



PART I. A REALISTIC EVALUATION  
OF SCIENCE POLICY - GENERATING  
LEARNING FOR SPANISH PUBLIC  
ADMINISTRATION INSTITUTIONS

PART II. A PORTFOLIO OF POLICY AND  
RESEARCH OBSERVATIONS AND  
REFLECTIONS

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I, ARMELA DINO CONFIRM THAT THE WORK PRESENTED IN THIS THESIS IS MY OWN.  
WHERE INFORMATION HAS BEEN DERIVED FROM OTHER SOURCES, I CONFIRM THAT THIS  
HAS BEEN INDICATED IN THE THESIS.

## ACKNOWLEDGMENTS

*Falemnderit Kadrie Dino, që besove aq fort tek unë e që më dhe aq shumë dashuri gjatë kesaj jete. Jemi të një shpirti.*

*“Primero el hombre aprende en la vida a andar y a hablar. Más tarde, a sentarse tranquilo y mantener la boca cerrada” (Severo Ochoa)*

What a joy it has been to go through the intellectual and spiritual growth of being a doctoral researcher! Cheerio to the curiosity, humbleness and consciousness that have brought me here!

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My heartfelt thanks to John and Joyce Taylor for seeing in me and supporting me!

*In memoriam Prof Jakup Agalliu, për mua Xhaxhi Kupja.*

*Falemnderit Eli dhe Armor Dino që më bëtë!*

## COVER LETTER – THE TWO PARTS OF A DPA

A Doctorate in Public Administration (DPA) is a research degree at **the interface of science and public policy** because the individual carries out scientific research while contributing to policy in a policy placement.

The DPA programme requires the development of an original research project with an academic contribution (i.e.: **the DPA thesis**) and the reflection on policy context and perspective, observations and reflections that the researcher carries out in the policy placement (i.e.: **the DPA policy portfolio**).

This document includes the DPA thesis as “[Part I. A Realistic Evaluation of Science Policy - Generating Learning for the Spanish Public Administration Institutions](#)” and the policy contributions under “[Part II. A Portfolio of Policy and Research Observations and Reflections](#)”.

**The two parts are stand alone in nature.** The reader may freely choose to start reading Part I or Part II indiscriminately. For a reader that is new to the Spanish system of science policy or to the dual nature of a DPA Programme, it is recommendable to start reading the policy context that I was involved before and during the doctorate programme: “[Part II. A Portfolio of Policy and Research Observations and Reflections](#)” first.

The DPA enables **the professional and the researcher intertwine** in their work and their intellectual growth.

## ABSTRACT

The **research herein aims to generate learning** for the Spanish government about the effects that “Severo Ochoa” Centres of Excellence Programme has produced; and to **give an insider’s systematic critical reflection** on the policy environment. The Programme was launched by the Spanish government as a high profile **science policy instrument**.

The research uses **programme theory and realistic evaluation approaches** rooted in qualitative methods and analysis. **As far as the author is aware**, it is the first time a realistic evaluation approach has been used to evaluate science policy.

The **literature review** focuses on approaches to science policy evaluation, in general, and science policy evaluation in Spain, specifically. It includes approaches to rethinking science policy evaluation, expands on theory-based, realistic evaluation and finishes with a focus on learning from evaluation for policy making, institutions and deliberative policy analysis.

The **empirical research** chapters firstly explore policymakers’ **conceptual framework of impact** at the time the programme was launched, and then, analyses the programme’s effects in the first 20 awarded centres. The effects are explained through a realist lens, identifying **context-mechanism-outcome configurations**.

Finally, the **research conclusions** identify what worked well from the policy instrument. All findings will be made available to the ministry in charge of science policy in the Spanish Government to enable policy learning from the research.

## IMPACT STATEMENT

Elaborated as a **research project in the Doctorate in Public Administration Programme**, the research was conceptualised and implemented with the intrinsic objective to create impact both in the policy arena and in the researcher. Once the results are reaped the potential impact of this research can be summarised as follows.

**In the academia**, the research develops the first ever programme driven realistic evaluation of a science policy instrument by solving challenges already identified by the science policy scholars. The use of this new approach may influence the policy evaluation academia in the years to come.

**Outside the academic world**, the research offers innovative solutions for the evaluation of high level policy instruments that are based in a complex and changing environments useful to any policymaker at different sectors of government and levels of intervention. More specifically, it brings out understanding on the effects of a performance based institutional funding mechanisms at a national level in Spain. The actual results may influence future policy design by the institutions in charge. In addition, the results may produce impact at both regional level (those regions that have placed similar schemes in operation) or internationally (to other countries or supranational organisations). The intrinsic capacity building component and **inclusion of the insider's perspective in both the research and policy arena** can impact immediately the public service delivery through the institutional upskilling. Organisational impacts may occur in the public administration institutions by creating space for policy evaluation trained staff to practice and therefore become systematic in improving the policy cycle.

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PART I. A REALISTIC EVALUATION OF SCIENCE POLICY -  
GENERATING LEARNING FOR THE SPANISH PUBLIC  
ADMINISTRATION INSTITUTIONS

## INTRODUCTION

This is the **report of the DPA research project** “A Realistic Evaluation of Science Policy - Generating Learning for the Spanish Public Administration Institutions” under the Doctorate in Public Administration (DPA) programme. This is considered as the academic deliverable for the DPA, and it is accompanied by a [Part II. A Portfolio of Policy and Research Observations and Reflections](#), the policy deliverable.

The research project was designed **with the objective to generate learning** for the Spanish government about how to understand the effects generated by the “Severo Ochoa” Centres of Excellence Programme, and to **produce an insider’s systematic critical reflection** on the policy environment by using specific research-related practices and skills to enhance policy understanding. This reflects the specific academic and policy-practice mixture of a DPA, in contrast to a standard academic PhD.

According to the ERAC Peer Review (2014<sup>1</sup>) **Spain’s science policy lacks policy evaluation** and systematic analysis, which impedes policy learning to improve Research and Innovation support (EU European Semester Country report, 2018<sup>2</sup>). This research aims, not only to bring in a novel approach to the evaluation of science policy in general, but as well to evaluate a programme of the Spanish government and in the same time to train academically one of its public employees.

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<sup>1</sup>[http://www.mineco.gob.es/stfls/MICINN/Prensa/FICHEROS/2014/140801\\_final\\_report\\_public\\_version.pdf](http://www.mineco.gob.es/stfls/MICINN/Prensa/FICHEROS/2014/140801_final_report_public_version.pdf) Page last accessed on 17 October 2020.

<sup>2</sup> <https://ec.europa.eu/info/sites/info/files/2018-european-semester-country-report-spain-en.pdf> Page last accessed on 17 October 2020.

The “**Severo Ochoa Centres of Excellence**” Programme was launched by the Spanish government as a high profile **science policy instrument** to award the best research centres and to grant them a four-year block funding based on their institutional performance. The project will focus on the evaluation of the programme by analysis the first round of the awarded centres during 2011-2014, a total of 20 centres.

As a start, [Chapter I “Understanding the background and context to science policy evaluation in Spain’](#) firstly, gives a broad overview of public policy evaluation, science policy evaluation, and its practice in Spain and beyond, with the objective to identify challenges and opportunities. Then, it reviews institutional learning for evaluation uptake. Finally, it focuses on rethinking science policy evaluation through a critical realist perspective, making the case for the new approach to science policy evaluation presented here.

Following that, the description of the “Severo Ochoa Centres of Excellence Programme” is done under [Chapter II “Policy description”](#). It introduces the reader with the programme goals and characteristics, and it gives a very brief historic presentation of the programme idea.

[Chapter III “Research Design and Methods”](#) draws out the design deployed for the realist evaluation, and the methods when using the qualitative techniques employed in the research: documentary review, interviews and participant observation.

The empirical research [Chapter IV “Findings”](#) firstly explore the policymakers’ conceptual framework of impact at the time the programme was launched, and then, analyses the programme’s effects in the awarded centres. The effects are

explained through a realist lens, identifying context-mechanism-outcome configurations.

Finally, the **research conclusions** in [Chapter V “Conclusions”](#) discusses the feasibility, benefits and challenges and limitations of a critical realist approach in evaluating science policy.

## CHAPTER I. UNDERSTANDING THE BACKGROUND AND CONTEXT TO SCIENCE POLICY EVALUATION IN SPAIN

### INTRODUCTION

This chapter draws out **an appraisal of the existing research** into the history and practice of science policy evaluation in general with a specific focus in Spain, and the role of the theory-driven evaluation for science policy with the objective to give the opportunity for contribution to the original research carried out in my study - to make the case for a realistic evaluation of the science policy instruments.

Firstly, the chapter introduces literature focused **on both the instrument under study, i.e.: Centres of Excellence, and the context, i.e.: Spain**. This gives the first approach on the policy evaluation of the “Severo Ochoa” Centres of Excellence programme.

Secondly, I look at one of the unresolved needs for policy evaluations, that of evaluation uptake. For this reason, I revise institutional theory, deliberative policy analysis, as well as specific public policy studies in the country to understand **what needs to happen for learning to occur in public administration institutions in Spain**.

Thirdly, I explain why **a new space for a theory driven realistic evaluation** for the Spanish public institutions opens through my research, and how does the literature on the needs to rethink science policy evaluation support the cause. For this, I review the literature on **science policy evaluation** and its latest advances, the one on the **foundations of critical realism** and the theory based realistic evaluation one with the perspectives it offers for my study.

The chapter finalises with a **summary** after having introduced the opportunity for my research study.

## EVALUATING SCIENCE POLICY AND THE SPANISH CONTEXT

The evaluation of science policy has been a concern for researchers in the last decades (Cozzens 1997; Georghiou 1998, Salter and Martin 2001; Shapira and Kuhlmann 2003, Martin 2011, Feller 2017) and for the policy makers (European Commission 2018<sup>3</sup>, 2019<sup>4</sup> and 2020<sup>5</sup>; and OECD 1998<sup>6</sup>).

For this literature review it is important to distinguish between science policy evaluation as “business as usual” in contrast to **science policy evaluation that aims to create knowledge for change**. The first one is the Research Excellence Framework (REF) in the UK as a process for distributing funding according to performance (Molas-Gallart 2012; Sivertsen 2017; Jonkers et al. 2018) or as part of an ongoing system of performance management (Sandström and Van den Besselaar, 2018).

Before checking on what the literature says about the evaluation of science policy which holds a central role in my research, this section will explore the following. Firstly, the features of the **evaluation of public policy**; secondly the **policy instrument placed in its international dimension** (i.e.: the performance based institutional funding and the centres of excellence); and thirdly the characteristics of the **context under study** (i.e.: the public policy and science policy and research evaluation in Spain).

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<sup>3</sup> <https://ec.europa.eu/info/sites/info/files/2018-european-semester-country-report-spain-en.pdf> Page last accessed on 29 June 2018.

<sup>4</sup> [https://ec.europa.eu/info/sites/info/files/file\\_import/2019-european-semester-country-report-spain\\_en.pdf](https://ec.europa.eu/info/sites/info/files/file_import/2019-european-semester-country-report-spain_en.pdf) Page last accessed on 14 Aug 2020.

<sup>5</sup> <https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1584543810241&uri=CELEX%3A52020SC0508> Page last accessed on 14 Aug 2020.

<sup>6</sup> <http://www.oecd.org/science/inno/policyevaluationininnovationandtechnologytowardsbestpractices.htm> Page last accessed on 12 March 2021

## *WHAT IS POLICY EVALUATION?*

**Policy** is defined as an **institutionalized proposal to solve a problem, guided by a conception** (Lassance, 2020); a statement of how an organisation or government responds to particular eventualities or situations according to its agreed values and principles (Palfrey 2012, Fox 2017); a statement of purpose and process for addressing a particular social, economic, or environmental issue (Parry, 2005).

**Policy studies** are at the same time people centred; aspiration, action and output and evidence oriented and value-laden (Goodin et al., 2006).

In this sense **evaluation can be seen as a policy study, a policy analysis** grounded in the foundations of **accountability** (demand to demonstrate impact), **social inquiry** (commitment on using social scientific methods) and **epistemology** (Christie and Alkin, 2013). Historically the policy-related evaluations started with proving value for investment, which seemed little effective to understand if the programmes worked (Weiss 1998), followed by the experimental designs which specifically in policy may lack effectiveness because they do not consider the epistemological perspectives (Cooper, 2018).

In the logic of the above the **use of evaluation for policy** has a special attention in the policy evaluation literature. The uses are summarised as: instrumental (direct use of findings for policymaking), conceptual (changing the levels of knowledge), symbolic (persuasion for policymaking) and process (participatory focused) (Lemire et al, 2020; Alkin and King, 2016; Patton, 2011).

Bovens et al. (2006) explain that **policy evaluation is an indispensable tool for feedback, learning and thus improvement**. Nevertheless, they conclude that policy evaluation is an inherently normative act, a matter of political judgement. It can at best be informed but never fully dominated by scholarly efforts to bring the logic of reason.

Patton (1997) sees policy evaluation as the **systematic collection of information** about the activities, characteristics, and outcomes to make judgments about, improve effectiveness, and/or inform decisions about the future. Rossi et al. (2004) see it as the use of **social research methods to systematically investigate** the effectiveness of social intervention programs in ways that are adapted to their political and organizational environments and are designed to inform social action to improve social conditions. On the contrary, Henry and Mark (2003) see policy evaluation as a **'politicized practice that nonetheless aspires to some position of impartiality or fairness'**, indicating openly some controversy and tension in the evaluation practice. Yet the policy makers need evaluation and it has come to be associated for the past few decades as a potent ally of theirs in that it is a means of assessing the 'value' of projects, programmes and policies (Palfrey, 2012). Good evaluation requires understanding the policy concerns, which often are masked by a generic descriptor (Maynard et al., 2016). This makes the case on the focus and better understanding of the policy instrument to be evaluated.

**Policy evaluations can be conducted by a range of different actors**, including external contractors, experts; internal staff; peers or a combination (Fox, 2017). It was in the era of New Public Management when evaluation became a more frequent tool used by policymakers and programme managers (Rossi et al, 2004). Recent trends related to evaluation capacity building and participatory evaluation approaches reflect a move toward knowledge workers, practitioners, and policymakers being integral to the use of evidence (Lemire et al 2020). making the case for internal reflective evaluators (White, 2014).

The literature reviewed here shows that **policy evaluation as a type of policy analysis reflects the challenges that policy studies have with producing knowledge that can inform policymaking**. The features of public policy

evaluation would be briefly summarised on: commitment to using scientific methods and considerations about the nature and validity of knowledge for bringing out evidence that can be used to create change through informing policy making. Here it is of importance the understanding of the object for evaluation, which in the specific case of my research is the “Severo Ochoa” Centres of Excellence programme, a performance based institutional funding (PBIF) launched in Spain in 2011.

The next section focuses on the PBIF and how it became an option for science policy making.

### *PERFORMANCE BASED INSTITUTIONAL FUNDING – AN OPTION FOR SCIENCE POLICY*

So widely has performance based institutional funding (PBIF) been used, that **the OECD dedicated three publications** to the instrument in a short period of time: OECD, 2014, 2018a and 2018b. The OECD states that the instrument came into use in the late 1980s in the UK and it has been adopted in different formats in most of the OECD countries in the following decades. Nevertheless, the OECD reports do not analyse the **motives for the countries to adopt this policy option**. Understanding these motives became an important part of my literature search, but there is not a lot published about it, and it not an easy task to reach a conclusion. My **guiding questions for the search** were: 1) Why was PBIF an option for science policy? and 2) Why was it considered relevant?

During the review, I came to realise **two main reasons**: 1) the PBIF was used as a mechanism to alleviate tensions between research autonomy and governance of research; and 2) the public policy at that time was influenced by the New Public Management (NPM) wave, making the PBIF a new tool for science policy. The NPM ideology served as a framework of inspiration and management for the sectoral policies in general, including science policy (Martin, 2019).

New Public Management (NPM) is **the label that many academics have given to a series of reforms** from the 1980s onwards, aimed at improving the efficiency and performance of western governments and/or public sector organisations. Examples are the development of performance indicators and benchmarking, personnel reforms aimed at ‘normalising’ public sector employment on private sector models, placing executive bodies at arms’ length from ministries, establishing public private partnerships and introducing new management techniques and instruments (Pollitt et al 2007).

**Performance, autonomy, accountability and effectiveness** were the expected outcome of this approach that were used as such in science policy, too. Rabovsky (2014) recognises that “performance management can be seen as an extension of the New Public Management ideology that stresses managerial creativity and adaptability as mechanisms for improving public management”. Performance based institutional funding became **a new way of funding research** in the NPM context. But why was that?

To a certain extent **PBIF alleviates the tensions** between the individual search for autonomy that researchers’ quest and the government mission to fund relevant research that solves societal challenges. PBIF instruments introduce an agent in between of the researcher and the government, i.e.: the institution that is receiving the research funding.

Through the PBIF science policy creates **a stimulus leaving the space for research freedom and at the same time steering the research** and being accountable to the taxpayers.

The most recent literature (Sabine Maasen and Sascha Dickel, 2019, and Claire Donovan, 2019) discusses the tension between science autonomy and the ability of the government to guide it. Claire Donovan discusses the issue through assessing the impacts of publicly funded research and she realises that a key

question is **how close the relationship between the government and the public funded researchers is**. She concludes that it is the steering of this relation that can serve as a mechanism to encourage broader impacts.

Although there is no agreement on measuring the impact of research (Reale, et al, 2018) the science governance uses funding to steer actors towards producing 'excellence' and 'relevant' research (Donovan, 2019). This new situation brings the need for a new social contract science-society that encompasses arrangements of trust and control for the promotion of science (Maasen and Dickel 2019). Boschen (2019), in line with what Maasel and Dickel discuss, states that the impact of science policy on epistemic regimes is not linear, making the **orientation towards excellence and the one towards offering solutions convergent**.

If funding the salient in science produces at the same time impact as well as it is legitimised in front of the public eye and it builds a win-win social contract with the scientists, then this explains why **the PBIF instruments became popular**, and the focus was placed on the performance of institutions, and certainly not individuals only.

Hicks (2012) and Jonkers and Zacharewicz (2016) in their respective publications indicate as **reasons for introducing the PBIF**, the provision of accountability for public investment, the choice to allocate research funding selectively to the best performers, and creation of performance incentive both at institutional and individual level.

Another reason for choosing institutional funding came from the governments themselves. Leopoli and Reale (2019) have observed that the overall increase in the role of project funding required additional management efforts from the governments or the public agencies. More managerial efforts for smaller funding

at project level created a need at policy level to shift into other dimensions, that of the institutions.

This takes us to the next section of the document: understanding why the support to the Centres of Excellence became a part of the PBI mechanism in science policy.

### *PROMOTING CENTRES OF EXCELLENCE AS A POLICY INSTRUMENT*

The answer to the question “Why the centres of excellence became a policy instrument of choice in the performance based funding mechanisms?” is found in **four factors** that are supported by the published literature revised here.

The literature based on Centres of Excellence **focuses mostly on the effects of the instruments** and to a smaller extent on understanding the reasons of usage of it. Because the objective here is to understand the policy option, the selected literature under this section checks on those studies that have considered these reasons and discusses them.

**The first factor is connected to the context that the governments operated when selecting this policy choice.** The OECD Report (2014) “Promoting research excellence. New approaches to funding.” is the deliverable of the OECD Working Party on Research, Institutions and Human Resources and their work on understanding the use and effects of the “research excellence initiatives”. The report states: “The National Research Systems face an increasingly competitive environment for ideas, talent and funds” (Page 15). This has made governments innovate in the funding instruments in the search for efficiency. “Governments have shifted funds from institutional core funding to reward success” (OECD, 2014). The results of the report are backed by a survey the Working Group had carried out to 20 governments that had implemented 56 different funding schemes. The most popular rationales for choosing the Research Excellence

Initiatives, out of a list proposed by the OECD, were: 1) To improve national scientific competitiveness; 2) To create an environment for improved quality in research; 3) To increase the international visibility of national research; 4) To steer public research, and 5) To promote linkages with industry.

In any case, the OECD report does not bring any analysis on how the promotion of the institutional dimension of excellence **causes** those effects. As said above, the results were based on a survey that the OECD made to the governments.

In order **to explore the choice on the Centres of Excellence**, and in connection to what it is already explained beforehand, when talking about the tensions between researcher's autonomy and the government's goal to steer research (Maasen and Dickel, 2019; Donovan, 2019), in a study of Siri Brorstad-Borlaug, from the Nordic Institute for Studies in Innovation, Research and Education and Magnus Gulbrandsen from the TIK Centre for Technology, Innovation and Culture at the University of Oslo, in their paper "Researchers identities and practices inside the centres of excellence" conclude that, in general, the Centre of Excellence programmes allow individual autonomy of research, by conserving the effects of individual practices. (Brorstad-Borlaug and Gulbrandsen, 2018).

Other studies (Hellström, 2018; Aksnes et al, 2012; Beerkens, 2009; Leach, 2009) indicate that **research centres allow more focus on Human Resources skills than other research organisations**, such as the universities.

There are clear indications that, across the schemes and scheme types, the emphasis is on human resource development for the science and higher education system, as opposed to the traditional publication-oriented emphasis of project funding, and on skills development and transfer rather than on product development and new firms (Hellström, 2018).

Another factor that makes the Centres of Excellence an attractive option for science policy is that **they offer the right conditions** to 1) organise research, 2)

to professionalise it, 3) to promote research governance, and 4) to enable interdisciplinary of research. As in instrument they offer the public policy a possibility to have an effect on research, on science itself.

Centres, as a means to organise research, emerge through a variety of channels, such as the governmental funding schemes, the ones that emerge from bigger institutions (universities, etc.), industry, etc. (Rip, 2011). The concept “Centres of Excellence” as a governmental policy instrument to improve research organisation is discussed by Siri Brorstad-Borlaug (2015). Her study on the Swedish and Norwegian centres of excellence concludes that the instrument supports organisation of research steered by the government. As a continuation to the above, Tomas Hellstrom (2017) states:

*There is also a clear indication that these schemes require a professionalization of research organizations, including funders that may ultimately stimulate the research system as a whole away from piecemeal non-directed funding and towards a capacity for priority setting and more systematic evaluations of the research effort.*

Not only does CoE instrument support the organisation of research at the targeted centre, but **it effects the bigger institutions** such as the universities to set their own priorities, engage in professional research governance and renew their disciplinary structures (Rip, 2011). Hellstrom (2017) suggests that CoE may be an instrument to enhance organizational governing capacity, and create institutional and legal frameworks in the research and higher education field.

These assumptions on the change of other institutions following the CoE schemes and the CoE existence in the system are tested in my research study and they are described under [Chapter IV “Findings”](#).

And finally, another factor is the **promotion of interdisciplinarity**. CoE create pathways to interdisciplinarity that allow collaboration to go beyond mere

interaction, and towards integration of specialisms (Hellstrom, 2018). CoEs increase collaboration between different fields and make disciplinary and organisational boundaries more permeable, explains Siri Brorstad-Borlaug (2019). 90% of CoEs analysed in the OECD study perform some type of interdisciplinary research, either within their own research field or cutting across the paradigms of other research fields (OECD, 2014).

The literature agrees that it is the **competition for prestige created by a PBIF that creates powerful incentives within university systems**. It suggests that under the right circumstances, PBIF will enhance control by professional elites, and as they aim for excellence, may compromise other important values such as equity or diversity (Hicks, 2011).

Hicks' study is the only one that brings forward a **causal relation between the quest for excellence in research and the compromise on important values such as equity and diversity**.

The review of the literature on the science policy instrument “centres of excellence” based on international experiences gives some understanding that the creation of centres of excellent research (developing the institutional dimension of excellence) can be beneficial for the research itself (it is better organised and steered maintaining the researcher's autonomy) and for the talent working inside the centres (promoting HR skills). The **“centres of excellence” instrument** can create change both at the centre level and beyond the organisation, and it can promote interdisciplinarity of research, as well as it can promote diversity and equity actions in the centre.

These two sections reviewed the existing literature on the policy instrument such as it has been practiced and studied at international level, with no mentions on the SO programme. Being the **SO the only performance based institutional funding at Spanish state level** an opportunity arises to research about it. And

another opportunity is the fact of researching on the SO whilst producing a greater understanding on the programme itself, as well as its effects, understanding how and where has the programme worked, under what conditions and why. In preparation for that, the literature review in the following sections focuses on the practice of science policy evaluation in Spain, starting by reviewing the literature about policy evaluation in Spain.

### *POLICY EVALUATION IN SPAIN*

Joining the European Union in 1986 is seen as a determinant incentive for the development of policy evaluation in Spain (Haarich, 2005; Fernández-Ramírez and Reboloso, 2006; Viñas, 2009; Muñoz, 2009; Rivero Recuenco, 2011). Nevertheless, the literature that has been identified decades after the entry to the EU reiterates that Spain shows a medium degree of evaluation culture maturity (Jacob et al., 2015) or even a lacking one (Bustelo, 2006), a weak evaluation system (Feinstein and Zapico-Goñi, 2010) with weaknesses not only at state level, but as well at the regional (Wojtowicz and Kupiec, 2018) and local one (Lladó and Masó, 2011).

The **beginning of 2000s** saw the creation of the Spanish Evaluation Society (2001) and of the State Agency for the Evaluation of the Quality of Public Services and Policies (AEVAL<sup>7</sup>) in 2007. The later was designed as an autonomous public body with the mission “to promote evaluations and impact analysis of public policies and programs, as well as the management of the quality of services, favouring the rational use of resources and accountability to citizens.” and a vision “to become an institution of national and international reference in the activities

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<sup>7</sup> <http://www.aeval.es/es/index.html> Page last accessed on 6 August 2018.

related to the evaluation of policies and the quality of public services.” (AEVAL, 2007)<sup>8</sup>

AEVAL objectives were the evaluation and analysis of public policies and programs, and the promotion of the culture of evaluation and quality of services and their practice in public management.

Feinstein and Zapico-Goñi (2010) and Viñas (2009), among others, recognise that **Spain made good efforts to consolidate an evaluation system through the creation of AEVAL**. Before 2007 evaluation policy was based on two pillars: the evaluation of European Union co-funded programs and the evaluation of international development for cooperation programs. Earlier to that, before the accession to the EU, the evaluation use in Spain was limited to cost-benefit analyses and conducting assessments of selected public investment projects (Pazos and Zapico-Goni, 2002).

In 2017 the government decided to **eliminate the AEVAL as a consequence of rationalisation of public bodies**, following the Law 40/2015, of 1 October, on the Legal Regime of the Public Sector. Its functions passed to Treasury. Its deletion shows the level of importance given to the evaluation of public policies by the state administration in the country (Garde Roca, 2017). The elimination of AEVAL – the sole institution dedicated to public policy evaluation in Spain – remains to be analysed.

Back in the day, its **creation raised very good expectations for the institutionalisation of evaluation in the country** (Viñas, 2009, Bustelo 2006). The institutionalisation of evaluation provides the conditions for sustained and systematic data collection on policy implementation and the effects and

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<sup>8</sup> [http://www.aeval.es/es/la\\_agencia/presentacion/mision/index.html](http://www.aeval.es/es/la_agencia/presentacion/mision/index.html) Page last accessed on 6 August 2018.

outcomes of programs. Institutionalisation also renders the presence of highly qualified evaluators within the public administration, universities or consultants' firms more likely. Moreover, it facilitates cooperation among concerned authorities in situations of multi-level governance (i.e.: in federal systems) and increases the acceptability of an evaluation culture (Jacob, 2015).

In 2009, Viñas published her study "The European Union's Drive towards Public Policy Evaluation." on the analysis of the determinants on the institutionalisation of **public policy evaluation in Spain, where the institutionalisation of evaluation and its implementation is among the lowest compared to other countries**, although the situation improved over the years (Furubo and Sandahl, 2002; Varone et al., 2005). All EU countries that developed or started to develop an evaluation culture in the 1990s, including Spain, did so as **a result of external pressure** (Furubo and Sandahl, 2002), and in this case was the European Union that depending on the policy either obliges evaluation studies (cohesion policy - investment of structural funds) or recommends them (research and innovation policy).

Viñas (2009) believes that the regional development public policies funded by the European Union have been one of the pillars upon which evaluation of public policy in Spain was initially built and later consolidated. Her work is consistent with other scholars in this area, such as: Derlien and Rist, 2002; Fernández-Ramírez and Reboloso, 2006; Furubo and Sandahl, 2002; Garde, 2005; Pazos and Zapico-Goñi, 2002.

Nevertheless, a study published in 2018 by Wojtowicz and Kupiec titled "Reluctant to learn? The use of evaluation to improve EU cohesion policy implementation in Polish and Spanish regions" finds that: "Spanish administrations have no capacity or practice of collecting and analysing data." (Wojtowicz and Kupiec, 2018, Page 115)

The limited resources for technical assistance in Spain were at least partially related to the fact that evaluation teams in regional administrations were understaffed and were not trained to efficiently commission or conduct internal evaluations (Wojtowicz and Kupiec, 2018).

After the elimination of AEVAL, **training remains one of the driving forces for the institutionalisation of evaluation in the country** identified by both Viñas (2009) and Bustelo (2006). The specialised evaluation units created in the Spanish universities are at the Madrid Autonomous University, Department of Psychology; the Madrid Complutense University, Department of Sociology and Psychology; the Autonomous University of Barcelona, Department of Political Science and Public Administration; the Alcala de Henares University, Department of Economics; the Madrid Carlos III University, Department of Political Science and Public Administration; The Seville University, Institute for Regional Development.

There **are no studies to-date on the profile of trainees** and how many of them are contributing or collaborating with the public sector. For Bustelo (2006) the problem of a lack of a culture may be as basic as professionals not really knowing what evaluation is, nor how it can be carried out. Professionals and civil servants who formulate, apply, and otherwise work with programmes, policies and public services have not received formal training in evaluation, and they cannot become socialised to a way of thinking about judging the value of policies and programmes if there is little public awareness of such an undertaking.

Other driving forces for institutionalisation that were considered are the **existence of associations or societies grouping together professionals who are working on policy and programme evaluation** (Viñas 2009, Bustelo 2006). As mentioned above Spain counts with the Spanish Evaluation Society constituted in 2001. The Society holds annual conferences. According to the website, the

society holds relations with Latin America, but there is no visibility of their activities with the EU or other OECD countries, a natural collaboration that could be expected.

Other indicators of the institutionalisation of evaluation in a given country include the publication of a scientific review on evaluation; and the use of standards and guidelines, **but in Spain there are no evaluation standards and guidelines, nor is there a specialised scientific journal on evaluation** (Bustelo 2006, Viñas 2009).

Bustelo (2006) recognises that in general, there is a tendency to evaluate specific measures, interventions or projects, but without a more global vision that takes into account general policies, planning and programmes, and this is where evaluation guidelines could help to highlight the issue.

Wojtowicz (2018) states that the **promotion of evaluation culture in Spain can happen through a strong leadership in the central government** that may be willing to start a national debate about evaluation and support the development of an evaluation capacity with the structures and skills to conduct studies and use findings.

In 2013 the Spanish government created the Independent Authority for Fiscal Responsibility (AIReF<sup>9</sup>) to raise effectiveness of the fiscal consolidation measures undertaken during the financial crisis. In the framework of annual Public Spending Evaluations, in 2019 AIReF carried out a Spending Review of the “Program for the Promotion of Talent and its Employability in Research,

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<sup>9</sup> Organic Law 6/2013 of 14 November on the establishment of an Independent Authority for Fiscal Responsibility at <https://www.hacienda.gob.es/es-ES/El%20Ministerio/Paginas/Organigrama/Autoridadindependientederesponsabilidadfiscal.aspx> Page last accessed on 3 Aug 2021

Development and Innovation”<sup>10</sup> one of the four programmes of the “State Plan for Scientific and Technical Research and Innovation 2017-2020”. This embedded an original evaluation of some parts of the programme, as never before seen in the public policy review in the country. In October 2019, the president of AIREF published a presentation<sup>11</sup> on the **challenges faced when carrying out the spending reviews with the aim to develop public policy evaluation** in the country saying:

*The challenge is to ensure the permanent character of evaluation and to help spread the evaluation culture. We are considering the creation of a new Evaluation Division in AIREF now. This effort makes perfect sense when accompanied by a rigorous implementation (AIREF, 2019).*

In August 2021 the evaluation division of AIREF has not been put in place yet.<sup>12</sup> To-date, as **pointed out in the review, the public policy evaluation in Spain lacks consistency and use**. Evaluations are carried out sporadically, and where they are, there is no evidence of systemised learning. **Spain has been a late country to adopt the policy evaluation practice**, which has been given as highly recommended or even mandatory (like the cohesion policy) by the European Commission.

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<sup>10</sup> <https://www.airef.es/wp-content/uploads/2019/06/Estudio4-5SR/P5-PROTEGIDO.pdf> Page last accessed on 3 Aug 2021

<sup>11</sup> <https://www.airef.es/wp-content/uploads/2019/10/presentaciones/191021.-IVIE-SR-J.Escriva%CC%81-web.pdf> Page last accessed on 3 Aug 2021.

<sup>12</sup> The organisation is composed of the President’s Office, the Budget Analysis Division, the Economic Analysis Division and the Legal Affairs Division, such as seen in its website <https://www.airef.es/en/about-us#the-team> Page last accessed on 3 Aug 2021.

## *SCIENCE POLICY EVALUATION IN SPAIN*

The **research evaluation system** was put in place by the Spanish Government in the beginning of the 1980s (Sanz-Menéndez, 1995) and it was multiplied by the regional governments in the early 2000s (Cruz-Castro and Sanz-Menendez, 2007). The following organisms were established for research evaluation at state level.

- 1) The **National Agency for Evaluation and Prospective (ANEP) in 1986** an administrative structure that was responsible for the evaluation of the research activities (Fernández de Caleyá, 2001). With “evaluation of research activities” it was meant the process of **reviewing research funding proposals** with the objective of determining the merit or scientific quality (Sanz-Menéndez 2014). The State Research Agency created in November 2015 (Official Gazette, 2015<sup>13</sup>) absorbed ANEP competences under one of its units, therefore ANEP, as such, **ceased to exist**.
- 2) The establishment of the **National Commission for the Evaluation of Research Activity (CNEAI) in 1989** designed to carry out the ex post research performance evaluation of individual researchers periodically (every six years). An evaluation of individual research outcomes is carried out with the objective of a salary increase (Jiménez-Contreras, et al. 2003, Cruz-Castro 2007, Sandstöröm and Van den Besselaar, 2018). In 2014<sup>14</sup> with the “Law 15/2014, of September 16, on rationalization of the Public Sector and other administrative reform measures” **CNEAI was included**

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<sup>13</sup> <https://www.boe.es/buscar/act.php?id=BOE-A-2015-12889> Webpage last accessed on 3 Aug 2018

<sup>14</sup> <https://www.boe.es/buscar/doc.php?id=BOE-A-2014-9467> Webpage last accessed on 3 Aug 2018.

under the National Agency of Evaluation of the Quality and Accreditation (ANECA).

- 3) The establishment of the **National Agency of Evaluation of the Quality and Accreditation (ANECA) in 2001** with two functions: 1) to carry out the universities' institutional quality assessment in teaching, and 2) to evaluate and accredit the young staff before entering teaching positions at universities in the country. (ANECA, 2018<sup>15</sup>).

Through ANEP, CNEAI and ANECA the **Spanish government institutionalised mechanisms for carrying out the evaluation activity in research** (Cruz-Castro and Sanz-Menéndez, 2008; Osuna et al., 2011), but the landscape of the evaluation of research in Spain was dominated exclusively by the ex-ante evaluation of the research projects (for the purpose of obtaining funding) and of the individuals (for the purposes of the six-year terms) (Sanz -Menéndez, 2014) **leaving unattended the evaluation of programmes or policies to merely “evaluative studies of R&D policies”** (Cruz-Castro and Sanz-Menéndez, 2007).

These were studies and research projects not formally commissioned, and not integrated or associated with the policy-making process, although some of them achieved informal acceptance and collaboration of the policy-making bodies, but with no commitment to implement the results. They were more academic exercises than policy commissioned research evaluations; their design did not provide clear definitions of the purpose or clear evaluative criteria, nor were methodologies well suited to generate policy feedback (Cruz-Castro and Sanz-Menéndez, 2007, Page 215).

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<sup>15</sup> <http://www.aneca.es/ANECA/Presentacion> Webpage last accessed on 13 Aug 2020.

Demands for programme and policy evaluation are evident nowadays in Spain and they are recognised up to a certain point by the political discourse. The Spanish Strategy recognises as a priority “The **coherent evaluation of the initiatives and activities deriving from the objectives and priority axes established** in the Strategy is a fundamental exercise to certify the follow-up of public actions in the field of science, technology and innovation.” (Ministry of Economy and Competitiveness, the Spanish Strategy of Science, Technology and Innovation 2013-2020, page 39.<sup>16</sup>) The Strategy connects the evaluation of the initiatives and activities to the need for existence of the new Information System (see below) that would support a better design of the Strategies and Plans. The references on evaluation are as well given related to the coordination of policies with the EU and the regions regarding the adoption of shared criteria in terms of management, evaluation and, where appropriate, the implementation of co-funding models (Spanish Strategy of Science, Technology and Innovation 2013-2020, page 5.).

The later **State Plan** published in 2018 (Ministry of Economy, Industry and Competitiveness, page 31) mentions that the state aids would be analysed based on advanced technologies, like for example text data mining and by natural language processing. Again, in this document there is no clarity about programme or policy evaluation as such. The Plan creates a governance body in charge of the evaluation being the “Sub-commission for monitoring of the State Plan”. The Plan, published on 3 January 2018, includes no advance to-date regarding the aforementioned evaluation practices.

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[http://www.ciencia.gob.es/stfls/MICINN/Investigacion/FICHEROS/Estrategia\\_espanola\\_ciencia\\_tecnologia\\_Innovacion.pdf](http://www.ciencia.gob.es/stfls/MICINN/Investigacion/FICHEROS/Estrategia_espanola_ciencia_tecnologia_Innovacion.pdf) Page last accessed 4 Aug 2018.

Historically, the **lack of programme and policy evaluation** in the Spanish science policy is connected to the fact that the Inter-ministerial Commission for Science and Technology (CICYT), which was the highest governing body of the science policy from 1986 to 2011, did not include any formal or explicit decision to systematically perform program evaluation at all (Sanz-Menéndez 1995). It was impossible to find any other literature on the lack of programme/policy STI evaluation in the country.

In the **2000s the National Plan for R&D&I included an annual monitoring and evaluation system**, the Integral Monitoring and Evaluation System (SISE) run by the Spanish Foundation of Science and Technology (FECYT) – a foundationally private run entity with public funding. The SISE reports were mainly based on descriptive statistics: number of calls for tender versus planned calls, budgets planned and spent, publication dates of calls, number of proposals submitted and funded, distribution of projects and funds across ministries and regions, and so on. There are no evaluations of specific program outputs or outcomes (Molas-Gallart, 2012).

The Spanish Law of Science 14/2011<sup>17</sup> replaced SISE with a new system called the Spanish Information System of Science, Technology and Innovation - SICTI (Ministry of Economy and Competitiveness, State Plan 2013-2016, page 53<sup>18</sup>). This system is designed as **an instrument for capturing and analysing data with the objective of better monitoring and preparation of the State Strategies and Plans**. Due to the fragmentation the Spanish Science, Technology and Innovation

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<sup>17</sup> <https://www.boe.es/buscar/act.php?id=BOE-A-2011-9617> Page last accessed on 4 Aug 2018.

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[http://www.ciencia.gob.es/stfls/MICINN/Investigacion/FICHEROS/Plan\\_Estatal\\_Inves\\_cientifica\\_tecnica\\_innovacion.pdf](http://www.ciencia.gob.es/stfls/MICINN/Investigacion/FICHEROS/Plan_Estatal_Inves_cientifica_tecnica_innovacion.pdf) Page last accessed on 4 Aug 2018.

System suffers (ERAC Peer Review, 2014) the information system is designed to enable a more effective coordination with the regions. The information system is not yet put in place, but at the present moment work is undergoing for its launch at the Unit of Planning, Monitoring and Evaluation in the Ministry of Science, Innovation and Universities<sup>19</sup> during 2018-2019 and the Ministry of Science and Innovation<sup>20</sup> to-date.

The need for **evaluation and systematic analysis in the Spanish science policy arena is reiterated in external reviews and recommendations from the European Commission** (ERAC Peer Review 2014<sup>21</sup>, EU European Semester Country report 2018<sup>22</sup>, 2019<sup>23</sup> and 2020<sup>24</sup>).

The European Commission in its 2018 report on the assessment of progress under the framework of the European Semester (section 4.4.3.) indicates that **Spain has an under-developed evaluation culture that hampers policy learning to improve R&I support** and recommends “The evaluation of successful programmes aligned to international peer review standards, such as Severo Ochoa and María de Maeztu, or relevant schemes to reinforce human resources and science-business links such as the Industrial PhDs programme, constitute a

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<sup>19</sup> <https://www.boe.es/boe/dias/2018/07/14/pdfs/BOE-A-2018-9860.pdf> Page last accessed on 4 Aug 2018.

<sup>20</sup> [https://www.boe.es/diario\\_boe/txt.php?id=BOE-A-2020-2740](https://www.boe.es/diario_boe/txt.php?id=BOE-A-2020-2740) Page last accessed on 14 Aug 2020.

<sup>21</sup> [http://www.mineco.gob.es/stfls/MICINN/Prensa/FICHEROS/2014/140801\\_final\\_report\\_public\\_version.pdf](http://www.mineco.gob.es/stfls/MICINN/Prensa/FICHEROS/2014/140801_final_report_public_version.pdf) Page last accessed on 29 June 2018.

<sup>22</sup> <https://ec.europa.eu/info/sites/info/files/2018-european-semester-country-report-spain-en.pdf> Page last accessed on 29 June 2018.

<sup>23</sup> [https://ec.europa.eu/info/sites/info/files/file\\_import/2019-european-semester-country-report-spain\\_en.pdf](https://ec.europa.eu/info/sites/info/files/file_import/2019-european-semester-country-report-spain_en.pdf) Page last accessed on 14 Aug 2020.

<sup>24</sup> <https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1584543810241&uri=CELEX%3A52020SC0508> Page last accessed on 14 Aug 2020.

solid basis for extending systematic evaluation approaches to other programmes.” (European Commission, 2018)

In 2019 the European Semester report detects insufficient reliance in policy evaluation in the country (European Commission, 2019, page 6), and in 2020 it reiterates the limited progress in developing evaluations of public research and innovation policy (European Commission, 2020, page 69).

The ERAC (European Research Area Committee) Peer Review carried out in the first semester 2014 by four academic experts, i.e.: Luke Georghiou, Arie Rip, Åsa Lindholm and Claire Nauwelaers, and five Member States peers from Belgium, France, Estonia, Germany, and Sweden coordinated by the European Commission arrived at the conclusion on the following regarding the evaluation in science policy in Spain.

*There is a lack of an effective system of evaluation at policy, institutional or research quality levels and only a partial existence of a policy intelligence system. Science policy evaluation at state level in Spain is yet to be conceptualised and put into practice. (ERAC Peer Review, page 3 and 8).*

The evaluation instruments since the 1980s have randomly focused on policy evaluation that lacks use, let alone relied upon policy learning. Science policy evaluation is present in strategic documents as a need and a compromise to be developed, though.

The above makes a SO evaluation relevant for the Spanish Government, but in the meantime it is of interest to review the literature on the evaluations of similar policy instruments published to-date – the focus of the next section.

## *APPRAISING THE EFFECTS OF THE CENTRES OF EXCELLENCE INSTRUMENT*

From the review carried out with the published literature on the performance based institutional funding and the Centres of Excellence (CoE), most of the literature focuses on the **effects of the CoE instrument**. The reviewed studies are many and diverse. Most of the times they are observations that do not go into explaining the causalities.

A significant amount of literature focuses on national systems of research, be it as an **international comparison** (OECD, 2014, 2018; Checci 2019); at a **European level** (Zacherewicz, 2019), or **regionally** (Geschwind, 2019). Academic research on national systems is based on countries such as: Australia (Scheider 2015; Martin-Sadersai, 2017; Barros, 2018; Lewis, 2018; Williams, 2018; Woeler, 2018; Hussey, 2019); the Czech Republic (Good, 2015; Vanecek, 2014), Denmark (Carter, 2016) Finland (Mathies, 2019), Germany (Kehm 2013; Gaehtengs, 2015; IEKE, 2017; Knie and Simon 2019); Italy (Cattaneo, 2016); New Zealand (Buckle, 2018; Lewis 2018); Slovakia (Pisar, 2017); Sweden (Lundequist, 2010); and the UK: Moed 2008; Hicks 2009; Martin, 2011, 2013; Rosli, 2016; Watermeyer, 2016; Lewis 2018; Hall and Martin, 2018; Pinar 2019.

As a result of the survey that the OECD (2014) carried out to the 40 governments' officials, a set of results have come out enumerated as "effects of the CoE instrument".

1. Research Excellence Initiatives (REIs) provide the Centres of Excellence (CoEs) with relatively **long-term resources** for carrying out ambitious, complex research agendas.
2. REIs can therefore lead to broad **changes in the structure** of the research system.
3. REIs allow for **greater flexibility** than other forms of funding, notably in terms of managing resources and hiring researchers.
4. **Researcher mobility** (both within national boundaries and abroad) is essential for scientific discovery and increasing productivity.

5. An increasingly **skilled workforce** is fundamental for economic growth and is likely to have lasting effects on society.
6. Research Excellence Initiatives concentrate **exceptional researchers** in well-equipped working environments.
7. REIs raise the **international reputation** of domestic research institutions.
8. The activities of CoEs can spill over and create **positive externalities**.
9. **Third-party funding** is important to the success of many REIs.
10. Responsible public funding bodies, CoEs and hosts **view REIs positively** (OECD, 2014).

The options for this survey were given by the OECD Working Group and the government officials were asked to score them in order of relevance. Some of the options given above do not relate to possible effects of the instrument, like for example, number 4, 5 and 9, and other effects are missing, like for example the **increase in performance** that will be discussed below.

### *Higher scientific performance*

The **first effect** highlighted in the publications is the **increase in the scientific performance** as a result of the performance based funding systems. The scientific performance is seen in terms of the research output such as publications and their citations. These studies are carried out at different levels: international, regional and at a national level. In general they confirm that the performance based funding systems have a **positive effect on the overall quality of research publications** (Buckle, 2018; Caetano, 2015; Checchi, 2019; Matthies, 2019; Scheider, 2015). Again, these conclusions are reached through observations in periods where the PBIF was put in place.

Daniele Checchi from the Department of Economics of the University of Milan, who checked on the number of publications on 31 countries that had put in place some instrument of performance based funding systems, found out that these

ones have a positive effect on the average research quality such as measured by the number of citations per paper normalised with respect to the field of study. They are a very useful instrument to steer the university system and increase the overall impact of scientific research of a country on a permanent basis (Checchi, 2019).

Another example is the evaluation of the German Excellence Initiative indicating that bibliometric investigations show **an impressive qualitative performance** regarding publications stemming from Excellence Clusters (IEKE Evaluation, 2017<sup>25</sup>).

Caetano (2015), in a sample of 75 Italian universities, observed that there was **an overall increase in the research productivity**, being this more pronounced among those universities that had inter-organisational linkages, such as third party connections, spin-offs, etc.

Another study by Bloch, Schneider and Sinkjær (2016) examined the relation between size and performance, and how performance for CoEs evolves over the course of the 10-year-grant-period in Denmark using multivariate analysis. Their study demonstrates that **performance over the grant period falls for the largest CoEs, while it increases for those among the smallest half.**

### *Influencing the overall science system*

**Secondly**, one of the observed effects in the literature has been how the performance based funding systems or the CoE instrument **influence the overall science system, beyond the scientific performance.**

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<sup>25</sup> <https://www.gwk-bonn.de/fileadmin/Redaktion/Dokumente/Papers/Imboden-Bericht-2016.pdf> Page  
las accessed on 13 August 2021

In Germany the university sector segmented into competing pressure groups because of the Excellence Initiative, such as analysed by IEKE Evaluation (2017) and Gaehtgens (2015):

*Beyond trying to save and continue some of the most successful projects, it is becoming obvious that the formerly homogeneous university sector itself is breaking up into competing pressure groups. The large, research-intensive and rich universities have organised themselves into the “U15” group; the large technical universities are represented as “TU9” (Page 23, Gaehtgens, 2015).*

This organisation of the top universities happened in Germany following the first period of the Excellence Initiative funding. More specifically the IEKE Evaluation reflects on the importance of governance of universities, their identity as institutions of excellence and the institutional framework.

A successful process of differentiation requires suitable governance of universities which rests on autonomy and strong leadership structures. University governance faced multiple challenges already during the process of applying for funds from the Excellence Initiative and this process has increased collective identity and understanding in many participating universities. Moreover, due to the triggered “competitive federalism”, the Excellence Initiative showed the potential to positively influence German state university laws (“Landeshochschulgesetze”) and thereby improve the institutional framework of the whole German university system (IEKE Evaluation, 2016, page 5).

Nevertheless, Knie and Simon (2019) state that a series of restructuring measures have been carried out in an institutional setting and that the Excellence Initiative has brought about considerable institutional changes by German standards, even those that were not intended from the outset, such as

new cooperation formats between universities and non-university research institutions. The reputation of the Excellence Initiative has also created an opportunity for innovation that would not have been conceivable with other funding formats or programmes of the Federal Ministry of Education and Research (Knie and Simon, 2019).

As a continuation of the above, and following several studies that have been made to the German Excellence Initiative, a core idea of the policy was the **promotion of horizontal and vertical differentiation**, which represented a comparatively radical challenge for the German higher education landscape, with its 'imperative of equality' (Flink and Simon, 2015).

The programme that has been mostly studied regarding its effects it has generated in the system has been the UK Research Excellence Framework (REF). The REF produces changes with the **appointment of new senior leadership**, a new vision, restructure of faculties and departments, and changes to the **research performance measurement systems**. The changes to both the university's mission and its internal systems are evident (Martin Sadersai, 2017). Technopolis Austria carried out a study of the effects the Czech Performance Based Funding system has produced in the Czech research system and it has showed considerable instability and unpredictability, making the strategic planning for research organisations difficult (Good, 2015). This could be classified as a negative effect, but yet it lacks a lot of background information on understanding these reasons, which may be related to the planning capacities and communication of the government and not intrinsic issues of the PBIF itself. Following the same line of thought, Pisar (2017) proved that in Slovakia this system has resulted in an increase in publication performance, but at the same time in a higher orientation on quantity instead of quality with several new negative effects such as creating one's own magazines, publishing in predatory

journals and bad timing of the whole model, leading to impossibilities of adjusting performances in advance.

The above are a selection of effects that the **CoE instruments have brought to the national research systems.**

### *More connection with industry*

The third observed effect of the CoE is the one that **connects the centres of excellence with the industry.**

As already stated above under one of the objectives of the OECD the CoE are the ones that generate impact in collaboration with the industries. One of the most important studies that demonstrate this is “Regionalizing “Mode 2”? The Adoption of Centres of Excellence in the Swedish research policy” by Per Lunderquist and Anders Waxell (2010). Their research that focused on the CoE in Sweden found out that even though the instrument itself counted for a relatively small share of government funding, it showed to have **a strengthening impact on particular research milieus and industries**, especially in the life sciences.

A later study by Rosli and Rossi (2016) examined the UK universities and how the policy to encourage **third mission engagement** could make use of the performance based funding instruments to reward universities’ activities in the domain. Their recommendation are aimed at the Higher Education Innovation Fund (HEIF).

### *Leveraging additional funding*

And finally, **the fourth effect** that has been observed by the literature is the **leverage of additional funding received by the CoEs.**

Carter Bloch from the Danish Centre for Studies in Research and Research Policy and his colleagues Jesper W. Schneider and Thomas Sinkjær analysed the effects of the CoE instrument in Denmark after 10 years of putting in place of the initiative.

The CoEs have also been very **successful in securing additional funding**, which can be viewed as a ‘cumulative effect’ of centre grants. In terms of new personnel, the far majority of additional funding is spent on early career researchers, hence, this accumulation would appear to have a ‘generational’ dimension, allowing for scientific expertise to be passed on to an increasing number of younger researchers.” (Bloch et. al., 2016, Page 15)

To recapitulate, the literature on the Centres of Excellence is mainly focused on **the effects that the instrument has produced** over time and it identifies **four** of them: higher scientific performance, influence on the overall science system, more connection with the industry and more leveraging on additional funding. The evidence brought is mostly based on observations and do not focus on understanding or explaining the causalities, typically quantitative with a strong output orientation.

### *INTERIM SUMMARY*

As the focus of my research is the evaluation of a science policy instrument in Spain, the literature review on this first block started with **understanding the characteristics of public policy evaluation** as a type of policy analysis based on the social inquiry, epistemological perspectives and accountability to produce evidence that informs policy making, and therefore it is very people-bound and value-laden. Literature evidences that two trends are reaffirmed in public policy evaluation: the importance of its use for policy and the integration of

policymakers in the evaluation practice with a rising trend on internal reflective evaluators.

With the objective to understand the instrument under my study (the SO Centres of Excellence), the review focused on the literature published in the last decade to **understand the reasons for performance based institutional funding and centres of excellence instruments as policy options in different contexts internationally**. By doing this, it found a place for my specific research study that offers an original approach to understanding the conceptualisation and effects of the science policy instrument in Spain.

Further on, with the objective to understand the context where my study took place, the literature was examined to give **a historical perspective on the public policy evaluation in Spain**. The review shows that a determinant enhancer of policy evaluation has been the EU accession. It points out that the Spanish administration needs to show real efforts for institutionalisation and systematisation of policy evaluation from different perspectives, by including evaluation as an intrinsic part of the policy cycle, by training of internal personnel on evaluation and collaboration with external specialised bodies such as universities and other entities.

As regards to the sector under study, that of **science policy**, the literature sheds light that the evaluation instruments have focused mainly on research evaluation and not at all on policy evaluation. There exists nowadays **a lack of programme and policy evaluation practice**, in spite of the fact that it appears to be present in strategic policy documents and it has been recommended internationally as a means to improve the Spanish performance in science and innovation.

Finally, the block checks the existing literature on a similar instrument like the one of my study (CoEs), and highlights **the four main identified effects** that the literature has observed. None of the studies explains causalities.

In line with the characteristics of public policy evaluation, the understanding of the policy options brought forward by the PBIF and the Centres of Excellence, and the context characteristics of Spain, **an opportunity arises to carry out a study like mine**. This will be explained under the last block of the review “Why a realistic evaluation of science policy for the Spanish public administration institutions?”.

In the meantime, the next block will deepen **knowledge on the evaluation use for policy and by public administrations**.

## **INSTITUTIONAL LEARNING FOR EVALUATION UPTAKE**

Here I turn my attention to understanding **what factors may affect the lack of take up of a policy evaluation**. Its focus on **institutional learning** derives from the perspective that a realist evaluation with an embedded researcher generates a good understanding of the programme, and from the fact that there is lack of science policy evaluation in Spain.

By reviewing literature on institutional theory, policy analysis and other country-specific public policy studies, I will firstly explore how do the public administrations learn, and later understand what we can do to make learning to happen.

### ***CAN THE PUBLIC ADMINISTRATIONS LEARN?***

Institutional theory categorises the understanding on institutions in three pillars: the **regulative, normative** and **cultural-cognitive** one (Scott, 2014). The creation of the state department and the administrative processes of its existence and

management are set into the **regulative pillar**. Aspects related to values, norms and routines in an institution fall under the **normative pillar**. Elements of the social reality, enhanced by the external actors make the **cultural-cognitive pillar**. An illustration of the normative pillar of institutions Scot's (2014) influenced by cultural and everyday activity of the members of the organisation is the research carried out in the **largest survey among senior public employees** of central governments which objective was to understand reforms in Europe as a response of the 2008 financial crisis (Hammerschmid et al., 2016). Among its findings, the Spanish state public administration comes out among the most static ones in Europe. The study measured **the perception on change the top officials had** on their work and on their institutions. For the Spanish case, the correlation is such that it is seen in different aspects of the institutional performance, like coordination, management and administration, etc. The dedicated chapter on Spain enumerates as one of the possible factors for the result the legacy of the Franco regime (Alonso, et al., 2016)

Seen under Senge's (2006) perspective and in alignment with the Hammerschmid et al. (2016) research, the **Spanish state public administration is rooted in a traditional culture of work** where decisions are authoritarian (top down and politicised) and the actors in them do not feel or perceive themselves as empowered to create change (even when they have acquired seniority). Nevertheless, the same research shows that the context and external actors may create change and learning in the European public administration institutions, including at certain extent, the Spanish ones. These **external factors** are the social movements of 2011 and the general regulations on public transparency, public contracting, etc. done at European Union level, including Spain. This is related mainly to the regulative pillar responses through cultural-cognitive pillar interactions with the external actors, explained by Scott (2014).

Related to the **social movements and the use of Internet** and the transformation of politics, Hajer and Wagenaar (2003) offer a post-positivist way of policy analysis, based on the belief that the “network society” - the one we live in - is open and the policy making would follow the same openness trend. This is highlighted by Scott (2014) through the introduction of cultural-cognitive belief systems in the institutional theory, by referring frequently to the neo-institutionalist theory. The transformative wave of social movements and digitalisation are felt in the institutions due to the interactions that these have with different actors (Scott, 2014).

This empowered interconnectedness in the **context** brought forward the **adaptive/deliberative policy analysis** focus into the traditional policy analysis (Hajer and Wagenaar, 2003), and it is already evidenced in the Hammerschmid e. al. survey, but it has had no echo in the Spanish administration (Hammerschmid et al., 2016).

In addition to the above, the public institutions that are, not only strongly influenced by what happens in their context and the relations with the external actors, but as well by **what happens with the internal actors** (Hammerschmid, 2016). People working in the institutions are key in transforming them, on creating the so-called “learning organisations” (Senge, 2006).

The remark that institutions are organisations that can transform and learn, is reinforced by the literature review revised here, beyond the differences in the contextual aspects of their research: public administration (Hammerschmid et al., 2016), businesses (Senge, 2006), institutional analysis (Scott, 2014) and policy analysis (Hajer and Wagenaar, 2003). A result of their research is that public **organisations can learn, and this would depend on the internal and external factors**. The section below will explore these factors.

## *WHAT DO WE NEED TO DO TO CREATE LEARNING?*

This section will focus on the **internal factors** being they: 1) the personal ones, the ones that are people-bound (their capacities and motivations) and 2) the organisation ones (teams, their interaction, and motivations).

Under the **personal factors** it is understood that institutional adaption to changes are dependent on the **skills and training** for the diffusion to occur and therefore adaption to happen in organisations Scott (2014). “Personal Mastery” – the capacity building, learning and skills of the individual - is key for enabling a learning organisation, including the technical skills of the leader (Senge, 2006). In the so-called Napoleonic tradition countries, there is more politicisation of decision-making (very high degrees in Spain) than in the Anglo Saxon tradition ones (Hammerschmid et al., 2016). This suggests that improving the skills of individuals inside the public administration in Spain can help increase the technicity of knowledge of both the leaders and public employees, and hence make change effective. Another people-bound, personal factor is the **mental model approach**, firstly articulated by Senge (2006) with echo in more recent research (Southwell, et al. 2018). This is useful to understand the diversity of learning contexts. “Two people with different mental models can observe the same event and describe it differently, because they’ve looked at different details and made different interpretations.” (Senge, 2006). As Schwartz-Shea and Yanow (2013) put it, this is the understanding of human meaning in context with the objective to recognise the sources of ambiguities. There exists a cognitive perspective in all strategy, i.e.: the pattern of cause-effect relations that, in top managers’ or entrepreneurs’ understandings, link value creation and value capture activities (Fumary, 2015).

Among the **organisational factors**, “**sharing a common vision**” is identified as a foundation for a learning organisation – this is created through team and inter-

team work inside an entity (Senge, 2006). The findings of Hammerschmid et al. (2016) do not see this happening in the Spanish public administration, where coordination is mainly done vertically. Page and Jenkins (2005) shed light in characteristics and dynamics of the public service that can support the understanding of why the Spanish administration has very little propensity to learn and change.

*In policy bureaucracies responsibility for maintaining and developing a specific area of policy rests to a large extent on middle-ranking officials. (Page iv) Making policy is a collaboration between the two parts of the executive. ...The officials outside the top levels have a larger role in making policy. (Page 183)*

The **role of the mid-level officials** as active players in creating change, creating “personal mastery” and “sharing a common vision” is key. These observations are aligned with my development as a reflective practitioner in my job place, explored under [Part II](#), accompanying document of this thesis.

Another organisational factor to institutional learning seen as “adaptation to changes” is the **size of the organisation** and **the distance to the public sector**. (Scott, 2014) Organizations that are aligned with the public sector are more likely to be responsive to institutional pressures, meaning therefore that the public institutions are receptive to learning and adaptation. Learning or as in this case it may be considered – the evaluation adoption mode – is determined by two factors: external pressure and internal predisposition of an institution. High external pressure and high internal propensity to evaluate show a mimetic adoption, a legitimizing and instrumental use. Hojlund (2014) If the pressure is high, but the propensity is low, than there is a coercive adoption with no use or just a symbolic use of the evaluation. Milzow et al. (2019) in line with what Hojlund indicates, highlight that:

*A methodologically rigorous and high-quality evaluation study is a necessary, but not sufficient, condition to use evaluation results. The context and other factors external to the evaluation itself—but often within the realm of the commissioning organization—determine the actual use of the evaluation.*

The internal pressure is key for creating a learning institutional and therefore being able to create evaluation uptake and this internal pressure is dependent by both the personal and organisational factors created in the institutions.

This aspect brings the review to create **crossing bridges between the personal and organisational** factors through **creating space for practice** and **including trained evaluators**.

Firstly, the space for practice is created by using knowledge related to policy practices and that allows space for interaction (Yanow, 2003). Then, another bridge between the organisation and the personal factors can be the integrating professional staff / evaluators (usually researchers, economists, and statisticians) into policy and strategy units ensuring that evaluation findings are incorporated into ongoing policy development from initial inception through to implementation (Jacob, 2015). This means the development of evaluation approaches in political arenas with some connection to policy analysis (Bovens, 2009).

Research finds that by creating knowledge that is very much related to the context and the institution and by **having embedded researchers** who develop policy analysis internally with the strategy can **enhance learning institutions**. These are affected by personal factors (training and skills of the public employees and their “mental model”) and organisational ones (sharing a common vision and creating internal predisposition for learning).

## *INTERIM SUMMARY*

The objective of this part of the review was to understand how learning happens in the institutions and how can they learn from policy evaluations. With that objective in mind the reviewed literature have enabled me to acquire general knowledge about institutional and organisational theory, to understand what makes institutions more flexible to new knowledge, to gain knowledge about the new forms of organisation of governance in the network society and its most relevant analysis for them; and to understand the public administration nowadays.

The idea that institutions can “learn” is reinforced in all the revised literature for this section, through different perspectives. To reach this conclusion Scott (2014) checks on all the institutional theory and its evolution, Senge (2006) observes the needs of the business sector and the motivations of workers, Hajer and Wagenaar (2003) discuss the need for a deliberative policy analysis and Hammerschmid et al. (2016) analyse the largest survey carried out to top public sector officials in Europe to offer internal perspectives towards institutional learning.

The literature reviewed here offers a bases for carrying out my specific research, that of a realistic evaluation of a science policy programme as an insider, working at the ministerial department in charge of science policy and with the programme itself. This specific part of the review will support my work and reflections of the Policy Portfolio, a document that accompanies my academic thesis and is composed of policy and reflective analysis on the work done as a practitioner and a researcher during the years the DPA years.

Mainly from Scott’s analytical framework, Senge’s 5-pillars for a learning organisation and Hammerschmid’s results of the largest European survey on public administration senior officials, **what would enable the Spanish**

**administration to “learn”**, is allowing internal staff to reach “personal mastery”, creating teams that communicate and listen, and having structures and institutional leaders/entrepreneurs that enable it.

By checking on Hajer and Wagenaar (2003) deliberative policy analysis theory on openness and contrasting it with Hammerschmid’s results I am able to reflect on the ministerial department where I work and explain **why a more realistic approach would generate more acceptance**.

As the policy evaluation has been explicitly one of the objectives of the Spanish science policy and it remains to be put into practice, my research will introduce **some new ways in terms of evaluation making** as well as training and capacity building inside the public administration institutions for institutional learning for evaluation uptake.

The third and last block of the literature review will specifically focus on the theory based realist evaluation as an opportunity for the science policy public administration in Spain.

## **WHY A REALISTIC EVALUATION OF SCIENCE POLICY FOR THE SPANISH PUBLIC ADMINISTRATION?**

Science policy in Spain lacks evaluation practice (see section above) which opens **an opportunity for my research** to not only evaluate a policy instrument, but to do so in a useful way. There are two main reasons for which policy evaluation should be useful:

Firstly, because a policy evaluation needs to draw out **a full understanding of a policy or programme** and how it works, in what conditions and why that is so.

The policymakers need evaluation to assess the value of their policies (Palfrey, 2012) by bringing evidence as well as the ideas and judgements around it. Policy

evaluations, such as policy studies are evidence oriented and value-people-centred (Goodin et al. 2006).

Secondly, a **policy evaluation needs to be useful to produce evidence for policymaking**. Considering the use of evaluation findings, this can be: instrumental by using the later directly for policymaking, conceptual by generating change in the knowledge about the policy being evaluated, symbolic by creating persuasion for policymaking, and process oriented by involving a participatory activity (Lemire et al 2020).

