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A FRAMEWORK OF PROJECT GOVERNANCE FOR ELECTRONIC ADMINISTRATION IMPLANTATION

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The main aim of this work has been to establish a project governance framework specifically to implement the electronic administration in a public department. This framework includes three views: an evolutionary, an organisational and an instrumental view. This work has addressed a case study which it can be considered a standard case since most of other public departments or administrations have similar problematics. To develop this framework, firstly, a theoretical background has been analysed which it contemplates different aspects such as the IT governance, the complexity of the implantation of the electronic administration, the specificities of public project frameworks and the specificities of the SW development project management. Based on this theoretical background, secondly, a representative case study has been analysed, which it has served to define our framework. A characteristic of this framework is that it makes mainly use of agile methodologies as well as continuous integration concepts; moreover, it takes into account different perspectives, such as the strategic, the business, the SW development and the operational one.

Keywords: Project Governance; Electronic Administration; Agile methodologies

MARCO DE GOBERNANZA DE PROYECTOS PARA LA IMPLANTACIÓN DE LA ADMINISTRACIÓN ELECTRÓNICA

El objetivo principal de este trabajo ha sido establecer un marco de gobernanza específico para implementar la administración electrónica en un departamento público. Este marco incluye tres visiones: una visión evolutiva, una organizativa y una instrumental. Este trabajo ha abordado un estudio de caso que puede considerarse un caso estándar, ya que la mayoría de otros departamentos o administraciones públicas tienen problemas similares. Para desarrollar este marco, en primer lugar, se analizaron los antecedentes teóricos, los cuales contemplan diferentes aspectos, como el gobierno TI, la complejidad de la implantación de la administración electrónica, las especificidades de los marcos de proyectos públicos y las especificidades de la gestión de proyectos de desarrollo de SW. Sobre la base de estos antecedentes teóricos, en segundo lugar, se ha analizado un estudio de un caso representativo, que ha servido para definir nuestro marco. Una característica de este marco es que utiliza principalmente metodologías ágiles y conceptos de integración continua; además, tiene en cuenta diferentes perspectivas, como son la estratégica, la comercial, la de desarrollo SW y la operativa.

Palabras clave: Gobernanza de proyectos; Administración electrónica; Metodologías ágiles

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1. Introduction

During last decades, public organisations have been changing the way they face IT. In the 1990s, their IT policies were more focused on the acquisition of HW and SW elements alongside the development of, generally, large applications that were mainly targeted for internal use, such as human resources and budget applications. Thereafter, public organisations were more concerned about having their IT systems fully operative and available for their users. On the other hand, during the first decade of this century, public organisations concern focuses on providing better services to citizens; thus, the concept of electronic administration (e-administration) began to be developed. During the latter process, most significant IT investment efforts have focused on the implementation and maturity of technological frameworks related to electronic government, such as electronic signature systems, and nowadays most public administrations currently have a clear technological framework for dealing with e-administration.

IT government, implantation, operation and use in public administrations primarily seek to improve its efficiency through changes in their way of management and to interact with users and citizens. The management costs of implementing IT services are not the most significant part of the overall IT costs. However, if we consider indirect repercussions, project mismanagement can incur in significant costs derived from delays and incorrect implementations. Accordingly, the cost of these repercussions can become high enough not to invest efficiently in management.

Currently, there exist frameworks that guide IT directors on managing information infrastructure and applications, such as COBIT® (Control Objectives for Information and related Technology) and operational frameworks oriented to operational management, such as ITIL® (Information Technology Infrastructure Library) (Sunthonwutinun & Chooprayoon, 2016). These frameworks are not oriented to project management, but they show us what processes we should implant and how to relate implantation to operation. Hence, to achieve complete IT governance, those frameworks should be completed with IT project governance. Furthermore, there are other relevant concerns to consider, such as those related to running a public administration and dealing with SW development projects in the context of the e-administration (e.g. transparency and security).

In this work, we have set down a framework for managing IT projects in a department of a public administration. This design has been the product of a process of, firstly, analysing theoretical background and, and secondly, applying it to our case study. The main trigger for developing this framework has been the growing complexity of managing IT projects since there are more and more different actors, projects and programmes involved in the implantation of e-administration. Another trigger has been the specificities of public administration when we assume that public projects not only must comply the new procurement regulation but also must be guided by criteria of legitimacy, efficiency and accountability, as laid down in Principles of Good Governance in the United Nations (Brunet & Aubry, 2016).

2. Objectives

Our primary objective is to establish a project governance framework specifically to implement e-administration in a public department. To reach it we have identified three secondary objectives:

- Objective 1: To achieve the alignment of processes with business and IT through the definition of an evolutionary model. This model consists of a structure of measures to fulfil the strategic alignment, alongside the processes to address a functional alignment.

- Objective 2: To know the most suitable responsible for the processes through the definition of an organisational model. This model consists of the description of an organisational architecture linked to the evolutionary model, as well as the place and responsibility for each role.

- Objective 3: To define a set of tools to support the previous models, through the development of an instrumental model.

