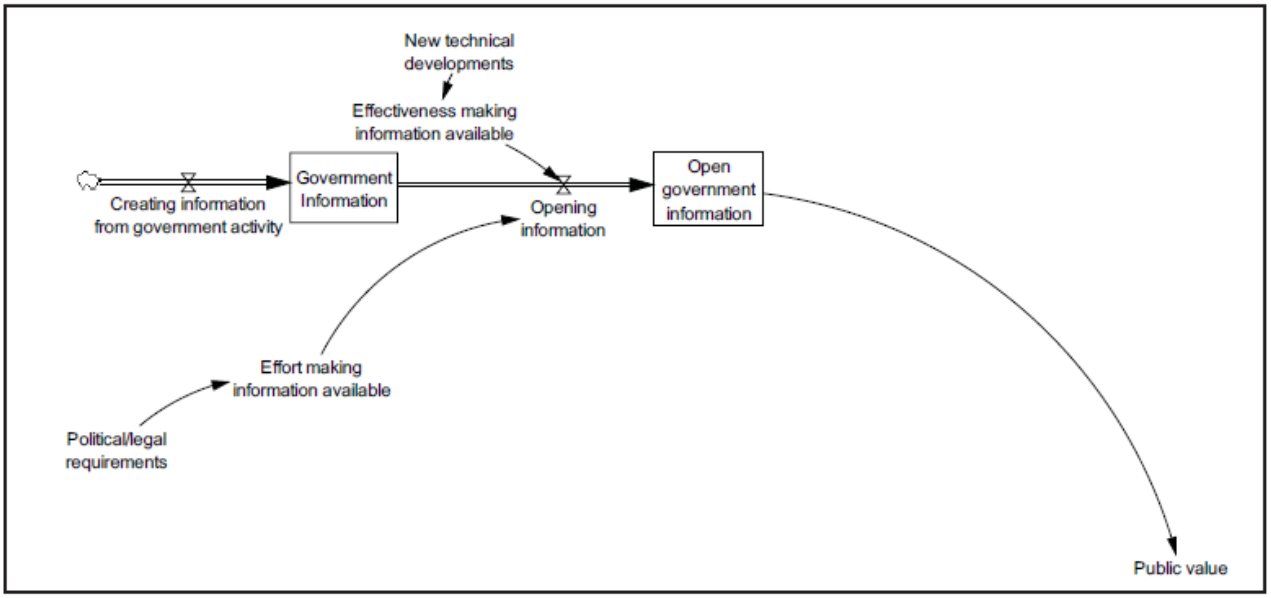


Figure 64
Making government information available

All data in this accumulation becomes candidate data to be opened to the public. The second box in the figure, **Open government information,** represents the accumulation of all open data available to the public and the valve 'Opening information' represents the activities necessary to make available such information. **Opening information** adds to the accumulation of available Open government information over time. To make this happen, Administration needs to allocate some effort to opening information. Every (person*hour) of effort varies on how effective the person is, which reflects that the most experienced people will be able to open more information with the same effort. As it is shown in the figure, departments' efforts to make information available may be increased or decreased by political or legal requirements. On the other hand, new technical developments may contribute to people's effectiveness in making this information available. Of course, the expectation of Administration is to create public value by making information available to public.

[286] Natalie Helbig, Anthony M. Cresswell, G. Brian Burke, Theresa A. Pardo, Luis Luna-Reyes*, *ibidem.*

4.5.5 MAKING MUNICIPAL INFORMATION 'FI T-FOR-REUSE'

Public Sector's information has been available to citizens long before the Internet or Open Data initiatives. However, the effort needed by citizens to physically get this data has been reduced over time. First, the Internet made it easier to post and access and second, recent platforms and format changes make machine-readable data more fit for re-use in different applications.

Figure 65 represents these changes in technological ease over time by adding a second set of stocks, **Government information fitness to re-use**, and **Open information fitness to re-use.** The boxes in the figure represent the way in which the characteristics of information have been changing over time. The box '**Fitness to re-use**' in the figure represents the accumulation of all data available to the public, and the valve '**Making information easy to re-use**' represents the activities necessary to make available such information machine readable.

Making information more fit to re-use also requires departments to allocate some effort to the process, and it is most likely that departments will also have different levels of effectiveness in accomplishing this task. As it is shown in the figure, the amount of effort to prepare the information also depends at least partially on political and legal requirements, and effectiveness also depends on technical developments. However, by placing a variety of related information together in HTML or PDF formats on the website reduce the effort of gathering this information. But, a citizen would still need to print, re-type it or pre-process it before being able to re-use it. Today's tools make machine-readable formats quite easy to re-use and as a result, new applications are developed to encourage mobile use of the information. The development of XML, for example, makes it easier to prepare information to be machine readable, and the Open Government policy in the Municipality of Palermo has clearly increased municipal effort to both open information and make it more fit to re-use. The following figure also shows how making information more fit to re-use will contribute to public value creation by reducing the costs of using the information in new and innovative applications.

The valves **Archiving information** and **Making information easy to re-use** are fed by the municipal activities needed to make such information available in any format. The release of data offers insight into the municipal processes for archiving and making it fit for reuse.

In the municipality of Palermo there are a variety of candidate data sets to be made available to the public. When trying to balance resources, time, and effort, choosing which data to pay attention to is not an easy task. Interviewees and survey's results consider the commitment from data owners to provide feedback to users as a key factor for success. The current data management practices of the municipal departments that own the data therefore is aimed towards this commitment's enhancement in order to increase the effectiveness of making data more fit to re-use.(e.g. geo-

reference). Good data management practices, in fact, firstly, should reduce potential conflicts in meaning by providing users with the information they need, then, the cost and effort of making information available and increase the probability the data will be opened and easy to re-use. On the other hand, poor data management practices will increase the cost and effort required to open data and make it available in machine readable formats.

Another important aspect is the quality of data management practices. Good practices involve providing excellent metadata suitable for the purposes of opening government data. The developers of the applications (Apps) in Palermo underline how the excellent quality of metadata makes it easier to, first, imagine what kind of application could be built and second, to make a quick assessment that the app's development would take approximately. These decision points is very important in making decision of whether or not to build an application.

Making information more fit to re-use requires municipal administration allocate some effort to the process and it is likely that departments will vary in their levels of effectiveness in trying to accomplish this task. The amount of effort to prepare the open information, in fact, depends, at least partially, on political and legal requirements. In this respect, the municipal Open Data guidelines (i.e. political and legal requirement) have clearly pointed out the need to increase effort to open information by making it more fit to re-use.

According with Theresa Pardo's claims in this field, it is possible begin to see the virtuous cycle and the constraints described above. According with the Center for Technology in Government at University of Albany's study, it is possible assume that in the last 25 years access to government information has been increasing, with two main points of rapid growth, one of them around the mid 90's with the introduction of the Internet (and transparency legislation), and a second around 2012 with the starting of Open Data policy. We can also assume that Fitness to re-use has increased over time with new technical developments, with an important push around 2013 when political and legal (guidelines) requirements mandated the Municipality of Palermo to allocate more effort to this task. Globally, local government is endorsing an Open Government policy. However, commitment of data owners and current practices in data management remain limiting factors both in terms of data availability and their fitness to re-use, as pointed out in the survey's results. Considering that around the 26% of the interviewees perceive the datasets' value very low (1 in a scale from 1 to 5).

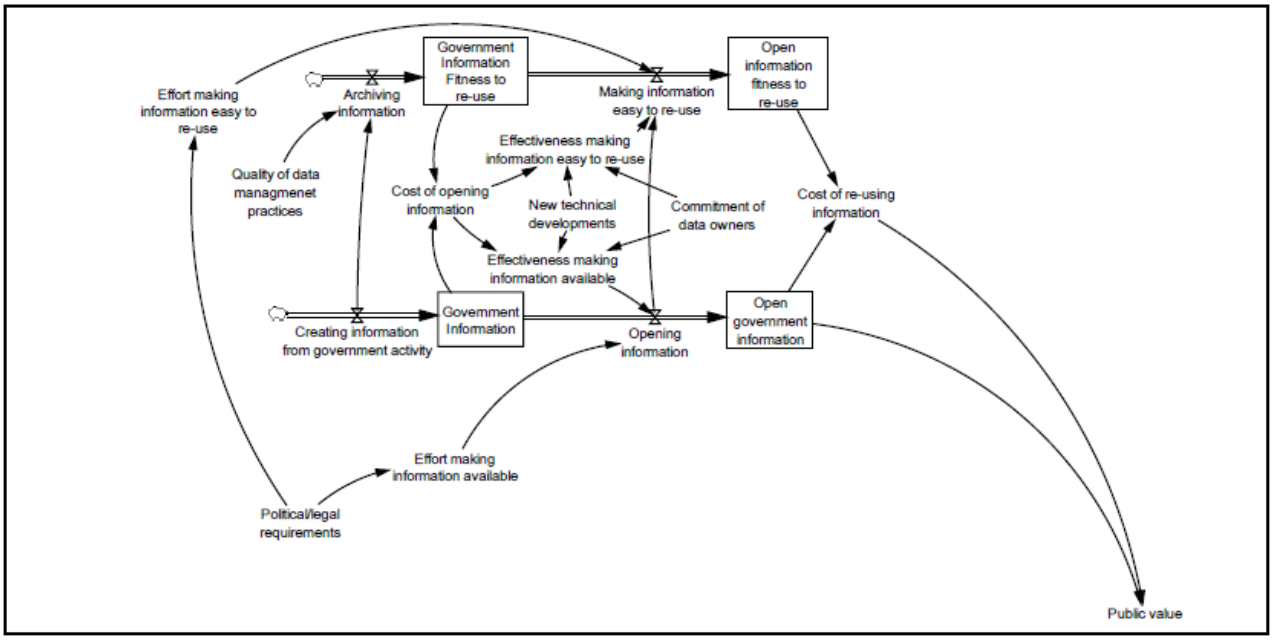


Figure 65
Making open information fit for re-use.