There are **approaches in policy evaluation** that may not be very effective for policy. At the beginning of the review under section "[What is policy evaluation](#)" I identify that **the foundations of public policy evaluation** lie in accountability (demand to demonstrate impact), social inquiry (commitment on using scientific methods) and epistemology (considerations about the nature and validity of knowledge), as well as use (of evaluation for policy).

In the table below I summarise the **three main approaches to evaluation** based in these four public policy evaluation foundations:

*Table 1 Approaches to evaluation*

	Epistemology (nature & validity of knowledge)	Social Enquiry (commitment on scientific method)	Accountability (demand to demonstrate impact)	Use (for policy-making)
Positivism	-Reality is objectively knowable. -Value-free. -Causation is successionist.	-Quantitative methods. -Experimental design.	Strong focus on the outcomes, loose connection to context.	-An objective position. -The evaluator as messenger of truth.
Constructivism	-Reality is socially constructed -Relativism -Causation is constructed	-Constructivist enquiry – dialectic hermeneutic -Qualitative mainly	Less focus on impact and more on social context.	-Relativist position. -The evaluator as a mediator.

<b>Realism</b>	-Double recognition of the objective and subjective interpretation. -Causality is generated	-Theory driven (incl. theory testing). - Method neutral	Outcomes in the context- mechanism- outcome configuration as a pattern.	- Policy friendly position. -The evaluator constructs explanation.
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As given on the table, there are approaches of evaluation that may not respond to the policy needs and may not be useful for the policy understanding and uptake. For example a positivistic approach evaluation carried out through an experimental design of randomised control trials may not take in account the context and epistemology of the policy sector, hence potentially explaining the claimed lack of demand for experiment-based evaluations (Cooper, 2018, Vine et al. 2014). On the other hand, a constructivist approach evaluation carried out through focusing on understanding the social context of interventions and by building a relativist opinion on the policy, lacks utility in informing the policymaking (Fox, 2017) as it is lacking evidence and ideas on the programme itself.

In the last section of the literature review, after firstly focusing on **understanding the science policy evaluation and its challenges**, I then introduce the **(critical) realism** as a philosophical approach that enables a **rethink of science policy evaluation**. By the end of the section, I review the literature that supports **the opportunity to offer a theory based realistic evaluation** of a science policy instrument in the Spanish public administration at the intersections of novelty both at academic and policy level.

### *WHY IS SCIENCE POLICY HARD TO EVALUATE?*

Science, technology and innovation policy have shown to be hard to evaluate (Cozzens 1997; Georghiou 1998, Salter and Martin, 2001; Shapira and Kuhlmann 2003, Martin 2011, 2016, 2019, Feller 2017) for decades. In the recent years

similar concerns have been risen by the research community in the “San Francisco Declaration on Research Assessment” (2014), the “Leiden Manifesto for Research Metrics” (2015), and the “Metric Tide: Report of the Independent Review of the Role of Metrics in Research Assessment and Management” (2015).

The question rises, **why that is?**

Such as we have seen above under [What is Policy Evaluation](#) section, **the public policy evaluation** is grounded in three foundations: **accountability** (demonstrate whether a programme has had a positive impact), **social enquiry** (the commitment to systematic use of social scientific methods) and **epistemology** (considerations about the nature and validity of knowledge), and **use** of evaluation for policy.

On the **accountability aspects**, the general political move towards the New Public Management (that has already been explained above) influenced science policy by placing emphasis upon accountability (Georghiou 1998) which has continued and it has been reinforced through establishing more complicated and burdensome mechanisms (Martin 2011). In the last years the accountability aspects of science policy are seen more prominent with movements like those of open science or citizen science, which include different concerns to the ones relevant to my study.

On **social enquiry** related aspects of science policy evaluation as part of science policy analysis has grown like a field of academic discipline and sometimes unrealistic with some troublesome observations offered by Martin (2016, 2019) in terms of:

- An increased homogeneity in terms of the researchers giving rise to a possible danger of intellectual ‘**inbreeding**’ or **cognitive lock-in**.

- An increased proportion of the studies carried out are **quantitative, even econometric, often exhibiting a naïve positivism**, and the papers published follow a fairly standard form.
- The **academic field as such may not keep up sufficiently** with a rapidly changing world and research environment.

As regards to the **epistemological aspects** around the nature of science, the literature reviewed shows that sciences themselves are based on different epistemic attitudes. They proceed according to divergent methods and ways of constructing proofs and of establishing truths (Pestre 2007). There are many open questions about the nature of science-policy interactions (Pedersen 2014).

From the above the literature identifies the following challenges in science policy.

Firstly, there is **a need to broadly understand effects and impact**. Susan Cozzens (2003) states that despite the new and old frameworks, we still don't know the impacts of science and technology policy on society in a broad sense and that the challenge is to develop the tools for examining societal impacts. Earlier than that, Georghiou (1998) identified the problem of behavioural additionality as a core issue for evaluation and one which reaches the most sensitive areas of policy. A focus on behavioural additionality creates scope for a wider appreciation of the effects than the conventional input and output approaches. In line with the above Rip (2003) remarks the need for developments in methodologies for programme evaluation that would make possible to overpass the value for money and accountability, and check if the goals have been achieved and how appropriate the policy or programme was. Impact is large and

diverse, it comes in numerous forms, and its assessment is far from straightforward (Martin, 2011).

Secondly, there is **a need for science policy evaluation to understand the ever evolving and complex context**. Martin (2016) raises the voice for the necessity of science and innovation policy researchers to focus on the new global challenges and perspectives of innovation studies. He suggests that these will entail overcoming the fundamental problem of how one gets from knowing that a particular policy “works there” in a particular context.

Thirdly, there is the need to create **adaptability of methods to the demands** for science policy evaluation. Some over-simplified methods of evaluation continue to dominate evaluations in the public sector (Wallace and Rafols, 2015) up to the point that the needs of evaluation users seem to have moved well ahead of evaluators conceptual apparatus (Arnold, 2004). Nevertheless, there is some evidence that there exists a willingness of managers and policymakers to include a greater variety of evaluation methods and indicators (Feller, 2012) if evaluation follows the same adaptive learning approach as science, technology and innovation policy itself (Georghiou, 1998).

Fourthly and finally, **there is a need to increase learning from evaluation**. Evaluation needs to be considered as a learning modality, and for that, credible theory, a changeable one, is necessary (Feller, 2003)

In Table 2, I **summarise and categorise the positions** on public policy evaluation, science policy evaluation and the challenges that the later faces in terms of accountability, social enquiry, epistemology and use.

*Table 2 Policy Evaluation bases & Science Policy Eval. Features & Challenges*

Public Policy Evaluation bases	Science Policy Evaluation features	Challenges science policy evaluation faces
Accountability (the demand to demonstrate positive outcomes and impact)	Rising need for accountability	Increased need to understand impact Increased need to understand context
Social Enquiry (systematic use of social scientific methods)	A discipline, but quite rigid	Adaptability of methods to the demands.
Epistemology (considerations about the nature and validity of knowledge)	Positivist mainly (due to historical legacy of first programmes)	Opener / broader epistemology
Use (of evaluation for policy)	Rising need for better use	Need to generate learning

This section has **identified the challenges** of science policy evaluation that are grounded on the public policy evaluation ones, but with their own specificities. The next part focuses on finding solutions for those challenges and opens up an opportunity for my specific research.

### *CRITICAL REALISM – RETHINKING SCIENCE POLICY EVALUATION?*

Critical realism is a philosophical approach firstly developed by Bhaskar (1989), and later by Collier (1994), Danermark et al. (2002), Elder-Vass (2010), and Edwards et al. (2014). **Critical realism shows a double recognition** of both the objective world that exists independently of people’s perceptions, language or

imagination, and of that part of the world that consists of subjective interpretations which influence the ways in which it is perceived and experienced. (O'Mahoney and Vincent, 2014)

This approach tries to overcome the dichotomy of the objectivist vs subjectivist, the positivist vs constructivist, the quantitative vs qualitative methods, the dealing with numbers vs dealing with facts, and offers an explanation of a **deeper reality determined by multiple factors** (Bhaskar 1993; Elder-Vass 2010). It takes therefore an open position towards the epistemological perspectives.

For the realists the **real is composed by the empirical and the mechanisms and context that generate it**. Thus, realist analysis needs to move frequently from the actual to the perceived, the so called "iterative movement". For this to happen the analyst needs to engage the domains of language and, what I will call: the one of "emancipation for change". The **language** is the means for communication, for generating persuasion and conviction, for creating narratives and contexts that can be subjected to realist analysis (Fairclough, 2002). On the "**emancipation for change**" there is an agreement in the literature that the realist researcher needs to be sensitive to the research implications and the political potentials (Bhaskar, 1986) by acknowledging the human needs (Sayer, 2011), and by reaching emancipation through self-awareness, and the ability to consider the means required to act on and create change (Ram et al. 2014).

This approach helps **critical realist researchers to deal with complex issues**, such as programmes and policies. A method to do so is called the "realist synthesis" with a purpose to build explanation through developing, testing, and refining theory to create an understanding of which programmes work for whom, in what circumstances, and why (Pawson and Bellamy, 2006).

The **complexity** in a critical realist study is tackled through the following:

1. **Outcomes are multiple, therefore they are given in a configuration, in a pattern.** The same intervention depending on the circumstances works in different ways and it is important to understand for whom, in which context the programme works and why (see causality below).
2. **Causality has a generative view.** The policy is understood as a resource that has been managed by people of different behaviours in different contexts, and all of these aspects make the policy work in a certain way. With difference to the positivist approach where causality is understood as successionist – giving causal powers to the policy itself. (Greenhalgh 2014)
3. **Theory creation is accumulative and iterative.** Understanding how the policy works is not just factual and analytical, but it is an accumulation and iteration of both.
4. **The unit of analysis is not the programme itself as an object, but the assumptions or ideas about how the programme is supposed to work, the so called “the theory” or the “programme theory” (Pawson et al. 2005), or in this particular case it can be called the “policy instrument theory”.**
5. **Implication of policymakers** is done through their close involvement from the theory development and throughout the whole process of research, and the conclusions are written in a language that can inform decision making (Pawson, 2006).

To help understand how critical realism can support science policy evaluation and therefore this study, I searched the literature to identify cases of realist

analysis or evaluations in the science policy sector<sup>26</sup>. To date, there appear to be no such studies, identifying one of the key contributions this study will make to the literature.

It may be the time for some rethinking of the science policy evaluation through a critical realist lens. First of all, **how does the realist approach solve the challenges identified in the evaluation of science policy?**

Firstly, the science policy challenge for **an increased need to understand impact** in a broader sense, the critical realist analysis offers **a pattern of outcomes**.

Secondly, the challenge the science policy evaluation faces nowadays, that of **understanding the dynamic ever-changing context** and therefore analysing it, can be supported and made easier by **the generative causality** offered by the critical realist analysis. Context is key in the realist paradigm, it turns on or off the mechanisms that create causality. For the realist analysts, the object under study does not cause change on its own, but it is affected by a series of mechanisms that operate differently in different contexts (Greenhalgh, 2014).

Thirdly, an issue for science policy evaluation, such as identified by the literature, is the **adaptability of methods to the demands** that may find a response to the so called **cumulative theory testing** proposed by the critical realists. Understanding how the policy works – understood as the ‘theory’ - is not just factual and analytical, but it is an accumulation and iteration of both.

Fourthly, the need for science policy evaluation to have **a broader view the knowledge and its validity**, the realist perspective brings as a unit of analysis the

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<sup>26</sup> A search on the largest indexing database of academic research relevant to science policy – Scopus – using the search term TITLE-ABS-KEY ("science policy" AND ("realist evaluation" OR "realistic evaluation")) returned 0 hits. A comparative search without ‘realist’ or ‘realistic’ returned 455 hits. Removing “science policy” from the initial search term returned 2141 hits.

**theory, and not the fact or the actual.** By that, the realists understand that the object of analysis or research is not the policy, but all the assumptions or ideas about how the programme is supposed to work.

Finally, to the science policy evaluation challenge on **being more useful** and generating more learning, the critical realist offers the rise in the **implication of the policymakers** in the whole process of the analysis, and the use of **a policy oriented language.**

This is a set of related statements that are suggestive of the possible benefits of a critical realist approach to the evaluation in science policy. The **bases for the connection is grounded in the complexity** that science policy evaluation has faced in the last decades (since the New Public Management, especially with the rise in demand for accountability), in the approach for enquiry that cannot find a response in a simple method, and most specifically in a quantitative or econometric one; in the narrow understanding of facts, without a broader understanding of the mechanisms and contexts that generated them.

As a summary, the **use of critical realism approach in the science policy evaluation** may give solution to the main identified challenges identified by science policy literature nowadays, and it may support **a new way of thinking for science policy studies.**

The next part focuses on explaining what theory based evaluation is and why a theory based realist evaluation of the Severo Ochoa Centres of Excellence programme can bring **new knowledge for the science policy evaluation discipline.**

*THEORY BASED REALISTIC EVALUATION OF THE “SEVERO OCHOA” CENTRES OF EXCELLENCE PROGRAMME*

**Programme theory is an approach to evaluation** that was made known by Weiss (1972) and Chen and Rossi (1983) as a critique to the “black box” evaluation. They claimed that evaluations could explain better and be more useful if they defined the issue to be evaluated and described and analysed the mechanisms of what was being evaluated and the context where these mechanisms were operating. They called this “**the logic model**”<sup>27</sup> and called the more comprehensive understanding component “programme theory”. The Programme theory **explains and communicates how a project, programme, strategy or policy contribute to generate impact** (Funnell, 2011) and it aims to strengthen the explanatory power of evaluations (Weiss, 2007). A useful definition for “theory” under the evaluation perspective is: “a frame of reference that helps humans to understand their world and to function in it” (Chen, 1990). **Theory-based evaluation** resonated more widely in the evaluation community in the 1990s with the publication of Chen’s seminal book “Theory-Driven Evaluations” (Coryn et al, 2011). In the 1990s and 2000s it started to be widely used in programme evaluation in different sectors. The approach had as well **critiques**. Patton (2010) questioned the degree to which theory-based evaluations adequately represent complex realities and unpredictable, continuously changing, open and adaptive systems. An effort to categorise different approaches to theory-based evaluations is made by Brouelle and

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<sup>27</sup> Nowadays we would know the “logic model” as a diagram to which the programme theory is displayed (Funnell, 2011).

Buregeya (2018). They classify three main approaches: logic analysis<sup>28</sup>, contribution analysis<sup>29</sup> and **realistic evaluation**.

Based in the critical realist philosophical approach, **realistic evaluation** is a form of theory-based evaluation that was firstly developed theoretically by Pawson and Tilley (1997). The realist evaluation assesses complex programs by probing what works, for whom, and under what circumstances (Pawson and Tilley, 1997, 2003). **Deep understanding of policy concerns comes from adaptive and flexible approaches to evaluation**. Programme-theory evaluations offer understanding to policy making (Funnell, 2011) through qualitative evidence that can be understood and be useful for the policy makers. This **complexity, diversity and adaptability** that is needed in order to bring useful evidence to policymaking, and that aims to answer what works for whom and in which circumstances is **put into practice by the “realistic evaluation”**. As Blamey and Mackenzie (2007) say “at their simplest both theories of change and realistic evaluation have emerged to **fill a deficit** in policy and programme evaluation.”

The **context-mechanism-outcome (CMO) configuration** is the main structure for the realistic analysis in the evaluation of policies and programmes. The realistic research **methodologies** provide the capacity to maintain epistemological robustness, while also being able to take due account of the wider perspective of stakeholders (Porter and Shortall, 2009). For example and most recently, interest in the underlying logic of programs under the realist perspective has seen methodological growth (Lemire et al. 2020, Schmitt 2020).

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<sup>28</sup> A type of program theory evaluation that uses scientific knowledge to evaluate the validity of the theory and identify alternatives for achieving effects.

<sup>29</sup> An effect analysis approach that examines the contribution rather than the attribution a program is making to expected outcomes/ impacts.

The realist evaluation approach is a pragmatic instrument, applicable to the evaluation of programmes with the critical realist underpinning.

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*Why a realistic evaluation for the Severo Ochoa Centres of Excellence Programme?*

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In a policy making environment where there exists no formalised practice of policy evaluation it is important to bring a broader epistemological perspective of the value judgements related to any aspect of policymaking, and in particular to a policy instrument in place since 2011 that started with a high political support. What the realist evaluation offers is to have as a unit of analysis the programme theory, i.e.: the programme and the assumptions or ideas about how the programme is supposed to work and it is working (Pawson et al. 2005). This is recognised by the critical realist synthesis as “**theory as a unit of analysis**”. This offers a more comprehensive approach towards the evaluation of SO in the Spanish public administration.

Another aspect is that the realist perspective sees **policy as a resource managed by people of different behaviours in different contexts**, and the SO instrument as a policy instrument (award and grant) was used in a variety of contexts (legal, cultural, operational) around the country. To be able to capture these features is important for the analysis itself and for the policymaker. The realist perspective can understand that, because the ways it sees **causality with a generative view**, where the policy itself does not have causal powers, but the way it is managed and the contexts where it is managed create it. Here the CMO configurations can be very useful.

The realist approach provides an **accumulative and repeatedly theory testing** – where the assumptions on how the programme works are not only factual or analytical, but a continuous iteration between the two. This way is already tested in various public policy sectors, but not yet in the science policy one. One of the reasons may be the examined rigidity of the discipline (Martin 2019, 2016) and the need to solve the challenges of adaptability of methods. As in science policy this challenge has already been identified, using a realistic approach to evaluate the SO can be useful as it can build the theory on the programme by a mixed of methods both based on data and on the analysis. For the Spanish government it is useful to understand how the programme works and in which contexts at the same time by providing a framework where one can integrate actors, mechanisms, and context features and when one can make causal links between the intervention and the observed result and thus discarding rival hypothesis.

Another important perspective offered by critical realism and by the realist evaluation methodologies is that of the **pattern of outcomes**. It captures impact and effects in a more comprehensive way. To be able to show a configuration of outcomes from the SO programme can be useful to the government. SO is a new instrument (and the only one to offer Performance Based Institutional Funding) that was firstly launched as a pilot. Understanding its impact is one of the first outputs of an increased accountability the Spanish administration has towards the society, and the internal stakeholders that may have controversial feelings with the programme. For this reason, the most highlighted CMOs drawn by the realistic evaluation can be instructive and of use.

Lastly, the **realist perspective offers “emancipation for change”** with its two domains: the implication of policy makers in the evaluation and the use of a policy-oriented language. In this particular case, I am the researcher, and I am a public employee for the Spanish public administration, and I have closely been

involved with the programme. I am therefore an insider that is being trained academically and it is practicing research duties. My research has been very close to policy making from both the researcher and the employee perspective. The implication of policymakers and the policy oriented language in this particular case are innate to the actual research. Reflections on these issues are given under "[Part II](#)" The realist perspective gives me as a policymaker a comfortable framework to develop the analysis, and this is what makes the theory driven realistic evaluation of SO an even more appropriate approach.

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*What new knowledge can the Severo Ochoa evaluation bring to the academic disciplines?*

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Firstly, my research can **show how conceptually to create theory about a science policy instrument** whilst performing a science policy evaluation. This involves capturing of ideas and assumptions on policy design - by using an additional approach that of mental models (Senge 2006), and by creating CMOs – and on policy management and implementation.

Secondly, the evaluation of SO through a realist lens can show how to capture **what the policy has caused and how**, and how it has been implemented in its different institutions in different contexts and with what mechanisms (internal to the policy or external to it)?

Thirdly, this research will **actually practice accumulative theory testing** (seen under the critical realist synthesis), the iteration from the observations of the reflective practitioner, to the data (both quantitative and qualitative) to the analysis and back through continuous testing, till creating a theory confirmation in the given timelines.

Fourthly, the SO realistic evaluation will show how to bring out, present, analyse and **communicate the pattern of outcomes** by using the CMO configurations as a bases and then a selection of the CMOs. These configurations are easily readable and understandable once they are laid out.

And finally, both disciplines, that of realistic evaluation research and science policy scholars will have the opportunity to understand the **perspectives of an insider whilst developing research** in the work environment while working, and understand the use of tools that are used to capture data (the research diary), and reflective information as a policy practitioner (the policy portfolio).

### *INTERIM SUMMARY*

The last section of the literature review **understands why science policy is hard to evaluate and identifies four main challenges**. Firstly, there is a need to broadly understand effects and impact, by including the stakeholders' perspectives, creating additionality and opening up understanding; secondly, there is a need **to understand the ever evolving and complex context**; thirdly the science policy evaluation methods need to adapt to the new demands, and possibly embrace new ways of study beyond the most traditionally known ones; fourthly and finally, **there is a need to increase evaluation use, learning from evaluation**. These challenges are grounded on the public policy ones, but with their own specificities.

Then, the **foundations of critical realism** have been introduced with the objective to rethink science policy evaluation. A suggestion on how the realist approach **solves the challenges** of the evaluation posed by science policy has been offered by explaining the pattern of outcomes, generative causality, cumulative theory-testing, building the theory as unit of analysis, and creating "emancipation for

change” by raising the implication of policymakers and using a policy oriented language.

Lastly, the review describes what programme theory is as an approach to evaluation and introduces **the realistic evaluation, as a pragmatic instrument with the critical realist underpinning**. Then it gives the reasons of why a realistic evaluation opens an opportunity to perform the evaluation of the SO for the Spanish government, and it finalises with the opportunity this evaluation can bring to the scientific field.

## SUMMARY

The literature review undergone opens up **a unique opportunity** for a theory based realistic evaluation of the Severo Ochoa Centres of Excellence Programme of the Spanish government.

The review confirms that **public policy evaluation is a type of policy analysis** based on social inquiry, epistemological perspectives and accountability to produce evidence that informs policy making, and therefore it is very people-bound and value-laden. With the objective to understand the instrument SO is based on, the review analyses the Performance Based Institutional Funding and Centres of Excellence literature and shed light on the contexts the policy was launched, as well as on the first effects that it has generated around the world in the countries it has been used, even though none of the studies were rooted on exploring causality. Further on the literature examined the little progress of **public policy evaluation in Spain**, and research and science policy evaluation in the country, determining that the practice of evaluation is missing - completely in science policy evaluation, spite of its political demands and strategical thinking of a crucial need for it.

The idea that **institutions can learn** is reinforced in all the revised literature for this section by factors like capacity building – seen as “**personal mastery**” of staff, creating teams that communicate and listen, and having structures and institutional leaders (entrepreneurs) that enable it. As well learning can be reinforced if the evaluation studies use **a broader epistemic perspective** – a realistic approach (post positivist one) that would generate more acceptance. Finally, the literature confirms that science policy is hard to evaluate, but solutions to its challenges can be found in the critical realist approach, and this opens a **unique opportunity for the contributions of my study**, an opportunity in terms of policy (to perform a realistic evaluation of a policy instrument) and in terms of academic research (to bring new knowledge to the disciplines of science policy evaluation and critical realism).

## CHAPTER II. POLICY DESCRIPTION

The Severo Ochoa Centres of Excellence and María de Maeztu Units of Excellence Programme (hereinafter, SO <sup>30</sup> ) is a programme of Spanish Government that awards and funds on a competitive bases research centres and units that **demonstrate scientific leadership and impact at global level**, as well as **an active collaboration in their social and business environment**. The programme was made operative in 2011 and, since then, it has had an annual call for funding.

A total of **29 centres and 20 units of excellence**<sup>31</sup> throughout Spain have been **accredited**. The accreditation is valid for **four years with possibility of renewal**. It funds with four million euros the centres and two million euros the units in the given period.

The purpose of the programme is twofold. First, **the recognition and accreditation of the best centres and units that stand out for the impact and international relevance of the results obtained in the last four years**. Secondly, it **funds strategic research plans** developed by the centres and the strategic research programs developed by the units for a period of four years in order to

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<sup>30</sup> The programme started as the Severo Ochoa Centres and Units of Excellence, and in 2014 call for funding it was split in two subprograms, following the same rationale for funding, but where the awardees were normally large and de facto independent research performing organisations, i.e.: the Severo Ochoa Centres of Excellence; and smaller units at universities or larger centres, i.e.: the Maria de Maeztu Units of Excellence. To the call for proposals, their differences are in terms of governance, structure and organizational and managerial principles, as well as the critical mass required for centres and units. For the purpose of the study, it will be studied the programme at the time of its launch, and therefore the Severo Ochoa Centres/Units of Excellence, in short, SO. The abbreviation SO will be seen in the study accompanied by SO Programme, SO Centres, etc. SO, in short for “Severo Ochoa”.

<sup>31</sup> As in 2020.

consolidate their scientific capacities and contribute to their international leadership.

The Programme targets those centres or units that carry out cutting-edge research and are among the world's best in their respective areas. Networks are not eligible.

Such as indicated on the web of the ministry (Ministry of Science and Innovation and Universities, 2018<sup>32</sup>), the centres or units that apply to this programme must demonstrate that their research fulfils the programme's requirements for excellence being:

- A **high level of competitiveness and impact** in their field of activity on the world scientific scene.
- Submission of research activities to **periodic scientific assessment** by external, international and independent scientific committees.
- Carrying out their research activities under a **strategic programme** designed to generate pioneering knowledge.
- **Attracting, selecting and training human resources** at the international level.
- Maintaining **active collaboration and establishing agreements** at the institutional level with high-level research centres.

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[http://www.ciencia.gob.es/portal/site/MICINN/menuitem.7eeac5cd345b4f34f09dfd1001432ea0/?vgn\\_extoid=cba733a6368c2310VgnVCM1000001d04140aRCRD](http://www.ciencia.gob.es/portal/site/MICINN/menuitem.7eeac5cd345b4f34f09dfd1001432ea0/?vgn_extoid=cba733a6368c2310VgnVCM1000001d04140aRCRD) (page accessed on 18 July 2018).

- Working to **boost knowledge transfer and dissemination to society**.

The accreditation as a “Severo Ochoa” Centre of Excellence has<sup>33</sup> a **duration of four years** and includes:

- A million Euros per year per centre in a four year period. The funding has **a high degree of flexibility** and its use should be determined by duly justified strategic criteria for the accredited centre.
- **Priority access to other support schemes to the government** to promote research, provided that the pertinent principles of transparency and competition are observed.
- A **boost to the reputation and social and scientific recognition** of each centre that strengthens it as a candidate for **patronage**, among other benefits.

Regarding the **scientific leadership**:

- Each Severo Ochoa Centre of Excellence **must have a Scientific Director**, who is not necessarily the director of the institution. The Scientific Director should perform research at the highest standards and also have a significant capacity for leadership in the management of research.
- Severo Ochoa Centres of Excellence must be centres of reference and clear examples of the quality and relevance of the pioneering scientific research carried out in Spain. As such, they should serve **to lead and**

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<sup>33</sup> As of autumn 2020 when the research finalised.

energise the Spanish research system as a whole and boost its international profile.

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*The idea at the 2008-2011 National Programme for Institutional Strengthening*

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The idea of the SO programme was introduced as “National Programme for Institutional Strengthening” in the Spanish National Plan for Scientific Research, Development and Technological Innovation (2008-2011), launched by the Ministry of Education and Science (2004-2008). The 2008-2011 Plan was “the programming instrument to achieve the country’s goals and priorities of the research, development and technological innovation policy in the mid-term.”<sup>34</sup>

The Institutional Strengthening Programme such as recognised in the Plan (page 99) was “a novelty in the Spanish System of Science and Technology to be developed through the National Institutional Strengthening Program.”

The programme was detailed as following (Ministry of Education and Science, 2008, p. 100<sup>35</sup>):

***Objective:** The cohesion of the Spanish System of Science and Technology (SECYT) and the critical mass gain of the groups and institutions. The program aims to support centres of excellence by evaluating results that*

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<sup>34</sup>

[http://www.idi.mineco.gob.es/stfls/MICINN/Investigacion/FICHEROS/PLAN\\_NACIONAL\\_CONSEJO\\_DE\\_MINISTROS.pdf](http://www.idi.mineco.gob.es/stfls/MICINN/Investigacion/FICHEROS/PLAN_NACIONAL_CONSEJO_DE_MINISTROS.pdf) page last accessed on 29 June 2018.

<sup>35</sup>[http://www.idi.mineco.gob.es/stfls/MICINN/Investigacion/FICHEROS/PLAN\\_NACIONAL\\_CONSEJO\\_DE\\_MINISTROS.pdf](http://www.idi.mineco.gob.es/stfls/MICINN/Investigacion/FICHEROS/PLAN_NACIONAL_CONSEJO_DE_MINISTROS.pdf) page last accessed on 29 June 2018.

*are based not only at the organisation of research at group level. It aims to encourage the creation of larger groups and critical mass, through departments and institutes upon presentation of a **strategic plan of action and validity of 4 years**. This will improve competition in the European Research Area (ERA), the possibility of setting up large business consortiums for the Framework Program projects, and fundamental research projects generated by the European Research Council (ERC).*

**Beneficiaries:** *Institutions of the public and private sector: centres or institutes of public research organizations and universities, hospitals, technology centres, science and technology parks, organisations supporting technology transfer, companies, etc.*

**Duration of aid:** *Maximum 5 years*

**Funding:** *Strategic programs for the development of research and innovation capacities. Funding by subsidies.*

**Related system indicators:** *(1) R&D expenditure as a percentage of GDP. (2) R&D expenditure by execution sector. (3) R&D expenditure by financing sector. (4) Spending on innovation as a percentage of GDP. (5) Percentage of world scientific production. (6) Number of publications / number of researchers. (7) Patents requested. (8) Triadic patents applied for and granted. (9) Patents granted. (10) Number of innovative companies. (11) Technological balance.*

The above is a skeleton of the Severo Ochoa Programme which was to be **fully fleshed as a policy instrument during 2009-2010 under a new government** at the new Ministry of Science and Innovation (2008-2011) and with a new team.

The **new programme was announced in September 2010**, just after the finish of the Spanish Presidency of the European Union and it was officially launched in April 2011, coinciding with the final year in office of the government and the final year of the National Plan 2008-2011. It was the last initiative launched in science policy by a government that had placed science in the centre of the attention since 2004, first under the Ministry of Education and Science (2004-2008) and then by the Ministry of Science and Innovation (2008-2011).

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*Fully fleshed “Severo Ochoa” Centres of Excellence Programme under the 2013-2016 State Plan*

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In the following **State Plan 2013-2016 the programme was shaped such as we know it now** and described at the beginning of this section and, so it does remain in the following State Plan 2017-2020, except for the fact that it incorporates the distinction for the “María de Maeztu” Units of Excellence, that such as explained above, grants structural units at universities or research centres the competitive funding as a recognition for the results achieved in the past to be invested in a strategic research programme for the four year period.

The 2013-2016 State Plan (Ministry of Economy and Competitiveness, 2013, p. 23) maintained the Institutional Strengthening Programme and it described it as:

*It is aimed to promote the **competitiveness of the Spanish System for Science, Technology and Innovation** and foster the scientific and technological leadership of the institutions, centres and units in the System. The resources shall be assigned by means of highly competitive tenders based on international standards, which allow to identify, acknowledge and fund **strategic Research, Development and Innovation (RDI) programmes** for*

*focusing their activities, strengthening their scientific and technological abilities and promoting synergies among research groups, units and centres with capabilities and international leadership potential. The considered actions shall include:*

*Subsidies aimed to **identify, recognise and fund existing research centres and units** in order to **promote the international leadership** of the Spanish System for Science, Technology and Innovation stakeholders by means of highly competitive tenders, subject to strict international peer assessment processes which contemplate, among others: (i) subsidies for the development of strategic programmes which organise and stimulate scientific and technological lines of research, promote the specialisation and combination of scientific abilities and the creation of highly competitive groups and units on an international scale; and (ii) the recognition, certification and granting of subsidies for the “Severo Ochoa” Centres of Excellence in the public sector for the development of RDI programmes and strategic actions which increase their scientific leadership, ability for attracting and retaining international talent and their driving role throughout the entire System.*

***Revitalisation activities** providing the institutions with the **strategic resources** and tools appropriate for the nature of their activities, foster their **specialisation and promote their international impact and visibility**, considering, amongst other things, the preparation of International Strategic Action Plans for the System’s stakeholders or the strengthening of the RDI networks and structures which increase cooperation, coordination and dialogue between the stakeholders in the territory as a whole and their internationalisation.*

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*The 2017-2020 State Plan continues with the “Severo Ochoa”  
and “María de Maeztu” Programme*

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On 29 December 2017 the Spanish government approved a new four year plan for Scientific and Technical Research and Innovation (La Moncloa, 2017<sup>36</sup>). The Plan **maintained and expanded the Institutional Strengthening Programme** (Ministry of Economy, Industry and Competitiveness, 2017, p54 <sup>37</sup> ) that recognises the most excellent scientific and technological institutions and funds internationally competitive R&D strategic programs.

The overall objectives of the Institutional Strengthening Programme are:

- Promote the **international leadership** of the research and technological centres in their respective fields.
- Promote the **retention and attraction of talent** to the scientific and technological research institutions.
- Encourage the **“tractor effect”/leadership** of the main institutions into the system as a whole.
- Valorise the **research results and its impact**.
- Boost the **private sector participation**.

The “Severo Ochoa” Centres of Excellence and “María de Maeztu” Units of Excellence instruments continue having the same definition and characteristics.

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<sup>36</sup> <http://www.lamoncloa.gob.es/consejodeministros/Paginas/enlaces/291217investigacion.aspx> Page last accessed on 18 July 2018.

<sup>37</sup> <http://www.ciencia.gob.es/stfls/MICINN/Prensa/FICHEROS/2018/PlanEstatallDI.pdf> Page last accessed on 18 July 2018.

The Plan describes the support for “Severo Ochoa” **Centres of Excellence** (Ministry of Economy, Industry and Competitiveness, 2017, p.53) as the following:

*The purpose of these grants, lasting four years, is to strengthen the existing scientific research institutions (centres) in Spain as well as their role in the Spanish Science, Technology and Innovation System as a whole. The accreditation and funding will be the result of a rigorous process of international evaluation by peers. The centres, for accreditation, must have a critical mass of researchers, present outstanding results in scientific-technical research, lead international projects, demonstrate their “tractor role”/leadership through collaboration with other agents, including companies, have and facilitate access to top-level research infrastructures in their respective fields and, in addition, present a strategic program for sustainable world class research.*

As for the “**María de Maeztu**” **Units of Excellence** the Plan (Ministry of Economy, Industry and Competitiveness, 2017, p. 54) states:

*The objectives of the grant, of four years of duration, are common to those previously described and are directed to research units that do not count with a legal personality or autonomy in the management and administration of resources, but are supported by the institutions to which they belong through their recognition and commitment to sustain and scientific, organizational and financial viability that enables the units the achievement of the objectives of the strategic research programme for which they receive the funding.*

As already stated both the “Severo Ochoa” and “María de Maeztu” grants **share the same objectives** targeting different sized research structures in the system, i.e.: centres and units, respectively.

The allocation of funding for the programme has been as following.

*Table 3 Allocation of funding 2011-2017*

Year	2011	2012	2013	2014 <sup>38</sup>	2015	2016	2017
	VI Plan 2008-2012		VII Plan 2013-2016				VIII Plan 2017-2020
Funding for the SO (and MM) programme	32M€	20M€	20M€	20M€	52M€	40M€	34M€
% of total National Plan funding	0,6%	0,1%	0,5%	0,6%	1,8%	1,5%	0,6%

The funding for “Severo Ochoa” and “Maria de Maeztu” is the only one considered as **performance based institutional funding in Spain at state level**,

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<sup>38</sup> In 2014 the Maria de Maeztu line was added to Severo Ochoa targeting units only.

being that regions have their own funding schemes for research centres and universities (Zacharewicz, 2018).

This chapter gave an overview on the “Severo Ochoa” Centres of Excellence Programme as the policy instrument under study.

## CHAPTER III. RESEARCH DESIGN AND METHODS

### INTRODUCTION

This chapter describes the methodology for carrying out the theory-based realistic evaluation of the “Severo Ochoa” Centres of Excellence Programme.

The **approach** used for developing the research design is defined and explained by connecting the opportunity offered as a result of the literature review to use the realist perspective for the first time in the evaluation of a science policy instrument to the means for developing the research in a realist style.

The **methods** are described and the process undertaken during the development of the research detailed. This includes the research carried out from 2016 till 2020. A final section on limitations is dedicated to make explicit the ones related to the techniques that were used.

The research project is registered with the **UCL Research Ethics Committee** - number **8435/001, dated 6 May 2016** - and it has rigorously followed the UCL Ethical Guidelines.

### RESEARCH DESIGN

#### *APPROACH USED FOR DEVELOPING THE RESEARCH DESIGN*

The literature review demonstrated the potential a **critical realist perspective** for understanding the effects the “Severo Ochoa” Centres of Excellence Programme has generated, and how it might enable the production of evidence and learning for the Spanish government. It is suitable for five main reasons:

Firstly, the critical realist lens offers a broader epistemological perspective on understanding the programme by analysing its “programme theory”, i.e.: the **analysis of the SO and the assumptions about how it was supposed to work** (such

as imagined by its designers) **and how it is working** (Pawson et al. 2005). This allows a broader understanding, a more comprehensive approach towards the evaluation of SO. Secondly, and following what is said above, the critical realist approach allows a better understanding of facts through a broader understanding of the mechanisms and contexts that generated them allowing a **more flexible scientific social enquiry**, such as in the case of understanding **causality with a generative view**. Thirdly, the **pattern of outcomes** allows for making visible a configuration of results that is linked to a better understanding of impact and therefore to an enhanced accountability. Lastly, the **realist perspective offers “emancipation for change”** with its two domains: the implication of policy makers in the evaluation and the use of a policy-oriented language.

As a science policy instrument launched in 2011 by the Spanish government and never publicly evaluated so-far, the “Severo Ochoa” Centres of Excellence Programme is examined under this study through the critical realist perspective, the so called “**realist evaluation**”, that is a type of **theory-based** evaluation. The realist evaluation approach is a pragmatic instrument, applicable to the evaluation of policies and programmes with the critical realist underpinning. The leading question in a realist evaluation answers: “What works for whom and in which circumstances?” (Pawson and Tilley, 1997).

The section below describes the steps to the **deployment of the theory based realist evaluation** for the understanding the effects of the “Severo Ochoa” Centres of Excellence Programme and for generating learning about them to the Spanish public administration institutions.

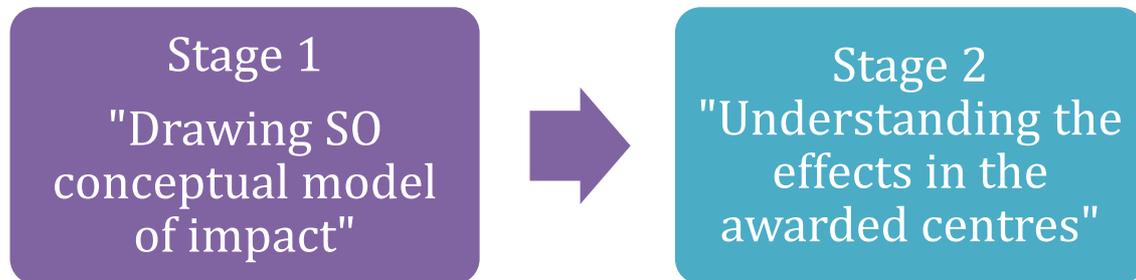
## *DEPLOYMENT OF THE RESEARCH DESIGN*

This subsection describes the key elements of the research design used in this study. It starts with explaining the specific **research flow** when performing the evaluation guided by the realistic evaluation backbone to develop and test the theory of a programme or policy. It continues with identifying the main **realist tool**, the context-mechanism-outcome (CMO) configuration and it offers a guiding description on each component. Then, it outlines the three **qualitative techniques** used, i.e.: the documentary review, the interviews and the participant observation. The subsection ends with a brief summary of the data used in the study, and opens the space for the description of how exactly the research was carried out during the period.

### The research flow

In the centre of a realist evaluation stands the construction and testing of the theory of the policy under study (**theory iteration**). This needs to bring explicit understanding on the ideas and assumptions of the policy itself. In the particular case of the SO, to understand the effects of the policy it was necessary to understand the ideas and assumptions that the policy makers had when they designed the project. This is why the first block of my research focused on drawing the **SO conceptual model of impact**, followed by a second main block on **understanding the effects of the programme in the awarded centres**.

Figure 1 Two stages of the Research Process



The initial part of my research focuses on understanding and making explicit the ideas and assumptions the policy designers had about the SO. Under the theory based perspective this is called “drawing the explicit theory” (Donaldson, 2007). Through the realist instruments (that will be described below) the research gives the contexts, mechanisms and intended outcomes that the policy was working on. This programme theory would be the bases for the second part of the research that tests the theory in the different centres that had received the SO award and funding. **The second stage, with the clear focus on the SO Centres of Excellence, aims to understand the effects that the policy has had in the awarded institutions, as well as describing the contexts where the programme operates, how it operates in these contexts and what mechanisms appear to have triggered the observed outcomes.**

### The realist evaluation tool - CMOs

This part of the research design describes the context-mechanism-outcome (CMO) configuration and offers a description on each component that may be useful to refer to when below I describe the actual process of doing the research.

#### CMOs for “Context, Mechanism, Outcome”

In theory based evaluation, the programme theory is usually displayed in a diagram called “a logic model” (Funnell, 2011). In realist evaluations the logical model is given as a **context-mechanism-outcome (CMO) configuration**, being the main structure for realist analysis. The CMOs are used to understand what worked in which context in the centres and how: “In this context this particular mechanism is believed to bring/brought this outcome”. Their pattern can identify how and why the outcomes are produced in the given contexts and what mechanisms are triggered by some contexts characteristics, and how the outcomes are connected to the contexts and the mechanisms.

In this particular **case the CMOs during the first stage** draw out the contexts when the programme was designed, the mechanisms that were put in place to create the SO programme, and the intended, imagined outcomes that the designers (policy makers) had in mind regarding the effects that the SO would produce. **The second part of the research** that aims at understanding the effects in the awarded centres, draws CMOs based in the contexts of the centres, the mechanisms of the SO that may have been related to the contexts and that produce the observed and identified outcomes. Both stages of the research draw CMOs in line with the realist evaluation structure and for the very first time used in the evaluation of a science policy instrument.

## C for “Context”

For the realist paradigm **context is key** as it “turns on” or “off” the mechanisms that create causality (Greenhalgh, 2014). Context is intrinsic to policy making, it is a fundamental part of its existence. Context is closely linked to the new policy that is being designed, it affects the implementation of the policy and it affects the results the policy can bring out. Understanding context in its wider sense was seen as one of the challenges of science policy evaluation so far (Martin, 2016).

For the SO evaluation and during **its first part** “Drawing a conceptual model of impact”, **context is understood as the setting where the policy was designed**. This is understood as a political, economic, and policy-related-planning setting during the past few years before the programme launch, as well as the moment when the policy was launched as a pilot in 2011.

During **the second part of the research** “Understanding the effects in the awarded centres”, **context is capturing the characteristics intrinsic to the centres and external to them** (but intrinsic to the framework they operate). These essential characteristics can be, e.g.: the legal personality of the centres or their size. Some external contextual elements can be: the economic situation, the legal measures of the State General Administration, etc.

## M for “Mechanism”

For the realist analysts, the object under study does not cause change on its own, but it is affected by a series of mechanisms that operate differently in different contexts (Greenhalgh, 2014). It is not the programme that brings about change, but the processes of how people interpret and act upon the resources offered

by the program (Pawson and Tilley, 1997). Mechanisms consist of the resources introduced by a programme and the participants' reasoning (Dalkin et al., 2015).

During **the first stage of the research** of the SO evaluation “Drawing a conceptual model of impact”, the mechanisms are to be understood as the ones that aimed to generate outcomes at institutional, systemic (Spanish Science Technology and Innovation System) and political level. During **the second stage of the research** “Understanding the effects in the awarded centres”, the change that SO or any aspects related to it have affected the centres is to be captured and analysed. For example the difference between the award and funding dimension of the SO Programme can be considered to trigger different effects at times. **At both stages** the mechanism for triggering change could be the SO itself, an intrinsic characteristic of it, or something external to it.

O for “Outcomes”

As already mentioned above, the science policy challenge for **an increased need to understand impact** in a broader sense, is answered by the critical realist analysis through its **pattern of outcomes**. Outcomes in a realist analysis are given as an indicative and inclusive configuration that narrates the observed effects through contextualisation and generative causality, and are able to capture impact and effects in a comprehensive way. The configuration is composed of one or more outcomes.

The outcomes from the **first stage** of the research “Drawing the conceptual model of impact” are seen as intended ones, produced by the SO programme and such as planned and envisioned during the policy process before the launch of the programme. As for the **second stage** “Understanding the effects in the awarded centres”, the outcomes are the ones observed during the research and

connected to the CMOs - allowing a causal explanation and wider understanding of the results.

After having briefly described the context-mechanism-outcome (CMO) and its components, as the main realist evaluation tool, the next step in the deployment of the research design is that of the presentation with the qualitative techniques that are used for the research.

### Three qualitative techniques

This subsection details the approaches used to target, retrieve and analyse the data. In the framework of a qualitative methods, and with a realist underpinning, the techniques used for the study are: documentary review, interviews and participant observation.

#### Documentary review

The collection, revision and analysis of information based on documents related to the programme is an important mechanism for the research. The documentary review for my research refers to the revision and analysis to all the information related to my study that is in a primary format of a document, be it formal, published, informal or unpublished.

Under the **first stage** “Drawing the concept model of impact” the documentary analysis is used as the initial reference for making the theory elicited. This data source that provides an initial explicit theory on the programme and the analysis of its development is useful to bring a better understanding of the idea behind it.

Under the **second stage** of the research “Understanding the effects in the awarded centres” the documentary review supported the knowledge around the preparation of interviews with the objective to better understand the context each centre was operating in and to see its main results during the years

they had had the grant and following that. The documentary analysis was not only done at the beginning, but it was more reiterative, done just after the interviews, and during the analysis process. As Pawson (2006) stated “A theory may be gleaned, refined or consolidated not necessarily in the next interview, but also while digging for nuggets of evidence” showing the importance of reiterative reviews on information.

#### Realist interviews

The realist evaluations identify the theory driven interviews as an important method of data collection that inspire, validate, falsify or modify the hypothesis about how programmes work (Pawson, 1996). Realist interviews are generally semi-structured, containing exploratory questions based on the programme evaluated, but acting as instruments to draw out the propositions of the general inquiry (Manzano, 2016). Interviews are designed around stakeholders’ awareness and experiences of the programme, including their reasoning about specific propositions (Dalkin et al., 2015).

Under the first stage of the research “Drawing the conceptual model of impact” with the objective to better understand the theory behind the policy instrument and its conceptual model of impact, the responsible policymakers at the time of design of the programme were targeted through elite interviews. To this particular research the **technique allowed flexibility to talk and explore the policy makers’ understanding and thoughts** on the policy programme. It is the programme’s story that I was pursuing by capturing the participants’ stories because those experiences illuminate the varying processes and manifold outcomes of the programme (Patton, 2003).

Under the second stage “Understanding the effects on the awarded centres” with the objective to better understand the generated effects the programme

had in these centres, the **semi-structured interviews** aimed to the research directors of the awarded centres that had finalised a full cycle of accreditation and funding from the policy instrument. The realist interview is the primary source for both identifying and predicting the generative mechanisms at work in the specific context being studied (Connelly 2001). On the realistic model, the researcher's theory is the subject matter of the interview, and the subject is there to confirm, to falsify and, above all, to refine that theory. The theory in question will, of course, be a realist theory of the mechanisms, contexts and outcomes that define how programs work (Pawson and Tilley, 1997).

#### Participant observation

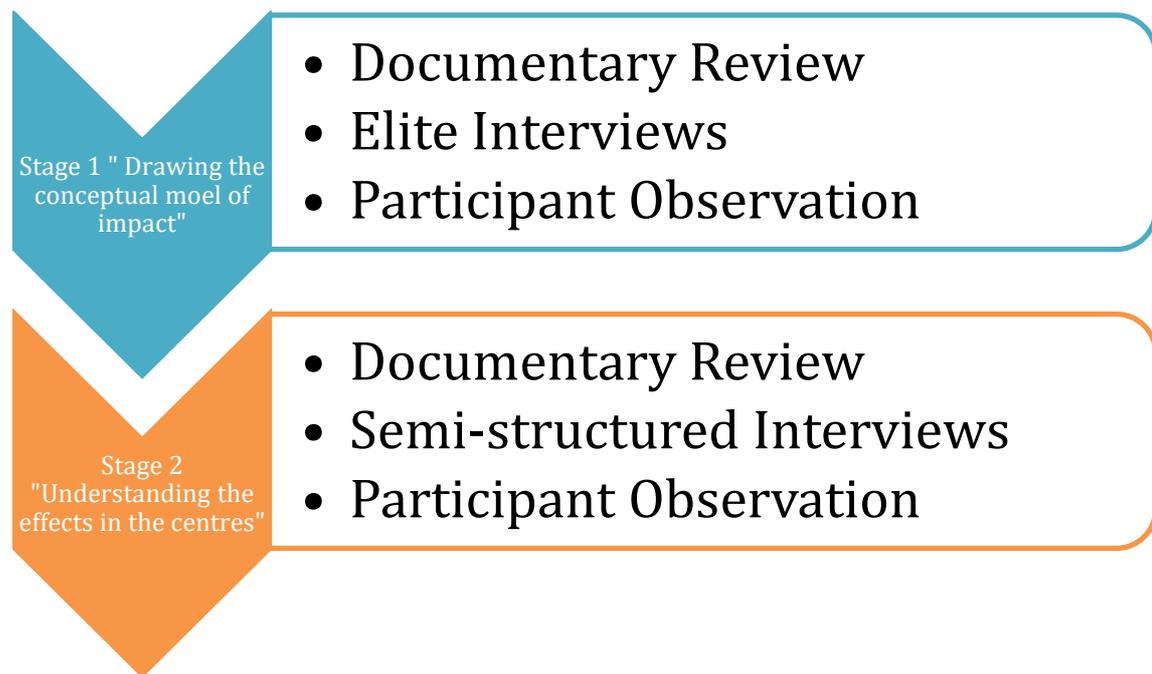
Participant observation is used in this study as another technique. I was a team member of the SO programme as a contractual staff for the ministry and the observations and reflections from that experience are useful to be recorded for this project as they support a better understanding of the programme under study. Being that **I am considered as an insider to the policy, the challenge remains on how to identify and select the observations that are valuable for the analysis**. Guidelines for being selective in the observations are useful for information processing (Flick, 2009). I have used the **research diary** (Robson, 2016) where I have recorded personal impressions and reflections.

The observations are recognised in realist evaluations for theory formulation based on the information gathered (Mukumbang, 2019).

## METHODS

This section describes the process of carrying out what was laid out above. The figure gives a snapshot of the procedure.

Figure 2 Snapshot of the research process and techniques



The structure of this section follows the two stages of the research, and then it gives details on each step when using the techniques.

### *STAGE 1 "DRAWING THE CONCEPTUAL MODEL OF IMPACT OF THE POLICY MAKERS"*

The objective of this stage was to draw the conceptual model of impact of the policy makers when designing the "Severo Ochoa" Centres of Excellence Programme. The research for this stage started in September 2016 and lasted till June 2018.

#### Documentary Review

The documentary review here gives the initial reference for analysis. The documents that potentially fall inside the scope of the research are:

1. The published documents that give the normative framework. These documents provide information on the legal frame that operated at the time the programme was designed in Spain at State level. New national

programmes refer to and operate within a given legal framework. These are the Law of 1986 and of 2011.

2. **The published documents that give the state-level strategic framework when the programme was designed.** These documents allow to better understand the policy priorities in science and research at the time the programme was conceptualised. These were the National Strategy of Science and Technology (ENCYT, 2007-2013) and the National Plan of Research, Development and Innovation (PNIDI, 2007-2011). Since 2011, the Spanish System of Science, Technology and Innovation (SECTI) and its governance are defined by the Spanish Law of Science, Technology and Innovation (14/2011). The strategic framework of SECTI is defined by the Spanish Strategy of Science, Technology and Innovation and the State Plan for Scientific and Technic Research and Innovation. These two documents are the ones that set the priorities of Spain to be examined for any similar future study. At the time of the design of Severo Ochoa, the Law 14/2011 was not yet in place, therefore the equivalent documents were that of ENCYT and PNIDI.
3. **Official documents published on the first SO call for proposals.** These provide full information on the programme, aim, potential participants, evaluation, etc. These documents include the Regulatory Bases of the programme, a mandatory document when granting subsidies in Spain, and the Opening Call for Proposals document that specifies administrative details related to the application for subsidy. These two documents relate specifically to the grants of the SO. These are mandatory documents regulated by the Spanish Law of Subsidies (38/2003).

4. **Non-official documents that are related to the design of the programme.**

These documents are notes, presentations, emails that the high level officials exchanged, and draft documents of the ones published (and mentioned above) that may shed light on nuances on the development of the programme within an institutional boundary such as the ministry responsible for the programme and during the timeline of the programme's conceptualisation (around 2006) till the publishing of the Regulatory Bases and the Call for Proposals (2011).

5. **Press-related documents.** Reports, press releases and interviews on the press that represent an echo about the programme. These documents provide a more generalised public view on the programme, and the expectations created around it.

As a researcher that started to work with the policy instrument in the summer of 2011, I was familiar with the official documents related to the programme, but I did not have access to the non-official ones that were strictly related to it, especially during the time of its preparation. Later in 2016 when I started the research, I could have asked for them both at the unit that managed the programme and the policy makers that I interviewed, but I did not aim to do so. The review of **the non-official documents is not considered essential** for the research for two main reasons: firstly, because the objective of the research at the first step of documentary review was to capture the explicit programme theory such as stated in the official records and other public documents, and secondly, because the unpacking of the explicit theory and better understanding of what the programme was conceptualised to do would later be discussed during the interviews. Allowing the information from the interviews to bring in new data in terms of memories, past experiences, beliefs, etc. was more

important to my research than asking for the past drafts of documents to the policy makers.

The **documents included in the sample** are therefore the public official and the press-related ones listed under 1-3 and 5 above. These documents were published between **2005 and 2013**, in addition to the old Law of Science in force when the first SO was launched dating back to 1986, that is included too.

The **data was collected as such:**

- The **legal documents** were downloaded from the Official State Gazette website (<http://boe.es/>). Both the Law of 1986 and that of 2011 were already identified and searched.
- The **strategic framework documents** were downloaded from the official website of the Ministry of Science and Innovation (<http://www.ciencia.gob.es>) that includes a repository of all the strategy documents from the different ministries that have covered science policy in the past. The search criteria here was the time. Those documents related to the time of conceptualisation and launch were selected.
- The **press articles** were searched and selected through a Google search. The sole criteria to choose the press articles has been the fact that they have to focus on the “Severo Ochoa” Centres of Excellence Programme. Articles where SO was only mentioned in passing were not included.

The **documents and press articles were coded following the context-mechanism-outcome configuration** used in theory-based realist evaluation.

**Context is understood** as the conditions and circumstances in which a programme is introduced and that affects the operation of the programme

mechanisms (Pawson & Tilley, 1997), it “turns on” or “off” the mechanisms that create causality (Greenhalgh, 2014). For this case, it is understood as a political, economic, and policy-related setting before and at the time when the SO programme was launched, like for example the “right political momentum” as it was fourth year of the legislature.

**Mechanisms consist of** the resources introduced by the programme and the participants that influence it (Dalkin et al., 2015). In this case they were the instruments that would generate outcomes, such as “the promotion of the units of excellence” seen under the Law of Science, Technology and Innovation (14/2011, page 36-37).

**The outcomes** were the intended ones, produced by the SO programme and such as planned and envisioned during the policy process before the launch of the programme. For Pawson and Tilley (1997) outcomes are intended and unintended generated by combinations of the programme mechanisms and contextual circumstances. In this case, an identified intended outcome is: “strengthen the development of strategic research capabilities of existing centres and units” (Regulatory Bases and Call for Proposals, page 39366).

The concepts were associated into a context-mechanism-outcome configuration such as done in several realist evaluations of different programmes in Andersen et al. (2020), Browne et al. (2021), etc. A first programme theory was made explicit only based on the documentary review.

## Elite interviews

### Population, sampling and recruitment

After having revised initially the documents and with an initial explicit programme theory on the SO, I started to prepare the interviews. The **population** under study for the research were the policy makers who were directly involved with the design and implementation of the programme: the policy makers who were the champions of the programme, and the ones who were directly involved with the implementation of the programme in the first years of its life.

The **sampling strategy** was to receive firstly information from two senior officials who I identified to have been directly responsible for the design of the first call for proposals, and to gradually open up the possibilities to receive more information from other officials whenever needed. Therefore, the **first sample included only two officials, ending up on being five after the snowball purposive sampling**. Full details on how the snowball sampling occurred are given in [Chapter IV. Findings](#).

The **recruitment** was done by approaching the interviewees via different channels, including emailing, LinkedIn messages, WhatsApp messages and orally. Under [Chapter IV. Findings](#) I explain that these techniques resulted in very effective recruitment.

### Interview design

As for the **interview design** scholars recommend a guide for interviews (Robson, 2016) or a standard set of questions especially related to programme theory (Gugiu and Rodriguez-Campos, 2007). The interview guide used in a realistic evaluation research stimulates reflection. In this case, **the interviews were designed to allow the interviewees to have enough space to talk**. A very general

topic guide was used (See [Annex 2](#)) to lead somehow the flow of the interview into:

- a) **Context questions** to discuss the context when the initiative was launched and how they felt on that;
- b) **Mechanism questions** to unpack the meaning of the policy programme, why was it launched, and where did the idea come from, how was it made possible, why it was designed in the way that it was – that is, what mechanisms were invoked to deliver the anticipated change; and
- c) **Outcome questions** to understand what effects the programme was thought to have, what was it meant to achieve, what do they think the programme has achieved now.

In these question blocks, I introduced some **probes, to get the interviewee to expand on a response** for example, when talking about the context the probe was, if the programme could have been launched in a different moment and why, on the effects of the programme the probe was if prosperity would be included; on the idea of the policy the probe was the question of why focusing on centres, etc. The **main themes** that discussed the most remarkable characteristics of the programme and its possible effects were pointed out. A short summary and interpretation of their description was written down for each theme.

In order to prepare to perform **interviews with high level officials and politicians I grasped the main concepts on elite interviewing** discussed by Aberbach (2002), mainly related to the need to have open-ended questions that can make comfortable the respondents to engage in discussions.

### Interview execution

As for the **interview execution**, before the start of the interview, all participants were given the **UCL Information Sheet** to read and keep, and the **UCL Consent Form** to sign.

**During the interview** I had a laptop where I took notes. The five interviews were audio recorded by using the mobile phone model LG-K8. I took notes on a laptop. I didn't feel there was any loss of engagement by the interviewee whilst taking notes. The interviewees were very keen on talking.

Because of my **perspective as an insider**, I tried to reduce the impact of my personal knowledge of the programme because I had worked with it, it was useful to collect, order, read and brief on the public official documents previous to the interviews, as well as to collect codes and themes which would be central to the interviews' analysis, as well as I tried to let the respondents talk freely during the interviews.

Interviews were **booked for 30 to 45 minutes**, but, except for one which lasted strictly 30 minutes, the rest **lasted between 60 to 75 minutes**. The conversation was very fluid and I had the chance to make questions even twice for the same concept, if that was necessary, to receive more and different information on the same issue.

The interviews took place in the places of choice for the interviewees, being them offices, home and a restaurant. They were carried out in Spanish.

### After the interviews: coding and analysis

**Once the interviews finished**, I saved the audios with anonymised codes.

The **audio recorded data was transcribed verbatim**, such as it is commonly done for qualitative data analysis (Rapley, 2007). For 30min of audio, I spent nearly 3 hours for transcription. Through reading, listening and checking the transcriptions I became immersed in the data and through this process, I became aware of key ideas and themes (Ritchie and Spencer, 1994).

The following step of data transcription is coding or **thematic coding**, recognised as a generic approach to the analysis of qualitative data (Robson, 2016) with a central role in qualitative analysis (Gibbs, 2008). Either “coding” or “themes” the understanding behind it remains very similar. If “codes” are more concise, “themes” are not tightly defined (Robson, 2016).

In this particular case, the documentary review and the transcriptions of the five interviews was done manually. The term “themes” is used when drawing the thematic network and later the conceptual framework of the policy. In this study **themes are given as a concept or a small block of information**, which is discussed by most or all of the interviewees and which may be present in the documentary review.

**Coding procedures** are very important especially in elite interviewing where answers are well formulated (Aberbach, 2002). The codes supported the design of the context-mechanism-outcome structure. These were compared with the ones used for the documentary review.

**Once the themes were identified and extracted from the text**, they were listed and organised into the context-mechanism-outcome configurations. The results are described under [Chapter IV. Findings](#).

### Participant Observation

I started practicing **participant observation at the work place** since the beginning of this stage of the research. I can highlight two aspects related to being an insider whilst as well a researcher.

Firstly, **the interviews allowed me to ask** questions that would not otherwise have been asked to the interviewees. Although I was an insider to the programme, it was thanks to the interviews that I reached a better understanding on the programme. Seeking clarification from some never-asked-questions makes the underlying effect of understanding greater, as the interviewees talk and explain the concept freely, such as they see it or such as they have seen it in the past.

Secondly, being an insider and knowledgeable of the topic, **the interview was converted at times in a natural conversation** where the roles of the interviewer and interviewee were not recognisable, and these moments may be useful to test the probes or go back at something to ask again for more or different information, a natural process for the realist interviews. Asking questions that may have appeared mundane meant unpacking knowledge about the programme.

The data retrieved from participant observation, mainly as notes from the **Research Diary**, was coded and structured in the same realist matrix used for the documentary review and enriched by the interviews. The results are given under [Chapter IV. Findings](#).

## *STAGE 2 “UNDERSTANDING THE EFFECTS OF THE PROGRAMME IN THE RESEARCH CENTRES”*

The objective of this stage of research was to understand the effects of the SO programme in the awarded research centres. The research for this stage started in November 2018 and lasted till June 2020.

### Documentary Review

The documentary analysis for this part of the research focuses on **information on the 20 research centres**, being this classified into four categories:

1. The information **the centres have in their webpages** regarding themselves (size, structure, organisation, etc.) and on Severo Ochoa programme (the research strategy, the activities carried out in this framework, and the results). In addition, information from the “Severo Ochoa” Centres of Excellence and “Maria de Maeztu” Units of Excellence (SOMM) Alliance and from the news online on the 20 research centres under study.
2. The **bibliometric information on the centres** such as produced by InCities, a tool of Clarivate Analytics that shows the evolution of publication metrics, especially by using the Category Normalized Citation Impact that is calculated by dividing the actual count of citing items of a publication by the expected citation rate for documents with the same document type, year of publication and subject area. The InCities tool was initially used during November 2018-February 2019 and then checked again in June-September 2020. The summarised updated data is given under [Annex 4](#).
3. **Information given by the ministerial department responsible of the programme** (Ministry of Science and Innovation in 2011, Ministry of Economy and Competitiveness in 2012-2016, State Research Agency 2016-to-date) on the implementation of the programme and any other

activities that may be related to the level of recognition of the programme by the state representatives during the years the programme has been implemented.

4. **Written information such as leaflets or reports** on their centres' activities that was given out by the research directors during the visits to the centres for interviews.

### Semi-structured Interviews

#### Population, sampling and recruitment

The **population** was decided to be those centres that had already finished the first four years of the Severo Ochoa grant – in 2019 there were a total of 20 centres: 8 centres accredited in 2011-2015, 5 centres accredited in 2012-2016, 5 centres in 2013-2017, and 2 in 2014-2018. The centres are located in Spain.

The **sampling** fits the description by Emmel (2013) when saying that “In realist qualitative research the sample can only be weakly elaborated beforehand. It is at best a weak construction which raises consciousness about the cases in the research and why they are chosen.” Common professional practice situates the acceptable number of interviews between 20 and 30 (Mason, 2010) following concepts of data completeness (Corbin and Strauss, 2008).

The **interviewees were approached** via a formal invitation email where they were informed about the project and the ethical aspects: anonymity, confidentiality, data security, and the opportunity to withdraw at any time. In some cases, for the reminder, a phone call to the person or their secretary was used. All of the scientific directors replied positively and showed their availability to carry out the interviews.

## Interview design

The **process of design of the interviews** was based in the intended outcomes of the policymakers and was supported by some of the documentary review. Four clusters of questions were designed, one per each desired effect. Most of the questions had probes (for more detail see [Annex 3](#)). One of them showed the participants a table with a classification of impacts of a wider conceptualisation, like for example: environmental impact, cultural impact, policy impact, legal impact, etc.<sup>39</sup> The directors were asked to show on paper where their centre had developed more impact and if the SO had had anything to do with it.

## Interview execution

Before the start of the interview, all scientific directors were given the **UCL Information Sheet** to read and keep, and the **UCL Consent Form** to sign following the Ethics Committee recommendations.

**18 interviews took place in the offices** of the research directors, 1 was done on Skype and 1 on the phone following the availability and preference of the participants. The Skype interview was with a director who was on a long term stay in an US university. The phone interview was an explicit preference of the participant. The rest of the interviews were carried out in the participants' offices in the research centres.

**19 interviews were carried out in Spanish and 1 in English**, following the request of the director to perform the interview in English.

