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Monografies

The Public Administration and the Open Innovation and Science Paradigm: Challenges and Opportunities

Tatiana Fernández Sirera and Elvira González Gago

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Passeig de Gràcia, 19

08007 Barcelona

<http://catalunya2020.gencat.cat>

Authors

Tatiana Fernández Sirera and Elvira González Gago

Page makeup

Montserrat Romagosa Huguet

Graphic design

Enric Jardí

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1.

Introduction

In the twenty-first century, the digital and physical worlds are becoming fused at a dizzying pace, and the process of virtualisation of reality is blurring the connections between our actions and their consequences, which we often neither see nor feel. In this context of change, we need to generate new responses to the great challenges that society face: unemployment (particularly among young people), aging of the population, growing social inequalities, climate change, food security, cybersecurity, immigration and so on. Technical solutions are available to meet these challenges, but collective responses are often needed to apply them, and such responses are difficult to articulate. Indeed, an effective response to such challenges requires far-reaching changes in economic, political and social systems, changes that involve the broad, open participation of all stakeholders in society: government; universities and the research and innovation sector; companies; and civil society. That is to say, the actors that have become known as the quadruple helix.¹

Rapid technological advances and, especially, Internet, are generating a technological and cultural rupture by enabling different stakeholders in society to interact directly, and to access information and services without having to go through centralised structures. Information and communication technologies (ICTs) make possible new forms of decentralised cooperation between public administrations and citizens, increasing the transparency of decision-making processes and transforming governance, structures and social relationships. In this way, they help to bring new social and business models into existence.

It is in this context that the European Commission has risen to the challenge of moving towards a new model of open innovation and science (European Commission, 2016), that is to say, an ecosystem of

¹ Cavallini *et al.* (2016) defines the fourth helix as: "A collective entity formed by individual users living on a territory and interacting with university, industry and government as customers, citizens or members of a community in order to contribute to build new innovation paths which are able to promote the socioeconomic growth of the territory".

innovation and science that is open to all stakeholders in society, one that promotes scientific excellence and enables knowledge to flow freely and become transformed into products and services that respond to the needs of users and society and create new opportunities and new markets. This change is generated by the rapid evolution of digital technologies and networks and the generalised use of ICTs, particularly Internet. All this has made possible the emergence and consolidation of new structures and new, open, collaborative models of innovation, such as living labs, digital fabrication laboratories (fab labs), social innovation networks and open data laboratories. At the same time, new ways of working and new economic and social models have also emerged (co-working spaces, the circular economy, the collaborative economy, etc.).

Besides the changes that have led to this new paradigm of open innovation and science, a paradigm shift has also taken place in the design, implementation and management of public policy. This shift is a consequence of the process of adapting to widespread use of ITCs and Internet, and affects the spheres of politics, the economy and culture, as well as models for cooperation and relations between the government and citizens. Traditional models of public management² have evolved to include such concepts as the electronic administration, e-government or digital government. In recent years, transformations linked to the new generation of technologies and social networks, the Web 2.0 philosophy, the hacking ethic, the open data revolution and the general spread of the principles and values of transparency, participation and cooperation have encouraged a new way of seeing public management. As a result, the concept of a new paradigm of open government, also known as the paradigm of smart public governance, has been introduced into the public debate.

The main thesis behind this paper is that an open system of innovation and science makes no sense without a public administration that acts in accordance with the principles and values of open government.

² In this respect, the "new public management" that appeared in the 1970s is characterised by its adoption of strategic tools used by private businesses in order to increase effectiveness, efficiency and productivity in the public sector (García Sánchez, 2007). For its part, "new public governance", a concept that emerged in the 1990s, calls for public administrations with multiple interdependent stakeholders that contribute to providing public services and focus on efficiency of service and the results of interaction between the organisations that manage public services and their environment (Osborne, 2010).

Indeed, in order to advance towards a model of open innovation and science, it is essential that governments change the way they interact with citizens, the aforementioned fourth helix. Citizens demand and expect the public sector to play an active role in providing innovative solutions to the challenges that society is currently facing and ensuring quality public services and jobs. Civil society also demands new spaces for participation and a share in the responsibility for designing and implementing these innovative solutions to present challenges. Bringing this change in the public administration's relationship with society into effect will require in-depth renewal of political processes and the processes of designing, implementing and evaluating public policies through social innovation and close cooperation with the other quadruple helix actors.

Accordingly, the governments are called on to play a key role as drivers of change towards the new paradigm. As a regulator, service provider, employer and buyer (public procurement accounts for 16% of GDP in the European Union), the Public Administration plays an important role in enabling and promoting innovation, in cooperation with the other quadruple helix actors, through its commitment to responding to the increasingly complex challenges that our society faces.