4.5.6 CONTEXTUALIZING OPEN GOVERNMENT INFORMATION AND CREATING VALUE

It is not enough to focus only on the technical components of opening government data, strategies must also consider the social aspects of information more generally, particularly providing sufficient context for information use. The effort the Municipality of Palermo makes to contextualize the information for use among diverse audiences and users is a key factor for the sustainability of the policy of opening up data.

As pointed out during the overall discussion, in fact, the whole process of opening data in the Municipality of Palermo is based on the involvement of stakeholders. Just stakeholders, in fact, have pressed so that the opening of the data to be realized over formal adherence to the Transparency legislation, making the data available in formats that would allow reuse.

With the membership of the Municipality of Palermo to the European project "Citadel on the Move", the activity of stakeholder involvement has been achieved through the organization of Living Labs, regarded as events to contextualize information. In such contexts, the stakeholders have had the opportunity to share with the municipal Administration their needs both related to the content of data available and to the format making them easy to reuse. This in order to achieve the common goal of creating new or improved innovative services with a consequent impact on public value. In light of the above, as follows, the box **Living Labs** acts for a third accumulation in place of the box labeled as the **Context information**, as shown in figure 66.

As is the case with the other two accumulations, this one requires effort to be developed, and also contributes to value creation by increasing the value of the information. According with Teresa

Pardo, it can be argued that this dimension of Open Government is not always addressed by municipal administration and technical developments cannot help much in improving it, given that this characteristic is closely related to the value of information for specific stakeholders, purposes, and applications. This fact limits, to different degrees, the extent of potential public value created by Open Government initiatives themselves, which may partially explain the existence of many data sets already available which are not used by anybody in useful applications. Although, in any cases, the information is machine-readable, it cannot be contextualized in a way that might generate value, and no set of stakeholders exist (yet) that find value in that information.

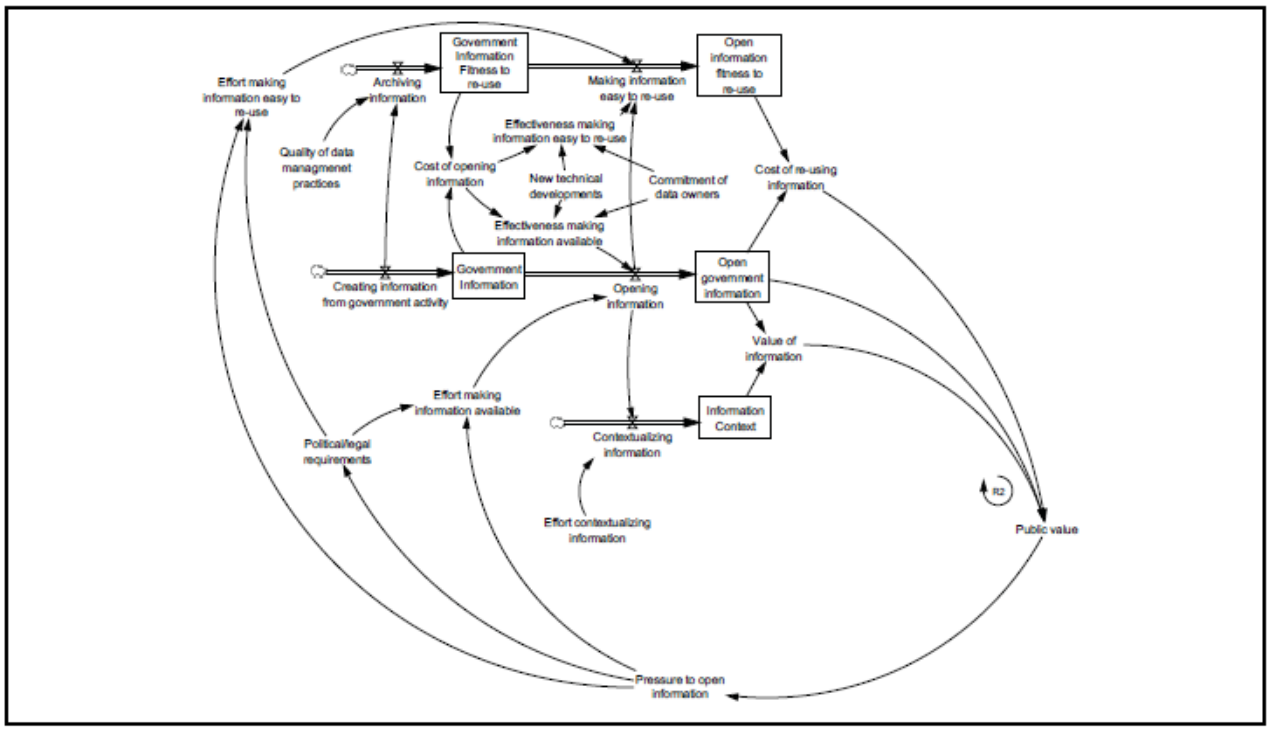
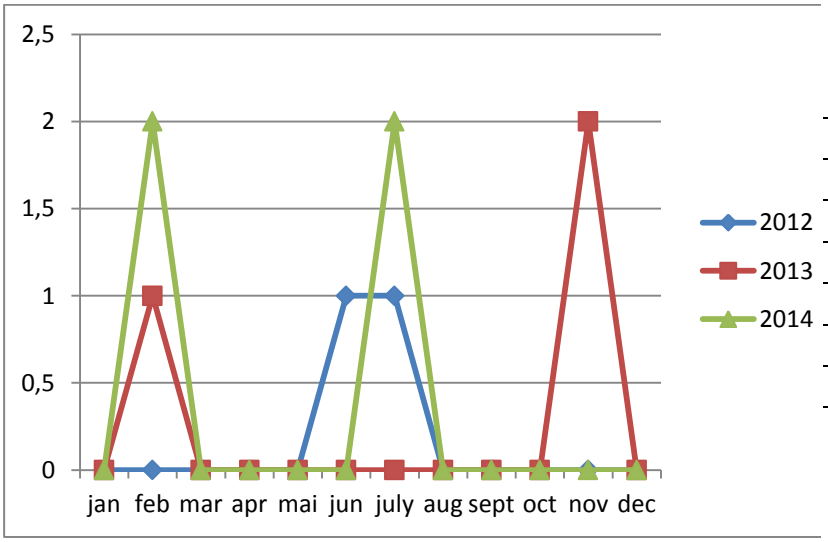


Figure 66
Contextualizing open government information and creating value.

In this framework, the dynamics of providing context are often not addressed by the Municipality when designing open data initiatives. Living Labs context, in fact, can be arranged by the users themselves in a bottom-up approach that allows to achieve better results without additional cost to the Administration. Providing additional context makes the data more fit for use by various audiences and users, which contributes to public value creation by increasing the value of the information. Since technical developments do not help to improve context, it may partially explain why the availability of so many open government datasets has not generated the uptake of use first envisioned. Contextualizing information (meaning its general quality, usability, and usefulness)

makes it more relevant when using it for diverse applications. Thus, **stakeholder involvement** is a way to increase the effectiveness of contextualizing information.



LIVINGLABS EVENTS	
giu-12	LivingLab Barcamp Palermo
feb-13	International Open Data Day
apr-13	Linux meeting Open Data
nov-13	Startup weekend
feb-14	International Open Data Day
apr-14	ApPalermo Contest
lug-14	Apps for dummies
nov-14	Pa-working

Figure 67
Historical Living Labs events to contextualize information

Figure 68
Historical relationships between Open municipal information and Living Labs events to contextualize information

The next figure shows the making of Living Labs, aimed at contextualizing information, which allows citizens to participate in the process of providing efforts to contextualize information and at the same time in the process of agreeing on both content and quality of data to be opened and ways to present this data in order to create value.

In the figure, can be observed three possible reinforcing (virtuous) feedback loops labeled as ‘R1’ and ‘R2’ and ‘R3’. As noted earlier, a reinforcing loop is a virtuous cycle that contributes to exponential growth or decline in public value, but over time, constraints are engaged. However, as argued before, according with Teresa Pardo, ‘reinforcing processes can represent an initial trap’. It is hard, in fact, in the beginning to get stakeholder involvement because they are uncertain of the value of the information.

