

UNIVERSIDAD DEL ROSARIO



Submitted By:  
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DEFINITION OF AN IT PROJECT PORTFOLIO MANAGEMENT METHODOLOGY  
FOR A PHARMACEUTICAL COMPANY

Master Thesis

School Of Administration  
Universidad Del Rosario  
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Master in Management  
X - Cohort

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## List of Abbreviations

AHP	Analytic Hierarchy Process
BPA	Business Process Architect
BPM	Business Process Management
CEO	Chief Executive Officer
CFO	Chief Financial Officer
CIO	Chief Information Officer
COBIT	Control Objectives for Information and Related Technology
COO	Chief Operations Officer
EA	Enterprise Architecture
ERP	Enterprise Resource Planning
FDA	Food and Drug Administration
GxP	Good "and end in" Practice
IRR	Internal Rate of Return
IT	Information Technology
ISACA	Information Systems Audit and Control Association
ISO	International Standards Organization
IT PMO	IT Project Management Office
IT PPM	IT Project Portfolio Management
ITDM	IT Demand Management
ITIL	Information Technology Infrastructure Library
MCDM	Multiple Criteria Decision Making
NCTP	Novelty, Complexity, Technology, Pace
NPV	Net Present Value
OGC	Office of Government Commerce
PM	Program Management
PMI	Program Management Body of Knowledge
PPLS	Project Portfolio Life Span
PPM	Project Portfolio Management
PRINCE2	Projects in Controlled Environments
ROI	Return on Investment
SAP ECC	SAP Enterprise Central Component
SOX	Sarbanes Oxley Act
TOC	Theory of Constrains

## ***Abstract***

With the increased popularity of IT solutions as key factor for increasing competitiveness and creation of value for companies, the need to invest in IT projects is considerably increased. The limitation of resources as a constraint to invest has forced the companies to look for methodologies to select and prioritize projects, making sure that the decisions made are those aligned with the corporate strategies to assure the creation of value and maximization of benefits. This dissertation provides the fundamentals for the implementation of the IT Project Portfolio Management (IT PPM) as an efficient methodology for managing IT-Based Projects, and a tool for providing transparent criteria to the executive managers for the decision making process. The document provides the information about how to implement the IT PPM in seven steps, analyzing the processes and the roles needed for its successful execution. Additionally, provides different methods and criteria for the project selection and prioritization. After the theoretical part where the IT PPM is described, the dissertation brings an analysis of the study case a Pharmaceutical Company. The company has already a project management department but they find the necessity to implement the IT PPM due to the wider coverage of the end to end IT Projects processes, and the way to assure maximization of benefits. With the theoretical research, and the analysis of the study case, the dissertation ends with a practical definition of an IT PPM rough model as a recommendation for the implementation in the Project Management Department.

Key Words: IT PPM, IT Project Portfolio Management, Project Management, IT Management, Governance, Enterprise Architecture.

## 1. Introduction

In the last decades, companies have been moving around the world of projects, looking for increasing their efficiency, competitiveness, profitability, and the creation of corporate value (Díaz C. & Castaño, 2013). The most common problem identified in companies for the realization of these objectives resides in that projects are handled isolated to operations management, being the cause of lack of quality in achievement of the objectives for the success of the enterprise (Bonham, 2005). Thus, the companies search for methodologies to create a connection between the world of projects and the world of operations as strategy for improvement in project management. With the implementation of a project portfolio, the companies can find the way to fix the gap existing between the traditional operations management and the project management, getting projects into harmony with the strategies, resources, and executive oversight of the enterprise. (Levine, 2005).

*“The emergence of PPM as a recognized set of practices may be considered the biggest leap in project management technology since the development of Program Evaluation and Review Technique and Critical Path Method in the late 1950s” (Levine, 2005, p.1).*

Nowadays, companies rely more in Information Technologies systems due to the competitive advantage that they can bring with the improvement of management of information. Therefore, the investment on IT has become one important part of the total investment of companies, considering IT-based projects as an important factor of companies' performance. In that case, companies implement IT Project Portfolio Management (IT PPM) with the aim of aligning IT projects with strategies, maximize returns on IT investments and company value (Chiang & Nuñez, 2013). Additional, the IT PPM is composed with a set of processes and tools that affords to the organization the capacity to improve investment decision making, enhance productivity and efficiency, and quickly adapt to dynamic business conditions (Velpuri & Das, 2011).

A clearly defined enterprise blueprint, a competent portfolio governance, standardized metrics and criteria, consistency and logic of organizational strategic objectives are fundamental elements for that as for a successful implementation of the IT PPM (Twiddy, 2013). The different parts that compose the IT PPM have to be aligned to ensure that the methodologies managed follow the requirements of the corporate management, and the information provided for the decision-making is reliable thanks to the transparency of processes. As a result, the projects foster the goals of the corporate strategy and satisfy the expectations of the stakeholders. This dissertation provides the fundamentals for the definition of the IT PPM, giving an overview about how the IT PPM is developed, followed by the steps for the implementation and description of the different components involved (Such as the IT Project Management Office, IT Governance Board and Enterprise architecture).

Following the introduction, you will find in this document 3 main parts. The first part is composed by the chapter 2 that describes the fundamentals of IT PPM, how is structured, what has to be considered for its implementation, and important components (such as the IT Governance, Enterprise Architecture and IT Project Management Office) that need to be present for the efficient development. The second part composed by chapter 4, describes the company where the case study was made. Then, in the third part composed by chapter 5, an analysis between the theory and the study of the company, providing the suggestions and conclusions with a proposed methodology for implementing IT PPM in the company analyzed.

## 1.1. Aims and Objectives

The aim of this dissertation is to provide methodology of IT Project Portfolio Management that can be implemented by the Project Management Department accordingly with the requirements of the Company analyzed.

More specifically, the dissertation tries to achieve the following objectives:

- ✓ Recommend a possible model that the Project Management Department can use for the further implementation of an IT PPM for the management of the different projects that are currently executed and the assessment of the new projects required.
- ✓ Suggest the criteria to be considered for the assessment of the portfolio projects for prioritize them efficiently.

## 2. Literature Review

The IT Project Portfolio Management is a practice that most of the companies are implementing on these days. There are several the benefits that IT PPM can provide, but the main reasons that make the companies to look on it is because of the capacity to manage a portfolio of projects enterprise-wide providing criteria for decision-making on IT-initiatives, looking to generate greater returns on the IT investments and contributing with the success of the company. Hervé Lauer<sup>1</sup> affirms that "*IT Portfolio management is not rocket science; it's just good management discipline*" (Gartner, 2007, p.5). When an IT PPM is correctly implemented, the optimization of that practice will easily achieve goals and give benefits to the business.

One important point that has to be clarified before starting reading this literature is the differentiation between the Project Portfolio Management (PPM) and the IT project Portfolio Management (IT PPM). Even when the IT PPM follows the same

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<sup>1</sup> Hervé Lauer is the CIO of the Adecco Group in France.

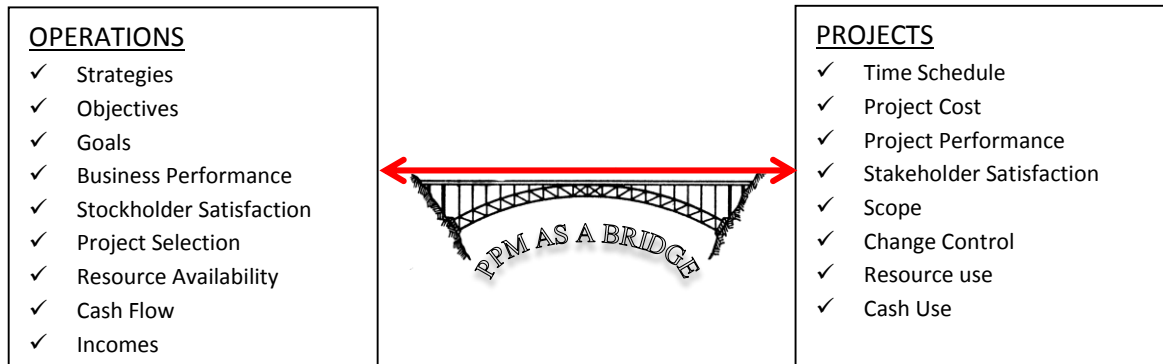
assumptions as the PPM, and having a first impression that the IT PPM in difference with the PPM works with IT based projects, there is also another point that is important highlight at the moment of compare those two kinds of portfolios management. Bonham (2005, P.xv) provides an explanation about the slight difference existing between PPM and IT PPM:

*“A Project Portfolio tends to be filled with projects that best mitigate risk and increase return. If the business climate changes, they tend to cancel projects rather than drastically modify them. The projects in an IT portfolio rest on shifting objectives. IT projects are designed to satisfy business unit needs, which, in turn, are at the mercy of shifting corporate strategies”.*

Although the difference between both kinds of Portfolios exists, they can be implemented using the same method because they are managed under the same processes basis. During the reading of this literature you will find that I refer in some cases to the PPM in order to give an explanation of processes or methods that also apply for the implementation and management of the IT project portfolio.