Through framework research programmes (such as the Horizon 2020 programme for the 2014-2020 period), the EU Programme for Employment and Social Innovation (EaSI), research and innovation strategies for smart specialisation (RIS3) and structural and investment funds for cohesion policy, the European Union promotes this paradigm shift by encouraging regional research and innovation systems and public policies to address societal challenges, the needs of citizens and cooperative innovation.

This paper analyses the challenges and opportunities represented by the new open innovation and science paradigm from the point of view of the Public Administration, as an active stakeholder in innovation and a driver of change towards a more sustainable, more inclusive development model.

The paper is structured into five sections. Following this introduction, Section 2 discusses the implications of the open innovation and science paradigm for public management, stressing that this new model changes the perspective and concept of innovation in the Public Administration, as well as government's role in the process of innovation and as a driver of change. Section 3 focuses on the process of innovation in public policies under the new model. Four stages in this innovation process are described: identification of the complex

challenge to be resolved through an innovative approach; generation of innovative ideas and solutions; experimentation (prototyping and pilot projects); and large-scale implementation of the solution. Moreover, given the importance of participation by citizens —the fourth helix— in social innovation processes, the discussion also centres on the possible ways and necessary requirements for managing this participation appropriately. Next, Section 4 highlights the value of social innovation in public policy, noting that this innovation should be an aim in itself for all public administrations. The importance of measuring the impact of this innovation is also noted, as this is the best way of demonstrating the role that innovation can play as a driver of change and progress. Finally, in Section 5, the conclusions are presented.

2.

Implications of the open innovation and science paradigm for public management

The new paradigm is clearly marked by the generalised use of ICT and its applications. Initially, at the beginning of the present century, the application of ICTs in the Public Administration focused on resolving internal problems of efficiency and effectiveness and improving relations with other stakeholders by establishing websites and providing electronic services. However, entering the twenty-first century, changes became accelerated thanks to the new wave of technological innovation that is helping to generate a new way of understanding politics, government and, consequently, public management (Criado, 2013; Subirats, 2012). Open government can be defined as "a model of government that promotes transparency, accountability, participation and cooperation through the intensive use of ICTs and a new management system based on co-governance and co-responsibility with citizens, all with the aim of generating maximum public value by promoting innovation and development" (Criado, 2016). In this way, the inclusion of civil society in designing, implementing and monitoring public policies becomes a central part of public management. We shall deal with the inclusion of civil society, made possible by ICTs, though not without its difficulties, at a later stage.

Open government, then, includes citizens and the external knowledge of companies and other stakeholders in processes of adopting public decisions, and it also includes new dynamics of cooperation. However, the most outstanding change in this model is found in citizens' expectations regarding the role of the Public Administration, which goes from being seen as a stakeholder that guarantees stability, resilience and continuity to become an actor that anticipates and responds to the changes and challenges in the environment and generates new opportunities for value creation (European Commission, 2013a). The creation of value requires public managers

not only to be able to identify niches of interest, but also to establish spaces for the co-creation of public services with citizens (Linders, 2012; Sørensen and Torfing, 2012).

The cornerstone of open government

- **Transparency:** the Government promotes and fosters the accountability of the Administration to citizens and provides information about what it is doing and about its action plans.
- **Collaboration:** the Government involves citizens, companies, associations and other stakeholders in the tasks of the Administration and enables teamwork to take place, both among its employees and with other administrations and stakeholders.
- **Participation:** the Government promotes the active participation and leading role of citizens throughout the process of designing, implementing and evaluating public policies.

Source: *Memorandum for heads of departments and agencies* (Holdren, Orszag y Prouty, 2009).

2.1.

Innovation in the Public Administration

By definition, innovation in the Public Administration, that is to say, innovation in public policy, is social innovation. This is because the concept is defined as the process of generating and implementing new ideas to create value for society through new or improved services and processes (European Commission, 2013b). For the purposes of this study, innovation is understood in its broadest sense, as a way of responding to new societal problems that neither the market nor traditional public policies can resolve separately, and as a way of tackling new (or not so new but, in any case, unresolved) global challenges (such as, for instance, global warming) from the perspective of a complex systemic process in which a diverse series of stakeholders interact (public administrations, corporations, third sector and social groups). These actors come together to generate social innovations that enable imbalances to be corrected in political and legal, economic, cultural and social spheres through the implementation of public policy (Conejero and Redondo, 2016).