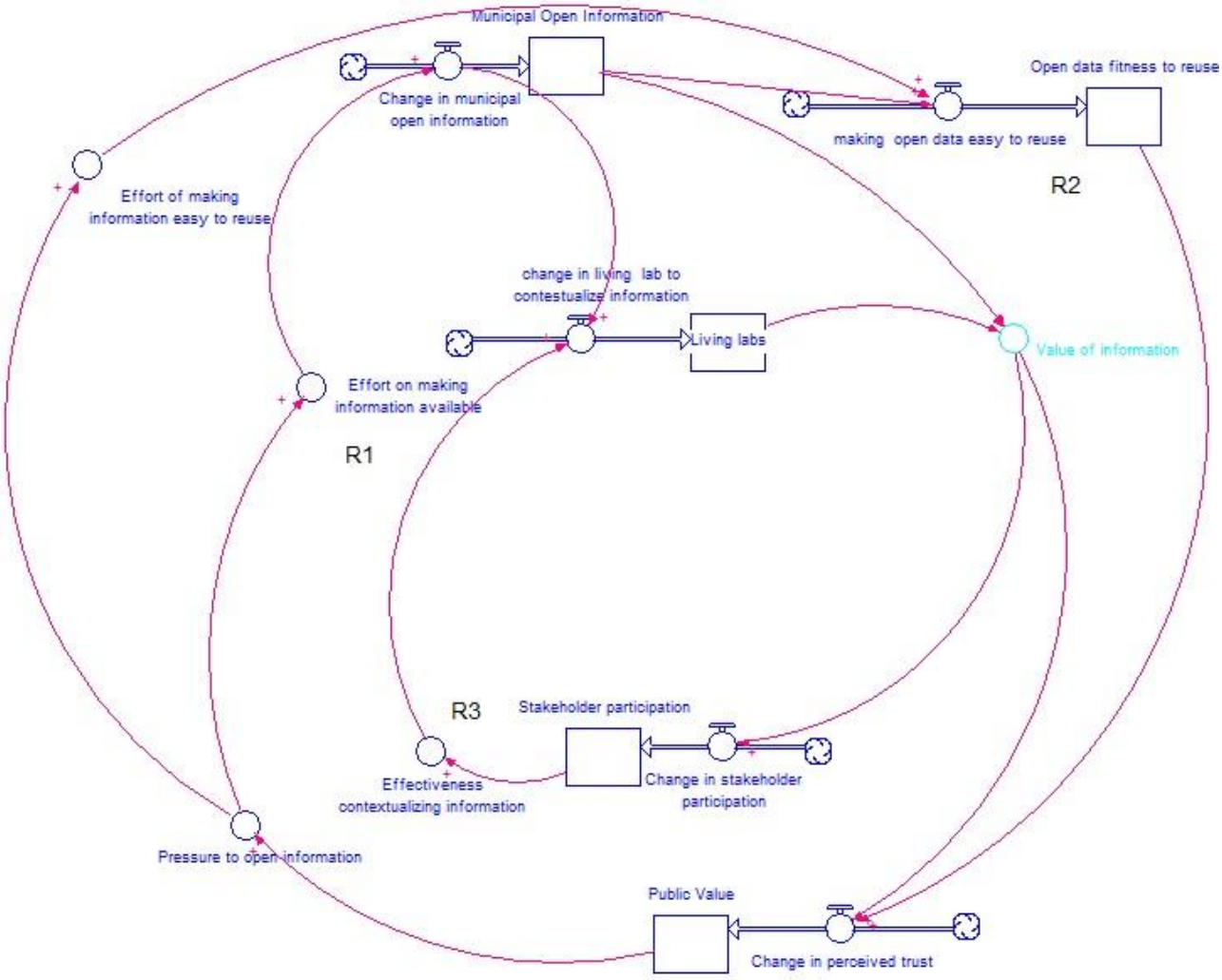


Figure 69
Living Labs’ efforts to contextualize information

4.5.7 CONFLICT OF MEANING

Further to that, the following figure shows one possible feedback process labeled as ‘R2.’ This feedback processes implies that the creation of public value through opening information will create public pressure to open information, pushing Municipality to allocate more effort to this activities,

and thus creating more value. As it is well known, a feedback loop exists when information resulting from some action travels through a system and eventually returns in some form to its point of origin, potentially influencing future action. If the tendency in the loop is to reinforce the initial action, the loop is called a positive or reinforcing feedback loop.

Reinforcing loops are sources of growth or accelerating collapse; they are disequilibrating and destabilizing. (Richardson, 1999).[287] This positive loop process of value creation is virtuous cycle, but can be a trap during initial stages of a project, when there is still little or no value, and there is no pressure (from stakeholders because no polity is formed), and no added effort.

However, in some cases, the context provided along with the information may trigger other feedback processes that may pose significant challenges and even stop such initiatives. For example, **the lack of context of the information creates potential conflicts in meaning, which may trigger two other feedback processes labeled in the figure as B1 and B2**. These processes are different to the reinforcing process explained before, and instead of promoting change, prevent change from happening. These negative or balancing loops have a tendency to oppose the initial action and can be characterized as goal-seeking, equilibrating, or stabilizing processes (Richardson, 1999). In our case, **meaning conflicts** created pressure to hide public information, reducing the effort on making information available or even eliminating already public information (process B1). On the other hand, this same **conflict of meaning** may trigger a pressure to carry out Living Labs to contextualize the information, increasing such effort, and potentially improving the quality of the information (process B2). Some constraints even have the potential to shut down an initiative. The lack of information context, in fact, can create a conflict in meaning, or misunderstanding of the underlying or intended data element. This conflict of meaning triggered the two other feedback balancing loops labeled in the figure as B1 and B2. In this case, conflict of meaning for some data elements creates negative pressure to hide public data, reducing the effort by the Municipality of Palermo to make the data available or even forcing the political/legal areas to create safeguards to eliminate easier public access to the already public data (see B1). On the other hand, the same conflict of meaning may trigger positive pressure to contextualize the information, increasing Municipality's efforts and potentially improving the quality of the information that will lead to public value (process B2), as we can see in the following figure:

[287] Richardson G (1999), 'Reflections for the future of system dynamics', Special issue on system dynamics of Journal of the Operational Research Society, Vol. 50, No. 4, pp 440-449.

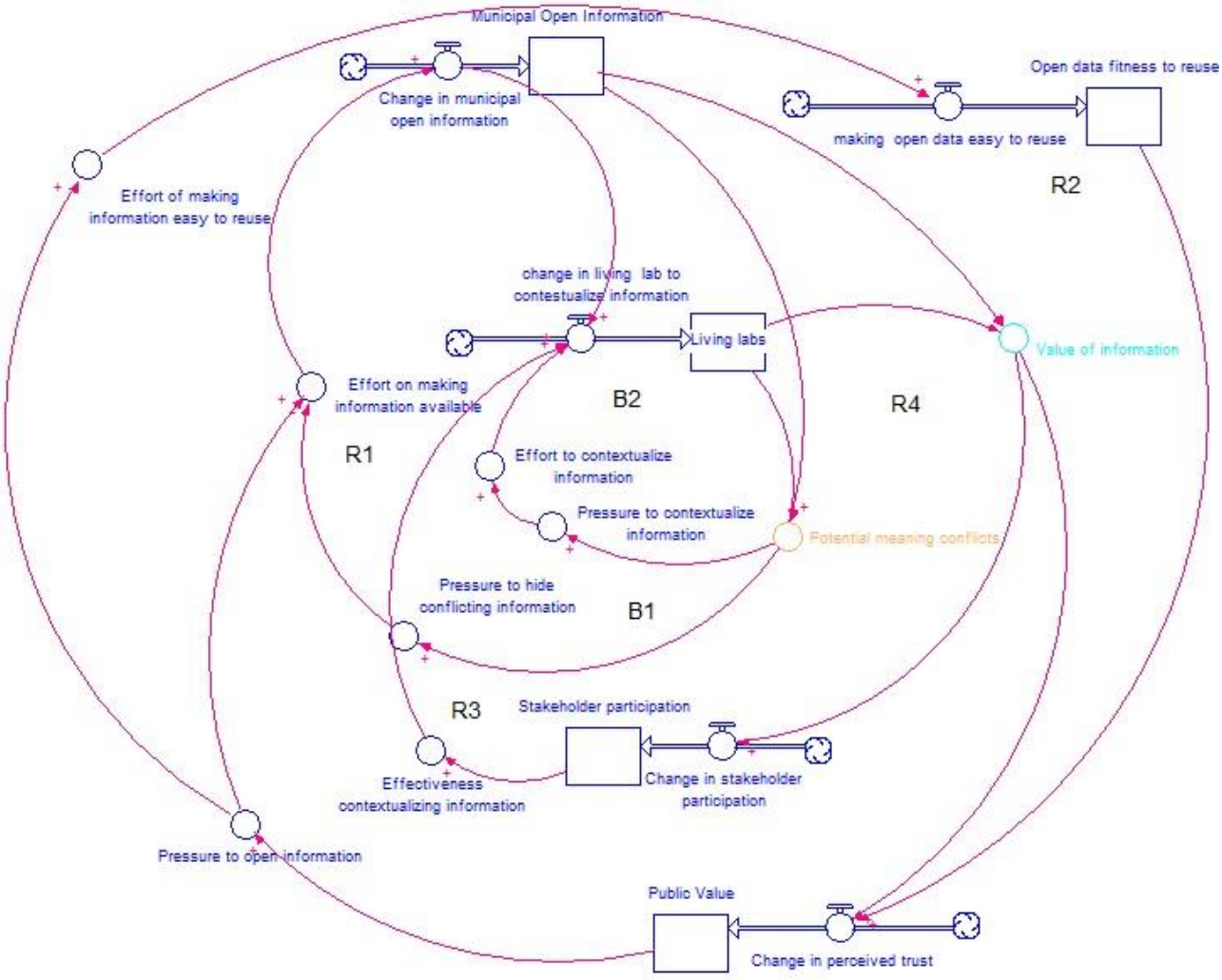


Figure 70
Potential meaning conflict in opening government data projects.

According with Teresa Pardo, it can be noted that when a feedback loop (B1) is dormant, it means that possibly the Municipality provides the information in the same way it has released the primary information without providing any, or additional, context. Releasing the data in this way will not create meaning conflict or create any pressure to hide the information. However, both other feedback loops remain active (R1 and B2). As noted in the case, a variety of new stakeholders are encouraging the Municipality to make more frequent updates to the data or provide additional data fields that will improve the value of the information for their new and intended uses.