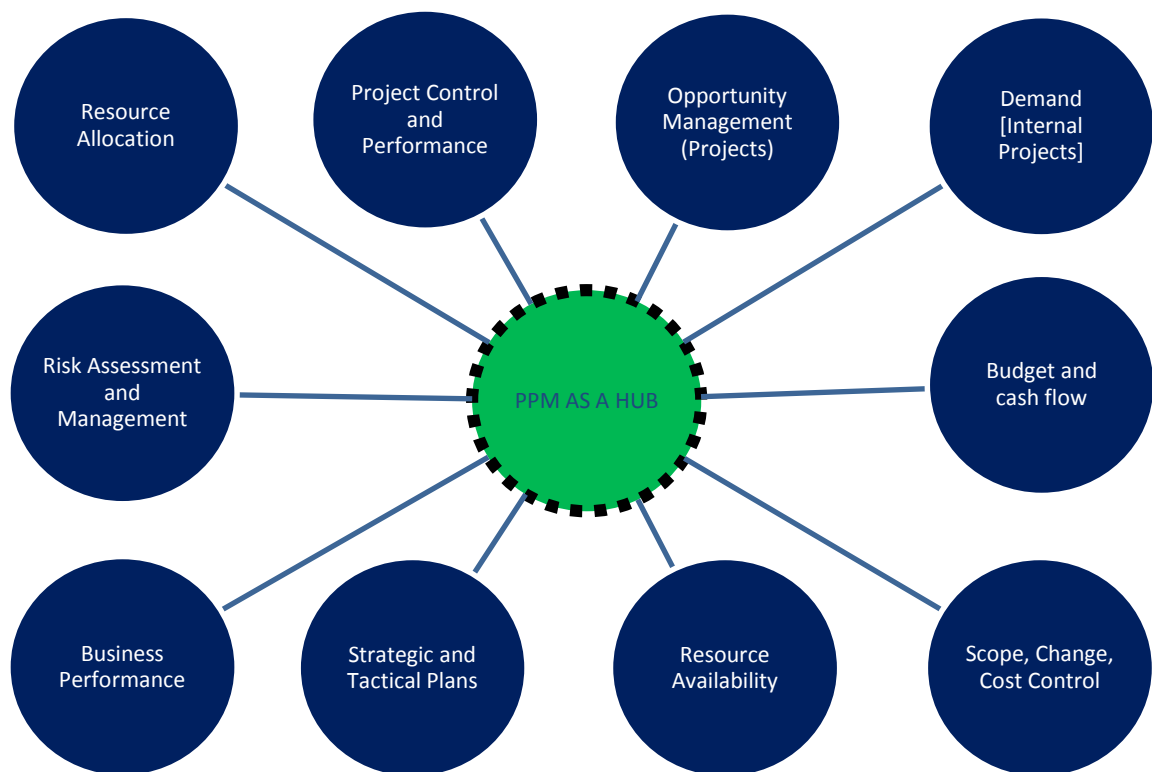
The IT PPM to create a solid connection between the world of projects and the world of operations. While the project management focuses its efforts in having projects that create value following the strategies that the company has established, the operations management focuses its efforts in provide the necessary funds and the resources required to run the project but not understanding whether the project is wanted or is really needed. Both sides encompass different functions, but using the IT PPM just as a bridge to interconnect the two important groups will not be enough, the functions will be clustered in each group and they will not be seen together as a unit that share the information for common business objectives. Levine (2005) explains the PPM as a bridge but also compares it with a better analysis for actual Project Portfolio management requirements; he states that it should be considered as a HUB more than a bridge because it acts as a nucleus system that takes projects and operations together. The Figure 1 and Figure 2 provide a graphic

explanation about how can the Project Portfolio Management works as a Bridge and as a hub.



**Figure 1 - Project Portfolio Management as a bridge**

Source: Levine, H. A. (2005). *Project Portfolio Management: A Practical Guide to Selecting Projects, Managing Portfolios, and Maximizing Benefits*. (1st ed.). San Francisco, CA: Jossey-Bass.



**Figure 2 - Project Portfolio Management as a HUB**

Source: Levine, H. A. (2005). *Project Portfolio Management: A Practical Guide to Selecting Projects, Managing Portfolios, and Maximizing Benefits*. (1st ed.). San Francisco, CA: Jossey-Bass.

The definition of PPM as a bridge is acceptable but, as explained before, it works as a connector that can identify Gaps between the two parts and is not be effective to eliminate those gaps. The idea that Levine provide is an assertive approach because he sees the holistic integration of the different operations, eliminating the isolation between the parts and having the capability to identify and fix the existing gaps. The HUB structure allows a strategic flow of information, working in harmony and managing the same language to communicate and assure the alignment of the strategies with the business objectives.

Looking the idea of having the PPM as a HUB creating a holistic structure between the different processes, assures that IT PPM covers all the different phases where a project has to go through from the moment it is conceived as an idea (point when is not yet a project) until the moment that the benefits are realized (After the project is released and is no longer a project). Having an overlook on the IT PPM, we can assert that it can bring big benefits because it covers all the phases that IT project involves, going beyond than the Project Management framework, making it more efficient for the management of Projects, and the framework can be divided in five phases which are defined by Wideman (2004) as the Project Portfolio Life Spam (PPLS). The phases are:

1. Identification of needs and opportunities
2. Selection of best combinations of projects (the portfolios)
3. Planning and execution of the projects (project management)
4. Product Release (acceptance and use of deliverables)
5. Realization of benefits

With the wider coverage of the IT PPM, more roles have to be included involving executive level for the search of transparency. Additional, in the case that there is project management department running, can start to be part the IT Project Management Office which is in charge of the Planning analysis, execution and control of the projects within the IT PPM. With the mastering of the Portfolio during the time, new roles will be identified to achieve an optimization and mature of the IT

PPM. However, IT PPM involving the management of projects can't be seen as extension of the Project Management; both are important but they are not even similar to each other. The Project Management Institute (2011) gives the explanation of the differences between the characteristics of PM and PPM. The information is provided in the Table 1.

Table 1 - Key Differentiators of PM versus PPM

<b>Characteristics</b>	<b>Project Management</b>	<b>Project Portfolio Management</b>
<b>Scope</b>	Control and manage scope against project specific requirements	Select projects with scope that supports organizational goals
<b>Time</b>	Manage task due dates and dependencies to ensure project delivery	Monitor all projects timelines against short and long term goals
<b>Resources</b>	Use provided resources effectively and efficiently	Monitor and manager resource utilization across the portfolio
<b>Tools</b>	Project Plans, budget spreadsheet, project charters	Dashboards, resource leveling, PPM applications.
<b>Impact of Change</b>	Manage Change within the purview of individual project to control scope.	Measure change across the entire enterprise to foster user acceptance.
<b>Industry Evolution</b>	N/A	Measure and evaluate future state against industry and portfolio.

Note: Retrieved from the Project Management Institute [PMI] (2001): [http://www.pmi.org/knowledge-center/~media/PDF/Knowledge-Shelf/Systems-Evolution\\_2011.ashx](http://www.pmi.org/knowledge-center/~media/PDF/Knowledge-Shelf/Systems-Evolution_2011.ashx)

After understanding what are the advantages of the IT PPM and the wider coverage that has compared with the traditional project management, the five phases that are defined by Wideman (2004) as the Project Portfolio Life Span (PPLS) will be explained in detail on the section 2.1.

## 2.1. The 5 Phases of Project Portfolio Management

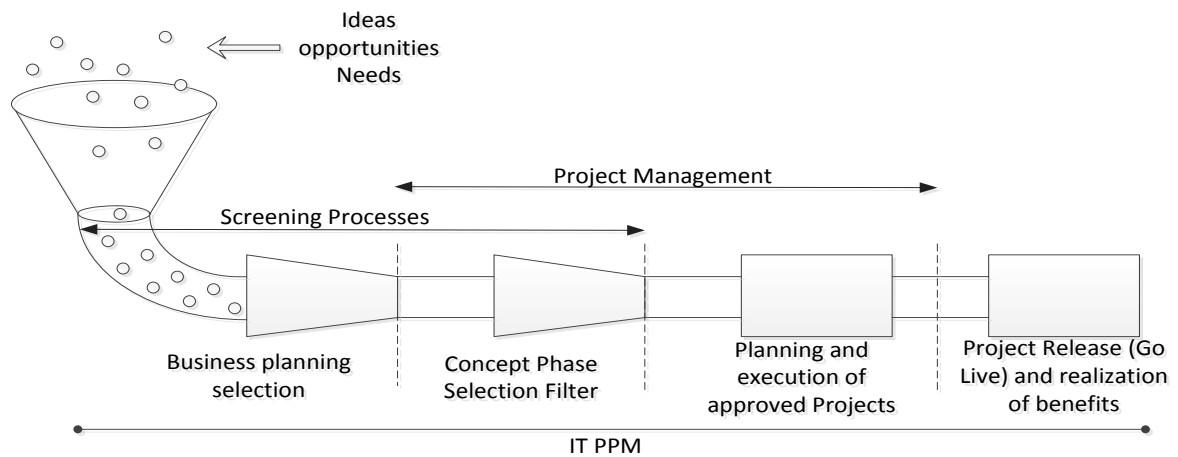
The IT PPM is the management of a portfolio of projects enterprise-wide providing criteria for decision-making on IT-initiatives, looking to generate greater returns on the IT investments and contributing with the success of the company. For the achievement of it, the IT PPM considers two parts in a high level design (Levine, 2005): The first part is related with the process of projects selection that are funneled from the set of ideas and strive to be part of the portfolio; the second part is related with the maintenance of the projects that become part of the portfolio and assure that they achieve the objectives of the individual project and the objectives of the portfolio.

With a correct application of this two steps in the IT PPM processes, the company will be sure that the projects will accomplish what the author Bonham (2005) describes as the 5 pillars of the project management: keep on scope being aligned with the business strategies and goals, deliverables are completed on the scheduled time, the project is delivering the expected results, the project is not incurring additional costs that exceed the “costs + buffer<sup>2</sup>” planned for the project, and to manage the risk of not delivering the project because the previous variances (cost, functionality, and schedule) don’t work as expected.

IT PPM is likewise divided in five phases that explain the processes included in its framework, following the two steps described above but in a detailed level, which include several functions that the IT PPM covers like projects, operations, financial, functional departments and resources, and marketing. For a better understanding of the flow of the five phases, the Figure 3 shows the framework of the IT PPM, named by Wideman (2004) as the Project Portfolio Life Spam (PPLS).

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<sup>2</sup> A buffer is an estimated contingency reserve included in the budget for unexpected situations that can appear during the project execution incurring additional costs.



**Figure 3 - The 5 steps of IT PPM.**

Source: Graphic adapted from Levine, H. A. (2005). *Project Portfolio Management: A Practical Guide to Selecting Projects, Managing Portfolios, and Maximizing Benefits*. (1st ed.). San Francisco, CA: Jossey-Bass., p. 21.