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<sup>39</sup> I drafted the table ([Annex 3](#)) inspired by the REF14 Guidance on Submissions: [https://www.ref.ac.uk/media/1447/ref-2019\\_01-guidance-on-submissions.pdf](https://www.ref.ac.uk/media/1447/ref-2019_01-guidance-on-submissions.pdf) and the Russel Group Report "Engines of Growth" report <https://www.russellgroup.ac.uk/media/5324/engines-of-growth.pdf> (Pages last accessed in July 2021)

The **technique** used during the interviews attempted to build rapport and trust with the participants in order to generate revealing conversations (Roulston, 2011). The realist interviewer arrives knowledgeable of what happens in the natural setting (Manzano, 2016). I already knew about the centres and their most determinant features related to context, not only because I had worked in the first calls for proposal and was involved in the evaluation process, but as well because I had studied in detail the programme theory drawn in the conceptual model of impact of the policy makers and I had examined the centre's performance and activity before the interviews.

**During the interviews**, I took notes on a notebook and used the laptop to follow the interview questions that were included as a Power Point Presentation (PPT) such as in [Annex 3](#). **17 interviews were recorded in audio** using a mobile phone model LG-K9. 3 research directors preferred to not be recorded.

The interviews were **booked for 30 minutes**, and they lasted between 25 and 90 minutes.

After the interviews: coding and analysis

The recorded **interviews were transcribed verbatim** and placed into Word documents. The notes from the non-recorded interviews were as well typed into Word docs.

The 20 documents were **analysed using the qualitative data analysis software (QDAS) NVivo12 programme**. There exist no guidelines on the use of QDAS for the analysis of data in realistic evaluation (Dalkin, et al., 2015) and the CMOs are usually identified in a human analytical process.

The interviews in Word documents were uploaded to NVivo. The format of the interviews and the headings were all homogenised, for example Interview 1 labels the interviewer AD1 (my abbreviations) and responses E1 (*Entrevistado 1*, in Spanish) and so forth. Before doing the coding of CMOs, the interviews were divided into cases, where the AD1...20 would be added under the interviewer's cases and the E1...20 were added under the respondents' cases. NVivo can do case selection automatically, as it recognises the beginning of the paragraph with the assigned heading. It is important to name headings as different as possible to normal words, because the programme would select as a case any sentence that starts with the letter AD1...20 or E1...20, this is why the naming of headings of the word documents as a mix of letters and numbers can be a good way out.

Following the cases process, I started to code the interviews through a purposeful identification of connections among elements of context, mechanisms and outcomes (Jackson and Kolla, 2012). **NVivo allows multiple codes for the same data** (Robins & Eisen, 2017) and co-coding ensures credibility of the analytic process (Tracy, 2010). The same paragraph or sentence can have elements of CMOs and for this procedure, it is key to identify these as much as one possibly can.

For example, in the figure below it can be noticed an answer of one interview, on the left hand side in Spanish, and several codes on it, on the right hand side, in English. The picture shows full coding, but at this first stage, only the context, mechanism, and outcomes elements were noted: "C\_, M\_, O\_"; and in this case they were: "in a context of an autonomous centre", "in a context of a big centre", "in a context of a basic-to-applied centre", "in a context of a MESE (Mathematics, Experimental Sciences and Engineering) centre", "the SO funding" as a

mechanism, and “the recruitment and talent attraction” as an outcome and “scientific quality improved”, as an outcome.

Figure 3 Example of coding

The screenshot shows a text document on the left and a list of codes on the right. The text document contains the following content:

**A2. Calidad científica**

**AD7**

En los últimos años, ¿Cómo ha cambiado la **calidad científica** del centro?

**E07**

La calidad ha mejorado. SeveroOchoa ha ayudado a hacer actividades. ejemplo es **la contratación de los jóvenes investigadores que hemos atraer gracias a esta financiación**. Nos ha ayudado, pero menos de lo esperaba al inicio. Ha bajado la ayuda adicional prometida. La realidad es menos que la expectativa.

The list of codes on the right includes:

- 0 Scientific Quality improved
- 0 Recruitment talent attraction
- A In a context of a MSES centre, SO obligation to fulfil a 4 year obligation
- A In a context of (org) a basic-to-applied research centre, SO obligation
- A In a context of (size) a more-than-400pp centre, SO obligation to do
- A In a context of (org) an autonomous centre, SO obligation to fulfil a SO obligation to fulfil a 4 year strategy as a mechanism
- Partnerships were created
- A In a context of higher expectations at the SO start, Award labelling, Impact of the centre has been positive
- A In a context of higher expectations at the SO start, SO as a whole a
- A In a context of higher expectations at the SO start
- Recognition lower feeling of
- Impact of the centre has been positive
- Scientific Strategy improved
- CM In a context of a MSES centre,
- CM In a context of (type) a basic-to-
- CM In a context of (size) a more-th
- CM In a context of (org) an autonou
- A In a context of (type) a basic-to-applied research centre, Award lab
- A In a context of a MSES centre, Award labelling dimension as a meca
- A In a context of (size) a more-than-400pp centre, Award labelling di
- A In a context of (org) an autonomous centre, Award labelling dimen
- Award labelling dimension as a mechanism
- A In a context of a MSES centre, SO as a whole as a mechanism
- A In a context of (type) a basic-to-applied research centre, SO as a me
- A In a context of (size) a more-than-400pp centre, SO as a whole as a
- A In a context of (org) an autonomous centre, SO as a whole as a me
- SO as a whole as a mechanism
- AD 7
- A In a context of a MSES centre
- A In a context of (type) a basic-to-applied research centre
- A In a context of (size) a more-than-400pp centre
- A In a context of (org) an autonomous centre

Once finished with the coding, the analysis tested a new technique presented by Bergeron and Gaboury (2020) that is the only one available to-date to identify C-M-O connections through a QDAS – Nvivo. This method works on the bases of firstly running an NVivo matrix query feature that facilitates the identification of connections among the concepts (Robins & Eisen, 2017) between those elements identified as “context” and those identified as “mechanisms”. A sample of the can be seen below, such as in NVivo.

Figure 4 Sample of the NVivo coding

	CAA	D	M_CSIC	E	M_Flexi	F	M_Fundin	G	M_Loo	H	M_Own	I	M_Propo	J	M_Pu	K	M_Se	L	M_SO as	M	M	N	M	O	M_U
1: C_In a context of (org.) a CSIC centre	0	6	2	5	4	3	0	0	0	0	0	0	0	0	0	0	0	22	2	1	0	0	0	0	
2: C_In a context of (org.) a mixed CSIC-univ centre	3	4	8	26	0	6	2	1	1	1	1	1	1	1	1	1	1	30	2	3	5	0	0	0	
3: C_In a context of (org.) an autonomous centre	7	0	17	46	2	4	5	4	0	0	0	0	0	0	0	0	0	93	10	4	1	0	0	0	
4: C_In a context of (siz.) a 200-400ppl centre	4	3	13	23	2	2	3	0	1	0	0	0	0	0	0	0	0	46	2	3	4	0	0	0	
5: C_In a context of (siz.) a 200-400ppl centre	2	3	3	26	4	3	1	1	1	0	0	0	0	0	0	0	0	42	5	0	2	0	0	0	
6: C_In a context of (siz.) a 200-400ppl centre	3	1	10	25	0	3	3	2	0	0	0	0	0	0	0	0	0	52	7	5	0	0	0	0	
7: C_In a context of (typ.) a 200-400ppl centre	4	2	5	26	0	3	3	0	1	0	0	0	0	0	0	0	0	34	4	3	3	0	0	0	
8: C_In a context of (typ.) a 200-400ppl centre	3	5	9	22	4	4	2	2	0	0	0	0	0	0	0	0	0	58	8	5	1	0	0	0	
9: C_In a context of (typ.) a 200-400ppl centre	2	0	12	25	2	0	2	0	0	0	0	0	0	0	0	0	0	46	2	0	2	0	0	0	
10: C_In a context of (typ.) a 200-400ppl centre	3	5	11	20	4	4	2	2	0	0	0	0	0	0	0	0	0	61	8	7	2	0	0	0	
11: C_In a context of (typ.) a 200-400ppl centre	6	2	14	48	2	3	5	0	1	0	0	0	0	0	0	0	0	68	5	1	4	0	0	0	
12: C_In a context of (typ.) a 200-400ppl centre	0	0	1	5	0	0	0	0	0	0	0	0	0	0	0	0	0	9	1	0	0	0	0	0	
13: C_In a context of (typ.) a 200-400ppl centre	0	0	3	6	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0	0	0	0	0	
14: C_In a context of (typ.) a 200-400ppl centre	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	
15: C_In a context of (typ.) a 200-400ppl centre	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	

With a reference to this matrix, every coloured (numbered above 0) cell includes references that cross C with M, therefore, every reference under these cells was recoded under new nodes that would represent CM elements. This new coding feature can only be done manually at this point in time.

A new matrix query was run with the new CM nodes and the Outcome ones. The results of this matrix represent all the connections among the context, mechanism and outcomes elements. Through this process all the original nodes are connected into a CMO configuration. A sample can be seen below, such as in NVivo.

Figure 5 Example CMO coding

The screenshot shows the 'Matrix Coding Query - Results Pr' window in NVivo. It features a search criteria section at the top with 'Files & Externals' selected. Below this, there are sections for 'Rows' and 'Columns' containing various text-based search terms. The main area is a large grid where each row represents a specific CMO configuration and each column represents a different coding category. The cells in the grid contain binary values (0 or 1), indicating whether a particular CMO configuration is present in a specific context. The rows are numbered from 73 to 88, and the columns are labeled with various codes like K: O, L: O, M: O, N: O, O: O, etc.

This **double matrix technique** allows all the possible CMO configurations to come to light, and it improves both rigor and transparency in the analytical process (Bergeron and Gaboury, 2020) as it is important for uptake and dissemination to give the full detail of this process, particularly through software programmes such as NVivo (Paulus et al., 2017).

The **most highlighted CMOs** were the **object of study**, such as seen under [Chapter IV. Findings](#). These were illustrated with text found in the shape of references under each cell and of a continuous check with the most relevant information found on the centre, mainly related to bibliometric information or flagship initiatives and news.

### Participant Observation

The third technique used for collecting and understanding data was participant observation. **In January-March 2019, when the 20 interviews were carried out, I visited 18 centres around Spain.** Once every interview had finished, I took notes on the atmosphere around the it. This was a good opportunity to write remarks on the centre, the director or the interview itself. This was very useful when analysing the text, the CMOs and in adding nuances to the information. For example, visiting personally the centres helped me understand where it was placed, if inside the university campus or next to another centre, or on its own, and it made me understand in a clearer way the messages the interviewee was giving. Personal visits to the centres are very useful to become more knowledgeable as an interviewer, and more specifically in the realistic evaluation approach. The notes were taken just after finishing the interview, or shortly after on the same day. I used the laptop to note down the information, and I saved the files next to the interview transcription and audio record.

Some more **details related to the notetaking** and aspects related to the visits on the centre can be found in [Chapter IV. Findings](#).

Another important aspect during this stage of the research has been the **participant observation at the work placement – from October 2018 till end of research**, whilst I was reincorporated as a public employee at the ministerial department responsible for science policy. The incorporation was done at the international policy department. Since November 2016, the Severo Ochoa programme was managed by the State Research Agency.

The State Research Agency was based in the same building as the ministry till summer 2019, when they moved to a new building 15 minutes' drive, which cut

even more the connections I had with the staff that manages the programme and therefore my reflections as an insider. Nevertheless, **the ministry holds its political position to the programme**, it produces press releases on its results, and it maintains contact with SOMMA, the association of the centres.

Whenever there were specific events or mentions on the Programme during my daily work life, I would note down in the “**Research Diary**” observations related to the programme and other policies that may have affected it. Since starting to practice **the concept of research diary**, I had on me an A5 notebook where I would include work related issues and as well research notes. I would keep this notebook both in the office and outside of it. This new practice has been very useful for the research carried out and the way the analytical processes have matured, not only related to this specific research, but as well in the work related issues. I have saved the notebooks during this period. More information on the use of the Research Diary can be found in [Part II. A Portfolio of Policy and Research Observations and Reflections](#).

## LIMITATIONS

The world is a complex place with many competing values and interests and research evidence may not be the first or even last thing considered when decisions are made. We need to, not only understand real-world decision-making processes and ecosystems, but also understand how the rational ‘evidence-informed approach’ impacts on, relates to and interacts with such real world systems (Gough, 2017).

The **policy programme under study is very complex**, not only because it can only be explained and analysed under limited viewpoints, but as well because the programme itself and the context it operates is dynamic and changeable.

The limitations are being made explicit with the objective to assist future studies when generalising findings or placing them in other contexts.

1. The study is limited to drawing the conceptual framework of the underlying model of impact of one policy initiative only, launched in Spain in 2011. **It is therefore very context and people-bound.**
2. The **techniques used are subject to their own limitations**, being them documentation review, semi-structured interviews and participant observation.
3. The **identification of themes as a result of transcription may suffer slight inconsistencies**, and the interpretation and analysis may fall into mistakes or biases.
4. As Renger (2010) says the **documents review technique used for generating programme theory has its own limitations**. Often the very organizational characteristics that led to the lack of an explicitly stated program theory are the reason for the lack of available, detailed source documentation. Further, even when source documentation exists and a program theory can be derived, it is possible the program is not being delivered as initially documented and for this reason the validity of the model should be checked with agency staff.
5. Another challenge is that **source documents are seldom written for the express purpose of developing a programme theory**. This is similar to the problem of using secondary data (Smith, 2008). Thus, **it may not be possible to identify all of the antecedent conditions targeted by the**

**program or the relationship between them.** Not doing so can create a problem developing the programme logic as it would be impossible to establish linkages between strategies and missing antecedent conditions (Renger, 2010).

6. Last, but not least, **the NVivo12 programme, software used for the analysis is not prepared to respond to the construction of the CMOs** as it is not programmed to link three text selections and to create a configuration of a context-mechanism-outcome. This advanced text analysis software tool requires of the manual effort to double programme the CMOs in order to bring out the results as a CMO configuration, necessary for the realist analysis.

These **limitations were mitigated by control** and support by the research supervisory team. Below are given some limitations related to each of the techniques in the two stages of the research.

#### *DOCUMENTARY REVIEW*

**Stage 1 - “Drawing the conceptual model of impact of the policy makers”:** shows its limitations as documents are not produced for the purpose of research and they do not have the sufficient information to answer the research questions (Bowen, 2009). It applies to this specific case and, in addition, the quest for understanding the idea creation of the SO programme would need more techniques that can support bringing information.

**Stage 2 - “Understanding the effects of the programme in the research centres”:** has its limitations related to the variability of information found online. For example, the Clarivate Analytics InCities programme, with which I prepared the information on each centre before the interviews in late 2018, was not available

till mid 2020. Compare and contrast information later in Stage 2 was done using Scopus information whilst InCities was unavailable.

### *SEMI-STRUCTURED INTERVIEWS*

On Stage 1:

- The **availability of elite interviewees** is determined to their full agendas and the researcher needs to respond positively to the time and location in the very first opportunity. The fact that I had to have a full time employment during the time I carried out the interviews limited my options. I minimised the impact of this limitation by giving top priority to the research, after my daily work.
- The **sample** who were interviewed were the ones who championed the design of the initiative and they were all politically assigned staff at the ministry and not permanent civil servants of the institution, meaning that they were working in different locations. I minimised the impact by travelling to their location of choice.

On Stage 2:

The **limitations of interviewing** as for this case were:

- **Time management.** As I aimed to cluster the interviews on my availability (for the visits to the centres outside of Madrid I took time off work as annual leave: 10 working days) and on the availability of the professors, as well as I tried to plan the interviews so that there was a natural connection between the cities I was visiting. This resulted in squeezing for example more than 3 interviews in a day in one city, which made the prime objective to reach on time and perform the interviews than having

the necessary time after the interview to review the notes and highlight the main conclusions. 2 interviews a day would have left me with a reasonable amount of time. This limitation may have had an impact on some of the interviews as I had to guide more strictly the interview to cover on time all the topics.

### *PARTICIPANT OBSERVATION*

On Stage 1, some of the limitations of this technique related to this specific study are:

- It is very dependent on the way I have seen and described the actions, therefore the **descriptions are subjective**.
- At times I felt part of the subject being researched, and therefore I found it **hard to be critical**, and searched for some distance to enable criticism.
- To most of the **team, it was not known that I was undergoing the research project whilst working**. This may raise personal ethical concerns, although as Stevens (2011) says supported by the British Sociological Association's (2002) code of ethics, "*Covert research can be justified when overt research would change the behaviour of participants and where access is controlled by powerful interests.*" Indeed, it would have been impractical if I had asked for consent from everyone all the time. My double position of a full time employee and doctoral researcher may result in stressful periods as the researchers have to perform the everyday job and as well try to observe and record for the research or in ethical issues (Bryman, 2016).

On Stage 2, two limitations can be highlighted per each context:

- 1) **The visits to the centres were short** and they were strictly related to the interviews with the research directors, even though whenever I could, I went to the centre early in time and had the chance to take a walk in its surroundings or have a drink in the cafeteria. This enabled to see centres that were very international. Some research directors invited me to the centre in case it was needed to interview more people or to attend any event at the centre, but this action was not carried out, because the research itself did not need it, and because the time is a crucial and limited asset for a DPA researcher that works full time and carries out research at the same time. Had this study been fully embedded in the ministry's action, a deeper understanding of the centres and the "Severo Ochoa" programme itself would have been more feasible.
- 2) **Participant observation was more limited than in Stage 1 because the researcher did not work anymore in the department that managed the programme.** Many changes occurred in my professional life during the time of this doctoral degree. Stage 2 of the research was completely performed when the SO programme was managed by the State Research Agency and I was working for the international unit of the ministerial department in charge of science policy. Nevertheless, the political follow up was done at a ministry level. I was able to take part in a couple of events related to the programme under study. The use of the research diary came out to be a very good instrument for note taking and enhancing the analytical process through evidence.

## SUMMARY

This chapter has described the methods for carrying out research for the study. A **programme theory driven realistic evaluation approach** was pursued, through

using qualitative methods and the techniques of documentary analysis, semi-structured interviews and participant observation. Data collection followed Maxwell (2012)<sup>40</sup> approach in a realist setting.

**Designed in two stages** for firstly drawing the conceptual model of impact of the policy makers who designed the programme and then understand the effects the programme had in the awarded centres, the research used three techniques:

- **The documentary review** of both formal public information on the SO programme, as well as press releases and web information, and scientific and communication information on the awarded centres.
- **The 25 semi-structured interviews** carried out with high level policy makers and top awarded centres' research directors. The UCL Research Ethics Committee guidelines were followed strictly to assure a responsible and accountable research. Data was treated with QDAS-NVivo through using a novel technique used for the very first time in policy evaluation. The double matrix NVivo query technique guarantees the visibility of all the context-mechanism-outcome connections.
- **Participant observation** was carried out in the work placement and through the visits to the centres to enhance understanding on the programme results with a conceptual refinement function (Pawson and Tilley, 1997).

The approach and techniques used for this research project are **new in science policy evaluation**. By enabling the realist evaluation configuration – CMOs- the findings will contribute to the research goal, that of understanding the effects of

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<sup>40</sup> Maxwell (2012) says that in realist studies data collected through qualitative ways are not “constructions”, but they are ‘evidence for real phenomena and processes’

the SO programme and generate learning for the Spanish public administration institutions.

## CHAPTER IV. FINDINGS

### INTRODUCTION

This chapter develops the findings that the theory-based realistic evaluation of the “Severo Ochoa” Centres of Excellence Programme drew out of the research.

The “Severo Ochoa” Centres of Excellence is a programme of Spanish Government that awards and funds on a competitive bases research centres and units that demonstrate scientific leadership and impact at global level. The programme was made operative in 2011 and, since then, it has had an annual call for funding. The accreditation is valid for four years with possibility of renewal. It funds with four million euros the centres in the given period. The funding for Severo Ochoa and Maria de Maeztu<sup>41</sup> Programme is **the only one considered as performance based institutional funding in Spain** at state level, (Zacharewicz, 2018). Approximately it has meant a 0,5% (in 2013) and 1,8% (in 2015) of the so called State plan for Scientific and Technic Research and Innovation (PEICTI<sup>42</sup>), the aids given by the State government annually.

As the evaluation findings are bound to the data interpretation, different ways of interpreting the information may produce different results. Nevertheless, this section will present research outcomes at two levels: from the realistic evaluation of the “Severo Ochoa” Centres of Excellence programme itself and the effects it has had in the first 20 awarded centres; and from executing a realistic evaluation from the insider’s perspective – a public employee

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<sup>41</sup> The Maria de Maeztu Units of Excellence funds units of excellence. It was launched in 2014 and it is not under study of this research.

<sup>42</sup> *Plan Estatal de investigación Científica y Técnica y de Innovación* (PEICTI)

developing a case study that may support future policy evaluation. Whilst the first level outcomes can be found under this section, the insider's perspective are given in [Part II. A portfolio of Policy and Research Observations and Reflections](#).

The chapter firstly develops the **conceptual model of impact** of the policy instrument supported by the realistic approach and the qualitative analysis techniques, by bringing in the contextual aspects, the mechanisms that played a crucial role and the four main intended outcomes that were thought to generate effects as a result of the "Severo Ochoa" Centres of Excellence programme operation.

A broad block of the chapter will focus on **understanding** what from the SO programme worked, for whom, under what circumstances, and what mechanisms have triggered **the effects the SO has produced** or enhanced in the awarded centres. The Context-Mechanism-Outcomes configuration lay at the backbone of all the analysis as the main tool of a realist evaluation.

Finally, the section on **limitations** will shed light on conceptual and actual limitations linked to the findings and their use.

The findings will be accompanied with references to [Part II. A portfolio of Policy and Research Observations and Reflections](#), the document where I include my policy work and reflections during the period of the DPA and whilst carrying out this research.

## UNDERSTANDING THE CONCEPTUAL MODEL OF IMPACT OF THE “SEVERO OCHOA” PROGRAMME

### *INTRODUCTION*

The “Severo Ochoa” Centres of Excellence Programme is a programme of the Spanish Government that **awards and funds on a competitive bases research centres** and units that demonstrate scientific leadership and impact at global level. The programme was made operative in 2011 and, since then, it has had an annual call for funding. [Chapter II. Policy Description](#) gives more detail on the programme.

The research here develops its **conceptual model of impact at the time of its launch for better understanding the idea creation** (why was the programme designed, what did it aim to do and why, and what effects was it thought to produce and why?) and by giving the observed programme theory through the context-mechanism-outcome configurations for the explication of the intended pattern of outcomes, such as given in the policy and imagined by the policy makers.

Porter and Shortall (2009) recognise that the realist methodologies have the capacity to maintain epistemological robustness, while being able to take into account the wider perspective of stakeholders. The realist perspective sees policy as a resource created and managed by people of different behaviours in different sectors.

This chapter focuses on drawing that **conceptual model of impact of the policy makers** during the programme design through the context-mechanism-outcome configurations and by taking into account the critical realist approach. The findings give the observed Programme Theory from the research carried out

through the interviews to the policy makers and the documentary analysis. More detail on who is interviewed and what documents have been revised is given in [Annex 1](#).

Firstly, the section introduces **an overall illustration of the programme theory** such as conceptualised by the policy makers in the form of CMOs, then it develops those CMOs that can be observed by the research, and finally it draws a comparison between them, and more specifically those that indicate the institutional level and the systemic ones. An interim summary will conclude the section.

It is to be pointed out that in spite of the variety of contexts characteristics and mechanisms and outcomes, there may be **some aspects that escape the observation**, as a consequence of the limitations to the methods or my own understanding, or the limitations of the research itself that needs to bring out a clear illustration of the findings escaping some nuances that may be lost in the process.

#### *THE CONCEPTUALISED PROGRAMME THEORY AS REALIST-CMO CONFIGURATIONS*

Under the realist perspective “theory” or “programme theory” is called the **unit of analysis that encompasses the assumptions and ideas about how the programme is supposed to work** according to programme owners and managers (Pawson et al. 2005).

The CMO configuration focuses on the aspects related to context of when the programme was designed, relates context to mechanisms on how the programme took shape, and related to the expected outcomes believed by the policy makers. With a realist perspective and by using the realist evaluation configuration: the context-mechanism-outcome (CMO), the theory from the public information analysis the following CMOs can be derived.

As already seen under “[Deployment of the Research Design](#)” in Chapter III:

- **Context** is key in the realist paradigm, as it turns on or off the mechanisms that create causality (Greenhalgh, 2014) and at the same time understanding context is one of the challenges of science policy evaluation so far (Martin, 2016).
- **Mechanisms** operate differently in different contexts, therefore the ability to identify the mechanisms that create change is key for the evaluation studies.
- **Outcomes** in the realist evaluation are given in connection to the context characteristics and the mechanisms that trigger them, and they are outlined as a pattern responding to the need to understand impact.

**Figure 6** below is a simplified version<sup>43</sup> of the **observed Programme Theory** where the implied context characteristics and mechanisms are linked to produce the imagined and intended outcomes from the policy makers. A more sophisticated version of the illustration could have been produced with design programmes that could represent context as an area where mechanisms would be introduced to be connected to intended outcomes labels. Nevertheless, I opted for a simplified version where the three main columns-like categorisation of labels in the Figure 6 below would represent the following:

- The **labels on the left**, tagged under “Context” summarise the observed context characteristics that enabled the mechanisms to act.

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<sup>43</sup> The information given here is a summary of findings across the research. Similar illustrations, in the form of a sketch, was drawn for every interview that reflect the interviewees CMO configurations on the programme and when analysing the documents. Putting the CMOs together in order to find a common denominator may leave out some perspectives given by a single interviewee only or any specific detail given in every individual document.

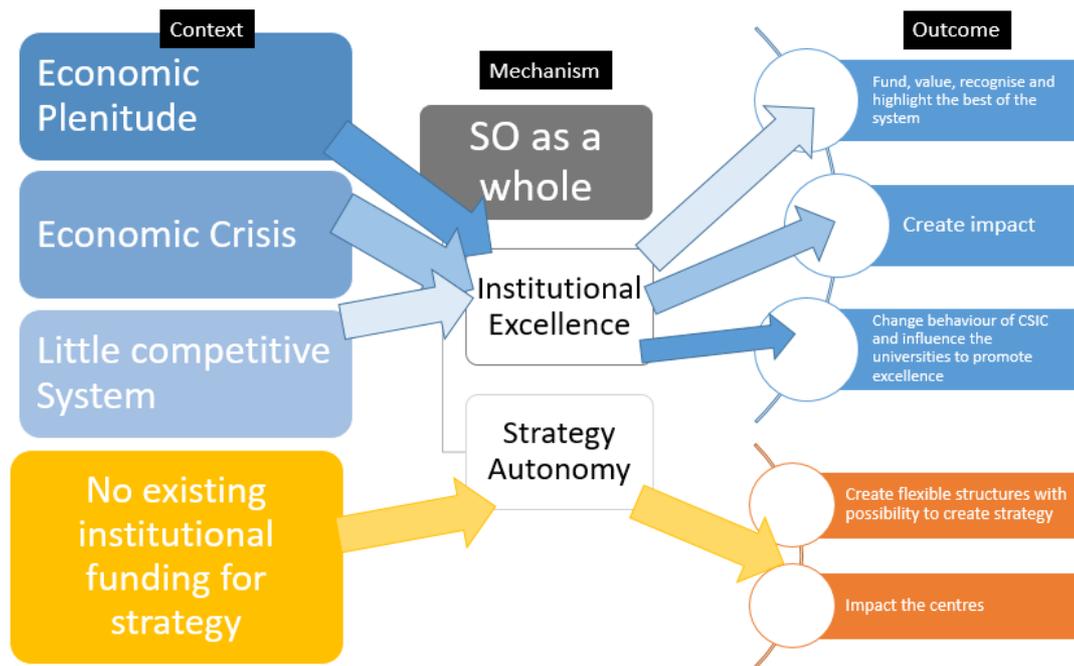
- The **ones in the centre**, tagged as “Mechanism” give the policy instrument with its two main dimensions: the institutional excellence and the strategic autonomy one.
- The **labels on the right**, tagged as “Outcome” are linked to the flow of context-mechanism causality to produce a pattern of outcomes.

Only **the main links are given between the labels with arrows**, with the aim to simplify the understanding at a glance. These are articulated at a later stage when illustrating each context-mechanism-outcome configuration below.

Figure 6 includes **a colour code** in the labels, so that in a snapshot the reader can see the two magnitudes of intervention conceptually when designing the SO Programme:

- The labels and arrows in **blue** relate the mechanisms, contexts and outcomes to the supra-institutional level, the systemic one, captured in the notion of the Spanish System of Science, Technology and Innovation, broadly understood.
- The labels and arrows in **yellow** relate the mechanisms, contexts and outcomes to the nodal level generating understanding and creating change at institutional: centre level.

Figure 6 Conceptual Model – SO Programme Theory



This illustration gives the CMO configurations of the Programme Theory observed during the research when trying to define the conceptual model of impact the policy makers had for the “Severo Ochoa” Centres of Excellence Programme. As a continuation, below each of the derived CMOs is illustrated with research data.

CMO 1: Economic plenitude allows funding for institutional excellence to influence CSIC

In the context of economic plenitude, the idea is generated as a request of universities to fund their research activity structurally and abundantly from the state government, but through the mechanism of shaping demands and keeping the focus on the excellence structures, the policy makers believed that this would promote a change in behaviour of the CSIC and universities to enhance excellence-oriented structures inside of their organisations.

Figure 7 CMO1



## Context

The beginning of 2000s and before the design of the National Plan (2008-2011) where the Programme for Institutional Strengthening was included, it was a context of economic abundance.

*I remember that it is the time of the “fat cows” and in the country there was an excess of money everywhere. The universities received basal funding from the regions based on criteria such as number of students, etc. They wanted another kind of basal funding by the state government to encourage the scientific activity. Where does the initial idea come from? From the rectors - the CRUE<sup>44</sup>. They claim that they need several hundred million euros. What for? They wanted indiscriminate basal funding for*

<sup>44</sup> Conferencia de Rectores de las Universidades Españolas (CRUE) - Conference of the Rectors of the Spanish Universities.

*research. All of this started to get moving, and there was a strong pressure from the CRUE to do so. So, the amount of money that was needed was very important and it was more of the same stuff - "coffee for everyone", - again. (Interviewee no. 4)*

As an interviewee confirmed the government had already put in place the “Campus of International Excellence” aimed at the universities with the objective to encourage them to become more excellent, an initiative that did not result so.

*In parallel to the “Institutional Strengthening Programme”, a new one called “Campus of International Excellence” was designed and launched with the objective to reinforce universities, but these [the universities] oriented the funding towards infrastructure (again!) and doctoral programmes. It was up to a university to decide on promoting research structures that could later compete for a Severo Ochoa. (Interviewee no. 5)*

The use of “again” from the former senior science policy maker shows exasperation and to no surprise other initiatives, launched briefly before the SO, “degraded” into “a seal for everyone”. This is in part because of the strong lobbying and little prioritisation from the ministry, as well as the attitude or culture that the STI policy operates in the country. On the “Campus of International Excellence” programme aimed at strengthening capacities at universities:

*What we cannot do is repeat the error of the “Campus of International Excellence”. In the end all the Universities became international excellence campuses. (Interviewee no. 5)*

On the Consolider programme, which aimed at creating big networks of scientists working in the same or similar field of science that do ground-breaking research:

*A very good idea of Consolider is launched, and the first Consolider are very selective, but then the level was being worked on. In the end, Consolider falls into the "crusher of the Spanish R&D system" that homogenises everything. So what happens? There comes a moment that the Consolider became a dialogue:*

*"- Doesn't this scientific community have a Consolider yet?*

*- Oh, we'll give you one." (Interviewee no. 4)*

This is the experience that the policymakers showed at the time when they were trying to design the "Programme of Institutional Strengthening" – to become the SO.

*The STI policy at state level is like a grinder that tends to homogenise everything. (Interviewee no 4)*

With the learning from the experiences of the past programmes (Consolider and Campus of International Excellence) the context that the science policymakers lived whilst preparing the SO and trying to foster the institutional excellence was such:

*Whoever is leading this, receives brutal pressure by our system. There must be someone able to withstand the attacks and ensure the quality.... In the implementation, the Ministry itself was also tough. Many people from the Ministry, who did not believe in the Programme and did everything possible to prevent it, because they did not get their hands on the call. The traditional section of the Plan wanted to control. The*

*insistence and the problem came from the part of the intermediate cadres<sup>45</sup>. (Interviewee No. 4)*

The interviewee gives a powerful image by describing the pressure received as “brutal”.

#### Mechanism

The **mechanism of keeping the focus on structures of excellence** is proposed by the State officials, in spite of the **opposition from the universities**.

*In the last CRUE meeting, in which I am still with the [Government] team, it is the meeting that the Secretary of State has a strong discussion with the President of the CRUE, after I presented the funding scheme - no longer a generalist scheme for everyone, but for a few, which is what we aimed for from the ministry. The outline of what I presented ended up in the [National] Plan [2008-2021]. It could not be started at that time because the rectors wanted the funding in large amounts and my superior was convinced that it had to be linked to excellence. My superior suffered many pressures. Then the elections were held, and there was a change in government. (Interviewee no. 4)*

The senior officials were aware of the need to support the centres and the system in the framework of the international arena, and this is linked to the CMO on the perception of a system that lacked effective competition.

*The question was: How could we support those centres that had a vocation for excellence? They had to compete, not thinking on the Spanish*

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<sup>45</sup> My “intermediate cadres” is meant the people between the politically assigned and the civil servants – these are normally civil servants that are in charge of an area or unit.

*parameters, but rather that they had to compete at the European level. For that, they **had to have stable funding to compete for European initiatives**, and they shouldn't depend on the arbitrariness of a National Plan project where success was relatively safe. (Interviewee no. 5)*

A mechanism that had to be reinforced was **the attraction of talent** that was considered as part of the programme.

*They [the structures of excellence/the centres] would have to be distinctive regarding the attraction of talent through ways that were not conventional to the Spanish Science and Technology system, and from there arises, in principle, I can also tell you that this institutional strengthening Programme did not sit very well to the Universities. (Interviewee no. 5)*

What did the “ways that are not conventional to the Spanish science and technology system” mean? Another official sheds light on how the State Plan can promote changes only through funding actions. The promotion of organisational changes in research centres may need another kind of incentive: a legal one.

*There is a lot to be done in the organisation and management of research. It would be very important for the State to promote a regime, it could be a special regime, or call it whatever you want, but a **regime that would allow the leading research institutions** – be it the “Severo Ochoa”s and the “María de Maeztu”s - **have a more agile and flexible management**. This can be done by the State. A State lawyer is needed to undo a knot that has been created by another State employee. (Interviewee No. 3)*

This is an explanation on why the mechanisms of stable funding and talent attraction fall under the two main dimensions of the SO: the institutional excellence and the strategic autonomy, such as shown in the Figure 7.

#### Outcome

In contexts that have been explained above the mechanisms of focusing on institutional excellence aimed to have as an intended outcome centres of excellence that would compete at international level, but not only. It was believed that the new programme **could influence the behaviour of the largest organisations in the country** (the CSIC and universities) and therefore creating change in the System at large.

*The idea of institutional strengthening would contribute to setting benchmarks of excellence in the R&D system that were more than the Universities and more than the Council [CSIC]. (Interviewee No. 5)*

The policy makers aimed to send a message to the CSIC and the universities to support and promote excellence, mainly through making their administration more flexible.

*What the centres of excellence want, is to reinforce their autonomy for management, and to have an umbrella that would allow them to do things that under conventional structures could not be done. (Interviewee No. 5)*

The **literature confirms the idea** of the science policy makers on creating effects, incentivising the bigger research institutions such as the CSIC and the universities to engage in research governance and renew their disciplinary structures (Rip, 2011) and it reinforced by more recent literature that suggests that the Centres of Excellence instrument may be an instrument to enhance organizational

governing capacity, and create institutional and legal frameworks in the research and higher education field. Hellström (2018) and Hicks (2011) suggest that it is the competition for prestige created by Performance Based Institutional Funding mechanisms that creates powerful incentives within university systems. The German Excellence Initiative evaluation (IEKE Evaluation, 2016, page 5) shows the potential to positively influence German state university laws (*Landeshochschulgesetze*) and thereby improve the institutional framework of the whole German university system. This suggests that the concepts upon which SO was designed had the potential to achieve the desired outcomes.

CMO2: During the economic crisis the programme would generate impact

In times of economic crisis (and last year of mandate), the Programme was thought to generate not only scientific impact, but as well other types of impact, in addition to attract collaborations and patronage.

Figure 8 CMO2



### Context

The research gives the context in 2010, when **the idea was taken from the National Plan (2008-2011) and designed** such as we know it now under the SO programme.

*We started thinking about this programme in mid, mid-late 2010 when the Minister of Science and Innovation and we identified that there was a National Programme for Institutional Strengthening in the National Plan and that there was no instrument linked to it. ...There were very few resources at the time. In 2010 we had already budgetary problems. The only thing there existed was the minister's commitment to preserve the resources for the 1st call of 2011. (Interviewee No. 1)*

The **idea of the award** arrived while the available budget was being reduced, the selection process was getting tighter, and therefore the funding was conceived as an award, which would create more recognition and better visibility for the

public and press. The reduced funding was aligned with the more focused “prized few” idea of the “Severo Ochoa” rather than the “awards for all” approach, as the interviewee informs.

*When the new team comes in, the minister picks up on Severo Ochoa. The minister drives it a lot, but there was a budgetary issue: “creeping” cuts were taking place. And then came the calculations. If before we spoke about 10 million/year then 5 million/year. In the end 1 million/year was discussed and it was maintained. So, we had to be strict, because there was no money, and this fact, in some way, favoured the Severo Ochoa scheme as we know it today. One could only give 10, because there were 40 million euros available. The only way you have to adjust to a small budget is by reducing the number of awards that you are going to give and in order to do this, you have to raise the bar a lot. (Interviewee No 4)*

**Another aspect of crisis** is brought by another interviewee when comparing that period with the need to save the most needed.

*We had the need to protect a part of the system that we understood had to be, let's say, what is called in governments, “critical facilities”, or something, as if in a country that always in case of war must control the four ships and three ports that they cannot sink and cannot be bombarded, as this would be a war economy. (Interviewee No. 2)*

**A context of the last year of a mandate**, the team of appointed officials (external team close to the minister), operating apart of the National Plan team at the ministry, designed the programme and launched the first Call for Proposals. The context at the cabinet of the minister during that year was described:

*We tried to copy the West Wing Series for our last 365 days at the ministry. We decided to dedicate our efforts to those things that we thought would*

*leave a different mark and they were: 1) the public procurement instrument, and 2) the “Severo Ochoa” Centres of Excellence Programme.*  
(Interviewee No. 2)

The reference to the fiction series set on White House and daily work of the United States President is interesting here. Bringing out new initiatives required imagination in the organisation of the team, too, and therewithin fiction series seemed to work.

The virtuous circle of **belief in the importance of research** and its **uptake from the politicians** translated therefore in political will was remarked as essential from the former senior policy makers.

*There must be political will at the highest level, that is, at some point someone with a lot of power has to say “Now we must promote the research”. That is essential. .... It is also possible to conquer the politician. Research is very rewarding. Let's say that there is also a profile of politician who, perhaps did not initially think about research, but who after several visits to laboratories with statistics of successes, they become very enthusiastic about research. ... The task of seducing politicians is essential.*  
(Interviewee No. 3)

*The political will is that you have a boss in front of you who tells you: "This is going to be done even if it is the last thing I do." This was one of the things that I liked the most, despite the innumerable pressures we had.*  
(Interviewee No. 4)

As a member of the team that worked in the implementation of the pilot call for proposals – the first SO call – I carried out ethnographic research as an insider to support the conceptual model of impact of the policy makers in this stage of the research. Full details of my professional experience during the Doctorate are

explained in [Part II. A Portfolio of Policy and Research Observations and Reflections](#).

The senior officials that launched the SO in 2011 operated to a certain extent delicately for its implementation. It is already mentioned above by an interviewee indicating **the pressure that one could receive from the main part of the system**. Some of the issues of that context are illustrated here below, too.

*There were co-optation mechanisms in house. This instrument could be co-opted by the scientists, the managers and collaborators inside the house. This is very hard to say.... In fact, part of the problems that this programme has had over the years, have been that the rest of those responsible for the other aids have viewed SO with suspicion. (Interviewee No. 1)*

*The insistence and the problem came from the middle positions, too. ... The traditional section of the Plan wanted to control and homogenise everything. (Interviewee No. 4)*

#### Mechanism

These paragraphs bring out evident issues in the **creation of a policy instrument**, as well as they bring out the **counterfactual decision** the cabinet of the minister took to going for the SO programme instead of for a thorough reform of the traditional structure – CSIC, the biggest research performing organisation in the country – “which would have benefitted centres of excellence, but it is not understood by the public”. The importance of perception in politics is considered key by the informants involved in this research, and the importance of the communication plan the ministry built around the Severo Ochoa award was significant.

A highlighted action during the research was **the selection process** - exclusively international peer review evaluation - based on past results of the centres and on the proposal of their research strategies. The mechanism is present in the Strategy, Plan and in the Regulatory Bases and Call for Proposals 2011 with much more detail.

*The research centres must be subject to rigorous evaluation processes... The evaluation by independent experts will be key to bring out a results-based selection.” (National Strategy, Page 25)*

*A transparent and demanding accreditation process, based on international best practices... The candidatures have been evaluated by three panels of twelve different nationalities, among which three are Nobel laureates. (El Economista, 2011)*

With a reinforcement with evidence from the interviews regarding the **importance of the evaluation**, such as some citations from different interviewees mention:

*We always knew that the evaluation must be international. Our system is inbred. It is good that it offers a double evaluation, but it is inbred. People don't like to admit it. (Interviewee No. 1)*

*What we were very clear about is that the decision had to be absolutely independent of politics and legitimized at the highest scientific level. The highest level in science is the Nobel Prize, so we looked for three Nobel laureates to lead the committees. There was a very personal commitment from the Minister to bring in the Nobel prizes, something that is not easy. (Interviewee No. 2)*

*All the aspects are necessary, the evaluation is key. (Interviewee No. 3)*  
*The evaluation is fundamental and that it is external and independent. (Interviewee No. 4)*

*This type of “ex ante” and “ex post” evaluation in Severo Ochoa does not occur in other programs in this country. ... I think [SO] is innovative, innovative from a management point of view, from an “ex post” evaluation point of view, and an international evaluation point of view, (Interviewee No. 5)*

The awareness of the “inbred system” foregrounds the promotion of independence and objectivity through the evaluation system put in place for this specific programme.

Another highlighted aspect (only as a result of the research through interviews) was that of the **execution of the idea by the unit in charge of it**, mentioning the difficulties especially inside the institution itself.

*In the implementation, the Ministry itself was tough. There were many people from the Ministry, who did not believe in the programme and did everything possible to prevent it. The insistence and the problem came from the part of the intermediate cadres. That is why we kept the selection process and the first call totally external. (Interviewee No. 4)*

*And “where” [would the programme be managed]? In any place that the usual structures do not touch it, because otherwise it [the idea] will converge again to the average and it will again be the same as [usual] projects. (Interviewee No. 1)*

A few mechanisms served as **choice for the initiative** among the policy makers.

*I recreated a model of Harvard Kennedy School - we asked ourselves certain things about the initiative: 1) Did we have enough **support** for the initiative?; 2) Did we have enough **resources**?; and 3) Has it got enough **value** for the system? I added a fourth one that is the **perceived value**,*

*which has nothing to do with the real value, but that is very important in politics, because in the end, many people will judge you. **The most important things for the system are not necessarily the ones that have more perceived value.** Severo Ochoa was reasonable effort, reasonable resources, real value and it was very powerful for the public. (Interviewee No. 2)*

A counterfactual choice to the SO was the reorganisation of the Spanish National Research Council (CSIC, for its abbreviation in Spanish):

*There are other things, like for example, the reorganization of the CSIC that is necessary to start, to give more support to the centres of excellence, but we did not have the support, we could have had the resources; it did have value for the system, but the perceived value was a horror, because it would have been a very big effort and people would not have understood it. (Interviewee No. 2)*

#### Outcome

The identification of excellence was done as well **to make the system more resilient**, especially in a context of crisis, when the interviewee was working as a senior official at the ministry:

*The identification of excellence: **we needed to understand who the best were, just in case we had to save science from a shipwreck.** We needed to identify the flagships, the critical infrastructure that needs to be saved in case of war. (Interviewee No. 2)*

Part of the conceptual model of impact for the programme was that this new policy mechanism would generate **a broad impact in the STI system and amplify the collaborations the centres had**, as well as making them more attractive.

*I believe it [SO] has confirmed scientific policy hypotheses, i.e.: the centres of excellence in research generate a great impact on the ecosystem. They are centres that are not isolated from their environment, that are internationalised, that contribute and have relationships with other research groups and with other researchers that carry out a type of research with high scientific, social and economic impact. Demonstrating that excellence has all three dimensions (scientific, social and economic) has been something that has exceeded my expectations. I believe that development and prosperity in our societies depend on knowledge and innovative policy instruments. We are not going to have a greater impact with the same instruments of science policy. You have to change them.*  
(Interviewee No. 1)

The idea that having recognisable and world leading institutes could attract **patronage** is given.

*A scientific recognition that will give them **preferential visibility in obtaining patronage aids**, among other benefits. (Science News Agency, 2011)*

The importance of having flagships of excellence that **attract additional resources** is reinforced:

*It is important to have these flagships [of excellence] for international competitiveness, attracting external resources, etc. (Interviewee No. 5)*  
*Severo Ochoa can be linked with scholarships; a patronage strategy with the centres, and more scientific diplomacy. We were beginning to observe a certain culture of patronage associated with science, something that Spain still has a lot to do, but that some patronage cases had already started, and we were concerned that these cases were led by very personalistic formulas.*

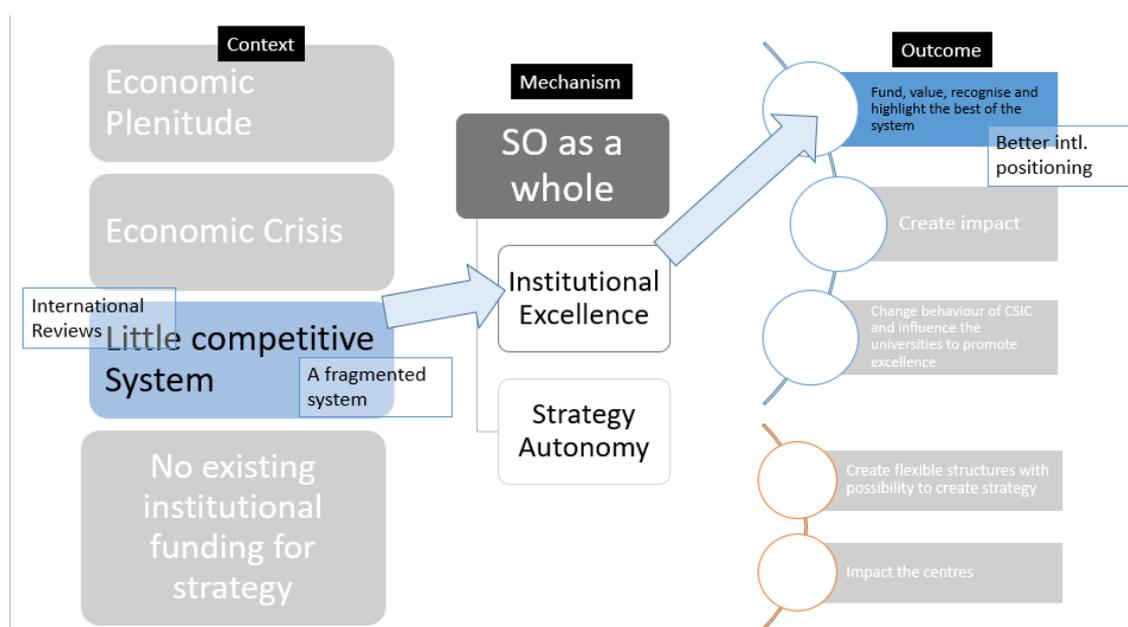
*It was necessary to help the patrons and future patrons to point out that if they wanted to put money into science somewhere, they would not fail in this place [the SO centers]. (Interviewee No. 2)*

In line with what **the literature confirms**, the performance based institutional funding mechanisms, similar to the SO Programme were introduced to provide accountability for public investment, the choice to allocate research funding selectively to the best performers, and creation of performance incentive both at institutional and individual level (Hicks, 2012; Jonkers and Zacharewicz, 2016). The OECD report (2014) recognises as one of the intended objectives of the countries where these instruments were running, the fact to promote linkages with industry, as well as it mentions that “The activities of CoEs can spill over and create positive externalities.” Some success cases on collaboration beyond research are seen in the German Excellence Initiative (Knie and Simon, 2019), the UK’s Research Excellence Framework (Martin Sadersai, 2017; Rosli and Rossi 2016), in Sweden (Lunderquist and Waxell, 2010) and with a particular focus on leveraging additional funding through sponsorships: in Denmark (Bloch et. al., 2016)

### CMO3: Valorisation of excellence at institutional level changes the system perception

In a context where the Spanish STI was perceived as lacking effective competition, valorising excellence at institution level would make possible that the best of system is highlighted, not its average.

Figure 9 CMO3



### Context

The **STI system fragmentation** is a context characteristic, present in all the reviewed government documents, except for the former Law 13/1986. The new the Law 14/2011 diagnoses of the STI system as:

*The system is fragmented and very little coordinated making of it a 'system of the systems'. (Law 14/2011, page 6)*

The National Strategy (2007-2013) had already identified it:

*The STI public system is characterised by fragmentation and the lack of institutional strategies in research centres/universities. (National Strategy 2007-2013, Page 10).*

The press, although it does not mention the fragmentation as such, it highlights the great success of the Catalan regional centres that to a certain extent create a pole of excellence inside of Spain.

*Catalonia stands out as the most excellent region with more than half of the candidate centres. (El Economista, 2011)*

The second identified context characteristic is **the lack of competitiveness and positioning of the Spanish STI system at international level, especially in Europe.** The Spanish research base had grown 6 times since 1980s, but this did not mirror in quality and international visibility. Among its motivations, the Law 14/2011 states:

*The [Spanish STI] system does not have enough leadership in the European Union. (Law 14/2011, page 7)*

Before that, the National Strategy 2007-2013 had specified:

*The continued effort made in Spain in R&D over the last twenty years has resulted in progress in many areas, although insufficient to place Spain in the right place. (National Strategy 2007-2013, Page 17)*

In the press, this context characteristic is stated with more emphasis:

*“Two decades ago we were in the 30th position in the world in scientific production; now among the top 10,” said the Minister, “but as for the economic translation of that quality, the classification falls, and we are between the 16th and 20th place in innovation.” (El País, 2011)*

*The Spanish STI system has taken a quantitative leap since 2004-in volume of resources and researchers, but not in overall quality. (Science News Agency, 2011)*

More specifically, the senior officials were aware of the specific critique on **lack of competitive institutions and lack of participation in international initiatives.**

*We were analysing several reviews, i.e.: OECD Peer Review of 2007 and other types of analyses of our system that had been published since 2000, in which we identified a significant weakness in our system. It was the weakness of our institutions – there was no presence of Spanish scientific institutions in large projects at international level. (Interviewee No. 1)*

A senior official would state on how they saw **the system at the time before the conceptualisation of SO**.

*We saw the scientific system very flat, very average, with some specific exceptions such as the national centres, either CNIO or CNIC or some centres of the CERCA network in Catalonia – which was well known - but the rest of the system was unknown. The effect of this program was to create in the system a kind of force that would segment and energise the system. (Interviewee No. 1)*

*What we didn't know - and this is very hard to say - where the niches of excellence were. (Interviewee No. 4)*

As identified by an interviewee “the competitive scientific institutions did not exist in the country”:

*There were no competitive scientific institutions in this country. They were only administrative institutions, without the capacity to make policies. (Interviewee No. 5)*

As a summary, there are **two aspects that make the context of that period**. Firstly, the **fragmentation** of the Spanish System of Science, Technology and Innovation, already mentioned in the Law 14/2011, the National strategy (2007-2013) and in the press, and secondly, the **lack of competitiveness and positioning** of the Spanish system at international level, especially in Europe. This was identified in both the official documents and the insight from the interviews.

## Mechanism

In that context, the mechanism that would **recognize the best of the system** and create change in it were identified, such as below.

The SO was seen in the press as **the one to modernise the funding model** of research.

*The programme will modernise the funding model of research in force for 25 years. (Science News Agency, 2011)*

Identifying a new instrument that would recognise world class institutions located in Spain needed **highlighting and recognising excellence**.

*The high-impact research that was done in the country was always hidden by the metrics. The metrics reflect the average and the average gives a very poor image of the country. This was a conviction based not on intuition, but on an analysis of cases and a very broad experience that we all had from different institutions, knowing that many of these institutions are much better than the average image of the country. I think that through SO we wanted to highlight it. And I personally think that this goal was reached. (Interviewee No. 1)*

There was a clear new focus on **“centres” as a unit of attention for developing the policy**.

*We had experienced with [funding] projects to the research groups, and we had experienced [funding] research group networks. We realised a [research] group does not have autonomy to create change in the system. For Severo Ochoa, what was intended was to create autonomous centres, which had their own behaviour patterns, not conditioned by the existing structures. (Interviewee No. 5)*

Developing the **institutional dimension of excellence** tailored to the context was a challenge for the policy makers.

*It was a long process. The first challenge was how we define or how we measure excellence. ... There is no international agreement on what the different dimensions of excellence are. There is a lot of controversy and in fact all the initiatives or political instruments and the existing policies are not coherent in this regard. We have been defining the very concept of excellence in this call and redefining it as it has been implemented. But there is no international guide that tells you if you want to recognise scientific excellence you have to follow these evaluation criteria. The only criterion that was most difficult for us to define was the criterion of impact normalisation, the criterion that we are now associating with the guarantee researchers - the critical mass, the minimum number of guarantee researchers that are required to have a number of citations from their own publications, which is 50% higher than the world average in their field. It is worth noting that they are well above the average at the international level and that has already taken us a long time to define. We consulted with experts in the field. The definition was very risky because it was an indicator that was not used before, and we did not know how to determine if 50% or 35 or 40 or 70. So we had to do exploratory studies to be sure that what we were asking for was demanding enough to be of excellence, but at the same time feasible. (Interviewee No. 1)*

As regards the “exploratory studies”, as a late comer into the programme – in summer 2011 to support the evaluation process, I was not introduced to any of them. They were discussed at the beginning of the design of the programme at the senior policy level. The interviewee discussed, not only the revisions they had carried out on the studies that other foreign or regional initiatives might

have had, but as well they had created tests to check if the programme would respond to the institutional dimension of excellence, such as already mentioned above. I did not ask about more information on the studies, as they did not directly respond to the focus of the research.

#### Outcome

After having illustrated the context and mechanism, below is unfolded how the policy at the time of the SO conceptualization would make possible that **the best of the system is highlighted, and not its average**, one of the intended outcomes of the programme.

The Law 14/2011 indicates as **a desired outcome in one of its ten General Objectives** the:

*Institutional strengthening of the Spanish System of Science, Technology and Innovation stakeholders and the collaboration between them. (Law 14/2011, Page 16)*

The question raises on how would the “strong autonomous institutions and the collaboration between them” create a “more cohesive STI system”? The answer from the reviewed documents can be found in the National Strategy (2007-2013) that stated:

*The STI system needs institutions and organizations with sufficient autonomy so that they can establish their own research strategies, promoting the institutional policy, favouring the creation of regional and international competitive institutions that function as a seedbed for researchers and where produce the discoveries and generate their industrial applications.” (National Strategy 2007-2013, Page 25)*

From the government documents review, one can understand that the fragmented system could be better coordinated through fostering collaboration

of excellent institutions. The first objective of the National Programme for Institutional Strengthening in the National Plan had as its first objective “the cohesion of the system”. (National Plan, Page 100). In the press the connotation is given differently saying:

*Garmendia [Minister of Science] trusts that this program will help reorder the Spanish research structure, perhaps too atomized. It will not be the government that will reorder, but it is expected to be a natural evolution (it is expected that the possibility of opting for the category of “Severo Ochoa” centre serves as an incentive to unite the best). (El País, 2011)*

By recognising the best of the system the desired outcome was to generate the effect of **valorisation of research both inside the country and internationally**.

*The initiative aimed at valuing the science with the highest international impact made in Spain. This is what it was: recognition, and also funding, but mainly **valorisation at country level and internationally**. Another way of putting it, is telling people, including the centres and universities of the country “Hey, here you have an institute, a centre or a department, which is just like you in principle, but is leading this and this and that.” (Interviewee No. 1)*

At an international level **identifying world class institutions** in the country “visualised that level of excellence that was a product of scientific development in the European Research Area” says another senior official.

*To be able to play on the international frontier of science, institutions that play by the international rules of science are needed. And this requires institutions that are very strong, that are reasonably well financed, and that have operational agility. (Interviewee No. 3)*

All the interviewees have stated that the SO aimed to give “*a first portrait of the research excellence in the dimension of institute.*” One of the interviewees uses the following metaphor:

*“I visualise what we aimed for as a mountain range. We want the level to be high, but for that it is important to have peaks. The Severo Ochoa helps to consolidate this. It is important to have these peaks for international competitiveness, to attract external resources, etc.” (Interviewee No. 3)*

This is **one of the most useful metaphors** that I encountered during the research whilst developing the programme theory of the policy. The literature already recognises the effects of similar instruments, the Centres of Excellence ones, in the overall research and innovation system of a country (Good, 2015; Flink and Simon, 2015; Martin Sadersai, 2017; Knie and Simon, 2019), but they do not so from this angle. The originality of being aware that by distinguishing the top stakeholders (“the peaks”) could raise the perceived quality of the whole system (“the mountain range”) is powerful to understand how the SO was conceptualised at the beginning.

Another intended **outcome** stated by the documents is the fact that **the policy would strengthen research institutions by creating strategic research capability**. It can be seen in the following documents:

*This policy [the Institutional Strengthening Programme] aims at achieving public centres with the right dimension and specialisation according to their strategic objectives, which should allow them to develop effective research plans.” (National Strategy 2007-2013, Page 25)*

*The aim is to strengthen the development of strategic research capabilities of existing centres and units that accredit a high level of*

*excellence, by evaluating results, affecting not only the capacity for execution and organisation of research, but also the strategy of training, selection and attraction of human resources, international collaboration and the dissemination of knowledge to society. (Regulatory Bases, Official Gazette 15 April 2011, Page 39366)*

The articles in the press focus on **the benefits of the centres** that could be selected:

*The candidates for the Severo Ochoa accreditation know that they opt to be part of the 'dream team' of Spanish science. Strengthen the development of strategic research capabilities of existing centres and units that meet the requirements of excellence by evaluating results. (Science News Agency, 2011)*

A scientific recognition that will give them **preferential visibility in obtaining patronage aids**, among other benefits. (Science News Agency, 2011)

The patronage aids was, in part seen as **another intended outcome** of the programme included, in this perspective in the creation of strategic capability at centre level.

In addition, there was a belief at the time that Spain could improve its international competition by:

*Supporting the centres and research units of the **first international level** that already exist in our country. (Official Gazette 15 April 2011, Page 39366)*

*Promoting **a qualitative leap in the Spanish science** by supporting the centres and research units of the first international level that already exist*

*in our country. (Regulatory Bases, Official Gazette 15 April 2011, Page 39366)*

*Promoting first level research, contributing furthermore to its [STI System] **competitive development within the European Research Area (ERA)**. (Official Gazette 15 April 2011, Page 39366)*

*This National Programme for Institutional Strengthening will improve **competition in the European Research Area (ERA)**, it will improve the possibility of setting up large business consortiums for the Framework Program projects, and fundamental research projects generated by the European Research Council (ERC). (National Plan 2007-2011, Page 100)*

In line with what is seen under [Chapter I. Understanding the Background and Context to Science Policy Evaluation in Spain](#) the way how the **Spanish STI system was perceived**, especially by foreign and international benchmarking exercises comes to a better understanding from the critical realism double recognition of the objective and subjective interpretations (O'Mahoney and Vincent 2014). This focus on valorising centres would improve the whole Spanish STI system, and the focus on the institutional dimension of excellence was put not only to create a new dimension for more effective international competitiveness, but as well for creating the best centres the opportunity to escape the rigidities of the Central Administration. The focus on the institutional dimension of excellence, such as the literature confirms, is an influence of the New Public Management ideology (Pollitt et al. 2007) that served of inspiration for the science policy as well as other sectoral policies (Martin, 2019). Another aspect that is supported by literature is the fact that in a competitive environment for ideas talent and funds, the governments shifted funds towards rewarding success. (OECD, 2014) The same report from the OECD confirms that the "Research Excellence

Initiatives” raise the reputation of domestic research institutions, in line with what the policy makers expressed.

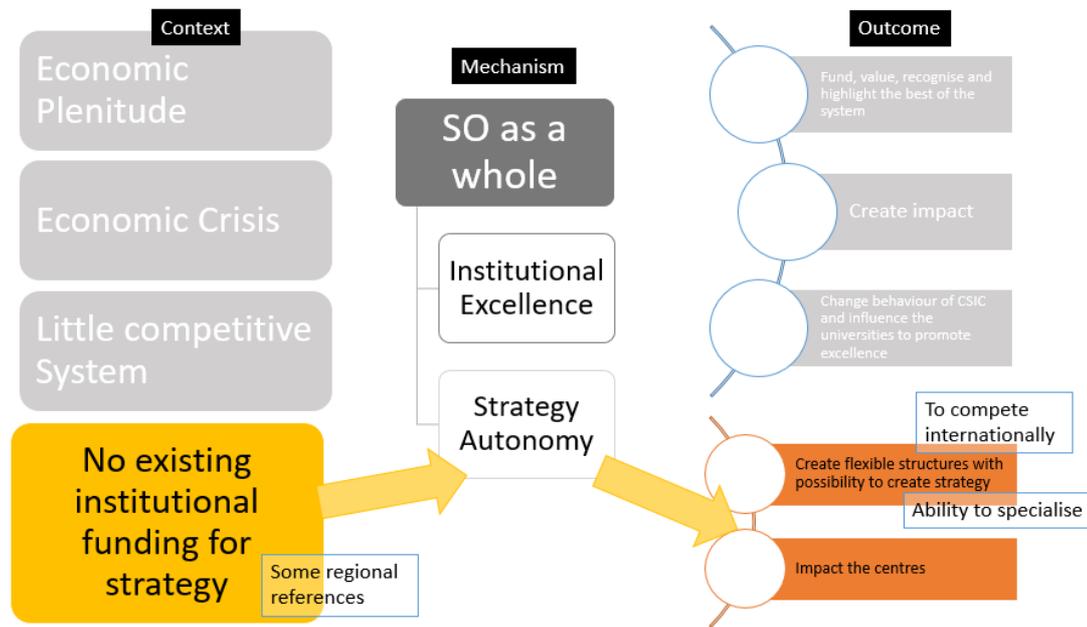
The **reordering of the system** is seen already under [Chapter I](#), where Flink and Simon (2015) say that one of the core ideas of the German Excellence Initiative was the horizontal and vertical differentiation of the German Higher Education landscape. By the end of the section and once the conceptual model of impact of the SO programme is fully drawn, one will realise that what was mentioned in the Spanish press is not taken forward to be developed in one of the intended outcomes of the conceptual model of impact. Nevertheless, in the literature reviewed Siri Brorstad-Borlaug (2015) and Hellström (2018) recognise that the Centres of Excellence policy instrument supports organisation of research steered by government.

The question here is whether the mechanisms and intended outcome worked in the way the national policymakers intended. I turn now to illustrating the next component of the SO conceptualised programme theory, focusing at a more specific institutional level.

#### [CMO4: Institutional strategies create flexible excellent institutions](#)

In a context where most of the institutions don't have funding for strategy, the design of an instrument that can give the best centres the capacity to develop their own strategy, would create autonomous structures of excellence with flexibility in administration and scientific leadership.

Figure 10 CMO4



In contrast to the three sections above, that explained the theory of intervention at system level, this section focuses on **creating change at institutional level**, the so-called nodal level.

#### Context

Before the SO, there was no state mechanism that would finance through performance based institutional block funding the research organisations. By mid 2000s the policymakers at the ministry were aware of this, and linked it to the lack of competitive structures/institutions in the system., such as seen above. They were as well aware about what was going on in some of the regions that were starting to create autonomous research centres from university institutes, for example Catalonia.

Before the SO came to exist there were **no state programmes focusing on institutional funding for research:**

*Because, the problem that our system had, was that the entire national Plan has been a bit perverse, in the sense that **it has greatly empowered the individual against the institution**. What the Severo Ochoa aimed to create is "collective money", which would allow scientific strategy as a centre, as an institution and work towards agreed objectives. (Interviewee No. 4)*

The policy makers identified at the time **similar instruments in some of the Spanish regions**.

*This was radically different from all the models we had been funding. Why? Institutional consolidation did not exist in this country. As for what corresponded to us at State level, **there was no State policy focusing on institutional strengthening**. It started in Catalonia, followed by the Basque Country, and then Madrid. The **regional governments that promoted research seriously and opened it up to the private initiative**. Catalonia, then the Basque Country - the experience of the GUNEs, and Madrid – the IMDEAs. **These were the three references**. (Interviewee No. 5)*

The idea that “most of the institutions are administrative ones” has been explained:

*In our system, all the funding that could be received was finalist and oriented towards projects, and it was given to the Principal Investigators (PIs). **In our centres, PIs are more important than the directors**. Most of the institute or centres’ directors in our system are administrative directors, not scientists. They have no power because they do not have resources. (Interviewee No. 4)*

The research institutions in the country were mainly administrative having an **administrative leadership**, but not a scientific one.