It is possible thus argue that these two feedback processes operate also in the municipal information's release, creating important political and economic costs to improve the validity of the information. That is to say, the governance of the public information resource is not only about preparing information systems, but also about adapting internal government policy, processes, and regulations. Information value, in fact, is not only based on the type of information being presented, but also on the form in which it is available and presented. The effort directed toward

contextualizing information thus includes efforts in gathering and preparing data, whose value, for the purposes of this case study, will be recognized in accordance with the stars-value scale of Tim Berners Lee. Finally, the case also shows that stakeholders' involvement is a way to increase the effectiveness of contextualizing information. Citizens and stakeholders can participate in the process of agreeing on types of data to be opened and ways to present this data in order to create value. However, as mentioned before, reinforcing processes in the stakeholder involvement (R3) can represent an initial trap, making it harder to get stakeholder involvement in the initial stages of the project because there are uncertainties related to the value of the information and the Open Data's system itself.

4.5.8 DEVELOPING APPS AND CREATING VALUE

The following figure shows that public value creation from opening the data is increased by the development of mobile or Web applications, as seen in the above reinforcing loop R7. This loop contributes to value creation by providing improved services to more users, specifically, those who download the App. Furthermore, R7 describes how the quality of the data set for re-use (**Value of information**) incentivizes the developer's community to create Apps. In this framework, the relevance of the data, how easy it is to use, and the quality of the metadata make users's decision easier.

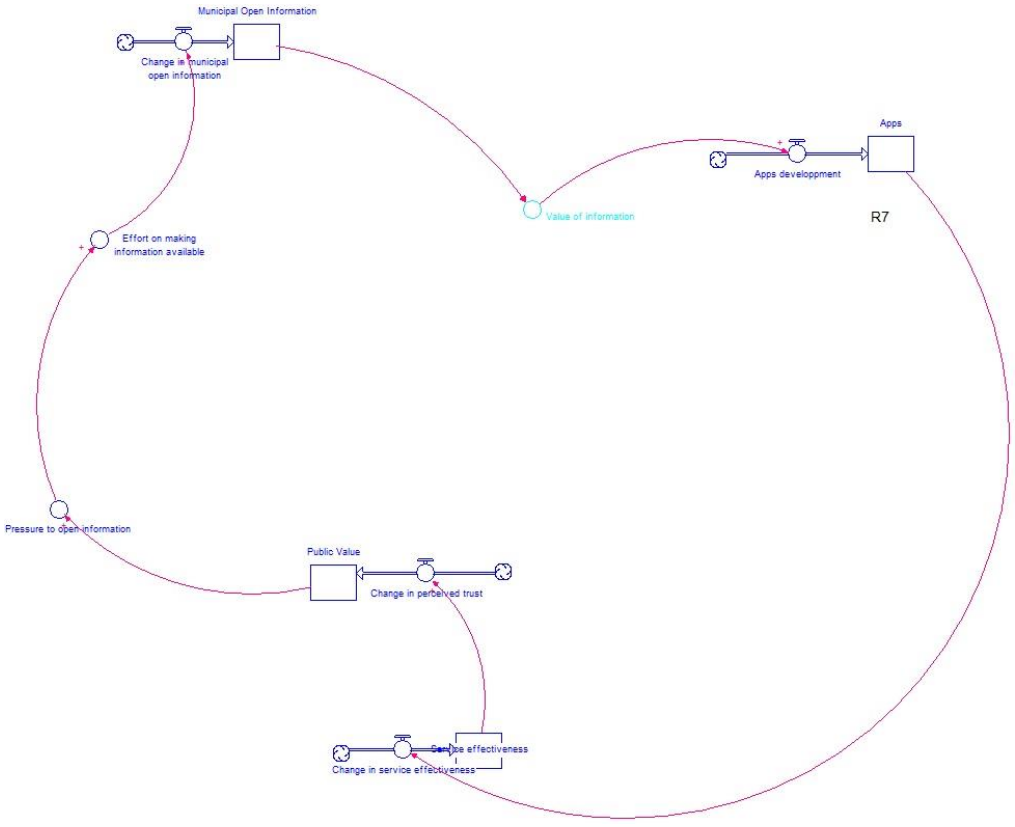


Figure 71
Application development and value creation

In the study conducted by Theresa Pardo was not analyzed direct evidence of citizen use of the mobile apps, but only presumed that the mobile apps provide additional value.

The creation of apps, in fact, put a new information source in play and provide citizen with a third channel of access. The technology, social, and political environment at the time are therefore moving together toward 'more openness' 'more collaboration' and more peer production and crowd sourcing. In this framework, also social media tools can further expand the reach of the information relationships. The downloads of apps by a large number of citizens, in fact, allow citizens themselves to become a source of information in their turn. Citizens indeed can use apps to report service problems in an open and available way to the public. Therefore, users themselves can participate in the improvement of services effectiveness. More specifically, this study is aimed at highlighting the impact that apps' availability has on the effectiveness of services provided to citizens which in turn lead to positive effects on increasing the public value, measured in terms of trust in the process of Open Government itself. Apps, in fact, allow users to use services that would otherwise not be available or, if provided by the Administration, directly to a so large number of service users, their cost would be unsustainable.

At this end, in the next section the study will try to illustrate some learning scenarios aimed at showing different outputs/outcomes emerging from Open Data government process carried out in the Municipality of Palermo.

4.6 System Dynamics modelling and learning scenarios

On the basis of the conceptual model analyzed in the previous section, a System Dynamics model has been developed starting from the above Dynamic Performance Management where have been identified the strategic resources, end-results (outputs / outcomes) and performance drivers related to the analyzed Open Data Government process. In particular, the model has been simplified in order to focus the analysis on two main key performance drivers highlighted in the previous conceptual analysis. Specifically, **Information value ratio** (Perceived Information value/Desired Information value), quantified in relation to the value assumed by information in accordance with the stars-value scale of Tim Berners Lee; and **Potential meaning conflicts ratio** (Potential meaning conflicts/Open municipal information). In this respect, learning scenarios have been built to understand the effects on the system coming from the values assumed by key performance drivers working as policy levers.

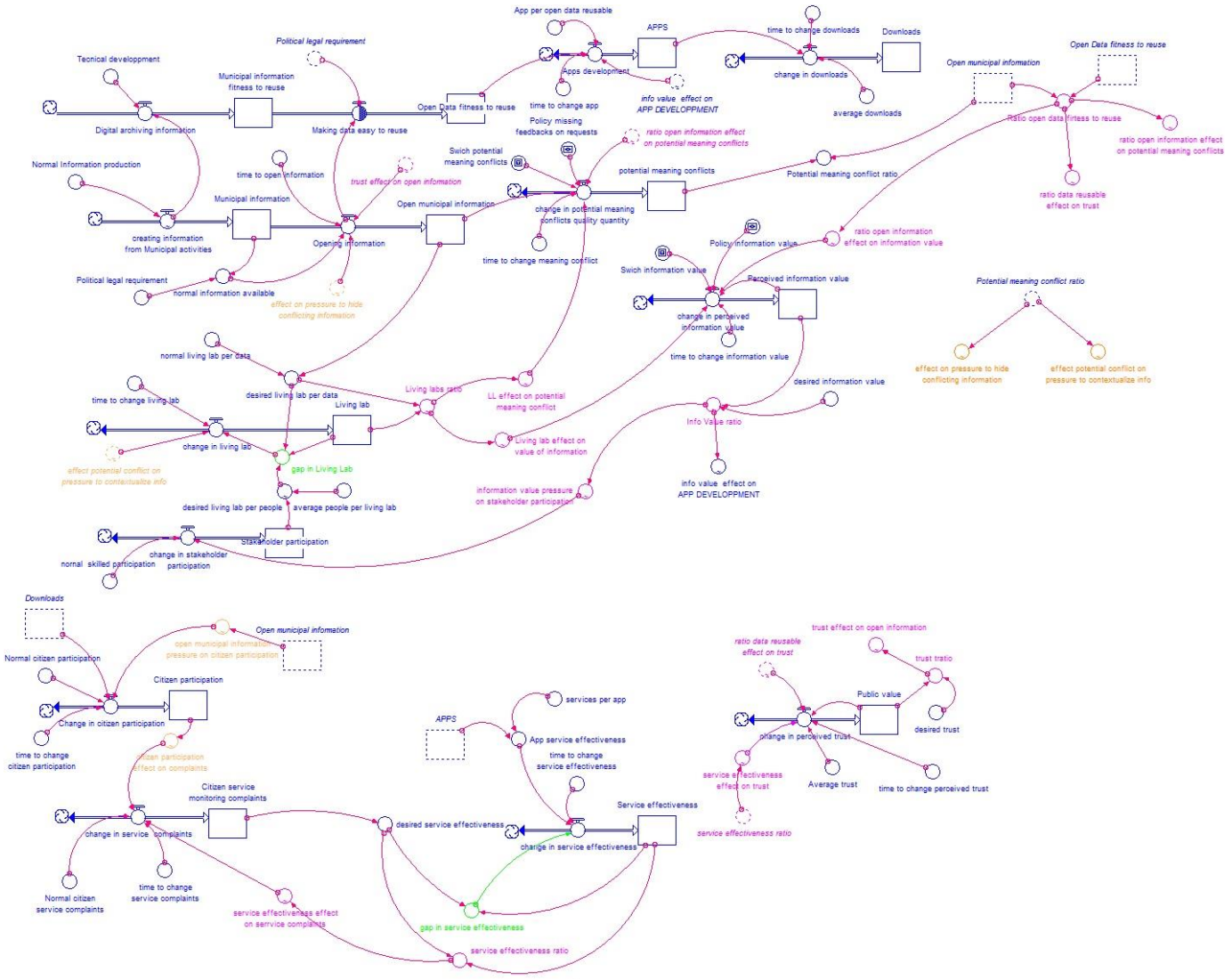


Figure 72
Learning scenarios

As follows the graphs produced by the simulation model. For the assumptions' values, to see equations in the appendix B.