### **First Phase**

The first phase in the IT PPM framework is the definition of an idea that involves a real need and a great opportunity. It is necessary to materialize the idea with the development of a business case that summarizes the cost, benefits and impact that the idea can involve. It also should include information related with the project management like the planning of a roadmap, the assignment of responsibilities and accountabilities to clarify the roles involved like the business sponsor, requestor and project owner (Maes *et al.*, (2013)). The correct documentation of the project idea is only realized if well-defined governance is present in the process, having standardized procedures to review the projects, a clear definition of the roles involved with the functions and responsibilities (Not only for the first phase but for all the process of the IT PPM), and supporting the business with the results obtained with the projects selected. I find that this first step is crucial for the realization of the next phases and to supply accurate information to the IT PPM. Thus, the incorrect definition of this first phase will have heavy negative impact in the output got of the IT PPM for the decision making.

### ***Second Phase***

On the second phase, all ideas are funneled and filtered, looking for the identification of synergies, the best combination of projects, and definition of priorities of the projects requested. The IT PPM always has to ensure that the ideas that are funneled are created to comply with the long-term interest of the firm. At this stage, the transparency is a key point for the successful decision-making having the IT PPM as a tool for it. A correct filling of information from step one, and the involvement of the senior executives to obtain such transparency in the process. Rivinus (2013) states that giving the justification and approval of projects completely in hands of senior executives oblige the IT projects department to bring the responsibility to a level where the justification is made to one another, not just to the IT projects department.

### ***Third Phase***

The third Phase starts with the planning and execution of the selected projects after the decision is made, giving the task to the Project office or project management Office. One of the big challenges that the Project Managers have to face is the volatility that the projects can have during its execution. It is in the projects nature to have the volatile condition due to different factors (For example decrease in productivity, reduction of team moral and increase of attrition rate, stakeholder requirements change, etc. (Thakurt, 2012) There are several approaches for modeling the processes of the execution of Projects that facilitate an effective planning, monitoring and control of the IT projects during its execution, reducing the risk of volatility and the risk of affecting the final outcome. The Table 2 shows a list of some process models that can be used for the project execution with the advantages and disadvantages that are identified for each model (Pressman, 2010).

Due to the volatility of projects in their execution point, it is necessary to keep tracking and have control on the evolution of them to be sure that the projects don't get out of scope. If the periodical review identify a project that is out of scope, it will be necessary to study alternatives to get the project back to track trying always to

avoid the idea of cancelling it (IT PPM rest on shifting objectives and tend to modify a project rather than cancel it). The IT PPM is affected with the modification of a project. When that happen, it is necessary to remodel the portfolio with the new modifications to keep it up to date and not distort the output that the portfolio brings for the future identification of synergies and decision making. It is essential to have defined an IT Project Management Office (IT PMO) for the project execution welfare composed of specialized personnel to managing it. I will go in more detail about the Project Management office in section 2.4

Table 2 – Classification of Process Models.

Process Model	Definition	Advantages	Disadvantages
Waterfall Model	It is an IT solution development model (with strictly one Iteration/Phase) in which development proceeds sequentially through the phases: requirements analysis, design, testing (validation), integration, and maintenance.	<ul style="list-style-type: none"> <li>· Clearly defined stages.</li> <li>· Process and results are well documented.</li> <li>· Easy to manage.</li> <li>· Works well for projects where requirements are well understood.</li> </ul>	<ul style="list-style-type: none"> <li>· Cannot accommodate changing requirements.</li> <li>· No working IT solution is produced until late in the life cycle.</li> <li>· Adjusting scope during the life cycle can end a project.</li> <li>· Not Suitable for projects of long duration.</li> </ul>
V-Shaped Model	This is an extension of the waterfall model but instead of moving down in a linear way, the process steps bent upwards after the coding phase in a typical V Shape.	<ul style="list-style-type: none"> <li>· Simple and easy to use.</li> <li>· Each phase has specific deliverables.</li> <li>· Higher chance of success over the waterfall model due to the development of test plans early on during the life cycle.</li> <li>· Works well for where requirements are easily understood.</li> </ul>	<ul style="list-style-type: none"> <li>· Very inflexible, like the waterfall model.</li> <li>· Little flexibility and adjusting scope is difficult and expensive.</li> <li>· IT solution is developed during the implementation phase, so no early prototypes of the IT solution are produced.</li> </ul>

Prototyping Model	It is an IT solution development process that begins with requirements collection, followed by prototyping and user evaluation.	<ul style="list-style-type: none"> <li>· Reduces development time and costs.</li> <li>· Requires user involvement.</li> <li>· Developers receive quantifiable user feedback.</li> <li>· Facilitates implementation of IT Solutions since users know what to expect.</li> <li>· Exposes developers to potential future IT solutions enhancements.</li> </ul>	<ul style="list-style-type: none"> <li>· Can lead to insufficient analysis.</li> <li>· Users expect the performance of the ultimate IT Solution to be the same as the prototype.</li> <li>· Can cause IT Solutions to be left unfinished and/or implemented before they are ready.</li> <li>· Sometimes lead to incomplete documentation.</li> </ul>
Incremental–Iterative Model	Here the IT Solution project is divided into mini-projects, each of which is an iteration that results in an increment. Each iteration represents a mini-waterfall model.	<ul style="list-style-type: none"> <li>· Some working functionality can be developed quickly and early in the life-cycle.</li> <li>· Results are obtained early and periodically.</li> <li>· Parallel development can be planned.</li> <li>· Less costly to change the scope/requirements.</li> <li>· Easier to manage risk-high risk part is done first.</li> </ul>	<ul style="list-style-type: none"> <li>· More resources may be required.</li> <li>· Although cost of change is lesser but it is not very suitable for changing requirements.</li> <li>· IT Solution architecture or design issues may arise because not all requirements are gathered up front for the entire life cycle.</li> <li>· Does not allow iterations within an increment.</li> </ul>
Spiral Model	This supposes incremental development, using the waterfall model for each step, with more emphasis on managing risk.	<ul style="list-style-type: none"> <li>· Changing requirements can be accommodated.</li> <li>· Allows for extensive use of prototypes.</li> <li>· Requirements can be captured more accurately.</li> <li>· Users see the IT solution early.</li> <li>· Development can be divided in to smaller parts and more risky parts can be developed earlier which helps better risk management.</li> </ul>	<ul style="list-style-type: none"> <li>· Management is more complex.</li> <li>· End of project may not be known early.</li> <li>· Not suitable for small or low risk projects (Expensive for small projects).</li> <li>· Spiral may go indefinitely.</li> </ul>

Rapid Application Development (RAD) and Time Box Model.	It is a project development process that allows usable IT Solutions to be built in as little as 60-90 days, often with some compromises.	<ul style="list-style-type: none"> <li>· Time to deliver is less.</li> <li>· Changing requirements can be accommodated.</li> <li>· Progress can be measured.</li> <li>· Cycle time can be short with use of powerful RAD tools.</li> <li>· Productivity with fewer people in short time.</li> <li>· Use of tools and frameworks.</li> </ul>	<ul style="list-style-type: none"> <li>· More Management complexity.</li> <li>· Resource requirements may be more.</li> <li>· Suitable for IT Solutions that are component based and scalable, and only when requirements are well known.</li> <li>· Requires user involvement throughout the life cycle.</li> <li>· For project with development times.</li> </ul>
Agile Methodologies	Agile is an evolutionary approach to software and projects development which is performed in a highly collaborative manner by self-organizing teams with the objective of producing high quality output in a cost effective and timely manner.	<ul style="list-style-type: none"> <li>· Promotes teamwork and cross training.</li> <li>· Functionality can be developed rapidly and demonstrated.</li> <li>· Resource requirements are minimum.</li> <li>· Suitable for fixed or changing requirements.</li> <li>· Delivers early partial working solutions.</li> <li>· Good model for environments that change steadily.</li> <li>· Minimal rules, documentation easily employed.</li> </ul>	<ul style="list-style-type: none"> <li>· Not suitable for handling complex dependencies.</li> <li>· More risk of sustainability and extensibility.</li> <li>· An overall plan, an agile leader and agile PM practice is a must without which it will not work.</li> <li>· Strict delivery management dictates the scope, functionality to be delivered, and adjustments to meet the deadlines.</li> </ul>

**Note:** Retrieved from Pressman, R. (2010). *Software Engineering: A practitioner's approach*. New York, NJ: Mc Graw Hill

### **Fourth Phase**

When the project is successfully executed, the fourth phase involves the Product Launch or Go Live (acceptance and use of deliverables). From that moment the project lifecycle ends but the information about the successful implementation has to be recorded in the IT PPM for having this project as a template of other projects

where synergies are identified. The correct functionality of the delivered project can be key performance to identify the good development of the portfolio.

### **Fifth Phase**

With the release of the project to the final customer, the IT PPM does not stop tracking the success of what initially began as an idea, going to the last step that is the moment where the product (released project) realizes the benefits. In that point the life span of the IT PPM for a specific project ends.

**Table 3 - Summary of IT PPM processes phases**

<b>Phase</b>	<b>Description</b>
Phase 1	A great opportunity that benefits the company is identified. The idea is documented and sent for analysis and approval.
Phase 2	The ideas that are aligned with the strategies are funneled and selected to be part of the Portfolio, prioritizing those that have more impact in the creation of value and maximization of benefits.
Phase 3	The selected and approved projects for the execution are taken by the IT PMO. A plan is designed for the execution of the idea (the idea turns to a project), then the project is released for its execution.
Phase 4	The project is launched (Go-live). The deliverables are accepted and used by the stakeholder or customer. In that moment is considered an IT product or service and no longer a project. Its performance is monitored to see if the planned benefits are being realized.
Phase 5	The benefits are successfully realized and the Project Management Office achieves that information for considering that case as a template for future projects implementation where synergies are identified.

*Note: Summary of the five phases made by the author.*

Having defined the five phases (Find a short summary of each phase in Table 3), we can observe that the IT PPM has a wide coverage focusing its efforts in prioritization and selection of projects for the portfolio (Projects that meet the requirements accordingly with the business strategies) and assuring that the execution of the projects is managed keeping the scope for realizing the projected

benefits, transcending the expectations that a company can have with only Project management.