The European Commission promotes social innovation in the European Union as a response to the economic crisis, to make public sectors more efficient through reforms of processes and organisation, and also to encourage public sectors to focus more on the goals of society, to which they should respond with new and better services and policies (European Commission, 2013c). In light of the new open innovation and science paradigm, social innovations are understood as "innovations that are social both in their ends and their means" (European Commission, 2012) and are defined as new ideas (products, services and models) that simultaneously meet social needs (more effectively than alternatives) and create new social relationships or collaborations. That is to say, they are innovations that are not only good for society but also enhance society's capacity to act. Accordingly, social innovation means developing innovative solutions and new forms of organisation and interaction to respond to societal needs. Social innovators may be social entrepreneurs, government managers, civil servants, civil society and citizens in general, who share ideas, experiences and knowledge to design more effective services for society (BEPA, 2011). It is important to emphasise, therefore, that in this new model the process of interaction between individuals, that is, the open innovation process, is as or more important than the results.

We can focus on this idea of open and social innovation through three complementary approaches (BEPA 2011):

1. **Social demand approach:** the social demand approach centres on the needs of groups that are more vulnerable or have less capacity to share in and benefit from the value generated by the market economy. In other words, social innovations are innovations that respond to social demands that neither the market nor public institutions are able to meet, and are normally aimed at more vulnerable groups.
2. **Societal challenge approach:** social innovation is key to giving collective responses to the complex challenges of society through new forms of interaction between social actors.
3. **Systemic change approach:** social innovation generates incremental changes in human attitudes and behaviours and in the relations and the distribution of power between different organisations and groups. The process of collective empowerment and learning is the central element in social innovation, and the results generated by this process are more effective policies and improved quality of life.

In accordance with the above, the key elements of social innovation are: 1) that it is based on open and collaborative innovation through management that centres on co-leadership, empowerment and mutual learning to resolve complex social problems; 2) that multidisciplinary and multidepartmentality lead to the resolution of complex problems through daring, innovative solutions; 3) that it includes a wide, diverse range of players –consumers, civil society organisations and even vulnerable citizens, as well as experts, private companies, consultants, interest groups, politicians and so on— when it comes to creating innovative solutions. Accordingly, social innovation is not created merely by actors and processes internal to the public sector, but also involves deliberative attempts to benefit from the creativity of charities, associations and social entrepreneurs to find new ways of meeting pressing social needs (Sørensen and Torfing, 2015); and 4) that it focuses on the person, on citizens, giving them an active and creative role.

Without doubt, all this acquires consistency when people are placed at the centre and, therefore, citizens' involvement in public management is key to the shift towards good government of public affairs (Criado, 2016) to complement the more traditional innovations in technology and economics (Hämäläinen and Heiskala, 2007).

From the point of view of public management, then, social innovation is the mechanism used to find innovative solutions that not only meet specific societal needs but also involve institutional changes to programmes and legislation. In short, changes in the way that government action is exercised. Accordingly, the elements that characterise innovation in public policy in the open innovation and science paradigm are as follows (Conejero and Redondo, 2016):

1. **Shared public leadership:** public policy promotes the shared redefinition of the societal problem and the joint generation, implementation, assessment, dissemination and replication of ideas.
2. **New solutions:** the solutions generated (ideas, products, services, processes and so on) do not need to be completely new, but they must be new within the context in which they are implemented. Multidisciplinary and multidepartmentality are key.
3. **Solution of societal needs,** that is, those needs to which the market and government do not provide a satisfactory response.

4. **Change in current social relationships:** through the inclusion and active participation of all actors involved in politics, new social practices are generated and power relations are modified.
5. **Improving the capacity of society to act:** the involvement of users or beneficiaries in the development of social innovation and its governance often leads to more innovative solutions and, at the same time, increases the awareness, competences and the self-esteem of beneficiaries.
6. **Generating public value** through the joint creation of public services with citizens.

2.2.

The Public Administration as an active player in innovation

Barriers to innovation in the public administration have been widely recognised in the economic literature,³ nevertheless, governments have tools that enable them to play an important role in promoting innovation: the public administration has huge budgets capable of absorbing the impact of any failures that may result from innovation; public spending is the main tool for implementing public policies for innovation, social policies (housing, employment, health, education, social services, etc.) and other types of policy; governments also have the capacity to alter market conditions through contracting conditions (social clauses).⁴ To this we should add that, generally speaking, the Public Administration has trained personnel with adequate competencies; it has easy access to the scientific knowledge of universities and research institutes; it also has easy to citizens and

³ The academic literature has exhaustively identified the following obstacles in the public sector: bureaucratic organisation and hierarchical structure; strict division of labour in departments; cultural divides between professionals (different languages); behaviours based on strict rules; management by a political class often driven by its own short-term interests; complexity generated by the rights-based focus of the rule of law; lack of economic incentives (Sørensen and Torfing, 2015).