The state funding system was lacking incentives for the centres.

*The Spanish system lacks the basal funding aimed at promoting institutions of excellence, a performance based system and also a strategy for the future as a unit, as an organizational structure. ... Research centres in Spain lacked baseline funding to start new initiatives. (Interviewee No. 4)*

#### Mechanism

It was believed that the **ability to create strategy** would support the centres' expansion and competitiveness, it would strengthen their Human Resources policy, and it would generate autonomous structures of excellence with more agile patterns of behaviour in management of research (compared to CSIC – the biggest national research performing organisation - or the universities).

Under the influence of the New Public Management, the above was expected to create an increase on performance, autonomy, accountability and effectiveness. Rabovsky (2014) As for the mention on improving HR capacity, this is backed by a few pieces reviewed in the literature (Hellström, 2018; Aksnes et al, 2012; Beerkens, 2009; and Leach, 2009) indicating that **research centres of excellence allow more focus on Human Resources skills than other research organisations**, such as the universities.

The mechanism that was aimed to generate competitive and autonomous centres at national level was thought as **a block funding given to high performing entities**, to fund a 4-5 years' strategic actions and it was hoped to create more administrative autonomy. The head of the centre had to be a scientific director that could create the collective culture of working in a research centre.

The Max Planck institutes in Germany were seen as **an example to follow**.

*An example are the Max Planck Institutes - each institute has its own autonomy and legal personality and belongs to an umbrella institution, Max Planck Gesellschaft [Society] that is responsible for quality review, and the decision to open and close institutes. ... We had the idea of a basal funding that is not related to headcount of professors, but a basal funding of excellence to give institutions the ability to implement strategies. (Interviewee No. 4)*

The mechanism of the need for institutional strategies was made through the **introduction of the figure of “scientific director”** – a requirement for the block funding to be given to the institutions. This figure was promoted in 2000-2001 in Catalonia.

*The figure of the **director of the institute is key**. This is the principle followed in Catalonia. The scientific director has to have several specificities: 1) A career as a scientist with a good reputation; and 2) Full authority on the institution. We did not believe in bicephaly. The administrative manager responds to the director. The director of an institute has to understand that a powerful institute is much more than their laboratory at large.... If I have to give an example, if I have to talk about the case of Catalonia and if I look at the Severo Ochoa centres that are now in Catalonia, it was important to have good potential directors on spot. In the year 2000-2001, Catalonia **started a programme that identified university professors who had a high level of research and talent**. It is interesting to go through that list as one can find ... (names of directors of SO centres). (Interviewee No. 3)*

The **scientific director figure** that was one of the mechanisms that could generate the strategy for research at the centre, and as well **a new culture in the structure, a collective one.**

*The problem that our system has, is that the **whole National Plan has been a bit perverse, in the sense that it has enhanced the individual against the institution.** What Severo Ochoa tries to give to the institution is a "collective" fund, which would place the scientific strategy at the centre of an institution and work towards the agreed objectives.... It was also intended to begin to install the culture of the scientific director.*  
(Interviewee No. 4)

The **role of the scientific director** for the programme can be linked to what is known as steering of research between the researcher's individual autonomy and the government's goal to steer research (Maasen and Dickel, 2019; Donovan, 2019), and in this case by creating leadership at a centre level towards excellence science.

The first Law 13/1986 had identified as a **mechanism for the promotion of research** the following:

*"A regular funding that makes possible to maintain and promote quality of research teams, both in universities and in other public research centres" (Law 13/1986, Page 6)*

Although the mentioned sentence is as old as 1986 it brings out **two characteristics of what the competitive funding** aimed for in the following decades in Spain: "maintaining quality of research teams" and "promoting quality of research teams". Competitive funding was directed to create and maintain research groups.

25 years later, the Law 14/2011 included **the promotion of the research centres of excellence, a new organisational perspective** when funding research:

*Measures for the promotion of units of excellence. The consideration as a unit of excellence may be accredited by the Ministry of Science with the aim of recognising and strengthening the research units of excellence, which contribute to placing research in Spain in a position of international competitiveness in both the public sector as in the private one, in the form of centres, institutes, foundations, consortiums or others. (Law 14/2011, Page 36-37)*

Passing **from group level funding to organisational level one** appears in the National Plan 2008-2011:

*Supporting centres of excellence by evaluating results, affecting not only the organization at group level. (National Plan, Page 100).*

In a context where most of the institutions didn't have funding for institutional strategy of any kind, the mechanism that would create the **institutional dimension of excellence** would be the instrument of performance based institutional funding to the top performing entities with a strong scientific leadership through the "scientific director" figure.

#### Outcome

The desired outcome of the programme is that of **having research structures able to develop excellent research and agile to compete internationally and position and lead international initiatives**. The agility for these structures would influence the more traditional organisations such as CSIC and the universities, wherever necessary to orient towards excellence based practices and policies.

*For the Programme to work the governance model of the research performing organisations is key. The programme works wherever the*

*centre has got full autonomy in **management and leadership capacity and therefore can recruit** without being subject to traditional rules and the administrative practice. (Interviewee No. 1)*

*In our head the idea that was to give the institutions the capacity to implement strategies. (Interviewee No. 4)*

The OECD Report (2014) highlighted as one of the most popular rationale from governments for choosing the Research Excellence Initiative was to increase the international visibility of national research.

**Promoting scientific specialisation** was a collateral intended outcome.

*There is another issue that was collateral, but that was important. There was an important concern in all the policies to promote scientific specialisation. Research institutions and universities in Spain were not very specialised. And then it is that collateral idea that fitted well that these were excellence aids for highly specialised institutions. (Interviewee No. 1)*

The **promotion of interdisciplinarity**, created by the Centres of Excellence that allow collaboration to go beyond mere interaction, and **towards integration of specialisms** is already recognised the literature review (Hellström, 2018). At the level of Centres of Excellence developing specialisation and promoting interdisciplinarity can be consistent and effective, although at first instance specialisation and interdisciplinarity seem competing in nature. The research adds the nuance that specialism and the right autonomy with strategy enables effective interdisciplinarity.

The design of SO was conceptualised as the one that can grant capacity to the top centres to develop initially their **own scientific strategy** as a centre and therefore through the mechanisms of funding, **a strategic leadership** at centre

level, etc. enable other outcomes in raising the centres' quality and effectiveness in management.

### Relating the parts of the “Severo Ochoa” Programme Theory

From the analysis above the Programme Theory of SO conceptualisation brings forward firstly, that the **generation of idea is developed in two broad contexts**, and without the context characteristics it would have been unlikely that the SO programme would have had the features it has today.

On the one side, in a **context of a funding abundance (before 2008) the universities requested a block funding scheme to the government** - Ministry of Education and Science at the time - to fund their scientific activity. The ministry responded to the request and presented the **funding scheme** at the Conference of Rectors meeting – what would later be called **the National Programme for Institutional Strengthening**. At a systemic level, this scheme was inspired by two main factors: 1) the international reviews, best practices, the development of the European Research Area, and the leadership Spain had in international consortia; and 2) the **new research structures created at regional level** – initially in Catalonia - entities that had full autonomy in the leadership and management of research and that were inspired in foreign models and in the reasoning that excellent research centres are those where the “per capita intensity of scientific excellence and competitiveness is high” (Interviewee No. 3). From a nodal perspective the policy makers had realised there was no support by the State administration to strengthen the institutional dimension of excellence, no funding for strengthening centres and their strategies at institutional level.

The idea was **included in the National Plan** for Scientific Research, Development and Technological Innovation (2008-2011) in 2008 as the National Programme

for Institutional Strengthening, but it was not implemented till the last year of the following legislature, in 2011. In 2010, just a year before the general elections, the minister and the team realised that the National Programme for Institutional Strengthening from the National Plan 2008-2011 was not implemented yet, and therefore there was an opportunity to do so.

In 2011, in **a context of economic crisis and diminished funding**, where the ministerial team not only wanted to leave a legacy, but as well they wanted to operate quickly and successfully for new a programme that “was reasonable effort, reasonable resources, real value and it was very powerful for the public” (Interviewee No. 2). Less funding available meant the need for higher recognition. **The scheme was designed as an award**, an accreditation, recognition, a seal of excellence, “a golden medal” (Interviewee No. 4)

The **international dimension/framework had not changed from 2008 to 2011, on the contrary**, the policy on completion of ERA was stronger, the European Commission started using the Innovation Union Scoreboard<sup>46</sup> – a ranking that classifies countries in terms of their STI performance – where Spain was considered a moderate innovator, in the same level as countries such as the Czech Republic, Greece, Hungary, Italy, Malta, Poland, Portugal, and Slovakia; and most remarkably, FP7 had introduced **the European Research Council** that funded scientists with brilliant ideas **hosted by institutions** that were offering flexibility in management, practices of research management that enabled

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<sup>46</sup> [https://ec.europa.eu/research/innovation-union/pdf/iu-scoreboard-2010\\_en.pdf](https://ec.europa.eu/research/innovation-union/pdf/iu-scoreboard-2010_en.pdf) Page last accessed on 22 August 2018.

research to be carried out successfully, and that very few centres could offer in Spain – mainly funded by the Catalan Government.

The **identification of these world-class institutions** in the country was not only fulfilling the task of identification of niches of excellence, but as well it would **highlight the best of the system**, and not its average. It would boost the system's self-esteem and hopefully stimulate mimicry for promoting excellence oriented and autonomous institutional structures inside the traditional system (Scott, 2014; Powell and DiMaggio, 1991).

The support given to the best **aimed to fund their research strategies with the idea to become stronger, to have a HR strategy of international standards and to generate recognisable scientific and socio-economic impact**. The pilot programme in 2011 was designed with this conceptual idea of impact.

The SO Programme was conceptualised and put in action as **a mechanism that would influence both the system and the institutions themselves** through two main characteristics: 1) The award dimension - that would recognise and highlight the best of the Spanish system, that would be able to attract attention to non-strictly-systemic science, technology and innovation stakeholders, i.e.: sponsorship and businesses. And 2) The funding dimension – that would be flexible enough to enable the creation and implementation of Strategic Research Plans at institutional level.

The observed Programme Theory draws out the following pattern of intended outcomes:

1. Fund, value and recognise the best research structures.

2. Have excellent research centres with scientific leadership and flexibility in their administration.
3. The excellent centres are the ones that generate, not only scientific impact, but also other types of impact.
4. Change behaviour of CSIC and influence the universities to promote excellence oriented structures.

These intended outcomes will be the focus to understand the SO programme in the awarded centres, developed in the next section.

### *INTERIM SUMMARY*

This section drew the **conceptual model of impact** of the “Severo Ochoa” Centres of Excellence Programme, an institutional performance based competitive programme in research running since 2011 in Spain.

By working with the theory based realistic evaluation approach and configuration, and the techniques of documentary review, elite interviews and participant observations, it was able to understand **four context-mechanism-configurations, three of them working at systemic perspective and one at a nodal one.**

At a **systemic level** the economic plenitude (before 2008 financial crisis), the context of crisis and that of the last year of the mandate of a minister served as a context to create a programme that would serve as a mechanism to produce intended outcomes related to funding, valuing and recognising the institutional dimension of excellence in the country that would generate impact and change the behaviour of CSIC and influence the universities to promote excellence oriented structures in the system at large.

At a **nodal level**, the policymakers realised that the state policy arena in research was a context where most of the institutions didn't have funding for establishing their own strategies. Therefore, the design of an instrument that can give the best centres the capacity to develop their own strategy, would create autonomous structures of excellence with flexibility in administration and scientific leadership and impact.

A **pattern of outcomes** was drawn out. Exploring what works well from the SO programme, in what conditions and triggered by what mechanisms is the focus of the following stage of the research that will understand and test these outcomes in the awarded centres.

## UNDERSTANDING THE EFFECTS OF THE “SEVERO OCHOA” PROGRAMME IN THE AWARDED CENTRES AND BEYOND

This section analyses in which context has the SO mechanism, or any of the characteristics related to it, influenced the observed outcomes. By taking in consideration the intended outcomes, a result of the conceptual model of impact drawn under [Understanding the Conceptual Model of Impact](#), this section will revise the context-mechanism-outcome configurations (CMOs) out of the research carried out in the **20 Severo Ochoa awarded centres**. The section will include a documentary review with the characteristics of the centres, and the information from the interviews with the 20 scientific directors. Illustrations of the most important CMOs will be given whilst explaining in which contexts which mechanisms produced the outcomes.

### *CENTRES' MAIN CHARACTERISTICS*

The centres under study are 20. The award is given for four years with the possibility of renewal. The centres that received the award in 2011 were eight,

in 2012 were four, in 2013 were four, and in 2014 were two. In 2015 the first eight centres were entitled to compete for the distinction and the funding again, and so forth. **The study here has examined the first 20 centres for the first round of awards (2011-2014)**, by checking on the programme theory and effect the programme had generated from the programme during the first period of funding (2011-2014 till 2018).

The twenty centres have been classified in three categories (such as in the Table 4 below): **legal entity**, **type of research** they perform and **size** (number of staff). **In terms of the legal entity**, they are categorised as **CSIC centres**, **mixed (CSIC-university) centres**, and **autonomous**. CSIC (*Consejo Superior de Investigaciones Cientificas*) is the Spanish National Research Council. It is the biggest research performing organisation the country with a total of 120 centres<sup>47</sup> around Spain. As regards this research those centres that depend of CSIC are called “CSIC Centres”.

51 of the CSIC centres collaborate with universities under the denomination of a “mixed centre” and they operate under both the CSIC and the university. As regards this study these type of centres are called “**mixed centres**”.

The third category of centres is the “**autonomous centres**”, the ones that have their own legal entity and they can operate independently as a research centre. They are public non-profit organisations.

The second column of Table 4 includes the categorisation per **research type** divided in: 1) **Basic** research centres, 2) **Basic-to-Applied** ones; and 3) **Applied** research centres. This consideration follows the definitions of Frascati Manual for scientific research and it is aligned with how the centres describe their

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<sup>47</sup> <https://www.csic.es/en/investigation/institutes-centres-units> Page visited on 13 September 2020.

research on their web, activity reports, SO applications, and self-explanation by the scientific directors' interviews.

The third column of Table 3 includes the categorisation per **size**, in terms of number of personnel, of the centre at the time of the research. As for their size the centres are classified as: a) **Small**, for the centres with less than 200 staff; b) **Medium**, for centres with between 200 and 400 staff, and c) **Large**, for centres with more than 400 staff.

During the entire project I have been familiar with the centres' webs and the latest activity reports.

A summary **table of the information** given follows:

*Table 4 Awarded Centres (random order)*

Centre	Legal Identity	Research Type	Size (Staff)
1	Autonomous	Basic-to-applied	Medium
2	Autonomous	Basic	Large
3	Autonomous	Applied	Large
4	Autonomous	Applied	Small
5	Autonomous	Basic-to-applied	Large
6	Autonomous	Basic-to-applied	Medium
7	Mixed CSIC-University	Basic	Small
8	Autonomous	Basic-to-applied	Large
9	Autonomous	Basic	Large
10	CSIC Centre	Basic-to-applied	Small
11	Autonomous	Basic	Small
12	Mixed CSIC-University Centre	Basic	Small

13	Mixed CSIC-University Centre	Applied	Medium
14	Mixed CSIC-University Centre	Basic	Medium
15	CSIC Centre	Basic-to-applied	Large
16	Autonomous	Applied	Medium
17	Autonomous	Applied	Medium
18	Autonomous	Applied	Small
19	Mixed CSIC-University Centre	Basic	Medium
20	Autonomous	Applied	Medium

As a summary:

- In terms of their **legal entity**: 2 centres belong to CSIC, 5 are mixed CSIC-University, and 13 are autonomous centres.
- In terms of the **research type**: 7 are basic, 6 are basic-to-applied and 7 are applied research centres.
- In terms of their **size as per number of staff**: 6 are small, 8 are medium, and 6 are large.

With these categories in mind, the research builds the context-mechanism-outcome to explore the intended outcomes drawn through the Conceptual Model of Impact.

#### *PERCEPTION OF SYSTEM-LEVEL RECOGNITION AT NODAL LEVEL*

*Findings related to the Intended Outcome at system level:*

*“Fund, value, recognise and highlight the best research structures of the system”.*

The recognition and value-giving from the government to the best research structures was the most visible intended outcome seen, not only as an intention of the policy makers at the time of the design of the instrument, but as well in all the public policy documents on the programme. This intention was not found under any of the literature revised, that focused on either understanding the application of the Centres of Excellence instrument under the Performance Based Institutional Funding or the effects the instruments had in the system. The new perspective on “raising the recognition” of the institutions by the government through the CoE instrument is a novelty in the literature.

And the research looked **to understand the “feeling of recognition”**, the perspective from the awarded centres. Did they see themselves as recognised by the government? There is a difference between “actually being recognised” and the “feeling of being recognised”. Whilst in the first notion it is the other that marks the action, in the second one it is the perspective of the one about what the others think/believe/say about them, regardless of this being true or whether it is meaningful.

The research confirms that the **SO generated a higher feeling of recognition in all of the centres, except of one**, for which the programme had produced higher expectations at the time of its creation, expectations that it did not meet during the years of implementation.

*We feel little recognised. When the instrument was created, it was thought it would be greater, but today it has become very small. The programme must increase funding. The labelling dimension came from the evaluators who talked about the programme in their institutes and in their circles. That story was very important to the labelling, but this has changed since then. At first it was thought that the program would attract*

*a lot of collaboration with large companies. Really, now the program is tiny. People recognise you, but not as much. The program has been devalued over time. (Director of an autonomous, basic-to-applied, mid-sized centre)*

### Recognition in terms of the legal personality

The rest of the centres show different patterns contexts and mechanisms that has made them estimate higher levels of recognition from the State Government. The CSIC centres show no particular preference for the SO characteristics that raise the level of recognition: two centres identify the instrument as the whole and one the award/labelling dimension as mechanisms that triggered the feeling of recognition. Among the mixed CSIC-university centres the most recurrent mechanism was the SO as a whole followed by the award labelling dimension of the SO programme, **whilst among the autonomous centres there is a clear identification of the award labelling dimension as a mechanism** that worked for raising the recognition, followed by the funding dimension of the programme and the SO as a whole.

The higher recognition as an outcome of the **mechanism of award/labelling dimension is explained as:**

#### **A label that converts the centre into a seal of doing “serious research”**

*For having to represent a group that can be taken seriously, more seriously than others; I do not mean that the rest are not serious. (Director of a CSIC basic-to-applied, big centre)*

#### **A league of excellence:**

*It places you in a higher position above others. That is, it gives you prestige, giving you prestige creates the Matthew Effect<sup>48</sup>. In this sense, the institute has benefited and surely benefits. There are people here who say that it is very cold outside of SeveroOchoa. It is true. (Director of a mixed, basic, medium centre)*

*Above all the labelling, the prize. Sharing the map with your peers, who are super recognized research centres, immediately makes you enter the mental scheme of that. Labelling has been as important to us as funding. (Director of an autonomous applied large centre)*

**For raising the visibility especially externally, and to the industry and society:**

*The SeveroOchoa has given us several things: On the one hand, visibility, both social and industrial, and in some ways as a “quality mark”, we no longer have to tell companies and our peers that we are excellent. There is someone who has recognised us internationally. The SeveroOchoa award, the selection committee is a fairly rigorous committee in the selection criteria are very rigorous, both administrative, and then after the actual evaluation by the selection committee, which is an international committee. So, since someone has already told us that we are excellent, we do not have to show it day-by-day. We have to be the landmark, the “cinco jotás” of the research, and we already have that. (Director of a mixed, applied, medium centre)*

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<sup>48</sup> Developed by Merton (1968) as a psychosocial process that enhances the allocation of rewards to the already eminent scientists for their contributions.

*And from an external point of view, it is clearly a medal. I would say that these have been the biggest impacts of the distinction: increasing the self-pride of the centre and the external recognition of the centre's quality. And as a whole, the SeveroOchoa centres have been able to move with skill and have been able to present themselves to society as elite centres, replacing other types of organizations that were previously considered the highest quality centres in the country. The battle for social recognition is won. (Director of an autonomous, basic, large centre)*

### **Raising the visibility in the field of research.**

*No less important is the quality label that SeveroOchoa represents; and our centre was the only one in our field at state level, the label gave us the visibility not only to the centre as such, but to our research field as a whole, which was necessary. (Director of an autonomous applied small centre)*

*The seal of excellence recognised us as a centre of excellence. Our centre entered SeveroOchoa in the first year. We were the only one from our research field, and therefore it gave us a dimension that we did not have within the other sciences. (Director of an autonomous applied small centre)*

### **Raising the visibility with the objective to improve hiring**

*Recognition is probably the most important asset for the SeveroOchoa program in the sense that this recognition also materialises in special opportunities for the recruitment of students. Also, the etiquette opens many doors when talking to people. This is the experience we have. (Director of an autonomous, basic, small centre)*

## Raising the implication of sponsors

*The label has also generated financial support from entities such as LaCaixa through its doctoral programs, which has resulted in financing more than 12 doctoral theses in our centre over 4 years. (Director of an autonomous, basic-to-applied, large centre)*

The autonomous centres identified the mechanism of **the versatility of the SO programme**, with a special emphasis into producing a higher feeling of recognition.

*The financial support of the SeveroOchoa program allows a versatility and flexibility that other sources of funding do not permit, and that is a great value. It is a value that goes beyond money itself. The degree of flexibility that it has, allows us to make decisions and to properly modulate what is necessary in the centre; something that no other funding allows. This is important. (Director of autonomous, basic-to-applied, large centre)*

In addition to the above, both the mixed centres and the autonomous ones have identified mechanisms in the autonomous communities (CCAA, in Spanish for *Comunidades Autónomas*) that accompanied the feeling of recognition.

*The General Directorate of Universities of the regional government called us ... to get our advice on a new programme that will support talented researchers. It has been the first time that this has happened. This issue has caused "friction" with traditional actors, such as universities, which have been surprised to see the SeveroOchoa centres for this consultation. (Director of a mixed, basic, medium centre)*

*Of all these [CERCA] centres, only six were selected by the Catalan Government to create BIST (Barcelona Institute of Science and Technology). We are considered to be the elite of research centres here, and we all are SeveroOchoa centres. (Director of autonomous, basic, small centre)*

#### Recognition in terms of the centre size

The feeling of recognition varies among the centres with different sizes. The **smaller centres, with less than 200 people** associate higher recognition with both funding and the SO as a whole, followed by the award labelling dimension. The **mid-sized centres, with between 200 and 400 people** feel that the recognition was triggered by the award labelling dimension firstly, followed by the SO as a whole. And finally the **larger sized centres, those with more than 400 people**, are clearly marking the award labelling dimension of the programme as the one that triggered the recognition, with a difference from the rest.

#### Recognition in terms of the research type

As regards the research type, the **basic research centres** do not show any highlighted preference for the mechanism that has made them feel more recognised at state level. The **basic-to-applied centres** clearly distinguish the **award labelling dimension of the SO programme** to have had an effect on their recognition, and to a similar but with less differences, the **applied research centres** follow the same line.

As the effects on raising the feeling of recognition to the SO centres come to light, it may be useful to reflect on **the wider consequences of this recognition to those centres that are not accredited as SO** (“Severo Ochoa” Centres of Excellence programme). This particular study does not cover the work on the later for several reasons that fall out of scope of this study that is limited in time

and resources. There is no possibility to understand at this stage if by making the SO recognised, does that make the rest of the non-SO centres deemed “worse” in some sense. More research would be needed to understand that.

### *CHANGES IN THE SCIENTIFIC QUALITY, INSTITUTIONAL STRATEGY, GOVERNANCE AND ADMINISTRATION*

*Findings related to the Intended Outcome at nodal level:  
“Create flexible structures with possibility to create strategy  
and scientific leadership”*

This intended outcome comprises several dimensions, such as: the scientific quality changes, strategic strategy, governance, and administration and management ones.

#### Scientific quality changes

The SO programme targeted top centres in the country. The research aimed to explore the progress in terms of scientific quality<sup>49</sup> during and after the SO. The preparatory information on the bibliometric performance of the centres (see [Annex 4](#)) showed their progress, and in parallel it was interesting to observe how the centres saw **their scientific quality evolve**, what dimensions of them would they highlight and how the SO was connected, if at all, to the scientific quality of the centre. The **outcomes here were identified as three**: 1) the scientific quality

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<sup>49</sup> With “scientific quality” the Programme understood “Scientific leadership and impact at global level. Carrying cutting edge research and being among the world’s best in the respective areas of scientific research”. See [Chapter II. Policy Description](#).

did not change, 2) the scientific quality was consolidated, and 3) the scientific quality improved.

The counterfactual factors here were the scientific performance of the centres themselves. When the centres show to have consolidated their performance, it means that they have kept the increasing pace such as in the years before the programme. The reflections here are given related to how much of this performance is affected by SO.

Scientific quality changes in terms of legal identity, type of research and research field

**In terms of legal personality of the centres<sup>50</sup>**, the context that shows with determination that the scientific quality has improved is in the autonomous centres. The mixed centres report that their scientific quality has not changed, whilst the CSIC centres show no mention on any aspect on that regard. The InCities figures align to this observation. The mechanism that has triggered the outcomes has been the SO as a whole, showing no difference between its dimensions or characteristics.

**In terms of centres differing from type of research<sup>51</sup>**, the basic research and basic-to-applied research ones show to have consolidated and improved their scientific quality, whilst all the applied centres have improved their quality.

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<sup>50</sup> In terms of the legal entity, they are categorised as CSIC centres, mixed (CSIC-university) centres, and autonomous. See section [Centres' main characteristics](#).

<sup>51</sup> In terms of type of Research, the centres are categorised as: 1) Basic research centres, 2) Basic-to-Applied ones; and 3) Applied research centres. See section [Centres' main characteristics](#).

Scientific quality changes in terms of size of the centre

The size of the centre as a context characteristic seems to have influenced a lot the outcome of scientific quality when the mechanism has been the SO programme.

**All the small centres (less than 200 people) report to have improved their scientific quality due to the SO programme.**

In the **small autonomous applied centres** there is a sign of “transformative” change or clear improvement of the scientific quality based in the top talent the centres are recruiting:

*It [scientific quality] has changed a lot, I insist, **it has been, like going from night to day**, because it has allowed us to do so much. Most of the funding has been used to promote contracts for doctoral students and postdoctoral researchers, something that has given a great dynamism to the centre. Human capital has increased. At the same time it [SO] has created a very positive work environment for research in the centre. (Director of autonomous, applied, small centre)*

*SeveroOchoa has contributed to attracting new people. We are increasingly demanding when we hire. For example, more and more researchers in the centre have ERC grants. Our researchers are increasingly publishing in the best journals in the field. In this sense the quality has improved, although we start from a very high quality, and when you are at the top, there is not much room to grow quickly. (Director of autonomous, applied, small centre)*

*For the **small autonomous basic science centres** the quality has risen because of consolidation of research programmes and change in the centre’s members focusing on quality.*

*It has allowed us to consolidate an important program that without SeveroOchoa we would not have been able to carry out. The award itself and the search to renew the SeveroOchoa focusing on quality not quantity, helps to promote quality. (Director of autonomous, basic, small centre)*

*The scientific quality has grown, and I think it has changed people's mind. People now are aware that for receiving SeveroOchoa funds, they need to come up with an excellent proposal in a framework of a plan. There is a plan! (Director of autonomous, basic, small centre)*

And finally for the **small mixed centres** the improvement in scientific quality is associated to the structural changes that were caused by the Programme.

*There has been a clear leap in the centre's quality because its [of the centre] existence now is thanks to SeveroOchoa. We went from an institution that began at a time of economic crisis, when there were hardly any resources for the management and administration of research, to a situation to be able to hire specialised managers, to create a European office, a transfer office, a communication network. Without SeveroOchoa we would not have been able to do it. It is a very big impact. (Director of mixed, basic, small centre)*

The **views that came out of the research may be affected** by the fact I carried out the interviews with the scientific directors of the centres, and I was both a science policy officer of the ministry and a doctoral researcher. The interviews were framed under the research study though; but some of the information may have been affected by the fact that the directors were talking to an agent of the policy department. A researcher notes this interference, and whenever there is

a more obvious link to the programme, this is certainly noted, such as it has been when working in this process.

Back to the research findings, as regards the **mid-sized centres, the ones with between 200 and 400 staff**, show a **variety of positions** regarding scientific quality. Most of them demonstrate that it has improved and the same number demonstrate that it has not changed. Two of them show that the quality was consolidated in the last years because of the SeveroOchoa.

The mid-sized centres that show **the scientific quality has improved** explain it in reference to publishing volume, journal prestige and international recruitment:

*If I have to look at what we have published in the past year, we are on top of everything we have done. We are publishing much more frequently in Science and Nature - which is very unusual in ... [field of science] - and with respect to the most important journals. We are in a very privileged situation. (Director of an autonomous, applied, medium centre)*

*There have been several leaps. It has been possible to bring in people from abroad. I believe that SeveroOchoa has given us the capacity to put an additional "gear" to the scientific quality. ... The first SeveroOchoa was used to promote cross-cutting collaboration between the research groups, to bring groups out of their comfort zone. These collaborations have taken us in directions that we did not have before, new work areas that unite different elements. For me, this scientific wealth is a leap in quality. SeveroOchoa has helped in this. (Director of an autonomous, applied, medium centre)*

*It allowed us to make a leap towards becoming an institution that, in addition to having very powerful research, had a structure that was very much in line with what is to be expected from an excellent research*

*institution. In HR management, project management, communication and image, outreach - in which we have been tremendously active. (Director autonomous applied medium centre)*

*The quality has improved. SeveroOchoa has helped with activities. A good example is the recruitment of young researchers that we have been able to attract thanks to this funding. (Director autonomous basic-to-applied medium centre)*

The **mid-sized centres which have identified that their scientific quality was consolidated or it didn't change**, identify the mechanisms of funding and the programme as a whole:

*SeveroOchoa has made us more resilient to overcome the crisis. Especially now that nationwide all calls are delayed. (Director of a mixed, basic, medium centre)*

*We are continuing as well as we were. SeveroOchoa has served to surf the economic crisis and I would say that in our centre the brutal economic crisis that there has happened, has been hardly noticed. We have continued to operate at a cruising speed without major issues. (Director of a mixed, basic, medium centre)*

For the **bigger centres (more than 400 people)** the scientific quality has either **improved or consolidated**. The mechanisms that have affected this are: the SO as a whole, the funding, the versatility in the funding and the award/labelling dimension.

*The scientific production of the centre has doubled since then [2011, when the SO started]. The impact indexes of the institute's scientific production*

*have also increased by 65-70%. (Director of an autonomous, basic-to-applied, large centre)*

*The scientific quality of the centre has increased. We have increased the quality of the publications - that is easy to find.... We have a higher impact factor. ... Despite the crisis that science has gone through in our country, we can say that the scientific quality of the centre has increased and this is also demonstrated in the Schimago rankings of the Nature Index. (Director of an autonomous, basic-to-applied, large centre)*

*The SeveroOchoa has contributed to maintaining quality. (Director of an autonomous, basic, large centre)*

*I think we are at a cruising speed. I don't think we have changed that much in the last 6-7 years... Let's say we are in a good situation. (Director of an autonomous, basic, large centre)*

*The virtue of SeveroOchoa is not so much in the amount of money, but how flexible its use is. If in these 25M€ [of competitive funding] there is 1M€, which is the SeveroOchoa that is flexible and allows you to do everything that others do not allow you to do - this has a lot of value and it has helped us a lot. If not, we would not have been able to grow this much. (Director of an autonomous, applied, large centre)*

None of the centres claim to have decreased their scientific quality, and this is checked in the preparation for the interviews through the bibliometric performance of the centres through the InCities check per institution in a period of years. The question may rise if were they going to improve anyways, without the SO intervention, that I will discuss in the [Chapter V. Conclusions](#). Research shows that particularly in some centres this would have been difficult.

The literature supports the idea that the performance based institutional funding in general, and the Centres of Excellence in particular, can have a

positive effect (Buckle, 2018; Caetano, 2015; Checchi, 2019; Matthies, 2019; Scheider, 2015) on creating performance incentive at both institutional and individual level (Hicks, 2012; and Jonkers and Zacharewitz, 2016). In line with the findings a specific publication that studied the performance of centres of excellence in Denmark over a period of 10 years demonstrates that the performance increases for smaller centres and appears to be falling for the largest ones (Bloch, 2016). The timeframe for this particular study is longer than the one of the SO programme. It would be of interest to understand the evolution of the scientific performance of the centres in a longer run, to be planned for future evaluations of the programme. No publications were found on the analysis of the effects the Centres of Excellence instrument may have due to the organisational configurations, although insight is given in terms of a balance between professional and administrative controls in centres of excellence (Cruz-Castro and Sanz-Mendéndez, 2018).

The findings on the changes in scientific quality as related to the SO are based on the claims of the scientific directors and the preparatory bibliometric performance studies. Therefore, these findings are **framed within the necessary caution** that the research requires.

### Strategy changes

**Enabling strategic capacities at centre level was one of the initial policy ideas** and it was in the centre of the conceptual model of impact of this programme. The SO programme recognised top centres and funded their four-year research strategy as a unique opportunity for the Spanish State funding. Checking on what context have influenced most the strategy changes and inside these contexts what mechanisms have triggered the outcomes has been of interest to

understand to what extent the conceptual model of impact intended outcome has worked and how.

The interviewees identified a **range of outcomes in terms of strategy changes** at the centres, starting from the creation of a strategy at centre level, focusing the strategy to new scientific areas, it simply reinforced research, or it was implemented. This variety of changes has been in the presence of the SeveroOchoa programme at the centre.

These outcomes were analysed with the different contextual aspects intrinsic to the centres and they show no highlighted correlated pattern with characteristics like the size of the centre, the type of research, or the field of research. The only contextual characteristics that shows a fairly clear pattern of outcome is the legal personality of the centre, illustrated here.

#### Strategy changes in the CSIC centres

Evidence from the awarded CSIC centres shows that the SO programme supported **the creation of a scientific strategy at centre level**. The process of the strategy was seen not only as an administrative endeavour, but as an integrative process in the institution. **The mechanism that worked in the CSIC centres context was the SO programme as a whole and the requirement to draft a 4 year strategy for the grant proposal.**

The individualistic nature that the researchers had in these centres is already visible when researching for the conceptual model of impact with the policy makers. They created an institutional strengthening mechanism to join forces at a centre level and create synergies, and therefore stronger centres that can perform more impactful research.

One of the interviewees says:

*It is because of SeveroOchoa that we generated a strategy as a centre.*

*The heads of the departments here were like a “community of neighbours”*

*that each one looked at their department and had no collaboration, let alone synergy, with the other departments. Before [SeveroOchoa], there was no executive scientific authority at the centre - none of the CSIC centres have one. (Director of a CSIC, basic-to-applied, large centre)*

Another director gives importance to how the SO programme requirements allowed the whole centre and its components to discuss strategic issues and decide on them, such as never before: *“I think that it [SeveroOchoa] forced us to think that we wanted and there were many discussions... We did things we had never done before.” (Director of a CSIC, basic-to-applied, small centre)*

#### Strategy changes in the mixed centres

The mixed centres are research entities that have no legal personality, and that are funded and composed by CSIC and university funds and researchers. These centres **show strategy changes in a variety of forms**, but mainly they have used the SO programme to implement their scientific strategy, to focus it into new areas, to improve it, and to reinforce the research side of the centres' strategies. In the context of the mixed centres, four mechanisms have had a role in the strategy changes, being them the mechanism of the SO as a whole programme, the SO funding, and inside of this, the characteristic of flexibility and versatility of the SO funding to generate novel outcomes, and finally the obligation of drafting the proposal, which stands on its own as a mechanism, a requirement that has had its impact in the centres' strategy.

The programme as a whole has made the centres' strategy more research-oriented

*The scientific strategy has become, more relaxed, because we have less industrial pressure. (Director of a mixed, applied, medium centre)*

In repetitive cases it has eased the implementation of the strategies these centres had.

*What we did with SeveroOchoa was to further refine our strategic plans because, if you succeeded, then you could implement everything you wanted to. In other words, the SeveroOchoa of this institute is pure strategy. (Director of a mixed, basic, small centre)*

In terms of implementation there are centres that were supported by the programme to make real what they had already planned.

*What we have done has been sticking to that strategic plan we had and trying to execute it because firstly, it was a well-designed strategic plan, and secondly, it was a strategic plan that was also evaluated by an international committee, and it was considered one of the best in the CSIC. (Director of a mixed, basic, medium centre)*

CSIC promoted centres' strategies (including mixed centres' ones) since the early 2000, but in some cases and due to lack of funding they remained unimplemented. Having an instrument that focused on supra-group-level strategy is seen useful even to create a centre-like environment.

*For the first time ever, it seems that the scientific strategy has generated interest in the institute. Within the centre we have increased participation in the major lines of research and have been present in emerging lines at the international level. (Director of a mixed, basic, medium centre)*

The SO programme and its funding have been effective to support the centres in developing a strategy. Indeed, such as the conceptual model of impact of the policy makers pointed out, there was no instrument in the Spanish science policy that funded scientific strategy at institutional level, and this is seen during the research.

*It is the first time that they [the government] ask us for a strategy and assign us resources for it. CSIC requests an Action Plan every year, but*

*without resources, which remains a formal exercise. (Director of a mixed, basic, medium centre)*

In terms of implementation, **the importance of the resources, comes again as a mechanism.**

*We have been able to implement the strategy we had because we were given the resources to do so. (Director of a mixed, basic, small centre)*

Having **resources to design and implement the strategy** has supported centres to create planning that would raise their international impact.

*It [SeveroOchoa] has helped us to make it [the scientific strategy] more comfortably, with more quality, and with more international impact. (Director of a mixed, basic, small centre)*

In the framework of the **funding mechanism, the centres highlight that of the flexibility/versatility that the SO funding has.** This versatility has supported international participation and being in the forefront of scientific and impactful endeavours.

*The huge advantage of the SeveroOchoa is that it is extremely flexible to create a scientific strategy. We can spend that money on infrastructure, on personnel, or on taking risks with new research projects. So, it has allowed us to pitch ideas. I say this because the fruits, some are already being seen but others are still ripening. (Director of a mixed, applied, medium centre)*

*SeveroOchoa has offered us possibilities to participate to new international projects properly, it has given us opportunities to respond - through the flexibility it has offered. We have funded groups with new lines and we have strengthened collaboration between groups. In this way we have promoted interdisciplinarity that did not happen before - only*

*now it is possible, thanks to resources. (Director of a mixed, basic, medium centre)*

These nuanced findings are a characteristic of the critical realist approach. The impacts noted here would be less visible in the more standard modes of science policy evaluation based on performance that would require a longer timeline to grasp impact.

#### Strategy changes in the autonomous centres

The autonomous centres are research centres that have their own legal personality, meaning that they are independent entities independent in administration and management from other entities<sup>52</sup>. Their core funding is provided either from the state or the regional governments. In case of these kind of centres, research shows that the SO programme was mainly used **to improve the existing strategy, to add new areas or to reinforce the research in the strategy.**

The programme as a whole, seen as a mechanism, has **enhanced the centres' scientific strategies**, to be more focused, and to reinforce strategic actions. Some brief mentions from six different directors:

*The SO effected the strategy in a very clear way. (Director of an autonomous, basic, small centre)*

*It is also true that SeveroOchoa has allowed the research part to grow and have shape. (Director of an autonomous centre)*

*With the SO we managed to re-align and focus the research in our centre. (Director of an autonomous, applied, medium centre)*

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<sup>52</sup> Such as already seen above, the SO centres categorised by legal personality are divided into CSIC centres, mixed CSIC-university centres, and autonomous ones. For more information see section [Centres' main characteristics](#).

*The program helped us focus and structure the centre's research efforts.  
(Director of an autonomous centre)*

*The SeveroOchoa as a program helps us reinforce the strategic actions  
that we develop as a centre. (Director of an autonomous centre)*

*It has allowed us to focus our research a bit more. (Director of an  
autonomous centre)*

As a reflection, the architectural and physics related metaphors are interesting here to show the **resilience and the power and impact of the outcome**, and the qualitative nature of observation.

Back to the findings, the programme, and especially its **possibility for renewal** – seen as a mechanism – has made the centres to have **a longer-term strategy, a vision**.

*I think that the first SeveroOchoa has given us a real tool to plan and then, you even have the second SeveroOchoa, which gives you another four years. In the end you think "I can have 10 years of planning, now I can plan!". At the strategy level this continuation is key, it has helped us very much. (Director of an autonomous applied medium centre)*

*If we had not achieved the renovation, to a large extent one could have had the feeling that during those first four years you can pour your own water to the ocean, whilst now we are using that water to grow plants, trees. (Director of an autonomous small basic-to-applied research centre)*

The metaphors have shifted to more ecological ones. The relation to the continuity of the programme is drawn clearly. There is a move from subsistence research to the long-term vision planning.

And finally, the programme has enabled the **professionalization of strategy making in the centre**, and in this particular case by having dedicated personnel on analysis and design of strategy.

*In our particular case, from a financing point of view, it [SeveroOchoa] has also helped the strategy because it has helped us create a Strategic Development group. We now have a team of two-three dedicated to strategy. (Director autonomous applied medium centre)*

Such as in the mixed centres, **the SO programme as whole has supported the autonomous ones to implement and, in this particular case, to quicken the development/ implementation of their long term planning.**

*It [SeveroOchoa] has allowed us to develop programs that otherwise would have had taken a long time to develop. (Director autonomous applied small centre)*

As a funding mechanism, **the programme has supported the autonomous centres to refocus research and to transition to timely research areas:**

*We have made a very important transition from ... (a technique used in the scientific domain) to the problem of general sustainability, especially in terms of renewable energy, reuse of carbon dioxide. We have been able to do this because we have been able to strengthen these lines with funding from SeveroOchoa. (Director of an autonomous, applied, medium centre)*

This observation indicates a shift in the quality of the research orientation, which is potentially something that standard bibliometric measures of impact would miss or might mistake for a drop in impact, if the topics are too novel to have wide citation or be leading the conversation, rather than following it, therefore it may not be suitable for the high impact journals.

The SO funding as a mechanism has made centres' strategies refocus on supporting HR, especially talent attraction, more specifically through "landing packs" for new coming researchers and designing "seed grants" for young researchers. Enabling competitiveness in talent attraction is seen as a positive benefit of the SO funding.

*With the SeveroOchoa resources, we have organised what we call seed-grants, which are research grants designed especially for young people who do not have access to other more powerful grants and which have served as a transition to those ones. ...The impact on the strategy has been, I insist, on the part of attracting talent. In other words, the decade that we have lived has a common denominator: the impossibility of fighting with other European institutions to attract talent. Here the dimension that has served is the financing. (Director of an autonomous, applied, large centre)*

**The mechanism of flexibility/versatility of SO funding is extremely highlighted in these centres.** The strategy development as part of the SO call for proposals is appreciated and seen as useful from the majority of directors.

*Developing a four-year strategy has been useful for us, since it is different from the five-year strategy developed for the Generalitat. The latter is more focused on the organisational aspects, while the SeveroOchoa has been a scientific strategy, and this is very useful. Sitting down to write it has been very helpful. With the Generalitat we have a program contract linked to a strategic plan, a plan focused on an organizational rather than a scientific level. (Director of an autonomous, basic-to-applied, medium centre)*

This observation creates a clear change between what the centre has with the Generalitat<sup>53</sup>, a contract that focuses on the organisational issues and progress of the centre in a given period, vs. the one that SO enables, structural funding for a scientific strategic plan in a period of four years. The director calls a “scientific strategy” what is asked in the SO call for proposals and for which the awarded centres receive the funding.

As for the PFIB and CoE literature, they have not covered studies on the changes of internal scientific strategies of the centres, making the findings under this section a novel contribution in the area.

### Governance changes

The conceptual model of impact of the SO programme studied at the first stage of the research identified that **it was in the ideas of the policy makers to create centres that had scientific leadership**, that worked as one and that were able to grow and create impact. Having excellent research centres with scientific leadership and flexibility was one of the intended outcomes of the policy makers. The research tried to understand if the programme itself or any mechanism related to it would have generated these kind of changes at centre level. Therefore, the interviews and documentary review tried to explore the governance changes and the freedom of the scientific directors to carry out their strategic plan and to implement it accordingly.

The only **contextual aspect that seems to have triggered governance changes is that of the legal personality of the centres**. As mentioned above, the centres are divided in three categorises under this characteristic: CSIC centres, mixed CSIC-university centres, and autonomous ones.

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<sup>53</sup> The government of Catalonia.

## Governance changes and freedom of directors in the CSIC centres

CSIC has a total of 120 centres around Spain, of which 51 are joint centres (mixed centres) with the collaboration of other entities, mainly universities<sup>54</sup>. The governance of the CSIC centres is based in the internal regulation of the institution, including an internal voting system in the centres and the CSIC President confirmation.

**The CSIC centres that were awarded the SO have experienced some changes in the governance as an effect of SO.** One of the centre's governance experienced "traumatic" changes because of the leadership change:

*It was something very political. SeveroOchoa was in the middle. It is difficult to separate cause and effect. (Director)*

It is difficult to understand as for this case to what degree the leadership change has been affected by the SO or it has been tangential to it. This fell beyond the realms and possibilities of this study.

Except for the case above, the rest of the changes have been: the creation of committees for pre-doctoral training actions, user committees, and establishment of internal procedures to enhance the participation of different stakeholders at the centre. These changes are bound to the SeveroOchoa practices, reporting to the government or to the evaluation committees (mid-term evaluation) and they have not passed to a more sustainable or official level as they could have been accepted by the CSIC Headquarters, but this has not been the case, maintaining the governance changes at a practical level only.

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<sup>54</sup> <https://www.csic.es/en/investigation/institutes-centres-units> Page visited on 13 September 2020.

Governance changes and freedom of directors in the mixed CSIC-university centres

The mixed CSIC-university centres that were awarded the SO lack the legal personality. The personnel in the centre are both from the CSIC and the universities. During the first round of the SO grant, all the scientific directors of the CSIC-university centres were CSIC personnel.

The **SO programme affected the governance** of these kind of centres in two different ways: a) It created **a change in leadership** due to the different ways of understanding the implementation of the SO grant; and b) Another governance change in these type of centres has been **the creation of a parallel structure** with a “SO own governance”: *“SeveroOchoa has created its own governance in the centre with a SeveroOchoa Steering Committee, plus the deputy directors.”* (Director mixed centre)

The programme had no effect on the governance of the rest of the mixed centres.

As for the **freedom of director to develop the grant**: this was asked as a question “Did you feel free to implement the grant?” The **directors answered negatively** describing the difficult situation of restrictions and bureaucracy, the long timing of procedures for both purchasing and recruiting etc. as a result of the intermediation with CSIC headquarters (HQ) or simply due to the restrictions that the public budget had placed:

*The Treasury is the black beast. There are several bureaucratic problems that the Treasury does not allow us to move forward. Internal rules. You have the money and you cannot spend it. (Director of a mixed, basic, small centre)*

Another director indicates about the intermediary process through the CSIC Headquarters:

*So many, many filters have been put in place and all those filters have to be passed, all those reports you have to get, and that means time, time, time and that tremendously slows down management, and that is worrying.... And the four millions have not come here. (Director of a mixed, basic, medium centre)*

No director from the mixed centres approved to feel free to develop the grant. All the mixed centres are between the CSIC and different university departments. All the grants during the first SeveroOchoa were applied through CSIC. In one case the second grant was applied with the university, changing from the CSIC administration.

Governance changes and freedom of directors in the autonomous centres

The **governance changes** in the autonomous centres are related to the **growth of the centre** and therefore new processes were put into place to implement, execute, monitor and evaluate the SO grant; and new structures were introduced such as a strategy office, an office of business and innovation, a technology transfer unit, etc. Some restructuring of the organisational way of working happened.

Wherever the programme as a whole or its funding (seen as mechanisms) in the context of the autonomous centres **have produced growth and therefore governance changes**. For example, a director mentions:

*SeveroOchoa has played a role in the growth of the centre, and this has had an impact on the management. Let's say that I am the scientific director or general director of the institute, and now I have three deputy directors: One for the internationalization area, another for the translation area - the impact part, and the third is for the talent part. There is also a person who is responsible for strategic actions and monitoring.*

*He manages the indicators. (Director of an autonomous, applied, medium centre)*

More specifically related to the funding mechanism and its execution, a director considers having successfully performed the SO *“It has been a very serious test, because the spending capacity now is considerably higher compared to the starting point. And I am particularly proud of what we have done. Now we are bigger and stronger.”* (Director of an autonomous, applied, small centre)

In terms of **reorganisation**, a few changes have been effected by the SO in some autonomous centres, like for example the creation of a Business and Innovation Office, the creation of a Strategy Unit, or the creation of a Technology Transfer Unit. For example, a reorganisation of governance in a centre is illustrated below:

*We have opted to remove the Office of Business and Innovation - we have removed it from Administration, it no longer depends on the General Manager, and we have placed it directly under Direction to align it with the scientific strategy of the centre and not so much with economic control. (Director of an autonomous, applied, medium centre)*

Connecting business and innovation with the strategy unit at the centre is a strategic move for this centre of excellence that was made possible because of SeveroOchoa as it enables and funds restructuring of centres for a more effective strategic research plan.

**All the autonomous centres’ directors gave their opinion on having felt free to carry out the grant.** The idea that the funding was not finalist in nature was much appreciated by the directors, making it the only performance based institutional funding available in the whole Spain. *“I wish all the aids were like Severo.”* (Director of an autonomous, applied, medium centre) Out of the funding dimension of SO, **the flexibility and versatility of funding is seen as unique and**

**very much needed**, and a key for success on their actions. *“I value the money, the recognition, but what I value the most is the freedom to have it in the way we understand it is best to use it.” (Director autonomous, basic, small centre)*

In the context of the autonomous centres the SO has been **implemented accordingly to the expectations** in the framework of public funding:

*Understanding that there are legal and funding limitations, but apart from this, we have not felt any limitation by the ministry on the development of the program. (Director of an autonomous, applied, medium centre)*

Literature supports the fact that CoE instruments produce changes on restructure of research organisations (Martin Sadersai, 2017). As far as the author is aware, there has not been any specific study that sheds light on the organisational structure of these entities previous to this one.

#### Administration and Management changes

The concept of the SO grant being institutional funding and financing the research strategy of the entity came together with the conceptual characteristic of **administration of this funding with as much flexibility as possible** from the entities to which it was going to be granted. **This flexibility of spending at institutional level** for research reasons only, and **for creating strategy** was part of the intended outcomes of the policy makers. The grant funded the research strategy and the implementation of this strategy needed by carrying out activities, hiring personnel, and purchasing goods and services.

The research focused on the **administration and management changes** in the awarded centres to know the possible effects that the SO had in the structure and processes of administration and management. The results highlight **two main contextual characteristics** that have affected the administration and management of the centres. On one hand, **the external one is the State**

**Administration, centralisation and bureaucracy** happening as a consequence of the public administration measures from the financial crisis; and on the other, **the intrinsic one: the legal personality of the centres**. In this, most specifically: the capacity that the centres have to receive the funding, and secondly, the regulations that the organisation that received the funding have when spending for the awarded centre's activity.

In terms of legal personality, the centres are classified in **CSIC centres, mixed CSIC-University centres, and autonomous centres**. The autonomous ones received the funding in their institutional accounts and were able to fund the activities following their regulations envisioned under a public framework of spending. All the CSIC centres and the mixed-University CSIC centres could not receive their funding on their institutional account, as they do not have one. Therefore, the funding for these centres was received by CSIC for the first round of the SeveroOchoa. There are cases that for the second round the centres have opted to choose universities for the funding. These administrative aspects were explored during the interviews with the directors to better understand the **dynamics of the management and administration changes** in processes, especially in the case of **purchasing and recruiting** for these centres. The CSIC and mixed centres underwent intermediary processes for funding the planned SO activities for their centre's strategy such as granted by the State.

This section will explain and illustrate what administration and management changes occurred to the 20 awarded SO centres.

#### Administration and Management changes in CSIC centres

The SO CSIC centres agree that the programme has had an effect in administration, and mainly in project management sector inside the centres. The project management units have been reinforced with professionalised staff that could effectively support the researchers with the grant applications. “I see

*people around here [the researchers in the centre] are very grateful to finally have professionals that support them with preparation and uploading of grants. This has been a change, even though we are not as good as ... or ... [mentioning names of two autonomous centres in a similar field of research]”.* (Director of a CSIC, basic-to-applied large centre)

The **professionalization of research management** at centre level has been accompanied with hiring project managers and doing an in-situ support to the researchers, as well as a follow up of projects that would be coordinated by the centres. *“Management and internal operations have been greatly improved.”* (Director of a CSIC, basic-to-applied large centre)

In terms of procedures, when discussing administration and management in these centres, we see that **they have encountered difficulties in both purchasing and recruiting**. These difficulties are related to State legislation. The Law 9/2017 on Public Sector Contracts that entered into force on 9 March 2018 restricted short-term purchases to 18’000 euros – the CSIC research centres for a bigger purchase had to wait between 3-9 months, until the law was changed in late 2018, with the effort of the SO and “Maria de Maeztu” Unit of Excellence Association (SOMMA) and the departmental ministry of the time. The technical and economic criteria for purchases, such as established in the Law, indicated the public administration had to always opt for the cheapest options. This was seen as frustrating for the research sector that could not find the cheapest material useful or they had no capacity to use it as they were not trained for it, etc. such as informed by the research directors. On top of it, all the process of purchasing for these centres is carried out through the CSIC HQ as an intermediary and there is a lot of paperwork to explain about the material that is required. The process needs to follow the public administration timing and

procedural aspects. “Administration is dire - *La administración es nefasta*”.  
(Director of a CSIC, basic-to-applied, large centre)

The research shows that most of the difficulties that these centres encountered in terms of administration and management were related to recruitment that, following the CSIC internal procedures, follows a very long process of planning and recruiting in a line of information exchange between the centre and the CSIC HQ, where all the recruitment of the 120 CSIC centres is carried out.

*To hire staff we must wait between 1.5 to 3 years, an average of two years. Thus, we cannot compete with any centre, not even in Spain. ... For a person to join our team we have to wait a minimum of 1,5 year, but after that, you won't even receive the profile you want.* (Director of a CSIC, basic-to-applied, large centre)

The **selection criteria** follows a detailed list that needs to fit the CSIC HQ and the State administration rules.

*The internal bureaucracy, especially the CSIC hiring, is very rigid. In centres like ... or ... or any research centres that are a foundation [autonomous, as a legal personality] this is much easier.* (Director of a CSIC, basic to applied small centre)

CSIC has enabled post-doctoral contracts out of the usual Labour Agreement with the objective to offer more competitive salaries for post-docs. This has made the CSIC centres more able to hire more competitively.

*At the CSIC you ask for authorisation to hire postdocs with a contract outside the [Labour] Agreement, because within the Agreement it would be a contract with a non-competitive salary. It is good that there are contracts outside the labour agreement.* (Director of a CSIC, basic-to-applied large centre)

Another issue that came up in terms of recruitment and especially **international recruitment** was that of hiring someone who didn't have a Spanish degree or had not passed through the process of State recognition of the foreign degrees. This is regarding the Undergraduate Degree and not the Doctoral one. Interesting enough, when hiring a researcher at CSIC, the control is done for the Undergraduate Degree. One of the directors points out:

*Those of us at the CSIC had apparently "stupid" problems such as the recognition of academic qualifications. We couldn't hire someone who didn't have a Spanish degree. We were asked to become more international, but as well to follow these CSIC rules, the ones of the public administration. The issue was later fixed. (Director of a CSIC, basic to applied small Centre)*

Several difficulties mainly related to the **administrative execution of public funding in research** were encountered by the CSIC directors.

*Here we manage, but within a "corset" that does not allow us to really manage. HR management is the worst part. Nobody trusts that we have the ability to decide on what we need. (Director of a CSIC, basic-to-applied large centre)*

#### Administration and Management changes in the mixed centres

As already mentioned, the mixed centres are CSIC-university centres of research. During the first round of the programme, the SO funding received by these centres was destined to the CSIC. This is decided in the moment of application for the aid.

As seen under the section above on [Governance changes and freedom of directors in the mixed centres](#), their administration and management is co-shared by the participating institutions. In their administration and management

team there can be both personnel from CSIC and universities such as decided at the time of the centre's constitution and following the centre's activities.

In the context of the mixed centres the SO as a whole and its funding dimension and flexibility for investment has generated a different range of effects.

First and foremost, **the SO has generated the funding of management structures inside these centres**, such as: a European Office, a European Project Management Office, A Gender Balance in Early Career and RRI Office, etc. These new structures were funded entirely with SO funding.

*With SeveroOchoa, a support structure was created, which has therefore been extremely useful because before that we had nothing. We had the CSIC HQ's and the University. This has meant a radical change for us. (Director of a mixed, basic, small centre)*

Having a **support structure inside the centre** has allowed the mixed centres to identify and prepare better for the European projects, to support the researchers in the applications.

*During the four years of the European office funded with SeveroOchoa we doubled the number of the European projects at the centre. (Director of a mixed basic, small centre)*

Investing SO funding for **leadership and coordination of European projects** is seen in several mixed centres:

*We have started a European project management office, which we didn't have before. We did not want to lead European projects because their coordination requires professionalisation of research management. Now we are coordinating several H2020 projects. (Director mixed, applied, medium centre)*

The choice to lead European projects that could not be done before because of lack of professional staff to support the researchers in their leadership has been

affected and changed by the SO funding that enables the hiring and institutionalisation of the research support.

In addition to the above, the research shows that the SO funding as a mechanism has been used **to hire staff in the administration of several centres** and to therefore increase the capacities of administration and management and technical level at the centre.

*In our Administration Team we are paying everyone with the SeveroOchoa grant, except the director who is paid by the University Foundation. In our IT team, the three computer scientists are paid by SeveroOchoa. (Director of a mixed, basic, small centre)*

*Our administration is strengthened. 80% of the external contracts PTA (Technical Support Personnel) have been financed with SeveroOchoa. (Director of a mixed, basic, medium centre)*

**The mixed centres have very similar difficulties to the CSIC centres with both purchasing and recruiting, because all of them during the first round of the SO decided to assign the SO funding under CSIC.** This was done for different reasons that the directors explained during their interviews. Mainly it is related to their first assignation, i.e.: they themselves are CSIC personnel. As already said above, in the mixed centres there are both CSIC and university staff.

The intermediary issues with the CSIC HQ are seen during this part of the research. The purchasing is done through formal Expense Proposals that the HQ checks, controls and admits, and undergoes the public administration procedure. If any amendments occur, the HQ sends back to the centre the Proposal for further revision. This entire process, such as informed by the CSIC centres' directors, is for every material the centre acquires and it takes a longer time than in other centres with an autonomous legal personality. *"The CSIC centres' system is centralised and every purchase or recruitment has to pass*

*through the HQ. This makes the management less comfortable.”* (Director of a small centre) *“There is a huge effort in terms of administration - sending applications back and forth to the HQ. This is effort and time - actions of the administration that cost money and that are never calculated.”* (Director of a mixed centre)

Such as with the CSIC centres, there is a general agreement that administration barriers in the country are making their research less competitive.

**In the same line with the difficulties encountered by the CSIC centres, the mixed centres have faced the same challenges in recruitment.** The HQ intermediation and the strict general public administration regulations for hiring make recruitment of research personnel slow (up to three years). The fastest procedure would last 3-4 months, even for a 12-months contract. *“This creates tremendous stress on our administration.”* (Director mixed large centre)

#### Administration and Management changes in the autonomous centres

The SO centres that have a legal personality and are autonomous as research centres in the legal format of a foundation (public or private), consortium, or association, have used the mechanism of the SO as a means to enhance changes in their administration and management structures and capacities.

The research shows that the autonomous centres show two tendencies in using the SO to produce changes in their administration and management. The first group of centres indicates that **SO was used to strengthen the capacities by introducing new structures in the centre** such as Innovation and Technology Transfer Units, Communication and Outreach Units, etc. And the other group of centres indicates that **the Admin and Management was reinforced by enhancing the already existing capacities and by raising the activity level and visibility through non-specific research activities around the centre**, such as: Responsible Research and Innovation (RRI), HR and training activities, Outreach, etc.

Illustrations of the first group where the SO was used to **create new structures** are given below by several different directors:

*The Innovation Department, created with SO funding, has been crucial especially in the relationship with the industry. 23 million euros have entered the centre in the last 6 years. ... SeveroOchoa has impacted on the internal functioning of the centre, it has allowed us to develop new structures for innovation, communication, support for research, and technology transfer. (Director of an autonomous, basic-to-applied, large centre)*

As regards to research support facilities, in spite of the fact that these structures existed previously to the SO, the SO funding has enabled their increase in capacity. The SO supported the consolidation of the Project Management Office and the Technology Transfer one. *“We already had them, but we have increased capacity and efficiency.”* (Director of an autonomous centre)

*It [SeveroOchoa] allowed us to make a certain leap towards becoming an institution that, in addition to **having very powerful research, had a structure that was very much in line with what is to be expected from a research institution of excellence.** In matters of HR management, project management, communication and image, outreach - in which we have been tremendously active. (Director of an autonomous, applied, medium centre)*

The autonomous centres, such as the rest of the research stakeholders in Spain, were affected by the general restrictive measures of public funding, and especially if they are public, such as the majority of them is. The difficulties encountered by the centres are mainly related to the renewal of staff.

*The problems came from the Treasury, which set maximum limits on work contract times that could not exceed 3 years per project. It affects our*

*centre as a public sector foundation. (Director, autonomous, basic-to-applied, medium centre)*

The recognition of the CoE instrument in the organisation of research at a centre was identified by Rip (2011), and the recognition that the instrument can **enhance organizational governing capacity** and create institutional and legal frameworks in the research and higher education field has been affirmed by Hellström (2018). Changes in admin and management structures of centres have already been identified as a consequence of the UK Research Excellence Framework by (Martin Sadersai, 2017), nevertheless no specific study previous to this one has checked the effects of a CoE instrument related to the legal personality of the centres. Cruz-Castro and Sanz-Mendéndez (2018) give insight on directorship's control in the managed research organisations such as the centres of excellence as a categorisation of research entities.

#### **IMPACT, PARTNERSHIPS AND SPONSORSHIP**

*Findings related to the Intended Outcome at both nodal and system level: "Create impact at centre level ('The excellent centres generate not only scientific impact, but as also other types') and system one."*

This was one of the intended outcomes or assumptions of the policy makers back in 2010 when designed the pilot of the SO call for proposals, and that continued as a programme in the following years. **The assumptions the policy makers had were related to the impact** the excellent centres in research generate, being this not only scientific impact, but as well socio-economic one. The research widened the scope of the impact and investigated on **a wide range of impacts** such as: cultural, economic, employment, environmental, global, health, legal, policy,

social, and technological impact. Using a realist interview perspective the directors were asked to identify and place in a context the outcomes, as well as to recognise the mechanism that triggered these kind of impacts, if acknowledged. The findings have been supported with documentary research findings mainly found in the centres' Annual Reports and websites.

The interviews tried as well to explore more **on changes that the organisation may have produced in terms of impact** through giving examples, explaining factors and highlighting the top success cases on that regard. The impact that was triggered by SO as a mechanism (with both funding and award dimension) was selected.

This section covers the findings on **impact changes, as well as changes in the creation of partnerships and sponsorships**, whenever this was effected by the SO as a mechanism. The research finds that the SO programme has been a mechanism to generate impact in a broad sense. This impact was triggered mainly by intrinsic contextual aspects.

This kind of approach has its **challenges and limitations** as it builds on positive stories from at times coincidental effects. Without more data collected from a wider set of sources, that in my case were limited as a sole-DPA researcher, the real impacts and the direct links of the programme to them cannot be fully addressed.

The section starts with describing the partnership changes developed by the centres under the influence of the SO, then it draws each and every specific impact, and it finalises with the sponsorship changes in the awarded centres.

### [Partnership changes](#)

In the framework of this intended outcome, the policy makers were interested in **understanding in which context had the SO enabled partnerships and of what**

type, as well as what were the factors for these new partnerships to be established.

All the centres have shown to be active on new partnership creation either as leaders or as key participators.