Levine (2005) affirms that when we think about the project portfolio Management, we should not see it fundamentally as the management of multiple projects. IT PPM is the management of the IT-based project portfolio that improves the way projects impact the overall welfare and success of the enterprise, and several components and systems of the company have to be involved to participate on the IT PPM to be effective. It is important to recall that for the successful development of all the steps, it is essential to have well-defined IT governance that assures the correct process management and brings transparency for the good functionality of the IT PPM. Details about the IT Governance are presented in section 2.3.

I have identified in the following list, the different benefits of implementing IT PPM in the company:

- ✓ The decision making will be done in a transparent manner, not for cases like political power of project sponsors or favoritism.
- ✓ Identification of failure of projects in an early stage, preventing of having projects that turn into a burden for the company.
- ✓ Brings tight integration between the business operations and the set of projects.
- ✓ Executive managers can have a Birdseye view over the different projects that are under their responsibility.
- ✓ It gives the opportunity to have an oversight on the projects that are already being executed and analyze if the realization of benefits are accomplished.
- ✓ Assures the fulfillment of the project scope with the business strategies and goals.
- ✓ Holistic organizational structure that creates ties between the different processes and operations.
- ✓ Efficient distribution of the limited resources within the different approved projects.
- ✓ Projects are contributing significantly in the positive cash flow for the company.

- ✓ The limited resources can be distributed effectively to guarantee the successful Go-live of the projects selected.
- ✓ The roles are clearly identified determining the functions and responsibilities in the IT PPM process.
- ✓ Identification of synergies between the projects listed in the Portfolio.

## 2.2. IT PPM Implementation

When a company decides to go for the implementation of the IT PPM has to consider seven aspects defined by Merkhofer (2007):

1. ***Embrace the principles:*** “PPM is not just another project management process” (Richardson, 2010, P. 526). At the moment of deciding to implement the management of a portfolio for managing IT projects, different parts of the organization will be involved and it is important for them to have a clear understanding about the principles that work as a common language of the portfolio. If all the structure of the IT PPM is not managing these principles, then results will be distorted and the benefits for the company will be so far of being realized. Remember that the implementation of the IT PPM is also a project, and the principles work also as design specifications to create the foundation of it. Merkhofer (2007) quotes the Systems Audit and Control Association (ISACA) (2006) to describe the principles that have to be fully embraced in the IT PPM:
  - ✓ Projects will be managed as a portfolio of investments.
  - ✓ The goal is to create the greatest possible value (considering the resources available and accounting for risk and organizational risk tolerance).
  - ✓ For the purpose of decision making, projects will be defined to include the full scope of activities necessary to generate value.
  - ✓ Because projects produce different types of value in different ways, they must be evaluated and managed differently.
  - ✓ Value delivery will be managed throughout the project life-cycle and the life-cycle of any products, services, or assets created or enhanced by the project.

- ✓ Value delivery practices will engage all stakeholders and assign appropriate accountability for the delivery of project benefits and the realization of value.
  - ✓ Value delivery practices will be continually monitored, evaluated, and improved.
2. **Choose an approach that fits your situation:** Companies that decide to go for the implementation of the IT PPM generally have a project management department that is already operating and managing the current projects with processes and tools already predefined. Those processes and tools can be reused for the development of the IT PPM, but they will have to get into consideration of the IT PMO or the department in charge of the project definition for the implementation of the IT PPM, to analyze if they bring the necessary support to the new approach or if they have to be modified, cancelled or integrated with new tools designed for the new IT PPM. It is also the option of dividing the IT Portfolio in smaller portfolios with the purpose of support divergent needs that business units can have, making the Portfolio more manageable and flexible with the company IT needs (Handler, 2011), but for doing it the portfolio has to be already in an optimized level to be able to handle a set of sub-portfolios.
  3. **Secure executive support:** The IT PPM works enterprise-wide and different roles of the company hierarchy can be involved. Levine (2005) recommends involving people with highest charges in the company to get the responsibility on the leadership and direction. Positions like the chief executive officer (CEO), Chief Operating Officer (COO), and Chief Financial Officer (CFO), and the Chief or Information Technologies (CIO) are the key for the successful management of the Portfolio of IT Projects. All companies have specific roles that are very important for the decision-making and should be involved, like the director of regulatory affairs in pharmaceutical companies. Also the heads of the departments that have major stakeholder responsibility should be considered in the list. For the initial implementation of IT PPM within a single department, the support and leadership from the department head would be sufficient to get

started, considering that the department has the resources to start the project. As a consequence of involving executives and key roles in the IT PPM assures that the favoritism and hierarchical power will not affect the decision-making, getting transparency during this process.

4. **Establish governance:** The business dictionary (2007) defines Governance as “*Establishment of policies, and continuous monitoring of their proper implementation, by the members of the governing body of an organization*”. The constant monitoring and controlling of the organization assures to the company a good performance and a wealthy business future. The governance process covers every process in the company, including the IT PPM, and can be classified in three groups accordingly with Gheorghe (2006): Enterprise Governance, Corporate Governance, and IT Governance. Each group is managed by people of different positions at different levels in the company. This aspect is one of the most important for the IT PPM; therefore I go in more detail about Governance and IT PPM in section 2.3. When you decide to go for the IT PPM, three main organizational components have to be defined for effective governance: executive leadership, the portfolio management team, and program and project managers. In Table 4, Merkhofer (2007), Bonham (2005) and Levine (2005) define some basic roles and responsibilities that may need to be established.

The roles described in Table 4 should be shaped depending of the size and the structure of the company, and the specific tasks defined for the IT PPM. Portfolio Management team and Governance board share together decision responsibilities and but the balance of power can vary within different companies. In some cases, the evaluation and decision-making on projects that are funneled into the IT PPM are made by the Portfolio Management team, leaving only decision-making for critical situations (projects that have to be redefined or cancelled because its performance is not supporting the original plan) to the IT Governance Board. In other cases, the Portfolio Management team (IT PMO) is in charge of gather information of projects to prepare the data to be analyzed and

give it to the IT Governance Board for making decisions on which projects have to be selected, which ones have to be placed in waiting list, and which that are already running have to be redefined or terminated. The IT PPM should not be under total responsibility of the IT PMO because it causes lack of transparency at the moment of decision-making and portfolio structuration. That is the reason for the IT Governance Board to have roles in the IT PPM and direct & review the IT PMO but, as described before, for the initial implementation of IT PPM within a single department, the support and leadership from the department head would be sufficient to get started, considering that the department has the resources to start the project.

**Table 4 - Roles and responsibilities in the IT PPM**

Role	Responsibilities
IT Governance Board	Also called IT Governance Council, is in charge of decision-making and oversight group composed of senior executives. The group sets portfolio funding levels, approves project recommendations, and provides policy guidance.
IT Portfolio Management Office (IT PMO)	The IT Portfolio Management team is composed of the Portfolio Manager, Portfolio Administrator, and, potentially, impacted Program Managers. Responsible for the portfolio management process.
Portfolio Manager	Head of the Portfolio Management Team, responsibilities include making project recommendations and reporting to the Executive Team.
Portfolio Administrator	Responsible for collecting project information, applying tools, and coordinating the day-to-day steps of the portfolio management process.
Program Managers	Responsible for managing groups of projects with similar characteristics or directed at specific goals (e.g., capital projects, maintenance projects, customer-support projects). IT PPM responsibilities include verifying project cost, value, and risk estimates for projects within their respective programs.
Project Managers	Responsible for day-to-day management of individual projects. Responsibilities include providing project proposal data and communicating project status to Program Managers and the Portfolio Manager.

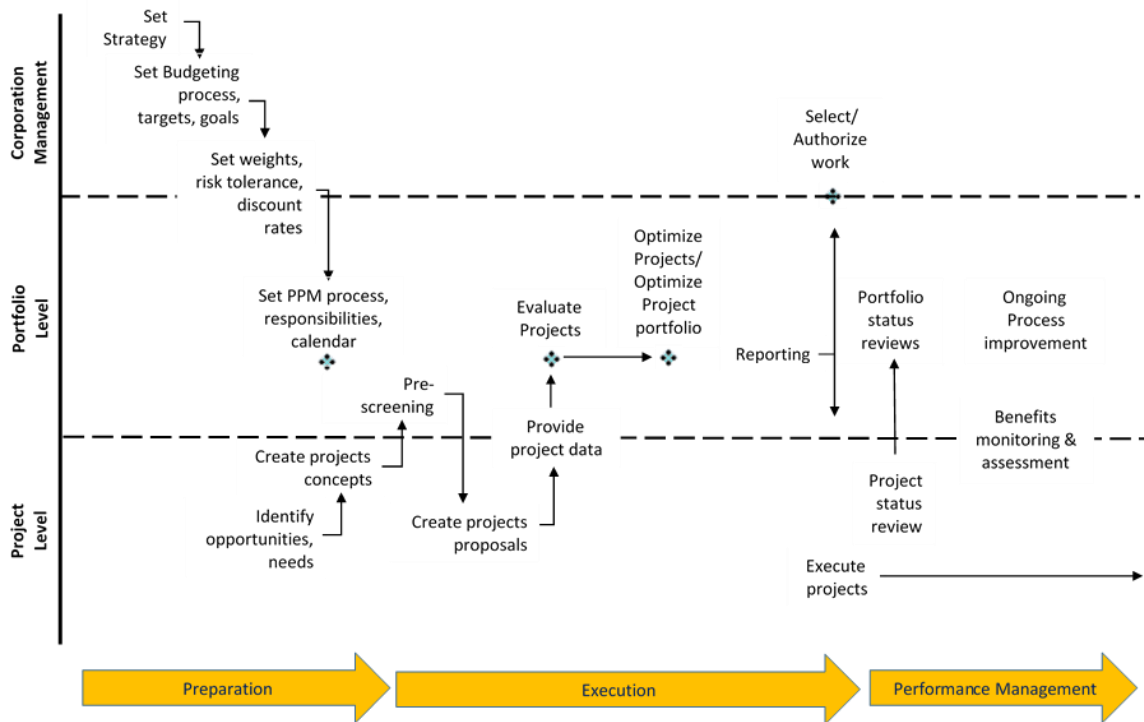
Note: Retrieved from Merkhofer, L. (2007, January 01). *Keys to Implementing Project Portfolio Management*. Retrieved June 22, 2014, from Lee Merkhofer Consulting: <http://www.prioritysystem.com/PDF/implementingppmcomplete.pdf>