In order to achieve these objectives, we must have three perspective in mind: the business management, concerned about IT-business alignment; the project governance, concerned about developing successful IT systems; and the operative management, concerned about having IT systems fully operative. Organisations often entrust these perspectives to different managers and, moreover, there exist different interested parties inside our organisation. When talking about public administration, these three perspectives face electronic government (information technologies that provide the necessary services to citizens) considering both implantation and operation. These perspectives are related to each other and, therefore, our project governance should integrate the three perspectives. Hence, we translate this problem to answer the question:

Question 1 (Q1): How to integrate the business and operative management into our project government?

In a public administration, IT responsible usually has a technological profile. The management of this kind of project typically arises as a technical issue, whereas, in general, there exist clear political guidelines for e-administration implementation. Accordingly, it is necessary to provide a transparent interface between the project managers and the political vision. Some problems come from project managers that tend to use a technical language for solutions, objectives and issues of these projects. The consequence is that the political direction makes precise initiatives or actions to solve problems that exceed the technical scope. Hence, a question we have to answer is:

Question 2 (Q2); How to integrate the political vision into projects with critical technical decisions?

The legitimacy, efficiency and accountability are goals that should drive the actions of a public administration, and thereby a governance framework should be designed to comply with them. Hence, a question we have to answer is:

Question 3 (Q3): How to integrate legitimacy, efficiency and accountability into project governance?

3. Methodology, background and case study

The methodology of this work is based on a qualitative and inductive approach with exploratory purposes, supported primarily by bibliographic analysis and observation of a case study, with the aim to generate a background framework. In the first stage, we have carried out a previous analysis to generate a theoretical model for the governance of e-administration projects from a bibliographic and normative analysis. In the second stage, the previous analysis sets the basis for a reference model to analyse and to contextualise our case study. As a result, in the last stage, we define a framework for e-administration project governance.

3.1 Theoretical background

As background, we have considered different aspects such as IT-business alignment, IT government and management, SW development projects, agile methodologies, continuous improvement and implementation, specificities of the public sector and regulation related to public procurement and e-administration.

Literature about IT-business alignment mainly has their background on Henderson & Venkatramen (1999). They based their strategic alignment model on two aspects: strategic adaptation and functional integration. The latter requires to adjust IT solutions to administrative or business processes, and the former recognises the necessity of a strategy to guide the external and private domain. The external domain is the environment where the organisation interacts and is concerned about decisions that affect the society. The private domain is its internal organisation and is concerned about deciding and designing its structure and key processes. Figure 1 shows where project governance is located inside a system of corporative and electronic government. IT governance deals with strategic adaptation or alignment.

Moreover, IT governance is mainly concerned about implantation and operation, where the former is related to project governance and the latter to IT service management.

Figure 1: Situation of project government inside our corporative and electronic government
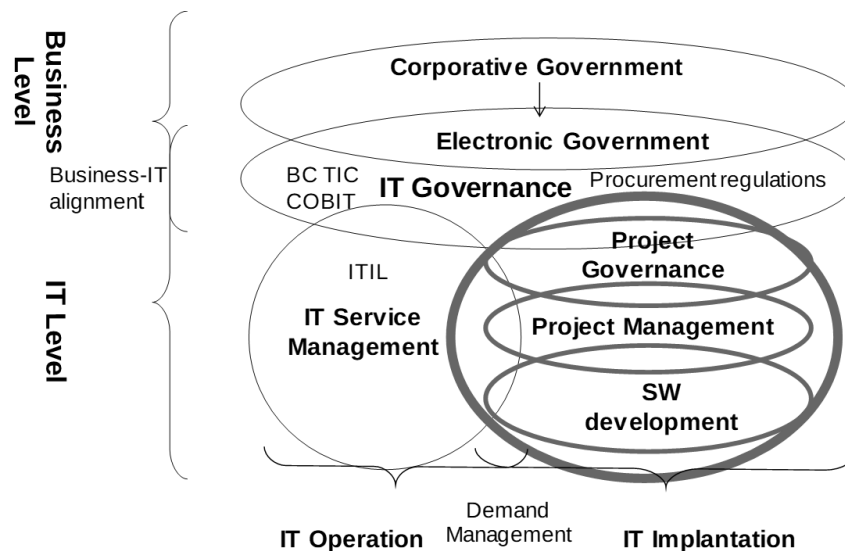
There exist two frameworks inside IT Government: COBIT® and the IT balanced Scoreboard. COBIT® (Sunthonwutinun & Chooprayoon, 2016) provides a complete list of the processes, which can be used to verify our maturity level and, thus, to provide a roadmap for implementing the different processes. Among these processes we may find those related to Project Government, which COBIT® bright through BAI01 processes. In this work, we have used COBIT® as a roadmap to implement project governance. Concerning IT service management, the most known framework is ITIL®, even though it does not develop specific project government processes. We have incorporated demand management into project governance based on ITIL®, because evolutionary developments and corrective and adaptive maintenances are usually undertaken by the same development teams. Additionally, ITIL® helps us to measure the quality of service associated with time of response.