**In the case of the CSIC centres partnerships with companies have been created even though they have had some difficulties especially in timing.** *“CSIC is a complicated environment for contracts, that is, it is not something you do in a day. These things can take you months.”* (Director of a CSIC, basic-to-applied, large centre) The CSIC centres have established partnerships with private foreign companies that have directly been effected by the SO programme, through its **award dimension**: *“... has chosen us, I think for being a centre of excellence, formally a reference centre in our field”*, but as well the **funding dimension** *“This strength, together with the acquisition of this machine through the support of SO, has allowed us a contract with the ... world leaders in ...”*. (Director of a CSIC, basic-to-applied, large centre)

In the context of the **mixed CSIC-University centres** the **award dimension** of SO has been noted by the scientific directors *“What I have noticed is that more companies are approaching us, or it seems to be easier than before, especially the Spanish companies that know what SeveroOchoa is - I think there has been a certain “call effect” especially with Spanish companies.”* (Director of a mixed, applied, medium centre) Under the mechanism of the funding dimension the SO, the **flexibility/versatility of the SO has enabled signing up collaboration agreements at international level.** *“SeveroOchoa has had to do, because it gives freedom to sign those agreements. A normal project of the Ministry is to research on a topic, in contrary to the SO that is a transversal thing.”* (Director of a mixed, basic, small centre). **At regional level** some SO centres have seen regional partnerships created by the regional governments dedicated only to the SO

centres. *“If we had not been a SeveroOchoa centre, we would not have been there. As part of this strategy we have now an innovation office supported and coordinated by the Valencian government”*. (Director of a mixed, basic, medium centre)

In the context of the **autonomous centres** there have been various types of partnerships triggered by several mechanisms. **The award/label dimension has raised the visibility of the centres especially the ones whose scientific field has not traditionally been recognised.**

*Given the low visibility of ... [science field] in Spain, the SO has made us capable to approach other centres and companies as a centre of excellence. The award has been a new and very different business card for us. There is something very serious behind all this and it is to make the country's large companies understand that they have to pay attention.*

(Director of an autonomous, applied, small centre)

**The funding dimension of SO has been an evident mechanism for the SO awardees to participate in international partnerships:**

*SeveroOchoa has allowed us to prepare for participation in European flagships, such as ... and .... When these flagships came out, we were already prepared to participate in them. For this type of performances, SeveroOchoa is very useful.* (Director of an autonomous, basic-to-applied, medium centre)

The directors identify clearly the contribution of the SO in their **newest international partnerships being them scientific or with the industry collaboration**. The **flexibility/versatility of SO** has allowed the centres to use the funding for positioning at international level in participating and leading these partnerships.

The programme as a whole has allowed the centres **to contribute to new international initiatives:**

*SeveroOchoa has enabled the international partnership... Our exposure to European and international funds was very big anyways, but this is a new way to be in the world map. (Director of an autonomous, applied, large centre)*

In the context of the **autonomous centres**, the SO programme as a mechanism has **enabled scientific partnerships among the SO centres inside of Spain:**

*Before it was not easy for us to collaborate with other SeveroOchoa institutes in areas where we had similar interests. With the SO we have formed these collaborations – and it [SO] has been very useful. (Director of an autonomous, applied, large centre)*

The participation in the SOMMA (“Severo Ochoa” Centres of Excellence and “Maria de Maeztu” Units of Excellence Alliance) was identified as a partnership with an objective to share experiences mainly in management and to create a possible lobby towards the policy making at state level.

In the **context of the autonomous centres**, the **regional government mechanism** to produce a new strategic partnership has been the creation of the Barcelona Institute of Science and Technology (BIST) launched by the Catalan Government and for which only SO awarded centres based in Catalonia were chosen. This has been identified as a strategic alliance/partnership by the autonomous centres based in Catalonia.

*Our most important strategic partnership is the BIST, it is a true strategic partnership. (Director of an autonomous, basic, large centre)*

The mechanisms already mentioned above have worked in different contextual aspects, but the research shows no strong differences between size, type of

research or field of research for establishing strategic partnerships from these the SO awardees.

### Impact changes

As a continuation on the development of the intended outcome on creating **impact at both systemic and nodal level**, this section describes the changes that the centres claimed to have in terms of specific and general impact, such effected by the SO mechanism. The order of the specific impacts follows an alphabetic order.

#### Cultural impact

Cultural impact is understood as “Enhancing and preserving our cultural heritage, producing cultural artefacts, creating, inspiring and supporting new forms of expression, and enhancing our understanding of minority groups and communities.” (Russell Group, 2015). It **has been identified in all of the contextual characteristics, except by the CSIC centres.**

The mechanism that has triggered this impact is that of the **SO programme as a whole**. When identified as such, the cultural impact is understood from different centres through different facets, such as communication and dissemination, outreach activities, and overall visibility of the centre.

1. **Communication and dissemination** of the centre has increased. *“The institute has become a reference in communication in the last years”*. (Director of a mixed, basic, small centre)
2. Transmission of the scientific value of science to the society through different **outreach activities**, such as news in the media, press releases, videos, social media, opening up the centre to the visitors.

*We believe that we are cultivating recognition of the value of science in society... Our installations are visited by 6,000 children a year... It is also*

*visited by 7-8 thousand tourists from all over Europe... We have worked hard to raise awareness” (Director of an autonomous, basic-to-applied, large centre)*

3. Giving a **“good image” to the city/location** the centre is located, especially an image related to excellence.

*The impact of the institute in the region, in the city of ..., is undoubted and has many aspects, because not only the economic one, but also the image, which is also difficult to assess, but it is important. If someone reads about the existence of a research centre of excellence in the city, their perception changes and it is different when they read only about cases of corruption and blocks of flats made by the seaside. (Director of a mixed, basic, medium centre)*

In terms of cultural activities, these are the ones that a top centre of research would normally carry out. Would they have happened at all or at a slightly smaller scale or reduced without the SO? In the framework of the centres’ strategic research plans of four years, the SO call for proposals asked the centres to outline the outreach activities they would carry out and the centres were evaluated on the entire strategic research plan, including the outreach component. There is therefore a connection between the programme and the **reinforced cultural activities** that the centres developed during the SO programme.

#### Economic impact

Economic impact, understood as “Driving economic growth, generating new products and services and creating jobs.” (Russell Group, 2015) was identified **in almost all of the contextual characteristics, except for the CSIC centres (in terms of organisational characteristics) and the basic research centres (in terms of type**

of research). The mechanisms that triggered this impact are the SO programme as a whole and its funding dimension.

Based on the perceptions and opinions of the directors, the research draws on the conclusion that in different contexts, **SO as a whole** and its funding as a mechanism **have generated economic impact** understood in different facets:

1. The economic impact is set/located in the framework of the centres surroundings, being this the locality/town/city, the region and the country, Spain. Observations on economic impact for driving economic growth were linked with the territories the centres operate. As highly international research centres, **the directors emphasised under this impact, the effects their centre had in their localities and the country in terms of developing relations with industry, the productive sector, and the technology centres.** One centre had carried out a study on its economic impact in the town and the region as a whole in collaboration with the economics department of the local university. Citations from different directors:

*I believe that today at the local level, in the city of ..., we are an actor that is taken into consideration, mainly because we have had a great economic impact.... Our researchers have a long relationship with companies that are incubated here or technology centres that are incubated or developed at the Institute. (Director of an autonomous, applied, medium centre)*

*We have carried out a study on the economic impact of our centre in the Autonomous Community. It was done by the Department of Economic Sciences of the University. Basically, what this study shows is that the institute generates in economic activity three times more than what we receive as a budget. ... So, the economic impact, for example, on this territory is an estimate is 0.5% of the entire economic activity. There are 1*

*million people living here, and the institute has got 400. (Director of an autonomous, basic-to-applied, large centre)*

2. The economic impact is produced **through the generation of companies and their incubation in the centre, the creation of start-ups, new private actors deriving from knowledge created in the centres.** This observation is common in various centres. The support that SO gives towards these actions can be directly linked with their last year activities in the SO applications for proposals.

*Three start-ups have benefitted from SeveroOchoa in the last two years. Without it they may have not come out. (Director of an autonomous, basic-to-applied, medium centre)*

3. **The economic impact is generated through the collaboration with industry to solve specific problems,** the collaboration with the private actors, including technology centres, through technology transfer activities at centre level.

*With SeveroOchoa we have supported our technology transfer, we have created a network of collaborations with the industry that we believe is good for the industry and it suits us well. Maybe the impact is not yet global, it has been more of a local impact, but I think it is a first step to begin to better understand how the industry works at a local level and then go more global. (Director of an autonomous, applied, medium centre)*

4. **The centres' economic impact is the quantity and quality of employment numbers they offer.** There is a direct link between economic impact and employment generation for these centres.

*I think that the economic impact, considering the institute globally, is, because the institute is 300 people but there are only around 90*

*permanent staff of the CSIC or the university. The rest, around 200 people are employees who are paid by competitive funds from the institute, including the SeveroOchoa. So, it is a generator of employment that is important for a province, a town as small as this one.* (Director of a mixed, basic, medium centre)

*We are about 350 people and in recent years I would say that, except for when El Corte Inglés<sup>55</sup> was established here, we have represented the most important job creation for this city. And above all, we are employing highly qualified staff.* (Director of an autonomous, applied, medium centre)

5. And lastly, **the economic impact is observed as the international investment the centre receives.**

*85% of our students are international and they pay an important tuition, with which we get external resources to later use them for research. In this sense we have economic impact.* (Director of an autonomous, applied, small centre)

The economic impact as drivers of growth and generators of new products or services for specific excellent research centres is marginal, especially given the scale of funding vs. the size of the institutions. The evidence above demonstrates that the centres are **active economic actors in their territory**, and they provide stable and resilient high qualified and innovative economic activity.

#### Employment impact

Although the employment impact is part of the economic one seen above, because of the importance highly qualified and stable employment has for a country like Spain, and because this is a dimension of impact that was

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<sup>55</sup> *El Corte Inglés S.A.* is the biggest department store group in Europe and third worldwide.

emphasised by several directors as a must-be in the list of impacts that were discussed during the interviews, it is included here separately. **In all of the contextual aspects the SO funding mechanism has maintained and attracted talent.** The mechanism here is SO as a whole and its funding and the award dimension of the programme. The idea for including “employment impact” came when discussing “economic impact” of the centres - the generation of employment was seen as one of the aspects of the economic one. Nevertheless, it stands on its own, and therefore here will be given some facets of how it was understood and highlighted by the interviewees. Talent attraction and retention is discussed in a later section when describing the [Unintended effects](#) of programme to the centres.

Most of the centres’ staff are hired with competitive funding, including the SO which makes the centres generators of high quality and high specialised employment in their surroundings. Mainly 2/3rds of the centres’ personnel are hired on competitive funding.

Some of the centres are located in areas where they are marked as centres of excellence with an important contribution to **job creation and to talent attraction and retention.**

In a context of an autonomous centre, one of the directors would say:

*I don't know if there is any other job creation program of the Spanish Administration that is as profitable and productive as the SeveroOchoa. We should value a lot more the impact that the programme has had in job creation. (Director of an autonomous, applied, large centre)*

#### Environmental impact

**Environmental impact** has been highlighted as one of the produced impacts in various contexts with the SO programme as a mechanism. The mechanism

where it was identified are the mixed and autonomous centres, in the both mid-sized and big centres, in applied and basic-to-applied type of research centres. In a context of these centres the SO as a whole supported programmes in reduction of emissions and it created global impact, being leaders in Europe.

*Here [environmental research trends] we are very involved at European level, we lead the main European project in this field. And also on..., combating climate change... Here somehow, global and environmental impact go together. (Director autonomous, applied, large centre)*

*Under environmental impact, we have a very effective activity in reducing emissions.... (Director mixed, applied, medium centre)*

#### Global impact

**Understood as delivering positive impacts from national research overseas including collaborating with partners in other countries.** Global impact has been influenced by all the contextual aspects, except for the CSIC centres. The mechanisms that triggered this impact are the SO programme as a whole and its funding and award/labelling dimension.

When discussing global impact the interviewees were mentioning actual global initiatives or the **leadership of international projects that were specifically funded by SeveroOchoa**. For safeguarding the anonymity of the interviewees, these specific activities are not mentioned here.

The centres recognise that their **global activity and impact is their strength** for leading excellent research internationally.

*Our strength is the global impact, in the sense of our ability to collaborate with different partners from different countries, especially industry. (Director of a mixed, applied, medium centre)*

The leadership of **European projects is a marker for this:**

*Global impact, I would say yes because, in the field of ... we are very involved at the European level, we lead the main European project in this field. (Director of an autonomous, applied, medium centre)*

It is **difficult to say if this activity that is framed under the global impact** is directly linked to the SO effect and if it would have happened without the SO, as it has been to a certain extent a requisite for the centres to have an impactful international scientific activity to receive the SO. At the same time the strategic research programme that the SO funds, is evaluated for an advancement of the centres' impact globally. Whilst the respondents have been able to fund the leadership of global initiatives with the SO funding, it can be categorised as an outcome of the programme.

The mechanism of funding, and its **flexibility/versatility of funding** of the SeveroOchoa is highlighted in this perspective to enable the desired impact.

Citations from two different directors:

*At a global level, another thing that SeveroOchoa has allowed us is the creation of ... a joint laboratory with the best centres in the world. This is global impact. This means sitting down with your partners twice a year and sharing progress, trends, etc. Without SeveroOchoa, we would not have been able to have the funds or the capacity, not only for participating in this club, but also for hosting meetings of this group here. (Director of autonomous, applied, large centre)*

*Global impact, clearly, I think so. The ... [activity] itself is a very clear form of global impact and it is funded entirely with SeveroOchoa. (Director of an autonomous, applied, small centre)*

The connection to the **label/award dimension** is done in several occasions:

*In the global impact, if you have the seal of excellence, more friends will join you... Within SeveroOchoa we have organized workshops with international distinguished invitees... Every Friday a person from outside comes to the centre for a workshop and to get to know us. They are professors from outside the centre and generally from outside the country. This is important. This means expenses sponsored by the SeveroOchoa program.* (Director of a mixed, basic, medium centre)

#### Health impact

Health impact, understood as “Creating new drugs and treatments and developing new therapies. Improving education and training, public awareness, and access to health care provision, as well as policy, legislation, standards or guidelines” (Russell Group, 2015), has been **one of the most identified by the interviewees**. The contextual aspects it has been triggered are nearly all of them. The mechanisms identified have been the SO programme as a whole and its funding mechanism.

The health impact is seen through four different facets.

#### **Centres have developed new lines of research in health funded by the SO:**

*Impact on health. We have a line of medical research, which has also benefited from the SeveroOchoa grant. Now it is led by an ERC Advanced Grant.* (Director of an autonomous, basic, small centre)

#### **Other centres have strengthened health-related structure in their centres.**

Herein the citation of a centre different from the one above:

*At the health level, the empowerment of the Life Sciences Department is leading us to specific cases of projects that generate health impact. SeveroOchoa was key for this.* (Director of an autonomous, applied, large centre)

Other centres see the health impact in terms of creation of spin-offs that were influenced and funded by SO.

*On the subject of Health, we have some spin-offs that were created under our spin-off programme, which only began to take shape with SeveroOchoa. SeveroOchoa has been central, it has been very relevant for this type of actions with health and with the generation of spin-offs.*  
(Director of an autonomous, applied, medium)

And finally, **the contribution to health impact is seen in the relevance that important health issues** were taken on board by the centres:

*Improve the quality of life as well, because the centre has become famous in the market, and improves ... health. I clearly believe yes there has been an impact.* (Director of an autonomous, basic-to-applied, medium centre)

Under this aspect, it is worth saying that the **impact on health per se – that is the health of Spanish citizens, has not been demonstrated so much** as the impact on health outcome precursors by and large, and it remains to be seen whether these changes actually affect the health outcomes of the population in any meaningful and/or measurable way.

#### Legal impact

**Legal impact, understood as improving law enforcement methods, effecting legislative change and improving legal practice is seen in a specific case by different interviewees.** In the context of the Law 9/2017 of Contracts of the Public Sector, where a minor contract<sup>56</sup> for the supply or services had to be

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<sup>56</sup> Minor contracts are public contracts that require no tender or contest to be awarded, but an administrative file that justifies the needs of a supply, service or construction. The construction contracts are considered as minor when their value including VAT is 40'000 euros or less. The supply or service ones are considered minor when their value including VAT is 15'000 euros or less, with the exception to

15'000€ or less, the research centres saw very difficult their daily operations in the midst of the administrative justifications. In this context the influence of the Association of “Severo Ochoa” Centres of Excellence and “Maria de Maeztu” Units of Excellence as a mechanism, generated the change in the law by raising to 50,000€ the minor contract in the law, only in case of research and innovation related contracts for all the stakeholders of the Spanish System of Science, Technology and Innovation. This change in the law is considered as a legal impact enabled by SO awardees.

*I believe that we are also having a certain legal impact since we joined SOMMA<sup>57</sup>, in the SeveroOchoa and MariaDeMaeztu network, and in fact, one of the tangible impacts is that last year the law on minor contracts was changed - this is very important - it was changed to €50,000, through an amendment to the [annual law of] budgets. (Director of a mixed, basic, medium centre)*

This is a clear example of affecting a legal change triggered by the SO and the networks the awarded centres created: SOMMA.

#### Policy impact

**Policy impact understood as informing, influencing and improving decision making, is seen under all the contextual characteristics of the centre, and it is triggered by different mechanisms, such as: the SO programme as a whole, the award dimension of the programme, and the Alliance of the SO Centres of Excellence and Maria de Maeztu Units of Excellence (SOMMA).**

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the supplies and services that are related to science and innovation activities – whose minor contracts' value including VAT is 50'000 euros or less.

<sup>57</sup> “Severo Ochoa Centres of Excellence and María de Maeztu Units of Excellence” Alliance

The policy impact triggered by the programme as a whole is observed in **behaviour change of the governments' representatives** at state, regional or local level, such as: meetings of the SO directors directly with the head of the ministerial department where there has been interaction for opinions for the improvement of visibility of the Spanish science abroad, improving training conditions for talents, and improving collaboration with industry through technology transfer activities.

*They [at the ministerial department] have seen us as interlocutors. That does not happen to the directors of a department of a university. We have been able to influence.* (Director of a mixed, basic, medium centre)

At **regional and local level** the SO centres are distinguished.

*We were consulted when the regional government launched the call for talented researchers. It is the first time that concepts related to scientific excellence and internationalisation are part of a human resources call here regionally.* (Director of a mixed, basic, medium centre)

Another way of supporting influence is through **science advice**.

*We have researchers who advise [international] organizations... who provide policy guidance. This [policy impact] is very clear.* (Director of an autonomous, applied, small centre)

Whilst there is a link on the effect of the SO towards the state and regional policy, the science advice indication, claimed by one of the directors would need further research to be better understood. It may have been probable that this advice would have happened without the SO influence.

The **award/label dimension** as a mechanism has been key to distinguish these top centres and create their getting together through the “Severo Ochoa” and “Maria de Maeztu” Alliance (SOMMA). In this specific aspect SOMMA has been

a tool to reach and talk to the decision makers at State level. *“They listen to us because we represent the best centres in the country.”* (Director)

**SOMMA itself is considered a mechanism for this policy impact** from the centres to the state government.

*We have influenced not so much as a centre, but as a network or nucleus of SeveroOchoa centres because when we held our meetings, people from the ministry came to listen to us raise the problems. These issues were diverse, and some had solutions and others had no solutions. ... In other words, the political impact is clear, very clear.* (Director of a mixed, basic, medium centre)

*The policy impact has been SOMMA. Through SOMMA we have lobbied and influenced decision-makers. ... I think we are listened to more than before. ... Things took a while to start, but finally, I think it is an important thing to complement the program through different political formations that can reach the Ministry. Also, to justify what has come out of all our effort.* (Director of an autonomous, applied, medium centre)

#### Social impact

**Social impact understood as informing public debate and stimulating public interest is seen in all contextual aspects of the SO centres**, mainly through mechanism such as: the programme as a whole, the SO funding dimension and its award/label dimension. The social impact can be seen through different facets.

Institutionalising the **outreach activities, improving significantly their communication efforts, hiring science communication experts** that work full or part time with their centres and designing outreach activities with a wide range of stakeholders, from schools to evening visits. SO funding has been an effective mechanism for the centres to enhance their social impact.

*The social impact, for example, on the public interest, has been tremendous. SeveroOchoa has brought change. A communication plan for the institute was created. (Director of a mixed, basic, small centre)*

*Recently they have given us - I think it is part of having had a SeveroOchoa - they have given us the national prize for research in communication, a program called ... and in which we have been very actively involved. Being involved in such an active way has been thanks to SeveroOchoa. We have dedicated resources. If not, where do you get it from? You cannot dedicate resources from a European project. So in terms of impact or communication, I believe that we have also been successful and we have success stories. (Director of an autonomous, applied, medium centre)*

*Social impact too. Now we have a communication person who is excellent. (Director of an autonomous, basic, small centre)*

#### **Outreach through embedding RRI and social responsibility:**

*The topic of social impact - we have embraced responsible research and innovation, issues of social awareness, above all, a lot of outreach, a lot of dissemination activity. And also the issue of social responsibility - trying to convey to society that we use the resources we receive from them. (Director of an autonomous, applied, medium centre)*

**Presence in the media, becoming more and better known by the mass public, having access to the society at large** to explain scientific issues of societal concern has influenced the social impact of the centres. The award/labelling dimension has been key for this.

*When they give you the award, this comes out in the press, people are interested, and they are impressed. (Director of a mixed, basic, medium centre)*

*We have had an important presence in the media, and stimulation of public interest, without a doubt. (Director of an autonomous, basic-to-applied, medium centre)*

Indeed, the social impact overlaps with the cultural and the socio-economic one under these findings, as impacts are interconnected at large. Nevertheless, in its core sense, social impact extends well beyond the above considerations and excellent research centres may not contribute directly to what the social policies are. The notion of contribution following these claims is fragile to reach the considerations of how excellence in science and innovation diffuse and how do they create inclusiveness and less marginalisation from the social perspective.

#### Technological impact

**Technological impact understood as the activity to develop new and to improve existing technologies is seen in all the contextual aspects.** The technological impact is triggered by the SO programme as a whole and its funding dimension in different ways.

**SO programme has supported the creation of Technology Transfer and Innovation Offices in the centres.** This institutionalisation of support for enhancing technology improvement is key to the centres.

*The fact of being able to create and professionalise the Tech Transfer office has allowed us to detect, protect and transfer technologies that otherwise would have remained in the drawer. This is thanks to SeveroOchoa. (Director of an autonomous, applied, large centre)*

**SO has funded facilities and equipment for the centres following their strategic programme.** The **flexibility/versatility of SO funding** is highlighted here. Centres have been able to combine SO funding with other sources, like for example: FEDER, for funding state-of-the-art equipment.

*All the investment we have done here in ... with quite good equipment, we would not have been able to buy it any other way. What we did was, co-fund with 50% the call for infrastructure that comes out every two years, charged to FEDER funds, which requires 50% of co-funding. Without SeveroOchoa that 50% needed we would not have been able to get it.*

(Director of a CSIC, basic-to-applied, large centre)

Although under technological impact, the co-funding of European Structural funds is relevant for the Spanish research facilities, in spite of the doubts that this action may generate. Using competitive public funds to receive competitive public (this time structural European) funds is less competitive and acclaimed than stimulating business investment, and therefore producing more technological, and economic impact.

Many centres identify the **technological impact as a key one enabled by SO**.

*I think the technological impact has been important in the centre with both the previous SeveroOchoa and this one. We understand that one of the missions of our centre is to bring technology to society... So yes, a lot of resources have been dedicated to developing the technologies. I think it is a real impact.* (Director of an autonomous, applied, medium centre)

The director is aware on the difference between developing technologies in general vs. developing technologies that are useful for society, a generic remark for this outcome. The later would require more understanding. It is notable that the director includes the SO under the vision of the centre on bringing technology to society.

**Collaboration with big multinational companies** has been one of the facets to identify the technological impact:

I clearly believe to improve and develop new technologies. They have been made thanks in part to the first SeveroOchoa, in a collaboration with

... It was a central part of the first SeveroOchoa. (Director of an autonomous, basic-to-applied, medium centre)

### Sponsorship changes

Another aspect the research observed are the changes that SO programme created in different context in terms of **the sponsorship that the centres have received in since the SO award**. The policy makers saw the possibility that **SO award would enhance patronage to the centres as a possible side effect of the programme**. This was found in news published by the Science News Agency: “*A scientific recognition that will give them preferential visibility in obtaining patronage aids, among other benefits.*” (Science News Agency, 2011)

The SO awardees are fully aware of the importance of sponsorship in research and they generally present the framework difficulties that exist in Spain related to aspects, such as:

**The lack of sponsorship tradition/culture in Spain**. References to American or British counterparts are common under this argument.

*My colleagues at Caltech who receive millions of dollars in donations for a project. Donations are common in the US.* (Director of an autonomous, basic-to-applied, large centre)

*The donation, as an activity of return to society of what one has earned, is very little developed here. ... It is a cultural issue - the Christian-Catholic culture. Here it seems that the Church is the only recipient of donations and, of course, not the science.* (Director of an autonomous, applied, medium centre)

**Difficulties to attract sponsorship/patronage because of the scientific field they work with.**

*If you are in the world of biomedicine, you are in a better position than if you are in the world of physics or chemistry. And it is easier to have money for medicine than for biomedicine. It is easier to have money for childhood cancer than general medicine, and so on. (Director of an autonomous, basic, large centre)*

Sponsorship is **scientific field bound** creating even more difficulties to attract extra funding from the centres.

**The lack of a consolidated legal framework** (Patronage Law) that may encourage sponsorship for research from private actors. Spain has the Law 49/2002, of December 23, on the tax regime of non-profit entities and tax incentives for patronage, but a revision of this law or a new one is expected in the last decade to happen. There were some references regarding the need for a smarter and encouraging regulation when discussing the difficulties for sponsorship among the centres.

*I think that those sponsors are not given the adequate recognition from a fiscal or image recognition point of view. Perhaps we should institutionally enable a mechanism by which these sponsorships could be financially recognised, and also culturally recognised because the support for science must have social and cultural recognition. These roads are not yet sufficiently prepared in our country for us to benefit from them, they are not as they are in other countries. There are entities that could do a very important altruistic work and hopefully they feel encouraged to do so. (Director of an autonomous, basic-to-applied, large centre)*

In this aspect there is a general agreement that **sponsorship is more than regulation** and it has to do with raising the visibility and political support towards donors and working with the most favourable centres for this action. The

award/label dimension of the SO is seen as a very strong mechanism for enhancing sponsorship:

*And here I also blame the government for not having made a policy of favouring donations to the SeveroOchoa centres. There must have been a campaign about the fact of having identified the top centres in the country. (Director of an autonomous, basic, large centre)*

Another factor that is internal to the centre is that of having a **no-specific/definite strategy for attracting sponsorship** and targeting the sponsors. Being visible for patronage would require an intentional previous strategy for that.

Nevertheless, the research seems to show that centres in all the contextual aspects have been effected by the SO programme, with its **award/labelling dimension as a mechanism to attract sponsorship**.

**The LaCaixa support is remarkably highlighted** as a robust approach to all the SO. All the centres of all the contextual aspects have identified the support of LaCaixa Bank foundation<sup>58</sup> in supporting them with doctoral fellows. LaCaixa fellowships started in 2013 focusing on SO centres only. The programme progressed to be open to Maria de Maeztu Units, the health research institutes and excellent and exceptional centres in Portugal. LaCaixa funds now 35 fellows a year. The centres have to compete for the fellows.

Other foundations mentioned by the centres that have funded either research or research related activity and have been influenced by SO programme have been: the foundation of BBVA Bank, “Fundación Areces”, and “Fundación Jesús Serra”.

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<sup>58</sup> <https://fundacionlacaixa.org/es/becas-la-caixa-doctorado-inphinit-incoming> Page last accessed in September 2020

On the other hand, the SO has been fundamental for the patronage foundation of a centre to strengthen their support to the centre being that it is recognised as top research centre in the country.

*For example, the XX<sup>59</sup> foundation is very important for our centre. They clearly realised the relevance of SO program, and identified it as an elite program in the country. Their support was reaffirmed by the fact that their centre is chosen as one of the best ones in Spain. (Director of a mixed, basic, small centre)*

**In the context of the autonomous centres, the SO award/labelling dimension as a mechanism has been important for visibility and patronage from the industrial sector that show a medium level of knowledge of science:**

*Our fundraising activity has seen improvement. Very recently we had a private foundation funding here a series of activities. In this occasion the fact of presenting ourselves as SeveroOchoa helped. They are people from the industrial, economic sector who have a certain average knowledge of scientific matters. To them the scientific label is important. (Director of an autonomous, applied, medium centre)*

Another centre has funded an entirely new sponsorship initiative that targets patrons/funders that would sponsor their centre and their projects/activities. In this case and in the context of an autonomous centre the funding mechanism of the SO has given a direct outcome on sponsorship change.

*With SeveroOchoa, we have created the “...” initiative, which is an initiative that wants to attract sponsorship. It has had a communication impact, it has increased the visibility of our centre in the society, etc. (Director of an autonomous, basic-to-applied, large centre)*

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<sup>59</sup> Name of foundation is anonymised.

The literature focused on the Centres of Excellence instrument and the Performance Based Institutional Funding has placed some focus from a systemic perspective on the **effects that these had related to impact generation, partnership creation and sponsorship in research**. It recognises that these instruments boost connections with industry and spin-offs (OECD, 2014; Caetano, 2015; Lunderquist and Waxell, 2010), for innovation (Knie and Simon, 2019) and in general in the research milieus, especially in the life sciences (Lunderquist and Waxell, 2010). In the SO evaluation I could not observe any contextual aspects related to the scientific discipline that would create more or less impact. No study from the reviewed literature has researched on such a broad range of components of impact.

The CoEs have also been very successful in **securing additional funding**, which can be viewed as a 'cumulative effect' of centre grants (Bloch et. al., 2016), but no published literature was found that identifies the implication of the private foundations, such as under this particular study.

The impact at system level is understood as an influence of what the awarded centres have developed during the period under study.

### *INFLUENCING CSIC, UNIVERSITIES AND BEYOND*

*Findings related to the Intended Outcome at system level:*

*Change behaviour of CSIC and influence the universities to promote excellence oriented structures*

The documentary review when drawing the conceptual model of impact of the programme **revealed that having the centres SO, excellent institutions, could bring a new pattern of behaviour in the Spanish system, and could influence or motivate change in the older institutions, such as the CSIC, or the universities.**

This pattern of change was based in the belief that the traditional institutions would support excellence by modifying their structures etc. because of the influence of the SO. In the press, this message was given somehow differently by the minister:

*Garmendia [Minister of Science] trusts that this program will help reorder the Spanish research structure, perhaps too atomised. It will not be the government that will reorder, but it is expected to be a natural evolution (it is expected that the possibility of opting for the category of SeveroOchoa centre serves as an incentive to unite the best). (El País, 13 April 2011<sup>60</sup>)*

As already discussed in [Understanding the Conceptual Model of Impact of the “Severo Ochoa” Programme](#), the **fourth intended outcome by the policy makers was that of bringing behavioural change in the CSIC and possibly influencing the universities<sup>61</sup>.**

Even though one of the interviewed policy makers during the first part of the research realised that the SO as such needed to be bound to some type of a legal instrument that could allow the needed flexibility to the centres to perform accordingly:

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<sup>60</sup> “The Science department launches a program to subsidize the best research centres.” Article in El País dated 13 April 2011  
[https://elpais.com/sociedad/2011/04/13/actualidad/1302645612\\_850215.html](https://elpais.com/sociedad/2011/04/13/actualidad/1302645612_850215.html) Page last accessed in September 2020

<sup>61</sup> Universities in Spain are autonomous entities that receive their core funding from the regional governments.

*There is much to be done in the organisation and management of research. It would be very important for the State to promote a regime, it could be a special regime, or call it whatever you want, but a regime that would allow the leading research institutions – be it the Severo Ochoas and the María de Maeztus - have a more agile and flexible management. This can be done by the State. A State lawyer is needed to undo a knot that has been created by another State employee. Political will is needed for this. (Interviewee no. 3)*

The intention was for the programme to create change in the system, and in the CSIC and the universities.

For the above, according to the respondents **the changes created both in these institutions and in relation to the founding organisations** of the SO awardees, they are consistent with changes that were triggered or influenced by the SO. The research tried to understand if there were any changes between the centre and the organisation since they were granted the SO and what characteristics of the SO made that change happen. As well, according to the data gathered by the respondents, the research **uncovered changes in policies or practices of the mother organisations** that may have been related to the SO, such as it could have been the promotion of excellence and/or the institutional strengthening.

The findings given here will only reflect what the specific research carried out. The institutions that are related to the SO awardees, such as the CSIC and the universities are dynamic and autonomous institutions that are in an ongoing

process of policy creation at many levels, including internal organisation. The research will reflect the findings drawn by this study completed in 2020.<sup>62</sup>

According to the respondents, **SO as a mechanism has triggered change** both in the relation of the SO awardees to their founding or dependent organisations, as well as it has influenced the behaviour of the “mother organisations” to promote excellence related actuations.

In the **context of CSIC centres and mixed CSIC-University centres** the SO award/labelling dimension and the funding mechanism has created **a reluctant and less proactive [negative] relational behaviour with the CSIC, the organism that they depend**<sup>63</sup>. Citations from different interviewees:

*I believe that SeveroOchoa, due to what it implies in a direct relationship with the ministry, and with other centres of that league, it was seen as a threat to the control that the Central Organization of the CSIC wanted to exercise. We asked the Presidency of the CSIC to allow us to compete on equal terms with other centres that did not have the hierarchical structure of the CSIC. This changed the relationship in the direction of getting worse. There was no understanding, quite the opposite. (Director of CSIC, basic-to-applied, small centre)*

*We have not received any kind of support from CSIC during the SeveroOchoa years. They say "since you already have money from*

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<sup>62</sup> The SO centres have been awarded from 2011-onwards.

<sup>63</sup> The mixed CSIC-university centres have received the SO funding through CSIC in the first round of the SO. There was some change in the second round.

*SeveroOchoa, then make up with that funding". We were not considered at all. (Director of a mixed, basic, small centre)*

*I have observed some change between the centre and the CSIC since we received the SeveroOchoa, for better and for worse, but that depends on who is in the CSIC. The Administration that exists now tries to support everything that is related to excellence and tries to help us. They've been there for a year. You get the feeling that they are proud of their centres of excellence and they want them to be rewarded or have a certain priority. And they also ask for information. They try to make things easier. But the previous one it was: "I think you bring problems", "They have already given you four millions, hold on for a couple of years, we have no money." Phrases like these. (Director of a CSIC, basic-to-applied, large centre)*

*The presidency of CSIC declared themselves enemies of our Centre, so they boycotted us, and for years they did not give us any positions. (Director of a mixed, basic, small centre)*

In the case of the **mixed centres**, the universities have offered mechanisms that **have changed the relationship with the SO centres**, by offering favourable conditions such as keeping less overheads for the SO funding, and allowing and making more flexible the management of the grant by the centre.

*There is a proactive positive attitude, at least from the University. It keeps only a small portion of the overheads, not even a third. The rest is given to the centre. It is more flexible in management. They have paid attention to the SeveroOchoa. (Director of a mixed, basic, small centre)*

*We were already well considered, but with SeveroOchoa we are more respected.* (Director of a mixed, basic, medium centre)

It is interesting to point out how the respondent here has mentioned to “be more respected” by the centre’s founders now that they are a SO awarded centre. These conversations were carried out at the end of the interview and no further elaboration of what the director meant by “respect” were made in this specific case. More research is needed to explore that, and as well whether the amount of change in respect is reflective of the level of the investment the SO represents, does it have to do anything with the SO award dimension, etc.

During the research, **in the context of the CSIC and mixed centres there has been no change in terms of policies in the CSIC**, the “mother” organisations for all the CSIC and mixed centres during the first round of the SO – the organisation where the SO funding was received.

As **for the autonomous centres**, the research gives different results. In their context, **the award/label dimension of the SO has triggered change in the relations with their “mother organisations” or their founders**. It seems that their relationship with the founders was enhanced because of SO.

*They congratulated us and found the seal of excellence gratifying.*  
(Director of an autonomous, basic-to-applied, medium centre)

*They were happy that we had the SeveroOchoa. They congratulated us profusely.* (Director of an autonomous, basic, large centre)

In the context of the **autonomous centres** the mechanisms of **the regional governments** that recognise and enhance the collaboration of the SO centres have been evident.

For example, **the Government of Catalonia** established in 2016 the Barcelona Institute of Science and Technology (BIST) **with seven SO centres located in the territory**. The condition of being SO has been key for the establishment of BIST. Citations from different directors:

*Now we are part, here in Catalonia, of the BIST, of the Barcelona Institute of Science and Technology, which groups together the seven most powerful centres in Catalonia. (Director of an autonomous, applied, medium centre)*

*For us, this type of recognition had an impact on the Generalitat: "We obtained the external result that you are a centre of excellence." (Director of an autonomous, basic, small centre)*

The Catalan government had offered support for the SO centres:

*We are better considered, obviously, and there are projects of the Generalitat that are only for SeveroOchoa centres, for example the doctoral program for medical doctors can only be requested by hospitals working with a SeveroOchoa centre. It came out this year [2019]. (Director of an autonomous, basic, large centre)*

Another example is the regional **government**, which has supported with structural funds its SO centre.

*We were supported because they are convinced that we are a centre of excellence, and I think the SeveroOchoa program has been instrumental in this. (Director of an autonomous, basic-to-applied, large centre)*

The regional government involvement such as in the **Canary Islands and in the Valencian government that has supported its SO centres** with structural support in innovation, such as seen above under “[Administration and Management changes](#)” section.

Research shows that not only have the founders of autonomous centres improved their relationship with the awardees, but as well, in some cases they have introduced excellence oriented policies, like for example the Viera y Clavijo Researcher Scheme funded by the Canary Islands government for the universities.

These findings will add more information and analysis to the literature that supports that the CoE instrument has had effects in the bigger institutions such as their universities to set their own priorities (Rip, 2011), to steer the university system (Checchi, 2019) and to influence legislation at regional level (IEKE Evaluation, 2016, page 5). What this particular study does, is to go into detail on the factors that create influence to shift institutional policy towards excellence as an outcome of a single programme.

### *UNINTENDED EFFECTS*

The findings above have remarked and illustrated the outcomes that have been emerging in different contexts by using different mechanisms of the SO. The research has brought out **various elements** in terms of CMOs where the programme has had an important impact on the centres and the Spanish System of Science, Technology and Innovation.

## Talent recruitment, attraction and retention

Research shows that the SO has effected all of the awarded centres in terms of their capacity and ambition to attract and retain top world Human Resources in their field of activity.

The **mechanisms** that have triggered the most this effect have been:

- For the **CSIC centres** in this order: the SO programme as a whole, the funding and its flexibility/versatility, and the award/labelling dimension.
- For the **mixed centres**: the funding, including its flexibility/versatility; the programme as a whole, the award/labelling dimension; and the CCAA as a mechanism.
- For the **autonomous centres**: the programme as a whole; the funding as a mechanism, including its flexibility and versatility; and the award/labelling dimension.

In the context of the CSIC centres the recruitment has:

*As a mechanism*

A **reinforced administration and management** through the SO characteristic of **flexibility of funding**.

*Normally with research projects, you can only and exclusively hire scientific staff. The SeveroOchoa project explicitly allows it. If it didn't allow it, we couldn't [do management and promotion]. ... And there the project [SeveroOchoa] helped a lot because giving a little room for manoeuvre has meant that we now have four people in project management. All of them are paid for with the SeveroOchoa project. Management and internal operations have been greatly improved.  
(Director of a CSIC, basic-to-applied, large centre)*

### Reinforced technology transfer and outreach staff:

*With SeveroOchoa we have hired a communication technician, another for technology transfer. ... It has allowed us to move forward with two people, one for technology transfer and the other for dissemination - we paid them in full from the SeveroOchoa project, since we have the project. The outreach makes the activity in the centre more visible. (Director of a CSIC, basic-to-applied, large centre)*

#### *As an outcome*

In the context of the CSIC centres the talent recruitment, attention and retention has been observed as an outcome when it has:

### Supported staff retention:

*There are more foreign researchers who have stayed. It is also true that it is not easy. It is very difficult, by the organization's own rules. If a person wants to stay here beyond a post-doctorate, they would have to apply for a position and would have to take an exam in Spanish and present their CV in Spanish and their doctorate degree also has to be recognised by a Spanish university. So, it is not even possible. It is not easy to enter. (Director of a CSIC, basic-to-applied, small centre)*

In the context of the mixed CSIC-university centres:

#### *As a mechanism*

The mechanism of talent recruitment, attraction and retention with the support of the award/label dimension of SO through sponsorship changes, has enabled **research capacity** with new researchers on board:

*I think that right now there are probably around 6-7 people hired from those private funds who have come to the centre in a competitive way,*

*because we are a SeveroOchoa centre. (Director of a mixed, basic, medium centre)*

The **capacity to attract talent at international level** as a mechanism has made possible to be competitive at international level:

*The fact of bringing postdocs is in itself competitive internationally and with this program [SO] they see that they have become internationally visible. (Director of a mixed, basic, medium centre)*

The same mechanism of talent recruitment has reinforced **administration and management**:

*SeveroOchoa has allowed us to hire people in the administration and fill in gaps where there were weaknesses - that obviously favours the management of the centre like everyone else. (Director of a mixed, basic, medium centre)*

*The administration was strengthened. 80% of the external contracts PTA (Technical Support Personnel) were financed with SeveroOchoa. (Director of a mixed, basic, medium centre)*

*We have incorporated new figures that did not exist before. We have, we are beginning to have an incipient European project management office. (Director of a mixed, applied, medium centre)*

*As an outcome*

In the context of the mixed centres the talent recruitment, attention and retention was observed as an outcome triggered by the funding mechanism in the shape of a “starting/landing package”. This outcome in the mixed centres has **supported the attraction of young researchers** through offering them a starting/landing package at the centre for initiating the research activity.

*For example, a program that we started with the former SeveroOchoa was to attract young scientists and give them the means to start working at*

*our centre. We have given them a start-up, an important package that consisted of freely available money so that they could buy devices; we have given them a technician, and we have given them an intern, etc. charged to SeveroOchoa. This is something that cannot be done in Spain anywhere if you do not have these funds. (Director of a mixed, basic, medium centre)*

The mechanism of **start-up packages** is used not only for young researchers, but as well for tenure track ones:

*SeveroOchoa has served to offer start-up packages to the RamonYCajales at the institute. Due to the crisis the CSIC was not stabilising anyone from RamonYCajales, through SeveroOchoa we have been able to stabilise 6 of them by providing bridge financing. (Director of a mixed, basic, medium centre)*

Tenure track researchers were incorporated to these centres. SO funding has served to **co-fund national and regional calls**, such as the Beatriz Galindo figure at the universities or the GenT call, etc. of regional governments.

The **flexibility/versatility of the funding mechanism has allowed researchers retention through “bridge-contracts”** that allow researchers to bridge from one competitive funding to the other by maintaining them in the centre.

*SeveroOchoa has financed many bridge contracts. It is flexible to change according to need. For example, for the postdocs that always gave +2 years, now with SeveroOchoa they have been +3. SeveroOchoa has made it possible to seek alternatives to the scientific career that is normally offered with grants. (Director of a mixed, basic, medium centre)*

The regional incentives as a mechanism have supported the centres with young talent:

*Participation in the GenT Plan has been very important. It is the 2nd call this year 2019. It is staff of excellence. Co-financing is requested by the institutions where they will be incorporated. (Director of a mixed, basic, medium centre)*

In the context of the autonomous centres

*As a mechanism*

In the context of the **autonomous centres** talent recruitment, attraction and retention is seen in the mechanism used together with the funding to maintain the competitiveness of the research centres.

*I would say that externally, from the point of view of the people with whom we compete, they are the best research institutes in Europe and we even do so at the level of US institutions. SO has allowed us to keep competing through retaining and attracting talent. (Director of an autonomous, applied, medium centre)*

Other outcomes in the context of the autonomous centres that have used the mechanism of talent recruitment, attraction and retention have been that of the **support of the doctoral programmes and improvement of research.**

*With SeveroOchoa resources we have been able to give support to the units to make higher quality hiring, we have supported the doctoral programmes. These are actions that we would like to continue doing and that we have to use SeveroOchoa funds for this. It improves the research that is done by the collective. (Director of an autonomous, applied, small centre)*

The SO as a whole and the mechanism of hiring of senior researchers/directors of department or any other talent attraction that has **created structural change in the centres contributing to their growth:**

*The two SeveroOchoas have allowed us to place bets on things that, as they have turned out well, have been the seeds of further growth. It has allowed us to incorporate an extremely competitive director, extremely recognised... thanks to [the new director] the department has been able to grow and its impact has been extraordinary. Soon [the new director's] department will have more than 100 people. (Director of an autonomous, applied, large centre)*

The funding mechanism in the context of the autonomous centres has **supported reinforcement in administration and management, outreach and knowledge transfer:**

*We have a Project Manager hired with SeveroOchoa, a person in Knowledge and Technology Transfer, and one in Outreach and Communication. (Director of an autonomous, basic, small centre)*

*As an outcome*

In the context of the autonomous centres the talent recruitment, attention and retention has been observed as an outcome triggered by the mechanisms of the award/label dimension that has supported **the attraction and retention of distinguished senior researchers.**

*Most of the ... group leaders have invitation letters to go to London or Germany. People who have received substantial offers and are constantly receiving them, and no one has left. Two years ago we managed to attract three new team leaders: one has an Advanced ERC, the other has a Consolidator, and the third has a Starting - people who come from other prestigious research centres and universities. There is no doubt that we have advanced. (Director of an autonomous, basic, large centre)*

The **flexibility/versatility of SO** as a mechanism has supported **talent attraction.**

*SeveroOchoa has helped us above all to be able to carry out certain actions to attract talent that would not have been possible without it, because the virtue of SeveroOchoa is not so much the amount of money, but how flexible its use is. (Director of an autonomous, applied, large centre)*

In the context of the autonomous centres, the mechanism of **flexibility of funding** used in the shape of the “start-up/landing package” has brought as an outcome the attraction of talent.

*It is thanks to money, and above all to the flexibility of the use of money, you can offer this person, not the salary, but landing conditions that make you more competitive than other institutions. For me the key is the use of SeveroOchoa for the landing. For those first two or three years in which the person who arrives and starts their laboratory. ... These initial investments, this start-up package, you can put it only with the SeveroOchoa. Without a SeveroOchoa you couldn't. (Director of an autonomous, applied, large centre)*

The **funding mechanism** has allowed **hiring young doctorate and postdoc** students. Citations from different interviewees:

*Most of the funding has been used to promote contracts for doctoral students and postdoctoral researchers. And that has given a dynamism to the centre. Human capital has increased. It has created a very positive work environment. (Director of an autonomous, applied, small centre)*

*A good example is the recruitment of young researchers that we have been able to attract thanks to this funding. (Director of an autonomous, basic-to-applied, medium centre)*

*The SeveroOchoa has been important because it has allowed us to hire new research groups, hire staff, welcome to the centre, etc. Paying for the*

*research groups would have been difficult otherwise. (Director of an autonomous, basic-to-applied, large centre)*

*It [SeveroOchoa] has contributed to attracting new people. We are increasingly demanding with hiring. There are more researchers in the centre who have ERCs grants. (Director of an autonomous, basic, large centre)*

*SeveroOchoa has helped us to attract foreign researchers from abroad. We have incorporated people like ... who were at University College London. It has allowed us people who are young or middle-aged, one of them has gotten the Consolidator. It has allowed us to grow, consolidating the lines of research that we had. (Director of an autonomous, applied, medium centre)*

These findings are **backed by published literature** that studied the CoE and PFIB in different contexts. They all indicate that the research **centres of excellence allow more focus on HR skills and development** than other research organisations (Hellström, 2018; Aksnes et al, 2012; Beerkens, 2009; Leach, 2009).

### Agency and self esteem

Agency and self-esteem is another effect that was drawn as a conclusion of the research and after the interviews with the directors. **This outcome shows no specific pattern in the contextual aspects.** The centres that show to have created it are from different legal personalities, sizes, research fields, etc. The **mechanism** that has triggered this outcome is **the award/labelling dimension.**

Firstly, an observed outcome has been the **recognition effect and the satisfaction** of the researchers:

*Internal [change] in the sense that the self-satisfaction of the members of the centre has increased so much. Being a SeveroOchoa centre has a euphoric effect. The members of the centre feel happy to be a SeveroOchoa centre and understand it as recognition of their work.*  
(Director of an autonomous, basic, large centre)

*There are people here who say that "It is very cold outside of SeveroOchoa". It is true. Researchers are aware that belonging to a centre of excellence presents them as researchers of excellence.* (Director of a mixed, basic, medium centre)

*We are recognised as a "centre of excellence" and we feel that way.*  
(Director of an autonomous, basic-to-applied, large centre)

Some directors observe an **increased agency and motivation** among their staff to participate in the decision making.

*The SeveroOchoa has influenced a lot in how we feel about ourselves. Back in 2011 when we presented the proposal, no one believed that we could get it. Nowadays we feel different.* (Director of a mixed, basic, small centre)

*People are proud to be in a centre of excellence, they attach importance to it. In meetings, there is always some suggestion like "Look at this [proposal, activity] for the next project [SO application], it could be taken into account." People are more motivated.* (Director of a CSIC, basic-to-applied, large centre)

In addition, change was observed in the internal culture and drive for improvement. Some directors recognise a change in the **culture of belonging to excellence as a drive for continuous improvement.**

*It also supposes an internal change of culture, an interesting change for a centre that did not have one [the SO award], for a centre that was small*

*like us, it is a leap from quality to excellence, to say “Yes, we can!”. To be able to think that suddenly the work we are doing has allowed us to enter to another dimension, and that we have to keep improving to stay there. ...The internal dimension for me is the centre, the fact of having that self-recognition, of thinking that now you have to give more. (Director of an autonomous, applied, medium centre)*

*It is also the awareness of the centre that we are in the elite of the country and that we have to be in the international elite as well. This awareness creates more progress. (Director of an autonomous, basic-to-applied, medium centre)*

Finally, the directors observe changes in the **internal atmosphere and cohesion** in their centres:

*You notice you are in a centre of excellence as soon as you enter. It seems that you learn simply by breathing what is in there, and for that, you have to create a positive environment, of collaboration and of healthy competition. We still have a lot to do, because ours is a very young centre; but I think that largely, the germ of this is already here - and this has been thanks to SeveroOchoa. (Director of an autonomous, applied, small centre)*

*By encompassing 5 main lines of research, the teams themselves have a more complete vision of the centre. ... This has been enabled by the program [SO] itself. (Director of an autonomous, basic-to-applied, large centre)*

The most identified **mechanism that has triggered the self-esteem of the researchers** in the awarded has been the award, labelling dimension.

*Above all the labelling, the prize. Sharing the map with your peers that are super recognised research centres immediately makes you enter the*

*“mental scheme” of that [excellence]. (Director of an autonomous, applied, large centre)*

*It is clearly the medal. I would say that these have been the biggest impacts of the distinction [dimension]: increasing the self-pride of the centre and the external recognition for the centre’s quality. (Director of an autonomous, basic, large centre)*

**None of the publications on the CoE or PFIB reviewed during this research focused on the agency and self-esteem as an effect of the policy instrument, making these findings original for this particular area of study.**

### Growth – “virtuous circle”

Another unintended effect related to the SO has been that of the growth of the centres that were awarded. **This outcome is only related to one contextual characteristic: the autonomous centres.** Among the autonomous ones, the pattern of characteristics is lost, because there are centres of the three sizes (small, middle and big), and of all the types of research (basic, basic-to-applied and applied). **The mechanisms that have triggered this growth have been the SO as a whole, the funding, its flexibility/versatility and the award dimension.**

The characteristics of the SO funding have made possible a leverage, multiplicative effect on the centres.

*SeveroOchoa's money has served us: for each euro obtained, we have multiplied it by competitive money. In this sense, it has been very positive.*

*(Director of an autonomous, applied, medium centre)*

The novelty of the funding, being the first **institutional performance-based funding** at national level is mentioned, especially for supporting growth. Some reflections, each from different directors, are given.

*SeveroOchoa is flexible and allows you to do everything that others [instruments] do not allow you to do. This flexibility really has a lot of value and it has helped us a lot. If not, we would not have been able to grow that much. (Director of an autonomous, applied, large centre)*

*From 2013 until now we have tripled the volume of competitive funding. We have gone from being about 180 [people] that we were then, to more than 320 now. We have expanded in a very complex time. (Director of an autonomous, applied, medium centre)*

The recognition for **growth of the scientific domain** is mentioned.

*It has been from night to day. On the one hand, the economic aid in the centre is a lot, because it is not a large centre, and it has allowed us to participate and develop programs that otherwise would have been impossible, but then the quality label that SeveroOchoa represents is no less important; and since it is the only centre for ... (scientific domain) at the state level, it gives you visibility not only to the centre as such, but to the...(scientific domain) as a whole, which was necessary. (Director of an autonomous, applied, small centre)*

The highlights of **growth in complex financial times for research and innovation** are given.

*I believe that in the last decade the institutions have entered either a vicious cycle or a virtuous one. Either they have been closed up at the local level, or they have run out of national funds and have entered a certain crisis, or they have been able to open up at the European level, at least, and that has allowed them to survive and grow. In our case, for example, in 2011 I think I remember that we did not reach 300 people, now we are 620, with the same contribution of structural funding from our founders and, therefore, with growth only attributable to competitive funds and*

*business contracts – this comes from our increase in quality. (Director of an autonomous, applied, large centre)*

### **INTERIM SUMMARY**

This section explored the **effects that the SO has had in the awarded centres** by navigating in the intended outcomes designed by the programme's conceptual model of impact.

As the award is given for four years, the **first-round of the awarded centres** was studied – in total 20 centres – and their context characteristics were categorised. The four intended outcomes and their effects were explored and checked with information from the public sources and semi-structured interviews with the 20 scientific directors.

The results brought up the most remarkable **mechanisms of the programmes that were triggered in different contexts** and that produced effects related to the intended outcomes of the policy makers at the time of the programme design, as well as unintended effects.

With regards to the “**Intended Outcome at system level: “Fund, value, recognise and highlight the best research structures of the system.”** The award dimension of the SO is very important for the programme. It has generated most the feeling of recognition. It responds to the intended outcome. As **a recommendation to the ministry** it would be to raise the award profile and associate it with other policy related and visibility etc. actions.

With regards to the Intended Outcome at nodal level: “**Create flexible structures with possibility to create strategy and scientific leadership.**” in terms of **scientific quality changes**, in general it is claimed the programme has influenced in raising the centres' scientific quality when they are usually smaller in size, giving them

resilience, when they are bigger; enabling them to carry out structural changes and perform new programmes that have led to a higher scientific quality. The crisis appears to be as an external contextual aspect that, in spite of being there, has not affected the awarded centres and the SO programme is recognised for achieving it, for making the centres more resilient.

In terms of **strategic changes**, enabling strategic capacities at centre level was one of the initial policy ideas and it was in the centre of the conceptual model of impact of this programme. SO has generated strategy changes at the centres, such as the creation of a strategy at centre level, sharpening the focus of the strategy to new scientific areas; reinforcing research; and supporting strategy implementation.

The only contextual characteristics that show a clear pattern of outcome is the legal personality of the centre. In the case of CSIC centres SO supported strategy creation. The research shows that CSIC-only centres used SO to create their scientific strategy at centre level. This is different from the other mixed (CSIC-university) or autonomous centres.

In the mixed centres the Severo Ochoa and its characteristics have enabled that the strategy makes the institute more inclusive, by actually creating it. It has empowered the research lines and as well it has enabled the centres to be present in emerging lines at international level. It has made the scientific strategy focus more into research and have less industrial pressure. As well it has enabled refining of the strategic plans and it has been focused entirely in the centre's strategy. In some centres it has **supported the implementation** of the strategy.

The **funding dimension of the SO** has made centres think on an executable strategy, different from that of CSIC that is an annual action plan without resources. The funding has supported some centres to create a more impactful

(especially international) scientific strategy. Under the funding dimension it is the flexibility/versatility of the SO funding that is repeatedly highlighted and it has effected the strategy process, with a range of outcomes: to participate to new international projects, to promote interdisciplinarity between groups, to have ground-breaking and fruitful ideas. In the strategy changes the mechanism of the call for proposals was seen as a useful exercise.

In the context of the autonomous centres the SO programme was mainly used to improve the existing strategy, to add new areas or to reinforce the research in the strategy. The programme has enabled some of the centres to have a longer term vision, because of its renewal characteristic. In other cases it has professionalised strategy making, through the creation of new structures in the centre.

In terms of the **governance changes**, these were not triggered by any external contextual aspects, but only internal ones, and most specifically the legal personality of the centres. On the CSIC centres the SO as a whole has triggered either “traumatic” processes of top-down changes of leadership or ad-hoc practical changes in governance that, being related to the SO processes, created a structure for monitoring talent or for the community users enhancing the intra-collaboration in the centre. For the mixed CSIC-universities centres that lack of legal personality and function under the umbrella of either the CSIC or the universities depending on the project that is being executed, the SO as a whole, whenever it has triggered change in governance it has been regarding the change in leadership, and the creation of the SO own governance inside the centre’s governance. The directors of these centres show to have had many restrictions when executing the grant, restrictions or delays that were mainly connected to the intermediary situation of the CSIC HQ and the general public administration rules applied to research management and recruiting during the

financial crisis. And finally, the governance changes in the autonomous centres, whenever they occur, are related to the growth of the centre because of the SO effects such as claimed, and therefore the creation of new governance structures or the reorganisation of organisational aspects at centre level to foster mostly the effectiveness of planning and possibilities for strategy making. As regards to the freedom these directors felt to execute the grant, all of them had a clear opinion on the positive side of type of funding, highlighting its flexibility and versatility that has raised the effectiveness of the governance itself in carrying out the set objectives.

With regards to the **Administration and Management Changes**, as a conclusion, in the context of the CSIC centres the funding of SO as a mechanism has reinforced the management and administration of the centres in terms of strengthening the project management through hiring professionalised staff. This has raised the capacity in project management by supporting the researchers, mainly related to international projects. It has as well professionalised the project management in the centres. The execution of SO funding has encountered several barriers due to the public administration legislation on the spending of public funding in terms of purchase of materials and recruitment of staff. The intermediation with the CSIC HQ has prolonged the procedures of both purchasing and hiring that has generated the feeling of being less competitive compared to foundation-like autonomous centres. The CSIC mechanism to contract outside of the Labour Agreement for postdoc students is seen as useful in the context of the CSIC centres.

In the context of the mixed CSIC-University centres, the mechanism of the SO funding has triggered change in the administration and management of the centre by 1) creating new structures of support for research, such as European Offices, Gender and RRI office, etc., and 2) strengthening the capacities in

research support through hiring professional staff on project management and technical staff. The results of these changes have been an increased number of European projects and initiatives being coordinated by these centres, and therefore raising their leadership capacities internationally. The mixed centres have encountered difficulties in both purchasing and recruiting, very much in line with the ones faced by CSIC centres.

The autonomous centres have a legal personality and they show flexibility in the management of research. In their context, the SO as a mechanism has enabled **change in their administration and management** by strengthening their research support structure with Technology Transfer and Innovation Units, Communication and Outreach Units, etc. It has as well increased the capacities of the already existing structures in these centres through raising the activities in RRI, HR and training and Outreach and visibility of the centres.

With regards to the Intended Outcome at both nodal and system level: **“Create impact at centre level and system one.”** The various types of impact are interconnected. More research is needed to understand the impact processes thoroughly.

In terms of **cultural impact**, in different contexts the mechanism of SO as a whole shows to generate cultural impact, although this is sometimes identified in concrete activities in the specific period of time and some other times, it is identified as a longer term intrinsic characteristic of the centre.

As for the **economic compact**, it is observed by all the SO centres of all the contextual aspects, except for the CSIC only ones and the basic research ones. The mechanism of SO as a whole and that of the funding have triggered this impact that is highlighted through different aspects. Firstly, it is recognised mainly at a local level; secondly it is seen through the generation of new companies, mainly start-ups of the centres; thirdly, it is seen through an increase

of collaboration with industry through technology transfer and liaison actions; fourthly the SO centres are important employment generation actors in their territories, producing high quality employment; and lastly, these centres attract international investors, students, etc. by generating additional income to the centres.

**Global impact** is one of the most highlighted ones by the interviewees. The centres' excellence is seen globally, through leadership of international initiatives. SO has supported the most remarked activities for the global dimension of impact of the awarded centres through funding and implementation, whenever there were leadership activities from the centres, and as well the award/labelling dimension of the programme has been important as a mechanism to make centres more international and to attract the attention for international collaboration.

The **health impact** was generated in different contexts through the mechanism of SO and its funding and labelling dimensions. This impact is generated by developing new lines of research in health, by strengthening their health related structure in their centres, by creating spin-offs in the health field, and by raising their relevance and recognition as health focused centres of excellence in research.

With regards to the **policy impact**, in all the contextual characteristics the mechanisms of the SO programme as a whole, the award dimension programme and the Alliance of the SO Centres of Excellence and Maria de Maeztu Units of Excellence (SOMMA) have triggered policy impact mainly to the state government. In some of the centres, located in less R&D intensive regions the policy impact has had effects in the regional governments through consultation activities in the process of design of new policy instruments.

**Social impact** is one of the most widespread among the SO centres and it has been influenced by the SO programme, its funding and its award/label dimension. The social impact is seen through institutionalising and professionalising the outreach activities of the centre and increasing the centres' visibility to the press, mass and social media.

As for the **technological impact**, developing and improving technologies has been observed nearly in all of the contextual aspects of the SO centres, triggered by mechanisms of the programme itself and its funding. This has allowed the awarded centres to institutionalise their technology and innovation offices, it has enabled centres to combine funding for larger investments, and it has affected directly their collaboration with larger industrial companies at international level.

Regarding the **partnership changes created**, the research has explored the intended outcome "**Create impact at centre level and system one.**" the creation of new strategic partnerships was seen as important from the policy makers. This was explored during the research to the centres, the identification in which context and what mechanisms have triggered the creation of partnerships. The contextual aspects that have influenced most the establishment of partnerships has been the legal personality of the centres, whilst the other contextual characteristics do not show an important difference.

In case of the CSIC centres partnerships have been created with industry, in spite of the difficulties in terms of time laps. The companies have been mainly foreigners. In case of the mixed centres partnerships have been created with the private stakeholders at both national and international level, and at regional level fostered by the regional government. In case of the autonomous centres there have been various types of partnerships triggered by several mechanisms. The award label dimension has raised the visibility of the centres mainly with the

private stakeholders/ businesses at national level. On the other hand, the funding dimension through its flexibility/versatility has enabled that the SO centres were ready to lead and participate in the newest most important scientific strategic partnerships created in the last years. Some strategy-oriented flexible funding has raised the dynamism and contribution of the centres to collaborate at local, national and international level. The leadership and constitution of strategic partnership is not only at European but at international level with some of the top performing institutions worldwide. At national level creating functional networks among the SO centres is another outcome of the SO programme. In spite of the fact that most of the mentioned partnerships have been at international level, the national cooperation seems to have risen because of the SO.

With regards to the **sponsorship changes**, the research identifies that in spite of several difficulties that the centres may have encountered to enhance their sponsorship effectiveness, the award/labelling dimension of the SO has influenced the centre's attraction of patronage in different contexts. The most observed compromise is that of LaCaixa that has supported the SO centres with doctoral and postdoctoral fellows since 2013. Most remarkably the autonomous centres have been able to use the award to attract funding, to reaffirm the compromise of their donors, to create initiatives that can target possible sponsors for their centres and to attract more foundations to support their scientific activity.

With regards to the Intended Outcome at system level: **Change behaviour of CSIC and influence the universities to promote excellence oriented structures**", the policy makers that created SO believed that it may influence the changes in behaviour of CSIC and as well influence the universities to promote excellence oriented structures. Research has shown that the behaviour of CSIC to the

awarded centres is dependent to the leadership of the organisation and during the years of SO under study the CSIC has not showed any interest for the centres and it has not supported them. There is no evidence that CSIC undertook any excellence related activity during that period influenced by SO. Evidence shows that universities have taken some steps ahead into promoting SO centres and easing their administration and management procedures. As for the autonomous centres they have seen their relationship with their core founders reinforced due to SO award. In some cases they are part of new partnerships at regional level because of having been recognised as SO centres, such as the case of the Barcelona Institute of Science and Technology (BIST).

**Talent attraction and retention is one of the unintended effects of the Programme.** The research shows that the SO has affected all of the awarded centres in terms of their capacity and ambition to attract and retain top world Human Resources in their field of activity. The effects it has had in the centres come out during many of the changes or impacts produced. It is a cross-cutting effect is observed in all the centres, with some nuances triggered by the legal personality of the centres.

**Agency and self-esteem** is another effect that was drawn as a conclusion of the research and after the interviews with the directors. This outcome shows no specific pattern in the contextual aspects.

Another unintended effect related to the SO has been that of **the growth of the centres that were awarded**. This outcome is only related to one contextual characteristic: the autonomous centres. Among the autonomous the pattern of characteristics is lost, because there are centres of the three sizes (small, mid and big), and of all the types of research (basic, basic-to-applied and applied).

The mechanisms that have triggered this growth have been the SO as a whole, the funding, its flexibility/versatility and the award dimension.

As a continuation, the next section considers the **limitations of the study**.

## LIMITATIONS

This section focuses on limitations related to the research outcomes. The ones related to the methods and techniques of research are given under the [Chapter III. Research Design and Methods](#).

The **evaluation findings that are bound to data interpretation need to be taken into consideration as my viewpoint**, a person who was involved with the programme and therefore has exercised the insider's perspective as well as the researcher whose objective is to unpack and understand reality. This construction of information may be a limitation for the findings.

The new approach of evaluation used in this case and deployed through context-mechanisms-outcomes configurations with the objective to understand in which context the mechanism would trigger an outcome requires at times **an effort of simplification that may contradict the complexity of the policy nature**. This reiterates that my opinion on interpreting the data becomes itself a limitation, in spite of the opportunities offered by the critical realist perspective when generating causality.

