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DEUSTO BUSINESS SCHOOL

Public policy actors, processes, decisions and evaluation: The case of FLOSS in Spain (2003-2013)

Doctoral Thesis

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Bachelor in Business Administration

Donostia-San Sebastián, July 2015

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Doctor en Ciencias Económicas y Empresariales

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Doctor Ingeniero de Telecomunicaciones

Thesis submitted to the Facultad de Ciencias Económicas y Empresariales in partial fulfillment of the requirements for the degree of Doctor in Business Administration

Deusto Business School

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Donostia-San Sebastián, July 2015

July 2015

WE HEREBY RECOMMEND THAT THE THESIS PREPARED UNDER OUR SUPERVISION BY Pedro Mª Ugartemendia Garro ENTITLED Public policy actors, processes, decisions and evaluation: The case of FLOSS in Spain (2003-2013) BE ACCEPTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF Doctor of Philosophy in Economy and Business Administration.

Juan José Gibaja Martins, Ph.D. Thesis Advisor

Jesús M. González Barahona, Ph.D. Thesis Advisor

“He who receives an idea from me, receives instruction himself without lessening mine; as he who lights his taper at mine receives light without darkening me”

Thomas Jefferson

Acknowledgements

This has been a long and strange journey for me. There is no doubt that I could not have made it without all the people who have helped me along the way. Thankfully, it is now time to dedicate a tiny space in this long document to acknowledge their efforts and courage to push me towards an end I could barely perceive along the way.

My first thought goes to Iñaki Garcia Arrizabalaga, who was able to masterfully seize on my wildly unconscious desire to continue my learning experience. Iñaki patiently welcomed all sorts of impossible research and dissertations; thanks to his long and rich expertise, he was able to keep me on the right track. He expertly helped me understand what it takes to start to become a social researcher. I was not aware what a privilege it would be to learn the basics from Iñaki. He even warned me, kindly but firmly, of the perils of not doing this research under the academic auspices of Deusto. Going solo was a risky business that only the strongest are able to "survive". Finally he guided me into the hands of Juan José Gibaja Martins.

Juan José has been my guide and mentor throughout the whole PhD experience. Just like Iñaki, he understood my intentions right from the beginning. He has been patient enough to bear with me, my difficulties and wrongdoings; yet at all times has been there to help me redirect my efforts. Juan José has helped me understand that the PhD journey is merely a first step in the research field. His insight and intelligence have been paramount in order to make this dissertation a complete and coherent exercise. Special thanks go to him for his support on those days when I had doubts and fears: at times, he was much more convinced than myself that we were onto something. The whole structure and unity of this dissertation are the result of many savvy guidelines provided over the course of long conversations. A final review of this document also proved to me that on top of his deep quantitative expertise, Juanjo's capabilities also include a good deal of qualitative knowledge.

If half of the things that are right in this document are thanks to Juan José, the other half can be attributed to Jesús González Barahona, who has co-adviced this research. Jesús is currently by far the best free software expert in the Spanish academic world. Yet, when I got in touch with him, he managed to make the time to discuss the research project with me. Jesús wanted to help me right from the beginning in a manner that proves that he lives by his deep convictions: we worked together for a long time before submitting the PhD co-direction request. It is clear to me that even if he had not continued to take part in my research, he would have been just as happy to help in a PhD dissertation about free software. Jesús has helped me enormously to understand how FLOSS has lived and continues to live within the Spanish administration. He helped redirect the target of the research after a couple of months of deep discussions. He raised the ultimate question behind the research: "If we were to spend public money on FLOSS, what would be the most efficient way to do so?" Such a simple question has been the basis of everything else that has followed, and my

attempts to shed some light on how the Spanish public sector deals with free software. If it were not for Jesús, this research would never have been accomplished.

Apart from Jesús and Juan José, the person who knows this research best is my friend Will. When I needed to ensure that my thoughts, findings and all sorts of new ideas could be transmitted properly, he was there to help. No hesitation. His enormous help has made this dissertation a much more readable document. Every single comment he made to the first draft of this document made perfect sense. It is a great thing that when I review this final document, I can feel your presence embedded in it, Will.

My deepest gratitude goes to the 28 people who opened themselves and their experiences up to my research. Yes, I had difficulty finding slots in my agenda to carry out the interviews: work and family did not allow me many convenient appointment times. Yet, those who welcomed me sometimes had even trickier schedules than mine and never hesitated to find an hour to speak FLOSS language openly with me. I clearly remember one conversation in which I had a minor family crisis taking place in the background while I could hear another baby crying at the other end of the line. I really want to tell you how much I am indebted to you all: you represent a group of people that clearly proves wrong those who claim civil servants to be a uniform group of unmotivated, lazy workers. Despite all the limitations and the rigidity of the system in which you work, you have managed to advance and innovate "the free way". Thanks.

A final word must go to those who did, do and will continue to influence me the most. To my parents: you never had a chance to educate yourselves as much as you deserved. However, you showed your offspring that hard work is the only way to move ahead, and never hesitated to sacrifice whatever it took to provide us with the best education. Only now do I understand that raising a family the way you did is harder than all the research I could ever carry out. To my brother and sister: you provide the balance that I need to move forward. This whole PhD thing might sound complex and obscure to you, but it does require the emotional equilibrium and support you have provided me with in different ways as we continue to share ups and downs. To my family: every single minute that I have invested in this research has been stolen from you. But you all understood how important this project has been for me and never, ever complained. On the contrary, you have adapted to my requests, giving up holidays and family trips. Josune, your love and patience is the energy that keeps me going on a daily basis. Thanks for supporting me in all my crazy projects, you keep me on track and make my life a happy experience. Egoi and Markel, if you ever get to read these lines, you need to know that my countless hours in front of the computer were a tough sacrifice when the alternative was to share the joy of life with you. I hope that you will understand my continuous need for self-improvement, and that you will both somehow inherit the passion for hard work that has provided your parents with so much pleasure and so many benefits.

Abstract

In Europe and other parts of the world, there is a strong movement exploring public policies oriented towards gaining the benefits of Free and Libre Open-Source Software (FLOSS) in public administrations. Defenders of the social benefits of non-proprietary open technologies demand public investment in such technological solutions. Some Spanish public administrations have been quite active in various FLOSS fields: internal adoption, social promotion, software development and distribution, etc. Many researchers have highlighted that the Spanish public sector has led various large-scale projects considered to be the pioneers of an emerging trend in ICT-FLOSS adoption. This trend cannot be understood without a parallel development and increase in the role of free software in the private sector.

Yet, not much academic research exists with regards to what, how and why FLOSS public projects and policies have been carried out. This shortage led to a desire to review these projects from a qualitative perspective. The leading actors of the public actions in question were interviewed to gain a deeper knowledge around a set of propositions. This thesis document is an attempt to propose a first exploratory step concerning public policies over the past decade in the field of FLOSS on Spanish territory.

A group of 28 cases was reviewed, involving interviews with participants in policies promoting FLOSS. The projects included different layers of the public administration. A qualitative approach methodology was chosen for the research, based on the analysis of the selected cases. For this purpose, a questionnaire was elaborated and validated with various experts in the field. Afterwards, the complete questionnaire was conducted together by means of telephone interviews, attaining a good level of understanding of the objectives of the research. The predefined objectives included defining the agenda, the roles of actors, decision-making models and evaluation techniques. A set of propositions was defined for each of these fields and tested against the reviewed initiatives. All interviews were recorded and reviewed several times in order to validate the gathered information against each of the propositions.

The main findings in the presented cases conclude that ICT-FLOSS issues are not usually present on politicians' agendas. Moreover, previous to any public action in the field, there is a lack of formal analysis in respect of problem definition. The roles of two main actors were observed and documented: civil servants and politicians. Both groups seem to carry similar weight in the promotion of new FLOSS policies. However, politicians use their gatekeeper capabilities to block or modify initiatives promoted from the bottom up. As for the decision-making model, small-scale organizations tend to present policies and projects of an incremental nature whereas bigger entities are closer to the garbage can model. Finally, the objectives of FLOSS initiatives center on outputs rather than outcomes. On top of that, outcomes are usually not defined *ex ante*. As a consequence, the evaluation techniques are not of an advanced nature: they tend to amount to technological milestones achieved and tools completed.

A final mention is made to a group of areas where this research could be developed further, including research aimed at improving shortcomings detected within the policy processes for promoting FLOSS.

Laburpena

Europan zein munduko beste hainbat tokitan, administrazio publikoan kode irekiko eta software askearen abantailak zabaltzeko mugimendu sakonak gertatzen ari dira (FLOSS izenez ezagunak). Kode irekiko eta lizentzia irekia duten teknologiek gizartearentzat abantailak ekartzen dituztela pentsatzen dutenek arloan inbertsio publikoak eskatu ohi dute. Espainiako zenbait administrazio publiko oso aktiboak izan dira FLOSS arloko hainbat ekimenetan: barne onarpena, gizartean promozioa, software garapenean eta hedapenean, etab. Hainbat ikerlarik azaleratu dute Espainiako sektore publikoak lidergoa izan duela eskala handiko hainbat proiektuetan, FLOSS administrazioan duen norabide berrian mundu mailan aitzindariak izateraino. Garapen hau nekez ulertu daiteke aldi berean sektore pribatuan software askearen garapena eta gehikuntzak kontutan hartu gabe.

Aldiz, gaur gaurkoz izaera akademiko ikerketa gutxi izan da arlo honetan; hots, zer, nola eta zergatik FLOSS politika publikoak eraman diren aurrera. Gabezi honek proiektu horiek kualitatiboki aztertzeko gogo bizia azaleratu zuen. Aipaturiko politika publiko horietako aktore nagusiekin elkarrizketak egin ziren asmo nagusi baten inguruan: zenbait proposamenen inguruan ezagutza sakona lortzea. Tesi dokumentu hau saiatzen da arlo horretan azkeneko hamarkadan Espainian izan diren FLOSS politika publikoen inguruan hasierako azterketa kualitatibo egiten.

28 kasu aztertu ziren, horretarako FLOSS sustatzeko parte hartutako pertsonekin hainbat elkarrizketa garatu ziren. Proiektu ezberdinak administrazio publikoaren maila ezberdinetako kasuak izan ziren. Ikerketa aurrera eramateko, metodologia kualitatiboa aukeratu egin zen, hautatutako kasuetako azterketan oinarrituta. Helburu horrekin galdetegi bat sortu eta arloko zenbait aditurekin batera ontzat eman zen. Ondoren, galdetegi osoa elkarrekin jorratu zen telefono bidezko elkarrizketetan, ikerketaren helburuen inguruan ezagutza sakona eskuratzeraino. Aldez aurretik ezarritako helburuek honako arloak barneratzen zituzten: agenda garapena, aktore ezberdinen papera, erabakiak hartzeko modelo ezberdinen azterketa eta ebaluazio teknikak. Baieztapen multzo bat ezarri zen arlo bakoitzean, ondoren aztertutako kasuetan aurkitutako errealitateekin alderatzeko. Elkarrizketa guztiak grabatuak izan ziren, ondoren hainbat aldiz aztertu egin ziren jasotako informazioa adierazitako proposamen ezberdinekin balidatu asmoz.

Aurkikuntza nagusien arabera, IKT-FLOSS politikak ez dira ohikoak politikarien agendetan. Gainera, arlo honetan edozein politika publikoa aktibatu baino lehenago, problemak aztertzeko eta zehazteko azterketa formalaren gabezia azaleratu zen. Bi aktore nagusiren papera aztertu zen: funtzionarioak eta politikariak. Bi talde hauek antzeko eragina erakutsi zuten FLOSS sustatzeko ekimenak martxan jartzeko. Aldiz, politikariek berezkoa duten atezaintzaile ahalmena erabili ohi dute funtzionarioengandik jasotako proposamenak blokeatu edo aldatzeko. Erabakiak hartzeko modeloari dagokionez, tamaina txikiko erakundeetan ohikoa da proiektu zein politikak urratsez urrats izaerakoak izatea. Bien bitartean, tamainaz

handiak diren erakundetan “garbage can” edo “zakarrontzia” delako modeloaren trazak aurkitu ziren. Azkenik, FLOSS ekimenen helburuak produktuaren ekoizpenaren araberakoak izaten dira eta ez eskuratu beharreko emaitza positiboetan zentratuak: sozialki edo ekonomikoki eskuratu beharreko emaitzak ez dira ezartzen aldez aurretik. Ondorioz, emaitzak ebaluatzeko tresnak ez dira oso aurreratuak: ohikoan lortutako ekoizpen mugarriak eta garatutako tresnak.

Azkenik, aipatu egiten dira ikerketa arlo honetan aurrerapausoak emateko zenbait arlo, gehienbat FLOSS politika publikoak ezartzerakoan azaleratutako gabezien konponketarako bideratutako norabidean.

Resumen

En Europa y en otras partes del mundo, existe una fuerte tendencia en la gestión de políticas públicas orientadas a incorporar los beneficios del software libre y de código abierto (FLOSS) en la administración pública. Los defensores de los beneficios sociales de las tecnologías no propietarias demandan inversiones públicas en este tipo de soluciones. Algunas administraciones españolas han sido muy activas en varios campos del FLOSS: adopción interna, promoción social, desarrollo y distribución de software, etc. Muchos investigadores han puesto en relieve que el sector público español ha liderado varios proyectos a gran escala que pueden ser considerados pioneros de una tendencia emergente en términos de adopción de ICT-FLOSS. Esta tendencia no puede ser entendida sin un desarrollo paralelo e incremental del papel del software libre en el sector privado.

Sin embargo, no existe mucha investigación en relación a las razones, formas y ámbitos en los cuales se han desarrollado políticas públicas FLOSS. Esta carencia se materializó en un deseo de analizar esos proyectos desde una perspectiva cualitativa. Los principales actores de un conjunto de acciones públicas FLOSS fueron entrevistados con el fin de adquirir un conocimiento profundo en relación a una serie de proposiciones. Este documento de tesis es un intento de proponer un primer paso exploratorio en relación a las políticas públicas de la última década en el área FLOSS en España.

Un grupo de 28 casos fue revisado a través de entrevistas con los participantes activos en la promoción de políticas FLOSS. Los proyectos incluyeron diferentes capas de la administración pública. Se eligió una metodología de tipo cualitativo, basada en el análisis de los casos seleccionados. Se definió y validó con diversos expertos en este ámbito un cuestionario con este fin. Posteriormente, el cuestionario fue revisado conjuntamente a través de entrevistas telefónicas, alcanzando un buen nivel de comprensión sobre los objetivos de la investigación. Los objetivos definidos inicialmente incluyen la agenda política, el papel de los actores, modelos de toma de decisiones y técnicas de evaluación. Un conjunto de proposiciones fue definido para cada una de estas áreas y posteriormente testeado con las iniciativas revisadas. Todas las entrevistas fueron grabadas y revisadas varias veces con el fin de validar la información recibida respecto de las proposiciones detalladas.

Las conclusiones principales de los casos analizados indican que los temas de ICT-FLOSS no están habitualmente presentes en las agendas de la clase política. Además de ello, antes de poner en marcha acciones en este ámbito, no se lleva a cabo un análisis formal de definición del problema. Los papeles de los dos grupos principales de actores fue observado y documentado: funcionarios y políticos. Los dos grupos presentan un peso similar a la hora de promover nuevas políticas FLOSS. Sin embargo, los políticos utilizan su capacidad de "guarda-puertas" para bloquear o modificar las propuestas que son presentadas desde el ámbito de los trabajadores públicos. En relación a los modelos de decisión, las organizaciones de menor tamaño tienden a presentar políticas y proyectos de naturaleza incremental,

mientras que entidades de mayor envergadura están más cercanas al modelo de "papelera de basura" o "garbage can". Finalmente, los objetivos de las políticas públicas tienden a centrarse en la producción de herramientas y no el los resultados sociales o económicos: estos resultados no se definen al inicio de las políticas. Como consecuencia de ello, las técnicas de evaluación no son de naturaleza avanzada y se reducen al seguimiento del cumplimiento de hitos y herramientas desarrolladas.

Finalmente, se hace una mención a un grupo de áreas de desarrollo futuro en el ámbito, principalmente investigación centrada en mejorar las carencias detectadas dentro de los procesos de promoción de FLOSS.

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Chapter 1

Introduction

1.1 Motivation

As an economist and public sector director, analyzing public policies concerning information technologies seemed like a perfect fit to me when I first took the decision to join the Deusto PhD program. Adding free software to the equation made the research field even more appealing. Furthermore, in the years that it has taken me to complete this task, the debate over public policies and resource allocation has gained momentum. The financial crisis that we have been experiencing for a few years as I type these words has eroded public finances, as well as having other significant impacts. In an environment in which global markets put enormous pressure on public debt, debates about cutting costs, public policy and debt have been a constant among economists (Krugman, 2012) (Reinhart and Rogoff, 2010).

In this context, directing my research into the broad nature of a public policy presented both a challenge and an opportunity for personal development, all the way from conception to completion. Expanding my views on how public policies are born, develop, mature, are evaluated and eventually die in public bodies of different sizes (from small rural towns to national Ministry departments) offered a great way for me to grow academically and professionally. My initial goal was to seek a detailed vision of "the good, the bad and the ugly" in the rather technology-intense field of policies promoting and adopting free software. I expected to find some hints on best practices and help develop a smoother path for both policy-makers and policy implementers. As a policy executor myself, the journey has allowed me to get to know and understand the experiences of a vast array of environments, which has been truly enriching. During the course of my research, I have discovered new ways of facing day-to-day issues, and new approaches to presenting "opportunities and threats" to political leaders. There were times when I could hardly differentiate between my job and my research, so close were the links of my case interviews with both worlds.

Yes, the motivations for my research were clear, from a personal and professional perspective. But is it of any interest at all to society? I am personally convinced that the response to such a question is affirmative, for two reasons:

- Good public policy management provides a benefit to society as a whole: regardless of political trends, executing projects the right way "must be a must". Efficiency is a treasure that society has to seek in order to maximize its resources.
- Free software offers opportunities to public organizations from various perspectives. However, there is little empirical research on the final benefits attained after executing promotion policies in the field.

As an example of this second dimension of the social interest of my research, let me tell a short story about how I found myself immersed in hardware machines and bits. I first got involved with free software because of the Basque language. Back in 2002, it was not easy to use computers in a minority language (Microsoft Windows being the main Operating System[1]). For such cases, local governments paid for a translation of the overwhelmingly present end-user OS into their language, meaning that the manufacturer would eventually create a new version of the OS in that language. If I remember correctly, even if a user had a new computer with a copy of MS Windows 98 pre-installed on it, she would still need to purchase the software a second time if she wanted to use it in a different language. Well, I wanted the Basque language in my operating system and was not willing to pay twice for the same product. A former colleague gave me a copy of Debian[2] at the time, but alas, it could not be installed in my laptop due to hardware driver compatibility issues, so I gave up. A few months later, I read that Mandrake[3] did have the Basque language included in its standard GNU/Linux OS (the translation being paid for by the Basque Country regional government at the time, in line with several efforts centered on MS Windows OS and its Office bundle). By then, Mandrake was a very easy OS to install. Thus, a few days later I had my own PC with dual boot Windows 2000 and Mandrake.

Then, everything started to change. With some help from a colleague in the IT Department at the company where I worked at the time, I installed my first web, FTP and mail servers. It was lots of fun and a learning experience: I could customize everything and did not have the feeling that I was breaking any legal contract or regulation while "playing" around. As of today, I have been the webmaster of several not-for-profit portals, and in my personal and professional life I mainly use open-source software. I have tested and used over 4 different GNU/Linux flavors and some 14 different solutions for both my personal and professional needs, including LaTeX (and its GUI LyX in which I am typing these words).

[1] OS, from now on. For a complete list of acronyms, see Appendix I

[2] Debian is one of the leading Linux OS distributions. For more information, see `http://www.debian.org/`

[3] Currently Mandriva: `http://www.mandriva.com`

To the limited extent to which my knowledge allows, I have been able to customize and adapt various packages to my specific needs. The e-education of our two digital native children is based on free solutions: Ubuntu, GCompris, Scratch, etc. All along, I have taken everything that I needed from rich open repositories. What I have not needed, I have simply ignored. But it is there for others to benefit from. Having an educational background in economics, the many implications of the unusual approach of FLOSS seized my attention right from the beginning of my Mandrake days. A few questions would eventually become the center of my main interest when I embraced the PhD adventure:

- *Why is it that such good software is somehow hidden from the majority of today's average e-literate user? Is there a market failure in this area?*

- *Should public bodies promote this technology? Embrace it? Subsidize it? Ignore it? In other words, is there a need and justification for the public administration to interfere in the software industry?*[4]

- *Can it be sustainable that so many people, non-profit organizations and businesses develop software for free in the long term?*

Concerning the first two questions, the topic is closely related to the role of public entities within the software industry. Should governments get involved in the software arena or should they remain neutral? Different approaches and views have been defended (Hahn et al., 2002), but little empirical evidence about the outcome of supporting free software technology has been collected or analyzed in the academic field. Needless to say, isolating detailed outcomes and being able to correlate them with specific policies is not a simple or easy task.

Regarding sustainability and business models, Richard Stallman[5] and the Free Software Foundation (FSF)[6] argue strongly that the whole point of free software is not money, but freedom. While it may be easy to agree with such a proposition, one should also understand that every full-time programmer behind free software needs to make a living from their occupation. In this sense, the future of free software depends heavily on the economic models that underpin it[7].

As a natural consequence of all of the above, I decided to focus my research on the social benefits of the widespread use of free software. Furthermore, the role that different

[4]The public sector is *de facto* a significant software player as it both purchases and creates a significant number of solutions for its own needs. Thus, it can be stated that it interferes already, especially in terms of legislative actions and free software distribution and promotion.

[5]Richard Stallman is considered to be one of the pioneers, if not the father, of the free software movement. His somewhat political view of software has made him into a controversial figure; the story behind this man is well documented by Williams (2002)

[6]`http://www.fsfe.org`

[7]Richard Stallman himself sold copies of his Emacs text editor at $150/unit after he quit his job at the MIT back in the 1980's (Stallman, 2002).

governments play in the software arena was of great interest to me. Extremadura, being one of the poorest regions in Spain[8], has managed to gain international recognition for its public support of open-source projects, including developing its own OS[9], which includes two derivatives aimed at public schools and SME's.

Moreover, we have all witnessed the development of the so-called Web 2.0 movement. Some of its benefits for modern society as a whole appear to be clear: citizens and consumers have shifted from being mere spectators to becoming actors in their own lives and in society[10]. Free software is behind most of this (blogs, forums, servers, etc.), yet the vast majority of the public are unaware that they are adopting free software and its implications. From that perspective, I feel strongly that it is necessary to conduct an in-depth analysis of the role that governments should or should not play in terms of free software. That is the key motivation behind all the words that follow in this document.

1.2 Relevance

Public policy analysis, including evaluation, is a topic of increased relevance as public expenditure increases both in monetary terms and scope. Within Europe, interest in public policy evaluation started at the end of the 1980's. The first authors in this area demanded a pluralistic evaluation in the sense that analysis should be viewed from various perspectives rather than a myopic one based purely on economic efficiency (Monnier, 1987). Also starting in the late 1980's, the first government-backed public policy review institutes were created. For example, in 1990, the French Prime Minister created a Strategic Evaluation Group (Conseil Stratégique de l'Evaluation) whose main mission was to evaluate the results of public action. The entry of Spain into the European Economic Community[11] triggered an increasing level of interest in the evaluation of public policies. Although not particularly structured at the outset, several changes in EU regulations required that funds allocated for specific programs be evaluated via a three-step process: previous, intermediate and final results. Such requirements meant that various bodies needed to be created within central government Ministries. Furthermore, due to the structure of political apportionment implemented in Spain with the return of democracy in the late 1970's, the evaluation tasks had to be coordinated with the various equivalent regional government bodies. The Dirección General de Fondos Comunitarios (European General Funds Body), which was part of the Ministry of Economy, was in charge of such coordination.

[8] €17k GDP per capita, according to 2008 INE (Instituto Nacional de Estadística) data.

[9] GNU/Linex, available at `http://www.linex.org`

[10] Needless to say, changes of such a magnitude carry issues along with the benefits they bring, but that is the topic of another research project altogether.

[11] The European Economic Community changed its name to European Union in 1993 when the Maastricht Treaty was signed.

Yet the National Agency for the Evaluation and Quality of Public Policies and Services (AEVAL[12]) was not created until January 1st 2007, based on the recently created Law 28/2006. As stated in its preface, the cited law had a clear goal: to "enforce a new model for public management in line with the EU principles of governance: accountability, efficiency, participation, openness and coherence". It is not surprising that the first body to be created under the aegis of this law was AEVAL itself. A preliminary step towards the creation of the agency was the establishment of an expertise group that stated in its final report[13]:

> "Sirs, in recent years, we have witnessed a growing demand from citizens and social agents in regards to the need to achieve better results in the actions of the Public Sector, with an improved management of its resources. It is necessary to evaluate the impact of the various public policies on social and economic development, as well as on the living conditions of the population, and to transfer to political decision-makers, to public managers and to society as a whole, information about the results and quality of the public services offered, in order to help adapt them to economic and social demands.
>
> Overall, the National Agency for the Evaluation and Quality of Public Policies and Services will constitute one more step in the process of enhancing the value of the Public Administration inside the advanced State that we propose, in which welfare is protected and the rule of law honored."

Between 2007-2011, the AEVAL analyzed and drew up reports on 33 different public policies in very diverse areas of public action: from the implementation of digital terrestrial TV to retired people's vacation programs. However, no report has been published since 2011. Instead, the agency has been developing guidelines for various topics related to public policy quality and evaluation in an effort to help streamline the wide array of public entities into a new framework and vision of their actions. Some authors (Nieto, 2012) have even reached the point of claiming that the AEVAL is nothing but a rhetorical exercise: the governing body is appointed freely "from professionals of recognized prestige", which results in an institution whose directors are loyal to the government and thus avoid making any kind of harsh criticism in terms of the real efficiency and efficacy of public policies in Spain. According to the cited author, when faced with any public paperwork, the average citizen has to put up with long queues before coming face to face with unpleasant bureaucrats. Yet the government creates a new agency, putting loyal people in charge to draw up indulgent reports on the current situation. As the most relevant critic in terms of issues in the modern Spanish public administration, Nieto probably views such behavior as a joke played on taxpayers.

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[12] `http://www.aeval.es`

[13] `http://www.aeval.es/export/sites/aeval/comun/pdf/agencia/Informe_comision_expertos_esp.pdf`, free translation by the author.

This is why good analysis and evaluation of public policies is clearly a relevant and important topic in public management today. Moreover, if we focus such efforts on a particular field, that of free software, the relevance increases significantly. Indeed, part of the trend towards FLOSS and interoperable systems comes from the European Union itself. In this area, the EU has been actively supporting research and the promotion of free software projects for some time now. The strategic vision behind this support is based both on encouraging less dependency on the major non-EU proprietary software firms and a desire to reinforce the creation of local support-based software businesses.

As far back as 1998, the EU promoted the "Working group on Libre Software"[14]. As stated by the EU itself, this group was the first milestone of significant efforts to better understand the particularities of open-source software as a major force of social and economic development. As declared in the final paper issued by the group (Daffara and González-Barahona, 2000):

> "Open-source software is becoming the most interesting 'new' phenomenon of the entire information technology landscape, generating a level of interest similar to that of the first moments of the Internet. However, as we will show in this document, the open-source software phenomenon is not historically new, although in recent years it has reached a critical mass, which has allowed it to enter the mainstream software market. The impact of open-source technology is expected to be quite noticeable in the software industry, and in society as a whole. It allows for novel development models, which have already been demonstrated to be especially well suited to efficiently take advantage of the work of developers spread across all corners of the planet. It also enables completely new business models, which are shaping a network of groups and companies based on open-source software development. And it has, in general, a very positive impact as an enabler for the creation of new markets and business opportunities. Despite these facts, many people think that the open-source movement is merely another temporary fashion in the software industry. On the contrary, many other believe that changes caused by open-source will be so deep that they will completely shape the software industry of the first decade of the 21st century. This document tries to provide some facts, opinions and references, so that the reader can decide if all of this is just nonsense, or if it deserves more and better study and consideration."

The group in question created a set of recommendations for policy-makers aimed not at "how to help open-source software", but, in their own words, at "how to help Europe to benefit from open-source software". It was also observed that if such initiatives were to be implemented at a European level, there was room for the EU to achieve the status of a

[14] `http://eu.conecta.it/index.htm`

top-ranked player in the software markets, next to the U.S. The list of recommendations drawn up by the "Working group on Libre Software", grouped by area, was as follows:

1. **Technical issues**
   - Promotion of open-source reference implementations for any protocol standard
   - Endorsement of neutral data formats and open-source tools for managing them
   - Promotion of projects to improve quality of free software
   - Promotion of free software in precompetitive research projects financed with public money
2. **Organization and support**
   - Services for organization of information related to open-source
   - Funding of open-source projects, including the provision of general facilities for open-source development
   - Promotion of projects related to documentation, translation and localization of free software
3. **Legal issues**
   - Fighting of software patents at all levels
   - Ensuring of the freedom to build free software implementations which can interoperate with proprietary interfaces
   - Improvement of the legal framework so that calls for tenders are open to free software solutions
4. **Training, promotion and explanation of benefits**
   - Promotion of training and education on free software products
   - Creation of an office to help institutions take advantage of free software
   - Specific recommendations of use of free software
   - Research about the economic and social impact of open-source software

Along the same lines, in 2001 the IDABC (Interoperable Delivery of European eGovernment Services to public Administrations, Businesses and Citizens) published a study[15] on promoting the re-use of software owned by public administrations. From a global perspective, the study recommended the creation of a software repository in which administrations could

[15] Available at `http://ec.europa.eu/idabc/servlets/Doce420.pdf?id=1973`

publish software under an open-source license which could then be used by other public administrations. The tool would concentrate on applications specific to the needs of the public sector and could encourage the replication of good practice in e-government services. As for a more local perspective, Spain was described as being on the verge of a new trend in terms of open-source solutions:

> "Until recently, the use of Open-Source Software was not the result of a declared government policy in favor of OSS, but was rather the expression of isolated concrete needs. The meeting held in Madrid for the present study with state IT managers demonstrated a high level of interest in European and foreign initiatives regarding OSS, although their use is still globally considered as "marginal" in the Spanish administration. The use of OSS solutions on servers does not yet appear in the official statistics (the IRIA 2000 report does not even mention it), but the situation seems to be changing rapidly, with the example of the MAP (Ministry of Public Administration), and the Virtual MAP project may greatly influence other departments.
>
> A summary of the main current OSS initiatives in the Spanish public sector was published by Fundación ASTIC[16], the professional association of IT public sector managers".

In the same vein, the eEurope 2005 action plan, which was included within Framework Programme 6, included a drive for open-source software solutions to be considered in many areas, in particular in the field of public administrations, as presented by the Commission of the European Communities in June 2002[17]:

> "By end 2003, the Commission will issue an agreed interoperability framework to support the delivery of pan-European e-government services to citizens and enterprises. It will address information content and recommend technical policies and specifications for joining up public administration information systems across the EU. It will be based on open standards and encourage the use of open-source software. (...)
>
> Priorities will be: trustworthy network and information infrastructures with an emphasis on emerging technologies (e.g. broadband, wireless architectures, ambient intelligence); the identification of vulnerabilities and inter-dependencies in infrastructures. It also intends to support standardization with a view to wider use of open standards and open-source software. (...)

[16] `http://fundastic.es/about/`

[17] Available online at `http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2002:0263:FIN:EN:PDF`, visited on June 5th, 2011.

> The detailed analysis of good practice should result in templates or guidelines. These provide proven, well-documented approaches to tried and tested applications for e-services. They would be modular and customizable for any particular user and would typically consist of a methodology, an associated set of tools and software in open-source form. This would result in a critical assessment of success factors and lessons of failure, which may lead to transfer and dissemination of good practice across Europe, particularly in the less favored regions."

The European Union views the opportunity provided by open-source software as a means to achieve its goals in terms of social and economic growth. Thus, it has continued to support open-source activities within its various Research and Innovation funding programs. Both Framework Programs 6 and 7 (2002-2013) included open-source within their ICT objectives. ICT-2009.1.2 is a good example of such support, included within the context of "Highly Innovative Service / Software Engineering" and "Coordination and support actions".

A list of the main projects that have been supported by the EU within FP6 and FP7 together with their expected goals would include:

FLOSSmetrics[18]: construct, publish and analyze a large-scale database with information and metrics about Libre software development coming from several thousands of software projects.

Qualipso[19]: meet the needs of basic software and applications for schools, universities, small municipalities, healthcare/hospitals and SME's in the adoption of Open-Source software.

Mancoosi[20]: develop tools for the system administrator when upgrading existing software.

FLOSSInclude[21]: strengthen Europe's participation in international research in FLOSS and open standards, by studying what is needed to increase the deployment, development and societal impact of FLOSS in Africa, Asia and Latin America.

Qualoss[22]: automate the quality measurement of open-source software.

SQO-OSS[23]: Software Quality Observatory for Open-Source Software.

FLOSSworld[24]: strengthen Europe's leadership in research into FLOSS and open standards,

[18] http://flossmetrics.org/

[19] http://www.qualipso.org/

[20] http://www.mancoosi.org/

[21] http://www.flossinclude.org/

[22] http://www.qualoss.org/

[23] http://www.sqo-oss.eu/

[24] http://www.flossworld.org/

building a global constituency with partners from Argentina, Brazil, Bulgaria, China, Croatia, India, Malaysia and South Africa.

Tossad[25]: Open-Source Software adoption and dissemination, start integrating and exploiting already formed methodologies, strategies, skills and technologies in the FLOSS field in order to help governmental bodies, educational institutions and SME's to share research results, establish synergies, build partnerships and innovate in an enlarged Europe.

Xtreemos[26]: design, implementation, evaluation and distribution of an open-source Grid operating system with native support for virtual organizations (VO), capable of running on a wide range of underlying platforms, from clusters to mobiles.

SELF platform[27]: central platform with high quality educational and training materials about Free Software and Open Standards.

Edos project[28]: study and solve problems associated with the production, management and distribution of open-source software packages.

All the projects included within "Network and Communication Technologies" are presented in Figure 1.1, where open-source's position and relevance is clearly detailed.

Finally, it needs to be pointed out that although the majority of the programs elaborated at the EU level have been successfully carried out, to date there has been little evidence concerning tangible achieved results, as presented in the literature review presented later on. This might be one of the reasons why the European Union included open-source adoption within the guidelines "Benchmarking Digital Europe 2011-2015, a conceptual framework" to be used for the i2010 annual report, starting in 2012.

This intense activity around the free software phenomenon has provided impetus for many research projects in the academic world. The majority of them can be allocated to any of the following four main areas:

1. Free software **development**: Research that reviews how the different software development communities are structured and what key success factors are present in successful projects. This topic is of particular interest in the field of project management: leadership in the gift economy and lack of traditional hierarchies are topics that can be extrapolated not only to software but to organizational behavior and management as a whole.

2. Integration and **adoption** of free software into existing organizations. A significant amount of this field of research is focused on public entities, although it is aimed at

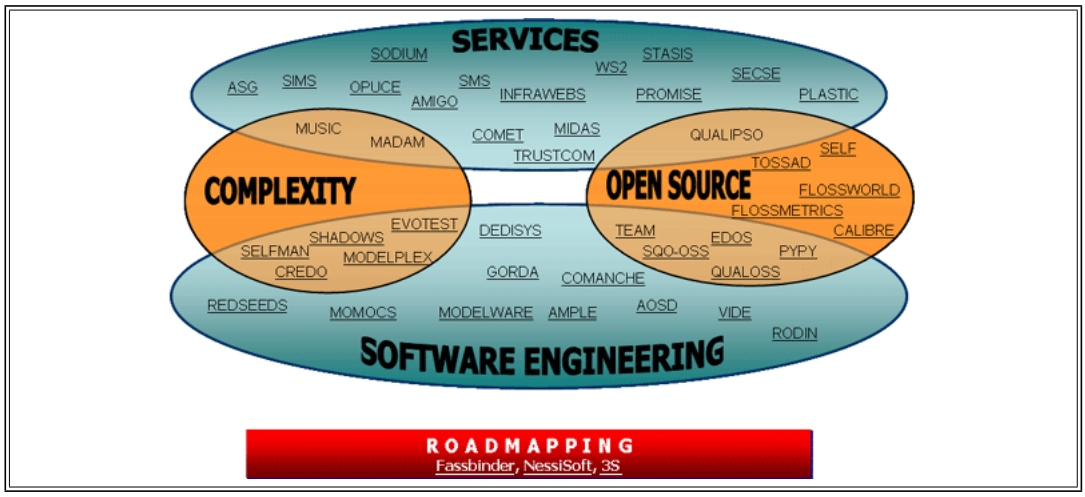
[25] `http://www.tossad.org/`

[26] `http://www.xtreemos.eu/`

[27] `http://selfproject.eu`

[28] `http://www.edos-project.org/`

Figure 1.1 – EU Framework Programme 6 Projects - Network and Communication Technologies



Source: European FP6

private corporations as well. Best practices in how to migrate from previous soft and hard infrastructure into new models that include FLOSS solutions.

3. Free software as a **business model**. Although the "free" as in "free lunch" could lead one to think that there is no way in which FLOSS can be at the center of a "for-profit" entity[29], the various ways in which free software organizations obtain resources to achieve good returns on investment (ROI) are covered by a few research papers.

4. **Public policies** concerning free software: a wide range of initiatives from the administration including adopting open-source and/or strongly promoting it among citizens or organizations.

The first two categories (development and adoption) are usually present both in conferences and research papers[30]. The third (business models) has not been the subject of many research studies. The reason for this could be centered around two main topics:

1. Being successful with a free software business is no different from being successful with a proprietary software business, thus there is no need to do specific research on the topic (Gonzalez-Barahona and Robles, 2005). This means that in order to become successful, a company operating in this field must obtain and maintain a loyal

[29] According to ASOLIF, a group that brings together the companies operating in this area in Spain, the whole revenue of FLOSS solutions in Spain was no lower than €776.8 million in 2010. The same source also claimed that FLOSS could account for as much as a 4% of EU GDP in 2013.

[30] Previous analysis in both fields will be presented in this research, for they are linked to areas of specific interest for the conducted research.

customer base; proprietary licenses are just a part of the revenue, not one of the key success factors of the business.

2. A significant part of the free software community considers those who want to make money from it to be "traitors" who do not understand the philosophy behind the movement[31].

As for public policies, most of the available research focuses on the need for governments to promote, support and adopt open-source solutions and to make freely available all software paid for with public money. Little empirical data exists on the outcome of public policies, either as general outcomes or as counterfactuals. Although the stated advantages that FLOSS can bring to public entities have long been explicitly declared and defended, there is not a great deal of empirical research into the final outcomes of policies supporting FLOSS once they have been implemented (i.e. figures concerning cost-savings, job creation, ICT literacy, etc.). This research document will try to shed some initial light on this area within the Spanish territory. Such research is relevant for three reasons:

- From a public policy analysis perspective
- For a review of outcomes of FLOSS public policies
- From the point of view of opportunities for empirical data analysis concerning public FLOSS projects

Analysis of public policies is a subject that attracts a good level of attention from the academic world. It represents a very broad area that can be digested from various perspectives. The legal researcher might be interested in how rules and regulations are crafted, enforcement of legality and implications of policies, among other things. The political sciences are probably more interested in theoretical policy constructions, game theory in policy creation and electoral competition. Meanwhile, sociologists will probably center on understanding trends and shifts in elections, citizens' perception of public problems and the like. From a public management perspective, efficiency and proper usage of public funds must be at the core of any attempt to achieve a significant level of insight into implemented policies. Yet all of the above disciplines might agree on a set of common areas into which the field can be divided:

- Problem definition and agenda setting
- Actors and their different roles

[31] Many papers are incredibly biased by their author's perception that free software is the one and only right thing; that it belongs to the community and that nobody should benefit from the "free" work of others, etc. As the author of this research, I have tried to steer clear of such temptations. The whole issue has frequently been caricatured by comparing free software with some kind of new religion.

- Decision-making procedures
- Tools and implementation
- Evaluation of ongoing or past policies

Problem definition and agenda setting are two sides of the same coin. Public decision-makers must review the specific problems that may or may not be subject to public action. Bardach (1981) describes how, very often, the academic world tends to promote the idea that defining the problem is the most difficult task for policy-makers. Instead, this author argues that finding plausible solutions is usually the tough step in policy design. It is also worth noting that Bardach expresses his belief that modern democracies must center their "prepolicy" analysis on topics that citizens regard as problems, rather than following the findings of internal reports. The writings of Elder and Cobb (1983), Dery (1984), Kingdon and Thurber (1984) and Lindblom and Woodhouse (1980) helped establish the foundations of modern problem definition theories within the public arena. Gallego (2003) has published several papers that probably offer the best review of modern Spanish policy making. All the mentioned contributions center on general policies, yet each field in which the "public hand" is present has its own particularities. On top of this, some authors (Brugué Torruella, 2014) have started to highlight the fact that, in recent times, public policies face an increasingly complex society. Treating complexity with traditional tools leads to so-called policy failure. New propositions are required to avoid such failures (Kooiman, 1993) (O'Leary and Bingham, 2009). Moving into the focus of this research, deciding whether there is a need for FLOSS policies on the public agenda is a relevant topic and a source of controversy, as explained below.

The different **actors and their roles** represent another area in which much debate and research is being continuously generated. Dahl (2005) raised the topic in his classic book with a very straightforward question: *Who governs?*. Various actors with different resources compete or cooperate in order to create awareness, and adapt or modify agendas. Dente and Subirats (2014) explain the reality in which actors play different roles in a very comprehensive manner. The public arena is composed of a set of laws and regulations that establish guidance and rules. The perception that legal texts regulate in detail the procedures by which all steps of the political process are to be implemented is a common mistake[32]. Actors can be individuals or collective. Usually, they can be grouped into one of the five following categories: politicians, bureaucrats, special interest groups, general interest groups and experts. The relevance of collective actors must not be ignored, as they share common goals and an increasing ability to gain public attention. Various actors usually have conflicting interests and diverse resources to defend their demands. Such resources are usually fragmented into four main categories: political, economic, legal and cognitive. Goals and resources are mixed

[32]The authors refer to such mistakes as "methodological constitutionalism".

and provide the basis for the various roles actors can play in the policy creation process: promoters, contestants, allies, mediators, gatekeepers and filters. Within this scenario, the concept of governance as a new style to ensure broad acceptance is gaining momentum lately. This research will extract two groups of actors from this academic proposition and will review their roles and activity: politicians and bureaucrats. The way in which each of them interacts within FLOSS policies will provide insight in line with current academic studies on public policies.

If problems and actors are at the heart of public policies, **decision-making procedures** need to be understood as the last step of the birth of a new program or initiative. In the words of Dye (1992), "public policy is whatever governments choose to do or not to do". Sabatier and Weible (2014) thoughtfully review the various approaches to the policy process, offering deep insight into the relevance of the decision-making step. Emerging concepts such as "dialogue", "networks" and "governance" are becoming increasingly relevant, especially when it comes to policies to foster the new "information society" (Hall and Löfgren, 2004). Traditional decision-making procedures are being proven to be insufficient in the face of new public challenges. As complexity arises, analysts are seeing organizations adapt and move by trial and error in an incremental manner (Harford, 2011) in a somehow updated version of the theories of Lindblom (1959). The garbage can model of decision making, as defined by Cohen et al. (1972), is also considered to be present in terms of information system decision-making (Boynton and Zmud, 1987) (Hayes and McGee, 1998) (Travica and Cronin, 1995) (Watson, 1990). Within this context, understanding how public decisions to foster FLOSS are made is clearly a relevant task that this research attempts to grasp.

Tools and implementation represent a key step in the life span of public policies. Both areas are prone to errors: faced with citizens that are becoming "customers" (Innerarity, 2011), choosing the right implementation model right from the beginning is paramount. Tools and implementation are two sides of the same coin. Pressman and Wildavsky (1984) have carried out an in-depth review of the particularities of implementation and Lipsky (2010) highlighted the relevance of the implementors who can, all by themselves, make a disaster of even the best policy proposal. Despite the significant relevance of this topic, it will not be covered in this research. The reason for this gap comes from the complexity intrinsec to ICT. Ever since the days of the "mythical man-month" (Brooks, 1975), ICT projects and their implementation has been a source of complex debates, mostly in the engineering field. Reviewing this complexity mixed with public policies falls outside the scope of this research.

Policy evaluation is probably the area that gets the most significant attention from society as a whole. Jacinto and Gallart (1997) define evaluation as the systematic and stringent examination, based on specific criteria, of the achievement coming out of a social program policy compared to the objectives and goals proposed and expected within the targeted social groups. Despite the historical lack of an evaluation culture in public entities in Spain,

Viñas (2009) reflects that the EU is having an impact on a trend change toward better practices in the country in this regard. Yet recent testimonies, such as that provided by Labeaga Azcona (2013), insist that behind all sorts of public statements, there still remains a lack of transparency at the core of the Spanish administration[33]. Ultimately, even today, the title of the seminal work of Lasswell (1950) remains the best simple definition of public policy in practice: "Who gets what, when, how".

Focusing on public involvement in ICT and its impact on welfare, current social research has shown an interest in the topic. A good example is provided by Kozma (2005): this author reviewed three national cases regarding the links between national development goals and ICT-based educational reforms. He also proposes a framework of growth factors and types of development that can be used to link ICT-based educational changes to national economic and social development targets. Although FLOSS is only one aspect of ICT policies, there is abundant literature on the topic. The economic merits of direct or indirect governmental support for open-source projects, for instance, are reviewed by Schmidt and Schnitzer (2003), along with various alternatives for public involvement in the field. Furthermore, various authors (Comino and Manenti, 2005, Ghosh et al., 2002a, Lee, 2006) argue that supporting FLOSS within a given region provides benefits for the local software industry as well. Yet other sources, such as Smith (2005), assert that there is no need for public action within the software markets. The debate over public involvement within the software industry and FLOSS in particular is best presented and reviewed in a famous compilation published by Hahn et al. (2002). The various aspects of the current FLOSS debate were best presented by Rossi (2004) who included a detailed summary of the diverse rationales behind government policies toward FLOSS software development.

1.3 Research objectives

At the beginning of this research project, we looked at many angles from which to approach public policies and free software. The first attempt was focused on measuring activity levels in the various regions of Spain. The Spanish political system grants a considerable amount of power to regional governments[34]. While some of them have been presented as pioneers within Europe in terms of public support for FLOSS, others have done very little or nothing at all in the field. According to the annual countrywide report on ICT published by Fundación Telefónica, Extremadura has been running projects and activities continually ever since 2006, while some other regions present little or no activity whatsoever (Castile and León, Murcia, Navarre). On top of this, nationwide projects have been carried out at various

[33]In this article, Labeaga reports how, despite "transparency" being mentioned 81 times in the electoral program of the governing Partido Popular for the 2011 election campaign, he has been unable to obtain a number of items of data concerning basic health-policy related public statements.

[34]Spanish regions are referred to as "Comunidades Autónomas".

Ministries for the benefit of related partners or society as a whole. Furthermore, local towns have been very present in terms of FLOSS activity, with significant leadership in terms of adopting FLOSS, in some cases. While the socioeconomic reality of the various regions might be very diverse, from a basic perspective the policies implemented differ enormously without any clear *ex ante* link between these aspects and the level of FLOSS activity. The targeted territory includes seventeen different regions and over eight thousand towns in a similar technological environment[35]. Classifying all of this into a perfect index of activity was our first tentative objective.

However, we quickly realized that rankings very often hide significant qualitative information and thus provide bogus images of reality. It was then that we moved into the "million euro question": if any given public administration is set to spend scarce resources on a single FLOSS-promoting activity, which one should it choose? Two big words came into play at this point: efficiency and efficacy. We started to look at various projects, typologies, goals, etc. After some time, we came to the conclusion that we were putting the cart before the horse. We were trying to extract answers and conclusions from a field that we did not control or know sufficiently. We decided to take a step back. We set our minds on producing an X-ray of the field. We decided we wanted to understand how projects were born, grew, were modified and lived or died.

Our goal was a very humble one: **to gain a deep knowledge of public policy and policies in action in the field of FLOSS in Spain over the last decade, centered on actors, processes, decision making and evaluation.** As such, before starting on any exploratory activities, four areas of interest with seven targeted propositions were detailed with the help of academic experts both in the field of software and economics[36]:

Public agenda definition: There is little discussion concerning the idea that public policies must address public problems. The big debate is over what is and what is not a public problem. In other words, where and when is it required that public resources be allocated to correct issues that affect society? Lots of literature has been released on different approaches to the level of public involvement in the daily lives of citizens. The most liberal proposals call for very low-level public interference in resource allocation, whereas other schools argue for much more robust involvement from the State. For the purpose of this research, two topics will be reviewed within the field of FLOSS public policies. The first goal will be centered around problem definition, the process by which public forces decide it is necessary to act and instigate a policy for promoting or adopting free software solutions. The full details of such processes is the intended target: to what extent are they formally arranged, standardized and documented? Public action is often taken without sound previous analysis,

[35]Both from a sociocultural and a business perspective.