5. **Create a value-measurement framework:** When a company focuses in IT investments is enabling the possibility of changes that create value, and the executive managers should understand that IT is not an end in itself, but is a mean that enable business Outcomes. *“IT is no longer about implementing technology. It is about unlocking IT-enabled organizational change”* (IT Governance Institute, 2006, P.7). Thus, each company define its specific principles accordingly with its particular focus, strategies and types of projects, and try to generate value in its own way, always focusing in the goal of the IT PPM (maximize the value of projects for the success of the company). A value-measurement framework is necessary to put those principles to work. Such Framework is a model that provides information for estimating and analyzing tangible and intangible values, risk and cost that the projects generate, and based on that information make investment decisions and monitor benefits (Booz et al., 2013). The definition of a value-measurement framework starts with the identification of whom will benefit from the creation of value [Company’s relevant stakeholders] and what do they consider as a value [Expectations from projects results]. Those two aspects will give you an indication about which of benefits have to be delivered within the scope of each project and what has to be considered for the estimations and establishment of priorities. Subsequently, you will need to identify the criteria that will determine the quantity of benefit produced, giving a ranking of value and benefits, and define the documentation needed to support the estimations. Finally, an evaluation of risk that can turn up has to be considered, analyzing also the impact that it can have over the priorities accordingly to the risk tolerance level of the company. The value-measurement framework is fed by a set of tools for the project’s output documentation that can be designed as list, tables, and graphic displays. I will go in more details about the value-measurement framework in the section 2.3 were I describe the most known frameworks for value measurement.

6. ***Implement effective processes:*** Companies are mainly structured by processes because those are the activities that produce a specific service or product for customers and the success of those processes depend on how effectively they are implemented. The value measurement framework is a model that defines the logic for choosing projects but as a model doesn't work alone and processes have to be defined in order to make it work (Merkhofer, 2007). For the definition of processes (Not only for the IT PPM but in general) is important to have well-documented specifications that clarify and make formal how the process is executed and who is involved specifying task and responsibilities. Once again, the governance is key point on the development of the definition of the processes that the value-measurement framework will involve, looking for standardization in order to get excellence in its development.

The well definition and implementation of the IT PPM, defining the processes of each of the five phases guarantee the success of the development and the achievement of its objectives. Remember that the company probably can have already a Project management department operating, and probably should be working for several years at the moment of deciding to go for the IT PPM. The Know-how acquired for that department on the processes that they have managed during its existence in the company is a big advantage for the definition of the processes in the IT PPM; those processes could be relevant and can be reused in the new definition, and the workforce that composed the old project management department are valuable resources for the implementation of the IT PPM project itself and the integration of the PMO.

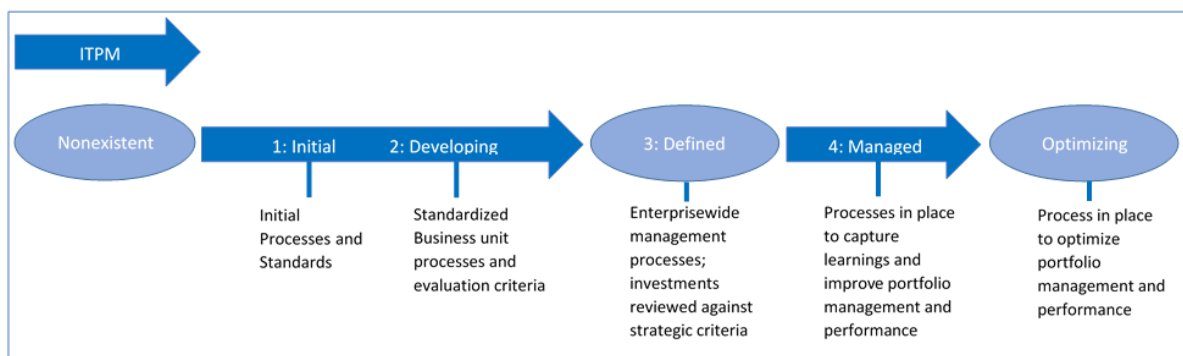
For the implementation of the IT PPM, Merkhofer (2007) suggest a common approach where IT PPM supports the regular budgeting cycle. On the Figure 4 you can see some of the steps of the approach in a typical process, and three phases that can be distinguished on the implementation: preparation, execution, and performance management.



**Figure 4 - Sample IT PPM process steps**

Source: Merkhofer, L. (2007, January 01). *Keys to Implementing Project Portfolio Management*. Retrieved June 22, 2014, from Lee Merkhofer Consulting: <http://www.prioritysystem.com/PDF/implementingppmcomplete.pdf>

On the performance management phase, it is important to track the processes and analyze if they are working as expected, if they have to be modified or redefined. The benefits of the IT PPM increase as it matures; that's why it is important to keep tracking and learning from the IT PPM experience. Gartner Company (2007) defines the maturity of the IT PPM in five stages: Initial, developing, defined, managed and optimizing. The Figure 5 explains how the IT PPM matures through the five stages.



**Figure 5 - IT PPM Matures through five stages**

Source: Gartner. (2007). *Mastering IT Portfolio Management*. Stamford, CT: Gartner.

The following table describes each stage for the IT PPM matures in detail (Gartner, 2007):

**Table 5 - IT Portfolio Management Maturity Model**

	<b>1. Initial</b>	<b>2. Developing</b>	<b>3. Defined</b>	<b>4. Managed</b>	<b>5. Optimizing</b>
<b>Objective</b>	Establish initial processes and standards	Establish standardized business unit processes and evaluation criteria	Establish enterprisewide management processes; review investments against strategic criteria	Capture learnings and improve portfolio management and performance	Optimize portfolio management and performance
<b>Governance</b>	Ad Hoc process only; evaluation of investments does not consider strategic criteria	Initial terms of reference exist; business unit IT decisions committees in place with varying degrees of formality	Standardized enterprisewide processes; single oversight IT decisions committee; active management of projects within portfolio for interdependencies	Benefits of earlier investments inform ongoing decisions; portfolio balanced for value	Focused on continuous improvement; results benchmarked to identify best practices; fund a greater proportion of strategic investments
<b>Investment Prioritization</b>	Ad Hoc processes and evaluation criteria; no standards templates; strategic criteria do not form part of investments evaluation	Basic process standards and criteria; strategic criteria considered informally; informal assessments of asset life-cycle plans in place	Formal criteria and process standards; decisions made at portfolio level; business strategy informs project and asset priorities; legacy asset plans in place	Process and criteria validated by historic measurement of benefits realized on earlier investments	Active experimentation to improve business returns from investments at each stage: Plan, implement and harvest

<b>Resource Utilization</b>	Ad Hoc processes, tracking against financial budgets; projects starts when IT resources become available	Basic processes; IT resource plans sufficiently accurate to specify a start date at approval	Standardized enterprisewide processes; resource plans include IT and other non-critical constraints; portfolio balanced to optimize use of resources	Enterprisewide resource management allows optimally dynamic allocation of resources to projects	Resource management informed by continuous improvement activities
<b>Risk Management</b>	Ad Hoc process; risk management occurs at the level of individual projects or assets	Formal tracking of project and asset risks; risks influence investments priorities	Portfolio balanced for risk; resources reallocated to address shortages as needed	Risk management informed by results of realized benefits	Risk management informed by continuous improvement

Note: Retrieved from Gartner. (2007). *Mastering IT Portfolio Management*. Stamford, CT: Gartner.

Mainly, the process for mastering the IT PPM is focused on the phases three and five where the benefits are realized. That does not mean that the first two steps are not relevant, undoubtedly they are the layers for the foundation of the later stages and provide the administrative accounting processes. When the first two stages are implemented is when the company can make evident the transparency and visibility enterprisewide on the defined stage three. Additional, the stage four works as a feedback instrument to analyze how well the decisions made from the IT PPM are impacting the business.

7. ***Institutionalize essential capabilities:*** Merkhofer (2007) defines seven essential capabilities:

- ✓ Capability to collect, store, and access project data: The need of IT PPM to document, standardize and communicate processes is evident. Standardized templates for filling the information and a central point for data storage empower the possibility to manage methodologies and data in a consistent manner. If such methodologies aren't clearly defined, then the IT PMO and Executive managers involved will be spending most of their time walking through worthless ideas and incomprehensible template formats.

- ✓ Capability to evaluate project proposals: This point impacts considerably the strategic decisions. Therefore there are tools that can help to analyze projects proposals in a quantitative way, making the process be quicker and more consistent. With the implementation of software at the beginning, the IT PPM can identify errors on filling formats that are common on the start phase because the people is affronting a new methodology of raising request of IT-based projects and they are not used to new data requirements yet. However, implementation of software could result expensive and premature to manage on the starting phase, so in that case, basic tools like Excel spreadsheets with simple programing codes for filling formats and ERP systems (In case that the company has already one) would be enough to help analyzing project proposals.
- ✓ Capability to prioritize projects and identify value-maximizing choices: The purpose of the IT PPM is to create value and maximize benefits with projects prioritization. We need to have look on the criteria from the Profitable side (when they will be finished, what they will cost and how much profit will generate), and the non-profitable side (Resource balancing, support of business strategies, and how do they create value to the business). Those criteria need to be reflected on your value-measurement framework model and the tools that help the analysis of it as in the case of use the Excel Spreadsheets.
- ✓ Capability to collect and manage project documents: IT PPM is based on information supplied by the documents on projects request, project status, and others (plans, process documentation, reports, etc.). The creation of documents is commonly in big proportions, and a process will also be needed for the maintenance of the big size database. It is recommended to manage the documents electronically to facilitate its management, linking the respective documents to each project and can access at any moment to that information when needed. There are several companies on the market for enterprise collaboration software that helps to synchronize and manage content in one place and allows sharing that information securely. E.g. Citrix, Box, EMC,

Accellion, Watchdox, Alfresco, Microsoft, IBM, between others (Basso et al., 2014).