⁴ In the European Union, public spending accounts for more than 40% of GDP. This is an enormous amount that has significant impact on the economy and immense potential to drive innovation.

users of public services, who are often involved in the provision of services; and it has greater possibilities for mutual learning for the transfer of policies and for the dissemination of innovation between agencies, as these tend not to compete with each other, at least not to the same degree as in the private sector (Rashman and Hartley, 2002; Halvorsen *et al.*, 2005).

The Public Administration plays a significant role as a facilitator of innovation, through the design and implementation of innovation policies that can be implemented using a diverse range of mechanisms (Boelman *et al.* 2014):

- Implementing legal and regulatory frameworks that promote social innovation and new models of services that generate social value.
- Providing funding for socially innovative organisations.
- Supporting social innovation and stimulating the creation of new markets through innovative public procurement.
- Sharing local assets and facilities with community groups, which can manage such amenities.
- Promoting forums and meeting places to enable social innovators to network and share knowledge.
- Promoting citizen participation in social innovation.
- Promoting programmes to support social innovation by providing training and guidance (incubators, accelerators, etc.) to develop the skills and knowledge needed in social innovation.
- Promoting skills in the use of digital technology and the use and application of this technology to develop new solutions to societal needs.
- Supporting studies of social innovation to build up evidence on public policy and practice. It is essential to be able to measure social innovation (that promoted by both the public and private sectors) and its impact, as well as to understand barriers and opportunities linked to social innovation and to identify the actors that promote it.

While this role as a facilitator of innovation is important, what particularly defines the role of government in the new model is its participation in the innovation process as an active player, alongside universities, R&D and technology centres, companies and citizens. That is to say, it is mainly through innovation in public services, in public policy, that governments have the power to promote, contribute to and implement innovative, efficient and sustainable solutions.

In order to play this active role in the innovation process and take advantage of the opportunities to create public value generated by the new model, two conditions are key. Firstly, that governments should change their organisational structures and processes, moving towards more horizontal and transversal structures in which leaders act as facilitators and promoters, encouraging the creation of public value. And, secondly, that the teams of government workers should cooperate as a matter of course with the other quadruple helix actors, since proposals for new solutions very often have their origins in society (companies, associations, entrepreneurs, etc.). Within this framework, governments:

- Should ensure that other players take part in the decision-making processes regarding public policy (participatory budgets, community building, deliberative democracy processes, conflict resolution, open asset management and so on) and in the co-creation and innovation of public services, promoting and guiding the innovations proposed by the actors involved.
- To this end, government should share and place people, data, infrastructure, instruments, networks and, in general, the resources available to them, at the service of innovation.

The social innovation ecosystem

The complexity of social innovation within the framework of public policy, as described and discussed in these pages, invites us to consider the quadruple helix actors and the interrelations involved in social innovation as an ecosystem whose articulation determines the capacity of a country to create a stimulating environment for social innovation. *The Economist's* Intelligence Unit has developed this idea of a social innovation ecosystem based on four pillars. The first and most important of these pillars is policy and the institutional framework; the second is the financing available to stimulate experimentation and the development of social innovations, and to support these innovations; the third is the level of

entrepreneurship and, especially, the willingness to take risks; and, finally, the fourth is the resilience and depth of civil society. Based on this, the Intelligence Unit formulated the Social Innovation Index as an indicator that summarises a series of comparable indicators from 45 countries around the world, seeking to measure the state of the question with regard to the aforementioned four pillars, as seen in Table 1.

Table 1. Pillars and indicators used in the Social Innovation Index

<p>1. Policy and Institutional Framework (weight: 44.44%)</p> <ul style="list-style-type: none"> • Existence of national policy on social innovation at the different levels of the public administrations. • Social innovation research and evaluation of impact. • Legal framework for social enterprises. • Effectiveness of system in policy implementation. • Rule of law. 	<p>2. Entrepreneurship (weight: 15%)</p> <ul style="list-style-type: none"> • Risk-taking mindset. • Citizens' attitude towards entrepreneurship. • Ease of starting a business. • Development of clusters.
<p>3. Financing (weight: 22.22%)</p> <ul style="list-style-type: none"> • Availability of government financing to promote social innovation. • Ease of obtaining credit. • Total public social expenditure. 	<p>4. Society (weight: 18.33%)</p> <ul style="list-style-type: none"> • Culture of volunteerism. • Political participation. • Civil society engagement. • Trust in society. • Press freedom.

Despite its limitations, particularly the lack of capacity to measure the impact of social innovation, this index is a good reference for detecting strong and weak points in countries' ecosystems. The results speak for themselves. They indicate significant differences between the countries of central Europe, with the United Kingdom, Denmark, Belgium, France and Germany occupying the leading positions in the European Union; the Nordic countries, including Norway and Iceland, in intermediate positions; and the Mediterranean countries, which occupy the lower positions. Moreover, these positions and differences remain constant, generally speaking, when the four pillars are examined in more specific detail.