[36]Details of how the different areas were defined and fine tuned are provided in the methodology section below.

the reason for this being the fact that decision-makers sometimes have "solutions in search of a problem". There may be a set of actions decided long in advance; decision-makers need to convince the population that such actions are the result of sound analysis in order to solve a public problem. Very much aligned with this behavior, the second objective of this part of the research will center on agenda-setting. This will involve addressing the level of detail in decision-makers' agendas regarding ICT-FLOSS related topics. The topic of how agendas are decided on is gaining momentum: it has been voiced on a number of occasions that they are being increasingly affected by public pressure and media awareness. FLOSS is a topic of a very technological nature, comprehension of which is limited to software experts. Therefore, the expectation of researchers could be that it will not feature on the public agenda.

Actors and the policy formulation process: In order to better understand the goals and expectations of any given policy, it is necessary to take into account where such initiatives are born. Moreover, the role that different actors play within the formulation process is a key element of the equation. For people very familiar with FLOSS, it might seem that there is a clear popular demand for politicians to move in that direction, but this often might not be the case. It could be that the politicians themselves have analyzed the future of technology and have clear agendas and commitments to support FLOSS within the public administration or not. Alternatively, public workers leading tech-related fields might be pushing for the implementation of FLOSS solutions with or without the support of political leaders. It could also be that politically supported initiatives are sometimes slowed down by the "system", which is not prone to change, by definition and nature. It is interesting to look at the origin and life cycle of any given project from the continuity point of view: it may be related to a single political leader or party, and thus dies after a change either in the ruling party or the leader herself. In essence, in defining this field, we wanted to know whether FLOSS policies are born top-down, bottom-up or as a combination of both mixed in with the surrounding noise. The role of the civil servants and politicians as the main actors is also a target of this part of the research.

Decision-making models: In order to obtain a better understanding of public policy in action, the path that leads to decisions is of paramount importance. A complex set of actors interacts together within an evolving reality where problems come and go. Plenty of literature has been produced on decision-making models, both in the public and private sectors. It has been recognized that the traditional linear model does not reflect the reality of constantly transforming entities. For the purposes of better comprehension, the linear model will be used only in broad terms in this document. Instead, when reviewing public policies, the researcher aims to seek other alternatives. The incremental and garbage can models seem to be best placed for public organizations. A significant level of bureaucracy, increasing levels of lobbying activity, civil servants that usually stay at their duties for many years and politicians that only serve for four years; these are the ingredients in the mix.

The objectives of this part of the research on public policy is to review how such elements usually interact among themselves prior to the start of a new initiative.

Goal setting and evaluation: The aim of this section will be to determine what is done in terms of goals: *ex ante* definitions that justify the projects will be analyzed. Setting very specific goals, both quantitative and qualitative, for an ICT policy, appears to be a fairly complex task. As a matter of fact, both scenarios are the two sides of a coin. Qualitative goals seem easy to define but very hard to measure; yet quantitative expectations are easy to put on paper but extremely difficult to measure with diligence. The first step in investigating how goals are set will be to identify which approach, quantitative or qualitative, is present in the policies targeted for the field study. Both approaches, or even a combination of the two, can be envisaged by policy actors. Once the approach is determined, the next natural step will be to review the extent to which objectives, either qualitative or quantitative, are clearly determined in terms of outcome and how they are defined and quantified. The very technological nature of ICT policies would suggest that reviewers may concentrate on outputs rather than outcomes. The process by which expected goals and the results finally attained are compared, and the extent to which conclusions are used to adjust ongoing programs, is also a target of the research. Finally, the usage of real complex and comprehensive evaluation tools is to be reviewed. Public policy manuals would suggest that outcomes must be evaluated based on counterfactuals. The presence of such a theoretical evaluation methodology in practice is to be analyzed. This part of public policy is very closely linked to the level of detail of the goal-setting step detailed above. The amount of detail and quantification of what a given administration expects from one particular policy has a direct impact on the evaluation process. In the field of free software, the goals linked to social issues (i.e. improving the ICT literacy of the population) can be intrinsically difficult to establish, except in a very broad and general way. Thus, measuring vaguely stated goals with a minimum level of rigor is tricky, if not impossible. Nevertheless, an effort to review the level of achievement of various programs, with specific details on cost-saving programs, is one of the objectives of the research. It will be of particular interest to review the difficulties encountered within efforts whose objectives are stated as part of a broader and less defined roadmap. The consistency of results achieved over the years is also of particular interest. Project development delays and their impact on goal achievement is another aspect of significant relevance in an environment where unfulfillment of due dates is part of the DNA of the complexity of the system.

We now have all the ingredients of the research. As with any delicious recipe, the flavors do not each inhabit a world of their own, but are all interrelated and create the environment in which they develop. As stated above, the exploratory nature of this research will attempt to shed light on the usual behavior over the past decade in the Spanish public sector with regards to FLOSS. The public sector will be considered to include enormous Ministries with both big budgets and deeply rooted infrastructures, regional government bodies, local towns,

universities and elementary school bodies. It is clear that no single uniform response is expected from all of the above; the aim is to simply analyze what we see and what kind of trends are present across the different organizations. Each entity will provide its own insight, which will subsequently be dissected by the researcher, separated into small pieces, and only then presented as final exploratory conclusions to this research.

It cannot be stressed enough that the purpose of this research is not to propose direct and clear correlations between open-source related programs and efficiency, efficacy or policy recommendations. Instead, the research is of a preliminary and somewhat exploratory nature based on several in-depth case studies, the clear goal being to detect hints for further, more detailed research, in specific areas that will be presented as the final part of this document.

1.4 Structure of this document

This research document follows a fairly standard approach to thesis writing. The first part includes the heart of what will be presented as a whole, starting with the motivations that brought the author to jump onto this particular train: why it is relevant to be discussing public policies and FLOSS in the scope of the Spanish territory. Next, the relevance of the topic discussed is detailed: why it is relevant for society, academia and the author himself to be digging and researching into this particular field. This is followed by a presentation of the research objectives, grouped together into the various areas that will be introduced later. Some minor details of these objectives start to provide hints as to what will be set out subsequently. Next, an overview of the structure of the thesis document is presented followed by the main findings of the research that will be discussed along with the detailed document.

The second part presents an extensive attempt to gather together a comprehensive literature review of the topic, taking into account the fact that the targeted field includes three dimensions all mixed together. The literature review will start with an overview of public policies, looking at the basic concepts and implications of a field that has tremendous particularities for the social researcher. It is appropriate to view everything that follows keeping one fact in mind: the need to plan long-term as opposed to the four-year terms for which all politicians are elected to any given political duty in Spain. On top of this, even if a given party is granted re-election within a given institution, the juggling of influences often results in various responsibilities being allocated to completely new actors. Next, the design, implementation and evaluation of public policies will be addressed. It is clear that policy reviewing has more than just one perspective: it is not all about costs, although major impacts cannot be achieved without monetary investment. However, FLOSS solutions are often provided without monetary compensation; such a factor will be relevant when the results of the field study are presented. As part of the literature review, the evolution

of macro public policies in the post-Franco era in Spain is discussed to somehow illustrate the enormous change that Spain has made as a country and still needs to make to achieve European levels of economic and democratic development. Moving on from this section, FLOSS will be very briefly discussed from many angles: its roots, particularities, historical development, and its impact on other fields, including the main trends of its adoption in Spain. A multitude of books has been written on the topic, so the aim will not be to rewrite the story of free software. Instead, the effort will be rather directed at setting out a concise background for the reader who is not familiar with the particularities and implications of FLOSS, as will be detailed when that stage is reached. The final part of the review will be focused on the experiences and research carried out in terms of policies implemented within the public administration to promote or adopt FLOSS, with a greater level of detail in the research carried out into projects and policies implemented at a larger scale in entities of different sizes.

After the review of the relevant literature, the detailed research objectives and the propositions to be tested are presented in detail. The propositions are directly linked to the four main areas of the objectives of the research; the rationale supporting each one of them is introduced in detail. The observations and literature reviews that are behind each one of these premises is presented so that the reader can understand the logic behind each of them. In other words, the main drivers needed to raise the various questions the researcher aims to investigate are set out.

Next, the methodology is discussed. After some brief observations about the various possible approaches, the particular design that was adopted for the field study is explained. The main data of the people who were interviewed for the field study is presented: their profile and level of expertise in the field, the time-frame of their involvement in FLOSS activities, their seniority, and the geographic location and size of the organization in which they perform their tasks. On top of this, the contents of the questionnaire, its validation steps and the fine tuning performed over the course of the study are broadly discussed.

Afterwards, the results and conclusions found by the author are presented in detail. These results are based on the actual field study that will be presented: answers provided, impressions gathered by the researcher, areas that could not be discussed in as much depth as desired, etc. The field study is limited to a set of findings specific to the cases being reviewed, with no intention whatsoever of being correlated to the overall reality of FLOSS public policies in Spain. Despite all the efforts to cover all levels of entities, both in terms of size and region, the conclusions drawn can only be linked to the projects that were studied, which are representative of the Spanish reality to no more than a limited extent. Finally, the limitations of the research, lessons learned, implications for policy-makers and proposed future research areas are presented. Owing to the exploratory nature of the exercise as a whole, it is expected that future studies will continue opening up new fields of research in the selected field.

1.5 Main findings

During the process of the case interviews of the qualitative research, many particularities and details came to the attention of the researcher. Each one of the projects presented its own unique features. On top of this, the interviewed agents had various different roles in policy implementation, meaning that perspectives were also slightly different from case to case. There were nevertheless a number of common aspects that helped establish some conclusions for the public initiatives being reviewed.

The first finding was clear: the public policies promoting FLOSS that were analyzed presented big gaps in terms of agenda-setting. The process by which problem definition is attained is far from being formalized and well thought through. Instead, policies are defined based on gut feelings that FLOSS is good and provides positive feedback from the media and stakeholders (politicians) or on an expectation of better capabilities, lower costs and independence from suppliers (civil servants). Therefore, it should come as no surprise that in most cases, FLOSS is a topic that is not part of the political agenda. Instead, it is adopted or implemented based on one-off decisions made without previous long-term planning.

As for the origin of FLOSS public policies, half of the projects analyzed were pushed bottom-up by the public workers in charge of the field. Meanwhile, political leaders either promoted FLOSS policies themselves or accepted the projects and let them grow mainly on the basis that "it works" and "it costs no extra money". Their gatekeeper role is a well respected one. They have been presented as having adopted three different attitudes towards FLOSS: pushing for it, allowing it exist or, finally, blocking any initiatives in this field.

Yet in order to achieve significant success in terms of acceptance and longevity, three key stakeholders need to embrace the change: politicians, tech-related managers and end-users. However, this is not always the case: there have been instances in which the decision-makers wanted to push in the FLOSS direction, yet the public workers in charge of the area clearly refused change. Indeed, "change" is the key word when it comes to a new policy implementation concerning software solutions. It refers to the change coming from the actors promoting FLOSS, change accepted by gatekeepers in terms of approval, and change in terms of acceptance by end-users; all seem to be required before any new policy can be sustained over the long term.

The decision-making models were also reviewed. Since no formal problem analysis and agenda-setting methods were identified as being present in most cases, it should come as no surprise that the decisions were not attained following a linear model. Instead, the "garbage can model", as defined by Cohen et al. (1972), was mostly present in large public organizations. This model tries to explain ambiguous behaviors that contradict classical theories by disconnecting problems, solutions and decision-makers. Problems and solutions are dumped into "garbage cans" where matches might happen and originate new strategies.

Smaller scale policies, on the other hand, were found to be of an incremental nature. A set of different circumstances needs to merge within the garbage can in order to launch policies promoting or adopting FLOSS in large-scale entities, as will be presented when the results are reviewed in detail. The most characteristic aspect of smaller scale projects is the incremental nature of the decision-making process: often, FLOSS is adopted to face new needs or demands. As the demands or requests increment, so does the scale of the project.

Taking into account the findings presented so far, it should not come as a surprise that goal setting is also designed, overall, at a technical level. All of the reviewed policies fall within a set of defined categories: adoption, promotion of e-literacy, industry support, etc. Yet the goals of the programs as they are being deployed is quantified in terms of software features, not expected benefits or, in other words, as outputs rather than outcomes. Very often, the promoter of change is both the leader and executer herself. Thus, the detailed set of goals is defined as a list of things or tasks that any given proposed new implementation must accomplish. Objectives, when clearly defined *ex ante*, are limited to outputs or milestones of a technological nature. Some voices also brought to attention the fact that in certain cases, not even the outputs are defined: apparently, significant resources were mobilized without having a list of expected outcomes or outputs, simply because FLOSS provided positive feedback and attention for its promoters. Public image was presented as the only final goal of political leaders promoting FLOSS.

As a consequence of the above, policy evaluation is limited in most cases to output validation and timely accomplishment. Goals are usually not defined in terms of macro-achievements; instead they rely on features or deployment levels. Achievement can be measured easily. Several interviewed players did recognize that both economic and social achievements were clearly present thanks to policies promoting FLOSS. However, due to the inherent nature of measuring both intangibles and macro-economic data on a local basis, no efforts were detected to quantify externalities. Furthermore, the researcher investigated the presence of sophisticated evaluation tools, such as the counterfactuals method. Despite the fact that several policies would have allowed for such analysis to be carried out, not a single case presented attempts to compare different realities based on the presence/absence of FLOSS policies.

All in all, the main findings of the research were in line with the propositions at the origin of the detailed field study. However, very open and straightforward conversations also uncovered unexpected facts that are presented in detail in the results chapter of this dissertation. Readers who wish to build a deeper understanding of the basic main findings presented can continue to the following chapters.

Chapter 2

Literature review

2.1 Overview

Public policies are a continuous source of debate, commonly fostered by political interests. To the outside observer, it seems that governments try to satisfy everybody: "when in trouble, knock on my door". This increasing economic and social involvement might end up with decreasing levels of respect and trust from stakeholders[1]. Trying to satisfy everyone is a recipe for disaster: if public policies are varied and highly diverse, the likelihood that the population will feel that taxes are being properly redistributed are minimal. However, when the time comes to cut spending, no one seems able to agree on any single reduction program. This is part of the tragedy of the over-involved player who fixes nothing while trying to mend everything. For instance, Golden and Min (2013) have recently published a fairly comprehensive review of various approaches worldwide concerning the level of the public sector involvement in distributive politics.

Meanwhile, it should not be ignored that academic research is also a source of inspiration for public decision-makers. As has been clearly highlighted by Navarro Arancegui (2009) based on the research of Laranja et al. (2008), research concepts that offer broader comprehensive flexibility are the ones most influential in public decision-making circles. The first part of the literature review that is presented next is composed of a very broad approach to public policies: concepts, requirements, design, implementation and evaluation. As such, one could be tempted to understand the process of policy-making to be linear. Many authors have given enough details about public policy in action to prove that it is seldom a linear exercise. However, it will be presented as such for the purpose of the review and in the interest of

[1] As could be the case, for example, of an older unemployed person whose benefit payments are cut while the government spends millions to build a football field to be used for private purposes only once every two weeks.

simplicity. The final part of the public policy literature review will include a brief overview of public policy in modern times within Spain.

After the basic public policy literature review, it will be time to focus on FLOSS,[2] with an overview of its roots followed by its impact on ICT public policies. Those who lobby for FLOSS public funds and support (Boyer and Robert, 2006, Ghosh et al., 2002b) openly argue that "FLOSS is good for society: the public administration should be required to support it". Meanwhile, proprietary software agents take a liberal approach and claim that governments should not interfere in an industry so critical for economic growth: let the markets fly free and let the consumers choose; that will maximize economic performance. Moreover, organizations as influential as the International Intellectual Property Alliance (IIPA[3]) have discussed public procurement policies that favor FLOSS, the latter concluding in its 2010 annual review of countries' intellectual property practices (IIPA, 2010) that such practices "weaken the software industry" and "fail to build respect for intellectual property rights". Meanwhile, the software industry itself is heavily regulated by IP legislation. Traditional proprietary software vendors usually request that such IP protection must be increased in the case of software. The controversy over software patentability within the EU reached its peak during debates in 2005 when the European Parliament voted on the "Proposal for a Directive of the European Parliament and of the Council on the patentability of computer-implemented inventions"[4]. The particularities of the debates and the various lobbies was documented by Müller (2006)[5], one of the most relevant activists against software patents[6].

The need for research into the outcome of public policies relating to FLOSS is clear when the current literature on the topic is analyzed. Defenders of public support for FLOSS often state broad arguments in support of the benefits for society, yet provide little or no scientific evidence of such accomplishments. Meanwhile, those who argue that public involvement in the industry is inconvenient rely on classic economic theory of "the invisible hand" within an industry as fragmented as the software arena.

Within this framework, the literature review included herewith reviews the state of the art in three main fields and their points of overlap, as presented in Figure 2.1:

1. Public policies: strategy and evaluation, mainly presented from an economic perspective.

[2]So far, I have used the terms "free software" and "open-source" as equivalents. They are clearly not. However, for the shake of simplicity the term "FLOSS" (Free and Libre Open-Source Software) will be used mostly. Both approaches can be gathered under the FLOSS umbrella, despite the often strong reactions to the wording. The topic is widely discussed and documented, see Wheeler (2004).

[3]`http://www.iipa.com/`

[4]Commission proposal COM(2002) 92.

[5]In addition to its relevance to the topic itself, this book provides a good insight on how lobbies perform around decision-makers.

[6]The proposal was rejected on July 6th, 2005 by an overwhelming majority of 648 to 14 votes.

2. FLOSS as a worldwide phenomenon and as a part of software and information technologies. Various approaches of public policies to FLOSS.

3. Overview of Spanish public policies with more emphasis on ICT and FLOSS

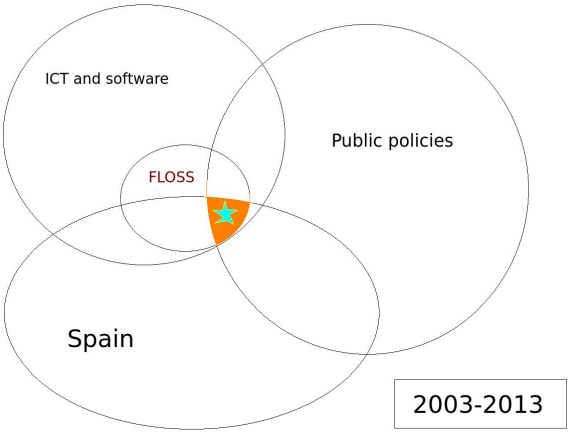
As presented in the above-mentioned figure, the object of the research will be the point at which the three areas converge. As previously stated, little empirical research has been carried out into the details of the benefits that are achieved after the implementation of policies supporting FLOSS. Therefore, before we focus on the point where the three areas meet, it is necessary to review what has already been said and reviewed by other authors.

The main question targeted by the research is clear: if any given public administration is to spend funds in order to support FLOSS, what would be the best field or activity, the best area in which to invest? Testing such an approach requires tools, technique and plenty of data. It is clear that "best" is a vague word, because it can be defined from many perspectives. Best from a cost-saving perspective? Best from a ICT independence and/or self-sufficiency perspective? Best from a society and/or educational perspective? Furthermore, developing and/or choosing the right tools for such an analysis is not a simple feat without having an in-depth knowledge of the usual practices in the field. In other words, before trying to draw any sound conclusion, the researcher needs to gain a complete understanding of what is going on in this particular field. Such knowledge needs to start from a qualitative perspective, with the researcher acting as a reporter and gaining access to players. He or she needs to obtain from them as much disclosure of the decisions made as possible. The researcher must then perform the correct analysis with the appropriate tools. Only then can he or she understand all the information received, test it and offer an explanation of the main observed facts. Such facts may open pave the way for further research in the field of efficiency and efficacy of public spending on FLOSS solutions.

The structure of the literature review presented in the next sections starts with a very broad public policy overview before moving into a highly specific field combining three ingredients: FLOSS, public policies and Spain. The first part of the literature review contains a first approach, followed by the implications on public policies of the various alternatives of the State model in terms of levels of policy centralization. Design, implementation and evaluation as the three main components of "policy in action" will be then reviewed. The design part includes a brief review of the different actors and problem definition. The implementation review includes the publicly visible part of any given public action, from its deployment through to its final moments. The evaluation step includes all the different alternatives as to how the public action can be carried out and its implications on feasible adjustments to ongoing programs. This is followed by a very brief review of the recent history of Spanish public policies.

The literature review will then shift its focus onto FLOSS: what it is, where it comes from and the main effects it has had in non-ICT areas of society. Only then will the different

Figure 2.1 – Literature review approach



Source: Own creation

approaches to public adoption and promotion of FLOSS be detailed. Various authors support different perspectives as to what public bodies ought to do, and it should come as no surprise that the alternatives in question mirror the traditional points of view concerning public policies. Some authors call for public involvement whereas others see no need for the public hand to intervene in the ICT markets. Finally, a brief review of FLOSS public policies implemented in Spain is set out as a final introductory step to the core focus of this research.

2.2 Public policies: an overview

2.2.1 The concept of public policy

Public policy can be defined as the set of decisions and directions in which any given society decides to move in order to maximize the well-being of its members as a whole. It is a topic that is attracting increasing attention in developed countries as the growing demands of society[7] are met with elected policy-makers who find it harder than ever to reduce the level of services provided to citizens. Modern economies have in recent times evolved into the so-called Social State. Under the new scenario, public policies have evolved from law- and procedure-fulfilling entities to service providers with expected results. This new approach requires a clear focus on objectives (planning), implementation (process management) and improvement (evaluation and adjustment) (González Rabanal, 2005).

The planning step can be defined at two main levels (Jansson and Ljung, 2013): the strategic and the operational. The public sector can have enormous difficulties not in strategic

[7] In search of the "free lunch" that Milton Friedman declared to be non-existent.

planning, but in executing long-term plans, given the evolving nature of governing bodies that must be re-elected on a periodic basis. Public services are perceived as rights by citizens; thus, downsizing the hand of the State in welfare provision is not popular in the slightest. On the other hand, increasing the taxes that are required to finance the increasing costs of public services is also a menace to continuity in power. Public policies cover the full range of decision making from detecting a problem to addressing it, and the various alternatives in terms of how to do so. However, as the popular quote attributed to Henri Queuille says, there is not any political problem so urgent that it cannot be solved by indecision[8]. In other words, not doing anything in terms of public policies is also policy-making.

Returning to the concept of strategy, one must not forget that it has its roots in the military arena. The word strategy itself comes from the Greek "strategos" which, when first mentioned in the 18th century, was considered to be the "art of the general" (Matloff, 1996). From the campaigns of Alexander the Great through to modern hi-tech drone bombing, what matters is how to optimize resources to achieve the highest possible goals. Key concepts of today's business management, such as sustainable competitive advantage, can be clearly linked to the military field, where it all began. Thus it is no wonder that modern businesses have embraced, adapted and developed the concept of strategic planning from the military field.

In business as in war, strategic thinking is about raising, thinking and obtaining answers to a few questions:

- Who am I?

- Where do I want to go? (i.e. what do I want to achieve?)

- By when do I want to get there?

- What do I need to do to get there?

As a matter of fact, whether explicitly or implicitly, all relevant organizations have some kind of strategy. It can be elaborated by means of a very formal method led by the executive team or it can be the sum of the actions and behaviors of the different departments of a given organization. The rise of strategic thinking in the business arena is actually closely linked to the birth of big corporations in the late XIXth and early XXth centuries (Mintzberg, 1994). The management of large manufacturing corporations prompted the beginning of the business and economic sciences. Although present in the thoughts and writings of early economists, business strategy started to develop as a part of economic thinking halfway through the XXth century. In his work about big corporations in the USA, Drucker (1993) concluded that the setting of central targets was part of the success of some of the most rapidly-growing corporations of the time. Furthermore, he was also one of the first to acknowledge that understanding how to satisfy the needs of the customer was a key factor in success and sustainability.

[8]"Il n'est aucun problème assez urgent en politique qu'une absence de décision ne puisse résoudre"

The foundations of business strategy were laid in the 1960's, led by the seminal works of Chandler (1962) and Ansoff (1965). Concepts accepted so readily nowadays, such as organizational strategy and capacities, were first defined by these authors during this period. Based on this line of thought, organizational consulting and the rise of Business Schools were a constant feature throughout the 1970's, as more and more corporations adopted the need to think ahead in terms of business strategy. The SWOT[9] analysis was fostered through use at the Harvard Business School as a key tool to help executives re-think main key strategic alternatives. Despite strong and relevant criticism of the tool as a means to define strategy, it is still widely used in business today, mainly as a tool for benchmarking the starting point in terms of strategy: in other words, helping decide "where are we now?" before attempting the "where are we going?" question. Also during this period, all kinds of growth/leadership, attractiveness/positioning and similar matrices were developed, so that strategic thinking could be standardized and carried out across all kinds of business by using a common root model.

However, the economic downturn of the early 1970's demonstrated that, despite the best strategic thinking, business are tremendously dependent on market forces that they cannot control and have very little power to foresee[10]. Based on such circumstances, criticism of bureaucratic planning emerged immediately: Mintzberg (1973) was the main voice to declare that good business management was not founded on planning but on intuition; successful businessmen use the right hemisphere of the brain to rule organizations paths. As an example of the new trend, Jack Welch[11], newly-appointed CEO of General Electric back in 1983, laid off over 200 workers in the corporation's strategic planning division and closed the department down. This marked the end of an era in business planning.

Modern strategic planning can be considered to be led by Porter (1985) who bases competitiveness on sector analysis: it is the business unit and not the corporation that needs to think about how to be competitive. The five forces analysis[12] he developed and promoted has gained worldwide acceptance when it comes to thinking and planning ahead in the business world. Further down the road, Mintzberg compiled the 10 main schools of thought, as presented in Table 2.1.

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[9]Strengths, Weaknesses, Opportunities and Threats: an exercise of corporate analysis of main issues in each field, so that any given organization can be prepared and react to future challenges ahead of time, as a part of strategic planning. There is no concluding evidence as to the parenthood of the concept, though.

[10]A similar lesson might be taken from the more recent economical troubles experienced by Western economies, despite warning signs raised ahead of time by several economists.

[11]Credited as one of the most successful businessman of the late XX century, Jack Welch massively increased the value of the company and grew it into one of the biggest corporations across the globe. As part of his working motto, he mandated all senior managers across the company to replace 10% of the workforce on a yearly basis: the lowest performing players were invited to leave the company. This simple practice is credited by himself as being one of the key success factors of the corporation.

[12]Threat of new entrants - Threat of substitute products or services - Bargaining power of customers (buyers) - Bargaining power of suppliers - Intensity of competitive rivalry.

Table 2.1 – Schools of Strategic thinking

Approach	School	Description (strategy formulation)	Contributions
Prescriptive (how should strategies be formulated)	Design school	Conceptualization process	Sector analysis: 5 forces, value chain, SWOT, PEST.
	Planning school	Formal planning	Formal planning system, development of planning systems
	Positioning school	Choice of strategic positioning for each context	Business portfolio corporate analysis tools: PIMS project, Porter corporate research
Descriptive (how should decision making processes be)	Entrepreneurial school	Response based on the leader's qualities	
	Cognitive school	Vision of the leader: focuses on mental procedure to conceive strategy	
	Learning (or emergent) school	Organization participation process	Strategies emerge step by step as the organization adapts and learns
	Power school	Power seeking processes of conflicting groups inside the organization and entourages	
	Cultural school	Linked to the organization's culture, shared process	
	Environmental school	Passive, it depends mainly on the entourage	
Integrative	Configuration (or transformation) school	There is a time for coherence and a time for change	

Source: Mintzberg (1998) (Free English translation as presented in Spanish by Goya Aramburu (2000))

Nevertheless, the latter continued to be a critical voice with regards to strategy. As part of his critical thought, he identifies (Mintzberg, 1994) three main fallacies around strategic planning:

1. The predetermination fallacy: the environment cannot be foreseen in detail; it depends on the behavior of competitors and many more unpredictable factors; it will never unfold as forecast by management.
2. The independence fallacy: usually, the strategist is part of the organization elaborating the strategy and thus his or her output is biased by inside facts. If this is not the case, the strategy defined by an outsider will very likely be meaningless to a given entity.
3. The formalization fallacy: strategic planning processes are usually defined by standard works that ignore the need to adapt and learn from unexpected events. This is even clearer in modern economies where speed to market is increasingly critical to success. There is no room for novel emergent strategies to develop. The relevance of unexpected events in recent times has been best presented by Taleb (2010) with the unpredictable black swan analogy.

Basic entrepreneurial thinking states that strategy is a tool for growth. Meanwhile, growth is the key for survival, meaning that all organizations must focus on basic strategic thinking. However, in the short term, the survival of the public sector does not seem to be at risk. Its political stakeholders, the fact that its powers are limited by regulations and bureaucracy, and the voting rights enjoyed by taxpayers mean that it differs from the private sector to such a great extent that one could be led to believe that there is no need for strategic thinking for the common good. However, the public administration is much more than a single monolithic entity. It includes hundreds of organizations that must (Marin, 2012):

- Seek funding from taxpayers and/or other public sources
- Optimize resources and ensure future budget allocations
- Measure performance
- Decide upon (de)centralization of services
- Focus on inputs (given the difficulty of measuring outputs)

To cut a long story short, the definition of strategic planning as stated by (Charih and Paquin, 1993) provides a perfect summary: “A process that allows an organization to analyze the internal and external environments, define major priorities and facilitate resource allocation”. This approach is in line with New Public Management, a theory of public administration that dominated debates in the 1980’s and 1990’s and will be discussed later. However, it

should be stated that the main characteristic of this school is its assertion that public entities must be governed by integrating a mix of needs and goals, instead of concentrating on a single value or target.

Regardless of all the peculiarities mentioned, the role of public involvement in the economy in developed nations is nothing if not significant. Indeed, public spending as a proportion of GDP is usually a mirror of both economic development and the State model[13]. A detail of recent trends in OECD member states is presented in Table 2.2. The relevance of the public role in the economy has given momentum to the school of public policy analysis that maintains that the State becomes a good manager by asking and addressing various questions, such as:

- What is the exact role of the government?

- What exactly is being carried out by means of public policies?

- How?

- Why?

In order for citizens to perceive that public affairs are ruled by good managers and strategists, it is necessary to select the right issues and prioritize them, show leadership and achieve efficiency and efficacy. The current economic situation, in which public income is being reduced and taxes are being increased in many developed nations has increased the focus on public policy matters. In the following sections, the various aspects relevant when focusing on public policy analysis will be presented.

2.2.2 Characteristics and requirements of public policies. Implications of the State model

As stated above, behind any given public policy, a decision has already been made "to act or not to act". This will to act is generated within the network of public entities and institutions according to a set of procedures clearly defined beforehand. The State cannot take any road in any vehicle: the set of legal regulations in regards of the right procedure to move forward is well established in modern economies. Yet this strength can also be considered a weakness, for the procedures are usually defined by bureaucrats with the primary goal of ensuring legality. This means speed and evolution are not part of them. They are conceived as production procedures with inputs (the budget and public assets) that need to achieve outputs/outcomes which are very often difficult and hard to quantify and measure.

[13]This means that the higher the proportion of GDP represented by State spending, the more advanced the nation may be. However, this fact is combined with a pre-defined adopted economy model (i.e. traditional *laissez-faire* of the Anglo-Saxon economies vs. European social democracy)

Table 2.2 – Total expenditure of general government as a percentage of GDP 1996-2011 (OECD member states)

	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Denmark	58.91	56.68	56.33	55.5	53.67	54.19	54.58	55.07	54.55	52.79	51.59	50.81	51.52	57.96	57.82	57.95
France	54.5	54.18	52.76	52.6	51.69	51.66	52.87	53.4	53.26	53.57	52.98	52.61	53.28	56.67	56.68	56.03
Finland	60.17	56.64	53.01	51.79	48.42	48	49.04	50.34	50.24	50.39	49.24	47.43	49.31	56.1	55.55	54.04
Sweden	62.92	60.66	58.78	58.11	55.09	54.52	55.6	55.67	54.18	53.85	52.71	50.95	51.74	54.94	52.48	51.29
Greece	44.48	45.28	44.73	44.8	47.12	45.71	45.5	45.15	45.94	44.6	45.19	47.59	50.65	53.81	50.2	50.1
Belgium	52.42	51.16	50.36	50.12	49.08	49.11	49.77	51.04	49.17	51.89	48.5	48.27	49.8	53.77	52.81	53.31
Austria	55.86	53.47	53.71	53.42	51.94	51.29	50.67	51.32	53.76	49.99	49.14	48.6	49.34	52.89	52.62	50.46
Italy	52.17	49.96	48.9	47.85	45.86	47.71	47.12	48.08	47.53	47.92	48.45	47.63	48.6	51.88	50.51	49.91
Netherlands	49.43	47.54	46.67	46.02	44.17	45.35	46.21	47.1	46.09	44.79	45.54	45.27	46.22	51.55	51.19	50.12
United Kingdom	42.27	40.51	39.47	38.88	36.76	40.17	41.1	42.12	42.96	44.09	44.18	43.86	47.84	51.46	50.28	49.01
Hungary	51.35	49.94	51.2	49.22	47.76	47.84	51.51	49.66	49.06	50.1	52.19	50.69	49.21	51.38	49.47	48.67
Euro area	50.46	49.23	48.41	48.03	46.17	47.19	47.5	47.97	47.43	47.33	46.66	46	47.13	51.17	50.93	..
Iceland	42.21	40.69	41.3	42.05	41.87	42.6	44.25	45.61	43.99	42.25	41.64	42.27	57.61	50.97	51.52	45.99
Portugal	42.4	41.56	41.44	41.48	41.62	43.16	43.06	44.68	45.42	46.56	45.22	44.36	44.8	49.76	51.26	48.89
Slovenia	44.15	44.51	45.38	46.17	46.51	47.31	46.2	46.24	45.73	45.3	44.58	42.48	44.24	49.29	50.25	50.92
Ireland	38.92	36.51	34.35	33.91	31.18	33.02	33.35	33.13	33.49	33.76	34.27	36.61	42.82	48.83	66.79	48.72
Germany	49.06	48.22	48	48.22	45.1	47.61	47.95	48.46	47.07	46.91	45.35	43.51	44.05	48.1	47.87	45.65
Norway	48.5	46.83	49.08	47.69	42.3	44.11	47.06	48.16	45.13	41.8	40.04	40.34	39.77	46.72	45.5	44.62
Spain	43.21	41.63	41.06	39.91	39.19	38.66	38.91	38.41	38.89	38.44	38.35	39.21	41.46	46.26	45.62	43.65
Israel	52.83	52.37	54.78	53.57	51.34	53.69	55.35	53.98	50.91	49.39	47.76	46.27	45.67	45.35	44.98	..
Estonia	39.45	37.4	39.2	40.15	36.12	34.8	35.77	34.82	33.98	33.6	33.6	33.98	39.48	45.23	40.62	38.19
Czech Republic	41.67	42.57	42.96	42.22	41.65	43.9	45.6	50	43.28	43.01	41.97	41.04	41.15	44.92	44.11	43.36
Poland	51.01	46.44	44.34	42.72	41.08	43.8	44.26	44.68	42.62	43.44	43.86	42.19	43.19	44.58	45.43	43.68
Canada	46.59	44.28	44.8	42.68	41.11	41.99	41.23	41.18	39.86	39.3	39.45	39.35	40.03	44.37	44.08	..
Turkey	..	..	..	..	..	..	..	..	..	..	33.21	34.89	37.48	43.84	38.48	..
Luxembourg	41.13	40.65	41.06	39.19	37.59	38.13	41.53	41.78	42.55	41.52	38.58	36.27	37.12	43	42.43	42.01
United States	36.59	35.46	34.62	34.17	33.88	34.98	35.89	36.27	36.06	36.32	36.02	36.85	39.09	42.66	42.46	..
New Zealand	40.6	41.33	40.23	39.49	37.8	37.11	36.5	36.79	36.71	37.78	38.98	38.84	41.63	42.33	..	..
Japan	36.71	35.72	42.46	38.6	39.05	38.55	38.82	38.41	37.02	38.44	36.17	35.9	37.22	42.03	..	..
Slovak Republic	53.75	48.93	45.79	48.1	52.14	44.46	45.06	40.13	37.67	37.98	36.52	34.21	34.92	41.53	40.05	37.39
Australia	35.91	34.68	34.92	34.44	35.53	34.93	34.32	34.43	34.49	33.72	33.48	33.32	36.05	37.19	..	..
Switzerland	35.29	35.52	35.77	34.3	35.1	34.78	36.16	36.39	35.95	35.27	33.48	32.32	32.37	34.15	34.17	..
Korea	21.21	21.82	24.14	23.19	22.43	23.92	23.58	28.9	26.08	26.59	27.73	28.65	30.45	33.08	..	..
Chile	..	..	..	..	..	..	..	..	..	..	..	..	22.18	24.62	..	..
Mexico	..	..	..	..	..	..	..	19.11	18.27	19.08	19.69	20.45	25.74	23.28	23.32	..

Source: OECD.Stat

For the modern management reviewer, the key perspective when analyzing public policies is that they need to start with a clear definition of goals and ends, as opposed to private agents who can plan as they please. Within this framework, Boston et al. (1996) clearly identified a set of critical differences between public and private management goals and constraints. The legal, market, human resources, monopolistic and decision-making criteria aspects clearly differ in both kinds of organizations. González Rabanal (2005) presented a simple chart to highlight the sharp contrast between the two models from a goal perspective, as presented in Table 2.3.

As a consequence of the above, a public manager needs to adapt her behavior and management capabilities to the environment and circumstances. Despite the enormous efforts and actions that are being carried out to create a more customer-oriented public administration, the task is far from being completed from a global perspective: modern economies continue to be ruled by bureaucratic organizations that are, by definition, resistant to change. As will be presented below, the new trend in public management seems to be gaining ground, mainly driven by the clash between modern economies, where growth means change and speed, and public bodies, in which stability comes from processes written in stone.

A brief mention needs to be made of the various stakeholders surrounding public policy-makers. Groups of interest usually try to put pressure on politicians to obtain policies in line with their goals[14]. Meanwhile, all kinds of lobbies try to achieve their aims and defend their interests both in public and in private in front of the legislators. Within this framework, any given new policy is very well thought through not only in terms of the public interest, but also in terms of the effect it might or might not have in regards to public opinion and electors. Complicating matters still further, in the present day we witness four key aspects that add yet more ingredients to the public decision-making pot:

- The increasing power of independent mass media conglomerates as a result of their ability to reach huge numbers of citizens and thus create public opinion (Strömberg, 2001).
- The democratization and multiplication of sources of information: alternative information channels are gaining more and more attention along with much easier access to them by both informers and the "informed" (Kamarck et al., 2004).
- A strong demand/movement towards open government and transparency as regards both public decisions and expenses (Lathrop and Ruma, 2010).
- New dynamic forms of mass protest against unpopular public decisions (Bennett et al., 2004).

[14]Think of any environmental organization demanding better public transportation policies.

Table 2.3 – The contrast between public and private goal orientation

	Public policies	Private action
Goals	External, society defines its goals (general interest)	Internal (decided by owners and executed by Directors)
Desired outcome	Social welfare	Owners' welfare
	Social problem-solving	Organization goals: profit, growth, market share, etc.
	Social transfers	

Source: González Rabanal (2005)

There is no doubt that all of the above influence politicians strongly, to the extent that the first dilemma presented above concerning whether "to act or not to act" might easily lean towards non-action for fear of "punishment" in the next election[15].

A final consideration needs to be taken into account when analyzing the particularities of public policy-making: the State model on which it is to be implemented and its implications. The centralized administration model has its roots in the French revolution, as the main work of Napoleon who transferred the centralized command style of the military arena into the public organization. More than 40,000 municipalities had been granted electoral autonomy as a consequence of the revolutionary spirit. However, Napoleon wanted to control the public administration and ensure equal services to all citizens regardless of place of residence. On the other hand, rural areas and minorities have traditionally seen centralized models as a threat to different local needs versus the common good of big towns and cities (González Rabanal, 2005). The struggle between the two models seems to be a circular one: despite the fact that modern States have a very well-established basic agreement on the state model, changes in the basis of regional, local and central decision-making empowerment are quite common within modern economies struggling to find the impossible perfect model. Traditionally centralized models are supposed to be more efficient and provide equality, whereas decentralization is linked with proximity and good resource allocation.

The search for the perfect equilibrium in the allocation of empowerment between the central and the local is a classic issue in public management. Efficiency and efficacy are traditionally the main drivers of any given model. Yet, traditional monetary and business approaches of maximizing the economic welfare of the population are ceding ground to new approaches that include pluralism, participation, representativity, equity and ethics. This trend represents a modern approach to the concept of democracy as the "government of all". The governance concept is another aspect of the new approaches to public management and public policy-

[15] An obvious example of this is the 2014 Partido Popular's attempted reform of abortion rights in Spain, where all the ingredients detailed were present.

making: the impact of public policies is far more complex in a global world, which means that decision-makers need to interact with stakeholders in a very active way before deciding upon change and action.

Both decision-making levels and modern governing approaches need to be considered within three different approaches:

- A global one, in which decision making is created at a supranational level. The European Union is a good example of this approach: it has done a tremendous job of creating standards in areas such as environment protection, although local particularities have increased criticism towards "decisions made in Brussels".
- Regional and supranational levels, in which borders of all kinds are becoming more permeable and thus cooperation between regions both inside borders and across borders is paramount for better performance.
- Local and metropolitan levels, where citizen involvement and participation is easier to achieve and decision making is much more closely focused on the real issues.

Modern public policies, as defended by the New Public Government trend, have a tendency to locate the center of decision and action as close to the final receivers as possible. The effort is to move towards self-administration. Thus, two key aspects need to be addressed: transfer of power and decentralization. This does not mean that central power is to resign its duties, but that a different style and strategy are needed in order to address better governance. Albi et al. (1997) define two clear internal design models in any given organization in terms of authority: decentralized hierarchies and bureaucratic hierarchies. The former seek to leverage the speed of adjustment to the environment, trading empowerment for the different players in exchange for results. The main center of decisions retains power over general policy guidelines and coordination (mainly performance assessment and cost control). The factors that the mentioned authors identify as key in terms of optimum decentralization levels are:

1. Divergence of objectives: in this case, the agent will require higher levels of control, as she will have a tendency to act in search of her self-interest
2. Information asymmetries: these are relevant only in the event that agents and the central organization have different goals
3. Scale economies at the information processing level: this might provide an advantage to the central power in terms of the ownership of relevant information
4. Supervisory costs: the more incentives the agent might have, the greater the need for close supervision

The center of power in the modern State is represented by the central government. It holds the ultimate power and has the ability to grant or allocate different levels of decision making and execution capabilities to lower entities, right down to local entities. Based on the defined scheme that any given nation may choose, the various levels of autonomy include a number of factors that create so-called inter-governmental relationships, which include:

- Geographic: boundaries, election rules and political, cultural and historical aspects.
- Legal: tradition and constitutional facts.
- Political: the party system and culture.
- Organizational: size and form of public administration, centripetal and centrifugal tensions (peripheral demands and central replies).
- Economic: linked to the ways in which wealth is created, needs to be aligned with the public sector structure.

Despite the fact that every modern State has its own particularities, there is a clear distinction between nations that have opted for a federalist system and those that are constructed around a centralized spirit. The clearest example of a federal organization is that of the U.S.: the particularities behind the birth of the Union have made the oldest federal system a model that has inspired many others. Nevertheless, it is not a model carved in stone. The U.S. has witnessed various forms of federalism throughout more than 200 years of history. In the words of Starling (2010), the different periods have been:

1. Dual federalism (1789-1933)
2. Cooperative federalism (1933-1960)
3. Creative federalism (1960-1968)
4. Neofederalism (1968-1980)
5. New neofederalism (1980-1993)
6. Federalism in competition (1993-present)

Each one of these periods represents a different approach to the complex equilibrium between all the stakeholders that form the nation, especially from the “who does what?” perspective. Conflicts that may arise are of a double nature, both positive and negative. Positive ones represent the will of different administrations to activate a given policy. The conflict can be resolved by agreement or resolution; alternatively, it may raise an issue that leads to a duplication of services.

On the other hand, negative conflicts occur when no public entity is willing to take accountability for a given policy or social demand. Based on public pressure or the emergency in question, the topic may be left unresolved or addressed. The second option usually ends in a dispute over the cost of the program; the entity that has acted will then demand that all costs be reimbursed, based on the argument that it was not its duty to take responsibility.

Federalist models are also very much present in Europe, to a large extent forced by the presence of multiple minorities and ancestral cultures. Germany and its Länders represent a model where regions (Bezirke), counties (Kreise) and towns (Gemeinde) share wide cultural, educational, policing and municipal law-making capabilities. The economic tasks are mostly left in the hands of the central government (Bund), although there is a complex tax system in which all involved parties take part (policy and management) depending on the nature of each particular fiscal instrument. German federalism is built around three key principles: loyalty towards the federal system, supremacy of the Federation over the Länders and cooperation among Länders and federal government. Belgium, Austria, Italy and Spain are also different models of European federalism, each with its own particular features. On the contrary, France and the United Kingdom are examples of centralized models in Europe. It is peculiar, however, that at the time of this research, both nations are in the process of modifying their state model. While France is moving towards more centralization with a consolidation of regions, among other changes[16], the UK is moving towards greater independence[17].

The tension between the central power that seeks uniformity and control and the periphery that demands diversity and discretion is a constant in terms of state model. In the case of Spain, the basis of the modern state is credited to Javier de Burgos who, as far back as 1883, was the force behind the provinces that exist today. The boundaries he defined were very much based on the historical kingdoms rooted in the past of the State. From the XIXth century until 1978, and apart from periods when both Catalonia (1932-38) and the Basque region (1936-37) each enjoyed a Statute of Autonomy[18], Spain operated under a centralized tradition . The 1978 Constitution, however, acknowledged historical facts and granted various levels of self-autonomy to different regions: public health, urban planning, education, culture, environment and agriculture are some of the areas in the hands of the regions. However, the text of the Constitution indicates that the journey on the path to more autonomous government will be conducted at different speeds. As a consequence of this, there remain significant differences in terms of levels of autonomy and social welfare between the various regions.

What is more, the fiscal model has certain peculiarities and a spirit of solidarity that creates

[16]In a desire to reduce public expenditure, as requested by its EU obligations.

[17]In this case, forced by popular demand, as shown by the Scottish referendum.

[18]The Galician one was in progress when the Civil War broke out in 1936.

conflict wherever overall public income is reduced. Navarre and the Basque country alike enjoy fiscal autonomy both in terms of tax regulation and management[19]. Not all public services are provided by the regional government, however. In exchange for the services provided by the central government, both regions negotiate and pay a global fee on an annual basis. The rest of the regions have their capabilities limited to collecting certain taxes (part of the income tax, patrimony tax, etc). However, the national government sets and collects the most significant part of the public income. A part of this collection is kept for the maintenance of its own organization and central public policies. The remainder is then allocated to the rest of the autonomous regions based on a principle of equality, so that social welfare is maintained across the territory. However, wealthier areas, such as Madrid and Catalonia, receive back lower quantities compared to what has been collected from their territory. This is usually a source of conflict, not only for those with a negative balance, but also with regard to the allocation criteria itself. There is no need to expand on the topic here, except to focus the discussion on its effect on public policies: in the absence of a single centralized system, there are public wealth differences correlated to GDP per capita across the regions. Historically, transfers from the European Regional Development Fund (ERDF) and the like have helped poorer regions somehow close the gap (bringing "Keynesian" wealth to the area). New member states from Eastern European countries have gained access to such funds in recent years, however. The current economic crisis has only increased the effect, as cost reduction and constraints to public spending are put in place. As a consequence of the above, tension over the state model is now at a modern historical high.

2.3 Public policy design

2.3.1 Introduction

The exact functions that the public sector could/should target is a classic debate among economists. The main topics that need to be addressed from a policy-making perspective are:

1. Resource allocation (what goods should be produced, and how)
2. Distribution issues (who is to share the benefits of production)
3. Economic stability (inflation, trade balance, etc.)
4. Growth issues (how to increase GDP)

[19]Autonomy in terms of tax regulation has limitations in regards to equality within the State model and European Union.

As the area main area of relevance to this research is that of resource allocation, a brief review of the main schools of thought in the field is presented herewith. According to the classic theory of public goods (Samuelson, 1954), all goods and services can be classified in four different groups, as presented in Table 2.4.