Regarding functional integration, it is necessary to link it to business, implantation and operation. A rational approach (Ansoff, 1986) or an incremental one (Mintzberg, 1993) can undertake our strategy for this integration. We have opted for an incremental approach since it fits better to our environment where functionalities or requirements are not known before the implementation of a project. We link processes of continuous implantation and improvement to this strategic view. Thus, Fitzgerald & Stol (2017) analyse those processes and propose a scheme that integrates business, SW development and operation, associating them, severally, to continuous planning, continuous integration and continuous use. Our project governance should manage this continuous implantation.

We link project governance to frameworks for project and program management. There exist two levels. The first one is related to general project management frameworks, such as PMBOK®, ISO 21500, PRINCE2® and IPMA (Rehacek, 2017). From them, we have mainly selected their techniques and tools. The second level is related to SW development projects, which we have addressed by applying both traditional and agile approaches, although we have focused mainly on the latter because of the particularities of our case study. For agile approaches, we have used concepts and terminology based on Scrum methodologies. When we apply waterfall methodologies to SW developments, problems arise primarily from both changing requirements of organisation or users and initial conditions are not clear or correctly defined (Pinto & Winch, 2016). This point brings the need for more flexible methodologies, which base their strategies on incremental developments, i.e., small functionalities are continuously added onto a SW product; furthermore, users and product owners (PO) are daily involved during product requirement specification and development, rather than being frequently disconnected during the SW development stage of waterfall projects.

Concerning the inclusion of the specificities of the public administration in our framework, we have analysed recent bibliography about different frameworks for public projects, as well as regulation of Spanish public procurement. There exist frameworks in some European countries (the United Kingdom, Netherlands and Norway) that have been established to solve the problems found in their large public projects (Christensen, 2009; Klakegg, Williams & Shiferaw. 2016; Samset et al., 2006). An important issue analysed by this bibliography relates to how to reduce failures in public projects. These failures are not only related to their project management (such as the deficient definition and monitoring) but also aspects as the lack of political support, unclear success criteria and changes of the strategy of the sponsors (Klakegg, Williams & Shiferaw. 2016). Thereby, some European governments have implanted project government frameworks with the purpose of reducing the failures of public projects. Accordingly, Brunet & Aubry (2016) locate the fundamental aspects to achieve success, where among the particularities of public projects are transparency and accountability, the shareholder participation and the strategic alignment.

Furthermore, since most public projects need service procurement, it is necessary to comply with regulatory aspects. In Spain, Law 9/2017 on public sector procurements came into force in 2018. This Law fosters, among others, more transparency, better value for money, inclusion of social aspects and facilitation of access to small-medium-sized enterprises (SME) to public procurement. For the latter, this new regulation forces procured services to be divided into lots to benefit SME, thereby the number of suppliers is increased as well as the need for more management effort. Thus, these regulations have essential repercussions in project governance.

Finally, incorporating e-administration through SW development projects involves the inclusion of the administrative processes and their structures. Hence, the e-administration implantation requires a set of activities and considerations such as the procedure simplification, security compliance, information privacy, interoperability and open data, as well as other transversal considerations, such as those related to gender dimension.

3.2 Case study

Our case study is focused on an IT organisation in charge of providing IT services, primarily related to e-administration. It is located inside a department of a public organisation, which is composed by different services and sections, each one with different functions, and, therefore, requiring specific solutions. The implantation of SW applications is mainly carried out through SW development projects of different sizes and features. At the same time, while these applications are evolving, they are operative and, therefore, provide services to their users, who require changes in the form of corrective and adaptive maintenance. In these projects, there is no technological infrastructure (such as servers, communications, base SW and so on) involved, because a corporative service from our public organisation provides the infrastructure. Accordingly, our projects are uniquely related to the implantation of SW solutions. This case study can be considered representative of many other actual cases since most of IT services across the public administration separate between SW development services and infrastructure provision ones. Moreover, most of these SW development services provide coverage to different kind of sections, because, in general, the IT unit is usually a horizontal service in an organisation.

Currently, all organisations across the public administration are in a process for the implantation of e-administration. The bases of e-administration are common to all administrations since they have the same state regulation. This regulation is primarily published in two regulations (Law 39/2015 and Law 40/2015), although, previously, another Law was the one that set the basis of e-administration since 2007. Thus, most public administrations have normally implanted a specific technological infrastructure base and are currently providing online electronic procedures.