The **pattern of intended outcomes** that was drawn when researching on the conceptual model of impact of the programme may suffer of over simplification and interpretation of the researcher. The most observed intended outcomes were selected and given as related to Stage 1 "Drawing the Conceptual Model of Impact" of the research. When understanding the effects of the programme in the 20 awarded centres, the theory was tested through an iteration between the written facts and the analysis, and it is constructed depending on the main

contextual characteristics of the centre and the mechanisms that triggered one or another characteristic.

The study focused on understanding the **effects of the SO in the awarded centres** and understanding where it worked best and under what conditions. This means that the 20 centres under study both in terms of information and interviews were the centres that were awarded during the first four years of the programme. This may have influenced the research from the perspective and interest of showing success and presenting the programme as successful.

As a sole DPA researcher I was **limited to data gathering from the awarded centres** because deliberately the focus of the research was the one to understand in what circumstances the programme had worked best, but having chosen another focus, I might have been attentive to **the non-awarded centres, that for this particular occasion were not analysed**. Data from the rest of the centres, or the non-awarded ones **would have allowed this study to provide more validation and place in a broader context some of the claims** given above. Intensive data collection and data analysis is required for a fully fledged critical realist study where a team is needed to pull together different branches of analysis.

My **double-role as the researcher and policy officer** for the public evaluation done through this practice with the objective to generate learning for the public administration, may have its **limitation on the findings making them more bound to the opinions that the others may have about me** in the institution – this may affect the use of the findings. Although the critical realists indicate that the inclusion of the policy makers in the process of evaluation increases the probabilities for evaluation uptake, this is a very context-and-person-bound judgement.

Ultimately, it is necessary to highlight that the point of the research carried out under this study is as much to understand the impact of the SO programme and how it was implemented, as it was to explore the application of the critical realist methods to the evaluation of science policy.

## SUMMARY

This chapter drew in detail the **findings** from the theory based realistic evaluation of the Severo Ochoa Centres of Excellence Programme.

The **conceptual model of impact of the SO was developed** and explained. From a systemic and nodal perspective four main context-mechanism-outcome configurations were drawn. In broad lines, in the context of economic plenitude (previous to 2008-2011 National Plan) the universities requested structural funding and the international indicators showed that the Spanish STI system was little competitive, as well as the policy makers had identified the lack of promotion of excellence at institutional level, bringing as an outcome the design of the National Programme of Institutional Strengthening (in the National Plan 2008-2011). In a following context of economic crisis and the last year in power, as well as the contextual characteristics previously identified by the policymakers, created a “Severo Ochoa” Centres of Excellence Programme that would use as a mechanism the valorisation of excellence at institutional level, and the structural funding to create scientific strategy at centre level, to bring out **four main intended outcomes**: Fund, value and recognise and highlight the best research structures of the system; Create flexible structures with possibility to create strategy and scientific leadership; Create impact at centre and system level; and Change behaviour of CSIC and influence the universities to promote excellence oriented structures.

Based on those intended outcomes **the research explored the effects of the SO in the awarded centres and beyond**, and it identified three main unintended effects such as: 1) talent recruitment, attraction and retention, 2) agency and self-esteem, and 3) growth. In brief, the programme has generated change in all the centres and the contextual factors have played an important role on triggering more some components of the programme than others.

The realist evaluation findings were given when carrying out the SO evaluation and by highlighting the use of five components of the so called critical realism offered to respond to challenges of science policy evaluation.

The next section will **conclude by reflecting on the optimal use of the critical realist approach for science policy evaluation** and the **limitations and challenges** arising from the application of critical realism on this study.

## CHAPTER V. CONCLUSIONS

This research report drew out the **theory based realistic evaluation of the “Severo Ochoa” Centres of Excellence Programme** - launched by the Spanish government in 2011 - a science policy instrument that awards centres of excellence in research and grants performance based institutional funding to these entities with a duration of four years.

The research was carried out in the framework of a **Doctorate in Public Administration Programme (DPA)** that started in September 2015 and finalised in October 2020, time during which I have been mostly<sup>64</sup> employed for and by the ministerial department in charge of science policy in Spain. The research project is registered with the UCL Research Ethics Committee - number 8435/001, dated 6 May 2016 - and it has rigorously followed the UCL Ethical Guidelines.

### APPLYING CRITICAL REALISM IN SCIENCE POLICY EVALUATION

The decision to apply a critical realist approach to understand the impact of the “Severo Ochoa” Centres of Excellence Programme was taken after having revised **the ways the evaluation of science policy was carried out** in general, and more specifically that of the performance based institutional funding instruments (PBIF) and centres of excellence (CoE)<sup>65</sup>. As a result of the analysis, a general way of evaluation was detected, focusing on **performance, systemic changes and economic impact**, and more specifically focusing on publications (Caetano, 2015; Scheider, 2015; Bloch et. al, 2016; Pizar, 2017; IEKE Evaluation,

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<sup>64</sup> Since the start of the DPA till September 2016 and from October 2018 to-date.

<sup>65</sup> Such as in the section [Evaluating Science Policy and The Spanish Context](#)

2017; Buckle, 2018; Checchi, 2019; Matthies, 2019); on the broad changes in the scientific system (Good, 2015; Flink and Simon, 2015; Martin Sadersai, 2017; Knie and Simon, 2019) and in the economic activity (Lunderquist and Anders Waxell, 2010; Rosli and Rossi, 2016). These studies fall under the **positivistic perspective at large**.

For decades now **science policy scholars had identified issues related to the approaches of evaluating science policy** (Cozzens 1997; Georghiou 1998, Salter and Martin, 2001; Shapira and Kuhlmann 2003, Martin 2011, 2016, 2019, Feller 2017) related to the accountability (Georghiou, 1998, Cozzens, 2003; Rip, 2003; Martin 2011) beyond the value for money; the social enquiry and the need to understanding context and how a policy works in a particular context (Martin 2016); a need for the adaptability of methods to the demands (Georghiou, 1998; Wallace and Rafols, 2015; Martin 2016, 2019) and the need to increase the use of the evaluations.

As a result of the existing evidence searched for this study, and the identified challenges from the science policy scholars, the research brought forward through the realist evaluation of the “Severo Ochoa” Centres of Excellence Programme has used as a pilot study **a new critical realist approach to understand from a realist angle the impact of the programme by addressing the science policy challenges**.

As a continuation, I reflect on the effects of the evaluated policy by using the critical realist approach.

### *THE EFFECTS OF THE “SEVERO OCHOA” PROGRAMME*

The results of the theory driven realist evaluation of the “Severo Ochoa” Centres of Excellence Programme that understood what works best, under what conditions and why in all the awarded centres during the first round of the

programme, 2011-2014 highlight the following three items, followed by three sets of effects that compose the impact that the policy instrument has achieved.

Firstly, the research shows **that talent attraction and retention is a prime effect** of the SO programme. It has affected all the centres in terms of their capacity and ambition to attract and retain top world Human Resources in their field of activity. This effect shows no dependence on the contextual aspects in terms of the centre's ambition. The centres that have had autonomy in their Human Resources management have been more effective in attracting and retaining talent.

Secondly, there are strong indications that the **mechanism of funding with its dimension of flexibility/versatility** has been important to enable growth in the awarded centres in all the contexts.

Thirdly, **agency and self-esteem** is an effect that was drawn as a conclusion of the research, with no specific pattern in the contextual aspects.

As a continuation are given the three sets of conclusions and a reflection on them.

#### [Scientific quality, impact, partnerships and patronage](#)

The research shows that the programme has enabled the centres to carry out **structural changes and perform new programmes that have led to a higher scientific quality**. The contextual characteristics have triggered the scientific quality change. **Smaller size centres seem to have increased their scientific quality** and there are signs that **bigger centres have become more resilient** maintaining their top scientific quality. The financial crisis appears to be an external contextual aspect that has not affected the scientific quality of the awarded centres, and the SO is recognised as a direct link for it. Yet, more

research is needed to draw this link. In other studies the increase in the scientific performance is seen through bibliometric revisions and peer review evaluations. Differently from this I undertook a pure qualitative approach to understand the impact of the policy in the selected institutions, that are only a few in the whole system of research. Nevertheless, in line with Bloch et al.'s study (2016), the increase in the research performance in smaller centres is sustained in a given period in smaller sized centres.

The research shows that **a wide range of interconnected impacts is associated to the SO** in the activity realised by the awarded centres, such as: cultural, economic, global, health, policy, social, and technological (in alphabetical order), being **the global one the most highlighted one**. Both the funding dimension and the award dimension of the SO programme seem to work as mechanisms for impact. Impact is triggered more in certain contexts than others, such as explained under [Chapter IV. Findings](#). The various types of impact are **interconnected**. More research is needed to understand the impact processes thoroughly, and more focus would be placed in exploring the sustainability dimension and green transition.

The research observed that the programme has affected the **partnership creation and leadership** of the centres, **influenced by the legal personality** of them, being the autonomous ones who have been more active and effective for partnership creation. In spite of the fact that most of the identified partnerships have been at international level, national cooperation seems to have risen as a consequence of the programme. The relations with industry are identified and analysed in these partnerships. These are well recognised effects (Lunderquist and Waxell, 2010; OECD, 2014; Rosli and Rossi, 2016). My research analyses this effect in detail. It understands that it is triggered from the high recognition

dimension that the award has produced, as well as the funding's flexibility in use, the strategy, communication and liaison aspects that each centre has prioritised. The understanding given from the qualitative critical realist approach is detailed and analysed per each type of context characteristic and mechanism that has triggered this outcome, in this particular case, the relation with industry.

As regards the **centres' attraction of patronage**, research shows that the award/labelling dimension of the SO has had an influence. The most observed compromise is that of LaCaixa. For other types of collaborations, the research confirms that there are **the autonomous centres have been able to use the award to attract funding**, to reaffirm the compromise of their donors, to create initiatives that can target possible sponsors for their centres and to attract more foundations to support their scientific activity.

#### [Strategy, governance, administration and management](#)

The research finds that SO has generated different **strategy changes** at the centres, such as the creation of a strategy at a centre level, sharpening the focus of the strategy to new scientific areas; reinforcing research; and supporting strategy implementation. These changes were triggered clearly by the legal personality of the centre. In the case of **CSIC centres**, SO enabled the creation of a strategy with possibilities to be implemented. In the **mixed centres**, SO supported the implementation of the strategy. In the **autonomous centres**, SO reinforced the research aspects of the existing strategy. The research highlights as an important enabler of the creation of a longer-term vision of the centres, the renewal characteristic of SO.

As regards **the governance** changes, the research shows that the SO has influenced some in the awarded centres. These changes were **triggered mainly by the legal personality as a contextual aspect**. In the **CSIC centres** the research

shows that the SO as a whole has triggered either “traumatic” processes of top-down leadership changes or ad-hoc practical variations in governance. More research is needed in this aspect to understand if the SO has been the cause of these changes, or it has been used as the pretext for them. In **the mixed centres**, whenever SO has triggered a change, it has been related to one in leadership, and the creation of “a SO own governance” inside the centre’s one. In **the autonomous centres**, whenever governance changes occurred related to SO, they were related to the growth of the centre or reorganisation to improve effectiveness in planning and execution.

With regards to the **Administration and Management Changes** the SO has produced **diverse changes triggered by the context where it has operated**. The research shows that in **the CSIC centres** it has strengthened project management by hiring professionalised staff, with difficulties due to the prolonged administrative procedures. In the **mixed centres** SO has **enabled the creation of new research support structures**, that have encountered difficulties in both purchasing and recruiting in line with the one faced by the CSIC centres. In the **autonomous centres** the SO strengthened the research support structures, such as units of technology transfer and innovation, communication and outreach ones; as well as it has increased capacities in Responsible Research and Innovation, Human Resources and training.

Literature recognises that the **CoE are a policy instrument that improves research organisation and the capacity for priority setting** (Borlaug, 2019; Hellström, 2017), because of observations carried out in specific fields, such as humanities (Borlaug, 2019) and mapping of results of 12 CoEs (Heellström 2018). No study goes into the detail of understanding the contexts that trigger the policy to produce the observed outcomes and what dimension of the policy is

allowing that change, such as I illustrate above in the case of the “Severo Ochoa” Centres of Excellence programme.

### New relations with funders

The research shows that the SO has generated **a feeling of recognition from the state government** to the awarded centres. The most important mechanism here has been the award dimension of the programme, even though there is a claim that it has not been fully exploited.

Research shows that due to the SO **the regional governments** have taken actions to either **reinforce institutional excellence** (in the case of the most research intensive ones) or to support the awarded centres into their excellence path, and to establish new ways of communication with these centres (in the less research intensive ones).

As regards the behaviour of the **Spanish National Research Council (CSIC)**, it is observed that it is dependent to the leadership of the institution. During a period of time the CSIC has not showed any support. There is no evidence that CSIC undertook any excellence related activity during that period influenced by SO.

Evidence shows that **universities** have taken some steps into promoting SO centres and easing their administration and management procedures. The relationship with **other core funders** is reinforced for the autonomous centres due to the SO award dimension of the Programme.

The science policy literature has researched upon the relationship of excellence and funders and the arrangements of trust and control for the promotion of science (Maasen and Dickel, 2019), but this is not assessed in such an applied manner and in the specific case of a policy instrument.

The realist approach has brought forward in **detail a pattern of new relationships with the founders** such as detailed by the 20 centres that have been assessed here by including the mechanisms and the contextual aspects of the centres. In some cases the direction is explicitly linked to the SO effect, such as reported. Nevertheless, more research is needed to understand the perspective of the funders, that due to the resources available for the DPA is not carried out.

#### Originality of effects through a realist lens

As my study was initiated with the main reason **to understand where the programme has worked better and why** with the objective to produce change, the study itself was built as a theory based realistic evaluation. None of the Performance Based Institutional Funding or Centres of Excellence literature has taken the same approach. The congruency on the design of the research and understanding the specificities of the instrument and its context over time, as well as of the centres where it has been applied and their context over time is key for giving and explaining the results and building some relationship between the observed effects and the policy instrument, a challenge that remains to be embraced for many other policy programmes. The contribution my research makes, beyond contextual or descriptive comparison, is the approach it takes to reach these results, focusing on a thorough understanding of the policy through the policy insider perspective.

The effects of the SO given above **would have not been possible by a standard evaluation** that would focus on the scientific performance through bibliometric analysis either would have been probable by introducing a positivistic approach in search of a unique truth. The effects of the policy were triggered by contexts and by mechanisms that operate differently in different context. Beyond what

the policy aimed to impact it is the understanding of how it is implemented in the 20 centres that the research was focused to.

The next section focuses on how the critical realist approach has responded to the challenges of science policy evaluation in this particular case.

### *RETHINKING SCIENCE POLICY EVALUATION*

The **critical realist perspective used here has enabled a rethinking of science policy evaluation** responding to identified challenges of the discipline – it has therefore brought novelty at both academic and policy level. It is the first time that a realistic approach is used in evaluating science policy. This section firstly outlines how programme theory seen as a unit of analysis allows a broader epistemology, then it checks on the generative causality for better understanding of context, followed by the cumulative theory testing component for a more adaptable social inquiry; a pattern of outcomes for a greater accountability, and finally, emancipation for change for more and better use of policy evaluation.

#### Theory as a unit of analysis for a broader epistemology

Public policy evaluation is based on understanding the nature and validity of knowledge of the object under evaluation, and the sectoral policy – the science policy one – can become even more challenging as the sciences themselves are based on different epistemic attitudes (Pestre, 2007), and because science and policy have different natures (Pedersen, 2014). This is why **the epistemology of science policy evaluation needs to embrace openness**, and to build understanding on the object under evaluation in an inclusive way.

The philosophical approach of **critical realism shows a double recognition of both the objective and the subjective** (O'Mahoney and Vincent 2014), explains a deeper reality determined by multiple factors (Bhaskar 1993; Elder-Vass 2010),

and it takes, therefore, an open position towards the epistemological perspectives. **This approach tackles the first challenge of science policy evaluation: that of a broader understanding.** The critical realist lens sees as the object of analysis not the programme itself, but all the ideas and assumptions about how the programme is supposed to work, and that is the theory, the programme theory (Pawson et al. 2005).

Through the realist evaluation approach, a pragmatic way of applying the critical realist philosophy, the evaluation of the SO programme offered to create a **“unit of analysis for the programme”** by bringing together the information that was published on the programme, and the ideas and assumptions of the most involved senior and political policy makers that conceptualised the programme before and during the time of its launch. The actual findings on this are found in the section [“Understanding the Conceptual Model of Impact”](#)

The **“theory as a unit of analysis”** approach such as conceptualised by the critical realist perspective could be useful for different types of policy instruments in different contexts. In the case of this particular research, it offered a more comprehensive approach towards programme evaluation in the Spanish public administration. In a policy making environment **where there exists no formalised practice of policy and programme evaluation** it is important to bring a broader epistemological perspective of the value judgements related to any aspect of policymaking, and in particular to a policy instrument in place quite recently and with a high political support at the time of its launch, and to include the five solutions brought by the realist perspective that of the generative causality, a commitment on using scientific methods through cumulative theory testing, a pattern of outcomes that responds to the increased need to understand and demonstrate impact (accountability) and of course that of evaluation uptake and use of evaluation by the policy makers.

For all the above, **the realist perspective responds to a repeated challenge of science policy scholars** (Cozzens 1997; Georghiou 1998, Salter and Martin, 2001; Shapira and Kuhlmann 2003, Martin 2011, 2016, 2019, Feller 2017) who have identified that a broader epistemology is certainly needed for science policy evaluation.

#### Generative causality for better understanding context

As a continuation to reaching a broader epistemology, the need to a better and **more understanding of an ever evolving and complex context** has been identified (Martin, 2016) as one of the challenges for science and innovation policy studies.

The findings that the generative causality perspective has brought to this particular research have enabled **a clearer understanding of the contexts that the programme was created in and where it operates now**. It has allowed to identify these contexts and the mechanisms (people, ideas, the SO itself and its components) that have triggered the outcomes. The CMO configurations highlight this clearly.

As seen under the Findings, the realist evaluation approach has captured not only the conceptual model of impact of the policy, but as well how it has been **implemented in the different Spanish institutions that have different contexts**, at least from the perspective of successful SO institutions. The evaluation allows to highlight what has the programme and its components appear to have caused, how they have been understood by the centres' leaders and how they have been used and with what mechanisms (internal to the policy or external to it) this has happened.

Drawing these causalities and being able to connect them to context characteristics (e.g.: the centres' size, legal personality, etc.) it has been

important to identify **where the SO is creating change and seeing how it is so dependent of the context aspects of each centre**. In a country as diverse as Spain where there exist differences in the research entities themselves (having or not a legal personality, being centres of CSIC, universities or mixed, etc.) and in the prioritisation and funding of the research system (done at state and regional level) it is fundamental to be able to highlight and explain how the context and the managed mechanisms create impact.

Another finding to be highlighted from the realist perspective is the **capturing of the unintended effects and the associated causality that the programme theory has**. The space that is created through the approach of “theory as a unit of analysis” and the “causation as a sum of people’s intervention with the object, the policy” as well as the cumulative theory testing (to be seen below) allows the opportunity to shed light to new aspects (be it context aspects, mechanisms or outcomes) that at the first instance may pass unobserved by the researcher.

The realist evaluation approach and the way the realist evaluations are presented (through the CMO configurations) can play an important role into **solving the present challenges of science policy studies**, and more specifically the one of understanding complex and ever evolving contexts.

#### [Cumulative theory testing for a more adaptable social enquiry](#)

Social enquiry, the commitment on using scientific methods is at the heart of the public policy studies and therefore public policy evaluation. At the same time, science and innovation policy studies have grown as a somehow rigid discipline with an increased academic homogeneity mainly using quantitative techniques in positivist approaches (Martin, 2016, 2019). The need for more **adaptability of scientific methods to the demands of the public sector in policy evaluation** in

general and science policy evaluation more specifically have been echoed by Wallace and Rafols (2015), Arnold (2004) and Georghiou (1998).

The realist evaluation carried out in this particular use “cumulative theory testing” through the iteration from the analysis of the data to my observations as a reflective practitioner and back to the data through a continuous testing. **This iteration has allowed agility in creating ideas about the programme and how it worked**, in shaping my understanding. This is a “scientific” understanding based in methods and data, beyond my initial comprehension on the programme as a policy officer. More on this is found in [Part II. A Portfolio of Policy and Research Observations and Reflections](#).

As regards the science policy, I have shown that using a realistic approach through the process of cumulative theory testing, to evaluate the SO can be useful and enlightening as it has built the theory and it has clearly shown where the programme has created change and in what conditions. The SO evaluation outcomes shed light on the facts and on the analysis and it combines and includes the two. This makes **the understanding on the programme very specific depending on the contexts and mechanisms** and it does not fall on a value of judgement on the programme, but it builds opinion through a robust and inclusive research approach.

In a framework where stakeholders, context and mechanism features, facts and analysis are included, and where one can make causal links between the intervention and the observed result can be useful for the Spanish public administration institution where the practice of policy or programme evaluation is scarce, or nil (Bustelo, 2006; Molas-Gallart, 2012).

### A pattern of outcomes for a greater accountability

Science policy was influenced by the New Public Management by putting **more emphasis on accountability** (Georghiou 1998) which has been reinforced through establishing more complicated and burdensome mechanisms (Martin 2011), and they have become more prominent in the recent years.

The critical realist perspective allows to see **outcomes as multiple and given in a pattern or configuration**. The same intervention depending on the circumstances works in different ways and it is key to understand for whom, in which context the programme works and why (in line with generative causality above) (Edwards et al 2014). The pattern of outcomes is indicative and inclusive, and it narrates the observed effects through contextualisation and building causality.

In the particular case of this research the CMO realist configurations have drawn **a pattern of intended outcomes and the one of effects in the awarded centres and beyond**. This capture of impact in such a comprehensive way and by placing and connecting one outcome to the rest and to the factors that produced it, is indeed very useful to the public administration that created the programme to produce change in the system. The SO programme is a relatively new instrument (and the only one to offer Performance Based Institutional Funding at state level in Spain) that was firstly launched as a pilot and later it was consolidated. Understanding and being able to explain its impacts can show an increased accountability that the public administration has towards the society, the Science, Technology and Innovation system stakeholders and the civil servants themselves operating or not with the programme. For this **the most highlighted CMOs drawn by the realistic evaluation can be useful and instructive, and can shape future changes on the programme**, if deemed relevant.

As Funnel (2011) stated on the clarity of the log-frame as the instrument of theory-based evaluations to easily communicate the outcomes to the policy maker, the pattern of outcomes drawn by the SO realistic evaluation as CMO configurations demonstrates and communicates clearly the main effects the programme seems to have generated, why and potentially how it has done so. It is to be highlighted that this is the first time this approach has been carried out in science policy studies.

#### “Emancipation for change” for more and better use of policy evaluation

“Emancipation for change” is a term created during this research, and key for the critical realism approach, that encompasses the critical realist perspective on **rising the implication of the policy makers in policy evaluation** and the use of policy-oriented language during and especially on the conclusions of the evaluation.

The use of evaluation has become a key subject of discussion and research from evaluation scholars, due to disappointing observations of the limited impact of many evaluations on public interventions (Pawson and Tilley, 1997; Henry and Mark, 2003; Johnson et al., 2009; Wojtowicz, 2018). There exists a dichotomy on the reasons, some assigning the faults on the characteristics of knowledge for policy making (Hajer and Wagenaar, 2003; Yanow, 2003) or knowledge from programme evaluation itself (Patton, 2012), and some on the organisations that are not able to learn and therefore to adopt evaluations’ knowledge (Hojlund, 2014) or on the context in general. For example, the Spanish public administration has been identified as reluctant to learn (Wojtowicz and Kupiec, 2018) and it is perceived as one of the most static, traditional ones in Europe. (Hammerschmid, et al, 2016), unlike the UK where government departments have integrated evaluators into policy and strategy units - a powerful way of

ensuring that evaluation findings are incorporated into policy development from initial inception through to implementation (Jacob, 2015).

Therefore this particular research has been carried out in a context not used to policy evaluation, and it has been thanks to the selected approach (critical realism) may make the **use of the report easier by the managers and the policy makers of the SO programme**, but at the same time, by incorporating my figure into the evaluation it is bringing in “emancipation for change”: involvement of policy makers (as well integrated during the first part of the research, when drawing the conceptual model of impact) and use of policy-friendly language.

On the “emancipation for change” the realist researcher needs to be sensitive to the research implications and the political potentials (Bhaskar 1986) by acknowledging the human needs (Sayer 2011), and by reaching emancipation through self-awareness (Ram et al. 2014). In this particular case and enabled by the DPA programme **I was the policy officer and the researcher at the same time, happening to be the officer working on the SO programme in its beginning stages**. This guaranteed the implication of policymakers that in the realist research is done through the close involvement since the start, and finally the conclusions are written in a language that can easily inform decision making (Pawson, 2006). In this particular case I am considered as an insider to the policy and have applied the reflective practitioner voice in both my research (such as seen under [Chapter IV. Findings](#)) and the policy practice (such as under [Part II. A Portfolio of Policy and Research Observations and Reflections](#))

As a contribution to the discipline, in spite of the research and the policy portfolio, it is to highlight **a research tool used here and that has been the “research diary”** (Robson, 2016) that has supported my research activity and reflections in a remarkable way. I describe more on the use of the research diary under [Part II. A Portfolio of Policy and Research Observations and Reflections](#).

Another finding is that **the realist perspective gave me as a policymaker a comfortable framework to develop the analysis**, and this is what makes the theory-driven realistic evaluation of SO an even more appropriate approach.

The process that I was involved whilst developing this research is **a process that has trained me as a doctoral researcher**. Training remains one of the driving forces for the institutionalisation of evaluation in Spain (Viñas, 2009; Bustelo, 2006). No data exist on how many evaluation trainees are contributing and collaborating with the public sector. The identified lack of culture of evaluation in Spain may be due to the lack of training in evaluation (Bustelo, 2006) something that in this particular case has been mitigated by the DPA process. The emphasis on training is such that it is one of the factors that allows learning in public organisations to happen (Scott, 2014), but even though people are key in transforming institutions and make them “learning” ones, institutional structure and leadership affects them (Senge, 2006), therefore **the importance of having space inside these organisations to perform evaluation or evaluative thinking**, such as for example in the UK government departments (Jacobs, 2014). Mainly from Scott’s (2014) analytical framework, Senge’s (2006) 5-pillars for a learning organisation and Hammerschmid’s (2016) results of the largest European survey on public administration senior officials, what would enable the Spanish administration to “learn”, is allowing internal staff to reach “personal mastery”, creating teams that communicate and listen, and having structures and institutional leaders/entrepreneurs that enable it.

I believe that this approach, a critical realist, post-positivist one, **may generate more acceptance inside my ministerial department** and the public administrations in charge of science policy because it encompasses a more open epistemology, it demonstrates accountability and it is built under a robust and

adaptable scientific method, as well as it has trained me as a researcher in science policy evaluation.

### ***A CONCLUSIVE REMARK***

The research carried out to perform a theory-driven realist evaluation of the “Severo Ochoa” Centres of Excellence **demonstrate the feasibility and benefits of the critical realism qualitative approach**, meant not to replace the other studies, but to augment them and to bring a new perspective in the science policy evaluation discipline.

There are **shortages of taking a pure qualitative realist approach**, as they are on a pure quantitative ones. My intention here was to focus on a qualitative realist exploration as I developed a strong interest to understand how the programme had worked in the different centres, and what had triggered the results. As a sole DPA candidate I had limited resources to develop a more expanded study and to possibly include an even better understanding of the programme in the awarded and non-awarded centres, and in the whole system.

The **limitations and challenges arising from the application of the approach** that were primarily limited by the resources of a DPA candidate are discussed below.

### **CHALLENGES OF THE REALIST APPROACH IN THIS EVALUATION**

Above I reflected on the decision and process of carrying out a critical realist approach to evaluate a science policy instrument. The focus of my research was not to do a classical economic appraisal (looking at the efficiency of the policy), but **to understand if the policy worked, then how, why and in what circumstances did it do so?** These two goals are quite different, and through critical realism the point is not to replace the positivistic approaches, but to add more value to them. This can be significant for the policymakers as they need to

know in the future what kinds of nuances do the programmes produce triggered by different contexts and how do the mechanisms of a programme operate.

This section reflects on the questions that may be risen by policy makers, the kinds of questions that are traditionally asked of policies, for example: whether the programme and its activities are worthwhile, if these activities produce the outcomes that were expected to produce, if the observed changes would have happened anyway, if the changes are big enough to merit the funding, etc. And in this specific case **the policyowners would be interested to see whether the “Severo Ochoa” worked?** These are operative questions asked by a standard evaluation. Below there is a reflection on these issues based on the data I collected whilst using a critical realist approach and the challenges that arise during the process.

#### *UNDERSTANDING THE EFFECTIVENESS*

The effectiveness of a programme is understood as **the degree to which it is successful in producing a desired result** and producing changes. The research carried out under this study indicates that the changes observed for the research would not have happened without the existence of the SO programme.

First and foremost, data shows that **the ability to attract and retain talent**, including top world renown scientists in some occasions, would have been **impossible without the availability and the versatile nature of the SO funding**.

Secondly, **the growth and “transformative” changes that some of the centres went through** were connected with the existence of the SO programme in both of its dimensions (funding and award) especially for centres that by using the SO became world leaders in a specific area of a field of science.

Thirdly, and enabled again by the flexibility/versatility of SO funding, some centres were able to **position themselves swiftly in international initiatives** because of the availability of a flexible structural funding at their disposal.

These first three effects **are connected to the intended outcome of valorisation of excellence at institutional level** and therefore increasing the impact of the Spanish System of Science, Technology and Innovation internationally.

There are references in the [Findings](#) of directly linked **impacts that the SO has created to some of the centres in a specific context and what specific characteristics of the SO have enabled them.** The programme has produced changes that would not have happened without its existence.

### *UNDERSTANDING EXTERNALITIES*

An externality is understood as **an indirect cost or benefit to an uninvolved third party.** A policy question that may rise in evaluating the SO is if the cost of the non-SO centres (and other actors in the system) has been worth the benefits of these. Such as it can be seen under [Chapter II. Policy Description](#), **the cost of the SO as a percentage of the annual state funding** has reached its highest point of 1,8% of the national research, development and innovation budget in 2015. The rest of the years it has been lower or substantially lower than that. If that funding would have not been invested to support a performance based institutional funding instrument – the centres of excellence of the country – it would have been applied to the subsidies for projects, therefore by the data we can speculate that there has been a more direct benefit to the Spanish research leadership through investing in the SO.

Other types of externalities that are **well observed under the Findings are the relationships with the funders** that the SO centres established as a result of the award. The participation in the Barcelona Institute of Science and Technology

(BIST) of the SO awarded Catalan centres, and other initiatives that were brought forward from the Valencian and Canaries government are directly affected by the SO policy instrument.

### *UNDERSTANDING THE VALUE FOR MONEY*

Another question that may rise from a positivist perspective is if **the transformations are big enough to merit the funding**. Here I can categorise in four options.

Firstly, some observed effects are **proportional to the investment**, and these are related to employment generation, training and recruitment, what in the policy jargon we would call talent attraction and retention.

The second type of investments would be the ones that are reliant on the **scale of funding** to get the scale effect. These would be related to the reorganisation and refocusing of the research activity at institutional level, as well as building transformative strategic research plans, on which the centres were evaluated to receive the award and funding.

A third category of funding is related to its intrinsic nature, in this case it has been **structural funding to be used for developing the strategic research plans of the centres**. This kind of investment with its versatile nature has allowed the centres to generate multiplication – leverage effects of multiple times.

*In these [investments] 25M€ there is 1M€, which is the SeveroOchoa that is flexible and allows you to do everything that others do not allow you to do – that really has a lot of value. (Director autonomous applied large centre)*

A fourth and last category of testing the value for money would be the **non-investment option**. Some effects related to the award dimension of the policy may have been augmented, especially if this would have been exploited to its

maximum capacities by raising the policy relevance and promotion of the centres by the state government.

### *UNDERSTANDING THE EFFICIENCY*

The last challenge for applying the critical realist approach is that of understanding the efficiency of the policy instrument. Questions like: if the effects could have been achieved with less investments, if **the programme has been cost effective and if it has carried out the activities in a timely manner?** The data to answer about the grade of efficiency of the policy sit with the programme managers that receive at the end of the funding period an annual justification of all the expenditures carried out in the framework of this investment. The balance between the cost effectiveness and the timeliness, the period of time to carry out effectively these expenditures, would bring a better understanding on the efficiency. Under a **critical realist perspective the understanding is greater** regarding the contexts that would trigger higher or lower efficiency and the mechanisms put in place by the centres that would enable it. The researcher could see how the efficiency is triggered by the contextual characteristics the centres operate. The differences on the efficiency scale could be better understood by carrying out interviews with the centre's managers and any other member that was responsible of the grant execution at the centre.

### *GENERATING LEARNING FOR THE PUBLIC ADMINISTRATION*

The realistic evaluation of the "Severo Ochoa" Centres of Excellence Programme has **embedded a strong learning component**: that of the inclusion of a reflective practitioner, myself, a policy officer who developed the research and was trained in a doctoral programme, although I was alone in the study and I had limited timeline and resources. Above we have discussed this component as "emancipation for change" a key aspect of the critical realist approach.

The realist approach has generated a **better and nuanced understanding of the whole programme** and therefore it may create more acceptance to use it (Hajer and Wagenaar, 2003) from an optimistic perspective, and in spite of the evidence of lack of the evaluation practice and low motivation of the top officials in the Spanish public administration (Hammerschmid, 2016).

The idea that **institutions can “learn”** is already presented under [Chapter I Understanding the Background and Context to Science Policy Evaluation in Spain](#). What would enable the Spanish administration to “learn”, is allowing internal staff to reach “personal mastery” (Senge, 2006), creating teams that communicate and listen, and having structures and institutional leaders, entrepreneurs that enable it.

A detailed description of **the challenges encountered and the learning component** – emancipation for change - is found under [Part II. A Portfolio of Policy and Research Observations and Reflections](#) composed of policy and reflective analysis on the work done as a practitioner and a researcher during my involvement in the Doctorate in Public Administration programme.

#### *A CONCLUSIVE REMARK*

This section has highlighted how a **critical realist approach used in science policy evaluation** can enable a more detailed and a **greater nuanced understanding of policy implementation**, but it comes with a price tag, it has challenges and limitations.

This specific study indicates that the **investment in intense data collection and analysis**, especially qualitative data can bring forward benefits on the effectiveness of possible changes to the policy instrument and the development of new policies, if that is the case. These changes would be backed with evidence that is possible to be drawn, all it requires is support and capacities.

The **integration of qualified staff as part of the evaluation process**, from data collection to learning and policy design, provides an actual mechanism for this to be realised, compared with the more traditional way of outsourcing evaluations, seen randomly in public policy evaluations.

## PART II. A PORTFOLIO OF POLICY AND RESEARCH OBSERVATIONS AND REFLECTIONS

ACCOMPANYING “PART I. A REALISTIC EVALUATION OF SCIENCE POLICY -  
GENERATING LEARNING FOR SPANISH PUBLIC ADMINISTRATION  
INSTITUTIONS”

## INTRODUCTION

This report is conceptualised as a policy and research portfolio. It includes my workplace experience as a DPA candidate during the whole programme from September 2015 till September 2020. It accompanies the academic thesis ([Part I](#)), an original research project developed during the DPA. In this specific case, previous to joining the UCL DPA programme I was working as a contractual staff for the department in charge of science policy in the Spanish Public Administration, and I decided to research upon a programme that I was working with, therefore the Portfolio here within is a collection of memories and research diary notes related to the time previous into joining the DPA programme at UCL and in the five years I was involved with the programme.

The first part of the Portfolio responds to “DPA Research in Practice” module at of the UCL department of Science, Technology, Engineering and Public Policy (STePP) during the first half of the programme.

The document describes my contribution as a science policy analyst whilst developing policy in the entities I worked for in the recent years and my participation as a doctoral student enrolled at the Doctorate in Public Administration (DPA) Programme at UCL doing research in the workplace since 2015.

The reflections on the relations between being a policy analyst and a doctoral researcher at the same time are given at the end of the Portfolio.

The main objectives of this report are:

1. To describe and analyse the policy development taking place in the context where I was operating and examine my contribution to it.
2. To give information on my research on the job and analyse its main characteristics and challenges.

The structure of the portfolio follows the timeline from my preparation for the DPA till the end of submitting my thesis, making a total of five years, including one year of the interruption of studies. The portfolio is structured in the following sections:

- Under [Methods](#) I brief on the techniques for information gathering and writing following the UCL Ethical Guidelines under project number 8435/001.
- [Policy Experience](#) is the largest section of the document and it includes my trajectory as a professional before the DPA until October 2020, date of finalisation of the report.
- Under [Reflections](#) I bring out my considerations on the relations between being a policy analyst and a doctoral researcher during the five years of the DPA.
- I finalise the portfolio with [Five Lessons from my Journey](#) for future DPA candidates or reflective practitioners and the [Annexes](#) with the public policy documents that count directly with my contribution in the past years.

The information included herewith in has passed the strict regulations and approval of the project number 8435/001 of the UCL Ethical Committee.

## METHODS

The policy portfolio consists in the second deliverable of the Doctorate in Public Administration programme, being the first one [Part I. A Realistic Evaluation of Science Policy - Generating Learning for the Spanish Public Administration Institutions](#). The policy portfolio is intended as a practical showcase of the actual policy work the DPA candidate has been involved in during (and, where relevant, before) the DPA programme.

This document is based in the first two deliverables prepared for the STEPGP18UPC-GPC-DPA “Research in Practice” Module run at STEaPP department during the academic year 2018-2019. The deliverables included a piece of policy portfolio and a piece of reflective writing. As a continuation I worked to extend the information to what is presented under this document.

The main tool for information gathering used has been the Research Diary, an A5-shaped notebook I carried around at work, the university and beyond. The beginning of the document especially before the DPA includes memories of the time. The rest is carried out through observations and ethnographic research done at the work placement.

I started using an A5-notebook for both work-related notes and doctorate-related ones. All the observations, reflections, reminders, tasks, etc. that had to do with the DPA, I would label them with a “Research Diary” note in the front and use a different colour or mark or highlight them. This was a new practice for me, but that came gradually to become something natural. In the office and previous to the DPA, I would normally use a larger size notebook to note down

minor daily tasks, issues, etc<sup>66</sup>. When I was exercising as a researcher, a smaller size notebook that was easy to carry around, became my new notebook. I was taking notes regularly, whenever an observation “sparked” that doctorate related thinking as I was trying to experiment my double identity: the policy officer and the researcher. I would date the notes I took, to place them in a context at a later stage. For example, during some meetings, I would tag some of the reflections as “Research Diary”. After finishing one notebook, I would save it. I have saved the nine notebooks that I used during the period of the DPA.

The process of turning the notes into findings and reflections as seen here happened less regularly. Whilst I worked with my research, I would scan through the “Research Diary” notes in the notebooks, and add as a draft on the Word document of the research the notes and reflections I had taken. This was a reiterative process that allowed me to increasingly become more reflexive on my role as a researcher with the object of research and policy.

The practice of research as an insider is already captured in the literature with a focus on the reflectivity component as key to the relation between the object of research and the researcher (Holmes, 2020; Brannick and Coglán, 2007; Anderson, 2006).

As a challenge and limitation whilst developing my work as a sole DPA candidate and carrying out a realistic evaluation of a science policy programme for the Spanish government, my position to the research I was carrying out changed during the years as one can read hereinafter, but despite that, I continuously explored my own positionality, something that can take considerable time and much “soul searching” (Holmes, 2020).

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<sup>66</sup> As for major tasks, I used and still use Google Calendar.

My involvement as a researcher whilst carrying out the DPA and the research project was supported by the work placement. The information is anonymised and follows strictly the UCL Ethical Guidelines accompanying the research project registered with the UCL Research Ethics Committee - number 8435/001, dated 6 May 2016.

## POLICY EXPERIENCE

### INTUITIVE NAVIGATION FOR SURVIVAL

Becoming a Science Policy Analyst that needs Doctoral Studies (2007-2014)

This section includes the policy activity before the DPA.

#### *ADMINISTRATIVE ASSISTANT*

In March 2007 I was a 25-year-old Albanian who had graduated with a BA in Marketing, French and Spanish from the University of Surrey Roehampton in 2004, had done an Erasmus Year Abroad in Paris and Madrid in 2002-2003, had finalised a Masters in International Development and Official Aid from the University of Complutense of Madrid (2004-2006) and a Postgraduate Course on the European Union from the Diplomatic School of the Spanish Ministry of Foreign Affairs and Cooperation (2006). I had worked in different places and I had held part time positions as a postgraduate student, but I had not found a full time employment yet living in Madrid, Spain.

The year 2007 was declared as “Año de la Ciencia”<sup>67</sup> – “The Year of Science” by the Spanish government. The flagship initiative to implement it was the INGENIO Programme with four pillars, being one of them the EUROINGENIO Plan that included the creation of European Offices in public research organisations and universities, i.e.: the EUROCIENCIA programme. The objective of EUROCIENCIA was to improve the Spanish participation at the 7<sup>th</sup> European Union Framework

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<sup>67</sup> <https://www.elmundo.es/elmundo/2007/01/12/ciencia/1168609140.html> Page last visited on 26 December 2021.

Programme in Research and Innovation. A total of 45 offices were funded<sup>68</sup>, one of which was the one I joined.

I applied for the only position available at European Office of the Ministry of Education and Science, that was funded and administratively linked to the Spanish Foundation of Science and Technology (FECYT, for its abbreviation in Spanish), although we were based at the Ministry premises. The Office depended functionally on the Ministry's General Secretariat of the Scientific and Technological Policy. Its mission was to strengthen the Spanish position in the European Union (EU) science policy, and to increase the Spanish participation in the EU Framework Programme for Research and Development (FP7). The strengthening of our position in the EU science policy arena was done through giving strategic advice to the minister and supporting work in the EU Competitive Council of Ministers, as well as being active in the follow up all the new initiatives from the EU, supporting their uptake at national level and vice-versa. The objective to increase our participation in FP7 (2007-2013) was done through putting in place a new model of coordination of the National Contact Points and the Programme Committee Representatives and carrying out training and promotion activities for research managers. We were a total of five people working, being I the only administrative assistant.

I was new to all the work the Office carried out, therefore, in spite of doing my administrative tasks, I focused on reading as much as I could and on gaining trust mainly to the director. My vision was to understand better and to start building a career path. My international educational background and the Diplomatic

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<sup>68</sup> <https://www.lamoncloa.gob.es/consejodeministros/referencias/documents/2010/refc20101008.pdf>

School Postgraduate Course had given me some foundation on dealing with European relations, but back in the day, these ones did not have science and innovation as a prime sector. Creating trustful work relations may not have a recipe to reproduce, but I may say that the way we worked at the European Office created the right framework for me, as a young authentic foreigner, to feel safe and welcoming to be myself, in my diversity from the rest, who had already worked in the field. I brought forward some type of authenticity and an original and different opinion that was heard and welcomed, especially from the Director. I did not have any expectations of what people would have liked to hear from me, I was paying attention to being myself in a respectful way. It was fascinating for me at the time to immerse myself in the others' perspectives and to try to understand what was going on from their own different points of view. By understanding the roles and the human dimension behind those roles in the Office I was working more easily and I was directing my energies into facilitating the role the Director had.

It felt back at the time that having the right information and building trust were key for a successful work – and in many occasions it still feels so nowadays. The relations built with my superior were very important to me and the establishment of some sort of mentorship rapport in these relationships, where trust could prevail, was key. With time, that mentorship relationship has shifted into a trustworthy expertise.

Being the only administrative assistant of an office of just 5 people, I had the chance to receive nearly full information in terms of content, which I would eagerly read and create an opinion in the Office meetings. I was participating in the core functions of the office, both the advisory one and in the understanding of the new model of Framework Programme Coordination one. I was as well in touch with several institutions, the ministry and FECYT, but as well some

organisms and the public research organisations, which at the time depended from different sectoral ministries.

Because of my active work and full dedication in the mission of the Office, and because of the quantity and nature of work we were dealing with, six months after my incorporation, I was appointed as an Institutional Relations Manager of the office. In September 2007 we recruited a new administrative assistant.

### *INSTITUTIONAL RELATIONS MANAGER*

As an Institutional Relations Manager I focused to liaise between the Permanent Representation of Spain in the EU, based in Brussels, and the organisations and ministries in charge of research and innovation at the time, in support of the European Office Director. I gave some administrative and technical support to the preparation of the Competitive Council of Ministers of the EU, and the follow up of the initiatives coming from there. This culminated with the preparation of the Spanish Presidency of the European Union in the first half of 2010.

This is why in 2009 the Office was assigned with this new crucial objective and we expanded with three more members of staff that would work with me in Madrid. One of our former colleagues was sent to Brussels to support the Spanish delegation in the Permanent Representation as a liaison officer.

Being a central contributor to the Presidency of the Council of the EU is an important milestone for the career of a young person, I was 27 at the time. I was not aware of the contributions I was making in terms of policy, as I was following the authority recommendations. Time was limited and being quick and decisive was the most important part of my day-to-day activity.

The organisation of the Presidencies before the Financial Crisis was quite ponderous. I remember it as somehow very busy and overwhelming. Looking back at it, I would say that I personally had no idea about policy creation or

design and there was no time to even stop and question or think over it. We were executing, implementing, spending. The team was enthusiastic.

This was again an important time for my initial career, especially towards my external visibility, but I was lacking something crucial for my internal self. I was lacking the excitement to meet knowledge, questioning and analysis.

By the beginning of 2011 we had finalised the Presidency and the reporting related to it. Finally, things had quietened down and we were back to our normal activity. I was back at supporting policy positioning and promotion, and preparation of the EU Council of Competitiveness. It consisted in supporting the Permanent Representation in the negotiations of the initiatives coming forward at European level. In addition, I was doing some kind of intermediary work, reaching that “middle-ranking officials” that Page and Jenkins (2011) describe in their book, but yet without any sort of ability from my side to build grounded opinion, or to understand the why’s of my contribution. I was sending petitions for information, gathering data, redrafting, and sending it to our Permanent Representation in Brussels.

In late 2011 at the start of the negotiations of the next EU Framework Programme for Research and Innovation, the so-called Horizon 2020, the Ministry created teams of experts and discussed the proposals of the Legislative Package. The European Office was assigned as the Secretariat that supported this work. Again, this was a lot of “bridge” work, taking information from the expert groups and preparing it for the political Heads of Unit and the Permanent Representation. Had I been less demanding on myself, less in search for wisdom, and more self-confident, or had this found me in another step in my career, I would have considered it interesting, and would not have let it go.

Whilst my visibility at the ministry of Science and Innovation<sup>69</sup> between 2009-2011 had grown, and I had got to know most of the Head of Units that at least dealt with some policy aspects with a certain international dimension (this was important for later on in my career) and whilst work was intense, I felt like I was not supporting anything except for the processes. I questioned myself why I was there and what would I need to do to develop? What part of my work would be that of a specialist and what part that of a facilitator, (although being a facilitator requires its own specialism)? I had shown myself I was a good facilitator, but my search for knowledge and understanding was distancing me from my daily work. I was in touch with external experts, highly reputed in their fields of science, and I could observe the work of my political bosses, so much drawn towards their achievement of results. As a product of the two there was knowledge that I was dealing with, laying in the middle, with no background knowledge and no framework understanding of my role. How important it was for me to recognise the objectivity and subjectivity and how could I become a better worker? Intuitively this led me to the need to better specialise, or otherwise I had to conform and do what I was doing, that didn't require a full understanding of what was going on. I wanted to convert from an intermediary of policy to better understanding it, and therefore doing a better job. I started to look for a job outside the ministry, mainly in the research centres, with the objective to gain more specialisation.

### *THE ENCOUNTER WITH "SEVERO OCHOA"*

Just around that time in summer 2011 I remember one morning, I received an email from my Director General in charge of International Relations copying the

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<sup>69</sup> New ministry from 2008 till 2011.

Director General in charge of the National Plan and communicating to me that, upon decision taken in a meeting with the minister, I would need to support the Deputy Director General who was handling a new programme launched that year (2011) called the “Severo Ochoa Centres/Units of Excellence Programme”. I was involved together with another foreign-born who worked at the time as advisor to the State Secretary. We were called to support the evaluation process, based on peer review, and entirely held by international highly reputed researchers with experience in leadership, some of them with Nobel prizes. This is how I started to work with the Programme I would later focus on for research on during my DPA at UCL.

The SO at the Deputy Directorate General of Studies, Planning and Monitoring

The management of the Severo Ochoa Centres of Excellence Programme was carried out at the Deputy Directorate General of Studies, Planning and Monitoring, without falling under its direct explicit competences, such as planned in the Royal Decree 1042/2009<sup>70</sup> that constitutes the ministry at the beginning of the new government.

The Ministry of Science and Innovation (2008-2011) was organised in a State Secretariat of Research, a General Secretariat of Innovation and an Undersecretariat of Science and Innovation dealing with management.

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<sup>70</sup> <https://www.boe.es/buscar/doc.php?id=BOE-A-2009-10762> Page last accessed on 28 December 2021.

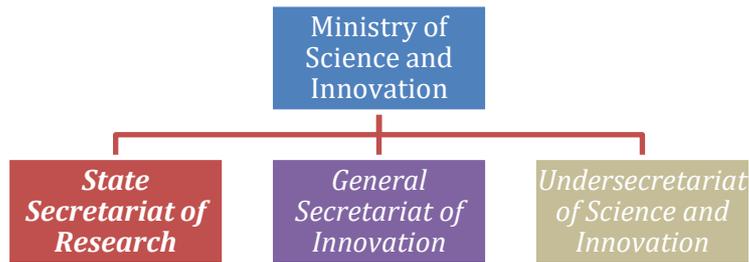


Figure 1: Basic structure of the Ministry of Science and Innovation (2008-2011)

The State Secretariat of Research was responsible of the National Research, Development and Innovation Plan, the cooperation with the Autonomous Communities, the international affairs, the European Union, the coordination of the public research centres, promotion of excellence in research, development of institutional strengthening, development of research infrastructures, and promotion of the scientific culture.

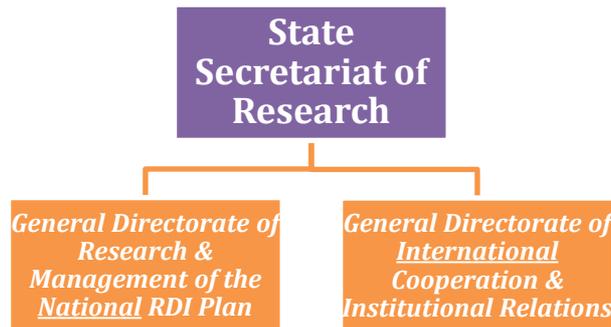


Figure 2. Basic structure of the State Secretariat of Research

The General Secretariat of Innovation was responsible for the innovation related competences and fostering innovative public procurement. The Undersecretariat in the Spanish administration deals with the general services, management, administration and human resources of the ministry.

The State Secretariat of Research had two General Directorates: the one of Research and Management of the National RDI Plan and the one of International Cooperation and Institutional Relations.

This General Directorate was organised in five units<sup>71</sup>:

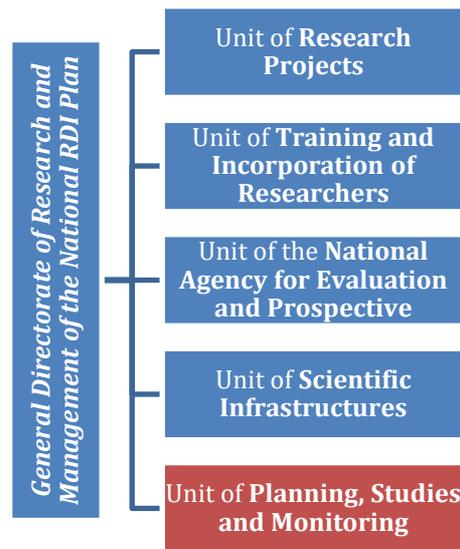


Figure 3. General Directorate of Research and Management of the National RDI Plan

1) Unit of Research Projects, in charge of the promotion of research in all areas of knowledge through funding of research projects, complementary actions, and promotion of the scientific and technological culture. This unit managed most of the competitive grants for research projects of the National Plan. It was structured in four departments: Life Sciences, Environmental Sciences, Engineering and Information and Communication Technologies (ICT), and Social Sciences and Humanities. I worked with this department in 2013 as a senior project manager for a European Initiative Water Joint Programming Initiative (Water JPI) such as described under [Back to Water JPI](#) section.

2) Unit of Training and Incorporation of Researchers, in charge of the National Plan actions that promoted the training and incorporation of researchers.

3) Unit of the National Agency for Evaluation and Prospective<sup>72</sup> in charge of the scientific and technical evaluation of the actions funded by the National Plan, and any other policy actions, as well as contributing to prospective studies.

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<sup>71</sup> In the Spanish State Administration, the basic unit is called “Deputy Directorate General” that I call here “unit”.

<sup>72</sup> The *Agencia Nacional de Evaluación y Prospectiva* (ANEP) was a unit of the General Directorate for Research that dealt with the evaluations of the proposals that received funding from the National Plan.

In 2015 these units became part of the newly founded State Research Agency.

4) Unit of Scientific Infrastructures in charge of strengthening research facilities in cooperation with the regions.

5) Unit of Planning, Studies and Monitoring in charge of the elaboration, follow-up and evaluation of the National Plan and its annual reporting; in charge of coordination of studies on the Spanish STI system; the coordination of national statistics; and the management of national research awards.

This is the unit I collaborated in 2011 to support the evaluation of the first call for proposals of the Severo Ochoa Centres of Excellence Programme, whilst I was working at the European Office (under the Directorate General of International Cooperation). The “Severo Ochoa” Programme was the only part of the grants under the National Plan that the Unit managed in the last year of the Ministry of Science and Innovation.

I understood why SO was being managed by a unit with no competences on any of the issues related to it when I researched about the design of the programme as part of the DPA. As the policy design had been carried out by the leadership of the minister and the minister’s cabinet and due to its unique nature for design and management, it fell under the management of the one of the advisors, who became responsible of the unit. On the contrary, the programme could have been managed by the Unit of Research Projects that carried out all the collaborative projects ongoing at the time.

In the later years (2013-2016) the unit kept most of the functions described above and it was moved to responding directly to the State Secretariat for RDI partly due its strategic competences on planning and analysis.

The involvement with the new programme brought to me the focus on an object that could be considered a unit of analysis. It was a policy instrument that was considered highly political as it was launched with the direct involvement of the minister, although this fact was not the most attractive to me. Having come from

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This unit was renamed as “Subdivision of Coordination and Evaluation” of the State Agency for Research (AEI, in Spanish) in 2016, when the AEI was established.

the Presidency, I was a bit tired of authority and visibility-oriented figures. The programme fascinated me in my search for understanding how it created change. At the time, I was already immersed in the rhetoric of excellence. The European Research Council had been launched for four years already, and 'excellence' was a "trending topic" of the funding instruments, but, I had not seen the institutional dimension of excellence ever treated before. I was genuinely interested in seeing if there was any kind of institutional behaviour change as an effect of the programme.

I was intrigued to understand more about the programme and its effects and indeed it connected me with a new science management form that at the European Office I could not be in touch with, mainly due to the nature of the activity of the office that was policy oriented only. Whilst the Office was more focused on policy, the development of the programme was embedded in the public administration dynamics that had to be managed and out of which we had to bring forward real results, i.e.: the call for proposals, the competing centres, the international evaluation, the resolution.

Nevertheless, this was an ad-hoc experience that found me in the middle for search for improvement. After the first collaboration with the Severo Ochoa programme and whilst I was working at the European Office, in 2012 I was offered a job as coordinator of a European initiative at a well-known research centre in Barcelona, granted with a SO award.

## *IN A RESEARCH CENTRE*

The research centre I started to work as Head of Outreach was an autonomous<sup>73</sup> publicly-funded centre created in early 2000s. It was supported by the Catalan Government and it was placed at the Universitat Politècnica de Catalunya (UPC) campus. It operated independently with a Board of Trustees. Its personnel were all contracted, except for several of its researchers and its director who were professors of the university - they were public servants. The rest of the principal investigators were foreigners, many of them internationally recognised holding ERC Advanced Grants. The management staff and technicians were hired. The centre had an organisational style similar to a Max Planck Institute in Germany. There were 22 centres like this in Catalonia – the so-called CERCA Centres - that were created with a vision of specialisation in a scientific or technological field and were given the independence in management. In less than 10 years some of these centres had become world reference in their respective fields of science. The opportunity to work at this centre was what I had been looking for some time, as it would give me - I thought at the time - the necessary experience to understand the scientific activity from a different angle and therefore to become more specialised and a better science policy expert, as well it would allow me the recognition in the policy arena of having achieved some close-to-science experience, which I felt at the time was very important for developing a career in science policy.

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<sup>73</sup> I say “autonomous” as the legal personality characteristics of the research centres in Spain vary and only few (circa 10%) have got their own legal personality to operate independently with their own legal personality. I explain this in more detail under section [Centres’ main characteristics](#) in [Part I. A Realistic Evaluation of Science Policy – Generating Learning for Spanish Public Administration](#).

The centre was very good at marketing. In the 8 months I was there they had the visit of the President of the Catalan Government, in another occasion the Catalan Minister of Economy and Knowledge who came to give a special lecture on science policy, and in a different day, the one of the Spanish State Secretary for Research, Development and Innovation.

I was gaining experience from a top centre in Spain, being aware of its uniqueness in both the scientific performance and its organisation and management. My interest shifted into understanding the enablers of the centre's performance.

The centre was already selected as a SO awardee. I remember that the leadership staff (Director, General Manager and Knowledge and Technology Transfer director) were all very proud of having received the award, as well as there was an awareness on the award among the management staff<sup>74</sup> (See [Administration and Management Changes](#) under [Part I](#)) The year I worked at the centre was the first year of the SO Award and there was a satisfaction on being recognised by the Spanish Government and high expectations on the instrument. Some of the outreach activities we developed in the Outreach department were funded with the SO programme.

Nevertheless, once I understood the functioning of the centre that fulfilled my main interest. My expectations to be closer to science were unmet, as I was farther apart in my experience than the lab scientists or the theoretical physics ones. There was no possibility I could develop my policy abilities and passion, mainly because of the organisational factors - there was very little mobility

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<sup>74</sup> Why was that? As a result of my research, I would later understand that the Programme would have a strong effect in their overall management and international positioning.

among units and doing policy was considered as an issue of the leadership. My expectations to develop felt misplaced.

### *BACK TO "WATER JPI"*

In 2013 I was hired by the Spanish Foundation of Science and Technology to coordinate the Secretariat of the Water Joint Programming Initiative (Water JPI) as a senior officer. The Water JPI was a European initiative led by Spain and with the participation of other 17 ministries or funding agencies around Europe.

The initiative aimed to align the national research agendas in water issues with the rest of the countries participating in the Water JPI, through the design of a joint Strategic Research Agenda, the launch of joint calls of proposals and other activities similar to the ones of the European projects. The implementation of JPIs set the bases of the Co-fund Instrument the European Commission would put in place in 2014 during Horizon 2020. Alignment of national agendas and implementation of a joint call for proposals without the European Commission's support was an interesting challenge for the heterogeneous practices that we had at national level.

During Water JPI I was based at the Department of Life Sciences and the Department of Natural Resources that managed the respective parts of the State Plan for Scientific and Technical Research and Innovation (2013-2016) at the ministry. The departments centralised the whole management cycle of a grant, from the opening of the call for proposals to the follow up during the lifetime of the project and the ex-post evaluation once the project had finished.

The departments were created decades ago to manage the competitive project grants of the National Plan, and I may say that they had remained somehow the same when I entered there: older staff, very strong interpersonal relations, very easy going – everyone felt very comfortable in the work they were doing, and

meetings were normally procedural. One of the first things that my boss showed to me during the first days in the office, was the handwritten registry book she had kept since 1988, year that she had entered the ministry.

The behaviour and organisation of work was very different from that of what I had known at the European Office. The civil servants working with the National Plan focused some attention on me and my colleague (the junior project manager) at the beginning as the ones that were bringing some novelty, but I did not perceive any kind of interest whatsoever from their part on our work. The theory behind these Joint Programming initiatives was to internationalise, to some extent, the national programming in different research agendas (i.e.: water, ageing, urbanism, etc.) and I believe that having two new staff with international knowledge and coordinating the secretariat of a European initiative was a step forward for the departments, but the limitations to transform the national agenda or the behaviour of this department were very significant. This significance generates, I believe, on the nature of our work. As my team was doing something new, the department, was managing the same calls for projects that had been going on for decades. The inertia of action may have been interrupted with the creation of the new State Agency of Research in 2016, to where the personnel of this department was moved, but this remains an issue to be studied somewhere else.

My work at the department came out to suffer limitations that transformed my everyday routine into that of European project management, very little apart of my aspirations to work more closely to policy related aspects.

After a year with the project and because of having certain visibility and support by other departments, the Cabinet of the State Secretary and the Head of Unit of Planning and Monitoring with whom I had already worked in 2011 for the first

edition of the Severo Ochoa programme, called me to work with them on a new endeavour, mainly policy related.

### *THE LANDMARK - ERAC PEER REVIEW*

In 2014 I won the position of a science policy analyst at the FECYT for the Deputy Directorate General of Planning and Monitoring that had to support the State Secretary in a peer review on the Spanish RDI system<sup>75</sup>. This was an initiative that the European Commission was carrying out, just before consolidating this practice as a policy instrument with other countries, the so-called “Policy Support Facility”. The ERAC Peer Review takes its name by the European Research Area Committee (ERAC). The peer reviewers were renown independent experts from academia and Member States’ representatives. The evaluation took place during the first semester of 2014. I was contracted for one year, based at the Unit of Planning and Monitoring, responding to the State Secretary of Research, Development and Innovation.

The work consisted of the thorough preparation of information to be presented to the peers, as well as the joint selection of over 100 stakeholders of the Spanish System of Science, Technology and Innovation to be interviewed in dedicated sessions by the peers during their meetings in Madrid. On one hand I was directly contributing to the preparation of information through significant data and some analysis on our system, and on the other hand I carried out the contact with the stakeholders who were invited at the group interview sessions, supporting the mapping of the system through a fair representation of its agents.

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[https://www.mineco.gob.es/stfls/MICINN/Prensa/FICHEROS/2014/140801\\_final\\_report\\_public\\_version.pdf](https://www.mineco.gob.es/stfls/MICINN/Prensa/FICHEROS/2014/140801_final_report_public_version.pdf) Page accessed on 29 December 2021.

I participated in all the meetings and interviews the international experts carried out, both the interview sessions and the discussions held for the analysis.

The Spanish System of Science, Technology and Innovation became the centre of the analysis of that exercise with all the diversity that it consists of, and all the perceptions that we had of it internally, externally, from so many different angles. I was fascinated and instinctively connected with the academics' behaviour in their search to understand for being useful to the review and advice. There was something in their neutrality and humbleness in the search for information, when posing questions and when trying to find ways to bring clarity to understanding that connected directly with me and my excitement for knowledge that was unbound to the political authority or one main determinant interest.

It was the first time in my life that I was exposed to policy and academia for the first time at such a hands-on experience. I had never read as much as then research on science and innovation policy. So, how had I worked on policy until then? Another fundamental aspect of that period was that I realised that science and innovation policy was a field of academia, quite scattered and quite on-and-off, and that I would love to be submerged into it.

One of the facts that struck me during ERAC Peer Review was the lack of policy evaluation of our major research and innovation programmes, already stated in my thesis (See [Science Policy Evaluation in Spain](#)). No evaluation of Consolider, or CENIT or EUROCIENCIA <sup>76</sup>. Reports existed when the programmes had finalised, but these included data related to funding, and nothing more. Recommendations for encouraging policy evaluation were apparent from the

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<sup>76</sup> Names of Spanish state programmes under the "Ingenio" Programme running during 2005-2010 in the framework of the EU Lisbon Strategy.

supranational organisations, such as the European Commission (See [Science Policy Evaluation in Spain](#)). The Literature Review, carried out for my research, emphasises the importance of internal capacity (i.e.: trained staff) for better evaluation use and performance, and it is aligned with what I could observe at that time during my work. Nevertheless, the fact of having the ERAC Peer Review showed transparency and openness from the Spanish System governors to accept the review and advice of peers.

The liaison with over 100 stakeholders from all over Spain and representing different perspectives and interests in the System of Science, Technology and Innovation exposed me to a wide range of diverse ideas in a concentrated period of time. It exposed me with questions about the validity of the knowledge brought forward in the group interview sessions and how broad had to be the understanding of the international experts carrying out the “Peer Review”. Working with the data of the system and participating in the interviews gave me a multi-criticism perspective. I enjoyed the exposure to different ideas - it was useful for creating new knowledge in the science policy field. I hoped this could be a reference for further work activity of mine.

A fundamental steppingstone for that period was the Head of Unit of Planning and Monitoring under the leadership of whom I was working for. As a former academic the Head of Unit knew how to destroy the hierarchical relatedness that was normally used in that work environment. To them, the evidence and knowledge seemed to be more relevant and more important. This interruption of top-down authority, which I would see as humility to build trust was enlightening for me as a professional, what Cornel et al. (2013) call “the enthusiasm and ability to share knowledge and learn, rather than impose

knowledge”. The frequent questioning of knowledge (including behaviour) that my boss was bringing into my professional life was a turning point.