Source: *Old problems, new solutions: Measuring the capacity for social innovation across the world* (The Economist Intelligence Unit, 2016).

3.

The process of innovation in public policy

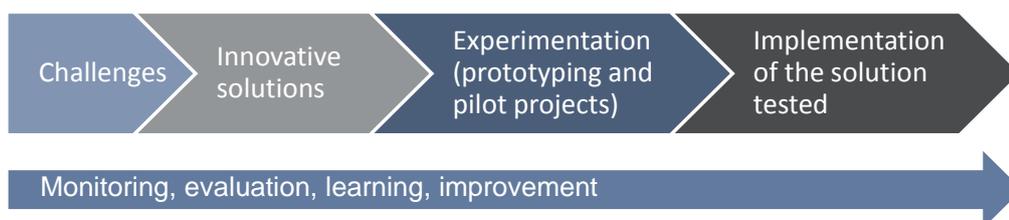
As we have seen, then, in order to benefit from the opportunities provided by the new model for creating public value, it is essential that, when it comes to designing, implementing and assessing new public policies, governments should promote open, interactive and collaborative processes with users. Moreover, they should harness the full potential of ICTs and the knowledge of all quadruple helix stakeholders.

3.1.

Stages in the innovation process

One of the main barriers against innovation in public policy is the risk and uncertainty inherent in all innovation processes. When we innovate, the results are always uncertain; we cannot know for sure what will happen within the range of possible future scenarios. Since there is potential to explore and generate innovations throughout the process, there is always the possibility of failure. However, we should also remember that, in the sphere of innovation and experimentation, failure is inherent to the iterative process of learning and improvement (Nesta, 2017). As noted previously, in the social innovation process, collective learning is a goal in itself, since the knowledge generated by interaction among different players is a key element for providing a response to new societal challenges.

Illustration 1. Stages in public policy social innovation



Source: The authors.

In this context of uncertainty, impact assessment and measurement should be conducted at all stages in the public policy innovation process. As shown in Illustration 1, the process can be broken down into four stages.

There follows a description of the four stages in the innovation process: identification of the challenge; analysis of the challenge and proposal of innovative solutions; experimentation with small-scale prototypes or pilot projects; and large-scale implementation of the solution.

3.1.1.

Stage 1: Identification of the challenge

This stage requires new processes, which involve the intervention of various stakeholders. Challenges or problems can be identified by either the government or other players through studies, surveys or tools enabling public communication and consultation or citizen participation, whether directly or through representatives from different groups (associations of citizens, residents, students, etc.). Accordingly, identifying the challenge, which is often raised at local level, can be considered the first stage or starting-point in the innovation process.

3.1.2.

Stage 2: Analysis of the challenge and proposal of innovative solutions

The first step in the innovation process is for the public administration or administrations with powers in the field in which the challenge is identified to decide to develop and implement innovative solutions in cooperation with other stakeholders. The participation of civil society is key from the outset in order to gain a holistic and systemic understanding of the challenge, and mutual understanding that can lead to proposals of innovative solutions that can be translated into real, feasible and effective projects. Proposals for innovative solutions should be put forward jointly by all the actors involved, and should be based on in-depth analysis of the implications for change that they entail: opportunities and alternatives, risks, systemic interactions, actors, and the behaviour of people, especially as users of public services, to co-create innovative, efficient and effective solutions. The government may use different tools to promote the generation of innovative solutions to meet societal challenges in cooperation with quadruple helix actors:

- Social innovation camps, with the participation of quadruple helix actors, to co-create innovative solutions for the social challenge posed.
- Deliberative democracy processes (replacing polls or public consultations), in which a large number of people gather together and receive information about a specific challenge. They discuss this among themselves and with experts in the particular field. At the end of these debates and discussions, they are asked their opinion about the possible solutions to the challenge.
- Consultations, which are opened to the market, calling for suggested solutions to the social challenge posed (within the framework of innovative public procurement processes or others).
- Small subsidies for innovative local initiatives, associations or non-profit organisations that pursue social missions (support for vulnerable people, environmental conservation, etc.).

Innovation camps

Innovation camps are designed as spaces to bring together governments, companies, universities research centres and citizens to discuss and find solutions to common challenges. They take an innovative, bottom-up approach, and are self-managed to a large extent, but they need political support and a degree of institutional governance.

- Inspired by the Aalto Camps for Societal Innovation, innovation camps may focus on a transversal **theme**, bringing together participants with different perspectives and experience to address specific challenges related to the theme.
- The **challenges** are usually identified according to local, regional or European needs. Challenges typically address complicated, complex or chaotic problems where there are no easy answers or ways forward. They require a suitable "challenge-owner", qualified to make the commitment to bring the process to a successful conclusion and implement the solution found.