Five maturity stages categorise the e-administration, from only publishing information (stage one) to personalisation (stage five). Current regulation forces all electronic procedures to fulfil the fourth stage in 2018, although not all administrations have accomplished it. This fourth stage mainly involves that citizens can, entirely online, initiate and finish an administrative procedure. In any case, even if we had implanted this fourth stage, most of their solutions

already need more improvement efforts. Currently, our case fulfils the fourth stage in all the procedures, even though we have achieved it through a standard procedure, to wit, no customised for each procedure and just complying to the fundamental legal demand; therefore, as from current implantations, it is required specific implantation to get procedures well-adapted with more value added to users. In our case, the number of electronic procedures is higher than 120. The implantation of standard procedures was successfully undertaken using a waterfall approach. This approach was possible because requirements were clearly defined from the beginning and did not involve customisation during implementation. Next step is requiring greater development efforts since each procedure or service requires differentiated solutions. Moreover, each service has its back-office with different SW technological architectures. In this step, an agile approach has applied since we have not defined the requirements from the beginning, as we expected to have change requests during the implementation of all the SW solutions.

Moreover, the strategic level has been increasingly demanding better coordination among all these projects to obtain more homogenization in all IT solutions. Thus, we have gathered all these SW development projects into only one programme, which has a technical manager and a Sponsor. Moreover, we have created a departmental backlog to manage this programme. This programme is made up by different projects where each of them has information and SW applications as main assets. For each asset, we associated a set of electronic procedures and administrative services. Besides, in the department there are different executive directors as political responsible for each project.

Furthermore, our corporative organisation has launched a series of corporative programmes, which collide with our internal projects. Thus, project management has had to include transversal programmes, such as procedure simplification, security compliance, information privacy, interoperability, open data and gender dimension. All of them have their respective normative that forces public managers to comply to them. Moreover, these transversal projects directly involve all SW development projects. One of the main problems is that each transversal program is managed by different responsible, who delegates its implementation to IT project managers in each department. The result has been that a project manager has different objectives of different programmes that collide each other. We have managed it using a specific backlog in each transversal program. As a result, all the backlogs, which include transversal backlogs and the departmental one, have been integrated into only one strategic backlog.

Afterwards, we have applied the scheme laid out by Fitzgerald y Stol (2017) to our strategic and functional alignment. Accordingly, we have supported the principles of continuous improvement and implantation. We have divided implementation into three phases: business, SW development and operation using an agile approach for project implementations, which we have managed through methodologies and techniques of project management. Additionally, there is another phase to improve the complete cycle.

We have established a Project Management Office (PMO) to support our project governance, and we have defined some requirements of project management for SW development teams, mainly using external resources, to whom we have required some professional qualification in project management and agile methodologies, especially for PMO. There exist a series of agile methodologies and project management frameworks supported by different organisations that provide professional certification. Moreover, we have had to take into consideration the limitations of market and procurement regulation. We have considered Scrum methodology since, not only it is one of the most widely used (Nerur & Moe, 2012), but also there exist organisations that certificate professionals in this methodology. In the case of the project management, we have included qualification requirements for human resources in the technical procurement specifications for public competition. Accordingly, we opted to require at least one of the different certificates for project management to ensure project management skills, although all the firms have only proposed PMP® certification from PMI. Thus, PMBOK® skills support to our project management system (which includes PMO and SW development services). We have not yet selected a specific project management framework. That said, we have taken under considerations, aside from PMBOK®, ISO 21500, PRINCE2® and IPMA, the PM² project management methodology guide (CoEPM2, 2016) for managing public projects, because it is supported by European Commission.

The use of these methodological frameworks lets us continuously monitor efforts dedicated to different tasks at the disaggregated level. In this scheme, we have used artefacts understood by business managers and directors, such as epics to define broad goals and user stories that are narrated by the product owners using their words. The technical profiles and users continuously interact, easing the decision making and the considerations of the improvement proposal. Moreover, during the implantation of the project governance, we have been defining different kinds of instruments. Thus, we have considered the services for administrative simplification and SW quality control. Although there are responsible for both of them, we have required external services to support them.

Finally, we have established committees for following-up projects at their different levels. We have been incorporating schemes and techniques of different methodologies, not only from Scrum or PMBOK® but also from COBIT® and ITIL®. The former lets us elaborate a roadmap to evolve our project governance framework, and the latter allows us to set a demand system to receive different kinds of requests from different organisational and operative levels, to label them and to prioritise them. Finally, we have created a set of documents and templates and selected software tools for supporting project management and software quality management. In this respect, we have had limitations selecting software tools since most of them are corporative; despite this fact, we have designed a project management system that integrates these tools. Among the tools we have used are OTRS for our demand system, Redmine for our project management and Git for controlling SW versions.

4. Results

We have seen above that our framework should include three conceptual scopes:

- An evolutionary model represents the view of the processes. This model primarily answers us how to advance in a continuous improvement process and to achieve solutions strategically and functionally aligned with the organisational objectives.

- An organisational model represents the view of the responsible and their roles. This model mainly answers us how the different roles interact with each other and apply the previous processes.

- The previous views should be supported by a set of different kinds of tools and instruments. This shapes the instrumental model.