It had been 7 years into my professional career. My experience had made me more confident, but not less critical. My new challenge at that time was how to grow into a professional that can offer a multiple understanding of aspects, a professional that finds authority in the evidence-based knowledge. I felt very thrilled to understand more and better of science policy.

In 2014 I was granted the Spanish nationality, making me finally a EU citizen. Just after ERAC Peer Review finished, in the autumn of 2014 I started looking for a PhD and was even ready to quit my job and go back to university. As a policy analyst I knew the organisations that were teaching and training doctoral students, and therefore I started to search more in depth about the programmes they were offering.

As the opportunity for a DPA<sup>77</sup> was offered by UCL, I considered it and discussed it with my Head of Unit in spring 2015, who was supportive; hence I started the DPA in autumn 2015.

## I FOUND MY FERRY

The 1<sup>st</sup> Academic Year (2015-2016)

This section includes the policy activity during the year and the observations whilst being a researcher at the workplace.

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<sup>77</sup> Even though I was willing to start a PhD and leave my working life for a few years, the opportunity to do both was even more attractive to me. This is why I decided to go for a DPA programme.

### *“SEVERO OCHOA” AND OTHER*

During the first year of the DPA I continued to contribute to the Deputy Directorate General of Planning and Monitoring (in the text seen as Unit of Planning and Monitoring<sup>78</sup>).

In the 2012-2016 period the Spanish Government remained unchanged, with Science, Technology and Innovation policy being under-graded from a Ministry to a State Secretariat of Research, Development and Innovation (SEIDI, for the abbreviation in Spanish) under the Ministry of Economy and Competitiveness (MINECO<sup>79</sup>), which had two more State Secretaries: that of Economy and Trade. The public administration funding saw significant budget cuts, being the STI sector the one that suffered the most, with a reduction of 24%, and impacting competitiveness in the private sector that invested at the time circa 40% of the total R&D funding. Spain was included in the Fiscal Consolidation Plan and annual revision of its public budget was performed by the European Commission. The Country Specific Recommendations given with the European Semester were entirely based on reducing the public deficit (Dino and Sanchez, 2017). In addition to the budget cuts, the crisis brought more administrative restrictions to the research activity. This enhanced centralisation under the control of the Department of Treasury that has affected the ongoing research activity around the country, having affected the SO implementation, too, such as cited in different places in the thesis. (See [Chapter IV. Findings](#))

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<sup>78</sup> The literal translation from Spanish would be “deputy directorate general”, and this is the basic unit of the Spanish State Administration, therefore in this text I am calling it “unit”.

<sup>79</sup> Royal Decree 345/2012 that sets the structure of MINECO, Article 1.

<https://www.boe.es/buscar/act.php?id=BOE-A-2012-2081> Page last accessed in October 2020.

As a novelty, there was the direct connection of the State Secretary with the Planning and Monitoring Unit responsible of the coordination, elaboration and monitoring of the Spanish State Strategy and State Plans; the coordination of studies and statistics on STI at state level; the promotion of open access policies and coordination at national and international level and the management of the SO Programme (Royal Decree 345/2012<sup>80</sup>), as well as with the Coordination of Public Research Organisations (PROs) Unit that carried out the coordination of the seven PROs depending from the State Secretariat of Research, Development and Innovation (SEIDI), and the Institutional Relations Unit that carried out the coordination with the regions (the Autonomous Communities) and supported administratively the collegiate organisms such as the STI Advisory Council.

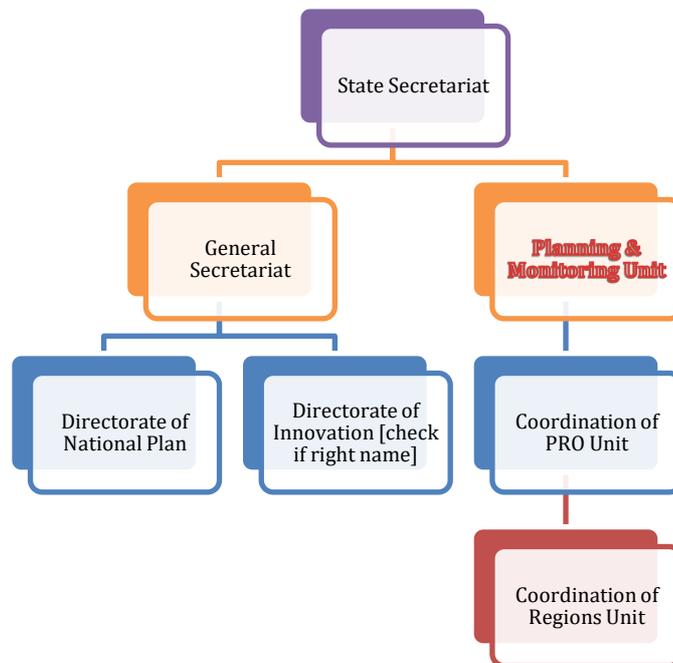


Figure 4. Basic structure of the State Secretariat of RDI (2012-2016)

<sup>80</sup> <https://www.boe.es/buscar/doc.php?id=BOE-A-2012-2081> Page last accessed in October 2020.

The Unit of Planning and Monitoring was the same one that I had collaborated ad-hoc for the SO Programme in 2011. Under this structure, the Unit was upgraded to reporting directly to the State Secretariat.

The five people at the unit were involved with the management of the SO, during the time of the year that the call was launched. I was mainly involved in the management of the evaluation process. Fulfilling the legal requirement of at least four international well-known evaluators with some management experience (e.g.: in charge of departments) for one proposal was one of them and perhaps the most demanding from the management team. It needed not only convincing invitations, but as well an effective follow-up with busy scientists around the globe in different time zones who had not only to read the proposals and produced evaluation reports, but also submitted these reports in the IT tool that was facilitated for the occasion, and that followed strict confidentiality measures. It required a proficient use of English and a proactive behaviour.

The programme was managed in English, except for the call for proposals and the official resolution that was written in Spanish, the rest of the documents: the application forms and the evaluation reports were entirely in English.

By end of 2016, once the State Research Agency was established, the programme passed under its management, and more specifically under the management of the staff of the former General Directorate of the National Plan, who were moved now to create the AEI (Spanish abbreviation of the “State Research Agency”).

In addition to the SO management, at the unit the staff worked with the preparation of the Planning and Monitoring documents of the Spanish System of Science, Technology and Innovation. I was involved in a few strategic and

advisory works at ad-hoc bases, tasks that I started to perform with an initial researcher's perspective, such as I describe in the next section.

In September 2016 my work for the ministry had come to an end as the contract with the company that was hiring me finalised. In November 2016 the new government created the ministerial department of Economy, Industry and Competitiveness where the STI policy were kept under the State Secretariat of Research, Development and Innovation (such as in the previous period). The former Head of Unit of Planning and Monitoring was promoted to Director General of RDI policy. This coincided with the start of my second year of the DPA, described in the "[Swimming in Troubled Waters](#)" section.

In the section below "[Being a researcher at the workplace](#)" I describe my main contribution during the period. This was a time of my life where I was indeed looking beyond the actual daily work activity and aimed for training. My temporality at work with very short contracts after an overwhelming experience at ERAC Peer Review, made me even more restless, but the start of the Doctorate gave me some sort of steadiness. Temporality was so common for professionals like me. Public jobs were hardly opened, and a replacement rate of 10% was the norm. I took it one day at a time. It felt like waves of change that I had to navigate somehow. At least I felt sure that I "had found my ferry" – I knew what I wanted to do in the next couple of years, i.e.: work in policy and do my doctorate. And I was doing both.

### ***BEING A RESEARCHER***

In the autumn of 2015, I was based intermittently in London for the first term of the DPA.

Back to Madrid I participated for a week as a rapporteur in the evaluation committee meetings of the “Severo Ochoa” Centres of Excellence Programme. It was not the first time for me to be in the panel meetings as a rapporteur, but this was the first time I could practice some observation as a researcher. The SO evaluation had three peer review panels 1) Maths, Experimental Sciences and Physics; 2) Biomedicine and Natural Sciences; and 3) Social Sciences and Humanities.

I was rapporteur of the panel of Maths, Experimental Sciences and Physics. The attention to performing these assignments as a rapporteur became, suddenly, less important to me, in comparison to the new task of observing the meeting, the interventions of the peers, their understanding of the programme, the dynamics that led to the decision making; and I was trying to articulate some kind of conclusions that would make sense academically, meaning that they had to be backed with some sort of theory. I was conscious of the epistemological perspectives that came from different circumstances and contexts when the peers were discussing, I was linking their programme theory with their analysis when discussing the performance of the centres, etc. It was indeed fascinating. It certainly made me more aware of my work and raised the standard of my performance.

When I was back at the office, at the end of the semester at UCL, this change of mindset affected my working behaviour. It was like experimenting with my workplace and with how I was connecting to it. The most interesting part is that I could change the intensity of this experimentation during the day relating it with the tasks I had to manage and the interactions I had with my colleagues.

Having this new internal<sup>81</sup> identity of a doctoral researcher made me change the relatedness I had to my colleagues or my boss, and as well how I was exploring to be a doctoral researcher with my own self, in a way similar to the one described by Letiche and Lightfood (2014).

I started to relate to my everyday tasks differently – I performed them in a “colder” way as if they were external objects of study, I placed them in some corner of what I thought was the entire policy and I carried them out in a higher conscience, a mindful manner. I saw them with a certain emotional distance. I transformed the tasks that would sound challenging a year ago as purely mechanical and therefore carried them out more easily and more effectively.

This experimentation at the workplace raised significantly my consciousness for the tasks I was involved and the work I was doing and therefore made work more enjoyable or, if not enjoyable, easier or just a mere task to perform with no emotional involvement. One day my boss told me they could notice I was going through a doctorate. This happened after they asked me to check on an article that the Department of Communications had written for Science Magazine on the creation of the Spanish State Agency. Both my boss and I were very hesitant on the draft article presented, so I decided to write a new one from scratch, which was presented to the Secretary of State. My changes were mostly related to discussing the new policy outcome of the creation of the Agency from a more studious angle, than just descriptive – saying that this was a response to the scientists needs. I imagine this perspective was observed by my boss that tagged as an outcome of my doctorate studies.

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<sup>81</sup> I say “internal” because not everyone around me knew I about it.

Regarding my initial attempts to place phenomena that I was observing in a theoretical background, a blurry one, that would later be transformed in the critical realism perspective, and more specifically into the realist evaluation one. I started trying to question and frame arguments in a more structured way and place them in some sort of a public policy background. I am aware of complexity, which is now shaped and not just a black box. At the beginning of my DPA I was obsessed with grasping theory. Since then, I have included in my work processes more interruption, more questioning, more understanding. Because of going through the practice of experimenting of being a researcher (or a quasi-researcher) and consequently building a new relation with the tasks I had to work with, I created this new identity of policy analyst. The analyst part in the new identity felt more comfortable than in 2014, when I started to work for the ERAC Peer Review and I was hired already as an analyst.

One of the works I did during the period, is a study on the report “Mixing and Matching Research and Innovation Policies in the EU countries<sup>82</sup>” led by Reinhilde Veugelers at Bruegel that connected the classification of the Innovation Union Scoreboard to the instrument mix countries used for promoting R&D<sup>83</sup>. Veugelers showed that the R&D policy mix was relatively homogeneous to the different countries categorisation of the Innovation Union Scoreboard.

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<sup>82</sup> [https://www.bruegel.org/wp-content/uploads/2015/12/WP-2015\\_16.pdf](https://www.bruegel.org/wp-content/uploads/2015/12/WP-2015_16.pdf) Page last accessed in October 2020.

<sup>83</sup> Countries were classified as Innovation Leaders, Strong Innovators, Moderate Innovators and Modest Innovators in this order.

My task was to test Veugelers suppositions to our national policy mix, checking it with the funding planned for 2015, such as in our Annual Action Programme. My conclusions showed that although Spain is a Modest Innovator in the results of the Innovation Union Scoreboard, it has a policy mix more similar to the higher categories "Innovation Leaders" and "Strong Innovators".

The last piece of work I did during the academic year 2015-2016 was that of a twinning project with Algeria, to which I was included as the study person to carry out the review of the regulatory and strategic documents. The objective of the project was to support Algeria with a new RDI strategy.

I must admit that carrying out these exercises became the common way for my work and I felt I was entering a studious field of the public administration operations, where analysis was made by somebody who could access and create academic knowledge.

## SWIMMING IN TROUBLED WATERS

The 2<sup>nd</sup> Academic Year (2016-2017)

This section includes the policy activity during the year and the observations whilst being a researcher at the workplace.

## *IN A CONSULTANCY*

September 2016 brought unexpected changes in my working life. That was the month when my contract with the company that was supporting the ministry and was hiring me, was planned to finish. I was finishing my second eight-month

period being hired through this company, and this renewal would have been the third one.<sup>84</sup>

On the last day of my work with the company, the ministry came out with a new decision: I was going to be hired as a freelancer and my main involvement would be work on the new State Plan 2017-2020. This meant that the next day I had to go and sign up as a freelancer at Treasury, which I did, and just after that, I visited the company that had hired me for 16 months to sign the letting off documents. The following day I visited the Social Security authorities to sign up there as a freelancer. The officer that attended me found out there was an abnormality that I had signed as a freelancer before postponing my unemployment assistance for a later stage of my life, meaning that I had completely lost the unemployment assistance till future employment on a contract through the general regime (meaning contracted by another company, and not being a freelancer) would be established. I had worked with no interruption from 2007 till 2016 and I had completely lost my unemployment assistance just because I had registered as a freelancer? I had no idea that registering as a freelancer would make me lose my unemployment assistance of nine working years. What did this mean for the employment policy and the social security policy of my country? How come I was given no information at all about this when I signed as a freelancer? This separation of policies was heart breaking to me as a professional passionate of policy making, as well as it brought turmoil into my life.

Following this very bad news, I went back to Treasury and I cancelled the freelance option. In spite of having been registered just for a day, I had completely lost access to my unemployment assistance, and was unable to get

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<sup>84</sup> This was how the relationship with the ministry was established during that time period.

it back unless I was hired by a company. Had I continued as a freelancer for three months, such as the ministry had planned, I would have ended up without any unemployment assistance at the end of those three months as my assistance was cancelled, till future hiring. The ministry bodies were not able to hire me in any different regime of that of the freelancer through the support of the Foundation, thus, after the relationship with the ministry finalised, I looked for opportunities elsewhere.

In a short while I was offered to start work in an R&D consulting company, going back to work in the private sector, such as I had done as a part timer before I started my career at the European Office.

The consultancy was a small team of former advisors, and they focused on a couple of strategic issues for R&D stakeholders. They aimed to expand their activity in supporting the research centres to design their research strategies, and this is why they were looking for somebody with my expertise.

The firm's areas of activity were related to R&D support to companies from a specific sector of production; and advice to local, regional and national governments in R&D public procurement, and support to research centres with their institutional strategies and promotion to Europe. These later activities were of interest to me as a professional and of course they interested my research at the DPA.

These topics were being handled in a very small structure and a very silo-like decision making process. The company was led by: a) the president, related to the business world, b) a delegate of the administration board, who was the main director, and c) two other directors with mixed responsibilities. The three directors were making a triangular leadership of shared responsibilities that made the decision-making flow quite confusing.

Just below the directors, there were the managers, who were in charge of one or several consultants. Every manager was in charge of the administrative and human resources supervision of one section of the consultancy, whilst the directors managed the sectors of activity directly or via the intervention (at times) of the managers.

I joined the company as a senior consultant in the public sector unit where there was another senior consultant working in the issues of public procurement. I supported the research centres with their institutional strategies and promotion to Europe. As a senior consultant I was in charge of content-based proposals (the economic part was done elsewhere) and “product development”. The ways of work were very much standardised at the company. All proposals were done in a unique model of a Power Point format. No alteration in documents, colours or fonts was permitted whatsoever. My second main activity was to develop the product, the project, to be in touch with what were called “the clients”, who were the researchers, professors at universities or research centres around the country.

This clientele-focused way of work surprised me completely. As I was supporting research stakeholders to succeed in policy programmes, I realised how one main interest drove the actions above any other. This was the interest to make more profit. On the other side, as a person coming from the policy world, I realised that my openness and humility and desire to question and therefore understand were hardly fitting in that kind of positivistic and confident world my company was giving to solve issues and to interact. The diversity of assumptions was in a way eliminated completely and created a convincing theory of the service we provided. I lasted only 6 months at this company. I was let off in March 2017. I explore below some of the underlying reasons for this change of circumstance as they relate to the reflective practice during the DPA.

## *BEING A RESEARCHER*

Before getting the job, two of the directors told me they were interested in my doctorate and they would encourage me to continue it. During the whole period of my stay there, there was never a single day they asked me about the research. There were only four colleagues with Doctoral degrees working at the company. The president held a doctorate, too. None of the directors was a researcher by training, none of them had a doctoral degree. Only one of the managers had worked as a postdoc before entering the consultancy. His team was composed by a senior and junior consultant who held PhDs.

Well into the second year of my DPA I had planned my research for Progression<sup>85</sup> and I managed to do the five interviews with the senior policy makers between October 2016 and January 2017 using my annual leave at the company.

The very long working day (8 hours) was split in two, adding to it two mandatory free hours for lunch<sup>86</sup> as a minimum, was taking away most of the possibilities to have some time to dedicate to my doctorate. I decided to ask for a reduction of the working hours, but no success. I checked the labour normative for reduction of hours at the workplace, and unfortunately, I realised that the Trade Union Agreement<sup>87</sup> did not take into account the education and training purposes as a valid case for reduction of hours. There was no possibility that I could legally ask for a reduction of hours (and, of course, salary) whilst doing the doctorate. Despite my determination and repetition of requests, no success.

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<sup>85</sup> Progression is the first stage of the DPA programme that the student has to pass in order to continue their studies and be considered a DPA candidate. It consists of the first part of the research, drawn into a thesis and policy portfolio and viva with one external referee from the departments.

<sup>86</sup> We had two hours of lunch as mandatory, making our normal working day from 09:00 to 19:00 as a minimum.

<sup>87</sup> In Spanish "El Convenio de Oficinas y Despachos"

In March 2017 I was let off. If this was correlated to my DPA work it is hard to say. I had indeed used the DPA to ask a few times for a reduction of hours and more working flexibility, as well working from home, but no agreement was reached. As a result, I believe it was easier to let go a researcher with concerns and bigger questions to ask than just “sell products” to “the clients”.

I do not take for granted those six months though. During my stay there I was given the opportunity to understand from the centres’ perspective – those institutions who were considering to strengthen their institutional strategy with their own means, as well as I realised how in a few years the SO programme had become a strategic goal for some centres and regional governments. (See [Influencing CSIC, Universities and beyond](#)) They went through organisational change, research strategy modifications and research selective patterns that aimed at higher quality in order to be as competitive as possible for the SO award. Within 5 years of its existence the programme had become a target even for longer term research vision at the institutions. Some of the regions<sup>88</sup> had designed some performance-based institutional funding grants that included the SO target as an objective for the regional centres to achieve. Part of these observations were confirmed nearly two years later when I carried out the interviews with the research directors of the centres. (See [Chapter IV. Findings](#)) As a researcher at the workplace, I could grasp how the programme was shaped and understood by different stakeholders somehow differently, and this interpretation made the programme itself cause change in the policies the centres would adopt. That generative causality that is built around the programme theory, the ideas and actions that people have around the instrument itself. The critical realist approach I was learning and trying to put in

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<sup>88</sup> Spain has 17 autonomous regions that can fund and organise research by law.

practice brought the so-much-desired theory framework I looked for long time before, at the very beginning of the DPA. Luckily enough this framework showed to be flexible enough to bring understanding at that level.

## THE HORIZONS

The Interruption Year (2017-2018)

This section includes the policy activity during the year and the observations whilst being a researcher at the workplace.

### *BECOMING AN "OPOSITORA"*

Only two months after the consultancy experience, in May 2016, the State Administration opened a recruitment process. The Ministry of Economy, Industry and Competitiveness was offering 28 posts, out of which 2 were assigned for the State Secretariat for Research, Development and Innovation.

It may be of interest to describe how the entry examinations work in Spain. The entire process takes a minimum of 9 months, leaving four months between the announcement of the call and the first exam. In my case there were a total of 3 exams: a multiple choice test, a handwritten exam where one had to write about 3 out of 5 topics in 3 hours, and a 2-hours practical exam where you are asked questions that are related to generic knowledge on the STI issues and funding procedures based on the topics of study. The exam had a total of 64 topics, out of which 19 were of a general background and 45 were of specific importance to the R&D post. Interestingly enough, there is no publication of the post in terms of competencies. The only information you are given is the unit you would be assigned in case you succeed.

The topics we were given to study were like headlines of themes or articles we had to put together with information from the legal and normative base. For

example, one of them was: “The Administrative Act, and the Administrative Procedure in the Public Administration”. With this information one should prepare a document to include the necessary information about the act and the procedure such as stated in the Constitution and the Spanish laws. The core of the topics was the EU and national legislation at first instance, followed by the strategy and planning documents of the research, development and innovation in the country, and finally the legal bases for funding, fiscal support and procedural issues for RDI support.

The preparation of the 64 topics into 64 documents<sup>89</sup> took me 3 months. The rest of the time I did a lot of reading, re-reading, revision and memorisation. In Spain the figure of “opositor” - the one who studies to pass the state exams – is quite recognised in the popular jargon. It is common to see people studying all day long for a couple of years to pass the entry exams. Being an “opositor” is somehow a profession or a full-time dedication of its own. This was seen interrupted to a certain degree during the 2008 Financial Crisis when the public administration had to drastically cut on costs and the replacement rate of the retired was only of 10%<sup>90</sup> (Montesinos et al, 2014).

It is important to understand that this is the only formal way one can enter the public administration in the country. The science policy departments operate

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<sup>89</sup> It was important to have the topics in separate documents because the second exam asked for development of 1 topic per hour, therefore the information one could give was limited, and it was important to have this information prepared in separate documents.

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<https://www.bde.es/f/webbde/SES/Secciones/Publicaciones/PublicacionesSeriadadas/DocumentosOcasiones/14/Fich/do1402.pdf> Page last accessed in October 2020.

through recruiting already established researchers who are civil servants<sup>91</sup> as researchers from the national research performing organisations or universities and through the standard recruiting of civil servants.

Becoming “opositora”<sup>92</sup> obliged me to focus my attention on the state exams and make sure I could go back to work where I really wanted. This made me ask for a one-year interruption from my DPA. Only by the end of this period in June 2018 I was able to prepare and hand in the progression documents that I passed in September 2018.

During the academic year that I was studying for my state exam it is important to highlight that I never felt that I was getting ready to become a science policy analyst. I disliked this new way of investing my time for some kind of entry exams that I did not find useful towards my future job. This was the most frustrating aspect of the studying. I had to play the rules of a game which principles I did not agree with, and I felt like I had to make this clear to myself and to work in the future towards modification of these principles, once I was part of the system. Nevertheless, the quantity of information that I had to structure and memorise for the exams was immense, yet there was not a single day I felt my critique and my analysis would be worthy for these exams. This exercise was quite on the opposite far end of what I was doing with my DPA, and it felt so different in terms of the culture or intellectual perspective.

During the months that I was preparing the state exams I started work at a research centre in Spain, located in Barcelona. I was working from home, in Madrid, 80% of my time. I replaced a maternity leave for 11 months.

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<sup>91</sup> The researchers who are civil servants have become civil servants in their research performing organisations or universities and they have passed entry exams related to their research only!

<sup>92</sup> The feminine version of “opositor”, the one who studies state exams.

I held the position of the Coordinator of the Malaria Initiative at the centre and I was working with the Initiative's director who was a professor at Harvard University and was splitting her time between Harvard and the Barcelona job. That same year they became the President of the American Society of Tropical Medicine and Hygiene (ASTMH).

The research centre I was working for was a World Health Organisation (WHO) Collaborating Centre for Malaria Control, Elimination and Eradication. It supported the WHO policy-making on malaria elimination by bringing in scientific and policy evidence and by identifying gaps in need of policy orientation.

My role as coordinator of the initiative with respect to the WHO was fascinating as we were supporting them in a couple of areas of policy making such as developing the concept of "border malaria" and designing policy on that issue; generating learning for malaria elimination from other diseases targeted for eradication, etc.. From the policy analyst perspective, working at this centre was indeed working at the intersection of science and policy. The "initiative" concept that the centre had developed supported perfectly this intersection. This model made them unique and placed its research at the service of policy in global health.

When dealing with policy we normally worked on a standardised, but adaptable approach, starting with a concept paper, the establishment of an Evidence Review Group with experts in the field, the production of a literature review in that issue, and some analysis of case studies, if necessary. This is what we did for example when working with the WHO on "border malaria".

In the case of studying elimination of other diseases to bring out learnings for malaria, I carried out an extensive literature review on the elimination of

Poliomyelitis from the perspective of global governance and taking action for its eradication.

This was the first time in my life I felt free to interact and give my opinion with no authority pressure, which was always so present at the ministry. The director of the initiative made everyone feel useful that we had created some positive dynamics of collaboration. My lack of expertise in global health was compensated by my good knowledge of public policy, and it was seen as an asset by the team.

Had I not been on a temporary position and had I valued less my public service job and the connection of the later with my DPA, I would have loved to continue at this position.

### *BEING A RESEARCHER*

This section is divided in three parts such as the activities I carried out during that year were: 1) preparing the entry exams, 2) working as coordinator of the malaria initiative, and 3) preparing Progression.

1) On the preparation of the State exams, the researcher inside me felt frustrated. Had I not known work in the public administration beforehand as a hired staff, these exams would have misled my opinions on how the administration is. By going through the topics one would think that the public administration is indeed full of laws, rules, norms that are applied and there is nearly no analysis, ability to create, to develop, to be human.

As my research was based in the realistic evaluation approach that falls in between of positivism and constructivism, going through the memorisation of those 64 topics for reproducing them during the second exam was indeed an experiment for me to walk on the guided path of positivism or at least appear

that I was doing it. The complex balance between the set norms and the human action in the administration was corrupting a lot of the values the human action has – and therefore I started to understand some greyish paths one had to walk in order to reach one's objective. Through these very personal experiences I was understanding even issues that my research was rising.

If the public administration work were what these entry exams indicated, it would mean that the civil servant and the researcher would sit in two opposing angles, or they would not even be related at all. The entry exams represent this old-fashioned public administration that is foreign to most human characteristics even though it is run by humans (for the time being) while, on the other hand the researcher needs to think, to question and to understand, to interpret and to give an opinion and therefore to position and to relate.

2) Regarding the job I held as coordinator of the Malaria Initiative at a research centre I believe that being a pre-doctoral researcher was a plus for me getting this job. The centre was looking for somebody that had some experience in academia and policy<sup>93</sup>. My boss asked me for my research project and they were aware I had interrupted it for that specific year, as I was focusing on the state exams. She continued to ask me about my research from time to time; she would come back to it and show enthusiastically interest about it, which made me very happy and appreciated.

In our group we had a mix of researchers of all stages. Most of us were involved in some doctoral training.

During that time I trained my research skills being actively involved in literature reviews, designing case studies, etc. By practicing these research related tasks

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<sup>93</sup> The coordinator who I replaced had a research background, she was a doctor in History.

for work purposes, I felt like I professionalised them, meaning that I performed them more diligently and quickly. If I compare with the time it takes me to do a literature review for my DPA to the one that I did for work, there is quite some difference. I see my DPA work more related to me as my inner self and I associate more emotions to it, therefore I spend more time and perhaps at the very beginning I attached some more difficult emotions with it, e.g.: lack of confidence. It is to point out that at that time, I had not passed Progression yet, therefore I had not done any significant literature review for the university.

3) The preparation of Progression in the summer 2018 was an important milestone for me as a researcher. By the end of spring 2018 I was told by UCL I had to pass progression in September in order to carry on to the 3<sup>rd</sup> year of the DPA Programme. During the last 12 months I had not been in touch with my DPA at all, but the fact I was a DPA candidate was in my mind and I really wanted to continue with my research.

I was in the dark until I started writing things up for Progression. I remember the moment it all started to make sense. It was when I began to draw the context-mechanism-outcome (CMO) structure of the documents and interviews, when analysing the research information. It was then when even the literature review I had already written started to make sense. This contact with the process and the findings enlightened my work and gave understanding to what I had been dedicating my previous years.

With this “enlightenment” I gained a lot of peace of mind and I started to externalise my research and therefore see it with a distance, with more ease and to be able to work with it more professionally. I suppose that these are the benefits of expressing and of writing – an externalisation. The process I went

through was more than writing though, it was a process of understanding and creating, and of producing.

I remember how at the beginning of my DPA, it was the fact that I was involved with research that gave me a distance to better relate with my work; and during research for Progression, it was the technique, the composition of the CMOs that caused the necessary understanding for me to feel that I was coming out of the dark, of the mess that I had in my mind, and I was producing somehow that necessary research result.

### “LLEGAR A BUEN PUERTO<sup>94</sup>”

The 3<sup>rd</sup> Academic Year (2018-2019)

This section includes the policy activity during the year and the observations whilst being a researcher at the workplace.

#### *A PUBLIC EMPLOYEE*

In end of September 2018, when I was at UCL doing the Viva for Progression, I received a call from someone at the ministry that invited me to start work in October and informed that my position would be at the Unit of Internationalisation of Science and Innovation<sup>95</sup>.

In spring 2018 the Spanish Workers’ Socialist Party won the motion of censure in the Parliament and created an ad-hoc government. It called for elections in April 2019, with no success to establish a government, which was finally made a reality after a repetition of general elections in November 2019. Basically,

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<sup>94</sup> Come to fruition, in Spanish.

<sup>95</sup> *Subdirección General de la Internacionalización de Ciencia e Innovación*, in Spanish.

between October 2018 and October 2019, a period of reference for this section, the government was still “acting”.

The new ministerial department created to manage research and innovation was the so-called Ministry of Science, Innovation and Universities. The ministry had a structure that included a State Secretariat of Universities, Research, Development and Innovation and a General Secretariat of Coordination of Science Policy reporting to the minister.

My unit was one of the three ones that depended from the General Secretariat of Coordination of Science Policy, and it was the only explicit unit that was in charge of international policies. The legal text that set structure and functions of the ministry (Royal Decree 865/2018<sup>96</sup>) assigned a wide competence in international relations to my unit, such as literally given on the text:

- *the promotion of Spanish participation in the EU programs of Research, Development and Innovation (RDI);*
- *the strategic planning, coordination, development, monitoring and representation of Spanish participation in large facilities and international scientific-technological organizations;*
- *the international cooperation in RDI, coordination of the Spanish position in international forums, and the proposal or designation, where appropriate, of those who are to represent Spain in the international organizations responsible for the corresponding programs, all without prejudice to the powers of other bodies;*

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<sup>96</sup> [https://www.boe.es/diario\\_boe/txt.php?id=BOE-A-2018-9860#:~:text=El%20Real%20Decreto%20355%2F2018,investigaci%C3%B3n%20cient%C3%ADfica%2C%20desarrollo%20tecnol%C3%B3gico%20e](https://www.boe.es/diario_boe/txt.php?id=BOE-A-2018-9860#:~:text=El%20Real%20Decreto%20355%2F2018,investigaci%C3%B3n%20cient%C3%ADfica%2C%20desarrollo%20tecnol%C3%B3gico%20e) (Page accessed in October 2020)

- *the coordination of Spanish participation in the development and monitoring of European RDI policies, including the Framework Program for research and innovation, and Spanish representation in other programs, forums and organizations of a European nature and competent in the design of policies on RDI, without prejudice to the instructions that the Secretary of State for Universities, Research, Development and Innovation may issue on the matter.*

In terms of organisation, my unit had a Head of Unit and a deputy, seven high level officers and two secretaries. The Head of Unit, who changed in February 2019, was a professor/ high level scientific staff at the National Council of Research (CSIC). Two other officers were from CSIC and had joined the ministry in the last decade. Three more officers were from the National Energy Research Council (CIEMAT), and the deputy head and another officer were from the National Institute of Aerospace Technology (INTA). These staff had entered the public administration through the research bodies either as scientists or technicians. Most of them had accomplished their doctorates in the past, normally at the beginning of their scientific careers. The secretaries were civil servants of the public administration.

The competencies of most of my colleagues were related to the strategic planning, coordination, development, monitoring and representation of Spanish participation in large facilities and international scientific-technological organizations. The national participation to these facilities is guaranteed by the ministry through annual budgets that may change from year to year, and the main competency of my colleague was to make sure the payments were processed correctly, as well as to participate in these organisations' committees (directive, financial, scientific), defending the Spanish position wherever needed.

On occasion, the representatives were being accompanied by researchers from national centres of expertise. Two colleagues of mine followed EU policy related tasks, one supported the preparation of the Competitiveness Council of Ministers of Research and the other coordinated the National Contact Points of the European Framework Programme of Research and Innovation (H2020), among others.

The general atmosphere in the unit was of an ongoing complaint of little organisation and leadership, mainly as a result of political changes. At the same time there was very little agency for getting things moving. The “research infrastructure” colleagues, as we call the ones that work with the representation to the large facilities, were always complaining on the payments of quotas that had to pass many administrative hurdles, and the “European” colleagues were in the same line, asking frequently for information that never reached them. Both parts were asking for the “Spanish position” here and “Spanish position” there, imagining the position as some verdict coming from the leaders. How about they positioning themselves and bringing out options? I discuss more of this below under “Reflections”.

This atmosphere was not new to me, as I had worked with traditional civil servants dealing with “science policy” for years, but then, I was a hired staff, and I had seen this complaint as an opportunity for me to develop further my work.

I had a first one-to-one meeting with the Deputy Director General, where I realised he was overloaded. He presented me the situation at the unit. In that first meeting, I offered to create a document to organise issues where there was more confusion and less knowledge in the unit, following the Royal Decree on our competences, which I had in hand. As regards to the coordination of Research and Innovation policy in the EU, we arranged I work on a document

where I could gather knowledge about the ongoing work the groups of the European Research Area (ERA) and draft for a better functioning and hopefully coordination. This came to be my first task.

Choosing an area of work as a new-comer is very important. I had thought about what to offer myself to do at first instance and it made sense I start work in a new area where the unit had not a consolidated knowledge, but with which we certainly had to focus at a point in time. The European Research Area creation and development has been going on in the EU since 2000, but it legally bound the creation of ERA within Treaty of the Functioning of the European Union, with its approval, in 2009. Since then, a few groups of work with the European Commission and delegates of the Member States were created in the areas of priority of the ERA. ERA committees/working groups were nevertheless seen as an advisory, preparatory teams of science and innovation policy that rarely followed a policy line of creation and implementation.

I firstly drafted a proposal named “The functioning of the ERA Secretariat in support to the ERA related groups” that was consulted and received input from my other two colleagues, and it was revised several times by the Head of Unit. My idea was to aim for coordination of the groups through offering them a centralised support at the ministry. The work reached to no fruition such as my initial idea was, but it was not uncommon for these kind of bottom-up initiatives coming as an initiative of the staff.

Nevertheless, as a consequence of this work, I was nominated as an expert delegate at two of the ERA Groups: the Strategic Forum of International Cooperation (SFIC), an advisory group of the EU council; and the Working Group on Gender in Research and Innovation (WG GRI). We shared the responsibility of following the work of the other ERA related groups with one of my colleagues, and some nominations on the rest of the ERA groups were renewed.

In my involvement with SFIC I could manage to be more active than with the GRI group. The first representative at SFIC was an external collaborator of the ministry, a professor at a university; and at GRI it was the advisor of the State Secretary. I tried to activate work on the groups by supporting vigorously the first representatives.

The first time I attended SFIC at the EU Council's Europa Building in Brussels was in December 2018 in a round-and-very-big meeting room with a round table with a space for the EU Member States and Associated Countries, and with interpretation rooms for every language of the EU. At SFIC there was interpretation guaranteed to and from English, Spanish, German, French, Portuguese, mainly. It may sound incredible how each one of us (officers from Member States) was invited to intervene in our native language. My gift in languages eased my understanding, even though I had to keep the headphones on, in respect to the Spanish interpreters, and because I needed interpretation when my German or Austrian colleagues were intervening. I had participated in other European meetings before this one, but I found the formality of discussing international aspects of science policy in several different languages somehow absurd, as it was indeed making the whole process of understanding, discussing and moving forward very slow. This situation changed radically with the pandemic, when we were all meeting online and we all talked in English.

A new working group that was established at SFIC soon after my arrival was dedicated to gathering and analysing data from European countries on their international collaborations in research and innovation. The group, led by France, involved the whole process of designing a questionnaire for data gathering, going back to our national countries, and finding out and putting together the information, and then analysing and preparing a Report we launched in December 2020. Spain was able to participate in the core group of

this exercise we called “The Benchmarking Exercise” with value and impetus, and I became one of the few authors of the published report.<sup>97</sup>

The Benchmarking Exercise enabled me to carry out at Spanish level something that was never done before under a unified exercise: gather updated information on the international collaborations from the three national funding agencies and the state Research Performing Organisations. The answer from the stakeholders was very effective and proactive, which I highly valued. At the first stage, with the answers of the funding agencies, in summer 2019 I drafted a document analysing the international collaborations we had at state level. My idea was to make this a ‘living document’ and enrich it with more details from the research-performing organisations. On my opinion, this exercise would not only support the policy makers’ opinion, but as well it would raise the visibility of the collaborations (they were many, but a general complaint existed on how little we did internationally!), and, internally, it would position the ministry in a more effective coordinating role. The first draft of the report I created, generated very little interest to my superiors, and I worked no more with its update. Later on, in March 2020, I was asked by a member of the cabinet of the Secretary General about the report (dated in summer 2019) and I forwarded it that version. If I remember well, he had to prepare a meeting on international collaborations with an external agent and he needed to have the data. I was surprised he even knew about it. It must have been that my boss had talked about this.

In the reflections below I explain why the idea on the recompilation of data and the report did not generate any interest to make this exercise an ongoing

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<sup>97</sup> [https://era.gv.at/object/document/5492/attach/0\\_Final\\_Report\\_Benchmarking.pdf](https://era.gv.at/object/document/5492/attach/0_Final_Report_Benchmarking.pdf) Page accessed in October 2020.

coordination at our ministry. Nevertheless, the spill-over effects of being proactive at the Benchmarking Exercise positioned me as an active member/policy entrepreneur (Mintrom and Norman, 2009) of SFIC at European level and put me in a sustainable contact with state agents at a national level, in Spain.

My professional activity during the period was not very busy. No comparison to what I was used to when I was a hired staff. I write more about this in the reflections below. This allowed me to focus a lot of attention on my research. I had the chance to take two weeks off in February 2019 to do the interviews with the “Severo Ochoa” centres’ directors and to visit the centres around Spain.

### *BEING A RESEARCHER*

In October 2018, when I re-entered the Public Administration at the Unit of Internationalisation of Science and Innovation, nearly no one was aware of my doctorate studies. I remember a colleague that knew me from the European Office (2007-2012) and with whom I was in touch, that she briefly asked me “Did you quit the doctorate you were doing?”, and I replied “No, I continue”. I didn’t go into detail of why they had assumed I had quit. I don’t remember when I told them I was doing a doctorate, but perhaps it was during the time I was away from the ministry and now they must have taken for granted that I had left behind the project. They are a PhD holder, gained early in her career before they became a public servant of one of the national centres of research, before moving to the ministry.

The 2018-2019 academic year was very important for my research. I planned and carried out the second part of it: the visits to the centres.

At the same time, in the job place I was able to carry out the “research diary” practice with more determination and more continuously. I had started taking

notes in my diary since October 2015 when I was back from my term at UCL to participate at the evaluation panels of the SO. Having the object always with me - that A5 shaped notebook that I carried around every day at work, to the bus going home, and at home - was a support for my thoughts and ideas. It was the accompanying gadget of my doctorate in my hands.

I used my skills of a doctorate candidate fully and openly in the European groups, initially when designing the Benchmarking Exercise and analysing the data. In our small group of colleagues, I referred to my doctorate quite often to back my opinion and took the lead in proposing analysis. It was very satisfying to be heard on issues, mainly methodological or simple explanations of public policy cycle or policy analysis that I was given validation upon.

I was open about my doctorate with the first representative at SFIC, the university professor, and they showed supported about it. What it is interesting is that neither they nor the other colleague from my unit ever asked me what I focused my research on, which did not create any ethical dilemma for me, but somehow detached my research to my day-to-day working life.

The Programme on Centres of Excellence Severo Ochoa was being managed by the State Research Agency, since 2016. I was not anymore involved with any management issues at all. In autumn 2018 the State Agency moved to another building far from the ministry and I lost touch with the personnel handling the programme.

During that period I was in the midst of designing the research for the second period (beyond Progression) and it was not clear to me what methodological path should I take in terms of techniques or research data. It may sound incredible now (at the time I am writing this, I have already finalised the study and I believe satisfactorily that it was the right path to take), but back in October 2018, the wide arrange of possibilities was open.

Being very interested on institutional changes and institutional effectiveness, I decided to attend a conference on the “Agencies of the future” organised by the Confederation of Scientific Societies of Spain (COSCE) with distinguished guests in Madrid. COSCE shared the participant list and I saw that one of them was the coordinator of the newly established “Severo Ochoa and Maria de Maeztu Alliance” (SOMMA) and I got in touch with him. We had a Skype together a few weeks after this conference. The interest SOMMA had in the publication of my study was immediate, but my research was not ready yet.

During my start as a public employee at the ministry I have brainstormed about the means of evaluation of programmes and the hurdles this may encounter – something I reflect upon below.

During the autumn 2018 as I started to use InCites tool from Elsevier (now ClarivateAnalytics) to check the scientific performance of the centres under study and was thinking about the ways I could carry out the realistic evaluation of the programme based on the four main intended outcomes of the policy makers.

In parallel, I noticed how my analysis capacity was being born in those job aspects I found most interesting. For example, I remember that during autumn and winter of 2018 my Head of Unit tried to have bi-weekly meetings with all of us. Nearly most of the days, my Head of Unit and the deputy were on travel away on mainly attending large facilities boards and committees, making these meetings mostly managerial, problem-solving for the team. Most of the issues came from the “large facilities” people who, as described above, had administrative aspects to solve and, in the middle of their complaints for payments were merely asking for the so-called “Spanish position” in preparation of the international meetings. It was as if the Head of Unit was a one-stop-shop

to whom it was clear what the position should be and they would speak out to their officers that would then take it back to Europe.

As a researcher I tried to think about the training and past job experiences of my colleagues. The vast majority of them came from experimental sciences background who had finalised their PhDs soon after their graduate studies (in case they had) and they had worked (I suppose) in authoritarian teams and institutions where solutions either worked together after the go-option given by the supervisor or leader. How come these older civil servants that had served in the unit for much longer than I, had no agency in their actions for creating and proposing and supporting the leadership for decision-making?

Another aspect that struck me as a researcher whilst attending my team meetings was the little capacity we had as a team to see things with a systems perspective. Opinions followed a trend of being quite positivistic, decisive, speaking the truth and giving some one-way decisions that were somehow simple, but yet complicated as they had lost the greater picture. I remember once whilst having a coffee with a colleague I discussed this with them, and they said, “well that may be because of our training”.

I developed an interest on better understanding motivations of science and innovation policy civil servants in my country, and the research and innovation knowledge of more general civil servants in Spain. Most of our personnel are not trained in policy, and the central government civil service bodies that exist nowadays in Spain do not require knowledge on R&D issues, except for 1 question out of 150 of them in the civil service exams (as is the case of the TACs – *Técnicos de Administradores Civiles del Estado*) or no questions at all as in the case of the Diplomats. I believe understanding our behaviours at work would require further studies, but my interest there remains high, because that indeed shapes how policies are designed in the workplace and the vast importance of

leadership into their design and maintenance, something that through the critical realist lens, would be the “Emancipation for Change” perspective.

Out of those meetings back in the autumn and winter of 2018, I realised that most of the effort of my team was invested in the follow up of the international large facilities, in some cases being these infrastructures very specific, but yet, they needed someone at the ministry to do all the follow up in the payment of the quotas, to do the intermediary functions with the research base in Spain and to defend the Spanish position in the meetings these facilities had abroad. Even though this was not my area of work, as an analyst I really think there is room for change on how we organise the work related to these facilities, and, by spring 2019 I came up with a proposal that I had the chance to discuss with my boss. On my opinion, some of these facilities, especially the ones that were very specific, could be managed by other state bodies like the Research Performing Organisations. I believed that by “giving out” the management of the Spanish quotas to these organisations we would “liberate some space” in our unit for dealing with policy making and coordination. Another colleague of mine seemed aligned with this proposal. At the same time, my new boss started some kind of brainstorming exercise - I am not able to say if this was prompted by our proposal or coincidental - that was later interrupted. I believe some strong budgetary changes had to be made administratively and required the ministry intervention, especially in the design of the annual budgets (that are an annual Law in Spain). Still, generally in policy making it is much easier to maintain the status-quo.

Another observation of being a researcher at the workplace happened on 23 May 2019 at a workshop dedicated to evaluation on the national network of R&D&i<sup>98</sup>. This is the network that coordinates at regional and state level the

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<sup>98</sup> <http://www.cdti.es/index.asp?MP=8&MS=886&MN=2> Page accessed in October 2020.

strategies for mobilisation of European structural funds dedicated to research and innovation. The network meetings are co-chaired by Treasury<sup>99</sup> that explained that the European Commission had placed importance on the evaluation of the Research and Innovation Smart Specialisation Strategies (RIS3) and therefore, Treasury had designed a guide for all the regions to follow. The info-day was held to introduce this guide. The practice of evaluation of the RIS3 was new to the regions. Some carry out already a thorough evaluation of their regional plans. Including strategy evaluation as a precondition for European funds is a novelty in the European R&D policymaking. For me as a researcher this was very encouraging to see it happen. I discuss more about this day under [Reflections](#) below.

The last observation for the October 2018-2019 period happened on 9 September 2019 when a meeting of SOMMA, the Minister of Science, Innovation and Universities and the regional ministers for research gathered at the ministry in the afternoon. I had heard about this meeting as it was appointed at the public minister's agenda online. I got permission to attend there as an observer. This was a three hour meeting between the SOMMA directors, the regional ministers and the state minister. The message of the get-together was to increase regional support to excellence schemes. This particular issue is as observed in section [Influencing CSIC, universities and beyond](#) under [Part I](#), bringing out as a result of the Severo Ochoa Centres of Excellence Programme the fostering of the Excellence Schemes in some of the regions. Being present in this event reinforced my research results.

The third year of the DPA finalised in my work placement with an increased awareness and understanding of policy issues and policy context. Yet new

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<sup>99</sup> *Ministerio de Hacienda*, in Spanish

elections were approaching in November 2019, and 2020 would be a totally new year for the entire world.

## “VELOCIDAD CRUCERO”

The Last Academic Year (2019-2020)

This section includes the policy activity during the year and the observations whilst being a researcher at the workplace.

### *POLICY ACTIVITY AND THE PANDEMIC*

This section covers my policy activity and the observations of being a researcher at the workplace during October 2019 till October 2020, coinciding with the final year of my DPA programme and the Covid-19 pandemic.

The results of the November 2019 elections created a coalition government with more ministerial departments split between the PSOE and Podemos parties. The responsibilities of science and innovation remained under the PSOE minister of the acting government and the ones of universities fell under Podemos. The Royal Decree 404/2020<sup>100</sup> developed the structure of the new Ministry of Science and Innovation, having now a General Secretariat of Research and another one of Innovation, both depending directly from the Minister. A General Directorate of Research Planning was created, reporting to the General Secretariat of Research, and to which my unit responded. Under the new government, my unit maintained its name, functions and leadership. The governmental changes did not affect my day-to-day work at all.

In October 2019, SFIC approved the creation of a new working group that, for the first time since the SFIC creation in 2010, was coordinated by Spain. It was

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<sup>100</sup> [https://www.boe.es/diario\\_boe/txt.php?id=BOE-A-2020-2740](https://www.boe.es/diario_boe/txt.php?id=BOE-A-2020-2740) Page accessed in October 2020.

the SFIC Africa Task Force with the participation of 12 country delegations and the European Commission. The Task Force was going to discuss on the European priorities of collaboration in research, innovation and higher education with Africa. By March 2020 the Task Force had not only gathered and analysed information on the present cooperation with Africa, but as well it had put forward its priorities in the so called “Strategic Report of the SFIC Africa TF”<sup>101</sup>. The Strategic Report was consulted with around 100 stakeholders in a Workshop we organised in Brussels in the beginning of March 2020. The published version of the Report is officially published at the Council’s web Consilium under this [link](#)<sup>102</sup>. I was the coordinator of the Task Force and the penholder of this report. In October 2020, date that this Portfolio is finalised, we are now a Council Working Group <sup>103</sup> and we (10 European delegations and the European Commission) are working on the implementation of the Strategic Report priorities and more.

When back from Brussels, and during the second week of March, I took a week off to focus on finalising a DPA assignment, one of the literature reviews focusing on Performance Based Institutional Funding, something that I managed to hand in just before the lock-down, that in Spain started on 14 March 2020.

The pandemic had officially started to affect everyone. From 14 March until 6 July 2020 I worked from home only. In July I was asked to go to the office three

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<sup>101</sup> [https://data.consilium.europa.eu/doc/document/ST-1355-2020-REV-1/en/pdf?fbclid=IwAR00kWOWscLsqfIOB\\_yk65KXSUybChcXTeo1X\\_WWu\\_vc682vpRm3RFS0Z\\_A](https://data.consilium.europa.eu/doc/document/ST-1355-2020-REV-1/en/pdf?fbclid=IwAR00kWOWscLsqfIOB_yk65KXSUybChcXTeo1X_WWu_vc682vpRm3RFS0Z_A) Page accessed in October 2020.

<sup>102</sup> [https://data.consilium.europa.eu/doc/document/ST-1355-2020-REV-1/en/pdf?fbclid=IwAR00kWOWscLsqfIOB\\_yk65KXSUybChcXTeo1X\\_WWu\\_vc682vpRm3RFS0Z\\_A](https://data.consilium.europa.eu/doc/document/ST-1355-2020-REV-1/en/pdf?fbclid=IwAR00kWOWscLsqfIOB_yk65KXSUybChcXTeo1X_WWu_vc682vpRm3RFS0Z_A) Page accessed in October 2020.

<sup>103</sup> SFIC Africa Working Group

days a week and that is the procedure we are following today. Before going into my work during lock-down, I would like to describe some of the policy developments in the first six months of the period (October 2019-March 2020). In the end of September-beginning of October 2019 I was invited to join the Science Diplomacy Days organised in Madrid by the Spanish Foundation of Science and Technology and the Ministry of Foreign Affairs, Cooperation and the European Union. These are two days meetings that bring together the science councillors Spain has around the world and the Spanish associations of researchers that are abroad. Under the new government, science had become a priority and the culture attachés in a dozen of embassies were given the science portfolio to follow. These councillors were diplomats by training of different ages. Some showed genuine interest in promoting scientific collaboration and in trying to understand the R&D nature and to know the Spanish System of Science, Technology and Innovation.

During those days I realised, our understanding of policy and priorities was so different. It was fascinating for me to spend the whole working day with the councillors. The diplomats talked about “telegrams with Spain’s priorities” to be received from Madrid before any meetings they had with their counterparts in the countries where they worked. “Priorities” – these fluctuating areas of interest for collaboration, areas we defended as a country. Priorities in science policy, science being so volatile and the policy making of science that follows the fashions science itself creates and, at the same time, trying to respond to the global societal challenges arising. Were we talking about the same priorities? This fluctuating equilibrium that we shape anytime we are acting on science policy – how could it be translated into the diplomat vocabulary?

The councillors were eager for training on the science, technology and innovation system. Their training had to be systemic, starting from their initial one as diplomats.

My contribution was on supporting the diplomats with what we called at the ministry as “Fichas País” – updated country information. This is information that I had collected for the Benchmarking Exercise done at European level earlier in the year.

The “Fichas País” started to be one of the tasks I became responsible for in my unit. These are brief documents that included updated information on the relations we, as a ministry and our funding organisations, have with different countries, mainly non-EU countries, but not only. They are used by our superiors, Minister, Secretary General or sometimes ambassadors when meeting with their counterparts. Later in the year, these documents started to be useful for building policy opinion.

In spite of their immediate usefulness, I was worried the information I had gathered in 2019 was getting outdated. The process we use at the ministry is that once we receive the petition for the preparation of information from the superiors, normally the minister’s cabinet, we start putting together information by asking our main stakeholders, i.e.: the funding agencies and the state research performing organisations. This is a reiterative process and unfortunately, it is always very time-limited.

For a while, having the information from the European exercise eased the procedure, but yet, I believed it was time to digitalise the process and count with a database where the stakeholders could update their information. I carefully designed a brief proposal for this online tool we could have had at the ministry and sent the proposal to my boss. My idea was to start designing an online (even

though with a restricted use) database where the stakeholders could add the information whenever they updated it. For that I had thought about two ways: 1) this info could be a part of the State STI Information System (SICTI<sup>104</sup>) that was being designed by a specific unit at the ministry, or 2) it could be apart in a website we could create with the support of the Spanish Foundation of Science and Technology (FECYT<sup>105</sup>). I am still trying to push this, and I am aware that my efforts may reach nowhere. But why does this happen? Why is a bottom up approach so hard to create positive results in this environment? I reflect on this below under [Being a researcher](#). when I look back at how I gathered the information for the Benchmarking Exercise in the first place back in winter 2018, I believe I should have personally thought on creating an online tool. My only impediment was the time. We were only given a few weeks by the EU Survey Tool to fill in our national data. At that time I was focused on getting the work done and not on the national process of doing it. Had I had more time I may have thought that the creation of an ad-hoc online tool could have been the start of what I would like to see the ministry having - an online platform where we can add the international collaborations of our main R&D stakeholders.

On 1<sup>st</sup> February 2020 the new regime of signing in when entering the office and signing out when leaving it came into place in our ministry, following the Royal Decree 8/2019<sup>106</sup>. This was a general regulation that came into practice in Spain

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<sup>104</sup> SICTI - *Sistema de Información de Ciencia, Tecnología e Información*, such as established in Article 11 of the 14/2011 Law <https://www.boe.es/buscar/act.php?id=BOE-A-2011-9617&tn=1&p=20200624> Page accessed in October 2020.

<sup>105</sup> FECYT has an observatory of R&D&I data in place, ICONO <https://icono.fecyt.es/> Page accessed in October 2020.

<sup>106</sup> <https://www.boe.es/buscar/doc.php?id=BOE-A-2019-3481> Page accessed in October 2020.

in all the businesses in 2019. The underlying objective of this measure was to raise Spain's labour productivity that is below the EU average<sup>107</sup>. The public administration put the regulation in place in early 2020. The signing in and signing out had to be done at the desk top computer that we have in the offices. Some control of our work was being formalised, as there was no other type of management procedure visible in our work whatsoever, neither there were evaluation processes in place. The results are only marked from our working process. It had been 18 months since my entry, and this was the very first measure that was introduced, and that counted the hours we had to stay in front of our desktops in the office. Interesting enough I thought about this measure as the first one towards the creation of a New Public Management system in our administration, but when I read the Royal Decree, I realised I was wrong. The measure to perform a daily registration of the working hours was put in place for the purposes of guaranteeing compliance with the limits on working hours, creating a framework of legal certainty for both workers and companies, and enabling control by the Labour and Social Security Inspectorate bodies. In addition, the creation of the Working Day Registry by this Royal Decree-Law ensured the conformity of the Spanish regulations with the European legislation (Royal Decree 8/2019).

These uniformed measures did not suit the nature of my work. Nevertheless, in my unit, I noticed no resistance at all. It was interesting to see how the creation of positions in items related to their work created a lot of complaint for my colleagues, but regulatory measures did not. I may have thought this did not

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<sup>107</sup> <https://ec.europa.eu/eurostat/databrowser/view/tesem160/default/bar?lang=en> Page accessed in October 2020

affect their work, but in my case, it did. The regulation said I had to be in the office as a max by 09:30 and I had to leave office the earliest at 14:30, and do 37.5 hours a week, and at least 7,5hrs a day. I was allowed to stay in the office till 17:30 max, but the extra hours were not reimbursed. The hours were going to be counted by an IT system. Working from home was unimaginable at that time, in February 2020, let alone to be permitted. I had to deal with a managerial system to which the hours were the only priority and the achievement of results that I, myself had put to myself, like it was the coordination of the SFIC Africa Working Group, seemed of no effect at all. On top of all the planning, I started to plan vigorously the hours I had to be present in the office. The heads of unit had little to do with these managerial aspects that are led by a different ministry in our State Administration. So, if content is separated so much from management, how can we excel? This rigidity in managerial issues at the State Administration must have crucial effects on the motivation of the personnel. And there is no managerial connection to this measure that can make it part of a somehow similar New Public Management style. Just as an endnote, there is a picture I took of myself holding the landline phone whilst in an hour long telephone conference with my European colleagues. Indeed, we all used telephones at that time, in the beginning of March 2020.

The pandemic rushed into our lives by mid March 2020, when we were all forced to stay at home and come out only for essential issues such as medical care and food fetching.

By mid-March the in-office registration was over. We became more intensively part of the digital world, and we took advantage of its opportunities for the immediate and hopefully long-term benefits of our health, but as well world's wellbeing, including the environmental one. The lockdown coincided with me

having finalised the SFIC Africa Task Force Strategic Report and the Stakeholder's workshop we organised in Brussels on 3 March 2020.

Shortly after that, Spain was invited to join the High-Level Policy Dialogue in Science, Technology and Innovation between the EU and the African Union (HLPD, in short) and I was nominated as a representative to the group. The HLPD met several times during the spring and summer 2020, in preparation of the first ministerial conference between EU and AU ministers in research and innovation taking place in July 2020. Working in the framework of HLPD was important politically. Doing policy is raising visibility, giving support, coordinating what is there, and creating, inventing, whilst taking advantage of the right moment. The "being present" in policy is important, especially in the moments of creation.

Likewise, I was nominated national representative at the Union of the Mediterranean Research and Innovation (UfM, in short) Bureau and we worked in the new priorities the UfM will focus in the future, and to the China Core Group where officials from the EU Member States we are working on R&D&I issues related to the collaboration with China.

In the last six months (from March 2020 to-date in October 2020) I have consolidated a portfolio of areas I am in charge of. I see my work as an analyst doing this "pendulum motion" with the force of gravity being some fixed areas of expertise and the generalist experience of supporting new areas to grow, as well as supporting leaders in their political decision making. The areas of expertise of my work are not related to content but to 'knowledge flow'. Public policy and especially science policy is fluctuating, but a consolidated analyst needs to have not only the knowledge but as well to know how to direct this knowledge, to understand and to create flow. For me specifically, being in touch with the stakeholders during the Benchmarking Exercise created that networking flow experience that is now consolidated and that I maintain during

my representation responsibilities. For an effective knowledge flow there is need for many soft skills. Both the recipient and giver of information need to perceive rigour and empathy from each other. Some certain degree of authenticity can be very useful, as well. Maintaining the relations with my counterparts in the funding agencies is key for me whilst developing my work as a national representative. I have tried to build these relations so that they are supportive to their extraordinary work. This is the gravity of my main work as an analyst at the moment. I would like to make this relationship more systematic though and to expand it to the top research performing organisations in the country.

There is another aspect of the work of the last six months that has tremendously supported my progress – the making use of the digital tools for working, meeting, and organisation and management. The lockdown has enabled me, my superiors and my colleagues to place more consciousness on orienting our efforts to getting things done. The access to the work environment from a place of choice (and of comfort) such as home has been, has increased my attention. The unprecedented times we all are sharing may influence on the fact of joint efforts. Nevertheless, the best use of the digital tools and online work has given good results not only on our effectiveness, but as well on reducing travel time and costs, and any related associated stress linked to displacements abroad for a couple-of-hours meeting or commuting in crowded public transportation. I hope this new way of work is here to stay.

In my personal case, I managed to establish an effective contact with my superior and I saw an increased availability to respond and discuss, not only by the leadership (that had now more time at home and less time on a plane), but as well to the rest of the people I have been in touch with.

At a policy level, the pandemic has triggered a framework for joint understanding and collaboration that I had experienced never before. The emotional shock we

were all in and the digital availability has united us. We are nowadays meeting more frequently and working better together, I feel. We are discussing more and understanding each other at a different degree. The international meetings are made easy as never before and in a day one can discuss issues in New York, Brussels or Barcelona. Science and innovation policy in Europe and its international dimension are seen emphasised by the critical time of life we are still living.

### *BEING A RESEARCHER*

The period between October 2019 and October 2020 has been the most research-intensive one of the whole DPA programme. These were the months where I started to work on the data analysis. The process is described under [Research Design and Methods](#) section of the thesis, but I want to stress here that entering the flow of the analysis of data is one of the most brilliant and creative process that I had ever entered. It felt like a game where I would have to liberate control from what I was doing to let the thing take their own shape.

This period coincided with an important process of growth professionally as responsible of several policy areas in my unit, as representative to European groups, and as coordinator of policy work that achieved milestones, such as the SFIC Africa TF Strategic Report.

There were two academic practices that have influenced the most my work as a policy analyst. The first one has been the process of doing literature reviews. The critical approach the researcher has towards a massive amount of diverse academic texts builds patient observation and makes critique fruitful. During my DPA I have been given the time to experiment so much with how to deal with literature reviews. I have collected texts that may have responded to what I wanted to say, I have searched for papers when writing and analysing in a

snowball process, I have read so many texts and I have tried to collect, to compare, to align or contradict. The rationale has its own life from the vast amount of literature that is over there and when it comes out through these reiteration process of creation, then the critique makes sense. The observation of the process itself and the training of going through the whole development has made me for sure a more effective and rigorous policy maker when receiving information and when analysing and advising it.

The second academic practice that has influenced my work as a policy maker has been the data analysis and the interaction with a software tool for text analysis (i.e.: NVivo). I have called this entering the “flow of creation” because I was not in control of the results. I was responsible for analysing these results, but there were conscientious and exciting moments where the research results had their own life and there was no way I could know what would come out of it. This experimentation and losing control of the endpoint, embracing uncertainty, the third component<sup>108</sup> of scientific research following the Frascati Manual<sup>109</sup>. This has opened a wide range of horizons of knowledge for me. As an analyst I understood the huge opportunities we have to improve policy making by introducing researcher’s practices and perspectives. Personally, the practice helped question authority.

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<sup>108</sup> Following the OCDE’s Frascati Manual, the scientific research activity has to be novel (to be aimed at new findings), creative (to be based on original, non-obvious concepts and hypothesis), uncertain (to be uncertain about the final outcome), systematic (to be planned and budgeted) and transferable and/or reproducible (To lead to results that could be possibly reproduced).

<sup>109</sup> <https://www.oecd.org/sti/frascati-manual-2015-9789264239012-en.htm> Page accessed in October 2020.

The research experience I lived during this period, being the end of my DPA has been a significant training for me as a policy analyst.

Two framework conditions supported my researcher's practice at its best. First of all, having a comfortable physical space of my choice – this has been for me spending four months at home during lockdown. The fact of having a space of choice supported my productivity at a large degree, such as it has supported my rest. Another framework condition for the past year has been: time, with its top characteristic: limitation. This has helped me boost my planning skills. Both space and time have helped me maintain my focus on the research, with periods of rest, and on my work, shifting from one to the other with less hurdles than at the beginning of the DPA.

Some more researcher's experience during the period that have influenced my career and the policy work I do have been:

- The teaching experience at STEaPP.
- My failed proposal (for the time being) to design an online tool to gather and update information on international cooperation.
- My research became of interest at work.

I expand on each below.

- ***The teaching experience at STEaPP***

On 19 November 2019 I was invited by STEaPP to speak about my study at the Masters in Public Administration, in the Knowledge and Governance module, at the Monitoring and Evaluation session. The students, who were in part former policy officers from different countries around the world, were interested on the practice of evaluation, a recognised policy tool that is not yet practiced in many countries. The type of evaluation I was researching on and putting into practice

through the study on what worked best in what context in the “Severo Ochoa” Centres of Excellence Programme raised the interest of some policy practitioners.

The rest of the students who were younger and attracted to policy work asked mostly how I managed to be both a reflective researcher and a policy practitioner in the policy placement, how I used the research diary, and how I even performed my research by being a professional and a doctoral candidate. Being in that environment where there was such a porosity between the trainees (going through postgraduate studies or starting a doctoral programme) and the policy officers (another speaker and myself, as well as some of the students previous to the studies) is very useful for both worlds and both practices. Professionally, one of my objectives is to design an Internship at the Spanish administration, and more specifically at the ministerial department in charge of science and innovation policy, with young doctoral students such as STEaPP’s. The exchange of several months would enable the interaction of the civil servants and researchers in social sciences who focus their academic activity into a more thorough understanding of aspects related to policy. This will benefit the policy officers by giving them some research-related insight and possibly practice, through the exchange that may happen between the interns and the officers.

- *My failed proposal (for the time being) to design an online tool to gather and update information on international cooperation.*

As I have described above, I have brought forward to my superiors a proposal to create an online tool with the objective to automatise the process of collecting the data on international collaborations from our main stakeholders (i.e.: funding research organisations and State research performing organisations). I

truly believe this instrument can fit under the design of the new Information System the ministry is designing or as an intranet under the R&D website of the Spanish Foundation for Science and Technology.

I have felt I have been a responsible policy analyst and a researcher at the same time during this process. Firstly, because I have laid down a proposal and not a complaint, common to the general behaviour<sup>110</sup>. If the practice is to gather information through Word documents in an ad-hoc bases we can of course continue as such, like we must have done in the past decades.