- ✓ Capability to track and report project/portfolio status: As described before, IT PPM is more than project management, it enhance the framework of projects world. The life-span of the IT PPM ends when the benefits are realized, and from the moment the project is approved and executed, you will have to monitor and know the status of the project at any point in time. There are 5 activities that have to be controlled (Bonham, 2005): Scope, schedule, cost, quality, and risk. Each activity has different approaches to analyze the status of the project and accordingly with the output got, the IT PMO will know if the project is going ok or if a change has to be made to bring the project to the original plan because is not delivering the expected performance. It is recommended that the controlling process of the project should be performed by external experts that are not involved with the project they control; that assures transparency and accurate information that feed the portfolio and is the base for decision-making in ongoing projects. I will go more into detail about the five activities for controlling and the tools that provide collaboration on that process in section 2.6.
- ✓ Capability to monitor, learn and improve: The experience brings you opportunities to improve. As described on the sixth aspect for the implementation of the IT PPM, the portfolio matures through five stages: initial, development, defined, managed, and optimizing. The major benefits are realized mainly at the defined and optimizing stages. When the IT PPM has mastered its processes and tools, will give the opportunity to manage sophisticated what-if and statistical analysis tools, and also integrated reporting capabilities. It will be the best scenario for planning, simulation and innovation (Gartner, 2007).

Some barriers (or challenges) can be affronted during the implementation of the IT PPM. Accordingly with Rajegopal (2012), most common barriers identified at the moment of decide to manage a portfolio of projects are: Customers, Cultural (Workforce & Management), and Knowledge. It's important to sensitize the people

who will get involved in the implementation process to mitigate the barriers that could be faced and don't have delays or deviations of the final outcome of IT PPM.

### **2.3. The importance of the IT Governance for the IT PPM**

When you establish a company is important to delineate a structure that defines how it will be managed. It is fundamental to define roles, assign tasks and responsibilities, then define internal policies and laws in order to have control, balance the power at the different levels that are associated with accountability, and assure the prosperity and the viability of the of the company. That's what we call the corporate governance which is defined as "*a method of governing the company like a sovereign state, instating its own customs, policies and laws to its employees from the highest to the lowest levels*" (Thomson, 2009).

Additional, the corporate governance as a regulatory method helps to avoid problems that can turn into disasters before they occur. With the connection of the full structure (from the operators level to the board management level), the company managers have a general overview of the business situation and with that they can give a realistic panorama, giving transparency to the business which is the basis to promoting shareholder trust (Norfolk, 2005). As an example, the giant energy company Enron failed to give investors a complete picture of the firm's operations as well as a fair assessment of the risks involved in Enron's business model and financing structure, and at the end the shareholders realized the real situation of the company but was too late to take countermeasures and solve the crisis.

The corporate governance is a proven method for the risk management when it is executed efficiently, and the key for getting it is with the good information management in the company. Norfolk (2005) affirms that achieving a good information management, you will have access to reliable information that lets you forecast the rewards and assess the risk with confidence in different aspects (e.g. financial, company reputation or market related) Identifying possible problems with risk forecast in an early stage helps to evade possible emerging issues in the future.

For the IT PPM, the governance also applies but at the IT level, that's why it is called IT Governance. First, to understand the governance in the IT level, it is necessary to explain different levels of governance that can be involved in a company depending on the processes implied. Accordingly with Gheorghe (2006), government processes can be lined up in three groups: Enterprise Governance, Corporate Governance & Business Governance, and IT Governance, which are described as follow (See Figure 6 for graphical explanation of their relationship structure):

**Enterprise Governance** is described by Gheorghe (2006) as the set of responsibilities and practices exercised by the Board and executive management with the goal of providing strategic direction, ensuring that objectives are achieved, ascertaining that risks are managed appropriately and verifying that the enterprise's resources are used responsibly.

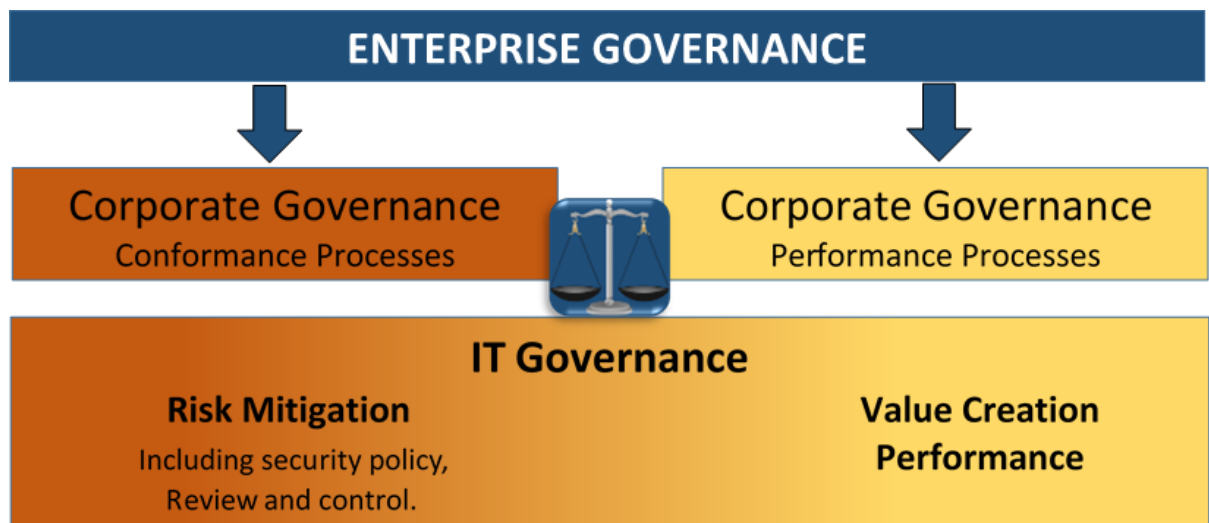
**Corporate Governance** (as addition of described before) is an ethical corporate behavior by directors or those that are in charge of the company governance, achieving an equitable return for shareholders and uphold the values of fairness, transparency, accountability and honesty (Norfolk, 2005).

**Business Governance** is described by PNMSOFT (2014) as a set of policies and business processes that set the way that business in the organization are run. Business Governance drive in the methodology of corporate governance and project governance with an emphasis on business process performance using the analysis, monitoring, reporting and optimization of business processes and business activities, including process simulation and optimization of desired business outcomes by using real-time, historical and estimated data values.

**IT Governance** is defined by Norfolk (2005) as part of corporate governance in general which ensures that IT systems contribute effectively to the business goals of an organization; that IT-related risk is adequately identified and managed (mitigated, transferred or accepted); and that automated information systems (including financial reporting and audit systems) provide a 'true picture' of the

operation of the business. In addition, the IT Governance assures that the methodologies for selecting IT initiatives have good performance, facilitating the maximization of value created by the IT projects, called the Value creation Performance of the IT Governance.

Henceforth, when we refer to the IT PPM as a method for efficient project management, we can associate it with the IT PMO who is the one in charge of managing and maintain the portfolio. In that case is correct to assert That IT Governance works in association with the IT PMO for the well performance of the IT PPM. But despite the association between the IT Governance and the IT PMO, the purposes that they have are different. On one hand, the IT PMO is in charge of developing standards and practices directed at the effective execution of projects and the realization of schedule, cost, scope, and quality objectives. On the other hand, The IT governance focuses on performing and transforming IT to meet demands of the business and the business' customers.

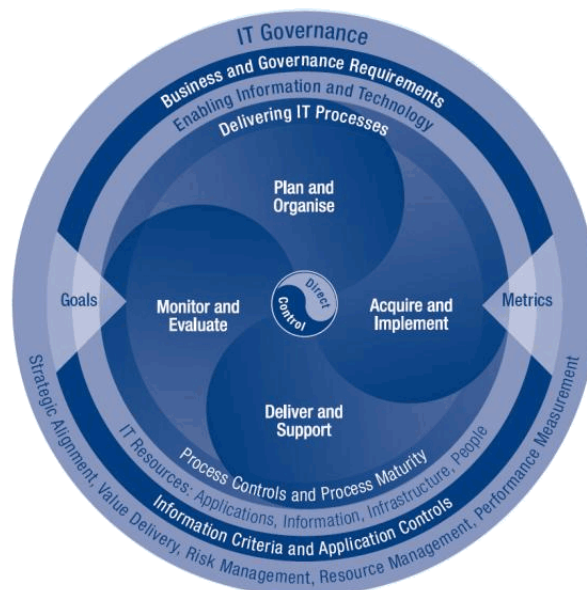


**Figure 6 - Relation between Enterprise, Corporate, and IT Governance**  
 Source: IGSi (2005). *The place of IT Governance in the enterprise governance*. Paris: Institute de la Gouvernance des systèmes d'information.

The IT Governance as an extension of the Corporate governance has to follow the same principles to be applied in the IT PPM (especially in delivering transparency in the processes defined), having aligned the world of Projects with world of operations. Therefore, the IT Governance should include executive level (As

explained in section 2.2) to share methods also with the enterprise Governance to ensure the achievement of objectives and verify that the limited resources are properly used, and to facilitate an enterprisewide decision making process for projects investment.

ISACA (2012) provides an innovative and internationally accepted framework for the governance and management of enterprise IT which is called COBIT (Control Objectives for Information and Related Technology). It is described as an IT governance framework and supporting toolset that allows managers to bridge the gap between control requirements, technical issues and business risks. COBIT enables clear policy development and good practice for IT control throughout organizations. COBIT emphasizes regulatory compliance, helps organizations to increase the value attained from IT, enables alignment and simplifies implementation of the enterprises' IT governance and control framework. The Figure 7 shows the description for the composition of the COBIT 5<sup>3</sup> framework, the last version of COBIT released by ISACA. The Figure 8 shows the principles that COBIT 5 manage.