4.1 Evolutionary model

When we talk about an evolutionary model, we want to point out a guided system that looks for that our organisation reaches its objectives. The proposal of our model to achieve the IT-business alignment follows the schema in Figure 2, where there exist a strategic adjustment and a functional adjustment. This twofold alignment should evolve through the continuous and agile implantation based on a cyclic and systematic implantation onto three kinds of phases (business, development and operation). Each type of phase has their functional measures concerning to each specific business, their technical needs and their users. Moreover, the strategic measures are incorporated and set by the strategic level with the correspondent priorities. Accordingly, we propose a model that strengthen the processes onto the three phases in an integrated way using two perspectives through these two kinds of measures. In Table 1, we have represented some examples of measures applied to a project, where we have classified them differentiating both strategic and functional measures.

Moreover, the system for the project governance is not a static system; it is a dynamic system itself; thus, this evolutionary model should consider its same evolution. Accordingly, based on COBIT®, we have considered the same evolution of our framework inside the evolutionary model through a maturity model with a specific roadmap with sequential stages (Initial, Repeatable, Defined, Managed, Optimised). Currently, we consider that our framework fulfils most requirements of a defined stage, to wit, our organisation has defined project management processes and applies them. The objective is to reach an optimised stage, where the organisation completely applies all the processes to our project and programme governance, periodically evaluates them and systematically improves them.
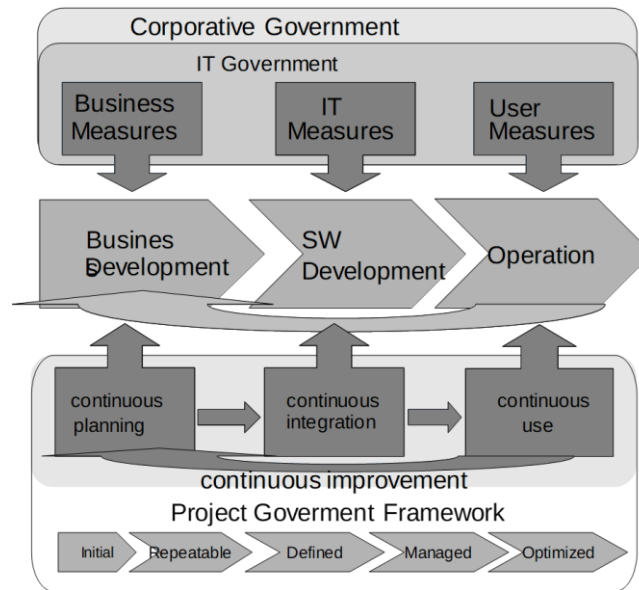
Figure 2: Evolutionary model for project government

Table 1: Some examples of measures sorted by type and phase

Phase	Strategic measures	Functional measures
Business	• Standardisation of administrative procedures • Definition of the level of risk of information and services • Definition of open data and interoperable data	• Definition of templates and content of forms • Modification of normative and administrative procedures • Definition of needs and narration of user stories
SW development	• Standardisation of user interfaces and modules • Development of interoperability platform • Authentication complying to security norms	• Definition and development of technological architectures • Analysis and definition of functionalities • Development of functionalities and SW testing
Operation	• Avoidance or removal of the use of paper • Standardisation of working equipment and places • Compliance with information privacy requirements	• Testing developed functionalities • Training on new functionalities and applications • Use of applications, reporting of incidents and improvement proposals

The evolutionary model guides these processes of continuous implantation. Thus, we have dealt with the long, medium, and short vision in different ways. To include agile project management in this model, as shown in Figure 3, we have implanted a three-level schema supported by a demand management system.

In level 1, we include programme and portfolio management. The corporative directives and the same department demand the application of, respectively, corporative programmes and IT solutions to our department. We translate these demands into corporative measures and IT solution projects which we incorporate into their respective backlogs. Afterwards, we integrate all of them into a single strategic backlog. In this level, it is important to have defined an integral map of assets which includes both applications and information.

Moreover, each asset is related to departmental and corporative measures. In this integral map we have defined the AS-IS and TO-BE stages, thereby we can see the maturity stage of the e-administration. We have mainly defined each project by means of a set of epics. Starting from such a project definition, we add the measures to each epic, or we create new ones, relating them to business, SW development and operation. The key to this level is the

negotiation of priorities of epics and specific measures. Associated with this level is the definition of the agile infrastructure of project governance. This infrastructure has a two-year horizon with a four-year perspective. Its design should respond to the needs for the incoming years, defining aspects such as the necessity of material and human resources, SW architectures, methodologies, the roadmap of the same project governance, and the definition of the scopes of procurements.

In level 2, we include project management. As from strategic backlog, we generate the definition of each project and its functionalities. As a result, we set up the roadmap of each project where we prioritise the functionalities. In this level, we apply project management techniques currently based on PMBOK®, as well as agile approaches. We have associated an agile system to this level. This system has a six-month horizon with a one-year perspective. It is designed to respond to the needs of each financial year. Thus, this system put into practice the planning of the activities, associating responsible with them.

In level 3, we include mainly the SW development management where we not only manage the user stories and tasks, but also include related tasks carried out by product owners and users. We associate an agile development system to this level, where we use methodologies based on Scrum; therefore, we apply incremental developments with a three-week horizon and a one-two month perspective. It is designed to implement the tasks at each sprint and to define the requests for the coming weeks. Thus, this system implants the functionalities, and controls and categorises the efforts of each human resource involved in each project.