The concept of "the invisible hand" elaborated by Smith (1904) is the main argument for the liberal school that asserts that public expenditure should be limited to public goods (justice, defense, security, etc.). According to this classic theory, each of the market players seeking her best choice creates a global Pareto optimum; that is, the equilibrium that has been reached represents the point at which no individual can be better off without decreasing the position of another player by a higher degree. This school supports the idea of the search for the best possible provision of public goods by the government. When a pure public good is optimally supplied, the marginal consumption benefits are equal to the marginal resource cost of production, as presented by Samuelson (1954). There are, however, additional welfare costs when governments use distorting taxes to fund projects. Pigou (1947) acknowledged this and argued that the marginal excess burden of taxation would raise the cost of production and drive down the optimal supply of a given good[20].

Contrary to the liberal approach, Keynes (2006) created a school of thought in support of an active role of governments in the economy. According to his argument, the powerful forces of the economy should be regulated by policy-makers by balancing times of low and high growth with taxes and subsidies in order to keep inflation and unemployment under control. Thus, in this scenario, the overall growth of any given economic system is softened by the hand of the government, reducing speed with taxes in periods of strong growth and increasing activity with subsidies in the event of a recession.

Somewhere in between the two stated philosophies, the interventionist school criticizes the invisible hand and supports the concept of market failure. According to this school, there are several situations in which limited intervention by policy-makers leads to weak Pareto optima. Market failures can be classified into four groups:

- Imperfect competition, which represents the fact that any given player(s) might gain a monopolistic situation and dominate the market with a far from optimum equilibrium
- Externalities, which represent the scenario where not all costs of production are allocated to a given good, and thus its production exceeds the quantity that the markets would accept, if all real costs were to be taken into account
- Information asymmetry, where not all players in the markets can access the same level of information; thus choices cannot be made in a completely rational manner

[20]For an in-depth review of the topic, see Jones (2005).

Table 2.4 – Theory of public goods

	Excludable	**Non-excludable**
Rivalrous	Private goods	Common goods
Non-rivalrous	Club goods	*Public goods*

Source: Adapted form Samuelson (1954)

- Preferred or prohibited goods, where society as a whole has decided that certain goods need to be obtained by the whole population (education) or should be banned from the market (illegal drugs)

In the event of any of these situations, defenders of public interventionism support the idea that society as a whole needs to intervene in the economy to correct the issues and improve the overall equilibrium. The case of software markets, as explained later, could be included in all of the above-mentioned categories for various reasons. Yet figures like Freedman (1962) strongly question whether governments are capable of fixing market failures. Instead, this line of thought argues that public intervention might make things worse. When entering the market, public policies, strong as they are, might act like a bull in a chinashop. Elaborating on these ideas, Holcombe (1995) argues that markets are superior and more cost-effective than public policies in pursuing social goals such as healthcare, environmental protection, and housing. The reality of software markets can be understood as having a dual nature: there is little, if any, public intervention, yet IP regulations impose a certain set of market rules that favor a specific business model, as detailed earlier on.

However, boiling the quality of life down to commercial value, cost minimization, and property rights might be considered short-sighted: social values such as equity, justice, equal opportunity and human dignity need to be included in the bigger picture when it comes to evaluating the impact of public policy on the quality of life.

Grossman and Stiglitz (1980) and Stiglitz (1985) argue that markets are efficient only under exceptional circumstances. Stiglitz argues that the invisible hand does not exist and that both information asymmetry and externalities are present, overall, in the markets.

In essence, today's debate is about finding the right balance between the market and government policies. There is clear consensus in recent economic theory that both are needed. For such a purpose, the need for proper implementation and evaluation of the impact of public policies is paramount.

Industrialized nations have seen an increase in concern about public policies since the 1990's. The "hand" of public bodies and its evaluation can be analyzed from the perspective of various disciplines: economics, politics, sociology, law and management. Such diverse perspectives have given rise to many complex issues. From an economic point of view,

budget constraints and increasing questioning of the role of the State are usually mentioned. Under the so-called *New Public Management,* the agendas of most public directors include a set of drivers/goals that seem to mirror basic private management tools, namely:

- Improve planning tools
- Modernize and improve service quality
- Manage by goals
- Develop management abilities in public employees
- Manage public responsibilities
- Evaluate plans and activities
- Manage transparency and accountability

The fact that public policies are often targeted at very specific economic sectors (i.e. subsidies for purchasing new vehicles across Europe) is usually heavily criticized by the liberal school. Thus, evaluation helps in various axes of public policy:

- Strategical: good evaluation practices can help understanding of current issues and changes required in future projects
- Managerial: evaluation helps improve the way in which public resources are implemented

Evaluation will therefore provide a valid insight from a political and economic perspective: the effects of a given policy might or might not have helped improve society as a whole; on top of this, one should review how efficiently such a policy was implemented. The first aspect would evaluate the politicians' role, whereas the latter is more focused on the capabilities of the public *machinery*. Orsini (1998) has presented four main areas of relevance to be reviewed within public policies:

1. The institutional perspective, or the approach that involves observing the legal boundaries of public action
2. Goods provision, or the ability of the public sector to provide the right goods in the right manner to satisfy market needs
3. The organizational challenge, which aims to investigate the coherence, efficiency and effectiveness of public entities
4. The public policy evaluation approach, in which the public role as economic and social regulator, and its effects, are reviewed

The first area, the institutional perspective, centers on what the public powers can consider to be their field of action from a legal perspective. It contains research with a heavy layer of laws and their interpretation. The goods provision approach does not foresee that policies are often aimed at behavior rather than material resources[21]. This research mostly covers aspects located in the third and fourth areas. Agenda-setting, the various roles of actors and decision-making processes are all part of the organizational challenge: proper management of those areas must help public entities become more efficient. The organizational challenge point of view has been criticized because it usually centers its analysis on internal topics and neglects the real goals of any given public body. As for public policy evaluation research, it seeks to solve most of the deficits and conceptual gaps present in the other approaches: the institutional perspective bends towards simplifying the administrative reality.

In contrast with linear thinking and boundaries across areas of investigation, researchers in public policy evaluation consider any given policy as a whole dynamic analysis unit, as expressed by Nioche (1982):

> "a given public policy is a **sequence of actions** that produce a more or less institutionalized answer to a situation that is considered problematic"

Such a sequence can easily be split into three different linear steps:

1. Policy creation
2. Policy implementation
3. Policy evaluation and adjustments

For the purpose of this research, a clearly linear public policy literature review model has been adopted. This model is far from being accurate in terms of covering the daily reality of public matters. Mass media reports constantly on all sorts of policy changes, adaptations and cancellations: public policy is of a much more cyclical nature in the sense that it is constantly moving and adapting based on the actions of the various actors at any time in the various steps identified. Such interactions and influences are part of the nature of public management.

Policy creation includes every step from the awareness of a public problem all the way to the launch of the public solution for that need. The debate over what is and what is not a public problem is at the center of public policy discussions. Several actors take part in such a debate through opinion and action: politicians, lobbies, mass media, non-profit organizations, civil servants, etc. Stakeholders are of a diverse nature depending on the field of action. It comes as no surprise that new ICT tools have leveraged the visibility of the

[21] Policies aimed at reducing traffic accidents are a good example of such behavioral policies.

public hand. Actions that years ago went by unnoticed by the masses are shared on social media easily nowadays. Such actions create a level of noise that policy-makers cannot ignore. The actors are more diverse and more present than ever. This diversity does indeed have an effect on decision-making models. It is widely accepted that the linear model plays out in steps as clearly defined as in the literature. The sequence of actions is more complex than ever and the paths that lead to the final decision for public action are not so structured, especially in smaller scale organizations.

Policy implementation is a critical step, often disregarded by decision-makers. Some of the same actors identified at the policy creation step return to defend their interests and combine with new stakeholders who can have a tremendous amount of unseen power when it comes to putting the decision-makers' plans into practice. The best example is provided by the *street-level bureaucrats*, as defined by Lipsky (2010). Lipsky categorizes the real people in front of the clients or users under this name. In his research, he identified that the level of discretion enjoyed by these actors is enormous: an absence of clearly defined manuals and guidelines directing their daily tasks gives the *de facto* policy implementer sufficient power to bring partial or total failure to a given program or policy. Healthcare, social services, education and law enforcement are the classic areas in which the role of the street-level bureaucrat is a key element. When it comes to ICT and new technologies, user adoption is clearly a must in order to move forward.

As far as public policy analysis is concerned, the goal is not only to describe the facts, but also to try and explain the issues at stake and the means that are required to avoid difficulties in future projects. As is explained in more detail in a separate chapter, the main goal of this research is aligned with this approach. Reviewing both policy creation and policy implementation in the area of FLOSS public policies can reveal a pattern or common ground and therefore help anybody seeking to progress in both areas. Public policy evaluation can actually be considered to be a substitute for the market acceptance/failure received by private initiatives. It represents the responsibility that must be attached to politicians who decide to carry out a given strategy and its implementation.

However, the fact that public policy evaluation can be assessed from different points of view and with different tools has led to a certain degree of confusion and heterogeneity of content, as explained by Orsini (1998). The concept of evaluation itself can be addressed from a quantitative approach (evaluation meaning the measurement of the effects of any given policy) or from a value judgment principle. For the quantitative approach, one of the biggest challenges is that of correlation, given the multiple inputs present in areas where the "public hand" usually operates. Meanwhile, value assessment takes into account not only measurable effects, but also the description of results. It includes measurement combined with explanations and the judgment of results in the most scientific approach possible. This value judgment can take several approaches:

- Classic approach, where results are compared with expected goals
- Efficiency approach, where means and results are compared to assess optimization
- Subjective value, where the actors themselves evaluate a given policy

So far, evaluation has been presented as an external task isolated from public policy itself, mainly coming from its *ex post* characteristics. Some authors (Monnier, 1990) claim a more plural approach, where the links with policy itself are tighter. The sequence of actions mentioned earlier is presented again in far greater detail in Table 2.5.

Furthermore, public policies are continuous in nature, and sometimes even operate in parallel, in terms of timing. This implies that accurate evaluation needs to be both dynamic and iterative. Public programs cannot be isolated from previous experiences and their environment. Plus, the evaluation itself must be integrated into public policy as a key part of the whole process. An economic perspective of public policy evaluation should not ignore the complexity of the circumstances. Qualitative and quantitative approaches should be combined in order to take said complexity into full consideration.

Despite its relevance to the overall economic activity of modern societies, public administration as a field of systematic study is quite a recent field of research. The seminal work of Woodrow Wilson "The Study of Administration"[22] is generally considered to be the starting point to review the activity of political systems. This specific area has gained increasing interest, both as a subfield of political science and as an academic discipline in its own right. The real awakening of an academic consciousness about public policy took place in the late 1960's. The topic was included in most curricula with a review of existing theories, policy formulation, implementation and, finally, evaluation. Case studies were also included. The works of Hogwood et al. (1984) and Hill and Ham (1997) constituted a landmark in the public policy review topic. Finally, Parsons and Greenwood (1997) established the basis of modern public policy analysis.

2.3.2 Public policy perspectives

Public policy development and its choice of means and operating schemes can be viewed from different perspectives. The evidence approach (regulations, taxes, communication, etc) concentrates on real facts. Meanwhile, the policy alternatives question (best instruments, choice criteria, etc.) refers to what those facts should look like. In this sense, public policy instrumentation is a significant issue, because it reveals the real balance between the governed

[22] In this essay, Woodrow Wilson asserts that bureaucracy should govern independently from the elected branches of government, a call that could be considered revolutionary at his time: the distinction between politics and the administration.

Table 2.5 – Overview of public policy evaluation.

Phase	**Elaboration**	**Implementation**	**Final**
Area	**Strategy**	**Operational**	**Results**
Goals	Program need and potential value	Understand operational implementation	Measure achieved results
	Policy understanding (issues)	Ensure follow-up	Economic value judgment
	Make program measurable	Identify key issues and proposed solutions	Propose changes
Key concepts	**External evaluation**	**Implementation analysis (expected vs. actual)**	**Results evaluation**
	External coherence	Follow up (quantitative and qualitative)	Policy measurement
	Context	Financially	Strategic effectiveness
	Internal evaluation	Efficiency-Effectiveness	Global efficiency Undesired effects
	Action theory	**Work in progress regulation**	**Process evaluation**
	Internal coherence	Malfunctions in execution	Correlation validation
	Program evaluable?	Interaction control	Analysis of process mechanics

Source: Adapted from Orsini (1998)

and the governing. Policies and their instruments are not neutral: they produce significant effects, even beyond the objectives sought, and define the logic of the public policy structure.

These effects even surpass their natural boundaries. As Barker (1944) demonstrated, state expansion in Europe between 1660 and 1930 presents clear hints of side-effects across borders. Although he only concentrated on the history of a certain set of countries, he acknowledged the strong interdependence of the procedures used across the years:

> "When we consider the history of the Modern State (...) we cannot but recognize the debt which all States owe to one another. Each country has developed according to its own genius; and each has produced its own fruit. But each has produced some institution, or some method of public service, which has served as an example to others; and each, in turn, has borrowed from each. There has been a rivalry of methods, but it has not been unfriendly; one country has studied, adopted, or tried to improve the methods of another; and all have combined, however unconsciously, to promote the growth of a common Europe standard of administration and public service."

The mentioned effects of public policy ideally have one single goal: the "public interest". In this sense, there might be misalignments between what the government understands as public duties and obligations as opposed to citizens' expectations. The perspective from which such public interest is analyzed is key. The points of view used to decide on the guidelines for public policies are diverse:

- Economy, as the alternative that drains the least amount of economic resources
- Social aspects, as the option that reaches the highest possible number of beneficiaries, directly or not
- Equality, as the alternative to best redistribute wealth[23] in a given society.
- Sustainability, as the choice that outputs the best long-term benefits

Needless to say, significant amounts of power gained by modern governments are linked to an extreme risk of conflict of interest. Regulatory policies need to be clear and specific about their goals, instruments and evaluation, as they have a very strong impact on the relationship between industry, individuals and other collective stakeholders. Balancing all the implicated interests is a tricky task, subject to all sorts of pressures and conflicts. Previous to the implementation of any given public program, one needs to take into account the impact on all stakeholders and review the different choices in the search for the action that will achieve the best balance between all the interests. Increased regulatory policies call for

[23] Not necessarily in monetary terms: knowledge, development opportunities, etc.

new unnecessary burdens to be called into question and for alternatives to be developed to satisfy the desired goals. Any preliminary review of proposed programs should ideally include several steps, as proposed by Harrington (1996):

- Review and meet with all stakeholders to understand their interests
- Evaluate the intended public policy based on its ability to meet the conflicting interests of all stakeholders
- Ethical analysis

These ethical dilemmas become even more relevant when one thinks about the implications of globalization. Transnational executive networks, initiatives across nations and similar trends call for a global public policy, as noted by Stone (2001). This author refers to the new global policy arena as the "global agora[24]". According to her perspective, the focus of public policy needs to shift from a purely nation-state point of view towards a transnational dimension. Complex multilateralism needs to be included within the classic formula of public policy-making:

1. Problem definition and agenda-setting
2. Formal decision making
3. Policy implementation
4. Monitoring and evaluation

The global picture cannot be explained better than by Stone herself:

> "The global agora is a public space, although it is one where authority is diffuse, decision-making is dispersed and semi-privatized, and sovereignty is muddled by recognition of joint responsibility and collective action. Transnational networks—whether they go by the label "partnership," "alliance," "facility," or "forum"—are one mechanism of global public policy. For the scholar, these developments presage the need to overcome the methodological nationalism and agoraphobia of mainstream public policy scholarship to examine global policy processes and new managerial modes of transnational public administration."

Finally, and before moving on to policy-making, its tools and limitations, the concept of welfare variables as being a random walk needs to be mentioned. Some authors (Hayes et al., 1990) argue that in some cases welfare is a completely random variable and thus public

[24]From the Greek term describing a place of assembly.

policy can be completely discontinued. Other researchers (Abereniye, 2001), however, state that even if welfare was a random walk, rather than an individual series, one needs to look at the welfare variable within the policy environment under application. In other words, policies can be effective based on the environment rather than the individuals affected. Such studies suggest a quite fascinating discussion on the role, especially in terms of size and involvement, that the public sector needs to have in modern economies.

2.3.3 Policy-making: design as a first step. The formulation process.

The design of a public policy includes a set of decisions that can be framed into a process. Each policy elaboration process presents its own set of actors, strategies and interactions that combine to produce a continuum of steps that are traditionally separated into five groups within a linear perspective:

- Formulation
- Implementation
- Evaluation
- Redefinition
- Reformulation and termination

The first part, formulation, takes place within a public sector that is nothing but a mirror of the society in which it operates, and its various actors. Any given society perceives an objective problem that needs to be addressed. However, a very specific vision of such a problem is then formulated, giving birth to an expected solution which becomes the ultimate goal of the public policy. In the words of Subirats (1994), it is the analyst who "with the starting point of a problematic situation raised, defines, classifies, explains and evaluates the problem". Problems that demand public sector intervention require analysts to focus on them as an objective, and need a decision to be made along the lines that they exist and need to be solved. In this regard, the formulation step seeks to define the problem and its boundaries. The required actions are then established: the problem is incorporated into the policy agenda.

In order to reach this status, a given issue needs to be perceived as a public problem. Such a condition may be indicated by a number of commonly occurring differentiating characteristics: public notoriety, global relevance, social values, presence of social actors, potential bigger issues in the future, etc. However, the mere presence of such attributes does not guarantee that public priority is focused on a given topic. Various stakeholders with

sufficient organization and representatives may be key when it comes to drawing an issue into the public agenda; often, persistent and unattended malfunctions are not addressed until the necessary set of circumstances is precisely aligned. Whether the most necessary or relevant public problems reach the policy agenda is a subject under continuous discussion. The problems that surmount the gap between the generic public agenda into the problems that are actually addressed is often a matter decided by the values defended by governing politicians. It is usual to distinguish between the generic agenda, the systemic agenda and institutional agenda. The generic agenda includes all topics of social value, whereas the systemic agenda focuses on those topics that most strongly affect the values of the community. Finally, the institutional agenda is narrowed down to the issues that will be the subject of a given public action driven by the governing politicians.

A final point needs to be made with regard to the context in which the agenda is decided: as international governing bodies are attaining more relevance, local decisions have to be adjusted to the new circumstances. The new international context has two main impacts: scope limitation and enforced requirements. The usually unlimited capacity to act enjoyed by sovereign territories is reduced if the territory is integrated into a broader set of players: monetary policy within the European Union is a good example of such a limitation. As for the enforced requirements scenario, a given government does not face a limitation, but rather a requirement of what it is expected to favor and regulate. The move towards a unified banking system within the EU is a a good example of mandatory policies that limit national abilities to regulate within a relevant area.

Once the problem has been defined, the next step is to foresee changes in the relevant elements that will have a future impact on the topic from various perspectives: social, political, economic, technological, etc. Next, the objectives to be achieved by public sector action have to be determined, including the desired and available resources aligned with the time-frame required to achieved these goals. These objectives will naturally lead to a set of alternatives, from which the one that is expected to be the most efficient is then chosen. This alternative must then be transformed into a specific action plan. In the process of analyzing the options, a very broad set of restrictive elements need to be taken into account, including (Subirats, 1994):

- Legal limitations: the normative environment in which the action will take place
- Political limitations: resulting from the way in which the implementation of political power is arranged, led by inertia or victim of endemic incremental forces
- Budget limitations: a usual topic, currently has increased relevance due to reinforced financial stability in the EU
- Technological limitations: coming from the state of the art; the ability to gain access to new innovations and to embed these in public organizations.

- Organizational limitations: human resource allocation, administrative organization and the empowerment to manage
- Public expenditure redistribution and ability to seek financing
- Time-related limitations: including duration of electoral terms
- Feedback from political externalities: the effect that a given policy creates on the environment and bounces back to itself

On top of the complexity presented by policy formulation, the participation of various actors of different levels of relevance is an additional factor that needs to be considered. The *policy community*[25] is added to traditional actors: the executive, legislative and judicial powers. Such actors play an increasing role and can even modify the initial orientation of a program. In addition to this, external financing capabilities, support from citizens[26] and "information management" by bureaucrats add up to produce a complex equation to determine policy design as a first step.

2.4 Policy implementation

The best-defined strategy or policy is worth nothing if the right people and structure are not in place to make it happen. The best-built ship is useless if the captain and officers know nothing about good navigation habits and technique. The principles of management, including procedures and accountability, are thus vital for good policy implementation. Good design and enforcement separates good management from entropy. A classic debate around this topic is that of legality versus efficacy. Such a debate is off-topic for the purpose of the present research, but a few notes should be detailed for the curious reader.

Citizens expect the public administration to manage health and education well, and to keep violence and crime to a minimum, at a reasonable cost and with maximum efficiency. Meanwhile, respect for public laws is also expected, for example with the use of public tendering and compliance with the set of laws and regulations society has come to accept. However, both desires are often in conflict. In the administrative arena, legality is usually the winner: public workers can be punished for not acting according to regulations, while they would hardly, if ever, pay a price for not being efficient. Lack of efficacy is usually blamed on the norms. However, according to Nieto (2012), such a dichotomy is of a cultural nature: some managers live in a culture of efficacy while others are guided mainly by rules and regulations. Managers, by definition, should seek efficacy; meanwhile auditors must

[25] This term includes interest groups, lobbies, non-profit organizations, experts, media, etc.

[26] As measured both in polls and surveys.

make sure this is done with the proper respect of the norms and legality. It is when the equilibrium between the two is broken that major problems arise, because efficacy without control leads to despotism and excess legality ends up in paralysis.

As a consequence, the success of a given policy significantly depends on the level of acceptance by the people being governed and the suitability of the tools that the public bodies utilize to put it into practice. If resources are used to satisfy the demands of a majority of society in a responsible way, the chances are that policy implementation will be carried out in a satisfactory manner. However, society is not a unique body; it is rather formed by a network of agents with sometimes very diverse demands. The higher the number of agents involved in a given implementation, the less likely the results will be optimum. It is recommended that good communication and negotiations are implemented prior to the launching of a new policy. In this regard, three different analytical models are considered to be the most prominent, as presented by Subirats (1994):

- Top-down
- Bottom-up
- Network systems

The **top-down** model represents a rational process in which objectives are clear and coherent, allowing an easy process of measuring success or failure. The resources and the capacity to implement authority are present as well. The ability to communicate across the organization is also a given. Furthermore, there is a clear capacity for control and a set of economic, political and social variables that configure the environment in which the program is to be implemented, along with the determination of the implementers.

This model refers to a situation in which a rational decision is carried out within an ideal administrative setup with no social conflict. Under such circumstances, the work of the implementers will be be carried out to a far higher quality, and the results will similarly be better.

However, as may seem obvious, it is not easy to clearly formulate goals, which are often diverse and contradictory in nature, since they come from different sources and try to address various topics at once. The background for implementation can also be hostile at best. The steps of policy design and implementation are also often difficult to separate. On top of this, the rationale of successful programs is difficult to review; and defining the real key success factors is tricky, including the incorporation of positive outside effects that were initially not foreseen as part of the policy. This approach is therefore being reviewed in modern economies, in search of more successful cases of policy implementation.

The **bottom-up** perspective includes open decision-making processes, allowing the insight and desires of diverse stakeholders to be expressed. The various effects of outside components

and their implications on desired results are intended, by design, to be controlled by this approach. Decision-making and implementation processes are thus combined. Limitations and both leverage and restraining effects on the implementation stage are foreseen in advance. This approach is a clear attempt to overcome the limitations of the top-down approach.

Another trending approach is the **network** approach: various institutional players and political, social and interest groups foster or construct the foundation of any given program or specific action. This approach embraces the complexity of policy implementation, seen as an aggregate of interrelated actors and interests. As a matter of fact, it disregards the classic linear model of policy analysis and acknowledges the fact that there are both horizontal and vertical interdependencies and influences across all aspects of related implications. The usually clear line of separation between the public and the private is no longer so evident.

Although this approach recognizes the need for the involvement of various agents, the fact that each one of them has a different level of resources and capabilities should not be ignored. The asymmetry of power coexists with the mentioned interdependency. The temptation to leave weaker agents out of the network must be ignored, if possible: projects based on broad agreements are usually much more successful over the duration of their lifespan.

A final point must be made to reinforce the singularity of the implementers of public policies. The best-defined goals linked with sufficient resources in an adequate environment still need to be implemented *de facto*. It is at this point that the relevant role played by bureaucrats comes into action. The level of compromise and pro-activeness of a workforce that presents significant particularities is paramount for a program to be successful. The workforce needs to compromise in order to avoid issues related to implementation that could potentially lead to failure. As noted above, bureaucrats often have a very important role to play in the policy formulation process, along with the analysis of various alternatives. It is then that their acceptance and involvement must be gained, often through consensus and respect. It should not be forgotten that politicians come and go, but bureaucrats stay on, term after term.

2.5 Public policy evaluation

As noted by Mettler and Soss (2004), government spending accounts for one-third to one-half of the gross domestic product in Western industrialized nations. Public social programs and tax expenditures constitute, on average, one-fifth of each nation's economy. This is why public policy evaluation is receiving more and more attention from all of the stakeholders involved. The requirement of balancing budget expenditures and public revenues is commonly accepted in Western Europe (although not so well achieved, some might say). From a historical perspective, beginning with a simple and somehow monolithic perspective, evaluation has evolved into broader new points of view. The discipline can be considered to be somehow eclectic and in constant transformation. Evaluation tries to capture a reality in which

many aspects influence the evaluated fact, affecting both the direction and methodology required. Many schools, including positivism, constructivism and critical paradigmism are being developed today.

The most commonly used evaluation method, and probably the simplest, is the empirical one. The policy-maker sets a specific goal and quantifies the aims that are expected to be achieved. Final results are then compared to the set expectations, and conclusions are drawn. A more pluralistic approach is currently emerging. Under this scenario, most relevant social variables are taken into account, and thus the analysis is both richer and more complex. The quantitative versus qualitative approach is already a classic one. Again, as the scope of this research is not focused on the evaluation methodology, no further discussion will be presented on the various approaches.

However, it is important to highlight the fact that the evaluation method does have a bearing on conclusions. Greene (2009) reviewed simpler versus more complex evaluation methods within the UK and concluded that simpler forms of evaluation tend to provide positive support for a given program, whereas more sophisticated evaluations are not so positive. He also warns against lighter forms of evaluation and the claims they make. The basic problem faced in evaluation is in assessing the "additionality" of a program. *Ceteris paribus*, more sophisticated evaluations are more difficult to conduct, cost more, and are more difficult to analyze (Oldsman and Hallberg, 2004). However, in a world where public funds are scarce and there are distinct opportunity costs involved in supporting one cause compared with another, sophisticated evaluations may be deemed necessary. A good compendium of evaluations of SME and entrepreneurship public policies was elaborated by Storey (2008).

Parsons and Greenwood (1997) have reviewed the various styles of professionals involved in the growing concern of policy evaluations. They concluded that it is a reasonably coherent multidisciplinary field. However, self-defined policy analysts often do not use the same language, much less share a common basic understanding of what the field is, in essence. It is not difficult to identify several divergent camps:

- The first group includes people trained in economics, or operations research: for them, policy analysis is a branch of applied microeconomics
- A second group comes from political science, sometimes law, certain subfields of sociology and psychology: they stress the particularities of the policy-making process; main topics usually center on values, fact-value distinctions, and legitimacy. The meaning of rationality will be more present than in the previous group
- A third camp, whose main area of research is centered on management, organization, and implementation

Regardless of the specific focus of the evaluation, the three basic types of policy analysis strategy are (Dunn, 2004):

- Retrospective
- Prospective
- Integrated

All three might be continuously combined in order to achieve better problem-solving. Furthermore, as presented both in the spinning model in Figure 2.2 and the general governance model in Figure 2.3, reviewing public policies is a continuous task aimed at adjusting and improving actions to achieve desired results.

Figure 2.2 – Evaluation spinning model

Source: Vedung, 2000

General procedures include monitoring, forecasting, evaluation and recommendation, with implementation of the following approach[27]:

- Monitoring = Description
  - Take-up of program
  - Recipients' opinions, if possible
  - Recipients' views of the differences made by the program
- Forecasting = Prediction
- Evaluation = Goal completion

[27]The exact approach of any given reviewer can differ slightly from the proposed steps based on the particularities of each case study.

  - Comparison of the performance vs. typical cases
  - Comparison with similar cases
  - Taking account of selection bias
- Recommendation = Prescription

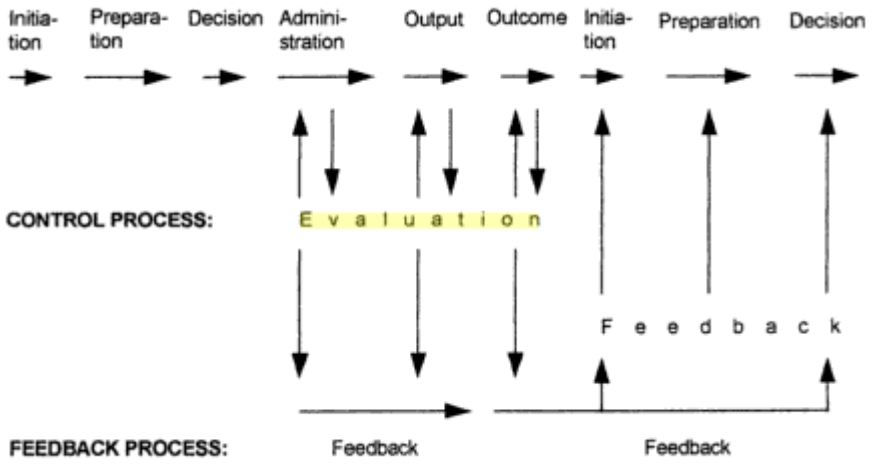
Monitoring represents a first step in which information about the causes and consequences of public policies are gathered. It allows the analyst to detail possible relationships between policy in practice and its outcomes. Its main objective is to establish factual premises about public policy. In order to reach such premises, monitoring starts with the production of specific claims. Various alternative approaches are possible: the main monitoring methods are case studies and research surveys. In cases where quantitative data is available, some analytical tools may also be used: graphic and tabular displays, index numbers, time series analysis, control-series, and regression analysis are some of the possible techniques. Each one of them has different possibilities, strengths, and limitations.

Forecasting may be used to make estimates of various expectations of future states: potential, plausible, and normative ones. Expectations concerning normative futures allow the analyst to limit the range of potential and plausible futures. Depending upon the level of *ex ante* available information and previous experiences, forecasts may take three different forms: projections, predictions, and conjectures. Nevertheless, all of them share similar techniques: previous trend extrapolation, theoretical knowledge, and informed judgment based on previous experiences and know-how. Projections are usually linked to arguments from similar previous experiences, predictions are based more upon analogy, and conjectures find their supporting rationale in previous insights and expectations.

Evaluation, meanwhile, is probably a much broader term: it can refer to assessment, appraisal and rating. Evaluation within public policies should include the production of information regarding the extent to which policy outputs contribute to the achievement of predefined outcomes. The level of performance of a given policy can be measured using evaluation methodology, "performance" meaning the extent to which policy problems have been resolved. Figure 2.4 presents the various approaches to policy evaluation. No matter which model is to be used, the main function of evaluation in policy analysis should be the production of reliable and valid information about policy performance. A valid implementation of evaluation techniques is paramount in order to clarify the choice of goals and objectives for future policies and provide information for problem definition and practical implementation.

If all the previous steps are properly implemented, **recommendation** comes as a natural final step for the analyst. Analysts can elaborate a set of expectations or consequences that are likely to happen if future proposals are launched. The audience for such advice can be individual decision-makers, groups, or society as a whole. However, recommendation is

Figure 2.3 – General governance model



Source: Vedung (2000)

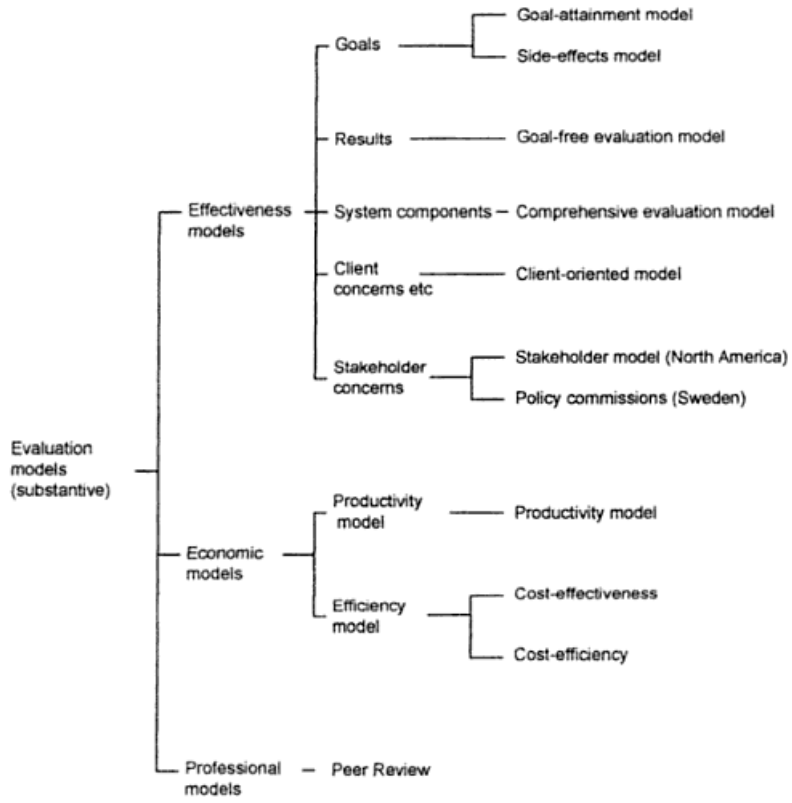
much more than presenting "learned lessons"; it involves transforming information about future policies into the actions they bring about and expected valuable outcomes. Such added value helps evaluate different alternatives prior to any final decision. The analyst who elaborates a set of recommendations must make up his mind about which alternatives are most valuable. Since the criteria each one of us uses for considering what is "best" may be different, the choice of any alternative also includes ethical and moral issues. The outside observer must take these into account when reviewing recommendations.

Vedung (2000) provides clear guidelines as to what he calls a radical rationalism approach to policy evaluation. It is quite clear that evaluation requires clearly defined goals to be attained. In his own words:

1. What ends are the decision-makers trying to reach and what is the problem in need of a solution?
2. What alternative options may contribute toward achieving the end?
3. What are the consequences of the different options and the probabilities of each of these consequences?
4. What are the costs and resource requirements of the various options?
5. How can the options be arranged with respect to costs and consequences, and which merit criteria should be used in the choice of option?

An alternative evaluation approach is the so-called "realistic evaluation" as presented by Pawson and Tilley (1997). Faced with a sharp rise in the number of evaluators coming from

Figure 2.4 – Public policy evaluation models



Source: Vedung, 2000

an "obsession with decision-making", they propose their own methodology. Evaluation is used to justify decisions and thus needs to be addressed properly. "Realistic" refers to how the goal of evaluation is set to avoid "scientific jargon" and present results in an understandable manner for policy-makers, practitioners, program participants and the public. Realistic should also mean free from any kind of bias, as expressed by the cited authors:

> "We know of decision-makers whose daily work involves removing from their life's agenda the uncertainties so typically raised by research. We know well the symptoms of "myopia", "selective vision", and indeed the "blind eye" that afflict many policy-makers when they do actually confront evaluation documents. On the other side of the coin, we know of the endless futile hours given to the extraction of lame and self-serving assessments from practitioners acting as lay evaluators. We know of the problem of evaluators keeping their heads well down and out of danger, producing expensive, safe and technically obscure answers to half-baked questions. We also know of the spasmodic capacity of evaluation to

> generate political power, and have seen the elevation of some researchers turned decision-makers on the basis of skillful promulgation of dubious evaluations of pet programs."

The proposed realistic methodology is based on the following rules:

1. Generative causation: why social programs have the potential to cause change
2. Ontological depth: go beneath the surface of the apparent inputs and outputs of a program
3. Mechanisms evaluators: how behavioral problems are compensated by the mechanisms of the program
4. Context: study of contextual conditioning
5. Outcomes: the "what" and the "how"
6. Context-Mechanism-Outcomes: the complete configuration of what works well, where and how
7. Teacher-learner processes: including all relevant stakeholders
8. Open systems: because programs take place in a changing and permeable social world

Finally, as an overview of current evaluation trends, it is interesting to review the work of Chelimsky and Shadish (1997). According to them, evaluation needs to be included in all steps of any new program decision. Evaluations of past initiatives can help a policy-maker avoid reinventing wheels, and can spare them political embarrassment further down the line by showing early on that the evidence is just not there to warrant the implementation of a given project. The evaluator's role here is to provide the decision-maker with the best available information on past experiences and on strategies for addressing them. Secondly, it is necessary to evaluate timely monitoring and how established programs are progressing. Determining whether the assumptions underlying the policies or programs appear to be correct is also part of the task. Finally, decision-makers use evaluation to establish the results of their initiatives, both in the short term and long term. This final evaluation should be used to improve further actions, but also as a record for the policy-maker herself.

2.6 Public policy in Spain: a brief outline of recent history

2.6.1 Overview

Based on the 1978 Constitution[28], Spain is divided in 17 different "Comunidades Autónomas[29]" (CA's, equivalent of NUTS-2[30]) that hold various degrees of political power in terms of legislation and public policy implementation. For the purposes of our analysis, it is important to remark that public policy actions have five main layers within Spain:

- Nationwide policies, carried out by the Spanish government
- Regional policies, implemented and guided by the Comunidad Autónoma
- Provincial policies, except for those regions that include one single province
- County level actions, led by various public actors.
- Local policies, carried out by the municipalities (including supra-municipal entities)

These layers have their roots in the principles embraced by the 1978 Constitution which demand that public policies be implemented as close as possible to the citizens[31].

Given the fact that each region has its own similar - but not equal - legislation with regard to autonomy, the amount of power and capabilities might differ slightly from one region to another.

An overview of the major socioeconomic data of all of the regions is presented in table 2.6. For reference purposes, a geographical map is also presented in figure 2.5

As previously stated, the current economic climate has put the ongoing debate about the level of public involvement in the economy on the agenda of all European governments and the European Union itself. It is interesting to view a historical picture of which economies have traditionally engaged in more or less state participation. Table 2.2 presents a detailed overview for this purpose in an OECD context (public spending as a percentage of total GDP). Regarding the Spanish public sector, some clear observations can be made without digging too deep into the figures:

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[28] Available in various languages at: `http://www.congreso.es/consti/constitucion/indice/index.htm`

[29] Because of their peculiarities Ceuta and Melilla are considered with the special status of "autonomous cities".

[30] `http://epp.eurostat.ec.europa.eu/portal/page/portal/nuts_nomenclature/introduction`

[31] A concept embraced by such respected organizations as the Council of Europe, of which Spain has been a member since November 1977.

Table 2.6 – Socioeconomic overview of Spanish CA's

Region	Population	Density (people/km^2)	GDP per capita (€)
Andalusia	8,371,268	95.14	18,507
Catalonia	7,519,838	232.78	28,095
Madrid	6,421,878	795.58	31,110
Valencian Community	5,009,930	219.08	21,468
Galicia	2,772,927	94.55	20,619
Castile and León	2,540,251	27.21	23,361
Basque Country	2,185,405	300.27	32,133
Castile-La Mancha	2,106,349	26.19	18,471
Canary Islands	2,082,655	282.53	21,105
Murcia	1,462,125	127.86	19,692
Aragon	1,344,502	28.20	26,323
Extremadura	1,104,521	26.48	16,820
Balearic Islands	1,100,503	219.44	25,967
Asturias	1,075,179	102.35	22,559
Navarre	640,125	60.69	30,614
Cantabria	592,543	110.74	24,508
La Rioja	321,171	63.77	25,895

Source: Instituto Nacional de Estadística (INE, 2008-2011)

Figure 2.5 – Map of the Spanish regions (CA's)

- With an average of 40.8% over the period, Spain is closer to the U.S. (36.75%) than to the EU average (48.1%).
- The range (38-46%) in which the country has moved over the years in question seems to suggest that despite various political leaderships, the state model appears to be clear, constant and unquestioned as a whole[32].
- Spain is very close to the overall average of the OECD economies: 40.8% as opposed to 42.7%. In other words, despite all the networks of public administration bodies, the Spanish public sector is not overly present in the economy [33].

There are two main drivers behind the weight of the Spanish public sector in the economy. The first is the will expressed by the wording of the current Constitution, that the country needed to have a hand present in the economy, as declared in Section 31 [34]:

> "(...) 2. Public expenditure shall make an equitable allocation of public resources, and its programming and execution shall comply with criteria of efficiency and economy. (...)"

Starting in the late 1970's and consolidated in the 1980's, Spanish democracy went through a period of some 25 years of enormous change both in politics and policies. Among all the changes analyzed in depth by Gomà and Subirats (1998), one of the major challenges at the time was the modernization of the public administration: the country moved from a reactive policy style into an anticipatory role, while a high degree of decentralization took place as regards the so-called "state of the autonomous regions".

Secondly, entry into the EU in 1986 had the effect of both injecting a significant amount of development funds into the country and consolidating an emerging public sector with similar goals to those of the surrounding economies.

As a consequence of the above, Spain closed the public expenditure gap with other members of the EU. While at the beginning of the 1970's, Spain presented a ratio of 22% of public expenditure, the figure was doubled within some 20 years to levels close to 50% (OECD data). Table 2.7 sets out details of the different areas that were affected by this dramatic increase in the government's role in the economy, along with the three main global areas in which public policy developed:

- Economy, with the clear goals of modernization and becoming more competitive, closing the gap created during years of protectionism

[32]Some other countries present a clear trend towards a change in the state model which can be detected by a change in trend maintained over the years.

[33]To a certain extent, public expenditure is also a function of public revenues. The political difficulties involved in increasing total tax revenue are obvious

[34]Spanish Constitution 1978.

Table 2.7 – Spanish public economy actions overview (1982-1996)

Period	Economy	Welfare	Multinationality
1977-1982	One-off anti-crisis actions	Social rights in Constitution	New regional model
	Wage control (framework)	Increase in social protection	Decreased homogenization in autonomous regions
	Fiscal reforms	Conflicts in the public health model & education system	
1983-1986	Centralization crisis	Public expenditure containment	Changes to the basic legal framework (LOAPA*)
	Monetary policy	Pension reforms (conflict)	Conflicts over autonomy in policy regulation
	Public industry reorganization	Design of health and education system reforms	Centralized fiscal model for regions
1987-1992	Public policies aligned with European model	Social policy conflicts	Public expenditure decentralization
	Monetary orthodoxy	Healthcare rights standardized	Implementation of language school models
	Liberal labor regulations	Increase in social expenditure (unemployment benefits)	
1993-1996	Public deficit reduction	Reforms in the management of the social system	Regional autonomy agreements
	Public sector privatization	Pension Toledo Agreements	15% of income tax allocated to regions
	Labor deregulation	Decrease in unemployment rights (conflict)	

* Public Administration Organization Basic Law

Source: Gomà and Subirats (1998)

- Welfare, in response to the loud demands of the population
- Multi-nationality: it was considered that a centralized model was not appropriate in order to ease tensions with regions demanding independence

Subirats and Goma (1997) defined two main periods of policy implementation for the nascent democracy:

- 1977-1982, when policies were reactive and achieved by political consensus[35].
- 1982-1996, when policies also started to be proactive, while consensus was broken and conflicts arose with regard to policy strategy.

The political cost of some less popular measures was clear at the time. It is interesting to note, however, that according to McDonough et al. (1986), the high level of expectation regarding economic policy conditioned the vote in general elections more than other topics such as religion, which had had such a strong degree of relevance in recent history.

Meanwhile, a few administrative reforms took place during the period, in an effort to modernize the public machine (Nieto, 2012). Democratic Spain inherited a very broad reform of its public structure as promoted by Laureano López Rodó under the Franco regime back in the 1950's (Montes, 2000). The central idea behind its accomplishments was based on three concepts that are still of relevance today: efficacy, celerity and rationality. A new education center was created to update and train elite public workers: "Centro de Formación y Perfeccionamiento de Funcionarios", which would later become the National Institute of Public Administration[36]. The central idea behind these reforms was to bring tools from private economic management into the administration. The current concept of levels of public administration workers was introduced, together with salary regulations (based on levels of education, expertise, location, etc.). Furthermore, a new Administrative Procedures Law was passed under the dictatorship. Once democracy was established, the topic somehow fell off the agenda, since there was a number of other topics to deal with once people had recovered the right to choose their political leaders. Several attempts were made, based on the advice and experience of US-based consulting firms (Nieto, 2012), but to no avail. Based on previous failed projects and the model implemented in the United Kingdom by Sir Derek Rayner at the time, a new plan to modernize the State Administration was unveiled in 1992. It included a new law (30/1992) for all administrative procedures. Yet, in practical terms, very few results were achieved and the administration continued to exist based on the fundamentals designed 40 years earlier.

[35]The country was slowly leaving the Franco years behind; all political parties were prone to consensus in order to avoid regression.

[36]INAP: `http://www.inap.es`

The last broad effort to try and adapt the public workforce to current needs was the 2007 Basic Statute of the Public Employee[37]. The goals and tools that are presented in this text seem to point in the right direction, yet it continues to be ignored at many levels and organizations. There are two main reasons for this flagrant rejection: a lack of capabilities within organizations and a tremendous gap between where the system is and where it wants to be (Nieto, 2012). A good example of the former is the requirement to introduce an annual performance review for all public workers. Such a requirement cannot be achieved without a huge training effort and culture change (equity issues, fear of punishment, etc.). As for the latter, a perfect illustration is provided by the new one-off salary bonus opportunities for the completion of goals and special projects. Yet such an opportunity is viewed as a way to increase the wages of those who are loyal and amenable to politicians' demands.

2.6.2 The role of the EU in the move towards policy evaluation

The European Union requires mandatory monitoring of all operational programs allocated to its different members[38]:

> The Member State shall set up a monitoring committee for each operational programme (...) The monitoring committee shall satisfy itself as to the effectiveness and quality of the implementation of the operational programme, (...) it shall periodically review progress made towards achieving the specific targets of the operational programme; (...) it shall examine the results of implementation, particularly the achievement of the targets set for each priority axis and the evaluations; it shall consider and approve the annual and final reports on implementation; (...) it may propose to the managing authority any revision or examination of the operational program likely to make possible the attainment of the Funds' objectives (...) or to improve its management, including its financial management (...)

Although such requirements would suggest that entry into the union would instigate a change of mindset in this area, this is far from being the case. According to Furubo et al. (2002), Spain did not embrace the evaluation culture until the 1990's. One of the first systematic analyses of the evaluation of public policies in Spain was presented by Grau (2002) who attempted to draw on policies being implemented at the time with theoretical analysis techniques. As compiled by Viñas (2009), there were various reasons for this late entry into the group of "evaluators":

[37] Estatuto Básico del Empleado Público, Law 7/2007.

[38] Articles 63 and 65 of Council Regulation (EC) No 1083/2006 of 11 July 2006, laying down general provisions on the European Regional Development Fund, the European Social Fund and the Cohesion Fund and repealing Regulation (EC) No. 1260/1999 (European Commission, 2006)

- Scant investment in expenditure in public welfare programs during the 1970's
- A weak tradition of applied social research; social research into public action began at the end of the 1980's
- An administrative elite trained mainly in administrative law, thus less concerned with results
- A lack of incentives to encourage the evaluation of programs
- A parliamentary system based on strong party discipline; limited controlling function
- The National Audit Office and similar bodies limiting their role to controlling public finances

Despite all of the above, Spain did not have a public entity for evaluation and quality until December 2006[39]. There have been other initiatives from the educational arena, such as the Sociedad para la Evaluación[40], which seems to suggest that the path and trend are now taking root more firmly.

2.7 Free and Libre Open-Source Software - an overview

2.7.1 Introduction

Presenting an overview of FLOSS is a complex topic. Briefing over three decades of free software is out of the scope of this document. Instead, the purpose of this part of the research is to provide the background as to what FLOSS is and why it might be relevant for policy-makers. Those who are very familiar with the topic may find some of the information presented here to be very basic. Yet, for those with little or no previous knowledge of the field, it provides some of the basic pillars on the beginnings of free software, its development and more recent growth, from various perspectives. This is not a review of the technology behind certain software solutions. It is much more about the philosophy that was at its origins and the various forks it has witnessed throughout the years.

To date, there has been not any single piece of work that can be considered as the complete history of free software. Somehow, the researcher has elaborated his own story, drawing from multiple sources. The point of view adopted has a dual nature:

- Enforcing the aspects of free software that can be considered relevant from a public policy perspective

[39] AEVAL (Agencia de Evaluación y Calidad) was created based on legislation (Parlament 28/2006) that aimed to improve public services. For more information, see http://www.aeval.es/es/la_agencia/presentacion.