Comparative behavior of potential conflicts meaning in relation to the policies adopted (0; 0.5; 1)

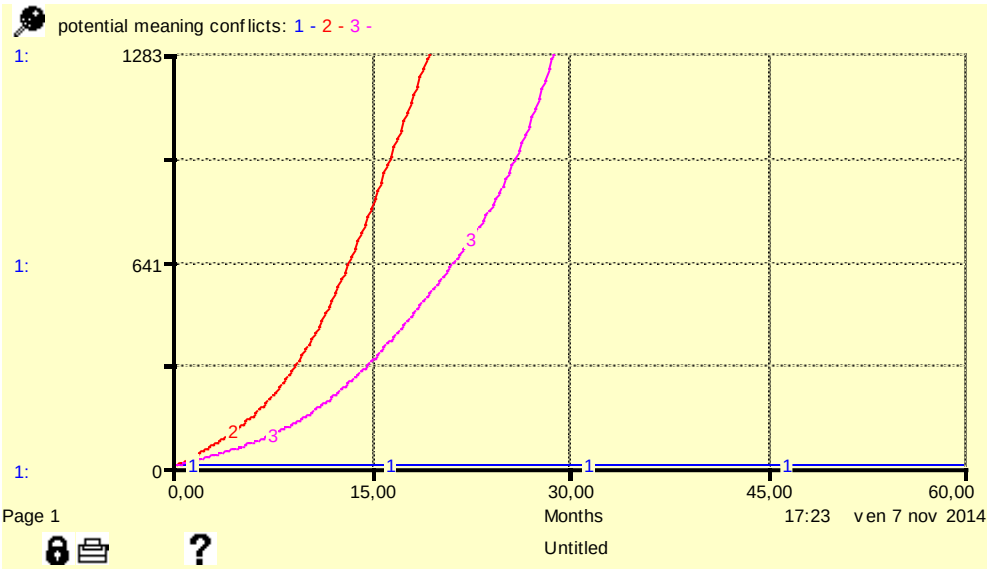


Figure 73

Comparative behavior of information value in relation to the policies adopted (1; 3; 5)
The stock's initial value point is the desired level.

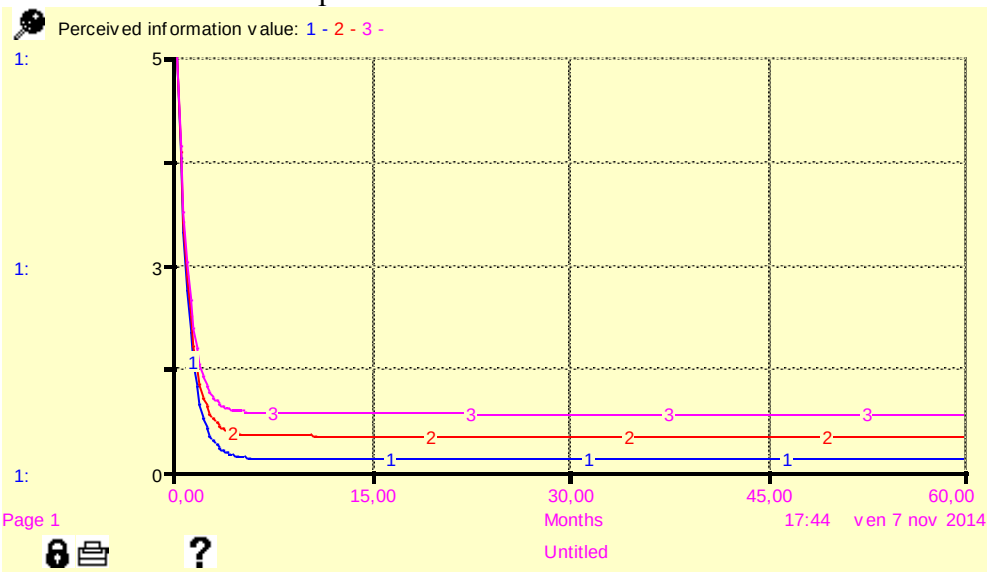


Figure 74

Positive relationships between Apps developed and Service effectiveness

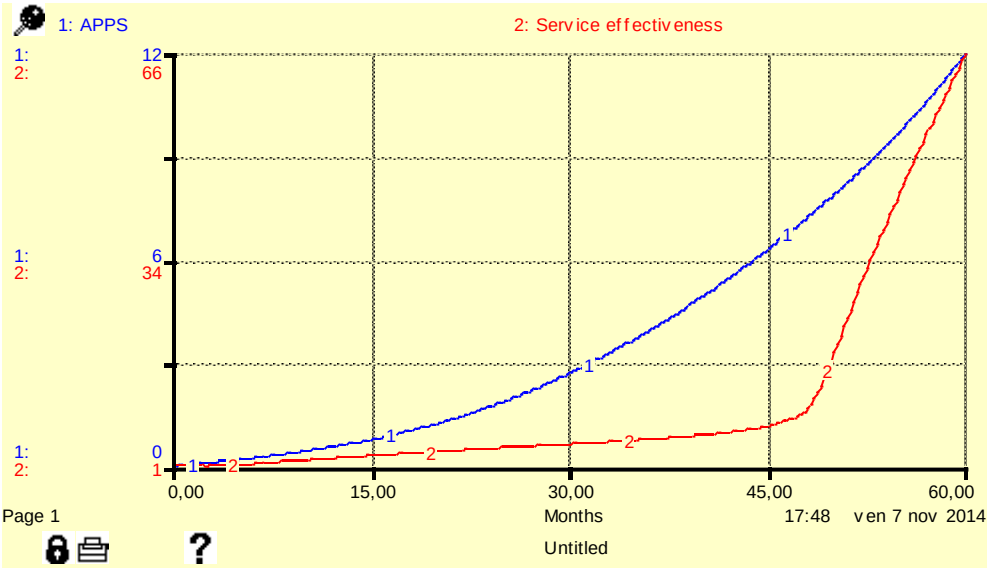


Figure 75

The following graphs show the variables' behavior related to the outlined research hypothesis:

H1: Information Value will be positively influenced by Living Labs

Figure 76

H2: Living Labs will positively affect stakeholder involvement

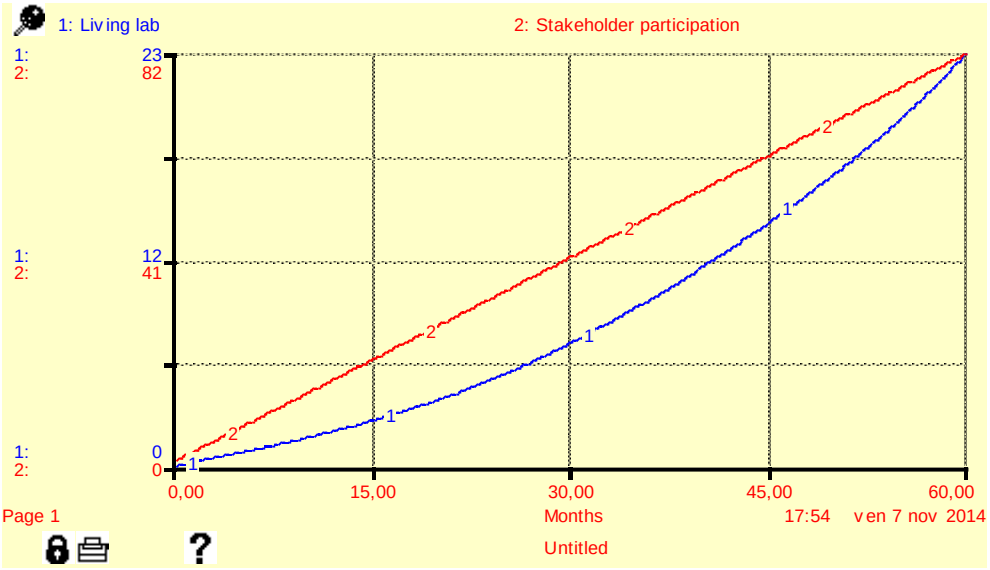


Figure 77

H3: Living Labs will negatively affect potential meaning conflicts

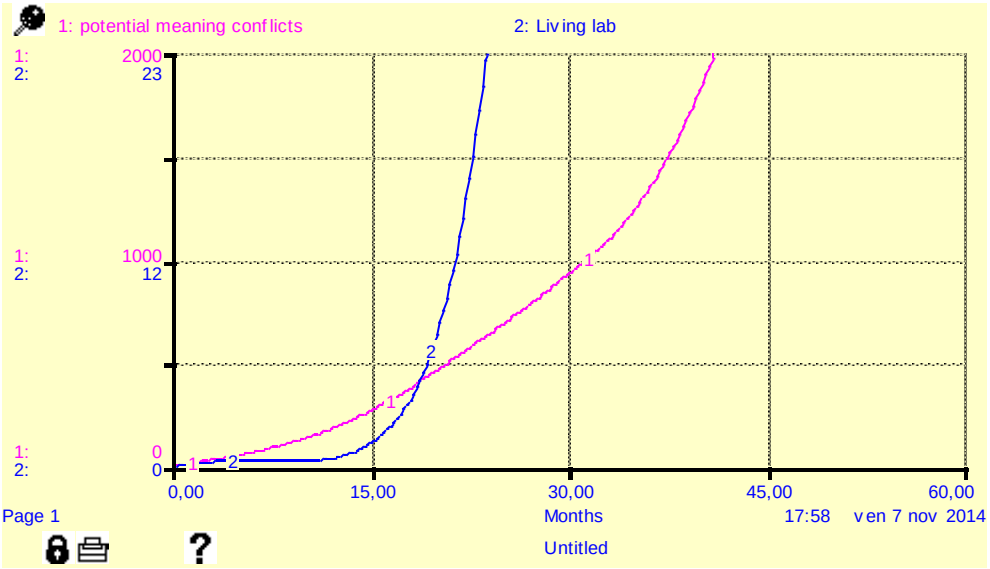


Figure 78

H4: Information value will positively affect public value (the stocks' initial value point is the desired level for both information and public value):