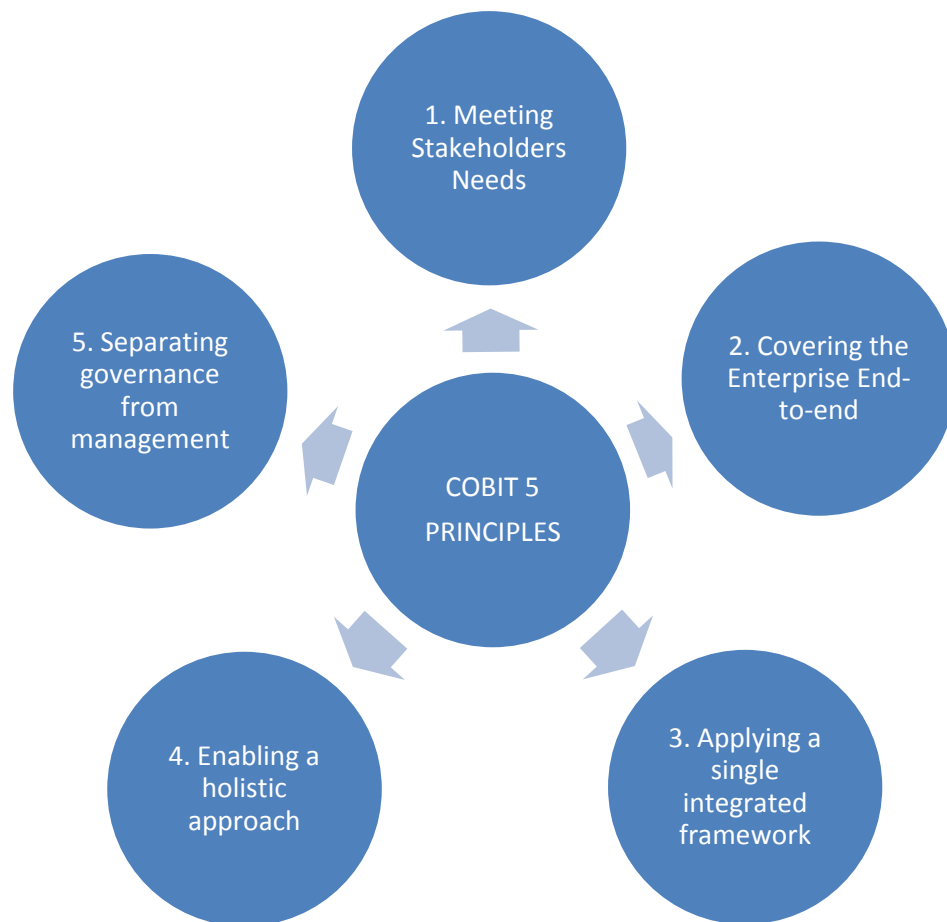


**Figure 7- COBIT 5 Framework for IT Governance**

Source: ISACA. (2012). Information Systems Audit and Control Association (ISACA). Retrieved June 28, 2014, from *COBIT 5: A Business Framework for the Governance and Management of Enterprise IT*: <http://www.isaca.org/COBIT/Pages/default.aspx>

<sup>3</sup> For detailed information about COBIT 5 (Benefits, overview, essential facts, etc.), visit the web page <http://www.isaca.org/COBIT/Pages/default.aspx>

IT Governance simplifies the way you manage the implementation of the COBIT 5, but it is not the only option available in the market. There are two more widely recognized third party Frameworks existing in the market designed for the IT Governance, that even when they are not defined in same conditions to develop the same specifications, each has significant strengths for the IT Governance. The Table 6 compares the three different frameworks: Control Objectives for Information and Related Technology (COBIT 5), The Information Technology Infrastructure Library (ITIL), and the ISO27001.



**Figure 8 - The COBIT 5 Principles**

Source. Source: ISACA. (2012). Information Systems Audit and Control Association (ISACA). Retrieved June 28, 2014, from *COBIT 5: A Business Framework for the Governance and Management of Enterprise IT*: <http://www.isaca.org/COBIT/Pages/default.aspx>

As we can see in the Table 6, each framework has a specific focus and all of them are created to strengthen the IT Governance. The best approach is the combination of all three, but for the implementation of the IT PPM I suggest to start with the COBIT 5 Framework that provides better support for the assurance of realization of benefits and the risk minimization in IT projects. The IT Governance, with the help of the COBIT 5 should cover five principal domains to achieve that aim:

**Table 6- Comparison of different frameworks for IT Governance**

	<b>COBIT 5</b>	<b>ITIL</b>	<b>ISO27002</b>
<b>Function</b>	Helps organisations meet business challenges in the areas of regulatory compliance, risk management and aligning IT strategy with organisational goals.	It is a methodology for managing IT as a service. It focuses on the end user rather than on the technology.	Manages Established guidelines and general principles for initiating, implementing, maintaining, and improving information security management within an organization
<b>Focus</b>	Controls and Metrics	IT Processes	Security Controls
<b>Issuer</b>	ISACA	OGC	ISO Board
<b>Implementation</b>	Information System Audit	Service Management Level	Compliance to Security Standard
<b>Benefits</b>	<ul style="list-style-type: none"> <li>• Improve and maintain high quality information to support business decisions;</li> <li>• Use IT effectively to achieve business goals;</li> <li>• Use technology to promote operational excellence;</li> <li>• Ensure IT risk is managed effectively;</li> <li>• Ensure ROI on the expenditure of IT services and technology;</li> <li>• Achieve compliance with laws, regulations and contractual agreements.</li> </ul>	<ul style="list-style-type: none"> <li>• Improved customer satisfaction</li> <li>• Increased staff retention</li> <li>• Increased ROI in terms of IT</li> <li>• Improved staff morale</li> <li>• A more transparent approach towards IT costs and assets</li> <li>• Improved delivery of third party services.</li> </ul>	<ul style="list-style-type: none"> <li>• Provides a framework for resolving security issues</li> <li>• Provides policies &amp; procedures in accordance with internationally recognized criteria, structure and methodology</li> <li>• Enhances business partners' confidence</li> <li>• Assists in the development of best practice</li> <li>• Optimized security delivers lower costs: fraud, inefficiency and errors should be reduced</li> </ul>

Note: Retrieved from IT Governance Ltd. (2014, January 01). *IT Governance*. Retrieved May 18, 2014, from IT Governance Defined: [http://www.itgovernance.co.uk/it\\_governance.aspx#.U-x9N-OSyQr](http://www.itgovernance.co.uk/it_governance.aspx#.U-x9N-OSyQr)

1. IT Strategic alignment: The IT Governance as an extension of the corporate governance has to design strategies for the IT PPM that are aligned with the business strategies (Bridge between Operations and Projects). The alignment of strategies is fundamental for the decision making, finding a balance between the IT projects that better support and those that make the company growth.
2. Value delivery: The IT PPM main purpose is to deliver maximum value distributing efficiently the limited resources. Thus, the IT Governance should assure that the IT projects will add value to organization; it means the project should be delivered on time, within the projected scope, the intended budget and the realization of the expected benefits.
3. Risk management: When an idea for an IT project is raised, the IT PPM identifies the possible vulnerabilities and threads that can affect that project during the execution and implementation, but how do we know which risks have to be considered? The IT Governance is in charge of defining the risk types, from an organizational level that cannot be eliminated but need to be minimized (Laws regulation, market fluctuation, financial, etc.), and second from the project side (Planning, Technology obsolescence, client requirements changes). *“Risk management should be a continuous process which begins by assessing the level of exposure of the organization and identifying the main incident risks. Once identified, risks have to be minimized using control procedure and finally residual risk should be adjusted at acceptable level”* (Gheorghe, 2006, P.92). The risk management is a cyclic process where the risk is identified, assessed and analyzed, monitored, then a mitigation plan is created, measured and controlled.
4. Resource management: The resources of a company are always limited and need to be prioritized and assigned to those projects that bring the best fit in the IT portfolio selection. The IT Governance composed by executive level strive to provide the necessary resources that the company can fund ensuring the suitable IT Competence and infrastructure to support the projects that provide best

business value. It is also a responsibility of the IT Governance to control the correct use of resources in projects that are being executed.

5. Performance measurement: This last point encompasses the fifth phase of the IT PPM where the project is released (Go-live) and is monitored to verify that it achieves the expected goals. The IT Governance in this part has to define methods to measure (with metric and indicators) the objectives and monitor them to verify if the expected goals are achieved. Additionally, the IT Governance in collaboration with the EA has to verify that the IT infrastructure managed is up to date, look for innovative projects that enhance IT capabilities, and keep vigil on the development of the technological development to be more competitive, more flexible to fluctuating market and to stakeholders needs.

With the five domains and a framework defined for the IT PPM, then you will have to define the roles and functions that will keep the transparency of the IT Governance. Norfolk (2005) states that to achieve transparency you will need to separate the function in three different groups: The first is the internal control group that is composed by executives that report to the board via the Governance steering committee. This group only establishes requirements and don't get involved in the projects definition and execution, armoring them against the political influences and favoritism. The second is the IT group composed by IT experts that are in charge of the technical matters. They assure the quality on what they deliver determining the best system solutions to the requirements that the first group raises. The first group should be kept out from the technical control because they are not appropriate people for that purpose and could be a cause for producing technical defects. The last group is composed by auditors that make analysis of how things are done compared with how is specified on the framework chosen. They report the results independently as external entity and proactively to the management board in case that any issue is identified. Afterwards, when the five domains have been correctly managed by the different roles involved in the IT PPM, the learning curve is

increased reaching a mastering level where you will have the capacity to implement the other two frameworks (ITIL & ISO27002) to get the best approach for the IT PPM.