[40] http://www.sociedadevaluacion.org/

- Highlighting the implications that the free software culture has spread into other aspects of culture and knowledge

From this perspective, this brief review includes the evolution of free software from its birth up to modern times. Recent developments and trends (mobile computing, cloud infrastructures, etc.) will not be covered in depth, the intention being to concentrate this review on the core of free software, what it is and what it stands for.

2.7.2 The origins of free software

The software industry is a fairly recent one. Despite its significant impact on today's economy, the software industry, separated from hardware, started up in the late 1970's. Since the beginning of the computer business in the early 1960's, revenues had been generated mostly from selling and supporting hardware. The software included was developed ad hoc for each machine and was the equivalent of what is known today as embedded software[41]. The users of such hardware were ICT[42] experts who had the knowledge to create additional coding on their own if required. IBM was the predominant producer of computers for business purposes. The company decided to separate hardware from software following antitrust inquiries by the U.S. Department of Justice, even though the case was dropped 13 years later (Usselman, 2009). This decision has been considered a "pivotal event in the growth of the business software products market" (Grad, 2002) and has been referred to as "IBM unbundling" ever since.

During this time, various efforts were made, aimed at creating a base operating system that could host multiple users and standard pieces of software. In the 1960's, the Massachusetts Institute of Technology, AT&T Bell Labs, and General Electric worked on an experimental operating system called Multics that would eventually evolve into the Unix operating system. Published in 1968, AT&T made Unix available to end users, mainly universities and commercial firms, as well as the United States government, under licenses. The licenses included all details of the source code including the machine-dependent parts of the kernel. The kernel is the part of an OS that, among other tasks, controls the communication between hardware and software. Copies of the annotated Unix kernel sources circulated widely in the late 1970's (Bashe et al., 1986). Sharing the source code was commonplace among the developers of the new technologies based on Unix (mainly universities and computer company research laboratories). This practice was leveraged by the emergence of computer networks like Usenet, which was created in 1979 by two graduate students at Duke University.

[41]The software code is built into the machine and the hardware and software together create an interdependent unit

[42]ICT stands for Information and Communication Technologies

Such networks would be the first to facilitate shared work in a project without the need to be physically located within the same computer facility.

In these code-sharing days, commercial users had to pay license fees in order to use Unix. Purchasing the software was the first step to be able to adapt it to one's needs. Furthermore, in the early 1980's, AT&T made a significant change in its licensing policy and Unix became restricted to those who paid for the license. Following this first step in the direction of closed source, the main hardware companies at the time, IBM, HP and DEC, started to develop proprietary Unix operating systems in order to prevent software from being used on their competitors' computers. Creating and maintaining a sustainable competitive advantage was the goal of the change in strategy. They imposed "non-disclosure agreements" on the programmers working on the software and recruited many developers for commercial software development who had previously contributed to cooperative and shared software development.

This was the beginning of proprietary software as we know it today. However, the new "non-disclosure agreements" made the previously software-sharing ICT experts who called themselves "hackers"[43] quite uncomfortable. One of them, Richard Stallman,[44] quit his job at the Massachusetts Institute of Technology with the intention of creating a new free Unix operating system that could still be shared openly (Stallman, 2002). However, the MIT allowed him to continue to use its resources.

Thus, the early 1980's saw the beginning of proprietary software as well as what Richard Stallman called "free software". Stallman created the famous emacs text editor[45] as "free software" and distributed copies by regular mail for $150 per magnetic tape. Free usage, but not free of charge. The reason for this was explained by the famous slogan: "free as in free speech, not as in free beer" which determines the "four freedoms" as stated by Richard Stallman and the Freedom Software Foundation[46] (Stallman, 2002) :

- Freedom 0: the freedom to run the program, for any purpose
- Freedom 1: the freedom to study how the program works, and adapt it to

[43]The term "hacker" is defined by the Webopedia as: A slang term for a computer enthusiast, i.e. a person who enjoys learning programming languages and computer systems and can often be considered to be an expert on the subject(s). Among professional programmers, depending on how it is used, the term can be either complimentary or derogatory, although it has developed an increasingly derogatory connotation. The pejorative sense of hacker is becoming more prominent largely because the popular press has adopted the term to refer to individuals who gain unauthorized access to computer systems for the purpose of stealing and corrupting data. Hackers, themselves, maintain that the proper term for such individuals is "cracker".

[44]Richard Stallman, President and founder of the Free Software Foundation, is considered to be one of the pioneers of free software. A very passionate advocate of free software, he dedicates himself to promoting its use and battling against all sorts of proprietary technology.

[45]http://www.gnu.org/s/emacs/

[46]As previously indicated, the Free Software Foundation was founded by Richard Stallman himself in 1985 with the main goal of promoting free software. For more information, see `http://www.fsf.org`

your needs. (Access to the source code[47] is a precondition for this)

- Freedom 2: the freedom to redistribute copies so you can help your neighbor
- Freedom 3: the freedom to improve the program, and release your improvements to the public, so that the whole community benefits. (Access to the source code is a precondition for this)

Any person not well read in this area might consider these requirements to be of little relevance, despite the fact that they could be affecting her life greatly. Software is increasingly present in everyday life. For example, the Software Freedom Center, a not-for-profit organization that supports legal matters in defense of FLOSS, released an article (Sandler et al., 2010) in which the dangers of living with a proprietary software medical device were presented.

In order to guarantee that these freedoms would be maintained with his software, Stallman established a special license, the GNU (named after Gnu's Not Unix) General Public License, widely known as GPL. Although it is not the only one, GPL is widely used by free software developers in its various versions[48]. In the GPL, the principle of "Copyleft" is applied. This means that every copy of a program released with GPL, even if modified, must continue to maintain the very same GPL. The licensing principles of the GPL, especially the fact that all derivatives must maintain the very same licensing terms, are not suited for use in traditional commercial software development because they make license fee-based revenue models impossible.

Although widely used, the GPL has been strongly criticized because of the impossibility of building any commercial or proprietary software on top of any software licensed with it[49]. Based on a strong desire to keep the software free, the freedom to change its licensing has been removed from the terms proposed by the current GPL license. The list of FLOSS licenses is quite long and ever-changing (von Hippel, 2005), but it must be stated that GPL style licenses are considered to be robust. In contrast, other licenses created around the BSD (Berkley Software Distribution) license are more permissive in terms of what developers can do with derivatives. It is also possible to find several different license terms within a given environment or device, as in the case of Android phones, where GPL is present on the Linux kernel and Apache licenses are present for most of the rest of the included software.

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[47] Programmers write source code using computer languages (e.g. Java, Python and PHP). Most commercial software vendors only provide users with the binary code that is to be installed on the computer. This is the sequence of 0's and 1's that directly communicates with the computer, but which is very difficult for programmers to interpret or modify. In the rare events when the source code is made available to firms by commercial developers, it is typically licensed under very restrictive conditions as regards what can and cannot be done with such code.

[48] http://www.gnu.org/licenses/old-licenses/old-licenses.html#GPL

[49] For more information on licensing, see `http://www.gnu.org/licenses/license-list.en.html` and `http://opensource.org/licenses`.

The topic of licenses, although critical to the survival and dissemination of FLOSS, is not clearly understood by many ICT users. The tendency to identify FLOSS with royalty-free software is intensified by standard marketing strategies to offer software free of charge to the end user with the aim of obtaining alternative revenue streams. This phenomenon is widely documented by Anderson (2009). Furthermore, Jiang and Sarkar (2009) review the different approaches to these techniques with several recommendations to be pursued under different scenarios.

Moreover, in order to confuse the novice IT user yet further, software created within the explained philosophy is subject to a tricky nomenclature including terms such as "free software", "open-source software", "FLOSS", etc. The most recent trend in the academic world is to use the term FOSS (Free and Open-Source Software) or FLOSS (Free/Libre Open-Source Software) (González-Barahona, 2004). As stated above, this pragmatic approach will be used henceforth when referring to software that is released with its source code available and under any of the various licenses that grants the four freedoms already mentioned.

The development of free software took a significant step forward in the early 1990's, thanks to the increasing use of the Internet and the success of the World Wide Web, which helped many new emerging open-source projects. The most relevant example is Linux. Linux is a Unix-like operating system designed to run on personal computers. The Linux kernel was initially developed by the Finnish computer science student Linus Torvalds who based his development on GNU software tools. When he released the code of an experimental version under the GPL to a newsgroup in 1991, he asked for comments and improvements and was rewarded with immediate and unexpected success. Over the decade that followed, Linux developed into a powerful operating system.

Although this OS is commonly called Linux, Stallman (2002) claims that it should be called GNU/Linux, as the GNU project that he leads contributed to the OS with all the key elements except the kernel. Although many people tend to identify free software with Linux, Linux is just the tip of the iceberg in the free software world, which includes Free-BSD[50], considered to be the first truly open OS.

The GNU/Linux debate is not the only discussion on terminology, as the term "free software" goes hand in hand with a full philosophy as to the creation and distribution of software, as defended with dedication by Stallman (Williams, 2002) to the point that many people accuse free software of being a religion of its own.

As part of a more pragmatic approach to software licensing, the Open Source Initiative (OSI) was founded in 1997. The OSI was based on the "Debian Free Software Guidelines" which had been published in 1995. Eric Raymond and Bruce Perens were the leaders at the center of this new trend. Their main goal was to promote Open-Source Software for

[50] Developed at the University of California at Berkley. See `http://www.freebsd.org/` for more information.

commercial use based on their beliefs that both the Free/Open-Source community and the business world could benefit from broader dissemination of such coding products.

Eric Raymond is the author of the famous essay "The Cathedral and the Bazaar" (Raymond, 2005) in which he describes the coordination of open-source software development as "Bazaar style," opposed to the "Cathedral" approach taken in standard software development, where development is organized in a more hierarchical, top-down and planned way. Usually, open-source software has a modular structure, meaning that developers can focus on one part of the program; often, interested partners will select parts of the program that they need to improve for their own benefit and incorporate it into the main fork of the suite. The principle of "Release often, release early" in combination with a constant peer-review process ("Given a thousand eyes all bugs are shallow") are further points in which it differs from commercial software development. The "Given a thousand eyes all bugs are shallow" motto has been quite controversial and some security issues[51] have proven that this is not always the case. Opponents of free software claim that having access to the source code is of no relevance whatsoever to the average user, who is simply looking for a hassle-free computer solution.

The terms "Free Software" and "Open Source Software" both basically refer to the same software. As the Open Source Initiative itself declares on its website:

> "Free software" and "open source software" are two terms for the same thing: software released under licenses that guarantee a certain, specific set of freedoms. (...) The FSF uses a shorter, four-point definition of software freedom when evaluating licenses, while the OSI uses a longer, ten-point definition. The two definitions lead to the same result in practice, but use superficially different language to get there.

2.7.3 The impact of FLOSS on society today

Research into the FLOSS phenomenon has traditionally been centered around three main areas (see Figure 2.6):

- Technology: mainly project management and software development practices
- Sociology: social adoption of FLOSS and motivations for code development initiatives
- Business: including the economics of FLOSS, legal aspects, business models, etc.

[51] See `http://lists.debian.org/debian-security-announce/2008/msg00152.html` for a significant recent security issue that was detected months after its release.

Figure 2.6 – FLOSS research fields

Source: Helander et al. (2007)

Due to its commitment to the sharing principle, the idea of combining FLOSS and economics might sound like mixing oil and water, on initial consideration, but there are some facts behind this industry that merit deeper analysis:

- The total international market volume of FLOSS in 2006 was estimated at $1.8 billion[52] Some authors even go as far as estimating the "Linux ecosystem" to be a $30 billion industry (Anderson, 2009)
- Meanwhile, revenues of the U.S. packaged software industry taken alone reached $131 billion in 2006[53], which helps give an idea of the comparative sizes of FLOSS vs. proprietary software in monetary terms
- The demand for a more FLOSS-oriented public administration is gaining momentum (Gonzalez-Barahona, 2002)
- FLOSS OS and end user software packages are now achieving user-friendly standards not previously seen (Chang, 2006)

Where does the money come from? Based on the main source of their revenues, FLOSS projects can, if anything, be classified into four main categories:

- Hobbyists or standalone individuals who make their personal projects available to everyone else. The "if you like this software, please make a donation" concept is very often present in this group.
- Foundations or non-for-profit organizations, Apache[54] being one of the most successful projects in this category. One should probably include public software releases within this category.

[52]IDC Worldwide IT Spending Guide (2006-10)

[53]U.S. Census, 2007.

[54]`http://www.apache.org`

- Educational institutions, the early stages of the already mentioned BSD being a typical project in this category.
- Commercial firms, whose goal is to make FLOSS part of their revenue sources. Red Hat[55] leads this group.

Needless to say, many projects combine more than one of the above categories as they evolve or simply as a consequence of their nature. Figure 2.7 represents the evolution of the FLOSS market. Along with the Internet and technology boom in the late 1990's, significant investments were made in business models based on FLOSS. Firms such as Red Hat and VA Linux were able to achieve high market capitalizations, as part of a free software market value boom[56]. As of today, most of those companies are gone, struggling or have completely changed their business models. The high expectations developed in the late 1990's ended with a rapid and heavy fall, followed by a slow but constant recovery. The main factor inhibiting a stronger development of FLOSS is usually considered to be the applications portfolio (i.e., lack of first class applications). Although very strong in terms of server related applications[57], FLOSS has historically lacked the user-friendly applications needed to reach mass market audiences. However, the whole software business has traditionally been centered around the program itself. The best OS is worth nothing if no application is developed for it. No business can be created around a superior framework if it has no final product. Two examples of this fact are provided by the VCR and HD video sales wars and the video-console market.

Recent years have seen enormous levels of innovation and development in the ICT world, and FLOSS has clearly been at the heart of the changes. Mobile computing, for instance, has seen a significant and sustained increase. Android, an open-source mobile phone OS, has maintained a market share in excess of 70% in recent years. The ubiquitous presence of smartphones and tablets in modern societies is very much related to the movement by Google to create an open-source OS for mobiles and make it available at no cost to hardware companies[58]. When Android was launched, it spelled the end for some previous proprietary platforms such as Symbian, owned by Nokia, yet iOS, the Apple platform for mobile devices, has maintained a significant market share. When Symbian started to suffer the "Android effect", hurting the hardware revenues of Nokia, the corporation made an attempt to make the platform open-source. It was too late: developers had turned their backs and users were

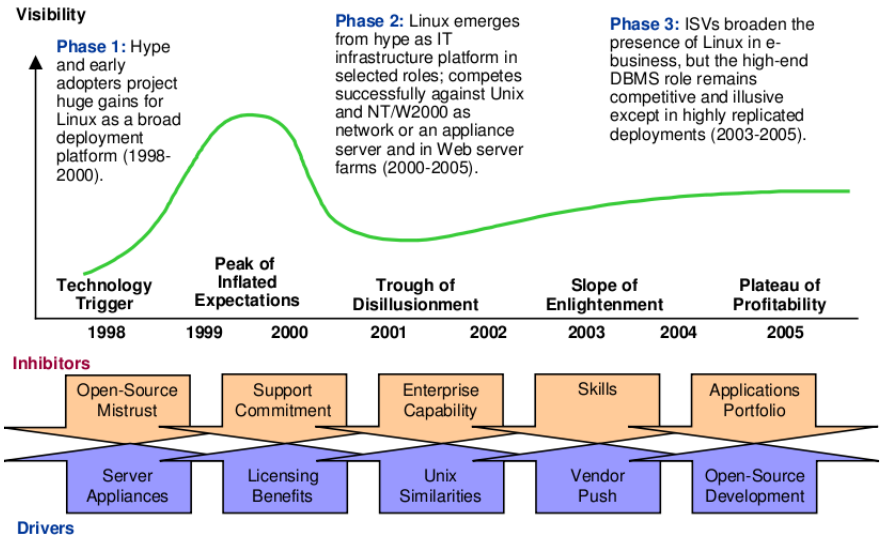
[55] `http://www.redhat.com`

[56] This boom made millionaires of the pioneering Linux developers.

[57] With over 106 million sites as of April 2009, Apache has dominated the web server market since early 1996, with a share ranging from 40-60%.

[58] Google has received strong criticism for its control of the platform. The open nature of the software has allowed programmers unhappy with policies adopted by Google to create a derivative "clean" version of Android that goes by the name of CyanogenMod. See: `www.cyanogenmod.org`

Figure 2.7 – FLOSS market evolution



Source:Weiss (2001)

no longer interested in the old technology. Symbian was completely abandoned by Nokia in 2012.

Another area of major development is that of infrastructures. Cloud computing, new web services and significant data traffic increases have led big corporations to invest heavily in data centers around the globe. Such gigantic infrastructures have, to a large extent, embraced open-source solutions. Costs and security are the key elements when it comes to ICT infrastructures, and FLOSS is very well positioned in both respects.

On a completely different level, the so-called "Internet of things" is a natural evolution of the ability to embed more and more technology in devices. Here again, the flexibility and adaptability provided by free software has made it possible to gain a significant market share. On top of the mentioned advantages, the fact that developers can usually get the base framework for their projects at no cost is also a competitive advantage.

A final mention needs to be made of the recent developments of internal business communities. Within an increasingly competitive marketplace, firms are realizing that their workforces represent their best tool when it comes to adapting to change. It comes as no surprise that internal communication is being reinforced in order to share knowledge and experiences in an effort to increase value. FLOSS provides a complete set of tools that any firm can simply download, customize and use. Although market share is extremely hard to measure for such initiatives, it is clear that the phenomenon of internal business communities is directly linked to the availability of FLOSS tools, with which most business users are already familiar, as they have been at the core of the so-called web 2.0 for years.

The future of FLOSS is intrinsically linked and rooted to the development of its applications portfolio, a field in which it has not enjoyed a great deal of success in the past, despite good volumes of activity. However, some authors (Deek and McHugh, 2007) go even further and assert that from their point of view, FLOSS solutions will eventually come to dominate all standard software solutions (operating system, office package, etc.) while proprietary software will be a niche market targeted at very specific needs. Current success stories, such as the Android mobile OS described above, seem to suggest that this opinion may indeed be borne out, because this software stack for smartphones is indeed based on a Linux kernel[59].

With such an intense level of activity and its unusual perspective as regards business, it is quite clear that the particularities of the FLOSS phenomenon have provided plenty of opportunities for research in many fields. Group dynamics, gift theories, knowledge sharing and software development are just a few. However, this brief review of the impact of FLOSS on technology and innovation would not be complete without a mention of the recent studies by Leach and Krieger (2006) which revealed an astonishingly low figure of female participation in FLOSS development. Compared to an average of 28% of women in proprietary software communities, the figure drops to 1.5% within the FLOSS environment. Although this fact will not be further analyzed in this research, it does need to be mentioned, for its social relevance.

Although it could be assumed that the software field described thus far stays within the boundaries of the software industry and is of no particular relevance to society as a whole, the reality is that open software ideals have "contaminated" many areas of public and private life that affect us all. A whole "open" movement has emerged in two fields that represent both the public and private domains:

- The increasing social demand for a more transparent public administration, in which both decisions and executions should be easily accessible to citizens. Just like open code, open administration means that public powers are entitled to disclose their operations to all stakeholders. Open Data and Open Government are the two main areas in which this trend is materializing.

- Coming from the private sector, the benefits of shared development often seen in open software have emerged into significant efforts to foster open innovation. According to this pattern, private actors seek to gain strength and complement their know-how by disclosing their innovation efforts outside the organization in various manners.

Both phenomena are documented in the next two subsections.

[59]Despite the fact that the buyer of the phone cannot have superuser rights over the phone without hacking it, the core of the phone is based on FLOSS.

2.7.3.1 Impact of free software on social awareness and public affairs

The similarities between open-source ideas and the concepts behind demands for more transparent accountability within society are quite clear. Furthermore, the sharing of culture needs to be protected rather than persecuted. Movements such as the Creative Commons copyleft[60] have emerged, somehow aligned with the growth of the free software movement. In his essay "Open Code and Open Societies", Lessig (1998) quotes Thomas Jefferson in what represents the essence of claims for sharing knowledge and ideas. A text that was written back in 1813 best represents the philosophy and ideals behind the strong social movements that claim sharing to be a right of citizens and an obligation of governments:

> "If nature has made any one thing less susceptible than all others of exclusive property, it is the action of the thinking power called an idea, which an individual may exclusively possess as long as he keeps it to himself; but the moment it is divulged, it forces itself into the possession of everyone, and the receiver cannot dispossess himself of it. Its peculiar character, too, is that no one possesses the less, because every other possess the whole of it. He who receives an idea from me, receives instruction himself without lessening mine; as he who lites his taper at mine, receives light without darkening me. That ideas should freely spread from one to another over the globe, for the moral and mutual instruction of man, and improvement of his condition, seems to have been peculiarly and benevolently designed by nature, when she made them, like fire, expansible over all space, without lessening their density at any point, and like the air in which we breathe, move, and have our physical being, incapable of confinement, or exclusive appropriation. Inventions then cannot, in nature, be a subject of property." (Lipscomb and Bergh, 1905)

The main idea behind the support for open societies is that "control of creativity and innovation is shifting from individuals to corporations; science is corralled by the restrictions of patents and culture continues to be captured by property that locks it up". In order to escape from such a reality, Lessig argues that drawing from the values of free software will definitely help achieve a free society. Elaborating on those ideas, Kelty (2005) discusses the reputational remuneration present in science creation as of today. He draws similarities with open software development along the lines of the so-called gift economy, and concludes that the open science model is continuously at risk: "openness cannot be assumed; it must be asserted in order to be assured". A somewhat different approach is defended by Garay (2010) which presents the idea of free software creating a free society as a false one: society is becoming a slave of technology rather than being freed by it. It is clear that humankind

[60] http://creativecommons.org

should seek an efficient and convenient use of technology as a means for progress rather than as an end in itself.

If human intelligence relies on analogy or is even the ability to analogize (Hofstadter, 1980), open-source represents a pattern that can be exported to different domains. Needless to say, its particularities do not mean that its methodology and process management styles are valid for everything. Modularity is one of the keys to success in open-source development, yet modularity is not present in every given area. Good examples displaying modularity, such as Wikipedia[61], were clearly created based on the free software philosophy. Thousands of people contribute content with the purpose of sharing knowledge without monetary compensation. Yet, as described by Ortega (2009), a very strong launch can be followed by decreasing participation rates; unlike in open-source, where there are usually clear project leaders (Ye and Kishida, 2003), the Wikipedia project depends heavily on all of its minor participants in order to achieve continuous data flow, growth and updated content. This kind of participative project has been defined as *Open-Source Intelligence* (Stalder and Hirsh, 2002).

These examples, and as pointed out by Alonso and del Arco (2006), show that "despite all the different groups involved with free and open software, this movement represents the emergence of a new ethical approach", in dispute with traditional capitalism and reclaiming older attitudes like the commons. Some authors (Bauwens, 2009) even go as far as proposing that peer production offers a unique chance to transcend capitalism, moving from soft to hard: not only should it be replicated in the creation of intangible goods, but it must also be expanded to encompass the production of physical goods. Somehow, free software continues to attract many thinkers that see it as living proof of untested "all-sharing" societies.

A final point needs to be addressed in the form of the gigantic vault of information and e-culture that modern society creates. The traditional library concept will eventually move from paper to bits, and the way in which these bits need to be stored and kept raises certain concerns (Echeverría, 2009). However, the risk of using proprietary technology for the storage of public data and cultural heritage should not be disregarded.

2.7.3.2 The technological impact of open innovation in software

Chesbrough (2003) was the first author to introduce the concept of open innovation. In contrast with classic firm-specific internal R&D, open innovation is based on the addition of new knowledge from the outside that is shared back publicly. This approach increases the speed of internal innovation, as well as expanding the markets reached by such innovation. The influences of FLOSS development are quite straightforward. Yet, FLOSS and open innovation should not be seen as equivalent solutions in different fields. Under the basic

[61] http://en.wikipedia.org/wiki/Main_Page

open innovation model, ideas receive the same treatment in development, regardless of their origin, whether internal or external. Open innovation can become a source of competitive advantage, or even a necessity in some industries where competitors have widely embraced it and, as a result, are capable of unmatched new product development. Despite the fact that the concept is easy to grasp, open innovation can be applied in many ways and can have varying degrees of openness, including intra-company systems. Moreover, issues such as terms of participation and usage of achieved outcomes are very much customized to the specific needs of each innovation "promoter" or base entity. Partnerships can be varied in nature, as highlighted in the case of Amazon.com by Isckia and Lescop (2009). The only common ground for all cases is the will to find win-win strategies for all partners.

In an attempt to differentiate, Gassmann and Enkel (2004) defined three different approaches to open innovation:

1. Outside-in
2. Inside-Out
3. Coupled process

The first approach usually opens up early radical innovations and allows the free inflow of new collaborative work, culminating in a project to leverage the current status quo. The second approach cautiously selects the innovation partners and then shares with them selected projects in order to achieve joint goals. Finally, under the coupled process, both outside-in and inside-out strategies are present in a mixed way. The key elements and challenges of a successful policy of openness are:

- Identifying new paths to leverage internal innovation processes
- Incorporating external innovation into product development
- Motivating outsiders to supply continuous streams of ideas and innovation

Obviously, there is no single best approach for all cases; any given actor must analyze its own capabilities and goals in order to find the optimal approach. Almirall and Casadesus-Masanell (2010) acknowledged that while an open approach facilitates new product features that are hard to achieve in other ways, divergent goals often modify the product's desired technological trajectory. Thus, an organization needs to clearly review its capabilities, goals and product complexity in order to choose an open or closed approach and, if open, what kind of openness. Taking the coordination risks into account is also paramount. The trade-offs of the various possibilities need to be assessed in order to make a final call. Some authors (Shinneman, 2010) have presented a view on the implications of open innovation in regards to patenting. Current patent regulations, they state, are meant to protect R&D in a

world where open innovation simply did not exist. Thus, reforms are required, so that new trends are not stopped by ancient regulations:

> "To continue to root patent law in a proprietary, sales-oriented model of intellectual property is to ignore the full potential of innovation and intellectual property"

Since the debate over patents and innovation is both long and complex, and far from being one of the goals of this research, the issue will be left unattended to and open to further debate.

Another field in which open innovation has been creating momentum, and indeed one very much linked to FLOSS, is that of open hardware. Open hardware initiatives envisage migrating the features of the best-in-class open-source development projects into the world of material products. This drive has reached the point of creating an equivalent of the licensing scheme present in FLOSS[62]. The number of active annual projects has been growing since 2005, with a total estimate of some 200 projects in 2010 (Torrone and Fried, 2010). Some of these projects, such as Arduino[63], have already achieved total yearly sales amounting to over one million USD. According to Balka et al. (2009):

> "In open design communities, tangible objects can be developed in very similar fashion to software; one could even say that people treat a design as source code to a physical object and change the object via changing the source"

Based on research into 85 open-source hardware projects, Balka et al. (2009) concluded that transferability of the open-source model to different industries beyond software was clearly achievable. Moving forward in that direction, Malinen et al. (2011) did a research project on the similarities of open-source software versus hardware. They reviewed the main characteristics of FLOSS projects in terms of leadership, product development and involvement motivations, and concluded that motivations for involvement in open-source hardware come mostly from extra-financial factors. Furthermore, more costly development and higher demands on resources require business involvement to be in line with project needs. Due to the fact that hardware development involves more areas than software development, the array of professionals contributing to projects is wider (e.g. marketing, technical, legal, etc.), while FLOSS is present mainly in the field of software development expertise.

A final comment should be made regarding the open access model and academic journals[64]. There is significant activity in the field involving all aspects of the picture: revenue model,

[62] http://freedomdefined.org/OSHW

[63] http://www.arduino.cc/

[64] For a comprehensive list of Open Access Journals, see http://oajse.com/

peer evaluation, business model, etc. The particularities of the open access approach have been analyzed by Waltham (2006), and some of the conclusions of his research at the time were:

- There is a lack of strong support from authors with regard to open access to their articles
- The publishers seem to be attracted by it, with a desire to cover costs and achieve a minor surplus
- With rising printing costs and a dependency on ever-reducing institutional subscriptions, online journals could help tackle the issue[65]
- Requiring authors to contribute in order to cover publishing costs does not seem to be an option; moreover, doubts will arise concerning the independence of the publishers
- Articles presented in open access publications are more widely read and cited than non-open ones

Open innovation, open-source hardware and open access journals are some of the main examples of the influence of the FLOSS movement in society today, reaching far more widely than just "computers". Indeed, the influence of FLOSS is also evident in the open democracy movements that are calling for deep changes to modern society, the effects of which can currently only be guessed at.

2.8 FLOSS public policies: problems and solutions

2.8.1 ICT policies

There is social consensus that ICT knowledge is a requisite for progress. "The illiterates of the future will be those who do not know how to use a computer" is a commonly uttered sentence. Public policies to enhance the knowledge and adoption of ICT are usually centered around the following areas (Husing and Korte, 2010):

- Elementary education, since today's children will be tomorrow's pillars of society
- Business, in order to gain productivity by leveraging resources through ICT tools
- Senior groups, as ICT can help them increase their quality of life and avoid the risk of being socially excluded in a society that is clearly moving in the direction of technological tools

[65] The average cost of producing a printed paper is approximately GBP 1,200, as opposed to GBP 97 for an online paper.

Programs for children are usually centered around school, where they are introduced to computers by means of games and drawing. Furthermore, recent policies include free provision of laptops in certain developed countries, a practice more and more common in private universities as well[66]. The concept of digital natives reflects the fact that new generations have come into a world already altered by the digital revolution, and society needs to ensure no one is left behind.

As for senior citizens, free courses are often used to appeal to them to learn about operating systems, Internet tools (e-mail, web-surfing, etc.) and office tools (mostly word processors). These courses are clearly targeted towards people who have had very little prior contact with digital means, if any.

The ICT policies targeted at business are usually centered around SME's, in order to nudge them towards new ways of doing business. The assumption and reality is that big corporations have embraced the digital revolution to a great extent. Faced with the usual discussion between left and right in UK politics[67], Nagel (2002) proposes win-win tax reliefs for companies adopting ICT in the way that policy-makers understand to be the right direction. Many studies have been performed on this subject. To name but one of relevance, Harindranath et al. (2008) surveyed 378 SME's based in the south-east of England. The aim of this survey was to build a snapshot of the state of play of information and communications technology (ICT) use by SME's in economically significant sectors in this region. Their main conclusions were:

- Adoption and use of ICT is mainly focused on operational matters, with few extensions into potential strategic use
- SME owners/managers often perceive ICT to be costly and complex and are wary of consultants and vendor organizations
- SME's are largely unaware of existing policy instruments at the regional, national and European levels, designed to help them in their adoption and use of ICT
- In terms of technology, the most important concern was a fear of obsolescence giving rise to the need for frequent updates
- Firms also frequently encountered operational problems with their ICT, exacerbating their dependence on external consultants or vendors
- In most cases, owners/managers did not have a strong ICT background or the skills necessary to judge the potential of ICT investments

[66] One assumes that the laptops are purchased centrally, at significant discount, the cost then being passed on in tuition fees.

[67] Those whose sympathies lie to the right argue that it is not the government's business to decide upon what companies need to do in terms of ICT adoption, as they will choose the best alternative by themselves.

- SME's are falling behind the best practices adopted by their larger counterparts in the global economy

Another trend in terms of ICT promotion is the role of the modern urban city. Cohen and Nijkamp (2002) have conducted research across many European cities and have found two types of policies: supply-side and demand-side. Supply-side policies include the delivery of free technology and have many effects, most of which are non-ICT related. Policies on the demand-side, on the other hand, might enrich the technological background of the city and benefit all the population, as explained by Mahizhnan (1999).

Another key issue around ICT public policies is that of the decision-making process. Fardal and Sørnes (2008) have concluded that the garbage can model as defined by Cohen et al. (1972) is often present at the organizational level. Meanwhile, Hall and Löfgren (2004) reviewed the Swedish government's new ICT policy in the 1990's and found out that "garbage can" entities were created for issues that traditional institutional processes were not capable of handling. It seems as though the inherent complexity of technology-intensive policies is not compatible with traditional rational decision-making processes.

2.8.2 Approaches of FLOSS policies

FLOSS communities have historically demanded public support for non-commercial projects. Around 1998, use of libre software became an issue on the agendas of most European governments. The approach to technology, business and competition by industry leaders was heavily criticized (di Cosmo, 1998), as the essential tools of information technology were moving towards a *de facto* monopoly. The noise created around the topic[68] helped persuade the European Union to start to perform research in this area. Furthermore, an increasing number of public entities started to implement FLOSS tools as part of a mostly voluntary approach (Aigrain, 2003). Ever since then, the level of public awareness of FLOSS has grown, together with increasingly user-friendly projects concerning desktop applications[69]. As of 2009, there has been broad support for FLOSS from public authorities within the EU, coming from various sources:

- Various projects promoted directly by the EU
- Several EU members are fostering policies in favor of FLOSS adoption, both by the public and private sectors

[68] Needless to say, since the advocates of this movement are mostly present in on-line communities, the amount of "e-noise" achieved can be quite significant, thus reaching a quite broad spectrum of ICT users.

[69] A desktop application refers to a tool used by regular computer users, from a window manager to spreadsheets or text editors.

- Public entities[70] are trying to reduce the Total Cost of Ownership (TCO) of ICT by adopting FLOSS solutions
- Different regional governments are promoting FLOSS within society as a whole

The main rationale behind such public support is usually based on the following factors (Boyer and Robert, 2006, Ghosh et al., 2002b):

1. Ensuring that no monopolies are created as a consequence of network externalities[71]
2. Avoiding unnecessary public spending (as license fees are eliminated)
3. Assuring security and permanence of public data and data provided by citizens (since there is no dependency on any supplier)
4. Guaranteeing free access to public information (making the public software available)
5. Fostering a service-oriented local FLOSS software industry
6. Improving the adoption by society of new technologies
7. Maintaining a healthy FLOSS community to maintain good levels of innovation in the industry

Hahn et al. (2002) presented a neat attempt to capture the different approaches to policies in support of FLOSS, as portrayed in Table 2.8. None of the reviewed authors supports direct subsidies, but in all other areas discussed, there is a quite interesting variety of approaches.

Within this scenario, it is important to review the approach that the European Union has taken in regards to FLOSS, concerning its internal use[72]. Back in 2000, the Commission declared the Apache Web Server to be the recommended solution on UNIX systems, as a preliminary step in what can be considered to be a pragmatic strategy. By 2003, a FLOSS strategy document had been drawn up and presented to the Comité Technique Informatique (CTI). The document was approved with the rationale to use FLOSS when a clear benefit could be expected (financial, technical or tactical). As a consequence of this recommendation, several actions were implemented:

[70] In a recent example, the French national police body (Gendarmerie) announced its movement towards Ubuntu desktops in 2009. `http://arstechnica.com/open-source/news/2009/03/french-police-saves-millions-of-euros-by-adopting-ubuntu.ars`

[71] The network effect in economy is the value that one user adds to a product or service in regards to other people. The classic example is that of the telephone: the more people that own a telephone, the more valuable my telephone becomes. In the software industry, if any given application achieves the role of standard it may force new users to adopt it. In the long term, an application that had an advantage at one point might maintain leadership even though newer alternatives are clearly superior (Arthur, 1989).

[72] For more information concerning ongoing Commission activities related to the use of Open-Source Software by public administrations, please refer to `http://ec.europa.eu/idabc/en/chapter/452`. For more information related to the issue of interoperability and e-Government, please refer to `http://ec.europa.eu/idabc/en/chapter/5883` .

Table 2.8 – Approaches of public policies in support of FLOSS

Issue	*James Bessen*	*David Evans*	*Lawrence Lessig*	*Bradford Smith*
1. Identifies a significant market failure in the development or production of open source software.	*No, but:* notes that open source solves a market failure in software provision by overcoming imperfect contracts and information asymmetry.	*No:* the software industry has performed extremely well in terms of production and innovation without any government intervention.	*Yes, but:* open source developers cannot fully capture the value of their work, but this does not necessarily destroy the incentive to innovate.	*No:* there is currently no market failure in software.
2. Argues for direct government subsidies for open source.	*No:* where the government has intervened (in patents), it has created a market failure.	*No:* the government should not be in the position to pick industry winners.	*No:* the government should be neutral but careful to address its own interests.	*No:* only the marketplace can satisfy actual market needs.
3. Believes open source and proprietary software both have important roles to play.	*Yes:* open source software extends the market.	*Yes:* the open source method is an important organizational innovation.	*Yes:* both forms of software production should compete in the market.	*Yes:* both open source and commercial software are integral parts of the software ecosystem.
4. Argues that government should make software procurement based on benefit-cost framework similar to a profit-maximizing firm.	*Yes:* products should be considered on their merits for the project at hand.	*Yes:* governments ought to pick the best products for their own internal needs.	*Yes, but:* the government has a greater interest in externalizing benefits such as an open platform.	*Not addressed.*
5. Suggests government should encourage firms to commercialize research and development by not permitting GPL or "viral" license to be used in government-funded research.	*Not addressed.*	*Yes:* governments should ensure that the results of publicly funded research are not subject to licensing restrictions.	*No:* no general rule can be asserted. Sometimes it will make sense for the government to support GPL projects.	*Yes:* governments can help promote innovation through research and development and should facilitate commercialization of the resulting research.
6. Suggests government should change patent policy to allow open source to be more competitive.	*Yes:* Congress could restore subject matter limitations on patents and strict standards on patent quality.	*No, but:* might strike a better balance between protection and innovation if software patent standards were tougher and patent lives shorter.	*Yes:* a system with software patents is biased against open source and free software.	*Not addressed.*

Source: Hahn et al. (2002)

- Linux became the recommended server OS
- The site europa.eu started to be managed by an Apache server
- FLOSS became the primary software for the Commissioner's blogs and public forums on europa.eu

As of 2010, the Directorate-General for Informatics (DIGIT) has declared its intentions to maintain previous policies, plus adopt some new statements[73], such as:

- Consider FLOSS solutions alongside proprietary ones for procurements, by using "value for money" criteria, including licensing, setup, maintenance, support and training as Total Cost of Ownership (TCO)
- Promote the use of solutions that support recognized, well-documented standards, in an effort to ensure inter-operability. DIGIT sees quality FLOSS as a key factor leading to open standards
- Establish FLOSS as the preferred platform for all new development, where deployment and usage by parties outside of the Commission Infrastructure is anticipated

Furthermore, the DIGIT specifies certain areas that need to be addressed in order to foster its internal usage of FLOSS:

- There is a clear need to clarify the legal framework of the internal use of FLOSS, including licensing and participation in FLOSS communities[74]
- Governance of all ICT related topics, including FLOSS. Guidelines and best practices need to be created in a solution-based, rather than product-based, approach: deployment of FLOSS solutions in data centers, scalability, reliability, manageability, security, support and training
- Follow the best practices and proven tools developed within the collaborative development process of FLOSS communities
- The role of FLOSS in e-Government projects and interoperability, as mentioned above

Elaborating upon recommendations regarding TCO, a brief mention needs to be made of this concept. Total Cost of Ownership is a concept that usually ties two areas of private business: finance and supply chain management. Its purpose is to elaborate a technique

[73]For details on the EU's current approach to FLOSS, see `http://ec.europa.eu/dgs/informatics/about/oss_tech/index_en.htm` .

[74]The EU approved the European Union Public License (EUPL) on 9th January 2007. For current details see `http://ec.europa.eu/idabc/en/document/7774` .

that optimizes purchasing decisions based on all the aspects that are relevant to the final and real cost of any asset acquisition. In terms of ICT, TCO is usually tied to the life cycle of new solutions. Usual proprietary IT marketing messages focus on the need to look further than at just the license costs, where usually, free software has no license or subscription fees. It is quite common to find authors who digest the whole life cycle of software within any given organization and conclude that FLOSS solutions are not cheaper, all things considered (Larsen et al., 2004). However, classic TCO techniques, as presented by Mieritz and Kirwin (2005), focus 100% on internal costs grouped into the following categories:

- Direct costs related to the assets, both short and long term
- Associated indirect costs, such as labor or downtime
- "Enterprise boundaries" costs, which include costs originated across the organization because of the performance of the solution

However, this classic TCO approach does not include any analysis of the effects of purchasing decisions on other stakeholders. Meanwhile, FLOSS public policies do indeed have an effect outside the organization that must not be ignored by the analyst: direct or indirect support jobs are created in exchange for license fees. Measuring such positive externalities resulting from FLOSS policies is not an easy task and no detailed analysis has been carried out within Spain to date.

Some authors (Dalle and Jullien, 2003) have even suggested that there may eventually be a need for "generic" software policies, similar to those used in the pharmaceutical industries, for the main widespread software tools that benefit from significant network effects. Some experiments (Kelty, 2008) to export the open paradigm of FLOSS into new areas are also well documented, but without achieving relevant consequences to date.

However, there is a lack of empirical research into the outcome of public policies clearly in support of FLOSS within the EU. Most of the advocates of such support assume a clear link between promoting FLOSS and the stated objectives. On the other hand, there are several authors who consider that there is no need for the government to intervene in a healthy industry that regulates itself very efficiently. In this case, their arguments are based on economic modeling scenarios that have not been compared with real situations. Thus, the need to evaluate the outcome of public policies promoting FLOSS within the EU is a task that requires close attention and on which this research will focus.

2.8.3 Nationwide case studies on policies promoting FLOSS

Within this framework, there is no shortage of case studies about support for FLOSS initiatives by policy-makers, in the international arena. National and regional governments

across the globe have carried out such actions. Analyzed from various perspectives, for rich countries, FLOSS might be a question of choice, in the search for the optimum solution to a need. However, as noted by May (2006) and Camara and Fonseca (2007), in many national cases there is no choice for decision-makers, and countries or regions where GDP per capita is low can only look in one direction: free software. This is usually the case of FLOSS-based solutions in terms of licensing. A second layer of technological independence is added on top of free availability.

When evaluating ICT in education, a recent report by UNESCO (Samaniego et al., 2012) detailed a set of criteria to identify best practices. Usage of FLOSS was considered to be one of the seven key areas to consider, along with open document standards (ODF) and web accessibility standards (W3C). It is important to note that these characteristics are often present within the same ICT solutions. This simple observation represents a small example of a trend towards FLOSS that is spreading around the world. As far as Europe is concerned, a significant amount of government activity was reported in the field as early as 2005 (González-Barahona, 2005). Despite a very diverse range of initiatives, the author identified some common patterns and consensuses such as libre software for public acquisitions, adherence to open standards and interoperability, the need for inspection, and the importance of retaining proprietary rights on software. The examples of activity provided at the time included:

- France: ICT guidelines provided by State Agencies and unsuccessful attempts to pass laws aimed at enforcing the use of libre software in public administrations and the principle of "right to compatibility of software"
- United Kingdom: formal policy on the use of libre software, guidance on implementing FLOSS and the creation of the Open Source Academy, which included the private sector
- Germany: formal policy on the use of libre software, guidance on implementation and creation of the Open Source Software Competence Centre
- Italy: rules regarding the use and acquisition of libre software in public administrations (criteria to consider when acquiring software)
- Denmark: "Danish Software Strategy" which adopts the principle of obtaining maximum value for money, irrespective of the type of software
- The Netherlands: OSSOS program, an informative advisory body aimed at encouraging the use of libre software and open standards in public administrations

Along with these initial national steps, another eight regional or municipal initiatives of significant weight were also presented. Additionally, a strong presence was detected in the field of education:

> "For several reasons — the specific advantages of libre software in the education field, the importance of localization, the lack of suitable tools for many educational tasks, the funding problem so ubiquitous in education, and the readiness of large parts of the educational community to accept and embrace its assumptions and philosophy — this field seems to be especially receptive to libre software."

More recently, the Open Source Observatory and Repository (OSOR) has been launched by the European Commission with the goal of supporting the distribution and re-use of software developed by or for public sector administrations across Europe. The Observatory includes a detailed vault of ongoing projects within the region. An overview of regions and areas targeted with those large-scale projects[75] is presented in Table 2.9[76]. It is clear that open-source activity is present both within EU projects and among its member States.

There have also been many public initiatives in the open-source and free software field outside Europe. This brief review will not attempt to present any kind of comprehensive list of main or most relevant projects. A very detailed summary of all of the major open-source initiatives[77] taking place worldwide as of 2010 was drawn up by the Center for Strategic and International Studies[78]. Nevertheless, two nationwide policies that set themselves apart need to be mentioned: Iceland and Ecuador. These two nations have made strategical decisions around ICT procurement and usage. In both cases, a global desire to migrate to full FLOSS solutions has been expressed at the highest national political level.

In the case of Iceland, the Prime Minister's Office issued the Policy on Free and Open-source Software Government in December 2007[79]. The policy is meant to be followed by all state institutions and organizations that are operated with public funds and declares that it has been prepared on the basis of other nations' policies and documents published by the EU. It consists of five articles followed by a detailed explanation and a final section listing future steps and responsible bodies. The five articles center on:

1. Purchase of new software based on equal opportunities of various alternatives
2. Preference for software based on open standards
3. Avoidance of dependency on software manufacturers or service providers
4. Ensuring reuse of public financed software

[75] Details available at: `https://joinup.ec.europa.eu/project/all`, visited on February 1st, 2013.

[76] Initiatives carried out within Spain have been omitted, as they are described elsewhere in this document.

[77] A total figure of 364 initiatives.

[78] Available at: `http://csis.org/files/publication/100416_Open_Source_Policies.pdf`, visited on February 1st, 2013.

[79] Available at: `http://eng.forsaetisraduneyti.is/media/English/Free_and_Open_Source_Software_-_Government_Policy_of_Iceland.pdf` , visited on February 1st, 2013.

Table 2.9 – Recent activity in FLOSS projects across Europe (2009-2013)

Country	Number of projects	Areas of development
EU-led initiatives	13	Secure Identity Environment Data eGovernment Open Government Development Fund eLiteracy eBusiness
Portugal	4	Local FLOSS adoption eGovernment
Greece	1	eGovernment
Romania	2	Sanitary controls Meteorology
Italy	6	Analysis report eGovernment Open Government
France	1	Procurement guidelines
UK	1	Procurement Toolkit
Germany	3	Local FLOSS adoption eGovernment
Sweden	2	e Procurement eHealth
Slovenia	1	eGovernment
Austria	1	eGovernment
Belgium	1	eGovernment
Cyprus	1	eProcurement
Poland	1	eGovernment

Source: OSOR website

5. Students to be given the opportunity to learn about and use open-source software

The first article is intended to ensure equal treatment of both proprietary and free software. However, the other four articles make it very difficult for non open-source options to be competitive, as it stands today. Under this legislation, reports have been provided of steady and sound progress in the adoption of FLOSS solutions across all major educational and public bodies within the nation. As of March 2012, a 12-month project was launched to switch the main public institutions in Iceland - including all the ministries, the city of Reykjavik and the National Hospital - across to open-source solutions, and help facilitate the migration process for the remaining entities.

In the case of Ecuador, the central government has elaborated a policy based on six expected outcomes from promoting FLOSS as a mandatory technology across the public sector:

1. Technological independence
2. Open standards and interoperability
3. Security
4. Independence from suppliers
5. Availability of information
6. Decrease in TCO

As a consequence, a mandatory policy was adopted in 2008, followed by a public strategy. The policy consists of seven articles that bring into force the requirement to adopt software that satisfies all the conditions of free software solutions, while ensuring that technical support is available as well. The policy allows for several exceptions to this mandatory requirement, based on the non-availability of free software for certain needs, and solutions that have already been implemented and whose replacement would not be cost-efficient. Finally, it sets out an order of preference for the origin of software, with precedence going to technologies developed at a national level.

An official report on the implementation strategy was published on January 2009[80]. The strategy is to be executed in four main areas:

1. Development of standards and interoperability
2. Formation of a critical mass
3. Planning, follow-up and control

[80] Available at: `http://www.administracionpublica.gob.ec/software-libre/`

4. Free software distribution

Each of these areas is developed with a set of mandatory steps. A detailed review of the strategy and its different areas of development (national interoperability schemes, cooperation with other entities, etc.) leaves no doubt that Ecuador has been able to leverage knowledge and expertise from many previous experiences. The public strategy document provides broad guidelines. The biggest challenge for such a broad and ambitious policy and strategy is how to execute and transform these vast areas into specific and tangible realities.

2.9 FLOSS public policies in Spain

2.9.1 Overview

The level of public involvement in the promotion and/or support of FLOSS in Spain is presented next. According to ONSFA (2010), part of CENATIC, Spain has a good level of free software adoption as compared to other European nations. As presented in Figure 2.8, back in 2010, the level of ICT development was among the lowest for the European region, while the level of free software development was only higher in France and Germany.