H4 (Policy information value = 5)

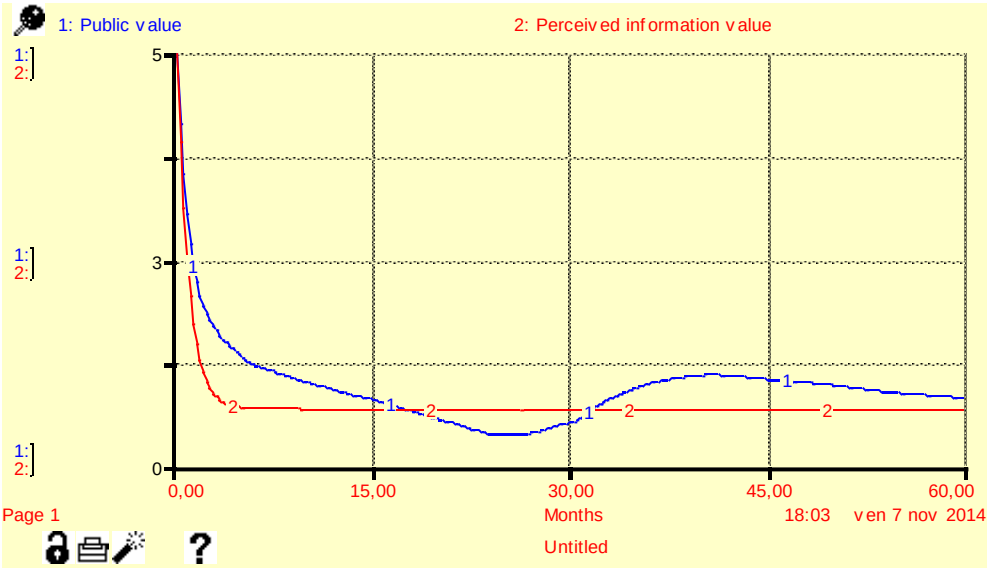


Figure 79

H4 (policy information value = 1)

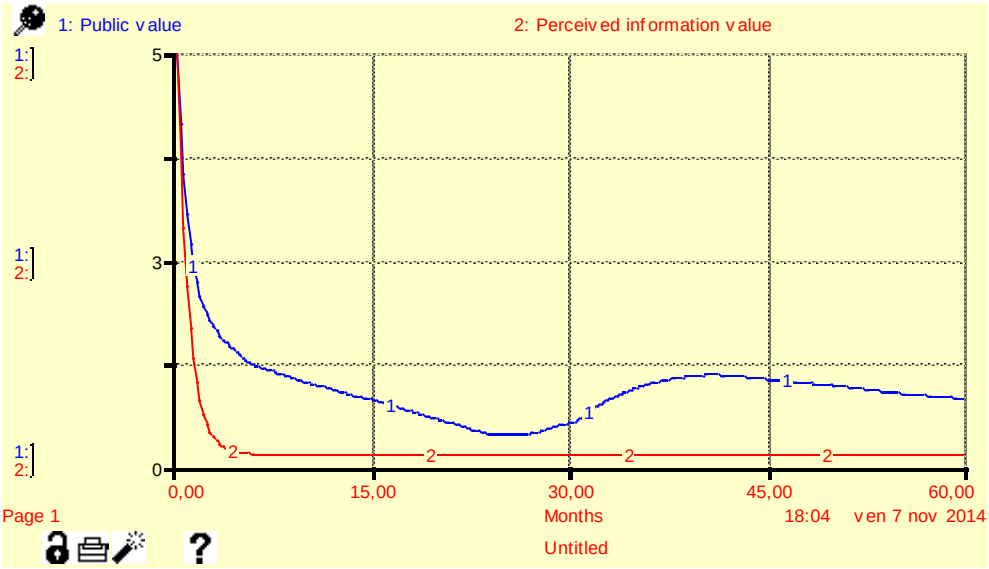


Figure 80

CONCLUSION

This kind of study, in answering research questions, is intended to highlight three things: (a) develop a new way for policy makers, executives, and managers to view the broad context and complex information relationships in which opening government initiatives unfold, (b) provide a way to analyze and model the information relationships, and (c) begin to develop a holistic opening government framework, specifically for understanding and evaluating the impact of different technology, management, and policy choices before they are implemented. Without this knowledge, it will be difficult to establish the necessary conditions, internal and external to government, that will enable meaningful use of new information access points, information resources, and enable initiatives that effectively exploit newly available technologies.

Based on the previous analysis, the following considerations can be underlined for the Municipality of Palermo in pursuit of Opening Government Data.

At the beginning, the opening data process has been characterized by an attempt to expand the list of 'data' to populate in open data catalogues, as pointed out in the figure 61. In this respect, survey evidence suggests that the majority of these first available open data initiatives have not enjoyed success or created public value.

After the adoption of the guidelines, the Municipality of Palermo has acknowledged more attention to the community's requests. This new awareness has gradually led, on the one hand, to a reduction of the datasets published, but on the other hand, to a sharp improvement in the data's quality. In fact, the last dataset published are almost all in .xml format, which corresponds to 4 stars in the Tim Berners Lee's stars-value scale. Just these new datasets enabled the developers' community to participate in the Contest to contextualize information. In this way, they have been able to develop apps that have provided new services to the citizens and tourists, creating public value in terms of service effectiveness and, consequently, increasing public trust in the municipal opening process.

Releasing datasets that are relevant to both municipal performance and the public interest is always a good investment. The wide range of potential uses underscores the fundamentally versatile and valuable nature of open data and explains why it is an attractive strategy. But it will be just as important to understand citizen demand as it is to understand intergovernmental demand, as it is to understand developer or third-party entrepreneur demand for the data. What makes data fit for use is context dependent. The intended use determines the specific data attributes needed by users.

This case study implies quite distinct requirements for various stakeholders regarding data quality, timeliness of data needs, useful formats, and metadata that make it more or less useful for the variety of stakeholders interested in the data. By providing feedbacks to users, giving them the opportunity and a mechanism to communicate data errors and enhancements back to the source, the

overall integrity and quality of government data can improve while increasing benefit to all future users. Think about sustainability. Data that is not '**demanded' by a stakeholder group may experience little or no value creation**. Without extensive prior research, it is unlikely that most departments will find it easy to accurately predict demand for a new or enhanced data resource. However, it is not harmful to think of opening data as a virtuous cycle, where opening data leads to use and more use. But, as our dynamic model indicated, there are constraints that can affect the positive aspects of opening government data. Downstream assessment of the impacts of open data initiatives should also be part of the longer term picture. At some point, baseline usage data and attention to performance metrics early in the process can have substantial longer term benefits for existing and new initiatives. In addition, attention to immediate and downstream governance issues is also critical. If the existing governance arrangements for an initiative's data ownership and use policies are not clear or well-structured, attention to those issues should be part of the overall effort.

The approach described in this study can help planners and decision makers understand proposed and existing open data initiatives. An information polity perspective provides a way to identify the various stakeholders and their patterns of interaction that influence or control the generation, flows, and uses of enhanced information resources in open data initiatives. The dynamic modeling techniques used highlight the ways different constraints can impact the system as a whole and affect value creation. These tools support planners' ability to generate informed hypotheses about changing patterns of interaction among existing and potential new stakeholders.

In this way, governments can better evaluate the costs, risks, and benefits of a wide variety of open data initiatives. The goal is to become better at building the capability between government and other stakeholders to address the ways that open data initiatives change power relationships, expectations, and performance.

Although tested and refined by a combination of feedbacks in the opening government data case, this approach is still a work in progress. The next steps in research and examination of practice should be to use this initial results to guide new investigations for developing practical tools to support efforts to open government data. In this respect, this approach can be useful across a much wider range of initiatives, but that belief requires testing. Additional research and review of new developments in practice can further the understanding of information polities. It is also potentially valuable to test the use of these analytical and modeling methods with other open data and related government transformational efforts. [288]

[288] **Open Government Data: A Stage Model**

LIMITS AND FURTHER RESEARCH

The limits of research consist essentially in the fact that it is a process still in progress whose effects are not yet fully manifested. To try to go beyond a simple conceptual analysis in order to implement a quantitative model, it was necessary to make some assumptions regarding the quantification of some strictly qualitative variables, such as the perception of trust whose value has been estimated with reference to the data collected from the questionnaire administered to the users on the website of the Municipality. While, for example, the value of the information has been fixed in relation to the perceived information value rather than the actual value of the information.