- The **participants** should be stakeholders with experience in the challenges, and should be involved in them, whether directly or indirectly. Together, they should reflect diversity in terms of experience, perspectives, profession, country, culture, age and gender. Students, researchers, innovators, entrepreneurs and artists have taken part in various successful innovation camp experiences.
- The **dynamic** varies, but the process always begins with an initial description of the challenge (provided by the "challenge-owner"). The other participants ask questions and reformulate this description before going on to design prototypes for holistic, integral solutions to address the challenge.
- **6 weeks, 6 months, 6 years:** soon after the staging of the innovation camp, the "challenge-owner" should complete a final version of the prototype (6 weeks) before going on to work on its implementation (after 6 months) so that, if the prototype is successful, it can be implemented on a larger scale in the medium term (6 years).

Source: *Innovation Camp Methodology Handbook: Realising the Potential of the Entrepreneurial Discovery Process for Territorial Innovation and Development* (Rissola, Kune and Martinez, 2017).

3.1.3.

Stage 3: experimentation with small-scale prototypes or pilot projects

Experimentation with prototypes or pilot projects at local level is key to the public policy innovation process: it enables the benefits and defects of solutions to be identified, so that appropriate adaptations can be made at the later implementation stage. Although this experimentation takes place on a smaller scale or over a short period of time, it should be conducted with the involvement of all stakeholders, particularly those at whom public policy is addressed. Moreover, experimentation is intrinsically linked to assessment of the social impact of the pilot project from the beginning of implementation. It is therefore essential to provide methods and tools to test initial hypotheses and assess impact.

To promote public policy experimentation through the design and implementation of pilot projects involving quadruple helix stakeholders, it is essential to create new forms of partnership, to facilitate the training of these stakeholders and, especially, of government, and to establish methodologies and examples of best practice. It is also vital for a budget to be made available to promote public policy experimentation.

3.1.4.

Stage 4: Large-scale implementation of the solution

Once the experimental or pilot project has been developed at local level; once the expected impact on the challenge has been assessed, undesired impacts have been identified and alternative mechanisms designed to minimise them; once it has been demonstrated that the innovative solution is effective, then it is time to implement the solution on a large scale. In many cases, implementing the solution in other contexts or on a larger scale will require changes in structures, organisation or procedures, and it is therefore essential that the project and the change proposed from the bottom-up should form part of an innovation process and project that is broader and driven from above (top-down) so that it contributes to the systemic change required by the new paradigm.

3.2.

Civil society participation in the innovation process

As is argued in this paper, one of the main elements in the new model is the inclusion of the fourth helix –citizens, or civic society– in the open science and innovation ecosystem. The design and implementation of effective, innovative solutions to respond to the challenges of society requires, in most cases, the active participation and cooperation of citizens, as an active part of the solution. In other words, the participation of citizens is not necessarily limited to co-designing solutions; it can also extend to managing the solution. Clear examples of this are the fight against climate change; waste minimisation, reuse and recycling; and the reduction in the cost of certain medical services through the use of online medical tools. The degree of citizen involvement can range from simply informing the government (enabling it to better understand the problem and the alternatives, opportunities and solutions) to giving opinions and analyses regarding the decisions taken and the alternatives to them, or working directly with the government to ensure that citizens' hopes and worries are understood and that these are addressed

appropriately. At the higher end of involvement, civil society can become a partner in all the steps in the public policy innovation process and can even act directly as a decision-maker or implementing public policy (Davies and Simon, 2013).

Managing citizen participation is a challenge in itself. The outcome of this participation depends largely on the skill and commitment of all those involved, and whether the distance between citizen and government is really reduced and mutual trust strengthened. It is essential to ensure social representativeness, freedom to become engaged, and transparency. It is also necessary to prevent well-organised local minorities from taking over the participatory process, sectors of society from excluding themselves from the process because they do not consider it appropriate or because they feel they should not engage in it; the process from lacking the necessary legitimacy (whether because it is taken over by a minority or because the unofficial representatives of some groups do not render accounts appropriately to the rest); and participation in negative experiences from causing disillusionment (Simon *et al.*, 2014).

Addressing these challenges and obtaining the greatest possible benefit from sustained citizen participation requires public policy to be open-minded and convinced that there can be no effective solutions without the engagement of all the stakeholders involved in the challenge (including citizens). Openness is also required on the part of citizens: trust in the public institutions they work with, and the ability to work together. The goals of citizen participation and why this participation is key must be made very clear, and the possibility that the final outcome may not be in line with any initial premises should also be clear. Moreover, it is necessary to decide who to engage with and why, the characteristics of this group and any barriers against participation. It is equally important to remember that managing citizen participation is no easy task. Training, knowledge and experience are required in order to avoid errors in the design of the process that can cause failure to engage, the alienation or disillusionment of citizens and loss of legitimacy of the process and the specific project or strategy.