This information can be compared to the research carried out at Georgia Tech University[81] by Noonan et al. (2008), in terms of FLOSS environments and activity worldwide. The indicators at Georgia Tech measured two main areas:

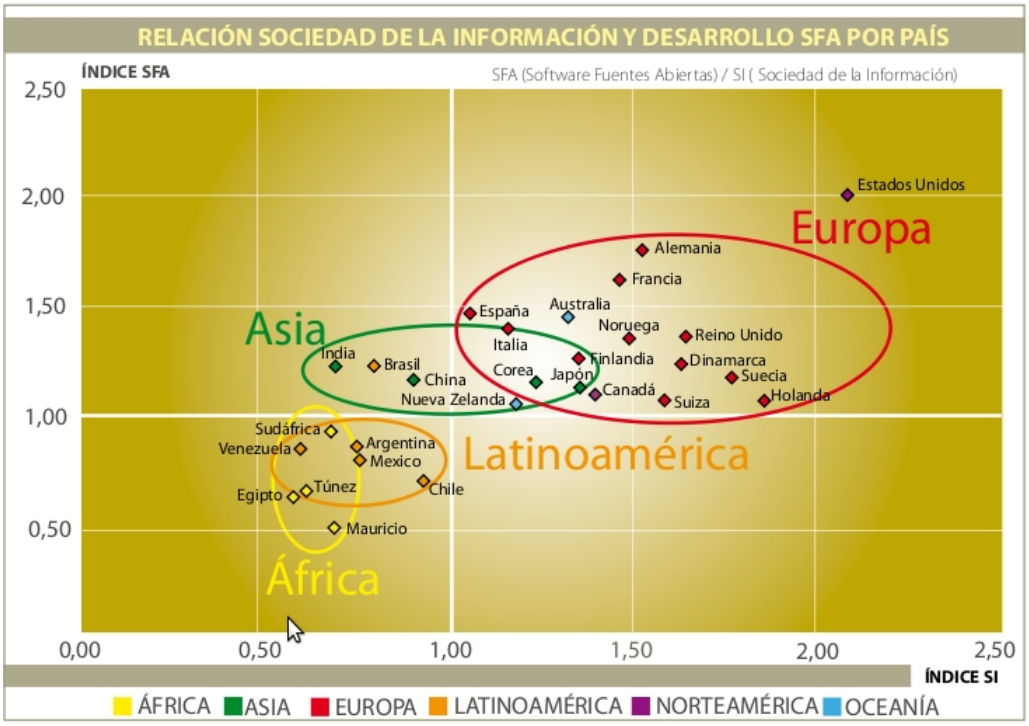
- Environment: how friendly a territory is for the development of FLOSS projects
- Activity: how active each of the analyzed territories is in terms of FLOSS projects

In a nutshell, the first indicator tries to reflect how "comfortable" a territory is, while the latter reflects how much "real activity" is going on in a given time-frame. Neither of them purely reflects how active any country has been in order to reach its current position in the ranking. As expected, the environment and activity indicators display strong correlation. Figure 2.9 presents the environment in which FLOSS activity needs to take place. Spain is ranked 20th overall worldwide, with similar results for the government and community components. However, the industry component of the index lags behind, lying in 29th place compared to the other reviewed countries.

Due to the previously stated FLOSS/proprietary duality that dominates the markets, the data that exists with regard to the FLOSS industry in Spain is fragmented and represents mainly those SME's that are chiefly built around certain FLOSS solutions. The predominant

[81] Sponsored by Red Hat, Inc., http://www.redhat.com/about/where-is-open-source/environment/

Figure 2.8 – International FLOSS vs. ICT comparison



Source: CENATIC

business model for such companies is characterized, for the most part, by the concept of customization: they do not charge any fees for software licenses; instead, they adopt a set of packages and solutions and customize them according to the needs of their target customers. It is the customization, maintenance and further development that provide their main source of revenue.

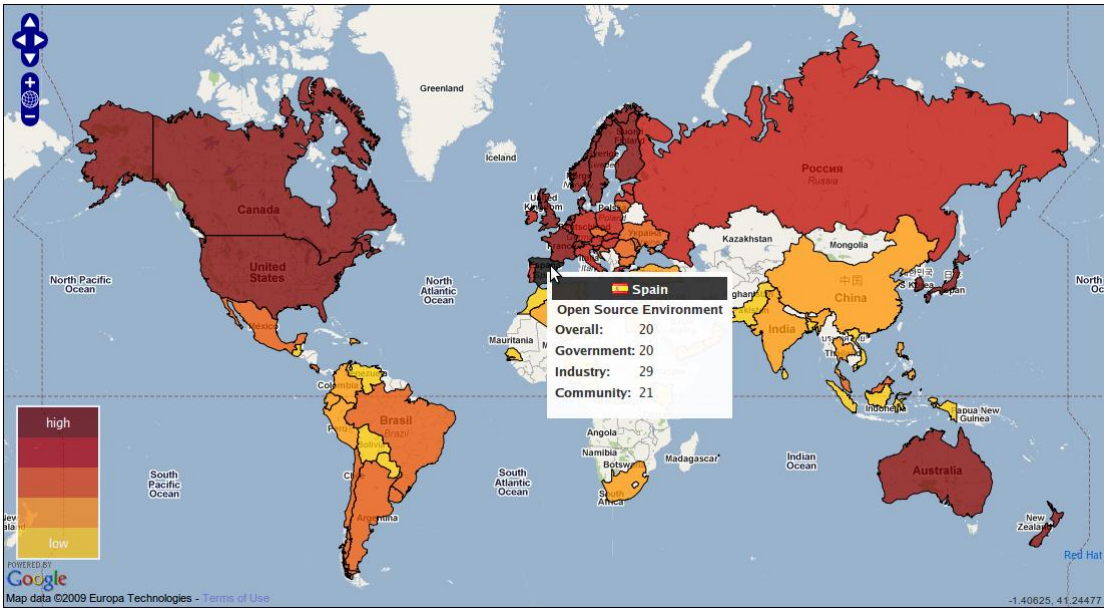
Based on a study led by ONSFA (2009), the Spanish software industry reveals some impressive figures in terms of FLOSS revenues:

- Some 49% of the total revenue of big software corporations comes from FLOSS solutions
- As for the SME's that participated in the report, their revenues come almost completely from FLOSS solutions[82]

Furthermore, the target solutions of SME's and big players are slightly different, as presented in Table 2.10.

[82]This is not in the least surprising, since all the SME's that were included in the survey were previously selected based on their clear involvement in the FLOSS business.

Figure 2.9 – FLOSS environment world map



Source: Noonan et al. (2008)

Table 2.10 – Target solutions of the Spanish FLOSS industry

Small firms	Big corporations
Web applications	Applications server
Global server	Groupware
Desktop solutions	Mail servers

Source: ONSFA (2009)

The survey also noted that while the big players dedicate a certain amount of effort and resources to R&D activities, smaller firms do not invest in these areas, most likely due to their limited resources. Building on this point, it was detected that while manpower is readily available for mainstream applications, it appears to be scarce when it comes to upscale professional applications.

The fact that many FLOSS-focused ICT businesses have created regional cluster-like business associations shows the growing strength and presence of FLOSS as an alternative to traditional proprietary solutions. Nine such regional clusters[83] created ASOLIF[84] (Federación

[83]Madrid, Basque Country, Galicia, Catalonia, Andalusia, Valencian Community, Aragon, Castile and León and Canary Islands

[84]http://www.asolif.es/

Nacional de Empresas de Software Libre) back in 2009, with the main goal of promoting and developing FLOSS solutions for local businesses and stakeholders. Some 200 firms are currently part of ASOLIF and, despite the current economic climate, this number has not declined in recent years. Such data seems to suggest that the level of activity of the FLOSS industry in Spain is growing, both in SME's based on free software and corporations with FLOSS-dedicated teams. This activity level was also estimated by Noonan et al. (2008). As presented in Figure 2.10, the level of activity in industry is slightly higher than the previously cited FLOSS environment ranking. The latter ranks in 29th place, whereas the actual level of activity ranks 22nd as compared to the other reviewed countries.

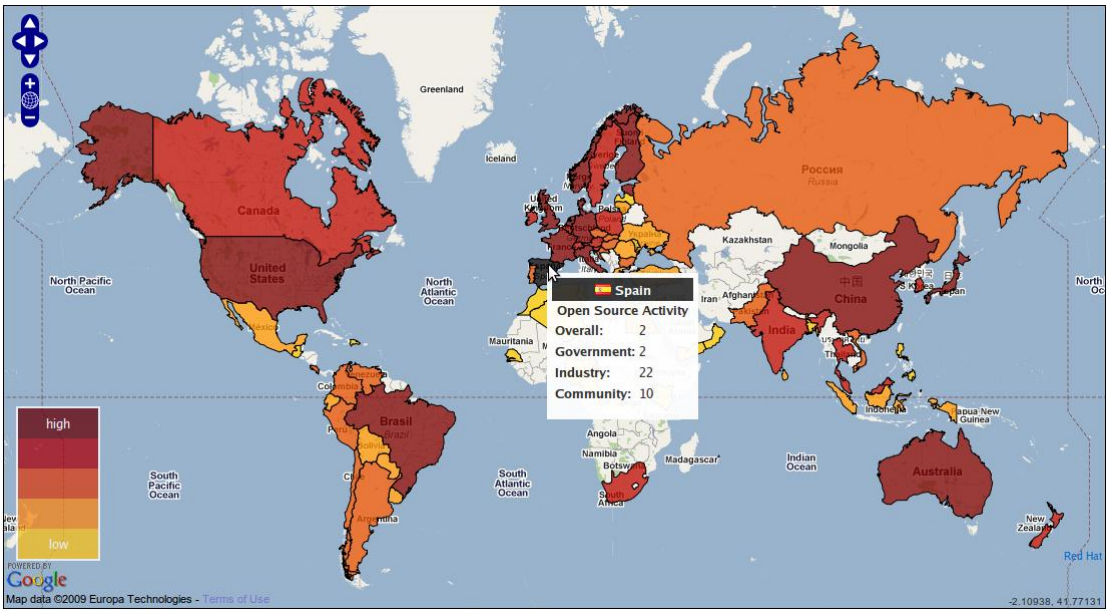
However, on top of this activity level for industry, Spain as a country was also ranked in second place. This fact is down to the public sector, whose activity was ranked in second place as well. The indicators reviewed by the authors of the research come from various agents in the public sector. As has already been described, the Spanish public sector consists of three main levels of decision making and empowerment: central, regional and local. As such, the following sections present a review of the role of the different actors and main policies implemented at each of the layers. Given that part of the policy strategy comes from within the European Union, a specific part will be dedicated to those centralized public actions that originate in EU regulations and initiatives. The "technological independence" aspect of open-source continues to have an impact on the decision-making process of European politicians, which is cascaded down to the different member states.

A final point needs to be made on the segmentation that is present. Indeed, as described by Domínguez-Dorado[85], there are significant difficulties involved in creating communities in the public sector, as compared to other informal cases. Once again, the particularities and boundaries of the administration come into play, making it difficult to launch otherwise win-win scenarios due to:

- Technical issues: linked to the particularities of continually evolving software versions
- Legal topics: related to software licenses and public procurement
- Procedural issues: because the public arena needs to move according to a very defined set of regulations
- Business - funding issues: the necessary economic resources need to be balanced among participants; otherwise, there is no interest in sharing projects
- Lack of knowledge: in the public administration, with regard to the usual rules and regulations of the FLOSS community

[85] As posted on the CENATIC blog, at `http://observatorio.cenatic.es/` Visited on October 19th, 2013.

Figure 2.10 – FLOSS activity level worldwide



Source: Noonan et al. (2008)

- Coordination topics: since remote participants have no experience of virtual work environments
- Influence issues: related to behavior in terms of controlling the FLOSS community
- Dedication problems: because public workers need recognition for their share of work and energy expended
- Corporate topics: because politicians may decide to transfer or relocate public workers from their current duties
- Stage fright: participants may restrain themselves for fear of losing reputation

Apparently, on top of issues dictated by experience, public FLOSS communities are gaining attention and momentum. One very active group, the Foro AAPP[86], attracts and collects most of the ongoing activity in the field and is, without any doubt, the starting point for any analysis.

[86]Spanish Public Administration FLOSS discussion team, see: `http://wiki.cenatic.es/wikiesp/index.php/Portada`

2.9.2 The impact on the public sector of FLOSS actions fostered by the European Union

The European Union is very active in terms of ICT policy-making, not only for its own usage and availability, but also for the welfare of the citizens living in the Union. All of its efforts in this defined key area are gathered under the umbrella of the Digital Agenda for Europe (DAE). The relevance of this initiative is clear: "it aims to reboot Europe's economy and help Europe's citizens and businesses to get the most out of digital technologies", as declared by the EU itself. It is one of the seven initiatives of Europe 2020[87], the EU's strategy for the current decade to deliver smart, sustainable and inclusive growth. The EU has identified that the digital economy is growing at seven times the rate of the rest of the economy.

The second pillar of the DAE contains the interoperability and standards adoption actions. The desired outcome of such actions is to ensure that new devices and applications are able to work together anywhere in the world. New IT devices, applications, data repositories and services need to interact seamlessly, anywhere. From a regional perspective, this focus can ensure an absence of technological dependency and lower implementation costs. The Digital Agenda seeks standard-setting procedures and increased interoperability as the keys to success. Such actions are transmitted to each of the member States.

Seven different actions were defined under this part of the DAE:

- Action 21: Propose legislation on ICT interoperability
- Action 22: Promote standard-setting rules
- Action 23: Provide guidance on ICT standardization and public procurement
- Action 24: Adopt a European Interoperability Strategy and Framework
- Action 25: Identify and assess means of requesting significant market players to license information about their products or services
- Action 26: MS to implement European Interoperability Framework
- Action 27: Member States to implement Malmö and Granada declarations

The EU administration has created a clear scoreboard to track each of the actions. Its role consists of two major main areas: EU legislation, and follow-up and review of compliance by member states. As regards Action 21, the European Commission, in communication document COM(2010) 744: "Towards interoperability for European public services", defines the standard of what all member states must develop to ensure that the desired target is

[87] http://ec.europa.eu/europe2020/index_en.htm

achieved. One of the underlying principles of the communication is openness, defined as the "willingness of persons, organizations or other members of a community of interest to share knowledge and stimulate debate within that community, the ultimate goal being to advance knowledge and the use of this knowledge to solve problems". In order to achieve the desired openness, the Commission recommends that public administrations should show preference to open specifications for new projects, taking due account of the coverage of functional needs, maturity and market support[88].

Amutio (2012) explains how such regulations have been adopted and implemented within Spain. Spanish law 11/2007 regulates the rights and characteristics of access of citizens to public services. One of its articles[89] created the National Interoperability Framework[90], in accordance with EU requirements. Furthermore, Royal Decree 4/2010 establishes all criteria and recommendations that will have to be taken into account by all public administrations in order to guarantee that all of their ICT related policies fulfill interoperability requirements, as presented in very specific technical regulations. The Spanish ENI has been aligned with EU regulations, so that any compliant solution must interconnect out of the box with equivalent European tools. Because of the nature of the policy capabilities of the different layers of Spain's public administration, the ENI's development was led centrally in close coordination with the regional public bodies, and included input from groups representing the ICT industry. It is worth mentioning that although it is not a FLOSS regulation, Law 37/2007 represents a milestone in terms of public document-sharing. Clearly inspired by the basic statements of the Creative Commons and FLOSS movements, the law is a first step towards a copyleft public policy.

One of the goals of the ENI regulation is to avoid discrimination of citizens based on their technological choices. One of the elements of its deployment is closely linked to this aim, stipulating license conditions whereby solutions, documents and other elements must be made available to other administrations and citizens. On top of this, directories for freely reusable solutions must be clearly published, as must the source code. E-signatures and certificates developed at central government level can be used by all layers of the public administration, thanks to their interoperability features.

Although the deadline by which all public systems were to be in compliance with the legislation was set for early 2014, a lot of unfinished work remains, which seems to suggest that small delays should be expected. However, projects such as @firma[91], a platform for

[88] A side note must be made concerning the fact that this recommendation leaves room for non-compliance as an exception: "However, public administrations may decide to use less open specifications, if open specifications do not exist or do not meet functional interoperability needs."

[89] Number 42.

[90] ENI, Esquema Nacional de Interoperabilidad. Available at `http://administracionelectronica.gob.es/pae_Home/pae_Estrategias/pae_Interoperabilidad_Inicio/pae_Normas_tecnicas_de_interoperabilidad.html`, visited on June 5th, 2012.

[91] Available at `http://administracionelectronica.gob.es/ctt/afirma/descargas`

e-signature validation purposes, have proven that common goals can be efficiently achieved with open centralized solutions.

Meanwhile, initiatives such as the EU-hosted CIRCABC (Communication and Information Resource Centre for Administrations, Businesses and Citizens)[92] and the Spanish government e-administration repository[93], where an increasing number of projects is published, seem to suggest that there is a new trend aligned with the guidelines promoting openness and interoperability.

2.9.3 State ICT and FLOSS policy

The various agents present in the policy-making process, as discussed above, are paramount when it comes to defining relevant topics to be included in the agenda during any given time-frame. In the case of the Spanish national policy agenda, Chaqués-Bonafont et al. (2014b) have compiled a complete set of all the political initiatives discussed, addressed and regulated in the time-frame 1982-2008. Given the nature and level of detail presented, FLOSS-related policies would be included in two policy groups: Intellectual property rights - Patents and ICT industry / Security. Table 2.11 presents the level of attention gained by such topics over the 27-year period. The table compares the number of actions taken in the two fields compared to the total activity in each area (i.e., out of the 13,673 queries debated in the Congress, only one was related to IP rights and patents, and two dealt with ICT topics).

This 27-year period has witnessed the birth of a completely new social system in regards to technology adoption and usage. Yet the level of attention gained in the Spanish Parliament and Senate is fairly low. Two key aspects can help explain this lack of presence in such a relevant area:

- In a world where change is taking place at an ever faster rate, government regulations and actions take effect much more slowly than in other areas of society, partly due to the burden of a bureaucratic organization where processes simply take longer.
- Technology is cumbersome, and target audiences have difficulty understanding the relevance of the complex dynamics of the field. Thus, the political actors do not see a clear advantage in adopting a more active role in the field.

However, the fact that it does not have a prominent status on the political agenda does not mean ICT has not been addressed from a budget initiatives perspective. As presented in Figure 2.11, from 2005 to 2009, the government

[92] https://joinup.ec.europa.eu/software/circabc/description

[93] http://forja-ctt.administracionelectronica.gob.es/web/cache/offonce/lang/en/pid/1104/

Table 2.11 – Patents, copyright and ICT topics on the national Spanish policy agenda vs. total initiatives (1982-2008)

Topic	IP rights and patents	ICT - industry and security	Total
Laws	15	1	1,564
Congress queries	1	2	13,673
Proposals in Congress	5	2	1,780
Law projects	11	3	1,128
Congress speeches	0	5	8,583

Source: Chaqués-Bonafont et al. (2014a) and Chaqués-Bonafont et al. (2014b)

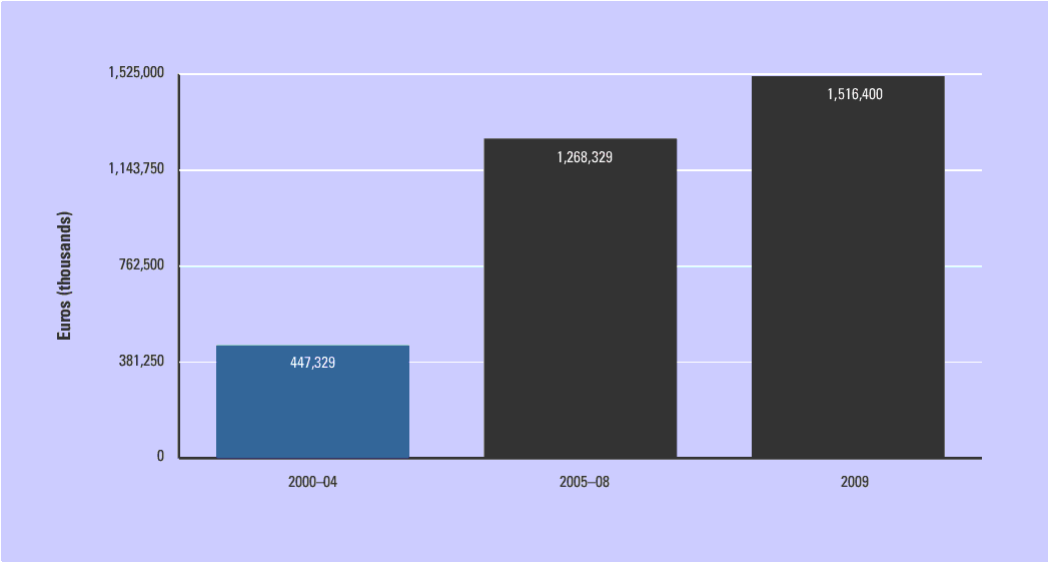
devoted more than €6.5 billion[94] to the development of the ICT sector and the information society, as part of the so-called Plan Avanza. The main goal of the first set of actions developed under Plan Avanza was to make up the gap in terms of ICT adoption and connectivity within Spain as opposed to other European economies. The plan was carried out on top of several other regional initiatives, even going as far as to introduce direct subsidies for PC purchases by the general public. It is estimated that over €4 billion was invested by other stakeholders (with regional governments playing a primary role). The sum of these efforts means that around €11 billion has been directly committed to foster ICT diffusion in Spanish society. One of the main indicators, household Internet access, as presented in Figure 2.13, doubled over the course of the period, although such an effect cannot be attributed solely to government action.

Plan Avanza was also extended and approved for the period 2011-2015, with the following 10 goals (which include 100 detailed actions) that should build on milestones already achieved :

1. Promote innovative ICT processes within the public administration
2. Extend ICT into healthcare and welfare
3. Maximize ICT usage within the education and training system
4. Improve the capacity and reach of telecoms networks
5. Encourage adoption of the security culture among citizens and businesses
6. Increase the use of advanced digital services by the population
7. Extend the use of ICT business solutions among companies
8. Develop the capacities of the ICT sector

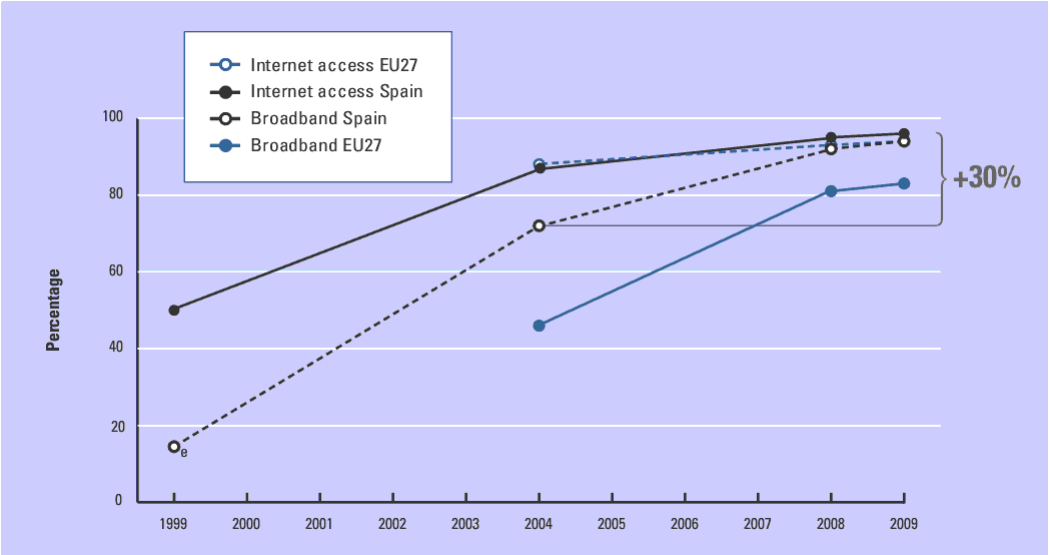
[94] One billion= 10^9 from now on.

Figure 2.11 – Average annual budget devoted to the information society (direct financing)



Source: Lanvin et al. 2010

Figure 2.12 – Internet and broadband use in businesses: Spain and the European Union (1999–2009)



Source: Lanvin et al. 2010

9. Strengthen the digital content business sector while guaranteeing IP protection through legal regulations within the Spanish and EU jurisdictions

10. Develop green ICT

Out of the 100 detailed initiatives, only one explicitly mentions FLOSS: Free software used for security purposes is to be strengthened, with a clear mention of the limits of neutral technology adoption within the public administration.

With regards to the total budget to be allocated, the plan indicates that detailed funding figures are to be decided upon depending on the scope provided by each year's budgetary capabilities. While this approach is understandable, given the current economic climate, it also leaves plenty of room for delays and lack of fulfillment.

Nested within these ICT-oriented public actions, ONSFA (2008) carried out a complete review of the status quo of FLOSS within the national administration and regional governments. The main conclusions that were reached by the study were:

1. Spanish public entities consider FLOSS to be a real choice and thus its usage continues to grow

2. Spain is leading the EU in terms of public adoption of FLOSS

3. In terms of FLOSS-friendly legislation, Spain is also leading the EU

4. The most active players are located within the public education field

5. FLOSS adoption levels differ significantly between the different regional governments, as well as within various global entities of the central administration

6. Training is key when it comes to ensuring the success of a new FLOSS implementation

7. Lower costs associated with FLOSS facilitate ICT literacy initiatives with lower budgets

8. Code sharing among regions was detected, in an effort to increase scale economies

The report needs to be reviewed critically: it only took into account FLOSS projects launched and consolidated in various public administrations and did not review failed initiatives or barriers coming from within the public system[95]. As for the background of the status of FLOSS adoption in Spanish state bodies, the first moves towards FLOSS can be traced back to 1999. The Ministry of Public Administration pioneered the introduction of FLOSS in the Spanish public administration by adopting a GNU/Linux based solution for the following services:

[95]Some of these can be seen from the SWOT analysis included in the report, however.

Figure 2.13 – Internet users in Spain (2003–2009)

Source: Lanvin et al. 2010

- File sharing
- Communications (VoIP)
- Mail servers
- Internet - Intranet access

The experiment proved to be successful in terms of cost and capabilities: not only were the new solutions technically sound and fit for purpose, they also helped reduce costs in terms of license fees. As a consequence, many other organizations followed suit. By 2002, the Junta de Extremadura[96] had migrated over 10,000 computers to GNU/Linux, mainly by using a distribution of its own creation: gnuLinEx[97]. Most of these computers were in public schools and thus the software was customized for such needs. This large scale policy represented a milestone at the time, as it was very widely publicized over various media channels and demonstrated that FLOSS capabilities could successfully reach mass desktop implementations. Andalusia followed with its own flavor of GNU/Linux: Guadalinex[98]. Regional laws were approved by 2003 in Andalusia to ensure that all newly purchased software was compatible with FLOSS and open standards. Once some of these initiatives

[96] "Junta" is the Spanish term for a regional government.

[97] `http://www.linex.org`

[98] `http://www.guadalinex.org/`

had succeeded, many other public entities embarked on the same path. Although reliable data on the topic is hard to find, the most accurate data indicates that:

- In 2001, only 3% of all public computers were based on FLOSS[99].
- By 2004, as many as 49% of all public entities were using FLOSS to a certain degree, according to the II Andago report[100]. Needless to say, the level of usage can range from close to insignificant to being the sole solution in use; however, such data is not available.
- The same Andago report indicated that 95% of ICT managers saw FLOSS as a valid alternative for their organizations. The awareness of and attitude towards FLOSS was already impressive at this time.
- The IRIA 2006 report[101] reflected the fact that, the bigger the machine, the more likely a FLOSS operating system was running on it: FLOSS OS's ran on 50% of the biggest computers but were practically non-existent on desktop computers.

Finally, we will consider the nest of knowledge represented by the university network. Table 2.12 presents a detailed list of universities in which FLOSS has been promoted significantly by certain groups[102]. The table does not include user groups and the like, although some of the official so-called university "Free software offices" have transformed into student user groups. Such groups, although usually promoting free software within the university, are not directly supported by public funds.

The different groups operate in an independent manner, although there is an informal network of participants who share their initiatives and knowledge. Indeed, some of these groups organize an annual free software development contest, which is open to any project that is developed in a public fork and documented in a blog or similar. The contest has already reached its 9th edition, and enjoys significant relevance within FLOSS educational communities.

Acknowledging that education is the key for growth in ICT related areas, CENATIC has released a specific report[103] on the current status of FLOSS within Spanish public universities. According to the report, besides internal use, there are three main categories in which public universities might push FLOSS related activities: courses, projects and support/promotion groups.

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[99] Informe Reina, available at `http://www.csi.map.es/csi/pg5r10.htm`

[100] `http://observatorio.cenatic.es/index.php?option=com_content&view=article&id=16`

[101] Available online at `http://www.csi.map.es/csi/iria2006/index.html`, visited on June 5th, 2012.

[102] Despite their main source of funding being the regional governments, public universities enjoy complete *de facto* independence in terms of management.

[103] Available at `http://observatorio.cenatic.es/phocadownload/informes/informe_universidad.pdf`

Table 2.12 – List of FLOSS promoting teams at Spanish public universities

Region	University	Group Name	Website	Creation
Valencian Community	Universidad de Alicante	COPLA	http://copla.ua.es*	–
Catalonia	Universidad Autónoma de Barcelona	GNUAB	http://www.gnuab.org*	–
Catalonia	Universidad de Barcelona	gclUB	http://ub.edu/gclub	–
Andalusia	Universidad de Cádiz	OSLUCA	http://softwarelibre.uca.es	2004
Madrid	Universidad Carlos III de Madrid	LUC3M	http://osl.uc3m.es/	–
Castile-La Mancha	Universidad de Castilla-La Mancha	CRySoL	http://crysol.inf-cr.uclm.es*	2000
Basque Country	Euskal Herriko Unibertsitatea	itsas	http://www.ehu.es/eu/web/itsas	–
Madrid	Universidad Europea de Madrid	GLUEM	http://www.gluem.net*	–
Andalusia	Universidad de Huelva	OSLUHU	http://cibercomunidades.net/uhu/osluhu*	–
Valencian Community	Universidad Jaime I	Software Libre UJI	http://www.swlibre.uji.es	–
Galicia	Universidad de A Coruña	OSL-UDC	http://osl.cixug.es/	–
Canary Islands	Universidad de La Laguna	SSL-ULL	http://ssl.ull.es*	2005
Murcia	Universidad de Murcia	SOFTLA	http://www.um.es/atica/softla	2004
Catalonia	Universidad Politécnica de Cataluña	CPL	http://www.cpl.upc.edu	–
Valencian Community	Universidad Politécnica de Valencia	poLinux	http://www.polinux.upv.es	–
Madrid	Universidad Pontificia de Comillas	linuxec	http://linuxec.upcomillas.es***	–
Andalusia	Universidad de Sevilla	SOFLA-US	http://solfa.us.es	–
Valencian Community	Universidad de Valencia	LinUV	http://www.uv.es/LinUV	–
Basque Country	Universidad de Deusto		http://softwarelibre.deusto.es***	–
Castile and León	Universidad de Valladolid	SOLEUP	http://soleup.eup.uva.es*	–
Galicia	Universidad de Santiago de Compostela	OSLUSC	http://www.usc.es/osl/	2008
Canary Islands	Universidad de Las Palmas de Gran Canaria	ULPGC	http://osl.ulpgc.es/wosl/	2003
Aragon	Universidad de Zaragoza	OSLUZ	http://osluz.unizar.es/	2007
Andalusia	Universidad de Granada		http://osl.ugr.es/	–
Castile and León	Universidad de Salamanca	OCA	http://oca.usal.es/	–
Andalusia	Universidad de Córdoba		http://consejo-eps.uco.es/corsario/*	2006
Madrid	Universidad Rey Juan Carlos**	LibreSoft	http://libresoft.es/	–

* Websites not active as of June 2013

** Research group

***Private University

Source: Own creation based on publicly available information

A detailed review of the ongoing activities across all universities reached the following conclusions:

- The number and scope of policies promoting FLOSS is quite low
- Despite such a lack of organized policies, the presence of FLOSS within the university arena is significant
- FLOSS is seen as an opportunity for innovation due to its flexibility and wide-reaching communities
- FLOSS could be much more developed if not for the lack of knowledge and mistrust
- The presence of FLOSS differs significantly between universities and departments

Despite the overall positive picture that is presented in the report, there are several topics that could be improved if the identified mistrust could be somehow reduced:

- Specific Masters degrees in FLOSS are only present in three universities
- FLOSS support groups are very present in the University network (50%), but their resources are usually very limited
- Only 22% of the universities have explicitly included support for FLOSS in their bylaws

The CENATIC report reviews all initiatives as detailed by each university. In this regard, some initiatives have more the ring of a "me too" or "let's do something" rather than a clear and consistent vision moving in the direction of a strategic policy aimed at growing FLOSS. Students seem to be leading the way and pulling up the level of demand: while only some 2% of teachers' computers run on FLOSS, more than 20% of students are using open-source solutions on a daily basis. This seems to suggest that the future will see an increase in the adoption of FLOSS in the university arena, which as a consequence should lead to a growing presence in other areas of society and the economy as well.

A final remark should be made on the annual ranking of universities in terms of FLOSS as provided by Portal Programas[104] since 2012[105]. Taking 65 indicators into account, the ranking tries to classify all Spanish universities based on the level of commitment to and promotion of FLOSS.

[104] A website specialized in Spanish language software downloads.

[105] Available at `http://www.portalprogramas.com/software-libre/ranking-universidades/analisis`

Table 2.13 – Index of activity and promotion of FLOSS in Spanish universities

Ranking	University	2012 score	2013 score
1	Universidad de Granada	100.00	100.00
2	Universidad de La Laguna	90.27	54.15
3	Universidad de Zaragoza	93.48	55.00
4	Universidad de Las Palmas de Gran Canaria	47.69	80.46
5	Universidade da Coruña	25.80	60.63
6	Universidad de Sevilla	57.78	21.79
7	Universidade de Santiago de Compostela	21.52	47.09
8	Universidad de Cádiz	49.07	26.20
9	Euskal Herriko Unibersitatea	34.68	40.40
10	Universidade de Vigo	25.81	31.99
11	Universitat Politècnica de Catalunya	38.37	19.16
12	Universidad Rey Juan Carlos	15.64	44.60
13	Universidad de Deusto	26.66	18.65
14	Universidad Carlos III de Madrid	26.04	23.04
15	Universidad de Salamanca	30.29	14.97
16	Universidad de Valladolid	42.26	5.49
17	Universidad Nacional de Educación a Distancia	34.13	10.35
18	Universitat Autònoma de Barcelona	28.73	12.20
19	Universidad de Córdoba	22.26	12.38
20	Universidad de Murcia	24.28	10.28
21	Universidad Complutense de Madrid	27.71	10.24
22	Universitat Oberta de Catalunya	22.18	6.80
23	Universidad Politécnica de Madrid	16.93	25.10
24	Universitat de Barcelona	20.72	8.72
25	Universidad de Extremadura	20.29	9.56
26	Universidad de León	10.88	24.19
27	Universitat Jaume I	18.18	9.27
28	Universidad de Huelva	21.24	14.23
29	Universidad Miguel Hernández de Elche	2.79	5.09
30	Universitat Politècnica de València	14.79	6.45
31	Universidad Autónoma de Madrid	21.63	7.88
32	Universidad de Castilla La Mancha	14.57	8.13
33	Universitat de Lleida	12.87	4.41
34	Universidad de Cantabria	16.57	3.90
35	Universidad de Jaén	18.60	6.69

36	Universitat de les Illes Balears	11.44	8.92
37	Universitat de València	20.28	6.45
38	Universidad de Alicante	8.94	13.17
39	Universitat de Girona	10.63	6.71
40	Universitat Pompeu Fabra	10.70	5.49
41	Universidad Politécnica de Cartagena	13.63	7.94
42	Universidad de Alcalá	10.80	6.40
43	Universidad Internacional de Andalucía	9.93	6.88
44	Universidad de Málaga	12.07	6.69
45	Universidad San Jorge	18.46	4.54
46	Universidad Europea de Madrid	10.22	6.82
47	Universidad de Almería	9.37	5.81
48	Universidad de Oviedo	11.49	7.60
49	Universidad de Burgos	4.88	12.85
50	Universitat Rovira i Virgili	7.44	4.54
51	Universidad Pública de Navarra	8.28	5.57
52	Universidad a Distancia de Madrid	7.44	3.10
53	Universidad Pontificia Comillas	8.22	4.25
54	Mondragon Unibersitatea	7.44	4.54
55	Universidad de Navarra	7.67	4.62
56	Universidad Pablo de Olavide	4.88	4.74
57	Universitat Ramon Llull	7.44	4.54
58	Universidad Católica de Valencia San Vicente Mártir	7.44	3.99
59	Universidad Pontifica de Salamanca	8.05	4.54
60	Universidad de La Rioja	4.88	3.66
61	Universidad Francisco de Vitoria Madrid	3.44	2.23
62	Universidad Nebrija	8.09	3.99
63	Universidad San Pablo CEU	4.88	1.68
64	Universitat Internacional de Catalunya	3.08	1.60
65	Universidad Católica San Antonio	2.09	1.27
66	Universidad Europea Miguel de Cervantes	2.79	2.94
67	Universidad Internacional Menéndez Pelayo	4.88	3.11
68	Universidad CEU Cardenal Herrera	1.22	4.62
69	Universidad Internacional Valenciana	4.65	1.60
70	Universidad Alfonso X El Sabio	2.09	1.27
71	IE University	4.88	1.68
72	Universitat de Vic	2.09	1.27

73	Universidad Católica de Ávila	2.09	2.23
74	Universitat Abat Oliba CEU	2.09	1.68
75	Universidad Camilo José Cela	2.56	0.88
76	La Universidad Online	0.00	0.00

Source: Own creation with data from `http://www.portalprogramas.com`

2.9.4 Regional FLOSS policies

For anyone in the world who is familiar with the FLOSS arena, Spain means Extremadura, to the extent that even *Wired* magazine reported on the region in its pages[106]. Indeed, as far back as 2002, Extremadura's political leaders took the first step towards a clear FLOSS-directed public policy. As one of the poorest regions in Spain, it had broad and clear goals at the time of implementing such a strategy:

- Providing all people with access to ICT resources, including the Internet as a public service
- Fostering technological literacy across the region
- Promoting new business models within local industry and develop a new labor culture

A few years later, the region had over 80,000 computers running a customized version of GNU/Linux called Linex[107] and had won the EU Regional Innovation Award in 2004 (Ghosh, 2005). The political changes in Extremadura in 2011[108] raised questions about the internal use of proprietary software within the administration itself. According to the new political leaders[109], Extremadura had spent large sums of money to promote free and open-source software, yet based its own large IT systems on proprietary solutions. Bad business, no real added value and just marketing rather than actual substance were other criticisms mentioned at the time. Previous administration reports[110], however, had indicated that over 60% of all software used by the Junta de Extremadura was non-proprietary, displaying a clear trend moving away from proprietary solutions. This controversy illustrates the political usage of this particular technology.

[106] http://www.wired.com/techbiz/media/news/2002/04/51994

[107] http://www.linex.org

[108] After ruling the region for almost 30 years, the Socialist party lost control of the government to the Partido Popular.

[109] See: http://joinup.ec.europa.eu/news/extremadura-administration-not-going-leave-free-software

[110] See: http://www.extremadura.com/general/un_estudio_revela_que_la_mayor_parte_del_software_que_usa_-la_junta_de_extremadura_ya_se_desarrolla_en_software_libre

FLOSS in Spain goes much further and deeper than Extremadura and Linex, being deployed in the fields of Education, the Health Service, Public Libraries, and the Public Administration. Andalusia reports over 255,000 units of its own GuadaLinex distribution, in the fields of Education, Guadalinfo Centers, Public Libraries, and other centers. As for Catalonia, a reported 60,000 units with OpenOffice.org are present in public schools (Amutio, 2006).

Since 2000, Fundación Telefónica has been publishing an analysis of the status of the ICT field within Spain[111]. Looking at the report from a historical perspective, the changes that ICT has brought to society in the last decade can be clearly seen. The report also includes a whole section on regional ICT policies, which provides a fairly complete overview of the main strategy and the role of FLOSS throughout the country[112]. Based on the facts presented in these reports and summarized in Table 2.14, three categories can be clearly distinguished:

1. FLOSS proactive and very active regions, where FLOSS is not only another area of public policy, but is the core around which the ICT strategy is built[113]

2. FLOSS conscious regions, where FLOSS is constantly appearing on the strategy agenda

3. FLOSS inactive regions, where no FLOSS policy seems to be carried out for longer than a couple of years

It is clear that the presented data does not cover the entire range of public FLOSS activity, but it can be used as an indicator of the level of public involvement the different regions have had over recent years. It is also important to highlight the fact that, of all the reported projects, only one has been quantified in terms of capital expenditure and milestones to be achieved (Galicia in 2010).

Regarding the impact that FLOSS public support can have on the private sector, Table 2.15 presents an overview of the adoption by businesses of FLOSS, by region. The fact that Extremadura is in second to last position in terms of the average, despite its clear public commitment to promote FLOSS, is quite surprising. The presented data relates to the use by businesses of any kind of FLOSS software. The lower level of adoption in certain regions could be linked to the particularities of the local economy. However, a much more detailed correlation analysis would be required in order to analyze each region's ranking details. Such research is outside the scope of this project.

[111] La Sociedad de la información en España, available online at http://e-libros.fundacion.telefonica.com/

[112] Each of the 17 regions provides their own section of the report, thus accuracy is not an issue.

[113] In other words, whatever the ICT initiative taken by the public administrators, it is usually carried out using FLOSS solutions.

	2006	2007	2008	2009	2010	2011
Andalucía	72/2003 Law	Portal + CESEAL (repository)	www.juntadeandalucia.es			Portal & MOAD ("Modelo Objetivo de Ayuntamiento Digital")
Aragón	DBE: promote free software (VI EU Framework)	FLOSS biz observatory	Join CENATIC + SMEs help	Internal software	SMEs training	.
Principado de Asturias	.	.	.	E-Admin FLOSS strategy	.	.
Illes Baleares	.	FLOSS biz observatory	Hospitality FLOSS	.	Hospitality FLOSS	.
Canarias	Some references	University funding	.	.	.	Portal at sede.gobcan.es
Cantabria	.	.	.	.	cantabria.es	.
Castilla y León	.	.	.	.	.	.
Castilla-La Mancha	Mollinux				.	.
Catalunya	.	.	FLOSS directory, LaFarga.cat & global strategy	.	Eines TIC (SMEs) + I2CAT	Workshops – proximity
Comunitat Valenciana	Corporate systems based on FLOSS	.	.	.	.	.
Extremadura	Linex, Vivernet (SMEs) and Cenatic	Linex SMEs and Admin (Squeak), Tech support (public & private) & industry promotion	Linex	'José de Espronceda', Linex (school and towns) + Observatory (Iberoamérica)	Espronceda center	Espronceda center
Euskadi	Some references	Some references	Some references	.	.	.
Galicia	FLOSS portals + mancomun.org + translation	Mancomun.org	.	Galinux	FLOSS global strategy (800k euros & 21 actions)	Continue 2010 strategy plus CENATIC
Comunidad de Madrid	.	.	.	.	.	.
Región de Murcia	.	.	.	.	.	Training platform based on FLOSS
Comunidad Foral de Navarra	.	.	.	.	.	.
La Rioja	Main portals open source	.	.	.	.	.
# Active regions	**9**	**8**	**7**	**6**	**7**	**6**

Table 2.14 – Public FLOSS activities by region (2006-2011)
Source: Own creation based on Fundación Telefónica's annual ICT status report in Spain.

Table 2.15 – Percentage of FLOSS adoption by businesses by region (2012-2013)

REGION	2013	2012
Andalusia	72.9	84
Aragon	69.6	81.3
Asturias	73.2	79.5
Balearic Islands	62.4	86.8
Canary Islands	71.9	84.5
Cantabria	71	75
Castile and León	71.2	80.8
Castile-La Mancha	69.6	81.2
Catalonia	69	84
Valencian Community	73.8	83.8
Extremadura	70.1	72.8
Galicia	74.4	80
Madrid	68.5	83
Murcia	71.8	85.1
Navarre	72.8	74.2
Basque Country	67.2	78.2
Rioja, La	72.3	79.4

Source: INE annual survey (2012-2013)

2.9.5 Public FLOSS actions at the local level

As of January 2013, there were over 81,117 towns in Spain. Yet, as presented in Figure 2.16, over 90% of the population lives in towns of less than 10,000 inhabitants. Under such circumstances, the local budget has little or even no room for promoting FLOSS, whether socially or to business. Instead, local public entities concentrate their efforts, if any, around adopting FLOSS for their own ICT needs.

Despite some very active entities like the Zaragoza municipality, no case study has been documented regarding FLOSS adoption at this level. Yet, two particularities detected in the field study seem to suggest room for such case studies:

- Due to the significant level of independence allowed to municipal technicians, those who are willing to implement FLOSS solutions often gain acceptance and support from local politicians[114]
- Since ICT needs at the local level are very similar, the level of activity sharing and promotion is very high compared to other administration levels. Towns that have succeeded in FLOSS adoption projects are willing to help other municipalities follow the same path

In the cited case of Zaragoza, which has almost 700,000 inhabitants, a FLOSS operating system has been implemented in one third of all desktop computers in town hall departments. Furthermore, it has developed FLOSS tools to control the IT infrastructure that have also been made available as free software to any interested person or entity. The whole FLOSS migration project has been consistently maintained over several years. Two complementary targets have been reported as significant achievements: cost-savings and security enhancements.

At a different level and scale, in 2009 the Mancomunidad de Municipios de Costa del Sol (Axarquía)[115] carried out and documented the different steps needed for its municipalities to make the shift to FLOSS. The project was called "Guia Migramos" (Let's migrate guide) and, for its time, it was one of the best documented efforts to help public bodies move from traditional proprietary solutions to fully open-sourced environments. Yet a lack of funding for the project resulted in the initial level of activity slowing down, to the point where even the website that hosted the project and documents has been abandoned.

The list of municipalities that have decided to partially or fully adopt FLOSS solutions for their needs is too long to list in this document. Echeverría (2007) mentions Benicarló and

[114] As will be highlighted, this is very often based on cost-saving proposals.

[115] A Mancomunidad is a supra-municipal entity whose task is to provide centralized services for the towns that have created it.

Table 2.16 – Population distribution in Spain by size (2013)

Population	Number of towns	Percentage	Cumulative percentage
< 101	1,193	14.70%	14.70%
101 - 500	2,670	32.89%	47.59%
501 - 1.000	1033	12.73%	60.32%
1,001 - 2,000	912	11.24%	71.55%
2,001 - 3,000	501	6.17%	77.73%
3,001 - 5,000	490	6.04%	83.76%
5,001 - 10,000	560	6.90%	90.66%
10,001 - 20,000	355	4.37%	95.04%
20,001 - 30,000	154	1.90%	96.93%
30,001 - 50,000	103	1.27%	98.20%
50,001 - 100,000	83	1.02%	99.22%
100,001 - 500,000	57	0.70%	99.93%
>500,000	6	0.07%	100.00%

Source: INE 2013

Zaragoza as the best examples of migrations to FLOSS in two municipalities very different in size and nature. This author also highlights the fact that smaller local entities have more difficulties adopting FLOSS solutions due to their lack of resources and capabilities. The main issue for small municipalities seems to be a non-existence of communication and capabilities to share efforts to face similar needs. In order to minimize those difficulties, several centralized projects aimed at fulfilling the needs of the local entities are usually carried out either from the central ministries or regional governments[116]. Abella and Segovia Romero (2007) listed some of the most relevant cases of municipalities that had adopted FLOSS solutions at the time of their research. The reported towns that had adopted clear decisions in regards of FLOSS and its relevance for local public management were:

- Benicarló (Castellón)
- Nava (Asturias)
- Santa Pola (Alicante)
- Sant Bartomeu del Grau (Barcelona)
- Villaviciosa (Asturias)
- Zaragoza (Zaragoza)

[116]Echeverría (2007) provides examples such as PISTA Administración Local, Proyecto e-ASLA, Proyecto Open Cities and Proyecto Guará.

More recently, other municipalities of relevant size, such as Castellón, Estepona (Málaga) and Barakaldo (Bizkaia) have been publicly reported as having decided to adopt FLOSS solutions for most of their ICT needs.

2.10 Wrap-up and final mentions on the literature review

The level to which public powers are required to intervene in social matters is a never-ending debate. A country's wealth and history are usually at the heart of the current arrangement of its institutions: over the years, societies have shaped both the state model and its role. This short literature review has presented a simple overview of the various approaches traditionally defended by economists. Furthermore, when it comes to such a "strategic" (and long-term) dilemma, determining which particular fields of daily life require public attention is an even harder task. This research has focused on the debate on public policies promoting FLOSS. According to some sources, the software market does not need any kind of regulation or intervention, because consumers regulate it through their choices. Yet, advocates for public support for FLOSS mention that all IP regulation is a form of intervention by the government. The purpose of this research is not to continue further along that path. While that debate continues, various different public actors have been implementing FLOSS promotion policies. The way in which such policies were designed is at the core of the research.