One of the main methodological constraints is the fact emphasized also by Vickery[289], that there is an absence of robust quantitative data on the size, growth, and impacts of PSI-related activities and the socio-economic benefits and any related costs of improved access to PSI. In addition, as the survey among data users shows, the Municipality of Palermo owning PSI is unable to a large extent to estimate the costs associated with opening up its datasets in the different phases of the life cycle, from production to publishing. An alternative approach to the methodologies that the existing studies have employed, would be to conduct an "internal audit" of a large and representative sample of PSBs and identify re-users who would fit in the profile of a "typical" re-user operating across the urban area in order to gather robust economic data for further analysis. This was, however, beyond the scope of this study given that it is an extremely costly and time-consuming method of data gathering. These constraints placed limits in the capacity to study in more depth the economic benefit of OD in the territory of Palermo.

[289] http://ec.europa.eu/information_society/policy/psi/docs/pdfs/opendata2012/reports/Vickery.docx

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APPENDIX A. SURVEY

1) Age:

<18
18 – 25
26 – 35
36 – 45
46 – 55
56 – 65
> 65

2) Gender : M / F

3) Education:

a) Middle high school
b) High School
c) Bachelor or higher

4) Profession:

a) Student
b) Employee in public sector
c) Employee in private sector
d) no-profit
e) Entrepreneur
f) Professional
g) Unemployed
h) Others

5) Region of origin:

1) Abruzzo
2) Basilicata
3) Calabria
4) Campania
5) Emilia-Romagna
6) Friuli-Venezia Giulia
7) Lazio
8) Liguria
9) Lombardia
10) Marche
11) Molise
12) Piemonte
13) Puglia
14) Sardegna
15) Sicilia
16) Toscana
17) Trentino-Alto Adige
18) Umbria
19) Valle d'Aosta
20) Veneto

6) Do you know the Open Data section of the Municipality of Palermo's website?
Mark only one oval.
YES /NOT

7) In which Open Data's portals do you research data?
Select all that apply.
a) From this portal
b) Portals regional / local
c) From the national portal (http://dati.gov.it)
d) From foreign portals

8) You research data as:
Select all that apply.
a) Individual citizen
b) Association / non-profit organization
c) Researcher
d) Entrepreneur
e) Employee of the Public Sector
f) Employee of the private sector
g) Blogger / journalist
h) Other

9) Do you uses data released by the Open Data section of the Municipality of Palermo? *
Mark only one oval.
YES / NOT

10) Could you indicate how you use the data from Open Data section of the Municipality of Palermo?
Select all that apply.
a) I've only shown
b) I have downloaded
c) I have scanned and cleaned
d) I have geo-referenced
e) I developed applications for smartphones and tablets
f) I drafted the report / info-graphic
g) I developed web services
h) Civic hacking
i) Research / study
j) commercial purpose
k) Curiosity
l) none
m) Other

11) Using a scale from 1 to 5, could you indicate your level of satisfaction with the quality and the related opportunities for reuse offered by Data downloaded from the Open Data section? *
1 = Low 5 = High
Mark only one oval.

12) Could you indicate how often download the data from the Open Data section?
Mark only one oval.
a)Only once
b)More than once, occasionally
c) Regularly
d) I've never downloaded

13) What types of data have you downloaded?
Select all that apply.

a) Administration
b) Culture and tourism
c) Territory
d) Education
e) Mobility 'and safety
f) public works
g) Health 'and welfare
h) Urban planning
i) Economic activities
j) Budget
k) Elections
l) None

14) What types of data would be issued in an open format useful to the development of applications for smartphones and tablets or to other forms of reuse?
Select all that apply.

a) Transparent Administration (tenders, measures, types and times of administrative procedures)
b) Productive activities and business services
c) Investee companies and related services
d) Landscape assets, architectural, artistic, archaeological
e) Urban infrastructure (Cycle routes, Tramway, Ring rail)
f) Geo-data (Satellite maps, elevation profiles, Cartographies vector)
g) Civic Participation (Profiles of community, Register of stakeholders)
h) Real Estate
i) Planning and Urbanism (Master Plan and its annexes, three-year plan of Public Works)
j) Civil protection (hydrogeological risk, weather alert)
k) Sport and leisure (recreational facilities, swimming pools and sports facilities, playgrounds)
l) Statistics (raw data)
m) Traffic (Urban Plan traffic with its annexes, excavation permits in public areas)
n) Transportation (ordinary and special transport services, routes, stops, timetables)
o) Other:

15) Do you have data that you would like to share in the Open Data section to allow the re-use for application's development or other forms of reuse by users?
Mark only one oval.

YES /NOT

16) Using the scale of 1 to 5, could you indicate how reliable do you consider the sharing of data by users in the Open Data section for a possible reuse? *

Mark only one oval.

17) How many applications have you developed through the data available in the Open Data section? *
Mark only one oval.

none
1
2
3
4
5
> 5

18) What type of applications have you developed or would you like to develop with the data made available in the Open Data section?
Select all that apply.

a) Environment
b) Geo-location
c) Information
d) Mobility
e) Monitoring civic
f) Citizen services
g) Business services
h) Social network
i) Tourism
j) None
k) Other

19) How many people on average have downloaded your applications?
Mark only one oval.

<10
10-50
51-100
101-500
501 - 1000
> 1000
No one

20) Checks a score from 1 to 5 with the following statements about the most relevant benefits coming from the adoption and diffusion of Open Data policy:
1 = Low 5 = High
Mark only one oval per line.

a) Greater transparency in political / administrative processes
b) Enhances the collective knowledge through the sharing of information
c) Develops innovative forms of participation of citizens (living lab, barcamp, hackaton, contest, jam)
d) Allows the acquisition of an increased awareness and ability of citizens to affect on public policy (empowerment)
e) Promotes the improvement of quality of services making the administration more responsive to the actual needs of citizens
f) Strengthens monitoring civic on political / administrative activity (accountability)
g) Allows individual citizens and existing companies to use data to create applications and innovative services
h) Promotes the ability to start innovative companies (startups)
i)Allows sharing of information between internal sectors and between institutions improving efficiency.

21) Please, could you indicate your current level of trust in the Open Data policy of the Municipality of Palermo Open Data?
1 = Low 5 = High
Mark only one oval.

22) The degree of confidence expected in the next 5 years?
1 = Low 5 = High
Mark only one oval.

23) Checks a score from 1 to 5 the following elements in order of how they have to increase your trust in the Open Data policy of the Municipality of Palermo.
1 = Low 5 = High

Mark only one oval per line.

a) Completeness and reliability of data and information
b) Certainty of timing in 'update of the data and information
c) Portal for the publication of applications developed by users and data made available by institutions public and private (distinguishing source of data and responsibilities on them)
d) Privacy / Security personal
e) Events programming to the involvement of experts for the development of smartphone applications and tablet
f) Dissemination of the culture of the Open Date by promoting informational space for development community.

24) Comments (tips, positive or negative experiences, expectations for the future)

APPENDIX B. EQUATIONS OF THE SYSTEM DYNAMICS MODEL

APPS(t) = APPS(t - dt) + (Apps_development) * dt

INIT APPS = 0

INFLOWS:

Apps_development = ((Open_Data_fitness_to_reuse/App_per_open_data_reusable)*EFFECT_ON_APP_DEVELOPPMENT)/time_to_change_app

Citizen_participation(t) = Citizen_participation(t - dt) + (Change_in_citizen_participation) * dt

INIT Citizen_participation = 1

INFLOWS:

Change_in_citizen_participation = ((Normal_citizen_participation*open_municipal_information_pressure_on_citizen_participation)+Downloads)/time_to_change_citizen_participation

Citizen_service_monitoring_complaints(t) = Citizen_service_monitoring_complaints(t - dt) + (change_in_service__complaints) * dt

INIT Citizen_service_monitoring_complaints = 1

INFLOWS:

change_in_service__complaints = (Normal_citizen_service_complaints*citizen_participation_effect_on_complaints*service_effectiveness_effect_on_serrvice_complaints)/time_to_change_service_complaints

Downloads(t) = Downloads(t - dt) + (change_in_downloads) * dt

INIT Downloads = 100

INFLOWS:

change_in_downloads = (APPS*average_downloads)/time_to_change_downloads

Information_value(t) = Information_value(t - dt) + (change_in_information_value) * dt

INIT Information_value = desired_information_value

INFLOWS:

change_in_information_value = IF (Swich_information_value= 1) THEN ((Policy_information_value*ratio_open_information_effect_on_information_value*Living_lab_effect_on_value_of_information)-Information_value)/time_to_change_information_value

ELSE ((3*ratio_open_information_effect_on_information_value*Living_lab_effect_on_value_of_information)-Information_value)/time_to_change_information_value

Living_lab(t) = Living_lab(t - dt) + (change_in_living_lab) * dt

INIT Living_lab = 0

INFLOWS:

change_in_living_lab = (gap_in_Living_Lab*effect_potential_conflict_on_pressure_to_contextualize_info)/time_to_change_living_lab

Municipal_information(t) = Municipal_information(t - dt) + (creating_information_from_Municipal_activities - Opening_information) * dt

INIT Municipal_information = 100

INFLOWS:

creating_information_from_Municipal_activities = Normal_Information_production

OUTFLOWS:

Opening_information = (normal_information_available/time_to_open_information)*effect_on_pressure_to_hide_conflicting_information*trust_effect_on_open_information