The tools for organising civil society participation in government innovation processes are many and varied: from consultations, idea banks and competitions to deliberative democracy processes and innovation camps (meeting spaces designed for the joint creation of innovative solutions by different stakeholders), and other forms of partnership. Within the framework of the model of innovation, science and open government, we are seeing rise in the relevance and importance of collaborative innovation spaces such as living labs,

citizen laboratories and digital fabrication spaces. These provide citizens, companies and governments with spaces for experimentation where the work is conducted through open and collaborative innovation methodologies that enable complex social challenges to be addressed and innovative solutions to be proposed, developed and tested. Such labs have great potential to strengthen networks of cooperation and the transmission of knowledge in the territory, and to generate new links between quadruple helix actors.

4.

The value of innovation in public policies

4.1.

The impact of innovation

In the private sector, innovation has a market value that can be measured in economic terms. On the other hand, in the public administration, the value of innovation is much more complex and, therefore, more difficult to quantify. This value is usually measured in terms of impact on society, in accordance with the following benefits (European Commission, 2012):

- **Outcomes:** contribution to resolving society challenges, such as improving health, creating jobs, sustainable growth, etc.
- **Services:** production of more efficient, higher quality public services with increased benefits.
- **Productivity:** improving the effectiveness and internal efficiency of public organisations.
- **Democracy:** strengthening the participation and engagement of citizens; greater transparency, empowerment, more equality, social justice, and more and better accountability.

4.2.

Key elements in measuring impact

The objective of assessing and measuring the impact of social innovation is, firstly, to monitor and improve the implementation of innovative projects and, secondly, to visualise the outcome from the innovative effort in order to testify to the value of this social innovation ("what is not measured is not achieved"). Moreover, the engagement of multiple stakeholders (including citizens) in public policy innovation processes makes it necessary for civil society to be involved at all stages of impact measurement.

Assessment and measurement of social impact should be based on what is known as the "theory of change" for the innovative project. That is to say, how the resources provided to develop it (inputs) and the activities of each of the stakeholders involved will enable the desired changes in products or services (outputs), short-term results (outcomes) and more medium- and long-term impacts will be achieved (CEGES, 2014; Hehenberger *et al.*, 2013). In accordance with the aforementioned stages in the public policy social innovation process, impact assessment should be based on in-depth understanding of the challenge to be resolved and the goals of the innovative project, taking into account the four benefits of public sector innovation discussed above.

In the already abundant literature on assessing and measuring social impact, there is general agreement that impact assessment should begin at the moment when the social innovation project is designed, as only in this way will it be possible to conduct the monitoring necessary for the iteration inherent to innovation. The assessment process is usually organised into the following steps:

1. The first step in the assessment entails clearly identifying the goals to be achieved as regards the complex challenge, taking into account all the points of view surrounding the solution, which is also complex. It is also necessary to identify the activities designed and their effects (outputs), the resources (inputs) available for the solution, and the expected outcomes and impacts. It has become usual in the terminology of social impact measurement to use the term "smart" when speaking of goals. A "smart" goal is specific, measurable, achievable, results-focused, and time-bound.
2. The second step is to identify all the stakeholders involved in the solution, including civil society and the final beneficiaries of the project. It is particularly important to analyse the expectations and specific goals of each of these stakeholders as regards their participation in the innovative solution, and to what extent these goals are in line with the final goal of the project and whether there is any conflict between them. It is also necessary to estimate the engagement of stakeholders, and what the implementation of the project entails for them in terms of workload.
3. At this point, and in line with the theory of change established for the project, the third step is to establish measurement systems (indicators) to quantify resources (inputs), activities, products and services (outputs), and the results (outcomes) and impacts of the project. The fourth helix —citizens, or civil society— must also be

brought in and led to engage with this process, although its role may vary greatly according to the nature of the innovative solution. In fact, since they are public services users, the participation of citizens in measuring social impact represents major added value, since it enables the design of assessment tools, both qualitative—for example, life stories, satisfaction surveys and focus groups—and quantitative (stated preferences, cost savings and cost/benefit analysis (whether monetised or not) in nature. All such tools are highly effective.