Designing public policies has traditionally been presented as a first step for efficient public management. Issues that are considered relevant make it onto the government agenda. Implementation and evaluation are the next natural steps: both need to be properly executed to ensure efficiency and efficacy. The opinions of the most qualified experts are presented with this in mind. The context in which public policies are to be executed is paramount. In this regard, two main fields of research were reviewed:

- Recent public policy trends and details in Spain
- The FLOSS phenomenon and its adoption by some Spanish public entities

Having reviewed the literature, the next natural step is to consider a set of propositions to achieve the goal of the research. In the light of all that has been reviewed thus far, the different premises will elaborate upon the various processes that lead to the final implementation of a policy or project promoting FLOSS within Spain. As defined in the goals set out above, the relevant information needs to be gathered and analyzed in order to gain a deeper understanding of the reality of the last ten years. The set of propositions detailed below is the first tool in order to effectively move in that direction.

Chapter 3

Main research goals and propositions

3.1 Research objectives

As explained above, a specific field of public policy has been selected for analysis: FLOSS adoption and/or promotion activities. The objectives of the **exploratory qualitative** study conducted have been decided based on the state of the art presented in the previous chapter. The main goal is to describe and test the reality of **how FLOSS public policy action takes place across different layers of the Spanish administration**. Four main areas, each with several propositions, are to be reviewed:

1. Public problems and agenda-setting
2. Actors and policy formulation processes
3. Decision-making models
4. Policy evaluation

A brief summary of these four areas and the specific goals in each one of them is presented next. Based on these defined objectives, the complete set of propositions and the rationale behind them follows immediately afterwards.

3.1.1 Public problems and agenda-setting

The hand of government is present all over modern society. Mass media, and more recently social media, usually set the focus on issues relating to daily life, calling for action by public

bodies. Yet, as noted in the literature review, the public administration has limited resources. Meanwhile, neoliberal theorists such as Friedman (2009) argue that modern free economies are more efficient when there is limited involvement of public powers. Choosing out of the "bucket of problems" present in society is both a choice and an obligation for those who command political power.

As such, the first objective of this research is centered on the process of establishing public problems. Taking the example of FLOSS, this will involve addressing the path that leads a certain authority to decide that there is a need for action. Identifying which steps are taken in order to decide that a situation is a public problem is half of the aim of this part of the research. The other half is centered around setting the agenda. The part of the agenda that politicians allocate to ICT-FLOSS technologies is of key interest to the researcher. Public policies in the field might be the result of a set of actions that starts with problem definition. The next logical step is to incorporate these problems, or, put another way, desired solutions, into the agenda for subsequent periods.

Nevertheless, it must be stated that often, FLOSS deployment decisions may be taken without previous planning or deep analysis: it could simply be a case of widely recognized technical superiority (Chopra and Dexter, 2008). The focus of the research will not cover such cases. It will instead center on cases where there is possible conflict over the final choice. Needless to say, proactive policies to promote FLOSS usage by society are also included within the target scenarios.

To sum up, this part of the research focuses on the steps taken **before** a FLOSS public policy is adopted, excluding cases that involve a purely technical choice. The review of these steps will look at whether or not paths defined theoretically are respected and maintained.

3.1.2 Actors and policy formulation processes

It is commonly accepted that the level of FLOSS public policies in Spain is significant. The role different actors play in the inception of such policies forms the basis of the second set of propositions. Of all the actors who interact both in calling for and blocking such public action, the research will concentrate on the two main players: politicians and civil servants. The analysis will have the clear objective of understanding the role that both groups play as part of the process of new FLOSS initiatives. Rules and regulations provide politicians with decision-making power. Therefore, they are expected to play two roles: active leaders and gatekeepers. The former includes steering the organizations they lead towards FLOSS policies; the latter is a much more passive role in the sense that politicians can decide upon policy proposals coming from other active actors.

The objective of the research is to gain an exploratory understanding of both roles from the perspective of where and how FLOSS public policies are originated. In particular, the

existence of bottom-up initiatives and the proportion of such initiatives in relation to total FLOSS activity will be digested.

3.1.3 Decision-making models

Not all decisions are alike when it comes to public policies. Basic theory calls for analysis and meditation before action. Yet, life itself proves to us all on a daily basis that acting in a timely manner is the first step to acting right. In terms of public policies, various authors have highlighted the circular, almost chaotic, nature of public decision-making procedures. Selecting FLOSS as a determined field of action, the objective of this part of the research is to analyze the process by which decision-makers reach the decision to start a new policy or project. Some of the most relevant academic models will be compared to the reality in the field in order to ascertain which is closer. Both the "garbage can" model and the incremental approach will be compared with the accounts of the interviewed actors. The specific objective of the research is to determine both similarities and links between organization size and decision-making models.

3.1.4 Policy evaluation

As seen in the literature review, modern public management trends are reinforcing the positive aspect of proper evaluation of policies. It has also been noted that the Spanish public administration has traditionally lacked a culture of evaluation. However, the entry of the country into the EU and the significant amount of subsidies received has promoted a new culture of evaluation. The objective of this part of the research is to review some basic aspects of policy evaluation from within public bodies.

These basic aspects are grouped into three different areas:

- *Ex ante* definition of goals in public policy
- Targets defined by public policy evaluation (outputs vs. outcomes)
- Existence of complex evaluation methodologies

A set of premises is presented in order to find out how the expected returns of a policy are set beforehand (*ex ante* definition of goals), to what extent *ex ante* goals reflect outcomes rather than outputs (within an area with a strong technical emphasis) and finally, what methodologies are applied within the public administration in order to perform this evaluation (the presence of counterfactual cases). All three objectives are addressed with individual propositions, as set out next. Evaluation, not being an isolated field, is the natural consequence of other aspects already presented within the objectives of this research.

The way in which actors interact, decide on public problems, prepare agendas and create policies, as well as the decision paths taken along the way, are all aspects that have a direct impact on both feasibility and periodic standard evaluation processes.

As such, all of the objectives presented in the various groups are no more than an interconnected set of explanatory qualitative findings. As has already been noted, it cannot be stressed strongly enough to the reader that drawing correlated conclusions was in no way part of the objectives.

The next section presents the way in which the expressed objectives are transferred into premises and the rationale behind each one of them.

3.2 Presentation of research propositions

The defined research objectives are now transformed into a set of propositions. These premises will provide the level of information required to achieve quality results. In line with the objectives of the research, four main groups of propositions will now be presented and discussed. The topic addressed by each one of them is presented along with the rationale behind it. They follow the natural order of public policies, from initial problem definition to final evaluation.

Each set of research propositions is divided into two or more specific areas of review. The reasons used to decide each targeted specific question may come either from the personal observations of the researcher[1] or from the literature review or from both. Depending on the current level of exploratory insight in the specific field of FLOSS public policies, the propositions will be formulated in a narrow or broad manner.

The link between the details of each set of premises and the goals described above will be briefly explained next. In order to help the reader understand the context of the topics, a brief description of current research within each specific field is presented. Given the broad nature of the research and the topics covered, the details provided with regard to current academic reviews are only a non-exhaustive selection of tips. They will help guide those interested in gaining a deeper knowledge in the areas in question and provide a single entrance into the friendly field of public policy research.

[1] As will be detailed, most of these come from the previously mentioned Public Administration FLOSS newsgroup, of which the researcher has been a passive member for the last six years.

3.2.1 In search of solutions to address public needs or problems in search of a public need: defining the agenda as a first step

As has already been described in the literature review presented above, "to do or not to do" is always the first step in terms of public policy decision making. Bardach (1998) has proposed a technique to ensure that prior to any public action, all relevant aspects are reviewed and considered. The author himself states that the main function of his proposal is to avoid mistakes resulting from not taking into account *ex ante* topics that influence the correct planning of any given public action. In that sense, there is a risk of this technique being adopted as an end, rather than as a means. This should not distract the analyst from having a general perspective and a sense of the global issue which is present in addition to any "engineering" tool. In other words, the best problem definition means nothing if it is not utilized to really attack and solve the public problem that has been detected and agreed upon.

Taking into account the above-mentioned disclaimer, the eight steps defined as being relevant by Bardach are[2]:

- Problem definition
- Information gathering
- Alternative construction
- Criteria selection
- Results projection
- Cost analysis
- Decision making
- Tell your story

Any of the above steps incorporate enough complexity to foster long and complex debates. Instead, this proposition will go no further than the first step: problem definition. Defining a problem in the public arena is a complicated task for various reasons. The idea of a public problem elaborated to solve a market failure seems quite straightforward. However, the goal of a public policy can be of diverse nature. The simplest approach would be public action meant to solve deficiencies or excesses present in the public domain. However, not all public decisions have simple propositions. The selection of alternatives meant to address

[2]The model presents them as linear; there is no need to restate here that the public reality is circular in nature. Wildavsky's famous saying that likens policy to trying to hit constantly-moving targets is the best simile in terms of illustrating such complexity.

established public services can also be considered to be the field of problem definition[3]. Furthermore, there might be agreement on a public need but strong disagreement across the board about the way in which the goals need to be addressed[4].

Quantifying an issue is also part of the process of defining it. Words such as "big", "important", "urgent" and the like are often presented to public opinion in order to justify actions. Academic public analysts will reason that public problem definition needs to quantify the relevant aspects to the best possible level. Such detail will not only help carry out further steps, but will be paramount to draft conclusions throughout the life cycle of the policy. The conditions in which public action needs to be taken are to be considered as well; the definition step has to include such conditions. Finally, momentum is the last ingredient of the recipe: like a photograph, problem definition reflects an issue at a moment in time.

Language plays a key role in problem definition: the same issue can be defined in multiple ways. Public advisers have by now mastered this technique: often, the political definition of a given issue includes its own solution. Public opinion embraces the solution once warned about it[5]. This is the key reason why each actor has its own definition of the problem. When there is a basic agreement among actors on public definition, a much better approach can be proposed. Nevertheless, conflict is a common ingredient in the public arena. On top of the long-established scenario, new and unexpected actors are now gaining momentum as part of the public relevance of social networks. Moreover, social networks are environments where FLOSS-friendly communities are very present and active.

Within such a context, **problem definition** in the FLOSS field is clearly a source of debate. As already presented in Table 2.8, some authors, such as Smith (2005), clearly see no need for public action in the software arena: the market is savvy enough to self-regulate and innovate towards better solutions for end-users. On the other hand, although there do not appear to be any relevant authors defending direct public subsidies for software production[6], other authors see room, to a greater or lesser extent, for government involvement in FLOSS-related topics. Public procurement, open licenses for publicly funded software and patent regulations are the main areas in which a clear debate is currently in progress. Several authors (Comino and Manenti, 2005, Ghosh et al., 2002a, Lee, 2006) argue that supporting FLOSS within a given region will foster the local software industry as well. Those who support public engagement with FLOSS use this argument on a regular basis: instead of paying licenses and fees to foreign multinationals, the administration would be better off adopting FLOSS,

[3]For example, take the different alternatives of domestic garbage collection, and the public controversy that can be created given the direct impact on the daily lives and habits of residents.

[4]For example, pollution and all of its complexity is a quite basic example.

[5]"Due to high salaries and severance costs, Spain has very high unemployment rates" is a recent example of public problem definition that includes the forthcoming solution.

[6]Except for some authors who defend public free software development, as presented in the literature review.

since this would help a network of SME's based on local support to flourish in the region. However, no empirical research has been carried out on this particular topic in Europe to date.

Problem definition is the very first step in crafting the policy agenda. Of the multiple social problems faced by modern societies, elected politicians must choose some and discard all the others within a given time-frame. The detailed premise presented next attempts to focus on how problem definition and agenda-setting processes take place at different levels of the Spanish public administration.

3.2.1.1 P 1.1: Classic problem definition steps are not formally documented and reviewed in ICT-FLOSS topics

Based on the facts presented so far, the main areas in which clear policies in support of FLOSS have taken place within Spain are:

- Interoperability: as a goal fostered by the EU with the aim of facilitating e-government across all levels of administration
- Education: various regions have carried out policies to foster digital literacy in school and public Internet facilities, usually by means of Linux distributions
- Industry: various forms of FLOSS business promotion have been attempted[7]; authors like (Roeger, 2001) have best analyzed and described the direct role of ICT in economic growth
- Cost-savings: internal usage of FLOSS solutions has a direct impact on license fee cost-savings, despite the continuing debate over TCO

Prior to the activation of a new specific public policy from the public powers towards society, some formal steps are recommended. The problem that needs to be solved has to be clearly identified. Bardach (1998) insist on the relevance of good problem definition. Only then can it be ensured that all the required tasks can be performed in order to complete the project. Problem definition provides a sense of direction to obtain evidence and information. Bardach suggest some of the steps required in order to achieve proper problem definition. The first move would be to think in terms of excesses and deficiencies present in society. This technique works very well, except for in two scenarios:

- Issues where very well defined objectives have to be addressed

[7]Direct investment, public capital risk or indirect subsidies, mainly.

- The decision is to be made in terms of choosing from several well-known technologies for a given topic

An evaluative description of the problem is also preferred, so that the nature of the problem can be diagnosed in a very accurate manner. Quantifying is also a desirable option, although not always possible. Guesstimates can be used for cases where a starting reference might help in problem definition. Root cause analysis is another necessary tool, because public action might be required to redirect the origin of the problem. A final remark is mandatory regarding problem definition and opportunities: not foreseeing a problem ahead of time is a lost opportunity, mainly because the best available solution can be included within other policies already in progress.

Along these lines, the proposition presented here is that, in terms of FLOSS policies, problem definition is not of a structured nature. Observations from the author as a public worker suggest that problem definition as an "academic" step with all the deliberation and analysis required is not possible in the policy decision-making process. Furthermore, observations from the public administration ICT bureaucrats newsgroup seem to reflect that FLOSS promotion is incremental in nature. FLOSS is seen by decision-makers as a tool to address public needs rather than a problem-solving action. This premise will be addressed within the field study, based on the methodology described in the next chapter.

The relevance of this statement is in line with the controversy concerning the existence of market failures and the need for public intervention in the software arena, as presented in Table 2.8. If the arguments defended by Evans and Reddy (2003) and Smith (2005) are correct, no real problem analysis of any kind is to be found prior to policy definition. If, instead, those who claim that market self-regulation needs to be amended by public powers (Lessig, 2005 and Comino and Manenti, 2005, among others) are right, the problem definition step is mandatory in order to understand the nature of the actions required.

3.2.1.2 P 1.2: ICT-FLOSS problems are not usually present in public policy agendas across the levels of empowerment of the various administrations

It is clear that the visible hand of the public sector cannot hope to solve all social problems. Limited resources mean that decision-makers must choose the problems they are to address. The areas in which public action is **possible** will clearly take preference. In this sense, previous to any decision, politicians might look at those issues that can be put right and that may generate positive reviews from the mass media agencies. In such cases, it is stated that there is a "solution in search of a problem". The topic is then brought to the attention of news agencies, and the politicians subsequently harvest the legitimation of including certain issues on the agenda.

Another "solution in search of a problem" is present when intra-public subsidies are granted for well-defined closed policy projects. This can be considered in terms of EU-fostered programs, in which public actors provide monetary subsidies for issues that otherwise would not have been tackled. Only when the money is granted are specific new problems identified and defined, in line with the recently-received funds. The tragedy of such public subsidies is that, the distance between the decision-makers and the street-level bureaucrats is often so large that funds are misused and real needs left unattended to, because of the local particularities.

The seminal work of Elder and Cobb (1983) clearly defined five key attributes that a public problem needs to have in order to cross the gap separating it from the final agenda on any given administration level:

- Specific issues...
- ...with social relevance and...
- ...defined time length and...
- ...low complexity with a...
- ...previous historical record

Those who lobby for much stronger FLOSS public action point to a set of problems that FLOSS policies are intended to solve. However, such problems (technological dependency, transparency, cost-savings, etc.) do not fulfill many of the "required" attributes. FLOSS is a broad topic, has little social relevance outside ICT-related groups, and is a project for long-term action with a significant level of complexity and no relevant previous records on the policy agenda. This might be the main reason for a lack of ICT-related topics on the Spanish State agenda, as already discussed in the literature review. Such an absence of ICT topics on the public agenda has been documented in great detail by the Spanish group of the Comparative Agendas Project[8].

Agenda setting is a broad and complex topic, as presented by Kingdon and Thurber (1984) in his classic book on political science. The authors distinguished two groups of actors involved in agenda setting: participants on the inside of government and participants outside government, "but not just looking in". Within this second group, they acknowledged the relevance of election-related participants. Closer to home, both in terms of time and space, McCombs et al. (1997) reviewed the effect of newspaper and TV news coverage of the 1995 Spanish local and regional elections, focusing on agenda setting. They concluded that the image Spanish voters had of political candidates and their proposed agendas was heavily

[8]For more information, see `http://www.comparativeagendas.info/`.

influenced by media coverage. As for the impact on agenda-setting after the elections, it might come as a surprise that Baumgartner et al. (2011) concluded that issues addressed by policy-makers are not governed by elections. Such findings, if proven right, assume the rejection of the so-called 'standard model' of agenda-setting in comparative analysis. According to this new approach, three key elements need to be reviewed: information, preferences, and institutions. The cited authors suggest that the role of information in agenda-setting needs further exploration, since policy change often originates from the emergence of new information and policy learning. The case of FLOSS is a good opportunity to test the latest discussions concerning the analysis of agenda-setting. The role of information flow and stakeholders in new FLOSS policies and projects will be reviewed, the premise being that ICT-FLOSS topics are not usually part of the agenda-setting "checklist" and that when it materializes it is through new information based around a specific need.

These expectations are drawn from the work of Chaqués-Bonafont et al. (2014a). As has been presented within the literature review, IP and ICT topics have had a minuscule presence in Spanish politics over the years (see Table 2.11). The proposition adds the possibility of testing if the detected "lack of relevance" of ICT policies on a macro level does indeed translate into the various layers of policy making agencies across the nation. It also provides an opportunity to review the process in which all actions detected and described at the national, regional and local level (except for those fostered by the EU) are implemented.

3.2.2 Actors and the public policy formulation process: where and how policies are initiated, shaped and designed

When describing the policy-making system in the U.S., Birkland (2001) differentiates between official and unofficial actors and their roles. Official actors are defined as participants in the policy process whose involvement is motivated or mandated by their official position in a government agency or office. Public workers or civil servants are classified within this group. Unofficial actors are participants in the process who do not have constitutionally or legally created mandates to be a part of the process. The first group includes the legislative, executive and judiciary, whereas experts, researchers, interest groups and the media are defined as unofficial actors. The particularity of FLOSS public policy formulation is that the interest group is often within the administration, being made up of its own public workers. Bureaucrats are official actors by virtue of their working contract, yet unofficial actors as part of an interest group that supports better usage of public funds. On top of this, the intrinsically technical nature of ICT in general and FLOSS in particular has historically kept it away from mainstream media debates. This is the fundamental rationale of the first area that will be researched.

The main schools of research in the field of policy process are presented in Table 3.1. The scope of this research does not allow a detailed analysis of the policy process to be performed.

However, for the purpose of helping understand its rationale, it must be stated that the trends within which the conducted field study could be located are Social Construction and Design (analysis of how policies are shaped and designed) and Policy Diffusion (adoption or promotion of innovative tools).

Based on the main policy process theories that have been defined, a first premise to be tested with future case studies is presented herewith. The field of the public policy formulation process in the particular case of FLOSS and the Spanish public administration is to be researched. Despite a significant amount of studies on public policy actors and their roles, no specific academic project has concentrated specifically on FLOSS in Spain to date.

The statement to be tested is mainly based on observation and follow up of newsgroups: it seems that a significant proportion of initiatives are originated, shaped and designed by public workers from within the organization. The projects are then presented to the decision-makers in a bottom-up direction. Such offers are then reviewed based on the expected advantages that such projects represent, as opposed to previously adopted solutions, if any. The role that ICT bureaucrats play in these processes is the target of the first specific proposition presented.

The second part of the targeted proposition is the complex question of project survival and development. The same idea is also central here: it is civil servants who continue to push forwards and keep initiatives alive and sound, rather than structured political agendas.

3.2.2.1 P 2.1: The role of bureaucrats: the concept and potential of free software is mostly promoted bottom-up within the public administration

As a privileged observer of the evolution of the Spanish administration, Nieto (2012) explains how the constitutional liberal State was born in Spain in the XIXth century structured into two subsystems: political and bureaucratic. Both structures were born mutually interdependent: there was no single top-down approach in terms of power and command. He provides an insight as to how, right from the inception of the Spanish administrative system, the bureaucratic layer exerted a significant amount of pressure on power holders. The decision-making filter allocated to the bureaucrats, which is mainly based on technical conditions, was significant. Many decisions required their unofficial support in order to be implemented. The cited author even affirms that, in order for a politician to enact certain decisions, she often required the approval of those who were to implement it.

According to Nieto, the situation has not changed with time. Instead, it has even worsened, as the top layer of bureaucrats has been modified at periodic intervals depending on the political party ruling any given administration. Furthermore, the boundaries between both layers have weakened such that top-level bureaucrats are usually those who are aligned with the ruling party. Continuity is only granted in the event that the same person continues

Table 3.1 – Established Theories on Policy Process

Theory	Focus areas	Authors
Advocacy Coalition Framework	Rationale behind the formation of coalitions, policy learning, policy change, and the role of policy brokers in the policy-making process	Jenkins-Smith (1990); Sabatier (1988); Sabatier and Weible (2014)
Institutional Analysis and Development	Components necessary to facilitate communication across diverse disciplines including political science, economics, anthropology, geography, law, and social psychology	Kiser and Ostrom (2000)
Social Construction and Design	Normative aspects of policy-making	Schneider and Ingram (1993)
Punctuated Equilibrium	Political processes comprise long periods of stability spiked by points of disequilibrium	Baumgartner and Jones (1991); Jones and Baumgartner (2012)
Policy Diffusion	Processes through which a government adopts innovative (new to this particular government) policies	Berry and Berry (1999)
Multiple Streams	How policies are made by national governments under conditions of ambiguity	Kingdon and Thurber (1984)

Source: PSJ Yearbook (`http://psjyearbook.com/`)

to hold the position of political leader. Ruling politicians have managed to provide career opportunities for the higher layer of public workers based on loyalty and obedience or complaisance. Such is the framework in which this statement needs to be understood.

At lower levels of the public sphere, the public officials in charge "manage" the politicians to go their way. Nieto's view on the evolution of the public sector in post-Franco Spain is quite pessimistic. However, the observations around FLOSS seem to suggest *a priori* that it is the lack of knowledge and awareness of FLOSS in the political layer which forces diligent public workers to promote technological solutions. The bureaucrats push for solutions they believe to be clearly superior in the interest of society. With regards to FLOSS, apart from some significant exceptions, it is simply not present in the proposals and agendas of the main political agents. This approach seems to be in line with the historical trend in Spanish policy-making as defined by Subirats (1992) where actions are taken in a reactive manner. FLOSS-conscious public workers promote defined actions to politicians, who then react with approvals or rejections[9]. Therefore, this proposition states that active FLOSS projects are usually crafted and promoted by ICT public workers.

The relevance of the proper alignment of the various actors in policy implementation as described by Lipsky (2010) is very significant when it comes to ICT. Policy promoters, developers and implementers need to embrace new challenges with a similar level of enthusiasm in order to guarantee the best achievement of desired results.

3.2.2.2 P 2.2: Gatekeepers and hidden actors: public entities that have implemented public policies concerning FLOSS have maintained their efforts aligned around a single view over time (with or without political change in power)

Whether public or private, individual or collective, actors play several roles around a given public policy: promoters, directors, opposition, allies, mediators, gatekeepers and filters. This part of the analysis will be centered around the role of politicians in the implementation of long-term FLOSS policies. Apart from some projects that have gained significant visibility within Spain, political actors seem to stay in the shadows, acting as gatekeepers. The existence of clear involvement in policies concerning FLOSS can be a sign of a positive gatekeeper. On the contrary, no FLOSS action at all might be a sign of a reluctant gatekeeper. The ICT-related political agenda, which includes FLOSS[10], might be modified at different periods of time driven by politicians' own beliefs or pressure from stakeholders and lobbies.

On top of the above framework, Subirats (2001) states that the weak democratic tradition in Spain (as compared to most of its European partners) has led to very little visibility in

[9] As per the defined public research, promoted projects that were never authorized are out of the scope of this research

[10] As a means for broader policies or as an end in itself.

decision-making scenarios. A great deal of influence seems to be allocated to technocrats, while participation from civil society and promoting entities remains weak. Indeed, lobbying activities are regarded as contrary to the public interest, based on legal tradition. Yet a lot of lobbying takes place behind the scenes through direct contact via personal and economic relationships. Thus public interest bodies should embrace and adopt the form of promotional coalitions to gain influence on regulatory policies. Moreover, as Spain is transferring policy decision-making power to the European Union, just like any other of its members, civil society should articulate new tools to defend its demands in terms of policy-making and welfare-maintaining efforts.

In May 2005, Bill Gates, founder of Microsoft, visited the Spanish President, Mr. Zapatero in Madrid. As part of their conversation, Mr. Gates praised "one region of Spain that has excelled in a new teaching experience". The media pointed immediately to Extremadura as the region Mr. Gates had referred to[11]. Was the founder of the icon of the proprietary software industry praising FLOSS? As it turned out, the reference was made to Aragon, where a project to foster the use of laptops in elementary schools was being implemented in partnership with Microsoft. On top of all the noise that was created around this confusion, it might come as a surprise that Extremadura and Aragon are both regions that were ruled by the Socialist party at the time. Same political party, two completely different approaches to ICT and education. This fact suggests that views on ICT strategic policies are decided at the regional or local level, rather than being part of nationwide party guidelines.

The gatekeeper role and the lobbying activities of hidden actors have a relevant impact on the consistency of FLOSS over time. The phenomenon of the politician as the gatekeeper of various policy proposals was expertly reviewed by Dahl (2005). His seminal work presents a pluralistic approach to politics, in which interest groups compete for the favors of decision-makers. The latter act as mediators with a clear gatekeeper role. Public policies need consistency and a clear vision if they are to be effective over the years. This holds even more true in the case of matters relating to technology. Often, the adoption of a new set of technological solutions in a given area is implemented at the expense of the previous ones. If no standards are maintained and respected, this situation becomes even more complex to manage[12].

The moment when a new FLOSS policy takes off somehow signifies a change in equilibrium. Based on the work of Baumgartner and Jones (2010), there seems to be evidence that two elements are needed in order for significant shifts in policy to take place: a crisis environment together with a paradigm shift. Furthermore, if the real promoters of FLOSS programs are public workers, programs could be expected to last over time, mainly because of the usually

[11] `http://www.enriquedans.com/2009/06/bill-gates-zapatero-y-el-affaire-extremadura.html`

[12] This can be illustrated with the straightforward example of a town that modifies its household waste collection system, deciding to start collecting waste door-to-door with new smaller-scale vehicles, while in the previous years it had invested in large-scale shared underground containers.

slow turnover rate of these bureaucrats within the administration. Changes in gatekeepers, both in terms of the individuals concerned and the political trends at play, are expected to be key in order for a policy to continue to move forward or be abandoned.

If one takes into account the short terms of office[13] and persistent changes in trend in a liberal-conservative balance of power, continuous changes in approaches to ICT policy are to be expected. Thus, the premise of continuity in FLOSS policies proposed here could be seen as counter-intuitive. Socially perceived ideas about the political desire for change, regardless of the success or failure of previous programs, would suggest that FLOSS policies are of a pendular nature.

Based on activity monitoring and the observations of researchers, those regions that are more active in terms of the level of public support for FLOSS activity seem to maintain their projects on a long-term basis. This observation is drawn mainly from publicly available data. For instance, the 2011 change in political leadership in Extremadura[14] does not seem to have had an impact on the level of FLOSS activity. Changes in the local and provincial ruling parties and the effect of these changes on ICT policies are much harder to identify, and this must be done on a case by case basis.

The proposition, as explained so far, states that FLOSS policies, when maintained long-term, are due to the positive acceptance of the politician-gatekeepers. This statement comes mainly from the consistency of the policies described within the FLOSS public policies section of the literature review. As has been described, policies promoting and/or adopting FLOSS have been either constant or nonexistent over the years. It seems that the decision to install such strategies is closely linked to the ICT views embraced by the governing politicians.

3.2.3 Decision-making models: strategic, garbage can or muddling through

The political organization of the Spanish territory provides the various levels of administration with a significant level of autonomy in terms of policy design and implementation. However, the path that leads to a positive decision to adopt FLOSS public policies can be of a diverse nature. Modern policy-making decisions present an increasing level of complexity, uncertainty and conflict. Decision making is probably one of the most difficult tasks in management, and it is even more complex in the public arena. The impact of a given public policy can extend from the immediate to years or decades. It might affect significant groups of citizens directly or indirectly both in a positive or negative way. These same citizens can today communicate among themselves very easily, thanks to the enormous ubiquity of social

[13] 4 years for every public institution across the nation.

[14] Where years of Socialist regional government made the promotion of FLOSS a flagship policy.

media tools. Thus, protests against new political decisions can be immediate, strong and lasting.

The path that leads to decision making has been a topic of debate and research at the academic level. Public sector decisions might focus on the means (how to govern public health) or about the ends (decreasing infant mortality). This approach differs from the private sector, where resolutions are centered mostly on final goals. In these environments, the choice of means to attain pre-defined objectives is addressed only once those objectives have been decided upon. When it comes to public policies, analysis of the decision-making process can be split into four main schools of thought:

- The rational choice theory
- Limited rationality
- The incremental approach
- The garbage can model

The classic **rational choice** model is based on the dominant idea that elections are the result of a set of structured and properly organized tools and steps. In other words, choice is a natural consequence of logic. The "rational actor" has her own ranking of priorities in terms of values and objectives. She is also aware of the means required and available to attain such goals. Moreover, it is possible to evaluate the consequences of each possible alternative action plan. The costs of each possibility can be calculated. Then, and only then, will the actor choose the option that maximizes profit and minimizes costs. This model, which is heavily present in the private sector, assumes that it is possible to have a clear segmentation of objectives and means. Moreover, the goals are clearly determined before the decision-maker starts to decide upon methods. The actors are able to order their preferences and can perform a rational analysis of the alternatives and their consequences. The time required for analysis is not an issue. Since all of these requirements are extremely hard to meet, when failure occurs, there is plenty of leeway for explanations, along the lines that things did not work out because of the ingredients missing from the complete rational formula. The path proposed for better implementation of future policies is increased rationality for future decision-making processes.

The limits of the rational choice theory were highlighted by Simon (1965) in his seminal work about administrative behavior. He states that the rationality of any given actor is limited to a certain goal, which might not be completely defined right from the start of the process. Getting to know all the objectives, and alternatives, and their accompanying consequences, is not feasible, because humans have cognitive limitations. Time constraints are usually an added element in the analysis equation. The **limited rationality** school reasons that decision-makers guide their actions based on good enough paths. Since it is not feasible

to create and analyze complete rational choices, best available options are selected, being considered "satisfactory or good enough". This "feasible" rationality is based on individuals' incomplete knowledge and preferences. As described in the Condorcet paradox[15], these preferences make it impossible to design a unique solution for social welfare as the sum of all individuals desires. Collective decisions are thus a challenge for the policy-maker.

"The science of muddling through" (Lindblom, 1959) is the seminal work of the **incremental model** approach. According to Lindblom, the values, objectives and analysis of any given project cannot be considered in isolation from each other. Instead, they are closely intertwined: ends and means are not so easy to differentiate. The ability to analyze the means required in order to achieve desired outcomes is often limited or inappropriate. Highly relevant consequences are thus neglected at the analysis stage, which means that alternative policies are not considered and important values are disregarded. Lindblom draws attention to the fact that decisions are not the act of a single individual. Instead, decisions are the result of intense social interactions. A set of different actors with diverse objectives and rationale take part in the process. Even in the rare event where the act of deciding falls to a single actor, she will take into account the preferences and resources of the rest of the relevant actors. Fear of vetoes or disruptions to implementation are present in the mind of the decision-maker. As a consequence of the above, it is clear that policy-making processes present a duality: diverse actors have interests and goals in constant conflict, but need each other in order to move forward. This process is what Lindblom defines as "muddling through", which refers to the fact that actors work "independently together" to maximize their benefits in a somehow "imperfect symbiosis".

Finally, Cohen et al. (1972) argue that the organizational choice takes place in the "**garbage can**". This model concentrates on decision making when objectives are not well-defined, technology choices are ambiguous and/or the actors' behavior might change over time. Under such circumstances, the casual encounter (in the garbage can) of problems, solutions, participants and opportunities craft the final decision that results. This metaphor suggests that the actors involved throw problems and solutions into different buckets. The final garbage mix in any given can is influenced both by the waste that it is expected to receive, the garbage being produced at a given time, and the frequency with which waste is collected. Even in business organizations, partial objectives can be of a diverse nature, for example debt ratio, liquidity, dividend policy, market share, productivity, market value, etc. Different participants will then engage to reach agreement as regards the best decision. The best example can be represented by product stock levels in a manufacturing business. The finance department tries to reduce them as much as possible to ease capital needs and reduce obsolescence, sales managers want to have the whole end-product range in stock to maximize sales, whereas the production manager is concerned with having more than enough raw

[15]Scissors, paper, stone.

materials available on-site. Under the direction of general management, they will all have to reach an agreement. Actors in public policy are much more diverse, and the role of an executive CEO is not present. Decision making is thus an evolving process, a kind of game theory event. Actors will modify and adapt their preferences throughout the process based on the behavior of the other players. Time also plays a key role, as actors might lose interest in order to focus on other more relevant needs. Global circumstances also have a direct impact on the feasibility of demands over time. The relevant actors might change over time, with some leaving the scene and others gaining relevance as time goes by. Therefore, the time context becomes the key element in order to interpret the final results.

A problem and a feasible solution find themselves together in a garbage can at a moment in time by chance. It is then that decisions happen. This model presents some strong implications in terms of the decision-making process: along with problems that need public action, one can find solutions that need a problem and actors whose only goal is to satisfy their interests. Kingdon and Thurber (1984) elaborated the multiple stream approach in which they try to explain why certain topics make it to the final agenda. According to this proposition, three different flows are present in public policy decision making:

1. The flow of problems: this consists of all the topics that actors consider need public action

2. Public policy flow: the starting point where ideas and solutions appear and disappear

3. The flow of politics: this specifies the urgency and relevance of a topic in the agenda

Every now and then, the three flows come together. This is when the possibility of addressing an issue with a specific project opens up. The merging of the three flows can be the consequence of directed actions or it might happen unexpectedly.

Although the garbage can model is descriptive by nature, this school also has some recommendations for policy agents. Its proposals push for action when faced with complex issues. Rather than trying to simplify complex actions, so that they can be treated with the usual tools, it promotes simply moving forward. Such haphazardly decided partial movements are then expected to bring the issue to unexpected simpler scenarios. Less restrictions and complexity will then help the decision-maker address the topic according to a more formal protocol.

Out of the four decision-making models presented, the following detailed propositions focus on testing which ones are present in the Spanish public administration, according to size.

3.2.3.1 P 3.1: Large-scale organizations where significant projects have been developed correspond to the garbage can decision-making model

Observations by the Spanish administration FLOSS newsgroup and general news on ICT topics seem to suggest that the garbage can model is, in essence, present in large-scale initiatives. It seems that many public entities are aware that FLOSS is something that might help them, but do not have a very clear idea as to how to leverage it. In other words, they react to what FLOSS lobby groups and individuals request, so as to move in that direction in cases where and when the three flows, as defined by the garbage can model, are present. This premise will review the garbage can model for large-scale projects: when the various required flows merge, FLOSS-related initiatives take root. Moreover, when and if any of the flows move apart and are no longer present, the chances are that FLOSS policies may vanish. If the proposition is proven to be correct, this would imply that it takes the place of any rational choice scenarios and long-term vision and planning.

These observations seem to be aligned with recent academic research. When reviewing ICT public decision making, as briefly mentioned in the literature review, Fardal and Sørnes (2008) report the presence of the garbage can model. Their findings conclude that such a model is of high quality at the organizational level. Meanwhile, Hall and Löfgren (2004) reviewed the Swedish government's new ICT policy in the 1990's as an experiment to move away from the previous public policy methodology towards dialogue, networks and visionary hearings "in an age characterized by deregulation, new paradigms in governance and a welfare state in transition". The authors conclude that institutions created on an ad hoc basis for this change in the governance model ended up as real "garbage can" entities for issues that traditional institutions are not capable of handling.

3.2.3.2 H 3.2: In smaller organizations, FLOSS projects are of incremental nature

This proposition will review FLOSS activity in smaller scale organizations, namely at the local level of the public sector. It has already been discussed that initiatives at this level are reduced mainly to FLOSS being adopted for internal usage. Based on the observations of participants in debates in public newsgroups, it seems that such initiatives are often founded once new needs are detected. The muddling through model (Lindblom, 1959) states that the key element for decisions is ultimately agreement between the actors. Local public workers in charge of ICT and politicians in their role as gatekeepers are usually the actors that reach incremental agreements to push new FLOSS initiatives. Messages in the newsgroup in search of help from other organizations suggest this is the most frequent scenario. Participants there often look for other members that might have implemented any given solution for similar needs. A statement of "no opposition" from the decision-makers

is very often presented as a "green light" to move forward when a new project overview is presented. The slides of various FLOSS public group meetings in the past[16] suggest that FLOSS is often adopted as a natural progression when new projects or needs[17] are detected. Under such circumstances, the muddling through typology takes place, led by the ICT workers in charge with the approval of the political leaders. It is important to highlight that Lindblom did not tie his decision-making proposals to organizational scale. On the contrary, he defended that this model was preferred to any "impossible" rationale[18]. In the observed scenario, FLOSS solutions are being used alongside previously implemented proprietary ones in a clear incremental reality. The premise that this behavior is typical of small-scale public organizations will be tested, once again, based on the methodology designed for the research.

3.2.4 Output versus outcomes in a technological world: the ins and outs of policy evaluation

Public policy actors filter ongoing problems and make decisions to offset them on a regular basis. They enable sets of instruments and tools to implement design solutions and obtain outcomes that improve the initial scenario, as best described by Dunn (2004). Simple as this construction may be, all sorts of unexpected positive and negative factors will affect any given public policy during its lifespan. As presented in the literature review, evaluation is the final tool in the linear model of public policy. Many advantages can be leveraged from comprehensive evaluation activities. Gaining an understanding of the final results is the first step that analysis needs to focus on. A second activity of paramount importance consists of gaining a complete understanding of the rationale gap between the design and the reality. Such an evaluation analysis is part of the DNA of modern business management.

Yet, public policy analysis, as best presented by Carlson (2011), has historically faced various obstacles preventing it from becoming a mainstream issue in academia and the policy community. According to this author, public policy analysis can be located in various fields: political science, economics, sociology, law, and others[19]. Not having one clear-cut home has resulted in difficulties when it comes to attracting institutional resources, support, and the stature that often accompany approaches grounded in a single discipline. On top of this, policy communities have, in the past, viewed analysis tools as susceptible to manipulation by policy advocates in support of a desired policy. Fortunately, it seems that non-partisan

[16] Available at `http://wiki.cenatic.es/wikiesp/index.php/Inicio`, visited on January 6th, 2012.

[17] Updating websites, creating a database with ongoing projects, etc.

[18] "Impossible" from the perspective that decision-makers can never have and/or analyze enormous sets of data and uncertainty.

[19] For example, IGOP (`http://igop.uab.cat/igop/`), the academic reference in the field in Spain, states on its website that it is formed by researchers from the political sciences, sociology, geography, economics, anthropology, law and the environmental sciences.

research institutions have started to turn the tide in the quest for credibility[20].

The presence of public policy analysis in Spain has been best researched by Viñas (2009). This author reviewed the presence of public policy evaluation in the various layers of administration in Spain. The goal of her research was to gain a deep insight into the impact of EU policy with regard to evaluation procedures after the entrance of the country into the European Union. Her conclusions were that evaluation has not yet taken root:

> Currently, evaluation as carried out in Spain is not part of a consistent policy evaluation system: a diversity of conceptual approaches is used, together with a highly heterogeneous methodology, and evaluation is carried out very sporadically. Seldom do the evaluations undertaken bring about the expected effects: organizational and political learning is not systematized; and results are not usually visible for citizens because there is no policy or practice of disseminating evaluations. However, evaluation in Spain has been strengthened over the last 15 years. While various factors have stimulated the evaluation of public policy, including political and administrative decentralization and an increase in social pressure for improvements in public services, the single most important factor has been Spain's membership of the European Union since 1986.

In an environment that suffers from a lack of a public policy culture, evaluation programs must compete for funding *against* other programs, rather than being considered an integral part of public action. Furthermore, as presented by Subirats (2005), public managers see evaluation as a purely bureaucratic burden that needs to be carried out at the end of a given program, imposed by the funding body. Furthermore, this author acknowledges a timing issue in the official EU policy routine: by the time final program evaluations are presented, the subsequent call for projects is already in progress. This timing issue results in an inability to fully apply procedures concerning the redesigning of policies based on evaluation feedback [21].

The set of propositions presented below is an attempt to explore the level of evaluation activity taking place within public FLOSS projects. The fact that FLOSS is a technology-specific field might have an impact on the approach taken by the different actors in its evaluation.

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[20] Carlson (2011) mentions the example of the Congressional Budget Office, the Washington State Institute for Public Policy, and the John D. and Catherine T. MacArthur Foundation in the USA.

[21] Mid-term evaluations and exchange meetings being the only sources of feedback prior to the drawing up of new policy priorities and areas.

3.2.4.1 H 4.1: The results evaluation process centers on outputs: products of a technological nature

Evaluation is a very broad topic. As presented in the literature review, there are various methodological approaches to it. The techniques presented and described center mostly on the "how", but another relevant choice is made in advance as to "what" to evaluate. Performance indicators need to be selected across the whole value chain. Gertler et al. (2011) present the different steps of any given program and its elements, as detailed in Figure 3.1.

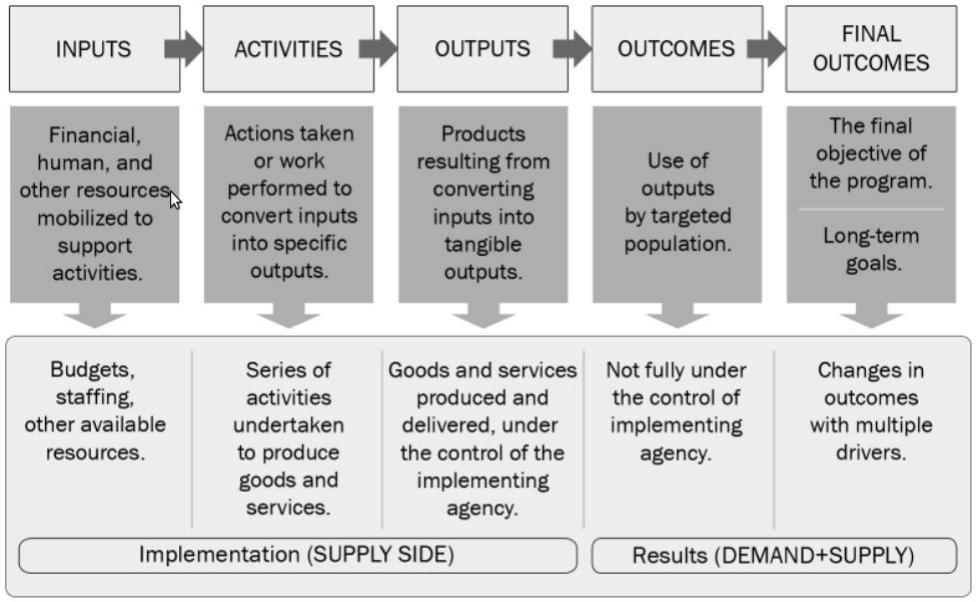
The **inputs** include the available resources that policy-makers might have for a given initiative. They represent a fraction of the limited human resources and monetary budget that the administration has access to in a given time-frame. Allocating the inputs for one project usually means rejecting or delaying other activities. The evaluation of a policy can be focused on the inputs and their efficacy and efficiency: whether the correct amount and combination of the right tools was used, or if instead, the expected results were not achieved due to a lack or misalignment of the resources used.

The **activities** represent the actual work performed in search of a given product or output. This final **output** represents the last step of the supply side. The total control of the administration ends here, when it delivers a tool intended to be used or implemented by the target population.

One key evaluation factor involves clearly separating the **outcomes** from the output. Even if the goods and services provided by a public agency are fully in line with the desired specifications, they might have little impact (or even a negative one) in terms of problem solving. Gertler et al. (2011) differentiate between short-term outcomes in reference to the usage made by the targeted population, and results achieved over the long term. Public decision-makers might provide elementary schools with one laptop per child in order to encourage digital education. Yet the use of such tools, intense as it may be, could result in little long-term improvement if it is not properly directed and fostered (i.e. students learning to use a single software program for basic tasks). Evaluating outcomes therefore becomes the hardest task for the policy reviewer, mostly because the outcomes are not under the reviewer's total control.

Based on the conclusions of Viñas (2009) regarding the lack of a consistent policy evaluation system across the Spanish public administration and the personal experience of the researcher, this proposition states that there is little formal evaluation of FLOSS projects, and that the evaluation that has been carried out concentrates on the technical specifications of the achieved final product (output). Other authors that have mentioned a lack of an evaluation tradition within the Spanish public administration, as presented in the literature review, include Furubo et al. (2002) and Grau (2002).

Figure 3.1 – The results chain



Source: Gertler et al. (2011)

3.2.4.2 P 4.2: The expected outcomes of FLOSS public policies are not defined *ex ante*

The purpose of public policies is to improve the status quo of any given reality. Clearly defining the starting point and the desired outcome is a complex task, except in areas mostly dominated by figures[22]. The starting point, prior to any policy action, is defined as the baseline. Progress can be assessed or comparisons made against this baseline. Before any program or policy is implemented, baseline data needs to be collected. The "before" state can then be assessed. As presented by the European Union in its practical guide for preparing proposals for spending programs[23] "reliable *ex post* evaluation, and hence accountability for results and impacts, is largely dependent on the quality of the preparation of the intervention at its outset". The effect of Spain's entry into the European Union had a relevant impact on the move towards a culture of public policy evaluation, as outlined by Viñas (2009). One of the requirements for public funding stipulated by the European authorities is that it will subsequently be possible to carry out reliable evaluation.

The policies supporting FLOSS observed and documented within the literature review

[22]For example, society expects to know what the unemployment figures are and to see policies that have clear goals in terms of reducing unemployment numbers to a certain percentage of the total working population.

[23]Available at `http://ec.europa.eu/smart-regulation/evaluation/docs/ex_ante_guide_2001_en.pdf`, visited on January 6th, 2012.

acknowledge little public funding by the European Union outside of software production and research activities. Therefore, global FLOSS policies provide a good opportunity to retest, update and review the *ex ante* definition of outcomes within public policies. Indeed, although FLOSS policies represent only a minor niche of administrative actions as a whole, they nevertheless present a good opportunity for analysis purposes.

The importance of *ex ante* goal definition cannot be stressed enough. As presented in the review of the main schools of public policy, Vedung (2000) insists that the level of information defined *ex ante* together with previous experiences allow for different types of expected results: projections, predictions, and conjectures. Each of this group presents its own level of certitude; while projections are expected to be very close to final achieved results, conjectures represent a broad image of the expected. Needless to say, good practices in terms of policy expectations help gain credibility when new programs are about to be launched.

3.2.4.3 P 4.3: The counterfactual evaluation model is not present in actions evaluating FLOSS

Cause-and-effect relationships are at the epicenter of much empirical work in the social sciences, including the analysis of public policies. Any given program is expected to be the cause of a positive effect that solves or improves the initial reality. Most academic policy evaluation questions involve cause-and-effect relationships: does the fact that I have performed a specific policy have beneficial effects upon the targeted issue? Cause-and-effect questions are common. However, it is not a straightforward rule to conclude that a relationship is causal.

Although there are many ways to evaluate such cause-and-effect relationships, the counterfactual model is credited as being one of the best techniques available to researchers and policy-makers. Rubin (1974) is considered to be the first author to have developed a counterfactual framework of causality formalized and extended to non-experimental design. In his model, Rubin presents the "What if" approach: one needs to compare two different realities, one with and the other without a given action. However, the social researcher cannot simultaneously observe the effects of both within the same unit or population. As best presented by Gertler et al. (2011): "The counterfactual is an estimate of what the outcome would have been for a program participant in the absence of the program. By definition, the counterfactual cannot be observed. Therefore, it must be estimated using comparison groups."