A demand system supports all these three levels, based on the ITIL® framework. Thereby it allows measuring the quality of service. This system collects all the demands from political managers, the program responsible, product owners and users. Afterwards, we include these demands, conveniently labelled, into each backlog. We deal with the strategic demands through specific meetings, where all the requirements of each program are gathered up. In the project management level, we collect product demands from meetings with product owners.

**Figure 3: General scheme for agile planning levels**
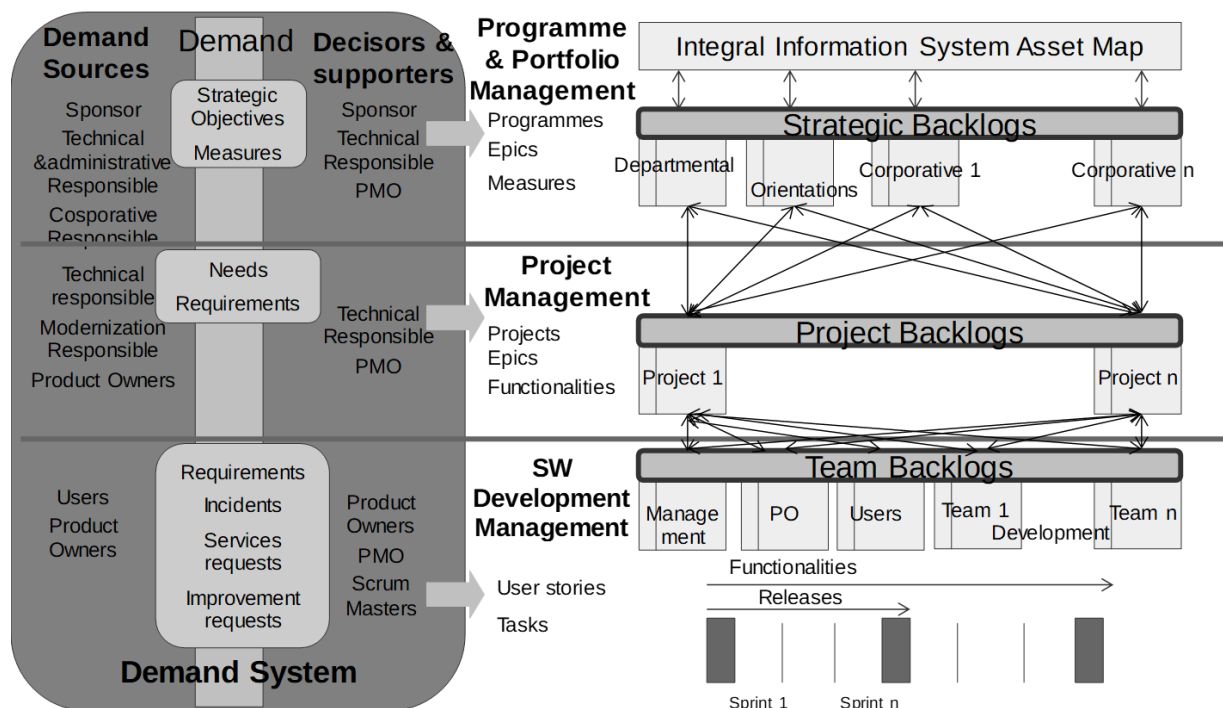
Moreover, during the planning process, the project management team establishes additional and specific requirements for project management, such as monitoring development times per task. Finally, a software application allows to pipe all the additional requests from users, such as incidents, improvement proposals and service proposals. We label them with their priority level. We promptly incorporate the urgent requests into development backlogs and discuss the rest of the requests in specific daily or weekly meetings depending on their type.

5.2 Organizational model

The previous structures interact with our organisation in the way that the political and business guidelines address, respectively, the strategic alignment and the functional one. We have depicted an organisational architecture with the dependencies shown in Figure 4. With a darker colour, we show the external services of our case. We can observe the role of the Sponsor, supported by a technical and an administrative manager. This role is meant to set the guidelines to PMO and has the rule to set responsibilities for Product Owners (PO) and other interested people in projects, such as Executive Directors. Beside the Sponsor, there are roles for the technical and the administrative responsible, who directly control suppliers, such as the PMO, consulting services and SW development teams. Product Owners are usually the Head of Services. Experience has suggested us that analysts from PMO (to whom we call as PO voice) should support the PO profiles. Besides, there exists a Scrum Manager in PMO, whose role is meant to be the responsible for controlling that SW development teams are correctly applying Scrum guidelines. Different external firms provide SW development services, each one with a Project Manager or a Scrum Master, analysts and programmers. Moreover, there exist two additional external services: one for testing and controlling SW quality, which is controlled by PMO; and another one for ensuring the simplification of the administrative procedures, which are managed by an internal modernisation responsible. Finally, users are continuously interacting with applications, testing them and reporting incidents and improvement proposals.