The selection of indicators should also be "smart": that is to say, indicators should be specific, measurable, achievable, results-focused, and time-bound. It is advisable to select a mixture of quantitative and qualitative indicators and to consult, as far as possible, indicators from other similar projects. It is also important to identify the evolution of all effects, both desired and undesired, and particularly those of displacement (a positive effect on one group can be accompanied by a negative effect on another), dead weight (the effect would have occurred in the absence of the action) and unintentional (which could also be positive). Another aim is to estimate what is known as the attributable impact, that is to say, to determine to what extent the change observed is the result of the actions of the project or other actions or events outside it.

4. The fourth and final step in impact assessment concerns the regular monitoring of the indicators designed. In other words, systematically collecting and analysing data from these indicators, using the methodology and at the frequency established, to check progress towards the goals set at the outset.

As mentioned previously, impact assessment must begin at the same time as the social innovation project is designed. However, the remaining steps do not necessarily need to take place in a sequential way. In fact, it is very likely that the dynamics of innovation will generate changes in the timing of all or some of the four steps described, including those devoted to defining goals and identifying the actors involved. It will be, precisely, good monitoring and assessment of the experiment that will guide these changes and provide feedback for the iteration of the innovation.

5.

Conclusions

As is made clear in this paper, the Public Administration is an important actor in the shift towards the new open innovation and science paradigm and the advance towards a more sustainable and more inclusive economic development model. This role centres on promoting, developing and implementing innovative, efficient and sustainable solutions that provide satisfactory responses to the challenges facing society and become a resource for the generation of economic and social value. Rapid technological advances, especially in the world of ICTs, helps to articulate the collective responses that these challenges require.

In a rapidly changing environment where multiple interactions take place, and in a society that faces increasingly complex challenges, governments need to develop innovations in cooperation with the other quadruple helix actors, that is to say, universities and research and innovation centres, companies and citizens, and civil society. All this has important implications for public management, as it requires structural changes (affecting political processes, organisation, the design and implementation of public policy and relations with the multiple actors in society) that are not easy to carry out due to the intrinsic characteristics of the Public Administration (risk aversion, hierarchical structures, behaviours based on strict rules, etc.). Transparency, cooperation, multidisciplinary, experimentation, participation and learning are the keys that should guide the direction and actions of governments, which should always place people at the centre of public policy.

Public policy innovation is conducted through a bottom-up process that often has its starting-point in the local sphere and can be described in four sequential stages. In the first stage, the aim is to identify the complex challenge to be resolved with the cooperation of all quadruple helix actors, including the fourth helix —citizens, or civil society. In the second, the participation of civil society is key in order to achieve a holistic and systemic vision of the challenge and mutual understanding among all the actors, leading to the proposal of innovative solutions that can be translated into real, feasible, effective projects. At this point, experimentation with prototypes or pilot

projects, a stage when the aim should also be to involve all stakeholders (particularly the beneficiaries of public policy), is key for detecting the benefits and defects of the innovative solutions designed. The final stage in the innovation process revolves around expanding the scale at which innovations that work and are demonstrated to be effective are implemented. In other words, the process begins with small experiments, often of a local nature and, if these work, they are converted into standard practice.

Although citizens —the fourth helix— should be present throughout the public policy innovation process, this presence still faces major challenges as regards guaranteeing its legitimacy and appropriate development. In view of the new opportunities generated by ICTs and the open innovation and science model, it is essential to explore how collaborative innovation spaces (living labs, digital fabrication labs and other spaces) can contribute to establishing new forms of cooperation between government and citizens that can generate social value through pooling and applying the knowledge and capabilities of the different actors in the territory. An interesting future line of study would be to investigate how the articulation of the quadruple helix innovation model, by increasing the economic and social value of the knowledge generated by the different stakeholders in the territory, has the effect of improving the effectiveness of public policies in response to societal challenges, generating social value and enhancing both the competitiveness of companies and the quality of life of citizens.

This, then, is the context that forms the framework for this paper, in which we highlight the key factors for making the Public Administration a driver of change towards the open innovation and science paradigm promoted by the European Union. In this respect, European cohesion policy, through the financial support provided by the structural and investment funds and the research and innovation strategies for smart specialisation, can and should play a decisive role —particularly after 2020— in helping state and regional public administrations to become active players in the change towards the new paradigm, which is expected to create new opportunities for generating economic and social value. Moreover, besides financing, the European Commission has multiple other tools available to it. These include: establishing directives and methodologies for open innovation in the public administration; highlighting the value of social innovation as a source of effective and sustainable solutions and as a source of progress; promoting spaces for collaborative innovation that bring together all the quadruple helix actors; and helping to create regulatory frameworks that support experimentation in the public sector (in general, or specifically for actions co-financed by European funds),

which entails systems to assess public policies that are more focused on the innovation process and learning than on outcomes. This because, when it comes to innovation, outcomes are always uncertain.

6.

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