Creating an online tool has got all the advantages that it may have the fact of consolidating the coordination role of the ministry with the rest of the Spanish stakeholders.

The researcher inside me has understood that in certain environments personnel proposals for systemic improvement would not be considered a priority unless they are a necessity. And in authoritarian systems the necessity is created either from an external force, such as it can be a working procedure by the European Union, or because there exists an intrinsic interest or priority from the leader to put this instrument into place.

- *Last, but not least, I felt I was a researcher when I was asked about my research study.*

2020 was the last year of the European Framework Programme in Research and Innovation (Horizon 2020) and it was the last year of the Spanish Strategy of Science, Technology and Innovation, and consequently the State Plan of Scientific and Technic Research and Innovation. A new planning period had started and new strategic documents were being designed in the ministry.

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<sup>110</sup> Again, I was proactive and came with proposals to create change. As seen above, the context was more on the contrary and complaints were a daily norm at work.

The Spanish Strategy of Science, Technology and Innovation 2021-2027 includes the relevance of the “Severo Ochoa” Centres of Excellence (EECTI<sup>111</sup>, p86) The State Plan being one of the main implementation instruments of the Strategy, was designed after it.

In autumn 2020 a new advisor of the General Secretariat for Research who was supporting the design of the new Plan came to my desk – we were in the same floor – and asked me about my thesis, expecting some results from the study. I was told the new Plan may change the programme and they would need some evidence on the evaluation. This was a short conversation I had with them.

My research was still unfinished then, and I could not forward any evidence, but nevertheless, the fact that that there was some interest in my research was quite satisfactory. This request created hope in me that evaluation studies can one day indeed be insightful for policy improvement.

## INTERIM SUMMARY

This policy portfolio had a double objective: to describe my contribution to policy development during my career; and to describe my positionality as a researcher in the workplace during these years.

The portfolio includes the information related to my involvement in the Doctorate in Public Administration (DPA) programme and during the entire period of being involved in the DPA, with a section dedicated to the time before my enrolment and the Interruption Year.

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<sup>111</sup> <https://www.ciencia.gob.es/InfoGeneralPortal/documento/e8183a4d-3164-4f30-ac5f-d75f1ad55059> Page last accessed in March 2021.

Before my decision to start doctoral studies, I had passed several years working for the State administration, a research centre and a European research initiative. Coming from a generic educational background and becoming an enthusiast of STI policy, my feeling of responsibility drove my work changes, at the beginning for the search of specialisation, and later for the encounter with policy analysis. The decision to start doctoral studies was sparked by a semester of a peer review of international academics and member states representatives on the Spanish STI system and policies. My boss played an important role in taking forward the decision to start doctoral studies and encouraged my critical spirit.

My first year as a DPA student coincided with my full involvement in the SO programme. I was managing the evaluation process and I participated as a rapporteur in the Evaluation Committees. My first impressions as a researcher in the workplace were the shift on the attention from the content towards placing it into the dynamics of the decision making; a shift from the “what” to the “how”, as well as to clear myself out of the emotions when dealing with my work and to change the relation I had with everyday tasks by seeing them as objects of my research.

During my second year of the DPA I worked for a private consultancy firm where the culture of work was very different. The standardisation of behaviours made that any highlighted personal identity features would be considered as non-welcomed. From the researcher point of view I was involved with several SO applicants and could observe some effects that the programme was having in terms of organisational matters, publishing patterns, etc. that would later on be confirmed as a result of my research.

During the year of the interruption of my DPA I was able to pass the state exams and entry in the public administration. I found the state exams quite misleading

to the work done in the ministry and very opposite to the human nature of a researcher. By the end of that year I prepared for Progression and developed the research study. This preparation and going through the research details enlightened my work and converted my inquiries in a research product.

My third and fourth year of the DPA coincide with me being a public employee at the ministry in charge of science policy, with a post as a “science policy unit” at the Unit of Internationalisation of Science and Innovation. During these years I developed the main part of my research and finalised it.

This document is followed by a Reflective Piece where I describe the reflections I drew out of the comparison of my contribution as a science policy analyst and as a researcher in the workplace.

## REFLECTIONS

This reflective piece brings out my considerations on the relations between being a policy analyst and a doctoral researcher during the entire period of my Doctorate in Public Administration (DPA) studies.

It looks at my reflections on how the doctorate changed me in my profession, and it highlights the main challenges I encountered in the places I worked; and finally it describes some useful skills I gained for overcoming those challenges.

## CHANGES IN MY PROFESSION

The incorporation of my new identity as a doctoral researcher in my everyday professional life brought a few of changes mainly on the way I related to my work.

I was firstly pushed to include my new researcher-like identity in my job by my UCL supervisors. Just after being back from the term at university I tried to experiment with it in my everyday professional life. I started to develop my new internal identity by including some characteristics I believed where more

appropriate of a researcher, like for example trying to understand in somehow a deeper way backed by theory, trying to structure, trying to question what struck me as interesting. This was practically done as an experimentation with the tasks and my job place – on how I was thinking about them, how I was connecting to them.

Having this new internal identity of a doctoral researcher changed the relatedness I had to my colleagues or my boss, up to the point that the latter mentioned that the change was apparent<sup>112</sup>. Working with mixed identities was not new to me. I was an Albanian born national that was educated in the UK and that had developed the professional life in Spain. Intellectually wise, I had used my UK education (undergraduate level firstly and now doctorate one) to seek recognition on my endeavours, as well as to design that international background I had. Culture-wise I saw my Albanian identity quite similar to the Spanish one, being Mediterranean countries, and among peer talks this kind of similarity reinforced my integration in Spain, including in the work environment. There was something different in there regarding my professional upgrading and tasks, as representation in international groups is involved, where I often reiterated that I was legally Spanish. During my DPA a new intellectual identity came to play, that of the doctoral researcher. And the context and mental models here are key, such as in the interaction when discussing other identities. What I was continuously noting is that whenever there existed knowledge about my doctorate among my peers, it brought a somehow new recognition attached to it.

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<sup>112</sup> “¡Cómo se nota que estás haciendo un doctorado!” – This is a quote from my research diary I had written in February 2015, when my boss was giving me some feedback on a document I had drafted. (In English: “One can notice you are going through a doctorate!”)

I explain in more detail below the main changes I felt during this experimentation, such as: thinking about theory, building emotional awareness, and formalising the observation.

### *THEORISING*

I explain under [Policy Experience](#) how I developed my wish to undertake doctoral studies. It has evolved from the need to become a specialist, an expert, to the one of building sound policy analysis and backing opinions with rigour, with theory and creating more validation around them.

This may explain why at the beginning of my DPA practice I was mainly obsessed with grasping theory and attaching it to what was happening, or vice versa, explaining/describing what was happening through theory.

I abandoned this fixed thought when I was preparing Progression. Today, what I am sure of, is that I have incorporated in my profession, in my work some processes that include some more understandable order, more accepted interruption, more questioning, more framing. In short, I believe I have included a deeper understanding.

What I started to be able to do was placing issues in a space and being able to create “systems”. I have drawings in my notebook, research diary, that I didn’t have before. I never used drawings to represent concepts. Inside a system, I found it easier to question. I started to feel more comfortable with questioning somehow well positioned issues. I realised that this positioning was creating more awareness, and by building awareness around complex systems creates simplification and understanding.

### *BUILDING AWARENESS*

By including my researcher-like aspects in my profession, I established new relations with the issues around it. I started to perform tasks in a “colder way”, at times if they were external objects of study, at other times, I placed them in some corner of what I thought was the entire policy and I carried them out in a higher conscience, mindful manner; at other times, they required no connection to me, and I merely performed them. I started to divide the tasks in two categories, the ones that deserved my attention as a doctoral researcher and the ones that did not. I was certainly placing my attention on the first ones, and I was performing the rest as simply and rudimentary as possible without any implications. Now well, even the first group had its own categories: from one side there were tasks that implied analysis of a quasi-doctor policy analyst and the rest – these were less – were directly related to my research project – the “Severo Ochoa” programme. I started to envision myself towards the tasks that needed more of the doctoral attention and, such as I mention under [Policy Experience](#) above, I started to receive more tasks that implied more analysis. I felt I was becoming more of a policy analyst.

This whole process changed how I was perceiving uncertainty. None of the tasks was raising the uncertainty and they used to before my doctoral studies. The full awareness on them created a certain emotional distance and there was some transformation on how I was dealing with the former-challenging tasks, which I started to carry out more easily.

### *FORMALISING THE OBSERVATIONS*

I was told by my supervisors to start observing and noting down about what I would find relevant during my stay at the policy placement - my job. The “formalised” part of my observation was totally new to me!

I started to experiment with this new activity. I started to practice just after I was back to work from my term at UCL. The first experience I had as a DPA student was during the term when I returned to be the rapporteur of the panel of Maths, Experimental Sciences and Physics in the evaluation of the SO projects. The attention to performing these assignments as a rapporteur became, suddenly, less important to me, in comparison to the new task of observing the meeting, the interventions of the peers, their understanding of the programme, the dynamics that led to the decision making; and I was trying to articulate some kind of conclusions.

Informally I had been a good observer, I believe, but I had never created some reasoning under the production of effects for the actions that were taken or the behaviours that were given. This time, as a researcher-like professional I started to think in these new ways and I started to ask myself more and try to give some interconnected answers.

Once the Evaluation Committees had finished and I was back at full time work in the Unit I kept exercising this new perspective, and there were days where interestingly enough my observation attention rose and I was more aware and noted down aspects that would somehow (directly or indirectly) relate to my research project or my field of study.

Sometime later, when I stopped working with the Programme, I think I should have been more formally active on this new practice. Only now, I realise the more data one has the better.

## BEING A RESEARCHER IN THE WORKPLACE

This part of the document focuses on the challenges of being a researcher in the job place and skills I developed to face these difficulties. It covers a year of work

for the public administration (during my first year of the DPA), six months for a private consultancy firm (during the second year of the DPA), a research centre (during the interruption year) and two years as a public employee (during my third and fourth year of the DPA).

With the objective to better understand the challenges in the three entities, I have preferred to have a detailed look of what are considered in general as the five characteristics of the scientific activity.

Following the OCDE’s Frascati Manual, the scientific research activity has to be novel (to be aimed at new findings), creative (to be based on original, non-obvious concepts and hypothesis), uncertain (to be uncertain about the final outcome), systematic (to be planned and budgeted) and transferable and/or reproducible (to lead to results that could be possibly reproduced or used to explain similar phenomena in different contexts)<sup>113</sup>.

In the table below I summarise the details related to how I felt in terms of these five characteristics in the three entities I worked for during my DPA.

	PUBLIC ADMINISTRATION	PRIVATE CONSULTANCY FIRM	RESEARCH CENTRE
My INDEPENDENT INITIATIVE (Related to “novel: to be aimed at new findings”)	I saw it was possible to flourish for this project. Novel activity needs to be thoroughly assessed and agreed upon.	I noticed it was unlikely to progress. The activity is guided by entity and the clients.	I got the impression this was an essential part of the work. It is embedded in the core activities

<sup>113</sup> Frascati Manual <https://www.oecd-ilibrary.org/docserver/9789264239012-en.pdf?expires=1565692042&id=id&accname=guest&checksum=B3EA5D69FD6BCA90CC57036F13E95D8E> Accessed on 13 Aug 2019.

	The need for the novel activity needs to exist for reaching the hierarchical necessary agreement.		and you are expected to produce it.
My CREATIVE ACTION (Related to “creative: To be based on original, not obvious, concepts and hypotheses”)	I used my creativity at times to perform tasks, reshape narrative of opinions, etc. There is some space for some sort of guided creativity	My creativity was disqualified due to given organisational and cultural limitations. No space for originality without full consent of hierarchy.	Creativity was the bases of my activity. There was a clear space for originality and questioning.
UNCERTAINTY To be uncertain about the final outcome (uncertain)	I noticed it was possible to manage at the quasi-personal level endeavour.	Lack of real interest on the subject by the company.	Not applicable, as the final outcome of my research was not related to the research centre I was working with.
My TIME MANAGEMENT related to “systematic (to be planned and budgeted)”	8 hours of office work in the office, including 1 hour lunch and 30min break, adaptable to one’s needs.	10 hours office work including a mandatory 2 hours break for lunch.	Teleworking 32 hours a week with no set timetable.
Would my results GENERATE ANY LEARNING for the entity I worked for? Related to “transferable and/or reproducible (To	Possibly.	No.	Not applicable as my research focused on a government programme.

lead to results that could be possibly reproduced) <sup>114</sup>			
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Table 1. The scientific activity at different work places

Such as the table above shows, developing the skills of a researcher in the workplace for me was different depending on the entity I worked for. In relation to being independent with the objective to develop new things aimed at new findings I found it possible in the public administration, but unlikely in the private consultancy firm. Regarding the creative action, it can have some space for development in the public administration, but it saw itself disqualified due to given organisational and cultural limitations in the private consultancy.

The uncertainty about the final outcome of the research can be seen as possible to manage in the public administration but it cannot apply the same for the private consultancy as there is a lack of interest in the development of research as a personal endeavour.

Regarding the time management it was possible to dedicate time systematically to the research in the public administration, but it was certainly impossible in the private company.

In relation to the transferability of the research it can be possible in the public administration but it cannot apply for the private company or the research centre, as for the experiences I had.

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<sup>114</sup> Frascati Manual <https://www.oecd-ilibrary.org/docserver/9789264239012-en.pdf?expires=1565692042&id=id&accname=guest&checksum=B3EA5D69FD6BCA90CC57036F13E95D8E> Accessed on 13 Aug 2019.

### *THE SPECIFICITIES OF THE PRIVATE COMPANY*

Ways of work were very much standardised at the company. All proposals were done in a unique model of a Power Point format. No alteration in documents, colours or fonts was permitted whatsoever. I found working in a PPT very limited as I could not develop my ideas there, I could not express myself, let alone that I had enough of dark blue colours in every single slide. The rigidity in shape and the whole process of not being able to do something new, something where one could leave their footprint was quite frustrating. I used a lot of my humour during those months of work.

This clientelism approach in a very narrowly focused perspective when “developing the product” limited my results. After a while, I came to terms with several issues related to the work in the consultancy. As a science policy analyst I was forced into a form of working that followed strict rules. I, as well realised the public policy was a product that was commercialised without the “will of improvement for a greater good” that was natural at the ministry.

I realised the private company was not the place for doing research, and especially not if I did it on my own initiative and it would enhance my critical thinking. I had the feeling that asking for my right for training was aggravating my situation at work. If I had such hard times to have the needed time to research, how could doctors develop their research in private companies even though they were paid by the government?

My thoughts on performing research in the workplace reminded me of a comment I received from one of the interviewees when explaining about the ideal work environment to perform research. They said that whilst companies do not want independent people with independent funding to work on them, the universities do not normally welcome directionality of research from some authority. Therefore, the optimal structure that can create a healthy

environment for science are the research centres. In different circumstances, I had felt this in my own skin as I was not allowed to develop my independent research whilst being involved in the company, and therefore I had understood the reasons for the SO programme to focus on centres when developing the institutional dimension of excellence.

### *THE PERSPECTIVE – SEEING THINGS NEUTRALLY*

My trained observation and my preparation as a researcher made me realise how I had become such an independent professional. A note on my research diary around May 2019 says “I have finally managed to see things neutrally. This is because of the Doctorate.”

The whole process of interviewing and then transcribing and re-reading the interviews and then making them ready for NVivo, made me re-observe and re-listen to the same information several times. My main objective when revising these texts was to “listen to them again”, just listen, with no set objective, no colour, or no light or shadow on them. This capacity showed to appear into my work associated as an effect of my doctoral training.

Looking at issues from the distance and from different perspectives creates a more independent and a fuller experience on their understanding, I now believe. Unpacking the leadership authority, acknowledging the interests around the issue, and embracing the contextual aspects that the issue brings with itself, has created in me such a mature capacity for analysis that, if I find little to compare myself to the years previous to my DPA, when now, it feels like I was just obeying.

### *EVALUATION AND AUTHORITY*

As a researcher in the workplace I was convinced that at the ministry level we certainly had the space to analyse effects but because of a couple of reasons we never did so. I was doing it with a small programme as a personal endeavour a

personal project, as well I was doing it for my personal training and capacity building.

One of the reasons we did not have the means at the ministry was that we had not trained staff in evaluation, perhaps. There is a remedy to training, but what was beyond it? If you had the capacity and space was created, would programme evaluation still happen in my workplace? Now, in October 2020 and after having acquired a lot of published knowledge, as well as after having analysed my “raw” knowledge, I don’t think we could do it unless two factors occur: 1) there is a strong conditionality of future funding related to evaluation and 2) there is a choice from the authority.

The conditionality of future funding can in certain policy frameworks be bound on legal documents, and so it is related to an economic and financial evaluation of actions (such as the law of subsidies indicates), but it is not related to the effects beyond the economic ones (and therefore the policy instruments are not affected by the legal prerequisite).

The choice of authority may be very much time bound and a specific time has to be placed on evaluation before redesigning a new programme. But above all, the choice of authority is very much connected to maintaining status quo and if there is change, it has to be through new initiatives. For this, the need for evaluation is not apparent, even though the evaluation community would agree that there is always a benefit to it whether formative or summative.

## SKILLS I GAINED

This section is dedicated to the skills I developed in order to overcome the challenges described above with the final objective to carry out my research in

the job place, and most specifically in the public administration and in the private company.

### *TACTICS*

During the time as a DPA student I developed a set of skills related to tactics and to building relationships with others and with places. I may say that I succeeded to carry out my research and my work in the public administration, but the contrary happened in the private consultancy firm.

With the objective to carry out my research work I built a positive and proactive relation with the Head of Unit at the ministry and I had a differentiated and selected relation with my colleagues. Whilst the relations with the fellows at the unit in the public administration are quite homogeneous, I favoured those colleagues who were more open to my understandings, who used English, who were more innovative, and it was with them that I discussed parts of my research. This allowed me to build trust and allow me to have more dedication to the issues of my interest.

This was impossible in the private company where the leadership was quite scattered and there existed a coordinated impediment from the directors and the manager for my dedication in research.

Tactics has been a key component for me to develop my own research in the job place.

### *A SKILFUL PRACTICE - THE RESEARCH DIARY*

I first heard about the research diary from my DPA supervisor, whose idea caught me by surprise. I thought it was too optimistic. Then, I read about it in a couple of qualitative research books. I had no idea how to keep a research diary. My usual diary I normally write whenever I need to write something in it is a life diary I have kept since a child. The research observations were somehow different

and, as I explain under [Policy Experience](#), my emotions were characterised by frustration until I managed to externalize my work with the research during the preparation of Progression.

I read the research diary was useful to ethnographers who dedicated their days to research, to observation and then they had to reflect about their time in the research setting. In my case this was my everyday working life. I had to introduce in my normal job setting the researcher-like thinking and action. An instrument of this action was the introduction of a research diary.

I changed my A4 notebook I used to take notes at work to a smaller and easier to carry notebook that I started to carry around at work and beyond that, at home, university, etc. Whenever I had observations that I believed were useful to my research I was highlighting them and adding the “research diary” tag. These notebooks had notes from my work and my daily life.

This new instrument was a great tool for my observations, for my connection to theory and structure. It has allowed me to carry out a better research, and it is key for drafting both the Policy Portfolio and the Reflective Piece.

## INTERIM SUMMARY

This reflective piece brought out my considerations on being a policy analyst and a doctoral researcher at the same time in the Spanish public administration (during my first year of the DPA) and in a private R&D consultancy firm (during my second year).

Going through the doctoral studies brought up changes in my profession such as a better understanding through creating places and structures, a change in relations with job aspects through building awareness and distance, and a

professionalisation of my participation through a formalised way of observing and noting down aspects relevant to my research.

The challenges of being a researcher in the job place depend on the characteristics of the jobs and I felt that the public administration can give optimal windows of opportunities for developing individualistic research internally.

## FIVE LESSONS FROM MY JOURNEY

As the “Portfolio of Policy and Research Observations and Reflections” comes to an end it may be interesting to send out a message for those future DPA candidates or reflective practitioners or policy officers who consider joining the research community for training and practice. What did I learn from this journey that started as an intuitive navigation for a professional life and is now being culminated with becoming a Doctor in Public Administration working as a science policy analyst?

1. The complexity and the dynamic nature of life in general and of the professional life more specifically, and especially when working with science policy is such that the researcher’s training and expertise makes easier the navigation. In the end of the day, the policy world and the research one are not apart. They are mixed and they trigger the same circuits in ourselves.
2. Critical realism offers a very comfortable framework to navigate complexity and diversity beyond absolute judgements. It offers that theoretical background. It may be interesting that, if you believe that you are missing some understanding from an issue you are dealing for at work, go and check what the critical realist framework can bring forward for you. It supports us

to overcome biases that lie in our mental models. Critical realism responds to the dynamic nature of knowledge on the other and ourselves.

3. See things as they are: complex. Don't be afraid of complexity to see, to understand and to describe it and make it accessible to others in your working environment, and elsewhere. The mere acceptance of complexity and your intentions for understanding will enable you to navigate through it more easily.
4. Research techniques that embrace complexity and that are allowed space in our non-research life can be very useful to be introduced as much as we can. Observation, noting down reflections and a simple research diary has transformed my working life and has eased the mixing of formal identities.
5. Combining the values of the research activity with those of a policy analyst can be an asset, and testing, questioning and unpacking for a better understanding can bring a greater fulfilment in your life purpose, and therefore your professional life.

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## ANNEXES PART I

### ANNEX 1: THE SOURCES OF INFORMATION FOR DRAWING THE CONCEPTUAL MODEL OF IMPACT

#### THE DOCUMENTS

By using the criteria explained in the “Research and Methods” Chapter, **14 documents were selected**, out of which five are legal-strategic governmental documents and nine are press articles, categorised as in the Table below.

*Table 5 Documents reviewed for the Conceptual Model of Impact*

	<b>Governmental (G) / Press (P)</b>	<b>Links</b> (last accessed in September 2020)
Law 13/1986	G	<a href="https://www.boe.es/buscar/doc.php?id=BOE-A-1986-9479">https://www.boe.es/buscar/doc.php?id=BOE-A-1986-9479</a>
Law 14/2011	G	<a href="https://www.boe.es/buscar/act.php?id=BOE-A-2011-9617">https://www.boe.es/buscar/act.php?id=BOE-A-2011-9617</a>
Strategy ENCYT 2007-2013	G	<a href="http://www.aei.gob.es/stfls/MICINN/investigacion/FICHEROS/Encyt.pdf">http://www.aei.gob.es/stfls/MICINN/investigacion/FICHEROS/Encyt.pdf</a>
Plan PN IDI 2007-2011	G	<a href="http://www.aei.gob.es/stfls/MICINN/Investigacion/FICHEROS/PLAN_NACIONAL_CONSEJO_DE_MINISTROS.pdf">http://www.aei.gob.es/stfls/MICINN/Investigacion/FICHEROS/PLAN_NACIONAL_CONSEJO_DE_MINISTROS.pdf</a>
Regulatory Bases Order CIN / 936/2011	G	<a href="https://www.boe.es/diario_boe/txt.php?id=%20BOE-A-2011-6869">https://www.boe.es/diario_boe/txt.php?id=%20BOE-A-2011-6869</a>
El País, April 2011	P	<a href="https://elpais.com/sociedad/2011/04/13/actualidad/1302645612_850215.html">https://elpais.com/sociedad/2011/04/13/actualidad/1302645612_850215.html</a>
Europa Press, June 2011	P	<a href="http://www.europapress.es/sociedad/noticia-programa-severo-ochoa-recibe-75-solicitudes-noviembre-conoceran-10-grupos-cientificos-elite-espanola-20110622113946.html">http://www.europapress.es/sociedad/noticia-programa-severo-ochoa-recibe-75-solicitudes-noviembre-conoceran-10-grupos-cientificos-elite-espanola-20110622113946.html</a>
SINC Agency, July 2011	P	<a href="https://www.agenciasinc.es/Noticias/Asi-son-los-directores-aspirantes-a-la-excelencia">https://www.agenciasinc.es/Noticias/Asi-son-los-directores-aspirantes-a-la-excelencia</a>
El Economista, July 2011	P	<a href="http://ecodiario.economista.es/sociedad/noticias/3250668/07/11/Los-responsables-de-los-centros-candidatos-al-galardon-Severo-Ochoa-presentan-su-candidatura-a-Garmendia.html">http://ecodiario.economista.es/sociedad/noticias/3250668/07/11/Los-responsables-de-los-centros-candidatos-al-galardon-Severo-Ochoa-presentan-su-candidatura-a-Garmendia.html</a>
SINC Agency, Aug. 2011	P	<a href="https://www.agenciasinc.es/Multimedia/Videos/Lanzada-la-convocatoria-del-programa-Severo-Ochoa">https://www.agenciasinc.es/Multimedia/Videos/Lanzada-la-convocatoria-del-programa-Severo-Ochoa</a>

SINC Agency, Sep. 2011	P	<a href="https://www.agenciasinc.es/Noticias/El-nuevo-programa-Severo-Ochoa-impulsara-la-excelencia-del-sistema-cientifico-espanol">https://www.agenciasinc.es/Noticias/El-nuevo-programa-Severo-Ochoa-impulsara-la-excelencia-del-sistema-cientifico-espanol</a>
El Economista, Oct. 2011	P	<a href="http://ecodiario.economista.es/salud/noticias/3427050/10/11/El-CNIO-el-CNIC-e-IRB-entre-los-primeros-8-centros-de-investigacion-mas-excelentes-de-Espana-del-Programa-Severo-Ochoa.html">http://ecodiario.economista.es/salud/noticias/3427050/10/11/El-CNIO-el-CNIC-e-IRB-entre-los-primeros-8-centros-de-investigacion-mas-excelentes-de-Espana-del-Programa-Severo-Ochoa.html</a>
La Vanguardia, Oct. 2011	P	<a href="http://www.lavanguardia.com/ciencia/20111006/54226915093/dimite-el-director-del-mejor-centro-cientifico-de-catalunya.html">http://www.lavanguardia.com/ciencia/20111006/54226915093/dimite-el-director-del-mejor-centro-cientifico-de-catalunya.html</a>
El País, Dec. 2011	P	<a href="https://elpais.com/sociedad/2011/12/06/actualidad/1323126007_850215.html">https://elpais.com/sociedad/2011/12/06/actualidad/1323126007_850215.html</a>

### *GOVERNMENTAL DOCUMENTS*

The official documents used as a source of information to understand the conceptual model of impact are the two Spanish Laws related to science and innovation, the national strategy for research and the specific ministerial order that established the bases for the granting of public aid and accreditation of the SO centres of excellence.

1. **Spanish Law for Promotion and General Coordination of Scientific and Technical Research 13/1986**, in force when the SO Programme was planned as the National Programme for Institutional Strengthening (2007) visible under the National Plan 2008-2011.

The Spanish Law of Research that was in force for 25 years (1986-2011) drew the mechanisms for funding and, up to a certain point, the coordination of research in the whole country. Its strategy and funding mechanism was the National Plan.

The document was selected as it brings understanding on what legal framework has the Spanish research operated till 2011.

2. **Law of Science, Technology and Innovation 14/2011** entered in force in 2011, the same year that the SO Programme was launched.

The 2011 Law aims to shape a system of science technology and innovation and the SO Programme was consolidated under this new legal framework with the second call for proposals in 2012.

The document was selected as necessary to grasp the regulations and general ecosystem in which Severo Ochoa operates since its launch.

### **3. The National Strategy of Science and Technology – ENCYT - (2007-2013)**

The 1986 Law's planning instrument was the 4-years National Plan. By early 2000s the need for a longer-term strategy rose. The government for the first time launched the National Strategy of Science and Technology (ENCYT), an 8-year strategy in 2007.

The document was selected as it establishes the strategic framework under which the Severo Ochoa Programme was planned and launched.

### **4. National Plan of Research, Development and Innovation -PNIDI-(2007-2011)**

This is the first plan where a similar programme to that of Severo Ochoa appears having as an objective institutional strengthening and excellence. It was called the National Programme for Institutional Strengthening.

The document is included as a reference one for understanding the theory element and the CMO configuration.

### **5. Order CIN / 936/2011, of 14 April, which establishes the Regulatory Bases for the granting of public aid and the accreditation of "Severo Ochoa Centres and Units of Excellence" within the framework of the National Program of Institutional Strengthening of the National Plan of Scientific**

Research, Development and Technological Innovation 2008-2011 and the Approval and Opening of the Call for Proposals for 2011.

The Regulatory Bases of the granting of public aid is a mandatory document required by the Spanish Law 38/2003 of the Subsidies. It is a formal document that states the motivation for the funding and its objectives, the requirements of the beneficiaries, the criteria for the application, the requirements of the to-be-funded activity, the general outline of the grant procedure, and the evaluation criteria and organs of evaluation.

The Call for Proposals includes the detailed description of the programme, its objectives and its rules for participation applicable for 2011. It draws out in detail 1) the eligible expenses, 2) the details of what the scientific memory of the applicant centre/unit should submit, 3) the description of the required annexes, and 4) the guidelines for the strategic research programme, 5) the requirements of the HR programme, and 6) the monitoring and evaluation plan that the applicant should submit. The document as well includes the funding distribution during the four years, being this 10 million euros (€) a year (1M€/year per centre/unit). It gives detail of the granting procedure, of the evaluation one and the procedure of management, justification and control.

This is a 27 pages document. Normally the Regulatory Bases and the Call for Proposals are two separate documents in the Spanish granting system, except for extraordinary occasions like this, meaning that the SO 2011 programme was aimed as a pilot.

### *PRESS ARTICLES*

The press related documents used as a source of information are published between 13 April and 6 December 2011. They include articles in generic popular

newspapers (El País, Vanguardia), specialised ones (El Economista), generic news agencies (EuropaPress) and specialised ones in science (Agencia SINC).

1. Article in *El País* dated 13 April 2011 [https://elpais.com/sociedad/2011/04/13/actualidad/1302645612\\_850215.html](https://elpais.com/sociedad/2011/04/13/actualidad/1302645612_850215.html) “The Science department launches a program to subsidise the best research centres.”
2. Article in *EuropaPress* dated 22 June 2011 <http://www.europapress.es/sociedad/noticia-programa-severo-ochoa-recibe-75-solicitudes-noviembre-conoceran-10-grupos-cientificos-elite-espanola-20110622113946.html> “The Severo Ochoa program receives 75 applications and in November the 10 elite Spanish scientific groups will be known.”
3. Article in the *Spanish Science News Agency* dated 14 July 2011 <https://www.agenciasinc.es/Noticias/Asi-son-los-directores-aspirantes-a-la-excelencia> “This is how the aspiring directors for excellence are.”
4. Article in *El Economista* dated 21 July 2011 <http://ecodiario.eleconomista.es/sociedad/noticias/3250668/07/11/Los-responsables-de-los-centros-candidatos-al-galardon-Severo-Ochoa-presentan-su-candidatura-a-Garmendia.html> “Those responsible of the Severo Ochoa candidate centres submit their candidacy to Garmendia [Science minister].”
5. Article & Video in the *Spanish Science News Agency* dated 3 August 2011 <https://www.agenciasinc.es/Multimedia/Videos/Lanzada-la-convocatoria-del-programa-Severo-Ochoa> “The call of the Severo Ochoa program has been launched.”
6. Article in the *Spanish Science News Agency* dated 20 September 2011 <https://www.agenciasinc.es/Noticias/El-nuevo-programa-Severo-Ochoa>

[impulsara-la-excelencia-del-sistema-cientifico-espanol](#) “The new Severo Ochoa program will boost the excellence of the Spanish scientific system.”

7. Article in *El Economista* dated 5 October 2011 <http://ecodiario.eleconomista.es/salud/noticias/3427050/10/11/El-CNIO-el-CNIC-e-IRB-entre-los-primeros-8-centros-de-investigacion-mas-excelentes-de-Espana-del-Programa-Severo-Ochoa.html> “The CNIO, the CNIC and IRB, among the top 8 most excellent research centres in Spain of the Severo Ochoa Program.”
8. Article in *La Vanguardia* dated 6 October 2011 <http://www.lavanguardia.com/ciencia/20111006/54226915093/dimite-el-director-del-mejor-centro-cientifico-de-catalunya.html> (Catalan Newspaper, article written in Spanish.) “The director of the best scientific centre in Catalonia resigns. The Centre of Genomic Regulation, excluded from the ministry's funding of excellence.”
9. Article in *El País* dated 6 December 2011 [https://elpais.com/sociedad/2011/12/06/actualidad/1323126007\\_850215.html](https://elpais.com/sociedad/2011/12/06/actualidad/1323126007_850215.html) “The Severo Ochoa Excellence Program: Lights and Shadows.”

Such as mentioned under [Chapter III. Research Design and Methods](#) **two types of documents were not considered:**

- 1) The **drafts – internal docs that the programme makers worked with** in their internal meetings when designing the programme. At the time of the design of the National Programme for Institutional Strengthening I was not part of the SO Programme team, therefore I did not have the internal documents related to the programme. This would have required asking the interviewees, but I realised it was not necessary to review these documents as, whenever they were talking about the process of

how it came to being written the programme, no controversy came up regarding what was being thought and was being written on the formal documents.

- 2) The **State Strategy of Science, Technology and Innovation 2013-2020** being planned in 2012 and therefore it did not effect at all the planning of the first SO programme. The strategy incorporated the importance of institutional strengthening previously drafted in the SO-2011.

## THE INTERVIEWEES

I interviewed five senior officials that were closely involved with the programme conceptualisation at the departmental ministry in charge of science policy. None of the interviewees were involved with the programme at the time of the interview.

The interview with the minister was not performed due to the very strict timing of notice. I approached the former minister in September 2016 and was offered a 30min slot in the end of December 2016 with only three days of notice, time during which I was on a working trip out of town. When asked for a second opportunity, the former minister's assistant indicated that the interview with the senior official from the cabinet could be sufficient to represent the minister's opinion on the programme. In the three months between September and December 2016, I had already interviewed the senior official from the minister's cabinet. Therefore, in spite of having all individuals responding, only 5 out of 6 interviews were performed.

*Table 6 Interviewees - Senior Officials*

	No.1	No.2	No.3	No.4	No.5
Working for the Government at the time of SO conceptualisation?	Yes	Yes	No	Yes	Yes
If yes, when?	After 2008	After 2008		Before and after 2008	Before 2008
Contribution to the SO Programme	Design and implementation	Choice	Advice	Design	Design
Any bond to the programme at the time of the interview	No	No	No	No	No

### *INTERVIEWEE NO. 1*

The interviewee No.1 was a senior official working for the government at the time of conceptualisation of the SO, after the 2008 (i.e.: the design of the National Plan where the concept of Institutional strengthening was included). The senior official contributed in the design and implementation of the programme. At the time of the interview, the official had no bond to the programme.

The interviewee had held several posts as politically appointed in the **government** during 2009-2011 (in the team that designed the SO programme such as we know it now, and implementation of the first call for proposals) and 2012-2016 (the consolidation of the programme under the strategic documents and consolidation of its implementation on the calls for proposals 2012-2015).

This was an essential interview to unpack more deeply the knowledge I had about the programme as having worked in 2011 in its implementation team. The senior official described the initial push for the design of the programme such as it is known nowadays, as well as the weaknesses in terms of the general performance of the system had shown, in line with the documentary review.

Being the first performance based institutional scheme the country was launching, more was discussed on the definition of the criteria to be reasonable and internationally comparable. In a context where excellence was a science policy jargon, the government was establishing its first scheme that would create the institutional dimension of excellence in the country.

From the interview, I understood that to better capture the context of decision making of the programme, it would be enriching to interview a senior official responsible for it, bringing purposiveness to the next interviews in a snowball process. Moreover, the interviewee mentioned in the talk some informal consultation done with a couple of remarkable regional governments where similar initiatives existed. This brought to another additional interviewee to be added on board. The interviewee recommended the discussion with another senior official part of the team in charge of the design of the programme, someone who I had already approached for an interview, because of the role the later had during my involvement in the implementation team.

### *INTERVIEWEE NO. 2*

Interviewee No. 2 was working for the government at the time of the SO conceptualisation, after 2008. This person contributed to moderate the choice of selecting a new political initiative to be launched. The interviewee had not bond to the SO at the time of the interview. The interviewee was politically appointed as a member of the minister's team.

The interview shed light on **the counterfactual choices that the minister had to take at the time of promoting one idea or another**, like for example the reform of the Public Research Organisations or the launch of the "Severo Ochoa" Programme. Other aspects discussed were the context at the time of the

Programme design, the relations with the traditional research sector, the press, etc.

### *INTERVIEWEE NO. 3*

Interviewee number 3 was not working for the Spanish government at the time of the conceptualisation of the SO programme. The contribution given was as an advice to the state government. There was not bond to the programme at the time of the interview.

**A senior official with a high profile in science policy and international experience.**

When a senior official in the regional government, the interviewee **was at the team responsible for the establishment of the regional centres of excellence** by granting block institutional funding to selected institutions and giving them autonomy in setting up strategies and management structures.

The development of the institutional dimension of excellence is seen by this official as essential to build a strong research system in Spain. The interviewee explained extensively how the strengthening of institutions, and especially centres, creates the optimum dynamics for research to flourish (something already seen under the [Promoting Centres of Excellence](#)) “Severo Ochoa is an idea that was unfortunately truncated to the possibilities of the Spanish legislation”, but that nevertheless, “remains one of the best programmes ever designed in the Spanish science policy”.

### *INTERVIEWEE NO. 4*

Interviewee No. 4 was working for the Government at the time of conceptualisation of the SO, before and after 2008, i.e.: during the conceptualisation the Programme of Institutional Strengthening that was included in the National Plan (2008-2011) and during the conceptualisation of

the design of the call for proposals related to the SO programme. The interviewee had no bond to the programme at the time of the interview.

A senior official who was appointed during 2004-2008, and who continued in the 2008-2011 political period. The interviewee was a member of the team responsible for the design of the National Plan 2008-2011 where the first sketch of what we know now as the Severo Ochoa Programme was designed under the then “National Programme for Institutional Strengthening”.

Talking to this interviewee was useful to understand **the roots of the idea that extended before the Ministry of Science and Innovation (2008-2011)** and the ministerial team that designed the Programme such as I worked with during its pilot implementation in 2011.

The interview was based **on questions that could leave space for telling or remembering past moments or meetings**. Suddenly, the participant remembered a meeting where there was a strong discussion about a new scheme of funding that the university rectors were asking the state government for, and that the interviewee, as a senior official, had to present a new draft of the scheme and transmit the idea that the “funding had to be grounded on excellence based international criteria of performance”. The interviewee said that this was backed up and “fought for” by the interviewee’s superior, who played a role to shape the universities’ petition to what would later be “National Programme for Institutional Strengthening”, such as it appears in the National Plan for Research (2008-2012).

At this point I realised that **interviewing this person would bring a better understanding to how the idea generated**. A new interview was added into the list, a total of five.

### *INTERVIEWEE NO. 5*

Interviewee No 5 was a senior official that was working for the government at the time of the SO conceptualisation, before 2008, when the idea was included in the National Plan as “Institutional Strengthening Programme”. The contribution this official gave to the programme was **the design of concept**. There was no bond with the SO instrument at the time of the interview.

A senior official appointed at the Ministry of Education and Science during the 2004-2008 period. The interviewee was part of the team responsible for the scientific policy in the country and as well, at a technical level, of the design of the National Plan for Research (2008-2011).

The interview was useful as it brought forward more clearly what kind of change they aimed to create through the design of the later-to-be-called SO programme and what forces drove that. The interview identified what was in the interviewee’s mind when talking about the National Programme of **Institutional Strengthening**, the programme used as a starting point to create the SO instrument.

## ANNEX 2: SEMI-STRUCTURED INTERVIEW TOPIC GUIDE WITH POLICY MAKERS

1. [Opener] **Can you tell me about the [programme] – why was it set up, how it worked, and what was meant to achieve as you see it?**
  - a. [Probe] Do you think the aim was also to do [x on Global Prosperity].
  - b.
2. [Programme operation] **I've made a simple graph of the programme delivery process – does this look right to you? Would you like to change or amend anything on here?**
  - a. [Probe] Why did the process have [x] component?



Validate the Programme Theory

**Input**

Political Will  
 Financial Resources  
 Need to tackle a challenge  
 ...

**Process**

A managerial Unit of confidence closely linked to the Minister  
 Prestigious International Evaluation Committee for the Candidates  
 Based on international practices of excellence initiatives/performance based funding  
 ...

**Output**

A list of top research centers that are awarded  
 New improved competitive funding process  
 Media coverage/visibility feeds reputation from ministry-top research centers and vice versa.  
 ...

**Impact**

The ministry is changing the role of the game for funding.  
 Ministry's contribution to top research centers is based on performance.  
 The Spanish STI system has new players/ is stronger.  
 ...

## *Introducción & ¿Ha cambiado el nivel de reconocimiento a nivel estatal?*

- **0) Would you please briefly describe who you are and your role in the organisation?**

*¿Podría, por favor hacer una breve introducción de Vd. y de su papel en el centro?*

- **A1) Do you feel that for your centre the level of recognition at state level has changed in recent years?**
  - In what direction?
  - What do you mean by that?
  - How do you see recognition? (differences between the distinction and the funding)
  - If yes: What was the reason for the increased recognition?
  - Did the SO have any effect on the feeling of recognition?

### ***A1) ¿Siente Vd. que para su centro ha cambiado el nivel de reconocimiento a nivel estatal?***

- *¿En qué dirección?*
- *¿Qué quieres decir con eso?*
- *¿Cómo ves el reconocimiento? (distinción vs financiación – partes SO)*
- *En caso afirmativo: ¿Cuál fue la razón del aumento de reconocimiento?*
- *¿Tuvo algún efecto el SO en el sentimiento de reconocimiento?*

### ***A2) ¿Cómo ha cambiado la calidad científica del centro?***

- **A2) How do you think the scientific quality of your centre has changed in the recent years?**
  - If it has improved: What do you mean by “improved”? What have the sources of improvement been? If it hasn’t changed: What do you mean? What are the causes? **In what** has it specifically changed?
  - Has the SO made any difference in this? If yes, in what way?
- ***En los últimos años, ¿Cómo ha cambiado la calidad científica del centro?***
  - *¿Qué quiere decir por “mejorado”?*
  - *¿Cuáles han sido las fuentes y los factores de mejora?*
  - *En caso de que no haya cambiado. ¿Qué quiere decir?*
  - *¿Cuáles han sido las causas de esto?*
  - *¿En qué ha cambiado específicamente?*
  - *¿Ha tenido algo que ver el SO en este cambio?*

## ***B1) ¿SO ha tenido algún efecto en la estrategia científica del centro?***

- **B1) Has the SO had any effect at your centre's research strategy?**
  - What kind of effect?
  - When did your centre have its first strategy, conceived as a roadmap for action?
  - How did you find the fact to develop a 4-year strategy in the occasion of the application? Why is that?
- ***¿SO ha tenido algún efecto en la estrategia científica del centro?***
  - *¿Qué efecto?*
  - *¿Cuándo tuvo el centro la 1ª estrategia concebida como hoja de ruta para acción/ concebida para implementarse?*
  - *¿Qué os pareció el hecho de desarrollar una estrategia de 4 años para esta ocasión? ¿Por qué?*

## ***B2) ¿Desde la idea inicial para solicitarla al liderazgo en la propuesta, a la recepción de la financiación y su ejecución y justificación?***

- **B2) Would you please explain briefly the lifecycle of the grant, from the initial idea to apply, the leadership in the proposal, to the acceptance of funding, its execution and justification?**
  - Is it done in-house or is it done or supervised by any other organisation?
  - Why is that?
  - If it is not done by you, **what factors determined that the grant was accepted by another organisation?**
- ***¿Podría indicarme el ciclo de vida de la ayuda en su centro desde la idea inicial para solicitarla al liderazgo en la propuesta, a la recepción de la financiación y su ejecución y justificación?***
  - *¿Se ha hecho en su centro o en otra organización? ¿Se ha supervisado por otra organización?*
  - *¿Por qué?*
  - *¿Qué factores han determinado que la ayuda se recibiera por otra organización?*

**B3) ¿Tuvo toda la libertad que quiso para usar la ayuda para la estrategia científica?**

- **B3) Did you feel you were as free as you wished to use the grant for the research strategy you had drafted?**
  - Why is that?
  - What factors influenced that?
- **¿Sintió que tuvo la libertad que quiso para usar la ayuda para la estrategia científica a la que fue director?**
  - ¿Por qué?
  - ¿Qué factores influenciaron eso?

**B4) ¿Diría que la gobernanza de su centro ha cambiado en los últimos años?**

- **B4) Would you say the governance of your centre has changed in recent years?**
  - In what way?
  - What has influenced that?
  - Has the SO played any role in that?
  - If yes: In which way?
  - If no: why do you think that?
  - What's your opinion, **which governance model would have allowed you to optimise the impact of SO?**
- **¿Diría que la gobernanza de su centro ha cambiado en los últimos años?**
  - *¿De que forma? ¿Cuáles han sido los factores de ese cambio? ¿Ha tenido que ver el SO?*
  - *Si sí: ¿en qué forma?*
  - *Si no: ¿Por qué lo piensa?*
  - *En su opinión, ¿qué modelo de gobernanza permite optimizar el impacto de SO?*

## **B5) ¿La administración de la investigación de su centro ha cambiado en los últimos años?**

- **B5) Would you say the research management at your centre has changed in recent years?**
  - In what way? What has influenced that?
  - Has the SO played any role in that?
  - If yes: In which way?
  - If no: why do you think that?
  - What's your opinion, **which administrative model would have allowed you to optimise the impact of SO?**
- **¿Diría que la administración de la investigación de su centro ha cambiado en los últimos años?**
  - *¿De que forma? ¿Cuáles han sido los factores de ese cambio? ¿Ha tenido que ver el SO?*
  - *Si sí: ¿en qué forma?*
  - *Si no: ¿Por qué lo piensa?*
  - *En su opinión, ¿qué modelo de administración permite optimizar el impacto de SO?*

## **C1) ¿Siente que el impacto de su centro ha cambiado?**

- **C1) Do you feel in recent years that the impact of your organisation has changed in some way?**
  - Examples? What have been the factors for that? Under the economic achievements, which ones would you highlight?
  - Did the SO influence that?
  - Would you please tell me **¿Which types of impact has your centre delivered the most?** [Show [table](#) with the types of impact.] Is there evidence you may show? How has the SO (and what dimension of the SO influenced it: award vs. funding)
- **En su opinión, ¿siente que el impacto de su centro ha cambiado?**
  - *Ejemplos. ¿Qué factores han influenciado en eso?*
  - *Con relación al impacto económico, ¿qué acontecimientos destacarías? ¿Ha influenciado en esto el SO?*
  - *¿Qué dimensión de SO ha afectado más? ¿La distinción o la financiación?*
  - *Puede revisar este documento e indicarme si siente Vd que existen evidencias de su centro que ha producido este tipo de impacto? [Enseñar la tabla.]*

## **C2) ¿Nuevos *partenariados* estratégicos?**

- **C2) Has your organisation participated in new strategic partnerships in recent years?**
  - Examples?
  - Are they mostly national or international partnerships?
  - What factors have influenced that? The localisation of your centre?
  - Did the SO influence that?
  - What dimension of SO: award or money?
- **¿Siente que últimamente su centro ha participado en *nuevos partenariados estratégicos*?**
  - ¿Ejemplos?
  - ¿Son mayormente *internacionales o nacionales o regionales*?
  - ¿Qué **factores** han influenciado esto? ¿La localización?
  - ¿Ha influenciado el SO? ¿Qué parte de SO: la distinción o la financiación?

## **C3) ¿Ha cambiado la efectividad de su centro para atraer financiación privada o de patrocinio?**

- **C3) Would you say your organisation's effectiveness in attracting private and sponsorship funding has changed in recent years?**
  - Why is that?
  - Did the SO influence that?
- **¿Siente que *ha cambiado la efectividad de su centro para atraer financiación privada o de patrocinio*?**
  - ¿Por qué?
  - ¿Ha influenciado en esto el SO?

*C4) ¿Qué más dirías que puede asociarse para ser un efecto SO para tu centro?*

- **C4) What else would you say that can be associated to be a SO effect for your centre?**
  - Effecting the attraction of talent? At national and international level?
  - Including policies of inclusiveness, gender equality, diversity, etc.?
- *C4) ¿Qué más dirías que puede asociarse para ser un efecto SO para tu centro?*
  - *¿Atraer talento? ¿A nivel nacional e internacional?*
  - *¿Hacer políticas de inclusión, igualdad de género, diversidad, etc.?*

*D1) ¿Cuáles considera que son "organizaciones madre"?*

- D1) Would you please describe briefly which ones you consider as “mother organisations”, meaning the ones that supported the establishment of your centre?
  - How are they connected to the centre nowadays?
- *¿Podría describir brevemente cuáles considera que son "organizaciones madre", es decir, las que apoyaron el **establecimiento** de su centro?*
  - *¿Cómo están conectados al centro hoy en día?*

## D2) ¿Algún **cambio** entre su centro y las organizaciones madre?

- **D2) Have you observed any changes between your centre and your “mother organisation(s)” since you were granted the SO award?**
  - If yes: What do you mean by that?
  - What characteristics of the SO do you think have made that happen?
- *D2) ¿Ha observado algún cambio entre su centro y su (s) organización (es) madre (s) desde que recibió el premio SO?*
  - *En caso afirmativo: ¿qué quieres decir con eso?*
  - *¿Qué características del SO crees que han hecho que eso suceda?*

## D3) ¿Algún cambio en las **políticas o prácticas** de su “organización (es) madre (s)” que pueda relacionar con el SO?

- **D3) In recent years, have you noticed any change in the policies or practices of your “mother organisation(s)” that you may relate to the SO award at all/ to the promotion of excellence/ promotion in the autonomy of research management, etc.?**
  - *If yes: What do you think is the cause for that?*
  - *If no: In which conditions do you think change would have happened?*
- *D3) En los últimos años, ¿ha notado algún cambio en las políticas o prácticas de su “organización (es) madre (s)” que pueda relacionar con el SO/ a la promoción de la excelencia / promoción en la autonomía de la gestión de la investigación, etc.?*
  - *En caso afirmativo: ¿Cuál crees que es la causa de eso?*
  - *Si no: ¿En qué condiciones crees que habría ocurrido el cambio?*

From question C1 above.

Technological Impact	Developing new and improving existing technologies
Social Impact	Informing public debate, stimulating public interest, improving welfare, equality and inclusion, and improving quality of life and opportunities.

<b>Policy Impact</b>	Informing, influencing and improving decision-making by government and public bodies, NGOs and in the private sector. Increasing the efficiency and/or quality of public services, directing investment to priority areas and raising business productivity.
<b>Legal Impact</b>	Improving law enforcement methods, effecting legislative change and improving legal practice and access to justice.
<b>Health Impact</b>	Creating new drugs and treatments and developing new therapies. Improving education and training, public awareness, and access to health care provision, as well as policy, legislation, standards or guidelines.
<b>Global Impact</b>	Delivering positive impacts from our research overseas including collaborating with partners in other countries.
<b>Environmental Impact</b>	Delivering energy savings and reduced emissions, improving management and conservation of natural resources, stimulating public awareness and influencing policy, improving business and public service operations, and environmental risk management.
<b>Economic Impact</b>	Driving economic growth, generating new products and services and creating jobs.
<b>Cultural Impact</b>	Enhancing and preserving our cultural heritage, producing cultural artefacts, creating, inspiring and supporting new forms of expression, and enhancing our understanding of minority groups and communities.
<b>Other Types Of Impact</b>	...

## ANNEX 4 PREPARATORY INFORMATION ON THE BIBLIOMETRIC PERFORMANCE

A preparatory study on the bibliometric performance of the centres was carried out as a reference to both the most qualitative data and the findings and conclusions. Although a full bibliometric study fell out of scope of this particular project, the realist evaluations in their multiple dimensions include such studies as a central part.

The data was retrieved by InCities database of Clarivate Analytics. Two sets of data were searched, firstly by country, i.e.: Spain, and secondly by the institutions. The 20 entities under study were found and added in the search engine. The search for the indicators is done separately for the country and the institutions. The chosen indicators out of the available ones for the countries are: Web of Science Docs Category Normalised Citation Impact, Industry Collaborations, International collaborations, and Documents in Top 1%. The chosen indicators out of the available ones for each of the 20 awarded centres are: the ones given above for the country, as well as: Domestic Collaborations, Impact Relative to World, and % Highly Cited Papers.

These indicators have been searched in two periods of time: firstly in the one that I call “pre-SO” programme, the eight years before the programme (2002-2010) and secondly the “during SO” programme, the eight years once the programme was running (2010-2018).

Below is given the table with the full information.

Figure 11 Information on the bibliometric performance

Organisation	Legal Research	Research	Size	Web of Science Docs			Category Normalised Citation Impact			Industry Collaborations			Domestic Collaborations			International collaborations			Impact Relative to World			% Highly Cited Papers			Documents in Top 1%		
				Pre-SO (2002-2010)	During SO (2011-2018)	Diff.	Pre-SO	During SO	Diff.	Pre-SO	During SO	Diff.	Pre-SO	During SO	Diff.	Pre-SO	During SO	Diff.	Pre-SO	During SO	Diff.	Pre-SO	During SO	Diff.	Pre-SO	During SO	Diff.
Global Baseline				16797238	23167944	6370706	0.98	0.97	-0.01	334402	449094	114692	5067	13341	8274	2288730	4177078	1878348	2.58	1.46	-1.12	0	0.68	0.68	196869	260185	63316
Spain				487684	788577	300893	1.02	1.14	0.12	9804	20194	10390	5067	13341	8274	158289	327373	189084	1.57	1.49	-0.08	0	0.98	0.98	5699	11806	6107
20 SO Centres				21601	59997	38396	2.19	1.79	-0.79	373	1558	1185	5067	13341	8274	12183	38894	26711	2.58	1.46	-1.12	0	0.68	0.68	483	1792	1309
1	Autonomous	Applied	Small	28	438	410	1.47	1.57	0.1	0	4	4	5	78	73	14	274	260	1.57	1.49	-0.08	0	0.98	0.98	2	11	9
2	Autonomous	Applied	Large	308	1739	1431	0.92	1.15	0.23	18	293	275	110	477	367	150	1095	945	0.92	1.15	0.23	2	11	9	4	37	33
3	Autonomous	Applied	Small	54	847	793	1.45	1.39	-0.06	2	11	9	5	167	162	44	591	547	0.92	1.15	0.23	0	0.47	0.47	0	8	8
4	CSIC	Basic-to-appl	Large	1646	3885	2239	1.5	1.54	0.04	38	88	50	490	1131	641	743	1986	1243	1.5	1.54	0.04	0	1.18	1.18	39	84	45
5	CSIC	Basic-to-appl	Small	1287	3521	2234	1.15	1.16	0.01	20	20	0	340	723	383	653	2273	1620	2.67	2.51	-0.16	0	0.94	0.94	37	104	67
6	Mixed	Basic	Small	1809	3048	1239	1.67	1.85	0.18	14	23	9	350	832	482	894	1665	771	1.81	1.72	-0.09	0	0.39	0.39	17	37	20
7	Mixed	Basic	Medium	2452	6447	3995	1.29	1.53	0.24	6	28	22	346	600	254	1783	5157	3374	2.18	2.55	0.37	0	1.99	1.99	54	208	154
8	Mixed	Basic	Small	2472	5525	3053	1.17	1.33	0.16	4	14	10	426	783	357	1520	3841	2321	1.69	2.13	0.44	0	1.45	1.45	38	130	92
9	Mixed	Basic	Medium	602	1415	813	1.7	1.57	-0.13	12	23	11	185	471	286	248	616	368	2.76	2.69	-0.07	0	1.06	1.06	7	26	19
10	Mixed	Applied	Medium	911	1887	976	1.9	1.65	-0.25	20	64	44	278	483	205	276	756	480	3.66	3.8	0.14	0	2.01	2.01	36	53	17
11	Autonomous	Applied	Medium	328	1776	1448	1.97	2.36	0.39	9	41	32	110	546	436	196	1167	971	2.69	2.72	0.03	0	2.48	2.48	8	48	40
12	Autonomous	Basic	Large	842	2853	2011	1.46	1.97	0.51	23	84	61	236	820	584	479	1812	1333	4.42	4.41	-0.01	0	2.31	2.31	36	153	117
13	Autonomous	Basic-to-appl	Medium	551	2683	2132	1.76	2.12	0.36	11	128	117	255	879	624	244	1586	1342	2.77	2.87	0.1	0	2.42	2.42	14	90	76
14	Autonomous	Basic-to-appl	Large	1390	3659	2269	1.29	1.38	0.09	55	213	158	403	976	573	653	2092	1439	3.45	3.81	0.36	0	1.97	1.97	42	148	106
15	Autonomous	Applied	Medium	307	1518	1211	1.72	1.92	0.2	5	27	22	132	592	460	139	842	703	1.79	1.85	0.06	0	1.52	1.52	4	33	29
16	Autonomous	Basic-to-appl	Medium	965	3306	2341	1.93	2.35	0.42	4	100	96	201	723	522	618	2260	1642	2.34	2.72	0.38	0	2.99	2.99	22	116	94
17	Autonomous	Basic	Small	951	2949	1998	1.02	1.37	0.35	2	23	21	80	181	101	733	2519	1786	2.81	3.38	0.57	0	3.39	3.39	41	160	119
18	Autonomous	Basic	Large	1065	2988	1923	2.24	1.81	-0.43	54	97	43	539	1258	719	436	1535	1099	1.96	2.45	0.49	0	1.57	1.57	13	65	52
19	Autonomous	Applied	Medium	732	2183	1461	1.19	1.74	0.55	15	44	29	333	1008	675	312	907	595	3.81	3.48	-0.33	0	2.23	2.23	29	53	24
20	Autonomous	Basic-to-appl	Large	2901	7320	4419	1.19	1.74	0.55	61	233	172	243	613	370	2048	5920	3872	1.6	2.32	0.72	0	1.75	1.75	40	228	188

The table with the information and its outcome may probably be inconclusive, but it outlines the additional information that could be done as a multidimensional analysis generally with a critical realist approach and it provides rich information for the overall findings.

As an explanation, a fuller bibliometric analysis was outside the scope of my specific project, but it would, nevertheless, be considered a part of any realist evaluation, exploring aspects like: a) From the identified programme theory see if the intentions manifested in international rankings (for instance). b) From the reported impacts see if funding resources changed or collaborations increased and extended; and more.

## ANNEXES PART II

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### *Annexes related to the year before the DPA*

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This report includes annexes I worked during that period, being them:

- The **ERAC Peer Review Report** that had counted with my collaboration as a member of the Spanish team:  
[https://www.mineco.gob.es/stfls/MICINN/Prensa/FICHEROS/2014/140801\\_final\\_report\\_public\\_version.pdf](https://www.mineco.gob.es/stfls/MICINN/Prensa/FICHEROS/2014/140801_final_report_public_version.pdf)

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### *Annexes related to the 3rd year of the DPA*

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- The Benchmarking exercise final report:  
[https://era.gv.at/object/document/5492/attach/0\\_Final\\_Report\\_Benchmarking.pdf](https://era.gv.at/object/document/5492/attach/0_Final_Report_Benchmarking.pdf)

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### *Annexes related to the 4<sup>th</sup> year of the DPA*

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- Strategic Report of the SFIC Africa TF:  
[https://data.consilium.europa.eu/doc/document/ST-1355-2020-REV-1/en/pdf?fbclid=IwAR0OkWOWscLsqfIOB\\_yk65KXSUybChcXTeo1X\\_WWu\\_v\\_c682vpRm3RFS0z\\_A](https://data.consilium.europa.eu/doc/document/ST-1355-2020-REV-1/en/pdf?fbclid=IwAR0OkWOWscLsqfIOB_yk65KXSUybChcXTeo1X_WWu_v_c682vpRm3RFS0z_A)

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## ACRONYMS

AEI	<i>Agencia Estatal de Investigación</i> (Spanish State Research Agency)
AEVAL	<i>Agencia Estatal de Evaluación de las Políticas Públicas y la Calidad de los Servicios</i> (Spanish State Agency for the Evaluation of the Quality of Public Services and Policies)
AIReF	<i>Autoridad Independiente de Responsabilidad Fiscal</i> (Spanish Independent Authority for Fiscal Responsibility)
ANECA	<i>Agencia Nacional de Evaluación de la Calidad y Acreditación</i> (Spanish National Agency of Evaluation of the Quality and Accreditation)
ANEP	<i>Agencia Nacional de Evaluación y Perspectiva</i> (Spanish National Agency for Evaluation and Prospective)
ASTMH	American Society of Tropical Medicine and Hygiene
BIST	Barcelona Institute of Science and Technology
CCAA	<i>Comunidades Autónomas</i> (Spanish Autonomous Communitities/Regions)
CERCA	<i>Centres de Recerca de Catalunya</i> (Catalan Research Centres)
CICYT	<i>Comisión Interministerial para la Ciencia y la Tecnología</i> (Inter-ministerial Commission for Science and Technology)
CIEMAT	<i>Centro de Investigaciones Energéticas, Medioambientales y Tecnológicas</i> (National Energy Research Council)
CMO	Context Mechanism Outcome
CNEAI	<i>Comisión Nacional Evaluadora de la Actividad Investigadora</i> (Spanish National Commission for the Evaluation of Research Activity)

CNIC	<i>Centro Nacional de Investigaciones Cardiovasculares</i> (Spanish National Centre for Cardiovascular Research)
CNIO	<i>Centro Nacional de Investigaciones Oncológicas</i> (Spanish National Cancer Research Centre)
CoE	Centre(s) of Excellence
COSCE	<i>Confederación de Sociedades Científicas de España</i> (Confederation of Scientific Societies of Spain)
CRUE	<i>Conferencia de Rectores Españoles</i> (Spanish Rectors' Conference)
CSIC	<i>Consejo Superior de Investigaciones Científicas</i> (Spanish National Research Council)
DPA	Doctorate in Public Administration
ENCYT	<i>Estrategia Nacional de Ciencia y Tecnología</i> (National Strategy of Science and Technology)
ERA	European Research Area
ERAC	European Research Area Committee
ERC	European Research Council
EU	European Union
FECYT	<i>Fundación Española para la Ciencia y Tecnología</i> (Spanish Foundation of Science and Technology)
FEDER	<i>Fondo Europeo de Desarrollo Regional</i> (European Regional Development Fund)
FP7	The 7th European Union Framework Programme for Research and Innovation (2007-2013)
GDP	Gross Domestic Product
GRI	Gender in Research and Innovation
H2020	"Horizon 2020" the European Union Framework Programme for Research and Innovation 2013-2020

HEIF	Higher Education Innovation Fund
HQ	Headquarters
HR	Human Resources
ICT	Information and Communication Technology
IGP	Institute for Global Prosperity
IMDEA	<i>Instituto Madrileño de Estudios Avanzados</i> (Madrid Advanced Studies Institute)
INTA	National Institute of Aerospace Technology
IT	Information Technology
JPI	Joint Programming Initiative
KTT	Knowledge and Technology Transfer
MINECO	<i>Ministerio de Economía y Competitividad</i> (Spanish Ministry of Economy and Competitiveness)
NPM	New Public Management
OECD	Organisation for Economic Cooperation and Development
PBIF	Performance Based Institutional Funding
PhD	Doctor of Philosophy
PI	Principal Investigator
PNIDI	<i>Plan Nacional de Investigación, Desarrollo e Innovación</i> (National Plan of Research, Development and Innovation)
PPT	Power Point Presentation
PRO	Public Research Organisations
PSOE	<i>Partido Socialista Obrero Español</i> (Spanish Socialist Workers' Party)
PTA	<i>Personal Técnico de Apoyo</i> (Technical Support Personnel)
QDAS	Qualitative Data Analysis Software
R&D	Research and Development
R&I	Research and Innovation

RDI/R&D&I	Research, Development and Innovation
REF	Research Excellence Framework
REI	Research Excellence Initiatives
RIS3	Research and Innovation Smart Specialisation Strategies
RRI	Responsible Research and Innovation
SECTI	<i>Sistema Español de Ciencia, Tecnología e Innovación</i> (Spanish Science, Technology and Innovation System)
SECYT	Spanish System of Science and Technology
SEIDI	<i>Secretaría de Estado de Investigación, Desarrollo e Innovación</i> (State Secretariat of Research, a General Secretariat of Innovation)
SFIC	Strategic Forum of International Cooperation
SICTI	<i>Sistema Español de la Ciencia, Tecnología e Innovación</i> (Spanish Information System of Science, Technology and Innovation)
SISE	<i>Sistema Integral de Seguimiento y Evaluación</i> (Integral Monitoring and Evaluation System)
SO	“Severo Ochoa” Centres of Excellence Programme
SOMMA	“Severo Ochoa” Centres of Excellence and “Maria de Maeztu” Units of Excellence Alliance
STePP	Science, Technology, Engineering and Public Policy, Department at UCL
STI	Science, Technology and Innovation
TAC	<i>Técnicos de Administradores Civiles del Estado</i> (State Civil Administrators)
TF	Task Force
UC3M	<i>Universidad Carlos III Madrid</i> (Madrid Carlos III University)
UCL	University College London
UfM	Union of the Mediterranean

UK	United Kingdom
UPC	<i>Universitat Politècnica de Catalunya</i>
US	United States
WG	Working Group
WHO	World Health Organisation