Morgan and Winship (2007) have recently published a broad review on counterfactuals and causal inference methods. They incorporate three major groups of methods for causal inference: statistical methods that include regression and matching analysis, exogenous

instrumental variable techniques, and finally the "isolated and exhaustive" mechanism of the causal variable of interest. If one is willing to evaluate programs implemented in the past, retrospective evaluations need to be carried out, using existing current data. Generally, the possibility of obtaining a valid estimate of the counterfactual is much more limited under such circumstances. The intrinsic difficulties of this technique makes its presence in ICT policies very rare.

An example of counterfactuals at the ICT level in the private sector was recently presented by Severgnini (2010), who reviews the effects of ICT investments on productivity for a dataset of Italian manufacturing firms. His conclusions suggest that the most productive firms are also the foremost recipients of ICT spillovers. As reviewed thus far, the lack of routine policy evaluation suggests that techniques as complex as the counterfactual model will not be present in Spain. The objective of this proposition is to review the existence of counterfactuals at the public level when FLOSS projects are carried out.

Chapter 4

Methodology

4.1 Methodology alternatives and selected approach

The nature of the research and propositions, as stated so far, is clearly **qualitative** and **exploratory**. Methods are tied to methodology, as Silverman (2011) detailed in Table 4.1. Directly linked to these thoughts, and in order to gain as much of an understanding as possible of the complete policy process with regard to FLOSS in a variety of public entities, various alternatives were analyzed as part of the initial approach, based on the guidance and propositions of Silverman (2013):

- Interviews
- Ethnographies
- Texts
- Audio tapes
- Videotapes
- Multiple methods

Interviews present several advantages for the purpose of this research. They provide direct access to the people involved in public policy implementation, which is advantageous but not risk-free. Grouping together many experiences as reported by the interviewees helps ensure that a given respondent's personal bias is isolated from the main trends, producing a clear general picture with no blurring around the edges. Interviewing target individuals allows the researcher to narrow the claims and questions down to the specific field of interest, yet there is an intrinsic risk of going "too straight", in which case a set of direct closed questions

Table 4.1 – Different uses for four research methods

	Methodology	
Method	**Quantitative research**	**Qualitative research**
Observation	Preliminary work, e.g., prior to framing questionnaire	Fundamental to understanding another culture
Textual analysis	Content analysis, i.e., counting in terms of researchers' categories	Understanding participants' categories
Interviews	Survey result: mainly fixed-choice questions to random samples	Open-ended questions to small samples
Transcripts	Used infrequently to check the accuracy of interview records	Used to understand how participants organize their talk and body movements

Source: Silverman (2011)

might not release all the potential knowledge held by the subject being interviewed. Finally, interviewing also has an advantage in terms of reaching the desired subjects: interviews do not necessarily require physical presence; thus the researcher can reach subjects regardless of the place where the public policy is being implemented.

Ethnographies involve observational work in particular settings. Extended periods of observation are required to put this research technique into place. This approach is usually used when analyzing the behavior of a certain group of people in their daily life or in professional environments. Modern ethnographies also include newsgroups on the world wide web, as their written interactions represent the interrelations of the members of a particular community. This approach has been used in the past to gain a comprehensive knowledge of FLOSS communities (Kelty, 2008). However, due to the nature of the target cases and time constraints, this methodology could not be adopted.

Texts differ from the above-mentioned newsgroups in that they do not present interaction, but rather a final outcome as published by any given body. Experts and industry reports, official websites, publications, conference minutes and slides, among others, provide an official written version of public policies in the researched area. Yet the discerning researcher must look beyond the basic proposition and perform a heuristic analysis: common elements present in the design, implementation and evaluation can be extracted from all sorts of written texts. However, the amount of material can be over-exhaustive and there is thus a clear need to define, from the outset, which materials will be selected and for what purposes. The experienced researcher will add, on top of this, a clear analytical approach and an

analysis that amounts to far more than a list. Text reviews can be used selectively during the research to gain a deeper understanding of actors, policies and processes. They can contribute to a better quality definition prior to implementing any of the other techniques described.

Audio tapes usually refer to naturally occurring interactions that are later transcribed. The analysis of transcripts of such tapes is usually classified as conversation analysis (Ten Have, 2007) and discourse analysis (Potter et al., 1994). The researcher who decides to go down this road should concentrate on a single concept or problem within the tapes, rather than trying to capture all aspects of the reality. The concept in question needs to be addressed from a fresh perspective by noting additional features not covered by the literature. Finally, it must be stated that gathering data contained in audio tapes can be quite tricky; therefore, an efficient technique and approach are required in order to avoid listening to endless playbacks of gathered samples. This methodology can be combined with interviews; recordings of talks can be kept for further reference and analysis.

Videotapes include most of the characteristics stated above in relation to audio tapes, plus one new fact, which is both as relevant as it is difficult for the fledgling researcher to interpret: non-verbal language. As such, videotapes involve complicated analysis of complicated data. The very same expressions and movements from any given individual can be interpreted in different ways by two different researchers. Experience both in videotape analysis and an in-depth knowledge of the topic in question are required to ensure relevant insight. This approach could not be envisaged for the purposes of this research for both technological and practical reasons.

Multiple methods: Clearly, various of the possible approaches above can be combined in order to gain a better understanding of the reality under analysis. The advantage of obtaining a fuller picture needs to be counterbalanced with the more complex data-analysis skills required. The rookie researcher may be tempted to select information from various methods in order to avoid difficulties along the way. This can also mean that the topic being researched gets broadened to an extent in which the goal becomes overambitious. Finally, mapping different sets of information from inconsistent methodologies into a single picture is a very tricky task. However, if the research is performed ensuring quality of analysis, multiple methods might be utilized to avoid data-gathering issues and difficulties. As will be seen shortly, a rather basic combination of two methods was selected for the presented research.

Different alternatives were weighed up before embarking on the field research activities. The scope of the research meant that information had to be gathered from various locations. Initially, texts seemed like a good option, yet it very quickly became apparent that there were far too many limitations for that approach: texts were limited and contained mostly software related technical approaches. Yet, reviewing the available texts suggested an alternative

opportunity: a community of individuals was clearly identified, working specifically in various layers of the public administration. Moreover, the identified community communicates throughout a newsgroup[1]. Access to the newsgroup is not open to simply anybody; only invited participants can read and post comments. Gaining access to the group was not a difficult task, but analyzing the texts of the newsgroup did not produce a picture clear enough to gain complete understanding of the desired topics. The participants presented hints suggesting that the object of the research could be attained, yet the information keepers did not provide full details in their interactions in the newsgroup. The community is there and it is active, but the available information is not enough. Interviewing a set of key individuals from that group became a clear option to gain a deep understanding of the objectives of the research. Face to face interviews were not feasible for the researcher because of monetary and time constraints. The option of trying to use video conferences as an alternative was also evaluated, yet such technology, as of today, lacks proper transmission of non-verbal language. On top of this, the advantages of non-verbal language did not seem significantly relevant. Written interviews and phone conferences were then considered. Both had advantages and drawbacks. Written formats would guarantee that the specific research topics would be addressed, leaving nothing out of focus; yet two main issues seemed to suggest phone interviews to be the better option: the significant difficulty of obtaining written responses in a qualitative format (rather than simply answering a pre-defined questionnaire) from enough individuals, plus the lack of live interaction that could bias the individuals into educated "official" replies.

As a consequence of the process explained above, it was decided that a significant number of actors involved in the implementation of FLOSS policies in the Spanish public administration should be interviewed. The interviews would take place by phone based on a predefined questionnaire (available only to the interviewer). Conversations would be recorded in order to allow further analysis and decryption of the received answers. The process in which the methodology was designed, implemented and applied is described throughout the rest of this chapter.

4.2 Questionnaire preparation and validation process

The first step in the creation of the questionnaire to be used was to decide which topics needed to be covered. Based on the objectives of the research, six different main areas were initially identified[2]:

1. FLOSS public policies: problem definition and agenda-setting

[1] `http://lists.forja.cenatic.es/listinfo/foroaapp-list`

[2] The third and fourth groups were merged and the sixth was abandoned after all the questionnaires were completed, due to the extremely tech-specific nature of the topic.

2. FLOSS policies: actors and origin of initiatives
3. *Ex ante* goals
4. Policy evaluation
5. Decision-making models
6. Project management and public cooperation

In an initial draft, some six different questions were proposed for each of the above categories. In order to gain acceptance from the target public, the time required to perform the interview needed to be limited to 45-60 minutes. In order to avoid reluctance to answer certain questions and/or issues related to complexity, the questionnaire was not to be shared with the target public beforehand. The first draft was validated by both research advisors as a first step. Afterwards, the research project, along with the questionnaire, was presented to industry and academic experts in order to gain outside validation. The validation process was performed in a step-by-step procedure: the first reviewer was to be an IT manager with broad experience both in project implementation and FLOSS tools. Once he agreed to collaborate and raised his concerns, the questionnaire was adjusted accordingly.

The second draft, as validated by the first expert, was then sent to a member of the IT engineering faculty at the University of Deusto, known for his FLOSS related experience and network. The process was repeated as previously explained, this time with the second expert, before seeking further validation from outside the University of Deusto network. The next review in the validation process was carried out together with an academic expert from the University of Zaragoza. Based on his feedback, a final version was submitted to the last expert, from CENATIC. This step also improved the final questionnaire document, which was then also re-validated by the research advisors. The final version in Spanish is reproduced in Appendix III. The main adjustment, as per the experts' validation, was to omit from the questionnaire everything about project management. The whole area was seen as a very broad topic, very technical indeed and probably the subject of a single PhD dissertation by itself. Instead, a sixth area was proposed, to be explored in the event that there was time left for it or the interviewed subjects had no objection to extending the talk beyond the one-hour period: public sharing of FLOSS projects, or in other words the channels and ways in which various levels of public administrations share the tools, know-how and lessons they have learned with each other, both in formal and informal ways.

The final questionnaire, as disclosed in Appendix III, includes both the interview guidelines plus the set of questions to be addressed to the targeted individuals. The first group of questions was centered around the origin of FLOSS public policies: how any given project is initiated, and by whom. Significant relevance was given to the top-down versus bottom-up scenarios together with both the level of knowledge and involvement of public constituents

with regard to FLOSS initiatives. To summarize this area of inquiry, consistency over time linked to political activity was also one of the topics to be specifically targeted.

Next, the long-term planning of the project, if any, was to be targeted. The main topics to be discussed included milestone decisions for short, medium and long-term goals. Moreover, the process by which these objectives are decided was to be discussed. Based on the replies, inquiries about the adjustment and revision of goals were another part of the researched topic. Directly linked with this previous area, *ex ante* goal setting was to be discussed next. This was to focus not only on the process by which such desired objectives are decided, but also key evaluation factors such as clarity, quantification and follow-up mechanisms.

Based on all the information and feedback received so far in the interview, the next area to be reviewed was that of monitoring goal achievement. This part was very much dependent on the preceding topic; goal expectations need to be well defined in order to compare the obtained results with previous expectations and desires. Project achievement versus goal achievement were discussed separately: a given project could be carried out in total accordance with the defined plan, yet achieve very poor results, or indeed none of the desired results at all. Monetary assignments and project continuity over time also needed to be addressed as part of the controlling of goal achievement. Based on the replies received when the topic was addressed, a natural final step to the public policy review was to dig into project adjustments made over time. In other words, based on classic public policy evaluation methodology (Vedung, 2000), this meant looking into the likelihood of any given program being reoriented to ensure proper goal achievement. The existence of formal program evaluation procedures was to be included in this part of the conversation; the results and the concluding facts about the execution of the programs are an important part of continuous program improvement. Whether or not such procedures are present was to be discussed during the interview. Since it was expected that the subjects would favor a positive reply to such an inquiry, details as to how such reviews are handled (time-frame, adjustments, etc.) were to be reviewed together, in an effort to clarify the responses.

Finally, as it has already been explained, the project management review was dropped from the questionnaire based on the advice of the experts. Instead, a final part was included to simply ask about cooperation with other public entities, both in terms of code and experience of sharing and shared projects. This part of the questionnaire was deliberately left quite open-ended. Basically, the questions were to focus on whether or not projects were shared with other parts of the public administration. On top of this, respondents were to be asked who promotes any given shared experience, and how. Such project sharing, which is, by definition, so intrinsic to FLOSS, can be carried out at two different levels: political or technical. The former would be guided by elected politicians willing to foster public interest, while the latter is very much peer oriented, resulting from public workers who happen to encounter each other in the field commenting on and sharing achievements in line with the spirit of free software. This part of the questionnaire was left open as a final part in which

the interviewee was asked to list such activities and their point of view as to what had been done and also what could be done.

All of the guidelines presented above were part of the final interview guidelines document. Based on this, the next step was to define the targeted public and gain acceptance to ensure enough interviews would be carried out to ensure the relevance of the research. This part of the research is explained in full detail in the next section.

4.3 Target public selection and acceptance

It was clear who the targeted individuals should be from the very start of the research process: those who have been actively involved in one or more policy promoting FLOSS in the public sector. These are the individuals who hold the information required to properly analyze the presented statements. Although the group of final users of FLOSS solutions is quite large, the desired participants cannot be obtained from within that group. Even if in some cases their participation is key for success, they do not hold the kind of knowledge that the research is aiming for: the role of the key actors, the problem definition steps, the decision-making processes and the evaluation activities. Instead, the civil servants who hold an active role throughout such activities, a much narrower group, was selected as the desired participant "standard". Based on the nature of the research, it was decided that a minimum number of 25 individuals was necessary .

The overview and objectives of the research project were presented to the Director of CENATIC before any action was taken to attract the attention and interest of the desired participants. CENATIC showed interest in the project right from the beginning. In addition to the significant feedback in helping to optimize the questionnaire as mentioned above, it was decided that they would post a mention of the research on their public Twitter account[3], together with an invitation link to register for participation. Twenty-four hours later, the tweet had not attracted the necessary level of interest: only a single person had registered. Just in case, it was left a few more days, but without further success. As previously planned, the next step was to directly address the most active individuals in FLOSS and Spanish public policies: the **foroapp newsgroup** mentioned above. An invitation to participate was prepared and sent to the group. Written by the researcher, the tone of the language used was significantly flawed: it was far too academic to gain broad acceptance. However, this mistake did not reveal itself until much further down the line, as will be explained shortly. Unappealing though the invitation was, 12 more individuals registered. All in all, the registered volunteers could be grouped into three groups:

- Public workers who had proven experience in FLOSS projects

[3] `https://twitter.com/cenatic`

- ICT subcontractors who had been in charge of FLOSS projects for the public sector
- One individual from Latin America whose feedback could not be considered valid (as confirmed with the candidate himself)

The limited number of participants gathered and the fact that some of them were not part of the "inner workings" of the public sector posed some doubts from a methodological perspective. Two decisions were made after an in-depth analysis. Firstly, it was decided that the number of interested individuals was sufficient to start the interview process. Secondly, it was next decided that the majority of the subcontractors had a broad knowledge of the ins and outs of the public policies that were to be discussed. Therefore, it was decided that, as long as the participants showed the correct amount of knowledge of the topics of the research during the interview, they could qualify as valid participants for the purposes of the research.

Starting with the very first interview, a final part of the questionnaire involved asking for new references of individuals who could participate in the research. It turned out that most of the participants would provide a couple of contacts, referring clearly to the projects in which they had been involved and the reasons for which they considered that they could provide good insight for the purposes of the research. Some participants promised to contact their references and ask them to participate. These initiatives were not successful, in the majority of cases. However, often the participants provided references for the researcher on the spot. A new message was then sent directly to these individuals, citing the referee and very briefly explaining the research topic and the reasons why both the researcher and the referee considered the participant to have insight of interest for the research objectives.

This second wave of invitations, though extremely time consuming, as it was carried out on a one-by-one basis, was quite successful. The number of participants hit the low 20's. Some of the participants in this second round of interviews acknowledged that they had seen the first invitation as posted on the foroapp newsgroup, yet stated that they had been somehow scared off by the language used. They had been involved in simple FLOSS projects and felt they did not have much relevant information to share with a PhD student. Such fears soon dissipated when the interview started, as will be explained in detail in the next section. Indeed, some of the "second wave" participants provided very wide-ranging and comprehensive information on the various propositions to be tested.

However, a third wave was still needed in order to attain the required 25 individuals. In order to involve more participants, two final actions were carried out. The first consisted of a review of projects presented in various public administration FLOSS meetings sponsored by CENATIC. Based on all the information available, a few projects were identified that fitted perfectly into the scope of the research. The persons behind the projects were contacted via "cold call" e-mails. Some of the messages were returned to sender due to the mailboxes no

longer being in operation; others were apparently ignored; however, a few resulted in positive feedback, and several interviews were arranged thanks to this initiative. Finally, in order to achieve the total number of participants, two parallel channels were opened up: the personal contacts of one of the PhD advisors and of the researcher himself. A few individuals with indirect professional links with either one of them were contacted and asked if they would be willing to be interviewed. Based on these personal relationships, the replies received were very positive, both in terms of availability and information gathered.

Ultimately, a sufficient number of individuals participated in interviews to discuss the topics forming the subject of the research. For obvious reasons, it cannot be claimed that they form a representative sample; nor was this the goal of the researcher. Instead, as can be seen in Table 4.2, the sample includes representatives of most Spanish regions, across all the different levels of public management. Both geographically and hierarchically, the sample includes a subset of experiences that probably represents a fairly comprehensive sample as regards FLOSS activity carried out in the Spanish territory by bodies ranging from major Ministries to small rural schools. The participants are detailed by Region and public entity. "Region" should be taken to mean the location (in terms of the 17 CA's) of the public entity for which the participant works or worked at the time of the policies reviewed. Ten out of 17 regions are represented. The different columns refer to the type of institution where the participants contributed to FLOSS policies:

- Central Gov.: national Ministries whose policy action is intended to reach the majority of the territory
- Regional Gov.: entities that are ruled by the Comunidad Autónoma and whose policies are limited to the territory in question
- Provincial Gov.: smaller Regions (Diputaciones, Cabildos and Consejos Insulares) within the Comunidades Autónomas[4]
- Municipality: local town public entities
- Education: this column reflects participants that participate either in Universities or educational bodies.

Approximately half of the individuals (13) were graduates in Computer Science. Except for one individual with a PhD in Physics, all other participants held graduate degrees, mostly in various Engineering Sciences[5]. As for the level of expertise, three main groups were present:

- IT professionals, either as civil servants or subcontractors (14)

[4]Madrid, Cantabria, Navarre, Asturias and Murcia each consist of a single province.

[5]Two participants were in the process of completing their graduate studies.

Table 4.2 – Number of individuals interviewed by region and gov. body

Region	Central Gov.	Regional Gov.	Provincial Gov.	Municipality	Education
Madrid	5				1
Aragon				2	2
Valencian Community		2	1	1	
Catalonia		2			
Madrid		1		1	1
Andalusia			1	1	1
Asturias		1			
Extremadura	1	2			
Castile-La Mancha		1			
Galicia		1			

Source: Own creation

- Education system, including a broad range of duties (9, from elementary school to universities)
- Others (3)

The seniority in terms of ICT professional experience amounted to an average of 9 years. As for the time-frame of involvement in FLOSS projects, all participants had been active in FLOSS policies for a minimum of 2 years. A couple of professionals had been involved in the development of such policies for over a decade. Yet the average tenure in free software related policies amounted to 4 years. It needs to be highlighted that a few individuals were involved in policies that were developed over long periods of time but personally were only implicated for a shorter period.

A final mention needs to be made to the selection criteria. Candidates for interview were screened one by one, as the opportunity arose to include them in the research. A few were rejected: they did not have the required profile, for various reasons. Every candidate that did fulfill the minimum criteria was included. As long as she had participated actively on the birth and/or development of a given FLOSS policy within the public administration, the candidate was accepted. Furthermore, workers from subcontractors who had a leading role in the policy deployment were also deemed valid. This no-criteria approach was used for some two thirds of the participants. As the ability to find more participants decreased, as explained above, one of the PhD advisers provided a final list of contacts of people who clearly had a lot to say (as part of the described "third wave" of contacts). Only for this group was a criterion used, stipulating that the participants should be well recognized experts on the field. Final users of FLOSS solutions within various public entities were not part of the target group. It is clear that they could provide very valuable insight on the advantages and drawbacks of implemented solutions. Yet the research does not intend to review the capabilities of FLOSS solutions. Such a debate is usually based on personal preferences and

predefined choices[6]. The research was in no way intended to review such users' perceptions, although opinions on the topic were expressed in each and every interview.

Two final key points need to be highlighted: the research does not claim to be a representative sample; yet it would be difficult to find relevant projects carried out in the researched decade that were not covered. In other words, representativity was neither sought nor claimed, yet the final sample is clearly a very relevant sample of the most prominent FLOSS public policies within Spain on the targeted period.

4.4 Public initiative experiences: data gathering

All individuals were contacted by e-mail prior to conducting the interviews. Based on the researcher's availability, a fairly wide range of days and times was offered to participants. Some of them understood their involvement to be part of their work duties and replied with proposals during office hours. Others, either because they were no longer in charge of project-related duties or did not consider their participation to be part of their job, offered to participate outside working hours. All in all, the interviews were carried out across a broad range of times (6.30 a.m. - 8.30 p.m.) based on the participants' availability. Such a wide range of times suggests that a number of participants had a high level of interest in the project and were thus willing to schedule their interviews at the only time slots they had available outside work and family duties. The interviews took place between April 2013 and July 2014. The main reason for such a long time-span was the difficulty in finding convenient times to interview a few of the participants, although the majority of the interviews took place during 2013. As the topic of the debates was centered on past projects and policies, this delay to the field study should not have any impact on the consistency of the gathered data.

All interviews were conducted by phone and recorded, except for two in which technical problems were encountered and no audio record was kept, only a wide range of written notes. Prior to all interviews, the researcher recorded both the appointment time when the target individual would be available, and their phone number details. A few interviews were rescheduled at the very last minute due to unexpected commitments or participant illness; overall the conversations took place as expected. After a few polite words by way of introduction, the researcher presented the guidelines for the interview, to put both parties at ease and ensure expectations were clear. The guidelines were presented as follows:

1. Initial warning about the recording of the session
2. Overview briefing of the research project for the benefit of the participant

[6]In other words, users might reason that **all** free/proprietary software is better based on their own limited experiences.

3. Interview goals, details of fields of questioning and expectations
4. Briefing to set out the education and career details of the researcher, in order to set the frame of reference
5. Same as point 4 above for the participant, in order to contextualize the participant's responses
6. Details on organization and structure, and FLOSS projects involving direct participation
7. Agreement on most relevant or interesting project for direct questions to come
8. Interview questionnaire
9. Closing thoughts, thanks and request to potentially contact participants

The first few interviews were used to conduct a pilot study using mostly **closed-ended** questions as presented in the questionnaire. Due mostly to the lack of previous experience of the researcher in such interview settings, he would read the key questions one by one in a somewhat clumsy manner. Very soon, this proved not to be the right approach: **open-ended** questions were more likely to provide broad information on the research topics. The technique improved as participants came and went: half-way through the research, a combined technique was implemented as the best approach to gain relevant information. Each part of the questionnaire would start with open-ended inquiries; as the conversation progressed, the researcher would try to lead the participant into a particular field. The conversations were therefore friendly and relaxed. Before closing one part of the interview, or even at the very end, the researcher would return to a particular topic if it was not sufficiently clear, and would address it with more specific not-so-open questions. Also, as the research moved forward, the most common responses were clearly identified. The construction of the questions was adapted slightly to try and gain a good understanding of what the public experienced when it came to a particular issue.

Another topic that is usually of relevance is the order in which the questions are asked. In the specific case of the area concerned, each question was built on the last, so there was no logical way in which the order could be changed and still make sense. The questionnaire took place like a conversation, grouped by topic, and unfolded in its own logical order. The first questions were simple and of interest to the respondents. This initial engagement helped establish a rapport and motivate the other person in order to create an atmosphere of trust and confidence. This was a process that the researcher made progressively more efficient; there were moments in the early interviews when the respondents were overburdened with closed-ended questions coming one after another, covering very broad ranges of facts. This issue could probably have been picked up at the questionnaire evaluation step, if

a pretest had been carried out to assess how a reduced sample of people responded to the questionnaire. However, the difficulties encountered in gathering enough respondents prevented the researcher from taking that particular path. Instead, the approach taken by the questionnaire was developed and improved right from the first interviews, in what became a continuous improvement over the time taken to carry out the field research.

A very remarkable by-product of the interviews was the opportunity to gain an insight on inside information, to see which topics are relevant to members of the public administration FLOSS community, and how people understand the opportunities and challenges of FLOSS in the public arena. In a broad way, this could also be considered to be a focus group exercise, with the researcher playing the role of a moderator asking general questions to help elicit unexpected responses from the group members; from then on, more specific follow-up issues could be raised and researched, as will be presented in the final conclusions of this document.

4.5 Final steps of the applied methodology

The "raw" material is there; now it is time to digest and make good use of it. Once all the interviews were completed, they were replayed and carefully listened to. The researcher had the opportunity to review certain parts at ease, looking for what was said and how it was said. The material gathered provided robust input to help test the research propositions as explained in the previous chapter. Based on Miles and Huberman (1994), data analysis consists of three concurrent flows of activity: data reduction, data display, and conclusion drawing/verification. In the words of the mentioned authors:

- Data reduction "refers to the process of selecting, focusing, simplifying, abstracting, and transforming "raw" data". Data reduction involves making decisions with regard to which data chunks will provide your initial focus.
- Data display is "an organized assembly of information that permits conclusion drawing and action taking". This involves assembling your data into displays such as matrices, graphs, networks, and charts, which clarify the main direction (and missing links) of your analysis.
- Conclusion drawing means "beginning to decide what things mean, noting regularities, patterns, explanations, possible configurations, causal flows and propositions".
- Verification means testing the provisional conclusions for "their plausibility, their sturdiness, their "confirmability" – that is, their validity".

Based on such guidelines, after a second and sometimes even third review of the statements and comments from the participants, a complete database was created (data reduction and

data displays). For each participant, it contained three main parts, ranging from the big picture down to detailed comments:

- Overall comments and point of view for each group of questions
- Exact replies to direct questions posed
- Specific remarks, comments and anecdotes mentioned, linked to the discussed topic

Within the overall comments part, the point of view on a specific area of the research was noted. For instance, when asked about the origin of a given policy, the respondent would directly mention that she was at the origin of any given project and presented it to the decision-makers. In that case, the database would include a basic bottom-up reference. The notes on direct replies refer to detailed questions such as how often a given policy is reviewed (e.g. annually), helping provide a quick review of the various answers received to such questions. Finally, the trickiest part of reviewing the notes and interviews lies in the remarks, comments, anecdotes, etc. They reveal a lot of experiences and facts, and the judicious researcher must listen to and grasp all of these in order to really gain the added value of an oral interview as opposed to a closed-ended written questionnaire. The database was populated with clear statements of such experiences when offered by participants, including as much detail as possible.

Once the database was complete with all the received input, the researcher compared all the gathered information with the presented premises (conclusion drawing). One by one, the conclusions were constructed and double checked, and a first set of conclusions was drafted. Once all the propositions had been addressed, a final consistency check was carried out and fine tuning was performed, in order that the results of the field study could be tested against the presented statements as set out in the next two chapters.

Based on the methodology explained above, a final validation of the replies and comments received was performed on an ongoing basis (verification). This validation consisted of a cross-analysis of the perceived replies. In addition to this, a continuous follow-up of the foroapp newsgroup mentioned above was used for final validation purposes. A lot of feedback is provided in this newsgroup by participants in various initiatives and projects. In fact, a significant number of the interviewed individuals are very active in the newsgroup as well. In general terms, the conclusions and facts learned from the field study are in line with most of the comments and replies to posts. This final quality check provided a degree of added value to the general interview process, as it also helped clarify certain points of view[7].

[7]Several respondents would have a "politically correct" approach during the interviews, while in the newsgroup expressed more critical points of view with regard to decision-makers and the public administration as a whole.

Chapter 5

Case Studies - Surveys & Results

5.1 Overview

The combination of a set of propositions and the selected methodology provided a rich and broad range of replies on the various case studies of policies promoting FLOSS that were reviewed. The following sections of this document try to present the results of those interviews. Each of the respondents presented a very unique case: despite the presence of clear trends, no two experiences could be considered to be equal. In order to reduce and concentrate all the particularities, a grouping technique has been used in order to present the results.

All the cases are grouped from the point of view of their specific features in relation to the various propositions selected for the research. The main characteristics of the defined groups are therefore presented in order to provide a final conclusion on the different propositions. However, of all the cases, those that present specific noteworthy characteristics are briefly discussed. All sorts of qualitative data is provided to help the reader gain a much deeper understanding of the policies promoting and/or adopting FLOSS that were selected and reviewed. Needless to say, the selection of a specific set of detailed qualitative findings is a choice made by the researcher. Such a choice is based upon two main characteristics:

- The intensity with which certain topics were commented on during the interviews
- A personal criterion regarding the relevance of certain statements to the ultimate goal of the research

Each individual who took part in the interviews had a clearly positive attitude right from the beginning. Yet some were more passionate than others: each individual had his or her own "level of commitment" towards the researcher. However, certain questions - not the same questions across the board - provoked strong reactions even from the calmest of individuals. Prior to writing up the results, there was a complex and comprehensive exercise of listening to all the recorded interviews. The level of intensity with which different participants replied to certain aspects of the interview helped decide which areas need more disclosure in terms of the findings of the research.

At the same time, some answers cannot be included within the scope of the research, even though the participants considered them to be highly important. This is where the researcher's criterion is weighed up against the relevance expressed by the individuals in the field. Only comments of significant relevance and cases that indicate a strong variance from the usual trends are presented within the analysis of results. All in all, a fairly complete set of information was gathered and is presented next.

5.2 Findings of the agenda-setting process

As presented earlier on, the first part of the field research was to focus on agenda-setting processes. Two main propositions have been put forward:

- A lack of a formal problem definition process in ICT-FLOSS related topics
- A lack of ICT-FLOSS problems on the policy agenda

The detail of the field study conducted is presented in the following sections. The general trend and information disclosed are set out for each of the areas. The ultimate goal is to review how ICT-FLOSS related public action reaches the execution level.

5.2.1 Problem definition: formal analysis or direct action?

The proposition defined around problem definition states that classic problem definition steps are not formally documented and reviewed in ICT-FLOSS topics. A significant proportion of the interviewed actors were not directly involved in the initial resolution to implement FLOSS policies within their organization. Yet all of them were close enough to the center of the decision-making process to reply in a straightforward manner when questioned on the topic. The origins of the various policies agreed upon were explained in detail to the researcher. Given the fact that the participants had significant roles in the reviewed projects, the replies included a mixture of expertise, passion and involvement.

The comments heard most commonly on the subject of problem definition related to cost-savings and technological aspects. Within the cost-savings category, various participants described situations in which the administrative body in question had a well defined need, initially unrelated to FLOSS. The lack of budget to address it using costly proprietary software naturally led to the adoption of FLOSS. This process was made easier and even proposed by FLOSS conscious public workers, as will be detailed further on. One of the participants stated that FLOSS was implemented because it did not come at any cost, yet once it had been implemented, the political leader praised its benefits publicly, taking the credit for an action that "looked good" in front of the media and her constituents. Despite the fact that there had not been any previous analysis, the politician would present the FLOSS project as a premeditated action that had been thoroughly thought through, seeking to gain political credit from it. This fact was not perceived as positive by the public worker who mentioned it. Some 40% of the analyzed projects can be included in the category in which the rationale behind the launch was related to the "no cost" aspect.

As for the technological aspects, the public workers were often faced with a new ICT related request or internal need and had the freedom to develop whatever they trusted as the best option. In some cases, it was even an initiative started from scratch by the technical staff, aware of needs or improvements in either their own tasks or other departments across the organization. Some ICT public workers mentioned improvements in terms of software security tasks in their daily jobs thanks to the adoption of Linux desktop distributions throughout their organizations. In such cases, the problem definition steps were carried out internally, yet not as part of any politically led FLOSS supporting initiatives. It was part of the routine task of public workers, mostly in the ICT field, but in some cases included teachers. One particular case presented the initiative of an elementary school teacher that was successful enough to initially draw the attention of the regional leaders and finally became a program established nationwide. Another case, also in the education field, involved an initiative carried out by a teacher that gained international awareness, yet the regional government banned the initiative from gaining more strength by being incorporated into centralized and official action plans. From the point of view of the participant, his initiative to foster ICT through FLOSS seemed to be a problem for the regional education system. This paradigm of internal problem analysis was present in some 25% of the reviewed cases.

The third most present group of policies was implemented from a "me too" rationale. FLOSS sounded "good", other regions were gaining attention from it, and therefore clear instructions were given by the political leaders to adopt such solutions. One participant mentioned that he was specifically asked to adopt FLOSS within the organization, and therefore had to make an effort to research in which fields "FLOSS made sense". Another participant mentioned the regional language as the main driver for a specific project: "That possibility was not available in our language, so it was decided that a project similar to existing ones should be implemented, adapted to that particular need". Lack of planning and strategy was eagerly

disclosed by some of the participants in higher ranks of the administration. Those who had been present next to the ultimate decision-makers were best positioned to witness the "me too" rationale behind programs. These respondents, who were often disappointed with the lack of proper planning, declared their will to structure a complete plan with mid-term goals. Yet, according to them, it seemed impossible to organize actions and commitments without the issuing of press releases.

The "solution in search of a problem" scenario was also narrated by a couple of participants. In these cases, subsidies were received with the goal of promoting FLOSS across various layers of the administration. The political leaders embraced the project "because there was money for it". Yet the leadership was not strong enough to gain adoption in various layers of the organization. The subcontractor was left with this task. As soon as the money had all been used up, the subcontractor left and the program slowly drained away. According to these sources, nothing remains today of those solutions in search of a problem. The actors did not embrace solutions for problems that they were not convinced existed. When the money went away, so did the solution.

Mostly because of a significant separation, either in terms of administrative layers or program dates, a number of participants could not explain the way in which problem definition was carried out prior to FLOSS adoption. Having joined the program once it was established, they mentioned a clear policy within their entity in terms of FLOSS support coming from the decision-making forums. However, they could not clarify how, if indeed at all, the problem definition process had been carried out before the free software alternative was chosen.

Contrary to all the circumstances explained above, a few projects did present proper problem definition analysis steps. Yet, FLOSS was central at the inception of none of these projects. In these cases, the decision-makers were facing new requests that needed them to take action. The most common examples involved requirements coming from the European Union, large-scale user needs or global ICT policy matters. Problem analysis was formally carried out, FLOSS being one of the technical alternatives to be considered for adoption. The specific problems were addressed by adopting open-source solutions, but the final decision could very well have been a completely different one. One participant mentioned that the trend within the European Union to favor locally developed FLOSS solutions carried tremendous weight when making the final call. One specific project went even further and presented an "out of the box" opportunity. The specific administration in question had a particular need in terms of software for internal usage that could not be fulfilled at an economically reasonable cost. The problem was analyzed, and not only was the final decision taken to code a new FLOSS tool, but also to try and make this tool the basis for a small software cluster. The administration devised a solution to foster economic growth and employment in the region within a highly technological area.

Summing up all of the presented cases and the findings stated above, it can be concluded

that the statement has proven to be correct. Except for some significant exceptions to the main trend, standard and formal problem definition steps have not been carried out in the selected programs and projects. Problem definition is not organized in a structured manner at the political level. Instead, problem definition steps are carried out in a mostly informal way at the technical level, as part of routines and ongoing processes. Apart from a few cases in which the problem was detected and analyzed in search of the optimum solution, the lack of such a review from the decision-maker's perspective is the rule witnessed in the researched cases.

5.2.2 The policy agenda: is there any FLOSS out there?

The second proposition presented above refers to ICT-FLOSS problems and agenda setting. It has been stated that such topics are very technical and complex in nature. As a consequence of this complexity, they do not hold much appeal in terms of broad public-oriented electoral proposals, and tend not to be included in public debates and agendas.

Approximately one third of the projects researched originated on the political agenda. The remainder were elaborated directly as ICT projects not coming from a global policy. Yet only three project leaders declared their initiatives to be part of a clearly defined FLOSS policy agenda. In those cases, there had been a clearly defined FLOSS friendly agenda at the highest political level. Thus, the projects needed to be carried out using FLOSS. All of the cases were linked to education, and FLOSS was to be the means with which to distribute new tools. Yet in one of these cases, the project started as an ICT education action fostered with EU public funds, only evolving into FLOSS later. The public funding rationale was present in other cases as well; free software was declared to be on the agenda because there was funding for it, rather than it being the result of a detailed analysis. Other than these cases, FLOSS was on the political agenda in two other cases, yet there was a lack of consistency over the duration of the political term.

A few public workers stated that FLOSS was present on their political agenda, yet comments along the lines that "it stays there as a wish rather than a real action plan" were heard. In other words, there was no connection between the agenda and the projects reviewed. These projects were carried out based on the autonomy of the civil servants rather than as part of a global public strategy. Those civil servants that worked within EU-shared projects were very clear, however: "The EU foresees it quite clearly: open, open and open".

Finally, three cases were relevant because of their unique nature. One of the agendas reviewed had FLOSS as a key element, yet as part of a global ICT cost-saving project. FLOSS was present thanks to the competitive advantage offered by its expected lower cost. A second case presented FLOSS as a tool to help create a regional public needs environment using FLOSS that could foster some kind of public-private symbiosis. The third case was meant

to create directly specialized software industries in the region. The two latter initiatives, in which some level of private involvement was expected, were not seen as successful by the public workers. Both cases declared that the private sector did not get involved as much as required: "They did not believe in it; there is a clear aversion to the risks of innovation in Spain".

Apart from these projects, the remainder of the reviewed cases declared that FLOSS was not part of the political agenda. Mostly, the projects were led and carried out at a technical level. A few cases were of a very specific programming nature, and one should not expect those to be part of any agenda. For the rest, all sorts of comments were disclosed. Because of the relevance and clarity that they provide, selected ones are quoted below:

> We easily manage to convince those who are in charge, they are receptive towards FLOSS
>
> Politicians do not use FLOSS, yet they see it as something positive that provides good social feedback
>
> They know it has been carried out elsewhere and they accept it
>
> We simply react to new needs without much ICT planning
>
> The politicians did not hold a straight course and, when faced with negative feedback, stepped back and the project collapsed
>
> There is no vision whatsoever in technology policy
>
> FLOSS depends on the person and not on the political party
>
> All of my proposals throughout the years have been refused because of a clear anti-FLOSS policy
>
> There is no support for free software because it is not well understood
>
> Luckily, it is a technical field that politicians do not dare enter
>
> Free software has always been a great promise that never comes to fruition
>
> The free software argument has never succeeded because it crashes against rigid administrative regulations

From these quotes, the gap between the political class and civil servants is clear. Technical experts mostly see FLOSS as a good tool and an opportunity, yet are somehow frustrated that those who hold the power to make the final call do not share their vision. The cases where FLOSS has been part of the agenda are mostly related to mandatory education levels. Also, some hints were made concerning successful projects: there needs to be an alignment between project leaders, politicians and end users. If any of these fails, free software and the change it brings simply fail to materialize.

Based on all of the above, it can be concluded that, as presented in the initial statement, ICT-FLOSS topics are not usually part of the political agenda. Instead, they are carried out in public ICT departments as a means to solve specific needs.

5.3 The diverse actors and their roles in FLOSS policies

The second part of the field research is centered on public policy actors. It does not focus on all the actors, but the main ones: politicians and civil servants. Two main statements have been proposed:

- Civil servants as the main driver for promoting public policies bottom-up
- Politicians as gatekeepers that maintain consistency over time

Despite the fact that they are not the only players present in the complex structure of public action as described so well by Dente and Subirats (2014), they represent the core structure within which public action takes place. Both groups are interdependent and must work together in tandem if any given policy is to be executed as desired.

In the following sections, the detail of the conducted field study is presented. The general trend and information disclosed is reviewed for each of the areas. The answers to the statements, as detected in the selected cases, are also proposed.

5.3.1 The role of civil servants and the bottom-up premise

The presented proposition states that active FLOSS projects are usually crafted and promoted by ICT public workers, based on their technical expertise. New FLOSS projects and initiatives are expected to be promoted by the network of actors at this level of the administration.

Yet almost half of the respondents acknowledged that the initiative came from a political decision-making level. Some of the respondents explained clearly that despite such plans or agreements, the technical layer holds enough power to cause the best intentions to fail. These respondents wanted to emphasize that the role of the civil servants is key when it comes to producing the clearest policy directives.

A few cases (i.e. universities and regional governments) were even reinforced by published declarations of alignment and preference towards FLOSS. A few respondents highlighted the key role played by the EU in their adoption of free software, usually linked to openness. A couple of cases even presented agreements between different levels of the public powers to initiate strong commitments towards FLOSS.

Yet a significant proportion of the respondents[1] who declared that the initiative came from the political layer were disappointed with the way the commitment was defined. Indeed, they claimed that behind the politically expressed undertaking, there was no more than a "me too" or "FLOSS has a good public image" gesture. One subject offered the example of the political layer changing its mind when the first users, who were unwilling to adapt to change, took their complaints to the top. The consistency between the walk and the talk did not seem to be present in this particular case. Statements like "FLOSS is in fashion, so let's do something" were also heard. A couple of cases included FLOSS as the center of a public initiative because there was money to carry it out. Finally, the most intelligent comments concerning projects decided at a political level expressed the sense that underneath the publicly expressed support for FLOSS, there was a clear lack of strategy and definition of goals.

As for the other half of the respondents, the FLOSS initiatives had nothing to do with political decisions. A few initiatives came straight from outside stakeholders: one was a direct request from an ICT cluster whereas the second was a demand within a technology industrial park.

The remaining initiatives were designed and promoted by civil servants with a clear goal of improving their daily tasks and the quality of their services. Some of the respondents saw no problem in it: they consider FLOSS to be of a technical nature. Whenever they request an approval, politicians usually grant them a green light. The reliability of past FLOSS projects has earned these technicians a significant level of trust within the organization. Such trust is the key element to allow them a high level of independence in project management. Some of the civil servants interviewed declared that every time they were faced with a request, they would analyze all the available options. After such a review, they claimed to choose the best alternative, all things considered. This procedure usually takes into account software features and specifications.

Along these lines, about a third of the bottom-up initiatives were discussed with the politically empowered decision-makers and went through quite easily. Such cases are present mostly in organizations that have a long and successful FLOSS experience where the technicians have gained significant credit from all the parties involved. Yet in one of these cases, the civil servant in charge complained that acceptance is usually given because "they cannot say they do not want FLOSS", meaning that such negativity would engender some kind of harsh criticism.

Maybe because of such difficulties, a significant number of FLOSS leaders wanted ICT projects and solutions to be kept within the technical layer. Going even further, two cases presented comments on the opportunism of politicians taking credit for ideas or projects they had hardly any involvement with. Three projects were clearly developed outside of working

[1] These comments were directly present in 5-6 cases, some other 3-4 cases showed hints of similar facts.

hours as personal projects. When these tools were considered to be complete, technicians incorporated them into the tools they used daily, for improvement purposes.

Finally, one particular case and comment needs to be mentioned. One civil servant who had managed to put together a brilliant solution for his education job described how the project was being forced to remain at the local level. Regardless of credit received publicly for a good educational initiative, his ideas were banned from spreading through the regional education system. Probably as a consequence of this situation (which had lasted for over a decade), he claimed that those who take decisions have no knowledge whatsoever of technology, meaning that ICT technicians are allowed to do as they please. Along these lines, a few respondents felt a complete lack of support from political leaders (mostly when faced with opposition from end users).

All in all, based on all the feedback received, the statement cannot be claimed to be proven correct. Instead, half of the time, projects are clearly promoted from the political arena. The other half of the time, they come bottom-up from civil servants. Still, a lot of tension has been seen between these two layers. The technicians can be divided into two clear groups: those who demand more support and dedication from the politicians, and those who would like them to stay away from ICT decisions. The complexity of the various roles of the actors and interactions within this field clearly calls for more detailed and lengthier analysis. Only then will the researcher be able to fully understand the complexity of two public classes that need each other, yet in many instances do not seem to enjoy mutual trust.

5.3.2 Gatekeepers and consistency

The next proposition, as explained so far, states that FLOSS policies, when maintained over the long term, are the result of positive acceptance by politician-gatekeepers. There can be little debate as to the fact that politicians are key gatekeepers as the holders of the ultimate decision-making powers. As a matter of fact, the Spanish bureaucratic system requires that final decisions, in particular when resources are mobilized, receive the approval of either a politician or a person belonging to the "trusted staff". Members of the trusted group usually belong to the civil servant workforce, but can be replaced basically as desired by politicians. When such a bureaucrat is forced to leave a position she has been entrusted with, she usually returns to a job previously "secured" within the public administration.

Of the reviewed projects, a few were described as failures over time[2]. Seven cases were described as attracting a clear lack of interest or support from the political layer. Out of these, five were abandoned or scaled down to a minimum over time. Such a lack of support created a significant level of frustration among civil servants: they expressed disappointment

[2]In a couple of cases, such failure was due to the fact that the project could not be leveraged over the administration and instead it had to stay "at home".

with the lack of knowledge shown by the political layer. Another respondent explained that after the project was launched, the initial support was withdrawn, thus dooming the project to abandonment. However, last minute support from ICT technicians managed to keep the project alive and overcome the protests and trouble created around the changes to be implemented. The role of the technicians as gatekeepers was detected in another project. In this case, they did not support the FLOSS project. As a consequence, the decision-maker changed their mind and the project was canceled.

Yet the majority of the interviewed individuals explained that they had had either clear support, some degree of support or a *laissez-faire* approach from the political layer. Lack of rejection as a method of approval over time can be considered a form of continuous support. The gate has been kept open over the years. As a consequence of this, each and every FLOSS initiative developed its own path within its expected environment.

Out of the projects that received continuous support and progressed over the years, four main groups can be distinguished, based on the reason behind the support received from those key gatekeepers:

- Clear institutional support based on sound and elaborated reasons
- Support based on financial grounds: either because there is public funding for FLOSS or because it is free of licensing fees
- Support based on "it sounds good" logic: the gatekeepers do not have enough knowledge but feel it is socially valued
- *Laissez-faire* kind of support, where the technicians have gained trust and prestige and easily obtain approval

The first group includes those organizations where the strategic value of FLOSS has been analyzed and discussed at the top level. The final call has been that FLOSS is a good choice for the public sphere and thus it needs to be supported. Nevertheless, such a decision does not necessarily mean that the efforts made are considerable. Such support is mostly concentrated in the educational field and is often of a promotional nature. FLOSS is still largely unknown, and its advantages and particularities need to be communicated to the educational community, in order for it to gain acceptance through demand.

The financially grounded support is perhaps the easiest to understand and explain. Some of the projects gained backing because of funding availability either for ICT or FLOSS programs. Increasing budgets at no additional cost to taxpayers, along with more public initiatives, is clearly a winning proposition for decision-makers. A second group within the financially conscious gatekeepers includes those granting approvals on the basis of there being no new incremental costs. Sometimes, FLOSS is presented as the only budgetary

option available in order to achieve new demands. Moreover, new internally developed projects are sometimes proposed with the "zero cost" label, and thus have no trouble getting the green light for go-ahead.

The "uninformed approval" group mostly includes those politicians who give approval based on the positive image gained by implementing public FLOSS projects within Spain. Free software has been presented to and by mass media actors as sound and modern public management. Therefore, public workers gave replies during the interviews such as: "they do not understand it or have much idea about FLOSS, but think it will attract positive attention from the media". A few actors even mentioned that political actors wanted to gain the credit for projects they hardly understood or had barely been involved with.

The *laissez-faire* approach is really a combination of different perspectives. Some cases include blind support for civil servants who have proven to be reliable and created no issues over the years. Yet others include approval for FLOSS solutions, as long as there is a choice for the end user. This is the case, for instance, in OS deployment in educational computers alongside traditional proprietary options[3]. This second approach is declared to have less acceptance among end users. Yet, given the choice, some of the early adopters, if satisfied with the new options, have been identified as the best promoters by peer interaction.

A final point needs to be made concerning a few cited programs in cases where the gatekeeper did not even have an option. The technicians kept the project within their decision-making scope. Logic of the "technical matters must stay in the hands of the technicians" kind was applied in order to justify this approach. It is clear that in some cases, this reasoning makes complete sense, but there are also situations where better communication channels and disclosure might be necessary.

All in all, based on the findings stated above, it can be concluded that the projects that have continued to exist on a long-term basis have benefited from positive acceptance by the ultimate political gatekeepers.

5.4 Decision-making models: garbage can, muddling through

Moving into this third part of the field research, the intention is to focus on decision-making models. Two main statements have been proposed:

- Large-scale organizations present the characteristics of the garbage can model

[3]In what is usually called "dual boot". When the computer is started, the user gets to choose which operating system will launch.