Figure 4: Organizational architecture
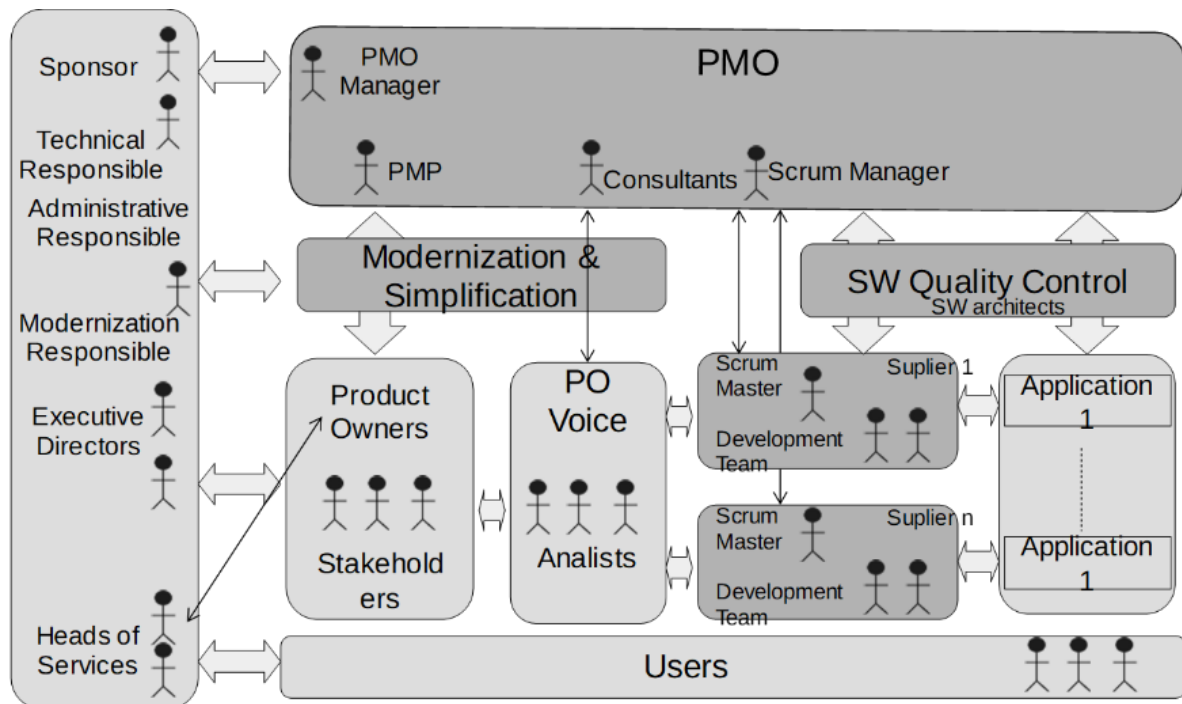
5.2 Instrumental model

Our instrumental model endures the previous two models with a set of tools or instruments that support our project management and governance. We have classified these instruments as shown in Table 2.

Services are composed by organisational units defined by a set of profiles, each one associated with their different professional profiles, such as training, capacities and experience. The same PMO is an external service, which is composed (in our case) by one Project Manager (PMP), one Scrum Master and some consultants or analysts. For instance, the required profile for PMP is any of the following certification titles: PMP®, Prince2® or IPMA. Moreover, we have defined other procurement services: Modernization Office, SW Quality Service and SW development services. Accordingly, associated with these services, to comply with procurement regulations we have established a set of instruments for calculating the prices of professional profiles and for generating the administrative and technical specifications.

Organisational instruments, aside from the previous services, are necessary as a set of temporary or fixed groups such as committees, working groups and meetings. There are mainly three kinds of committees with different decision levels: Programme Management Committee, Project Management Committee and Supplier Management Committees. Although these committees can meet at any time, there is a meeting frequency per each type of committee.For instance, there is a follow-up meeting with each supplier every three weeks; project management committee every month and with programme committee every six months. Moreover, previous committees may create ad hoc working groups to deal with specific issues.

Table 2: Instrument classification for project government

Type	Description	Application examples
Services	Set of internal or external units that carry out specific functions to support project management.	• PMO • Simplification and Modernisation Office • SW Quality Office
Organisational instruments	Set of temporary or fixed groups to follow-up and to make decisions about different project issues.	• Programme Management Committee • Project Management Committee • Supplier Management Committees • Working groups
Techniques and methodologies	Set of techniques obtained from different frameworks and methodologies, such as COBIT®, ITIL®, PMBOK® and Scrum	• COBIT Maturity Model • Good practices of ITIL for requests • Templates, instruments and techniques form PMBOK • Backlogs • Scheduling system (Canban)
Documentary instruments	Set of documents and templates for supporting projects.	• Follow-up minutes • Programmer manual • Templates for the creation of technical documents and procedures
Software tools	Set of applications to automate and to support project management and governance.	• Redmine (project management web application) • OTRS (request management system) • Git (version control SW)

Methodological instruments are a set of standards, guides, methodologies and best practices that, in general, are recognised by the market. These methodologies contribute with their tools and techniques to our project management. As examples, we have taken into consideration COBIT®, ITIL®, PMBOK® and Scrum. COBIT® gives us a maturity model for the project governance; ITIL® a guideline for demand management; PMBOK® a set of techniques of good practices; and Scrum a reference to managing agile SW development project as well as different techniques, such as Canban for scheduling management and backlogs for managing list of requirements.