Municipal_information_fitness_to_reuse(t) = Municipal_information_fitness_to_reuse(t - dt) + (Digital_archiving_information - Making_data_easy_to_reuse) * dt

INIT Municipal_information_fitness_to_reuse = 10

INFLOWS:

Digital_archiving_information = creating_information_from_Municipal_activities*Tecnical_developpment

OUTFLOWS:

Making_data_easy_to_reuse(o) = (Opening_information*Political_legal_requirement)

Open_Data_fitness_to_reuse(t) = Open_Data_fitness_to_reuse(t - dt) + (Making_data_easy_to_reuse) * dt

INIT Open_Data_fitness_to_reuse = 10

INFLOWS:

Making_data_easy_to_reuse(i) = Making_data_easy_to_reuse(o) * CONVERSION MULTIPLIER

CONVERSION MULTIPLIER = 1

Open_municipal_information(t) = Open_municipal_information(t - dt) + (Opening_information) * dt

INIT Open_municipal_information = 100

INFLOWS:

Opening_information =
(normal_information_available/time_to_open_information)*effect_on_pressure_to_hide_conflicting_information*trust_effect_on_open_information

potential_meaning_conflicts(t) = potential_meaning_conflicts(t - dt) +
(change_in_potential_meaning_conflicts_quality_quantity) * dt

INIT potential_meaning_conflicts = 1

INFLOWS:

change_in_potential_meaning_conflicts_quality_quantity =
((Open_municipal_information*average_meaning_conflict)*ratio_open_information_effect_on_potential_meaning_conflicts*LL_effect_on_potential_meaning_conflict)/time_to_change_meaning_conflict

Public_value(t) = Public_value(t - dt) + (change_in_perceived_trust) * dt

INIT Public_value = desired_trust

INFLOWS:

change_in_perceived_trust =
((service_effectiveness_effect_on_trust*ratio_data_reusable_effect_on_trust*Average_trust)-
Public_value)/time_to_change_perceived_trust

Service_effectiveness(t) = Service_effectiveness(t - dt) + (change_in_service_effectiveness) * dt

INIT Service_effectiveness = 1

INFLOWS:

change_in_service_effectiveness = (gap_in_service_effectiveness-
App_service_effectiveness)/time_to_change_service_effectiveness

Stakeholder_participation(t) = Stakeholder_participation(t - dt) + (change_in_stakeholder_participation) * dt

INIT Stakeholder_participation = 1

INFLOWS:

change_in_stakeholder_participation =
information_value_pressure_on_stakeholder_participation*nornal__skilled_participation

App_per_open_data_reusable = 50/1

App_service_effectiveness = services_per_app*APPS

average_downloads = 1000

average_meaning_conflict = 0.30

average_people_per_living_lab = 10

Average_trust = 3

desired_information_value = 5

desired_living_lab_per_data = Open_municipal_information/normal_living_lab_per_data

desired_service_effectiveness = Citizen_service_monitoring_complaints

desired_trust = 5

gap_in_Living_Lab = (desired_living_lab_per_data+desired_living_lab_per_people)-Living_lab

gap_in_service_effectiveness = desired_service_effectiveness-Service_effectiveness

Info_Value_ratio = Information_value/desired_information_value

Living_labs_ratio = Living_lab/desired_living_lab_per_data

Normal_citizen_participation = 50

Normal_citizen_service_complaints = 30

normal_information_available = Municipal_information*Political_legal_requirement

Normal_Information_production = 100

normal_living_lab_per_data = 10/1

nornal__skilled_participation = 10

Policy_information_value = 3

Political_legal_requirement = 0.20

Ratio_open_data_firtess_to_reuse = Open_Data_fitness_to_reuse/Open_municipal_information

ratio_trust = Public_value/desired_trust

services_per_app = 1

service_effectiveness_ratio = Service_effectiveness/desired_service_effectiveness

Swich_information_value = 1

Tecnical_developpment = 0.3

time_to_change_app = 6

time_to_change_citizen_participation = 1

time_to_change_downloads = 1

time_to_change_information_value = 1

time_to_change_living_lab = 1

time_to_change_meaning_conflict = 6

time_to_change_perceived_trust = 1

time_to_change_service_complaints = 1

time_to_change_service_effectiveness = 1

time_to_open_information = 6

citizen_participation_effect_on_complaints = GRAPH(Citizen_participation)

(0.00, 0.02), (100, 0.03), (200, 0.035), (300, 0.0425), (400, 0.0525), (500, 0.055), (600, 0.0775), (700, 0.0825), (800, 0.11), (900, 0.153), (1000, 0.482)

desired_living_lab_per_people = GRAPH(Stakeholder_participation/average_people_per_living_lab)

(0.00, 0.6), (10.0, 0.6), (20.0, 0.9), (30.0, 1.65), (40.0, 2.10), (50.0, 2.70), (60.0, 3.30), (70.0, 4.95), (80.0, 6.75), (90.0, 9.75), (100, 28.6)

EFFECT_ON_APP_DEVELOPPMENT = GRAPH(Info_Value_ratio)

(0.00, 1.06), (0.1, 1.14), (0.2, 1.08), (0.3, 1.05), (0.4, 1.04), (0.5, 1.16), (0.6, 1.50), (0.7, 2.15), (0.8, 2.88), (0.9, 2.95), (1, 2.93)

effect_on_pressure_to_hide_conflicting_information = GRAPH(potential_meaning_conflicts)

(0.00, 0.025), (10.0, 0.125), (20.0, 0.185), (30.0, 0.235), (40.0, 0.3), (50.0, 0.355), (60.0, 0.4), (70.0, 0.49), (80.0, 0.535), (90.0, 0.58), (100, 0.895)

effect_potential_conflict_on_pressure_to_contextualize_info = GRAPH(potential_meaning_conflicts)

(0.00, 0.015), (10.0, 0.005), (20.0, 0.00), (30.0, 0.00), (40.0, 0.02), (50.0, 0.06), (60.0, 0.125), (70.0, 0.175), (80.0, 0.25), (90.0, 0.315), (100, 1.00)

information_value_pressure_on_stakeholder_participation = GRAPH(Info_Value_ratio)

(0.00, 0.135), (0.1, 0.42), (0.2, 0.48), (0.3, 0.51), (0.4, 0.54), (0.5, 1.64), (0.6, 2.11), (0.7, 2.40), (0.8, 2.56), (0.9, 2.69), (1, 2.69)

Living_lab_effect_on_value_of_information = GRAPH(Living_labs_ratio)

(0.00, 0.125), (0.1, 0.125), (0.2, 0.125), (0.3, 0.125), (0.4, 0.2), (0.5, 0.4), (0.6, 0.575), (0.7, 0.95), (0.8, 4.93), (0.9, 4.95), (1, 4.85)

LL_effect_on_potential_meaning_conflict = GRAPH(Living_labs_ratio)

(0.00, 1.86), (0.1, 1.65), (0.2, 1.33), (0.3, 1.21), (0.4, 0.85), (0.5, 0.68), (0.6, 0.57), (0.7, 0.47), (0.8, 0.39), (0.9, 0.34), (1, 0.2)

open_municipal_information_pressure_on_citizen_participation = GRAPH(Open_municipal_information)

(0.00, 0.00), (100, 0.02), (200, 0.02), (300, 0.02), (400, 0.0375), (500, 0.14), (600, 0.183), (700, 0.198), (800, 0.205), (900, 0.21), (1000, 0.498)

ratio_data_reusable_effect_on_trust = GRAPH(Ratio_open_data_firtess_to_reuse)

(0.00, 0.00), (0.1, 0.00), (0.2, 0.00), (0.3, 0.3), (0.4, 0.425), (0.5, 0.6), (0.6, 1.00), (0.7, 1.70), (0.8, 4.10), (0.9, 4.70), (1, 4.85)

ratio_open_information_effect_on_information_value = GRAPH(Ratio_open_data_firtess_to_reuse)

(0.00, 1.02), (0.1, 1.03), (0.2, 1.05), (0.3, 1.08), (0.4, 1.10), (0.5, 1.13), (0.6, 1.17), (0.7, 1.37), (0.8, 1.54), (0.9, 1.77), (1, 1.79)

ratio_open_information_effect_on_potential_meaning_conflicts = GRAPH(Ratio_open_data_firtess_to_reuse)

(0.00, 0.955), (0.1, 0.685), (0.2, 0.425), (0.3, 0.23), (0.4, 0.15), (0.5, 0.105), (0.6, 0.07), (0.7, 0.085), (0.8, 0.085), (0.9, 0.075), (1, 0.03)

service_effectiveness_effect_on_serrvice_complaints = GRAPH(service_effectiveness_ratio)

(0.00, 0.97), (0.1, 0.585), (0.2, 0.455), (0.3, 0.435), (0.4, 0.43), (0.5, 0.425), (0.6, 0.405), (0.7, 0.36), (0.8, 0.32), (0.9, 0.185), (1, 0.00)

service_effectiveness_effect_on_trust = GRAPH(service_effectiveness_ratio)

(0.00, 0.015), (0.1, 0.225), (0.2, 0.525), (0.3, 0.525), (0.4, 0.6), (0.5, 1.05), (0.6, 1.88), (0.7, 3.40), (0.8, 4.73), (0.9, 5.00), (1, 4.93)

trust_effect_on_open_information = GRAPH(ratio_trust)

(0.00, 0.02), (0.1, 0.00), (0.2, 0.05), (0.3, 0.05), (0.4, 0.06), (0.5, 0.13), (0.6, 0.35), (0.7, 0.74), (0.8, 0.92), (0.9, 1.78), (1, 1.86)