- The incremental nature is present in policies at a much smaller scale

Based on those propositions, the detailed field study is presented next. The general trend and information disclosed is digested in detail. The final goal is to review the process in which decisions to promote or adopt ICT-FLOSS are made.

5.4.1 Where are the garbage cans? Decision-making models in large-scale public entities

It has been stated within the group of propositions that large-scale organizations where significant projects have been developed correspond to the garbage can decision-making model. Before the findings and conclusions of this premise are presented, two key issues need to be highlighted. The first one refers to the size of the sample. As the statement itself reveals, "large-scale organizations" are the target of the observation. Yet not all the interviews and projects selected fulfill this requirement. Instead, 17 public initiatives took place within large public administration entities[4]. Thus the sample that has been selected is reduced compared to that used to test the other premises of this research. This same limitation applies to the next premise within this group where "smaller organizations" are presented. Put simply, each of the organizations was labeled either "large-scale" or "smaller" for the purpose of the proposition concerning decision-making models.

The second limitation that needs to be stated at the outset concerns the involvement of respondents in the initial decision-making process. Not all respondents were fully involved in the process that led to the launch of the initiative. When questioned about it, some clearly stated themselves to be a secondary source with sentences such as "I inherited this project" or else "We received clear instructions to adopt FLOSS". Yet, the level of detail provided demonstrated a sound knowledge of the ins and outs of the projects in question. The fact that the researchers were able to judge them is sufficient to make their statements relevant and valid for the purpose of testing the proposition.

Of the 17 isolated projects, four initiatives cannot be considered to represent the garbage can model in any way. Two of the four resemble the traditional rational decision-making process. A problem was detected and a set of alternatives was elaborated. Out of these alternatives, the most appropriate was proposed, selected and implemented. In another case, the decision to adopt FLOSS came straight from a higher administrative level, as part of a shared project. Finally, one project was kept within the technical layer where demands and alternatives were discussed. Based on the technical knowledge, expectations and availability of funds, the alternative that was expected to work best was selected. The rational model was present, albeit the whole process was kept out of the hands of the political layer. Between the

[4]Mainly ministries, universities and regional governments.

lines, a certain amount of frustration could be sensed with the politicians' desire for "photo oportunities".

This feeling of opportunism may indeed be well founded: of the 13 other projects, six were clearly the result of a political decision taken without any analysis or report from the technical layer. "Act first, think later" behavior is present in all of these projects. A mixture of political opportunism and technicians willing to embrace free software was present in these initiatives. In some cases, FLOSS was completely unknown to the civil servants affected while in others, a proactive attitude was already apparent. Depending upon the level of continuity of both support and the availability of funds, these initiatives have either grown over time or else remain limited to a certain category of routine periodic events.

The remainder of the projects reviewed in large-scale organizations were mostly a mixture of actions defined in no particular order by politicians, technicians and other stakeholders. The confluence of various goals and interests provided the roots for the birth of fresh FLOSS projects. Problems, solutions, opportunities and participants merged at a moment in time, so that a new reality was created. The influence of regions where FLOSS was being implemented along with international FLOSS conferences was described as being of particular importance. Two particular replies need to be stated, based on the frankness of the respondents. One civil servant mentioned the "opportunists of free software": firms that had neither competent directors nor skilled ICT workers, yet, knowing that politicians were willing to embrace the FLOSS movement, promised and sung the praises of the best and easiest solutions in line with what politicians were willing to hear. This project was not destined to succeed, as the private outsourcing actor disappeared along the way, a victim of their own lack of professional skills. A final mention needs to be made of one large-scale project that gained full media attention. Yet one of the leaders throughout the lifespan of the project declared that it was nothing more than a mixture of chaotic events. For example, it was mentioned that no software created within the project could be made publicly available: due to a lack of leadership and sound knowledge, the licenses of the base software included in the various projects would not allow such a possibility. Put frankly, a project that gained significant media attention for its FLOSS support was creating not free but "unfree" software.

Based on the feedback received from the respondents from large-scale organizations, it can be asserted that the elements of the garbage can decision-making model are present in the majority of the decisions. A mixture of ambiguous behavior along with a disorderly process starting with problem definition results in significant similarities with what has been defined in the reviewed literature as the garbage can model.

5.4.2 Incrementally muddling through in small size entities?

As for smaller size organizations, according to the proposition, FLOSS projects are expected to be incremental in nature. The muddling through decision model, as per its original

definition, is mainly about policy-making. Yet policy-making in small-scale organization can be confused or merged with process making. In terms of FLOSS decision-making processes, the initiatives of the smaller entities reviewed are clearly incremental in nature.

Out of the 13 initiatives included in what could be considered as "small-scale", three were not incremental. One of these was well in line with the muddling through style, yet was abandoned by the technicians. They claimed that they could not guarantee an optimum level of support to end users, so stopped support and left the tool "live but unattended". Two other projects were carried out by subcontracting them from beginning to end. One had clear boundaries whereas the other had a considerable range of allocated means. Between 3 and 15 workers were subcontracted, depending on the availability of funds. The project was meant to be a trade-off, making savings in terms of license fees in return for more spending on IT programmer hours. And when the final solution was delivered, that was basically it. As of today, the application is still being used, though not optimally leveraged or developed.

However, all the other FLOSS projects or internal policies in small-scale organizations were of a clear incremental nature. Moreover, basically all of them shared the same pattern: an internal vision of the technical[5] superiority of free software as opposed to traditionally used proprietary solutions, an attitude of *laissez-faire* and acceptance on the part of the decision-makers, and no major resistance from end users. They also displayed a lack of sound financial capabilities. This recipe leads to organizations that create a roadmap of areas in which FLOSS can replace other solutions, defined in small steps[6]. These steps are then achieved and consolidated with more or less resistance and/or cooperation. While implementing these new tools, the leaders are already thinking ahead to the next steps, but the strategy is neither formalized nor communicated to the stakeholders. When asked about a particular project, the leaders would make it fit within the boundaries of other projects that had previously been implemented and before executing some other planned future projects. Yet, by nature, these leaders always have a long and clear "wish-list" in terms of future areas of development. Meanwhile, along the way, they have gained trust and entitlement from both end users and decision-makers.

Some of the program leaders mentioned "silent" work as the best way to advance: "by the time they realize, my FLOSS solution is already implemented, and up and running at full satisfaction rates". Another project illustrated the peculiarity of a FLOSS framework being utilized by programmers unaware of its FLOSS status, yet by definition creating fresh internal FLOSS solutions.

Unlike the majority of the projects in which a single person usually took the lead, one participant in a regional education project described how a previously unconnected group of teachers merged together virtually to develop FLOSS projects around a centrally provided

[5]And sometimes ethical / philosophical.

[6]Often migrating software from proprietary into new free tools.

tool. In this particular case, the teachers were free to adopt any of the two OS's available in the centrally distributed PC's, either Linux or Microsoft Windows. Although the number of classes in which Linux was selected was a significant minority, the teachers were able to learn together by trial and error. Such a learning process took place both in technical software issues and in project management itself, where strategy and continuity were declared to be key issues.

Within the same field of education, an isolated teacher in a rural elementary school managed to build up an Ubuntu[7] derivative distribution for education purposes on his own. Due to the size of the student base in rural areas, the classrooms are not arranged strictly by age. The teacher clearly described how such a particularity provided an opportunity to "learn together". Indeed, he conceded a lot of credit for the choices made in his project to the students themselves: "They show me what is easy and meaningful for them on a daily basis. I improve the project by trial and error thanks to them." Yet, thanks to the possibility of sharing it, such a small-scale project managed to gain a significant level of attention. A foreign Education Ministry considered such a Linux distribution fork as one of the candidates for nationwide implementation of a new global technology project. Apparently, it was not selected due to the fragile nature of its support base (i.e. it was a one-man project).

As a consequence of all the experiences and details collected, it can be concluded that the policies and projects implemented in the majority of the smaller scale organizations are mainly of an incremental nature. Yet they are not literally "muddling through", but rather are being designed, crafted and implemented by the relevant (direct or indirect) ICT civil servants in charge within the organization.

5.5 Output versus outcomes in a technological world

Finally, the fourth part of the field research reviewed policy evaluation. Three main statements have been proposed:

- Technology as an output is the main focus of evaluation
- Lack of *ex ante* outcome propositions
- Presence of counterfactuals evaluation methodology

The details of the conducted field study are presented in the following sections. The general trend and gathered information is specified. The ultimate goal of this premise is to review how ICT-FLOSS public policy evaluation is carried out on the ground.

[7] One of the most commonly used Linux OS, based on Debian: `http://www.ubuntu.com/`

5.5.1 Setting expectations: outputs vs. outcomes

According to the predefined propositions, the evaluation of results centers on the outputs. The paradox of ICT and FLOSS policy evaluation lies in its very technical nature: the outcome is distant and diffuse while the output is right on site and crystal clear. It is true that some FLOSS policies carried out in Spain have centered on fostering free software awareness in society and businesses. Yet most of the projects which were reviewed during the field research somehow or other had a FLOSS end solution behind them. This is probably why, when asked about the evaluation process, most of the respondents moved directly into describing milestones, capabilities and deadlines.

Nevertheless, some 11 projects diverted away from the main trend and typology. Of the most relevant, one particular project had the ultimate goal of promoting FLOSS knowledge and capabilities in the business field. The interviewed director acknowledged the need and his desire for final evaluation data, but declared he could not isolate revenue increase in the targeted tech-industries resulting from the impact of FLOSS. It is true, indeed, that the current public reporting requirements of businesses make this task impossible without the active participation of the parties involved. Another actor who had been involved in nationwide FLOSS activities was very clear on the topic: "there is no evaluation and there is no will to measure results". He provided an example of 35 persons traveling to South America for an ICT trade fair, without any clear objective: "what in the world could we be doing there from a public interest perspective?". Some other respondents "defended" themselves on the lack of objective measuring activities, citing the fact that their organization did not have a very clear sense of what needed to be measured. "No clear instructions" in this case meant "no action taken". Other respondents argued that there was a lack of internal tools for such activities. Some of the projects mentioned earlier, in which the work was kept completely inside the civil servants' circle, did not have a programmed initiative to measure objectives. Finally, two typologies cropped up more than once: questionnaires and cost-savings.

Questionnaires were present in a few projects. If properly applied, they could represent one of the possible tools to evaluate outcomes. Yet, in one case, the main goal of the questionnaire was centered around user satisfaction, and in the second, in which the goals were slightly broader, there was a very low response rate. As for cost-savings, this goal was clearly defined in some initiatives. Yet none of them presented a formal TCO analysis to review such savings. One of the actors interviewed declared that once the decision to abandon the proprietary solution was taken, every single cent of the previous license cost was a saving. This could very well be the case, as all IT support might be provided within the organization. Nevertheless, the savings could be even higher than license fees or, on the contrary, there might be hidden costs that deny such an optimistic perspective.

Despite all of the cases portrayed above, a vast majority of the FLOSS cases reviewed present some kind of evaluation of objectives. All of these centered on the output rather than the

outcome. Another circumstance encountered was the fact that politicians rarely get involved in any sort of follow-up of objectives, whether they concern outcome or output. Where such follow-up does take place, it is limited to sporadic meetings without any kind of established agenda or scheduled dates. There is one exception to this main trend at the highest level of the Spanish administration: Ministries do have, within their DNA, a clear, documented and structured procedure for project follow-up. The cases reviewed at this level displayed plenty of examples of politicians' involvement in the following up of policy objectives. According to several replies received with regard to these particular cases, the politicians "did not care much" about ICT policies as a whole, and much less about any FLOSS initiative.

The particularities of the FLOSS policy evaluation, as witnessed in the cases reviewed, usually included two main characteristics: implementation milestones and product/solution completion level. These two items received extraordinary attention from the bureaucrats leading actions promoting FLOSS:

> We have clear goals in terms of implementation, yet not regarding usage levels
>
> We draw up a yearly memorandum of projects completed and in progress
>
> We closely monitor the technical capabilities achieved
>
> The current solution achieves 95% of the desired features
>
> We have informal internal meetings to review expected dates and achieved features
>
> We compared the achieved with the planned on a regular basis during the implementation

When asked about outcomes, the respondents showed a good level of interest; some of them even stated that "as a matter of fact, the final outcome is what really matters". In many other cases, the respondents were surprised by the question. They were fully conscious and convinced of the need to evaluate projects, programs and policies, but had always assumed that reviewing the output was the way to go, as any other area is out of their hands. This is tantamount to admitting that a perfectly assembled software solution is a failure because it does not achieve the outcome it should. Lack of interest from the politicians and focus on the output by the civil servants provide a landscape in which there is a good level of review, but it focuses on the technical quality of software solution outputs accomplished periodically.

Those bureaucrats who acknowledged outcome to be the way forward mentioned three key reasons that do not let them move in this direction:

- Lack of interest in such outcomes from the political layer
- Lack of data making it possible to review outcomes

- Lack of proper tools for the task

Moreover, any given output needs to be compared with the target expected initially. Yet, as we saw earlier, problem definition is not carried out in a structured manner in the field of study. One of the many consequences of this is that the nature of the expected outcome is unknown to the policy "implementer".

Based on all of the replies presented above and the reality found by the researcher, it can be concluded that the presented statement is a valid one. Almost two thirds of the reviewed projects present a formal evaluation process implemented to a higher or lower degree. Yet such evaluation goes no further than ensuring proper output delivery, mostly of FLOSS tools intended to target one problem and/or need.

5.5.2 Setting expectations: identifying goals from the outset

The second part of this group of propositions states that the expected outcomes of FLOSS public policies are not defined *ex ante*. The avid reader might have seen a hint in the previous section regarding this statement. In fact, the evaluation presented in the preceding section is closely linked with the objectives any public action is supposed to have. Evaluation is about effectiveness and efficacy with regard to a pre-defined target. Such a target, as explained above, can be the output or the outcome. The fact that the researcher looked specifically into outcome expectations rather than outputs implies an added complication: outputs are usually well understood and planned, yet outcomes as a final objective of the decision-maker are harder to define explicitly in advance.

When asked about outcomes defined *ex ante* for the FLOSS policies they had been involved with, only two experiences provided a clear affirmative reply. The first could be understood easily: the case of the rural elementary school mentioned above. The local teacher clearly identifies the outcomes expected for each of the student groups at the beginning of each and every school year. These outcomes might be the ability to use a PC in the case of the youngest pupils, or the development of movie editing capabilities for the older ones. Moreover, such expected outcomes are addressed with free software tools. It is interesting to note that the students themselves participate, when possible, in the selection of the software tools. Trial and error is used, and when the classroom shows the teacher that one specific solution matches their needs, that seems to be the chosen one.

The second experience in which expected outcomes were clearly identified involves an initiative to promote knowledge and the use of FLOSS tools among businesses and individuals. According to the leader of this initiative, clear outcome objectives were established at the beginning of every year. For the duration of the initiative, a set of actions was carried out over the course of the year in order to achieve the goals in question. The awareness that

measuring the final achieved outcomes was an extremely difficult task did not prevent this public entity from declaring its goals. The project lasted approximately 4 years. Afterwards, the public entity created on an ad hoc basis for this initiative was transformed into a new entity with a much broader business-promoting objective. As a consequence of this change, the projects previously carried out were abandoned, yet some low-level activity was continued in the field.

A specific mention needs to be made of three typologies encountered in a significant number of cases:

- Cost-savings as an output
- FLOSS promotion
- Technological independence

The cost-savings output was declared as the main goal in 2-3 cases. The respondents stated that this was one of the clear outputs of FLOSS adoption practices within their public entity. However, no specific target number was identified. "Every new step we take in that direction is a cumulative cost-saving figure" was the argument for not specifying the desired output *ex ante* in those cases. As for the cases of FLOSS promotion, the expected output was sometimes vaguely defined. It is true that FLOSS awareness is a complex topic to measure, yet no thoughts on feasible proxies were mentioned to the researcher. Comments along the lines that "our goal is for people to know it and install it on their home PC's" were encountered in a few cases. Finally, a few entities mentioned the technological independence of their entities after FLOSS adoption as being one of the outputs. These cases are somehow trickier, as "independence" seems initially to be a black or white kind of concept. Yet, as mentioned by one ICT director, some FLOSS tools have very little local software industry support, if any. Under such circumstances, scenarios are possible in which the entity might depend on one single provider, for example, meaning that its independence can be restricted by the ICT supplier landscape.

More than 13 projects had *ex ante* objectives. Yet all of them were outputs rather than outcomes. Many specific desired *ex ante* outputs were presented to the researcher, including projects, planning sheets, usability, migration percentages, Gantt charts, etc. In some cases, a significant level of detail was provided, along with specifications. Some of these objectives came directly from government political bodies, some were established in the ICT director's office; yet all of them were outputs rather than outcomes. A few civil servants complained about the impossibility of them working over the course of the year as expected: according to them, it is normal practice for the political leader to make changes on the go, rendering any kind of planning useless.

Finally, seven of the reviewed cases had no *ex ante* goals specified whatsoever. The reason for this lack of expectations was mostly attributed to the decision-makers. Comments such as: "They do not have a very clear idea" and "They tell us what to do, but in very broad terms" were heard during the interviews. One respondent was particularly bitter about what he had experienced while leading a "large-scale" FLOSS project. According to him, leaders who had been granted public recognition for their FLOSS support had no strategy whatsoever: public money was being spent not only without objectives, but also without any results whatsoever. "The capabilities of the leading politicians in this country are minuscule". Probably along the same lines, a person in charge of a migration project found himself in a rather confusing situation. The decision-makers expressed their support for a publicly funded migration project, yet when he was in the field and faced difficulties stemming from resistance from ICT civil servants, he received no support from the very same politicians. In cases like the two above, the researcher could feel the frustration of the respondents, which accumulated over the course of their tenure as FLOSS public leaders.

Based on all the responses presented and detailed above, it can be concluded that the expected outcomes of FLOSS public policies are not defined *ex ante* within Spain. Cases in which real expected output is clearly defined are rare. Both political leaders and civil servants concentrate on output definition, instead. And yet quite frequently, not even the outputs are defined before a decision to spend public money is made.

5.5.3 Counterfactuals: the missing path to excellence

The final proposition considers that counterfactual evaluation models are not present in public FLOSS evaluation procedures. Testing this final premise was fairly straightforward. When questioned about policy evaluation techniques, there was not a single case in which the counterfactuals model had been used. The evaluation models described were much more in line with project management techniques: milestones, bottlenecks, root cause analysis and the like. This reality should come as no surprise given the conclusions reached with regard to the previous statements. The lack of expectations in terms of *ex ante* outcomes makes a lack of interest in the advantages provided by the counterfactual methodology more likely.

Yet quite a few of the reviewed cases provided opportunities for counterfactual analysis. As a consequence of the diverse nature of FLOSS adoption under various scenarios, counterfactual analysis can be considered feasible. This technique could shed some light on the quality of FLOSS use and promotion. Some examples of these scenarios are:

- FLOSS adoption / non-adoption by similar municipalities or within supra-municipal projects

- ICT literacy in elementary education based on ICT tools and intensity of use (proprietary or free)
- TCO in various similar public entities based on the rate of FLOSS adoption
- Level of activity of the FLOSS industry based on the existence of public FLOSS repositories

Of the above examples, the case of education is probably the most relevant. Yet, the counterfactuals model cannot be used across all projects. Some regions requested mandatory FLOSS adoption in schools. Therefore, it would not be possible to compare various results within those specific regions. However, in other cases the choice was left to the local teachers. In such a scenario, it would be possible to compare ICT literacy at a certain point in the education path. Nevertheless, a sound counterfactual technique must be used: teachers likely to adopt FLOSS might be more proactive as regards ICT in general and thus dedicate much more effort both to training themselves and to transferring their ICT knowledge to their pupils. Such a possibility must be taken into account when carrying out the analysis.

Although good opportunities for counterfactuals analysis are present, the reality proves correct the statement that the counterfactual evaluation model is not present.

5.6 Summing-up of all the presented propositions

As a form of reference and in order to provide a quick and clear guide for the propositions, Table 5.1 presents a summary of the results of the field research and the validity of each of them.

Table 5.1 – Summary of statements validation results

Reference	Proposition	Result	Comments
H 1.1	Classic problem definition steps not formally documented and reviewed	Correct	Problem definition is informal and takes place at the technical level (civil servants)
H 1.2	ICT-FLOSS problems not present in agendas	Correct	
H 2.1	Free software promoted bottom-up within the public administration	Partially correct	Politicians do also initiate FLOSS policies
H 2.2	FLOSS public policies kept aligned around single view over time	Correct	
H 3.1	Large scale organizations present garbage can decision models	Correct	Significant similarities are present
H 3.2	Smaller organizations present incremental decision models	Correct	Not literally "muddling through", but rather led by civil servants
H 4.1	Evaluation process centers on technical outputs	Correct	
H 4.2	Expected outcomes are not defined *ex ante*	Correct	Expectations are often defined for outputs
H 4.3	Counterfactual evaluation model is not present	Correct	Not a single case found

Source: Own creation

Chapter 6

Conclusions and Further Research

6.1 Summary of final conclusions

A brief summary of the findings linked to existing literature is presented next. The results of the field study are merged with previous statements presented both in the literature review and the rationale behind the propositions.

The first part of the research around agenda setting includes two main topics: problem definition and the existence of ICT-FLOSS issues on the political agenda. Problem definition in the public sector as proposed by Bardach (1998) has not been found to be present in agenda setting procedures. Instead, there is a mix of political guidance[1], direct action led by civil servants and simple acceptance of proposals coming from various stakeholders within the public administration. As for the existence of ICT-FLOSS topics on the political agenda, a simple consequence of this lack of formal procedures is that problem analysis is not usually well documented, instead depending on the assessment of the "problem solving" proponents. These findings contribute to recent research, such as that of Brugué Torruella (2014), by confirming that problem analysis is fairly complex in modern times. Yet FLOSS policies still seem to be far from reaching the starting point: the reports of Chaqués-Bonafont et al. (2014a) are confirmed in the sense that ICT topics are not present in public policy agendas. These findings would need to be backed up by more insight into non-FLOSS ICT policies.

As for the actors' involvement, only two main groups of official actors[2] were reviewed: civil servants and political decision-makers. The bottom-up scenario, as presented by Subirats

[1] Mostly "undocumented" according to the civil servants that participated in the interviews.

[2] As defined by Birkland (2001)

(1994), was expected to be at the heart of new policies and projects. This was found to be borne out in a significant number of cases. Nevertheless, the top-down and network models were also found. Within the top-down approach, guidelines were received from decision-makers about adoption and/or promotion of FLOSS solutions. Some of these cases, as disclosed in the interviews, can be considered to be good examples of reactive actions, as defined by Subirats (1992). A few cases of network effect, mostly projects in which various administrations took part, were also present.

A second part of the review centered on the role of the main actors: decision-makers as gatekeepers. While the "green light" scenario was often described, very little change was detected when there were political changes after elections. This reality can be considered to be the result of the internal balance of powers, as proposed by Nieto (2012), or indeed a minor validation of the findings of Baumgartner et al. (2011). Consistency over time within the most active entities is in line with the various trends presented in Table 2.14, which provides an overview of policies over time within the different regions.

The limited scope of the research means that it has not been possible to gain a comprehensive understanding of all actors and their interaction. Instead, based on analysis of the various roles and resources as defined by Dente and Subirats (2014), civil servants play a mixed role: they are both experts in FLOSS and bureaucrats at the same time. On top of that, they also play a significant role in terms of advocacy as defenders of the general interest. As for the resources of each of the two groups reviewed, a source of tension was reported that confirms, to a certain extent, the proposals of Nieto (2012). Civil servants hold cognitive skills while final decision-makers act as gatekeepers, based on their political power.

The decision-making model prior to the implementation of new policies was also reviewed. Two statements were presented, based on the works of Cohen et al. (1972) and Lindblom (1959). Although the different currents that these authors represent were not completely aligned with the definitions and proposition, both premises were validated. The decision-making processes of large-scale organizations present "garbage can" characteristics. Smaller institutions, however, tend to advance in an incremental manner. Nevertheless, such incrementalism is not a consequence of a well thought-through strategy: it comes as a result of lower resources and shorter decision-making procedures. Several authors have reported the existence of IT garbage can models (Boynton and Zmud, 1987, Hayes and McGee, 1998, Travica and Cronin, 1995, Watson, 1990). This research confirmed the existence of a similar trend in decision-making procedures within large scale organizations. In small scale organizations, on the other hand, a lack of resources and lower complexity led to a presence of "muddling trough" similarities. This final particularity has not been held up against current research; it needs to be validated by more specific case studies.

Finally, evaluation was analyzed and compared to the theoretical framework as presented in the literature review. The results of the research elaborate on the need to focus on

outcomes rather than outputs. Instead, it was found that due to the lack of desired outcomes clearly stated *ex ante*, project leaders focus on the technical outputs when implementing simple evaluation techniques. Policy leaders do not seem to be concerned much beyond the initial media attention captured by the positive social implications of free software. The monitoring/forecasting/evaluation/recommendation steps, as presented by Vedung (2000) were not found to be a common procedure. Evaluation, when present, was detected to be retrospective in nature. Under such circumstances, it was not a surprise to find that any attempt to review the outcomes of FLOSS public policies by executing the counterfactuals model (Gertler et al., 2011) was simply non-existent. This final part of the field study was challenging: its purpose was to identify the extent to which the trend toward evaluation in Spain (Viñas, 2009) has taken root or if, on the contrary, no serious attempt is being made to change the traditional lack of appraisal culture (Labeaga Azcona, 2013) within Spanish public bodies. As it turned out, the technical nature of FLOSS has favored the analysis of outputs rather than outcomes. The lack of predefined desired outcomes was also clearly identified. As a consequence, impact evaluation was simple and benevolent (Greene, 2009) or else non-existent, in terms of complex tools (Gertler et al., 2011) (Weiss, 1972). Such findings need to be extended and confirmed by further research projects.

A final word needs to be noted on a common fact detected across issues and organizations concerning the existence of a clear gap between the theory on how to manage public policies and the practices encountered. Carrying out the procedures proposed by the academic world happens to be very complicated, in reality. The participants offered various reasons for this:

- Lack of pro-activity or dedication from the decision-making political layer
- Historically, no culture of analytical procedures within the Spanish administration
- Lack of resources to accomplish such tasks[3]

Concealed by this reality, as pointed out "off the record" by one participant, it could be argued that none of the decision-makers are willing to take the road of analysis, calm and sound problem definition, and action.

Before drawing this brief review to a close, it should once more be stated that this set of findings and contributions refers only to a set of policies selected without the goal of proposing a strong correlation or overall conclusions. Indeed, this is one of the limitations of the research presented below.

[3]As presented when reviewing the role of the AEVAL agency.

6.2 Lessons to be learned from the conduct of the study

This research represents a step forward in terms of understanding the way in which FLOSS public policies are crafted and evaluated within the Spanish territory. The field study revealed that almost all the propositions were correct:

- Problem definition steps are not formally documented and reviewed
- ICT-FLOSS policies are not part of the decision-makers' agenda
- FLOSS policies are promoted equally by politicians and civil servants
- Politicians as gatekeepers have mostly maintained their approach over time across public entities
- The FLOSS policy decision-making model present in large organizations corresponds to the garbage can style
- Smaller entities usually decide FLOSS policies by means of an incremental model
- The activity of evaluating results usually centers on the output of software solutions and deployment
- Public policy outcomes are not usually defined *ex ante*
- The counterfactual evaluation model is not present at all for purposes of FLOSS policy evaluation

These statements are valid for the field cases selected for the research. However, if anything is clear from the reality that was encountered, it is that the gap between what public management manuals suggest as good practice and the way in which FLOSS policies are implemented is enormous. When the policy is promoted by politicians, there is no definition of either the problem or the desired outcome. Therefore, the success of the implemented measures is left in the hands of the bureaucrats executing the policy. On the other hand, when policies are promoted by civil servants, the expected outputs are usually clear; milestones and similar tools are used to ensure good quality and timely results.

This reality to an extent reflects the often-cited distance between policy-makers and executors (Nieto, 2012). In addition to the distance separating them, there is also a difference of interests. Decision-makers seem to be mostly interested in re-election, meaning that they seem to use FLOSS policies to gain mass media attention and credit for sound management. Civil servants, on the other hand, promote and adopt FLOSS solutions mostly because they are convinced by their advantages at various levels. It is worth mentioning that bureaucrats often carry on their shoulders the burden of overcoming internal resistance. A

clear conviction of the need for public use of free software is the main fuel that moves public human resources forward with a rather unusual degree of self-assurance.

Furthermore, the need to set a clear *ex ante* outcome for new public initiatives is another obvious lesson that must be taken from the research. Providing outcomes with the relevance that they deserve is also a responsibility of the ultimate decision-maker. FLOSS does not seem to be a field in which swift decisions need to be made. Instead, sufficient consideration and debate should precede any new initiative that benefits from a minimum allocation of resources, be they human or economic. Evaluation techniques also need to be improved. Current trends in open government might provide the impetus that gives this desired approach momentum.

This research also offers a good starting point in terms of further social science research: it provides the basis and knowledge as to how public entities of various scales deal with public policy on a daily basis. It sheds light on the extent to which theoretical propositions are implemented and adopted in the processes embedded within the Spanish public sector. And it does so within a field that is expected to attract growing levels of attention in the near future. FLOSS combines two ingredients that are set to be the main drivers for progress in the near future: ICT tools and open innovation. As such, this review of part of the policy chain helps make progress along the path towards theoretical premises that are feasible given the structure and capabilities of the Spanish public sector. No doubt this is just a small step, but hopefully one taken in the right direction with sound methodology.

All in all, most of the lessons learned from the research are not much more sophisticated than basic principles of sound public management. Yet, political leadership seems to be the missing link. The complexity of the public administration and habits becoming entrenched over the years make this a complex yet feasible task.

6.3 Limitations of the research

The presented research, as explained at the outset, is of a qualitative and exploratory nature. It does not intend to establish any kind of correlation between the presented results and the whole reality of FLOSS public policies in Spain. As such, it has some limitations that are discussed below.

Because of its **qualitative** nature, both the opinions received and the way they are interpreted are subject to the researcher's ability to filter the content. Interpreting what is said within its own context, being able to read between the lines, and gaining a deep enough knowledge of the researched phenomenon are all abilities required in qualitative research. Yet the researcher is a novice in these tasks. Although the thesis advisors have provided broad and very valuable guidance on these aspects, the author's lack of experience in this kind of

qualitative research is clearly a limitation in terms of the final results presented. Furthermore, the selected **sample** was based on the willingness of various individuals to participate in the research. As presented in the methodology, half of the interviewed individuals were volunteers who answered the researcher's public request. The other half became involved mostly based on the personal links of the previous participants. Often, the researcher could sense that the individuals most active in FLOSS were quite aware of many other cases included in the research. In other words, the sample that participated in the research was largely made up of individuals who have been leading the most proactive and relevant FLOSS public policies in Spain. Other policies that are not so well known might have been of a completely different nature. Ultimately, the reader needs to know that most of the participants come from very proactive FLOSS public initiatives.

Another source of limitation is the **exploratory** nature of this research. As presented in the literature review, there has been very little research on the topic of FLOSS oriented public policies in Spain. The researcher was therefore faced with a field in which very little academic reference material already existed. As a consequence of this, the research was targeted towards a set of variables defined *ex ante* about which there was no previous insight. During the interview process, the researcher was faced with various cases in which the desired information was simply lacking or out of focus. Every single case reviewed had its own particularities due to the nature of the projects in question. As of today, it seems clear that more detailed FLOSS case research should be either of a comparative nature or else grouped in terms of the various typologies of public activities promoting FLOSS. This limitation is of a double nature, however: the described singularity of the research is also one of its strengths. Based on the findings of the presented cases, more focused research can be carried out in the near future.

Another definite limitation lies in the **questionnaire**. As the interviews were being carried out, it became clear that not all aspects covered *a priori* could be addressed: time and particularities were the clear boundaries. Although one hour might seem to be a long time, it proved not long enough to go through all the questions prepared for the conversations. The researcher adapted by letting the individuals explain, in their own words, the ins and outs of any given public policies. Once again, had the researcher had more extensive research experience, both the questionnaire itself and the interview could have provided better insight into the various policies. Closely related to the limitations in the questionnaire design is the fact that the interviewed persons did not include any political leaders. Indeed, most of the respondents had a rather pessimistic view of the capabilities of the political leaders. A significant number of participants declared rather vehemently that the political lawyer did not understand the particularities of FLOSS (and often did not want to, either). Incorporating such actors into the research questionnaire[4] would probably have given the

[4]Needless to say, it would have need some adaptations if it was meant for a broader target audience.

research a broader point of view in terms of why things happened as described so far.

Free software can be a religion for some. Having blind faith in its superiority over all other technology is a clear source of bias for any actor placed in a key role. The researcher did not encounter much evidence of this attitude in the cases reviewed. However, to a greater or lesser extent, it could be sensed that a number of the civil servants were indeed convinced of the technical and moral superiority of free software. Few respondents acknowledged that they reviewed and compared various solutions, both free and proprietary, prior to deployment. Instead, the decision to adopt free software was made first. Only then would various alternatives be analyzed. Does this somehow suggest a "hidden" bias towards free solutions and, if so, could it be claimed that such bias might have led to a slightly distorted view over which FLOSS public policies were implemented, and how? The researcher did not have this impression. But once again, the researcher is biased himself, to a certain degree. Therefore, it could be stated simply that no bias or limitation was perceived from a pro-free software perspective, but that this impression might not be wholly accurate either.

Finally, two minor limitations need to be highlighted: subcontractors and the "lost-job" criticism. A small number of the individuals were subcontractors, as explained in the methodology section. They were accepted on the basis of their in-depth knowledge both of the public administration and the policies in which they had been taking part. During the interviews, it was hard to tell the difference between these subcontracted workers and standard civil servants, such had been their level of involvement in the projects and policies. However, it was also clear that, except for in some cases, they had never been in direct contact with the final decision-maker, i.e. the politician or their delegated bureaucrat. This means that some of their answers need to be considered to come from secondary sources. This is not the case of the other respondents. This limitation is considered to be minor because, out of all the interviews, only 4 people could be viewed as secondary sources. As for the "lost-job" limitation, it refers to the point of view of 2 actors whose perspective was particularly harsh towards the way FLOSS public policies were carried out. In these case, the actors in question had participated intensely in projects for a period of time, only to be released from their duties later on. Their point of view can be considered directly influenced by this fact, yet it was frank and direct. The researcher has tried to accommodate the facts described by these actors within the overall picture, and isolate personal feelings from facts. One of the two cases was quite simple and provided evidence of the limitations of qualitative techniques: the actor described a policy already reviewed with a previous civil servant. Yet the image described in this case did not tally with the account that had already been heard. While one actor described the policy as a success that had achieved its desired objectives while it was in force, the second respondent described it as being chaotic from the outset. According to this second testimony, none of the various actors were aligned and, therefore, creating added value within the project proved to be an impossible task. Based on the two narratives, the researcher was able to construct what seemed to be the most

likely reality behind the reported comments. This feedback was also quite useful in helping adopt a similar filter with regard to other over-enthusiastic accounts.

6.4 Implications for policy and practice

It is clear that further research, as presented in the next section, is required before sound advice can be drawn up. The quick and easy temptation would be to preach magic solutions of the "follow the manual" kind. Yet, the public administration is a complex environment, as has already been discussed. Public policies are not of a linear nature either. Bureaucratic organizations are subject to complex and circular back-and-forth actions that are constantly changing. Different actors and stakeholders are in permanent movement and react to new environments almost immediately in an increasingly connected world.

However, if the results provide one clear policy implication, it is the need to adopt sound analysis and evaluation practices. Aspects such as what FLOSS is, in essence, what it means and what its particularities are seem to be largely unknown to decision-makers. Some nations have performed strategic analysis around free software and its implications. Centralized policies are being pushed as a result of sound problem definition. The intention of this research is in no way to state that such approaches are the right way to proceed. Instead, the foundations for a lengthy analysis can be constructed based on all the FLOSS initiatives that have taken place in the last decade in the Spanish territory.

Procedures such as the counterfactuals model have not been detected at all. The rationale provided in the field study highlighted a lack of resources, tools and capabilities. The existence of central bodies such as AEVAL provides a great opportunity to carry out an in-depth evaluation using sophisticated techniques. Of all the FLOSS public policies reviewed, two cases present the particularities that would allow a counterfactual analysis to be conducted, based on feasible historical data:

- FLOSS adoption by public entities for internal use
- FLOSS implementations in education centers

Public entities that adopt FLOSS solutions for internal use report cost-savings among the benefits. Those who are responsible for public funds must perform sound analytical evaluation. This task could be executed by comparing two similar organizations, one of which uses FLOSS solutions, the other non-FLOSS solutions and establishing TCO figures. As previously discussed, TCO analysis needs to go much further than simply reviewing internal costs. Instead, wealth created locally linked to FLOSS policies also needs to be included within the calculations. For this purpose, techniques used by the private sector

to assess TCO would not be sufficient, as the external economic implications of technology choices are not usually part of corporations' concerns.

As for adoption in education, apart from TCO, the ICT capabilities of the student body is another field in which good evaluation projects could be carried out. The objective would be to analyze the correlation between usage of free software within the education process and the final ICT capabilities achieved. Within this field, an area ripe for social studies could be a review of the impact of concepts such as openness and sharing as part of the ICT curriculum on education as a whole, and personal approaches toward society.

These opportunities build on past FLOSS policies which, for the most part, had neither clear expected *ex ante* outcomes nor predefined evaluation procedures. However, the fact that good and sound public policy practices are complex and require time should not be used to justify the lack of such activities. Instead, all actors, but in particular the decision-makers, need to ensure, prior to launching significant projects:

- Expected or desired outcomes
- Evaluation procedures, tools and schedules

Governing the public requires the actors, agendas, problem definitions and decision-making procedures to seek efficiency and efficacy in terms of public spending. The results must be measured in terms of real outcomes (or the lack thereof). Only then can future decisions be taken in the light of results achieved in the past and lessons learned.

6.5 Future lines of research

The explanatory nature of this research contains two particularities:

- It opens up a rather broad field for new research
- It lacks a detailed definition of those new fields

Therefore, rather than elaborating clear new lines of research, fields in which new and more detailed projects are desirable are presented in this final part of this dissertation.

The first area in which future research could concentrate concerns the specific details and procedures relating to public policy expectations. In other words, this refers to what public powers expect of their initiatives, how they go about defining these expectations and the extent to which follow-up procedures are present. This line of research does not necessarily need to be tied to FLOSS initiatives. Indeed, comparative analysis of other aspects of

similar policies might be a good area to explore. Is the lack of *ex ante* outcome definition a peculiarity of FLOSS, or is it present across other policies as well?

Another area of future research is the cost reduction field. Free software is not always gratis software. It is true that most solutions are free of charge. The most usual business model of FLOSS suppliers is centered around the service, which means customization and maintenance. Detailed and sound research can be envisaged based on large-scale FLOSS deployment. As one civil servant noted, the adoption of FLOSS came hand in hand with an increase in the workforce. Comprehensive research into TCO over time can help understand and test some of the usual claims of FLOSS, along the lines that it reduces costs for public entities and creates local jobs.

A recurring feature of the interviews was the lack of inter-institutional cooperation[5]. It was even mentioned that entities leveraging publicly developed solutions were forced to hide such usage, because revealing it would have provided free positive attention to a political rival. Moreover, rigid administrative procedures pose significant problems to the sharing of initiatives. In the meantime, cooperation at the technical level is quite formalized and facilitated by CENATIC. When it comes to inquiries about the best alternatives, past experiences, projects in progress, etc. a significant amount of information is brought into the common realm. This combination of diverging aims and rigid procedures provides rather appealing grounds for a future line of research. Reviewing experiences in which such walls have been broken down is one possible path. Another relates to possible tools for public cooperation and the role that CENATIC might play in facilitating such initiatives. The rationale behind this line of research is founded on the fact that different public bodies have similar ICT needs. Developing such solutions publicly under FLOSS-friendly licenses seems like the logical path to take.

A final mention must be made of the whole evaluation process. Two lines of future research can be identified: effective evaluation of past experiences and proposals of evaluation processes. As expressed earlier, advanced techniques such as the non-existent counterfactual model can be applied to past experiences of FLOSS adoption. However, such an evaluation is not feasible across the board. For this reason, the *ex ante* definition of evaluation methodologies presents a whole new field of research. Different methodologies applied to ICT-FLOSS could be tested and reviewed, with the best alternatives then being made available to policy-makers. Finally, the exact impact on EU evaluation requirements for granted subsidies suggests a final area of research. For example, do such requirements end up "contaminating" other areas of the public sector, leading towards endemic evaluation cultures? Alternatively, are such practices limited to EU reporting requirements, which are mandatory in the area of public funding? As indicated, all of the above are quite broad lines

[5]Some successful projects like the @firma platform were developed by the central government and then made available to everyone. Usage has been inter-institutional, not the project itself.

for further research. The relevance that public management is gaining in the present day[6] suggests that the current status quo might evolve into a situation in which there is greater accountability for public spending habits and procedures.

[6]Open data, open government, social legislation requests, etc.

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Appendix I - Acronyms

EU: European Union

FLOSS: Free and Libre Open-Source Software. This acronym is mostly used in the academic world to describe free software, libre software and open-source software.

GDP: Gross Domestic Production

GNU: recursive acronym for "GNU's Not Unix!", a Unix-like computer operating system developed by the GNU Project, composed wholly of free software

GUI: Graphical User Interface, a set of tools to interact with electronic devices through graphical icons and visual indicators, as opposed to text-based interfaces, typed command labels or text navigation, which were at one time the only possibility for such interaction

ICT: Information and Communication Technologies

IP: Intellectual property, i.e. to the laws governing copyright on various aspects of creation

MS: Microsoft

OS: Operating System

TCO: Total Cost of Ownership, a common measure used in ICT argot to refer to all sorts of costs relevant to the usage of a specific solution

VOIP: Voice over IP, an Internet protocol that facilitates voice communications by using computers networks

Appendix II - Andalucia's regional law on free software

SPANISH

Decreto 72/2003 Andalucia

Artículo 31. Software libre.

1. En las adquisiciones de equipamiento informático destinado a los centros docentes públicos para su uso en actividades educativas, se exigirá que todo el hardware sea compatible con sistemas operativos basados en software libre. Los ordenadores tendrán preinstalado todo el software libre necesario para el uso específico al que estén destinados.

2. El equipamiento informático que la Administración de la Junta de Andalucía ponga a disposición en los centros de acceso público a Internet utilizará para su funcionamiento productos de software libre.

3. La Administración de la Junta de Andalucía fomentará la difusión y utilización orientadas al uso personal, doméstico y educativo de software libre debidamente garantizado. A tal fin se establecerá un servicio de asesoramiento a través de Internet para la instalación y uso de este tipo de productos.

ENGLISH (free translation by the author)

Decree 72/2003 Andalusia

Article 31. Free software.

1. In the procurement of computer equipment intended for public schools for use in educational activities, all hardware is required to be compatible with operating systems based on free software. Computers must be pre-installed with all the free software needed for the specific use for which they are intended.

2. The computer equipment that the government of Andalusia will provide in public access Internet centers must use free software products.

3. The government of Andalusia shall promote the dissemination and use of properly guaranteed free software for personal, domestic and educational usage. For this purpose, an online advisory service will be provided for the installation and usage of these products.

Appendix III - Research Questionnaire

Public policy actors, processes, decisions and evaluation: The case of FLOSS in Spain (2003-2013)

Guia de entrevista con responsables de proyectos FLOSS en el sector público: **45-60 minuto**s

Notas: Previo a la entrevista se facilitará un guión basado en este documento de una manera abreviada (detalle de áreas a tratar).

A su vez se tratarán los temas marcados en negrita en este cuestionario prioritariamente para asegurarse cubrir todas las áreas. El resto de preguntas se realizarán en función de la disponibilidad de tiempo.

ESTRUCTURA DE LA ENTREVISTA

Presentación del proyecto y sus objetivos **2-3 min**

Presentación de la entrevista: temas a tratar, expectativas por ambas partes, grabación (uso interno), tratamiento anonimato- **2-3 min**

Introducción - **5 min**

Breve noción del recorrido profesional y formación académica (Nombre, cargo y organización además de datos de contacto recogidos previamente, a través de un breve cuestionario online).

Organigrama dentro del que encaja su puesto de trabajo y modo de relación con los responsables políticos (directo o con alguna o varias capas o escalones intermedios)

Proyectos de FLOSS en los que ha participado/dirigido durante los últimos 5-6 años. Numero y descripción global. Caracterización en base a tipologías: Fomento de uso, elaboración de software, implementación en interno, etc... (Todo esto también se intentará recoger en conversaciones previas) Para las preguntas concretas posteriores, elegir el proyecto más significativo de común acuerdo.

Área #1 – Actores en políticas de apoyo al FLOSS: de abajo para arriba o de arriba para abajo? /10 min máximo

¿Dónde han surgido las ideas para nuevos proyectos FLOSS?

¿Es respuesta a una demanda social?

¿Cuál es el conocimiento (a nivel usuario) de los responsables políticos de su área de trabajo sobre la nuevas tecnologías en general? ¿Y sobre FLOSS? ¿Sensibilidad?

¿Qué respuesta se recibe por parte de los políticos a las propuestas de actividades FLOSS realizadas por los técnicos de la administración ?

¿Proponen los políticos actividades-programas concretos al respecto? En caso afirmativo, ¿cual suele ser la reacción por parte de los técnicos en general?

En base a todo lo anterior, ¿se ha mantenido una línea de acción clara y constante a lo largo de los años? ¿Ha habido modificaciones significativas con cambio de responsable político dentro del mismo partido? ¿Y de diferente partido (si es el caso)?

Área # 2 – Definición de los problemas y agenda / 10 min máximo

¿Existe una planificación estratégica de algún tipo? Proceso de elaboración. Razones principales para su elaboración (o carencia de ella) Proceso de análisis de problemas previos, pasos que se dan.

¿Se marcan objetivos claros a corto, medio y largo plazo? ¿Cuales? **Agenda**

¿Se mantienen por escrito? ¿Son razonables?

¿Se revisan - evalúan?

¿Se actualizan?

Los objetivos de la planificación, ¿se coordinan con algún ente superior, dependientes, etc.?

Área # 3 Objetivos establecidos *ex ante* / 10 min máximo

¿Cómo se marcan los objetivos *a priori* de un programa/acción? ¿Son lo suficientemente claros antes de su implementación?

¿Se cuantifican los objetivos? Si afirmativo, ¿de qué manera?

En caso de tener objetivos de tipo cualitativo, ¿se establece algún tipo de baremo para realizar su seguimiento?

Área # 4 Medición de los resultados alcanzados./ 10 min máximo

Están claros los beneficios esperados a medio-largo plazo (fomento empresarial, conocimiento social, etc.) ligados a cada una de las tipologías de acciones?

¿Cómo se establecen los objetivos que el programa debe alcanzar? Incidir en aquellos programas que no tienen un objetivo monetario claro (reducción de costes) y ver las dificultades experimentadas para establecer medición de logros alcanzados.

¿Se alcanzan los objetivos esperados? ¿Se mantienen en el tiempo los logros?

¿De qué manera se lleva a cabo el seguimiento en la consecución de metas del proyecto? ¿Se lleva a cabo para el propio proyecto (implementación) y para sus logros (objetivos)?

Habitualmente, ¿los proyectos se llevan a cabo según las pautas temporales previstas? ¿Cómo se reacciona ante retrasos?

Desde el punto de vista presupuestario, ¿los costes se ciñen a las expectativas o existen desviaciones significativas? ¿Hay presupuesto plurianual? ¿Se ajusta el gasto total en ese caso?

Área # 5 Planificación a largo y modelos de evaluación/ 10 min máximo .

¿Se planifica a medio-largo plazo?

En caso afirmativo, ¿se ajustan los programas periódicamente? ¿Se trasladan las modificaciones a los nuevos resultados esperados?

¿De qué manera/s se evalúan los programas? ¿Existe una sistemática clara?

¿Se modifica la estrategia a largo plazo periódicamente?

O por el contrario, ¿se analizan las problemáticas y dificultades a corto para corregir ineficiencias? ¿Existe la posibilidad de planificación a largo plazo o existe una dependencia clara de los vaivenes políticos (cambio de siglas o de personas)?

Área # 6 Modelos de decisión. / 10 min máximo

¿Se captan ideas a nivel técnico? ¿Dónde y cómo se toman las decisiones?

¿Existe una relación fluida con otras regiones-administraciones en cuanto a compartir conocimientos a nivel institucional? ¿Político? ¿En mayor medida en casos de mismo color político, proximidad geográfica?

CIERRE

Búsqueda nuevos contactos y permeabilidad de proyectos-estrategias.

Agradecimiento final y emplazamiento a posibilidad de poder contactar a posteriori para aclaración-matización de alguna parte en concreto (preguntar si desea recibir información sobre el resultado de la investigación vía cuestionario previo)