Figure 5: Software system architecture for integrating demand and project management
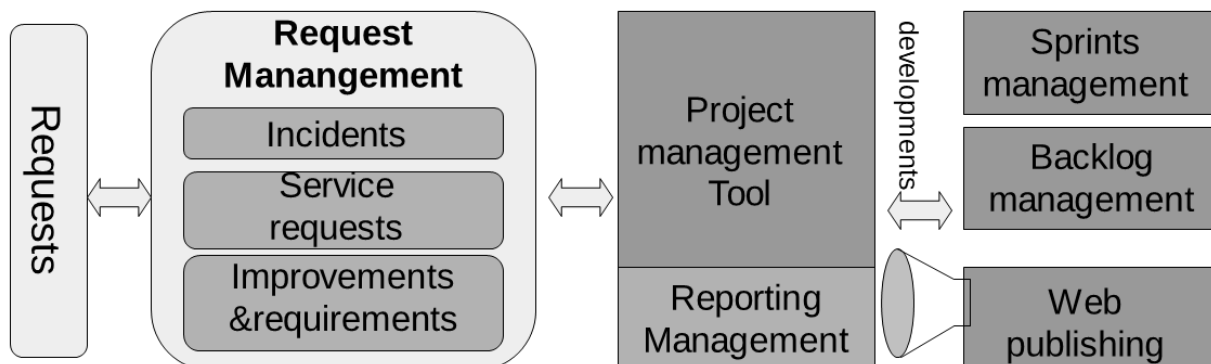
Document instruments are a set of documents, forms, spreadsheets and templates, whose primary mission is to deal with uniform documents across projects. For example, all the projects should use the same format for the follow-up minutes.

IT tools are a set of applications to automate and to support project management and governance. Their primary purpose is to improve efficiency, to avoid the use of paper and to ease transparency and accountability. His evolutionary model is an integrated system as the one represented in Figure 5. This system manages the requests for new services, incidents, tasks and queries. Moreover, it should handle projects alongside the interactions of the SW developments, using backlogs to sort epics, functionalities, user stories and tasks. This system should generate reports, listings and statistics. One aim of this system is to enable the publication of the project follow-up to ensure its transparency. Transparency and accountability are included, as explicitly as implicitly, since this solution facilitates continuous on-line publishing. Since all of the data are collected from the same data source, we can generate different views according to their interest group. We have selected four interest groups: suppliers, mainly SW development teams, project management, project governance and citizens.

6. Conclusions

The three models discussed above provide answers to the three research questions. Concerning research question Q1, we have seen that the management of the electronic government covers the three management perspectives: business management, project governance and operational management. In our model, there is a structure for the demand management and a backlog system which enables the integration to these three perspectives. This structure is summarised in Figure 2, where we have integrated our project management into the specific aspects of each phase. Our framework explicitly includes the participation of interested parties since agile methodologies involve different actors, such as managers, product owners and users, who interact continuously with project managers and development teams, easing the flow of improvement proposals and short/long term decisions.

As for Q2, we have designed this framework to incorporate the political and administrative guidelines in the list of work to be managed. Thereby, this is carried out through a language understood by non-technical staff using epics and user stories, which are translated, respectively, into functionalities and tasks to be dealt with by technical staff. Thus, the project management effort focuses on managing requirements in different decision levels where purely technological aspects are far from the political level, but we can translate into strategic repercussions understandable by the political level. Accordingly, our framework provides a transparent interface between the political level and the project manager. Thus, alignment with business is mainly addressed through collecting, processing and including corporative and strategic measures into strategic backlogs.

Regarding Q3, i.e., how to comply with legitimacy, efficiency and accountability; we strengthen legitimacy because our framework enables priorities and important decisions to be centralised by the political level. We improve efficiency because of applying a continuous improvement process along a more rationalised and decentralised structure. Finally, to ensure accountability, public officials and political officers have clear roles; thus, they can be enquired due to their results which can be transparently published using IT tools.

Finally, as seen above, we have considered our framework as a defined maturity stage; therefore, it requires more evolution. Accordingly, one important issue is to establish a definitive project management framework. From PMBOK® we have mainly taken its techniques, not only because we have selected PMBOK® as reference framework, but because all selected suppliers, as a part of a public competition, had certificated their professional profiles in this framework. Currently, we are considering other frameworks, specially the recently established European framework, which has an import focus on SW development projects but has lack of certificated professionals in our reference market.

7. References

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