#### **2.4. IT Project Management Office**

The companies that take the decision of implementing the IT PPM have to think about the different options to increase management efficiency and assure transparency. The IT Project Management Office (IT PMO) is one solution for a balanced management structure, incrementing the efficiency of IT PPM cutting costs and improving project delivery in terms of time and budget (Santosus, 2003). The IT PMO is composed by an infrastructure of professional staff in project management that has as a role the set of well-defined processes and tools that help to reduce errors in procedures. Additional, the IT PMO aims to achieve efficient project management by leveraging standards, identification of a solid schema for the distribution of limited resources within the different projects, identification of the good practices for establishing methods for selection and prioritization of projects, consistent performance measures, and avoid the duplication of efforts (Piscopo, 2009). The processes that IT PMO manages usually are repetitive for all projects that come into the IT PPM pipeline, which makes easy to standardize processes that are identified as those who can provide the best performance for the IT PPM, finding the best practices for the maintenance of the projects in the pipeline.

For the achievement of transparency in processes and decision making, it is necessary the participation of the IT Governance Board in the IT PPM for directing and reviewing the IT PMO. With a second party involved in decision making in the IT PPM and not giving total control of the IT PMO prevent the favoritism and power hierarchical influence for making the decision of projects selection and execution. Aligned with the IT PMO, the IT governance board keeps communicating with the IT PMO in steering Committee meetings. It provides the information needed to ensure that the decisions are made in base of that output to select projects and manage the pipeline. In the other side, the IT PMO will keep an oversight in all projects and inform

the IT Governance Board with reports about the overall status of the Portfolio and projects running. This includes issues identified that would affect the planned benefits of any project because of different factors like poor schedule or cost performance, technical impediments, and reduced technical performance. For a clear understanding of the roles that each part has in the IT PPM, the Table 7 is created based on the criteria defined by Levine (2005).

**Table 7 – Roles comparison between IT PMO and IT Governance board in the IT PPM**

IT PMO	IT GOVERNANCE BOARD
✓ Develops its tasks in the projects side.	✓ Develops its tasks in the operations side.
✓ Oversight of all projects: monitors projects accomplishments against established criteria.	✓ Oversight of the IT PMO performance and assurance of processes accordingly with company requirements.
✓ Evaluation and decision responsibility, escalating to the governance board only in critical situations and prepare recommendations for its consideration.	✓ Evaluate the critical situations and verify the impact in revenues and cash flow, risk impact, scope deviation, and decide if the affected high impact project should be terminated, delayed, or continued under a revised set of expectations
✓ Make decision of executing small projects.	✓ Makes decision of executing high cost projects or High risk project.
✓ Get information in a corporate level from IT Governance Board to make decisions based on that data.	✓ Communicate regularly in Steering Committee Meetings the changes in corporate Governance and corporate strategies.

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Note: Retrieved from Levine, H. A. (2005). *Project Portfolio Management: A Practical Guide to Selecting Projects, Managing Portfolios, and Maximizing Benefits*. (1st ed.). San Francisco, CA: Jossey-Bass.

Additional to the roles described in the Table 7, the IT PMO manages internally the following responsibilities (Kaleshovska, 2014):

- ✓ Enterprisewide project coordination and consistency.
- ✓ Set standards and methodologies for all projects in the enterprise.
- ✓ Do quality audits of the projects.
- ✓ Improve and master the approaches to select projects that support strategic goals.

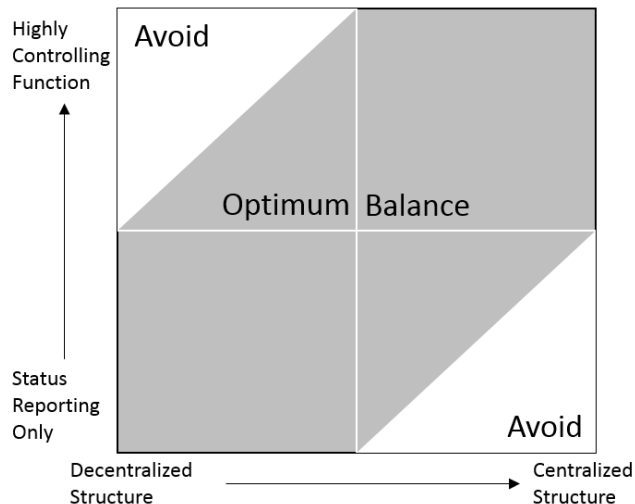
- ✓ Track the entire portfolio or projects in work by developing metrics and measuring all projects against those metrics.
- ✓ Identify the resources that are available to work on upcoming projects.
- ✓ Support the project managers and project teams with training, mentoring and career development.
- ✓ Collect and archive the documents from completed projects and analyze them for trends.
- ✓ Provide a knowledge management system that gathers all project-related information and makes it available in a readily-accessible, useful format.

As described in Table 4, the IT PMO is composed mainly by the Portfolio Manager, Portfolio Administrator, and, potentially, impacted Program Managers and project managers in charge of high impact projects. It is usual that companies that already have an existing Project Management department have defined those roles (Except by the Portfolio Administrator that is defined at the moment of deciding to use IT PPM in the company). This makes easier to establish an IT PMO to migrate the best practices established over the experience during years of project management existence. Then, verify which processes fit into the new definition and which ones have to be modified accordingly to the new requirements that the company has with the implementation of the IT PPM. Note that the implementation of the IT PPM in the company is considered a project and the IT PMO is typically chosen as the process owner for IT PPM implementation. An Analytic Hierarchy Process (AHP) is an excellent MCDM (multi-criteria decision making) tool used to support decision makers to rationally select the best alternative based on the qualitative and quantitative approach (subjective and pair-wise comparisons) (Syamsuddin & Hwang, 2009). With the methodology present, it will be useful for facilitating to build the basis of IT PPM methodologies and criteria. Levine (2005) states that the AHP underpins and supports portfolio governance process by enabling leadership to clearly establish organizational objectives, communicate priorities, allocate resources responsibly, and measure performance accurately. In that case where the company has not a structured IT Project Management

department and wants to create an IT PMO, or has not clear where to start, Piskopo (2009) defines useful steps to identify the critical aspects to build an IT PMO:

1. *Enlist Executive and Management Support:* For companies that are structuring a new IT PMO from the ground without the existence of a previous Project Management Department will require a big change in the organizational culture. It is a common effect on the staff of a company to resist to changes having the structural and cultural changes will be viewed as negative when employees are not previously sensitized. New procedures means more efforts spent to do what do they do while they get used to do it. That's why the personal that will be involved has to understand the benefits for the company. It could take some time before the personal to perceive the ease of doing the new processes instead of the old ones, but it will be motivation for optimize the way processes are developed. For high levels staff that has to be involved it is necessary to talk in terms of ROI to attract their attention (how the IT PMO increase the cost value and benefits of projects managing a portfolio need to be shown).
2. *Determine the structure and build a team:* The structure of the IT PMO defer according to the requirements that the companies have. Therefore, it is crucial to find the correct structure that matches with those specific requirements that the company has for the success of the IT PMO implementation. Kaleshovska (2014) highlights that at the moment of determining the structure; the following cases (As described in Figure 9) should be avoided: "a decentralized structure with highly controlling functions and a centralized structure with responsibility only for status reporting. Instead the structure should be somewhere in the Optimum Balance field".
3. *Develop and Document Standards:* IT PMO is the one in charge to develop standards and practices focused to achieve an effective execution of projects with the necessary resources and budget during the time planned to realize the expected benefits. With the corresponding documentation, the IT PMO is assuring good project planning, clear responsibilities within the processes and

the IT PPM, definition of standards for project selection, definition of methodologies for controlling procedures, criteria for project progress measurement, and good practices for the success of the IT PMO. Those documents are also the basis for the needed training that project managers and staff need for mastering the IT PMO, which is the topic explained on next point.



**Figure 9 - IT PMO Implementation**

Source: Kaleshovska, N. (2014). *Adopting project management offices to exploit the true benefits of project management*. *Economic Development / Ekonomiski Razvoj*, 1(2), 151-165.

4. *Identify skills and train the staff:* One of the main reasons for the success of the IT PMO implementation and further performance is the staff that makes it up. At the moment of implementation of the IT PMO it is necessary to enroll appropriate skilled people, and they have to be constantly trained to improve their skills. Information from staff's feedback can be used to train new staff because members of IT PMO come and go from their positions, being ready for integration of new staff, creation of new roles that are identified as needed for improvement, make changes and evolve.
5. *Measure success and continuously improve:* When the four points described before are finalized (IT PMO Structure Finalized, project management standards are established and communicated, and personnel are trained) the following step is to Measure success and continuously improve. The measure tends to be neglected with the pass of the time, most commonly when things are working

right. Because things are working right is not a reason for stop doing measurement, it's an ongoing process and is the only way to reach a possible mastering in what IT PMO is made for. One way of improving is gathering information from recommendations that staff have from daily tasks, that has to be taken into consideration to improve procedures and practices. Each person is an expert in what he/she does and it is important to get their feedback for constant improvement. Actually, exists several ways for the IT PMO to improve and most of them are identified with the pass of the time. Those ways identified are essentially for improvement of measures, processes and tools, working in favor of increasing efficiency of IT PPM and the existing structure of the company. *“An effective PMO is a catalyst for greater efficiency as it allows an organization to do more quality work with fewer resources and less risk”* (Piscopo, 2009).

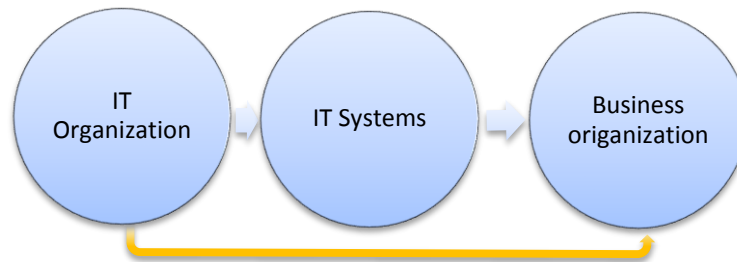
Having a correct manage of the five steps, you will assure the most important aspects for the successful management of the portfolio and projects execution. The resources that are limited will be well distributed efficiently to get the maximum benefit from them, and the projects will be correctly planned avoiding rejection that drives re-planning. The IT Projects will have the support and budget from Board management because decisions will be transparent and projects will have solid fundamentals for investing on them. With the help of the EA, the IT PMO will be an effective and efficient way of implementing new ideas for future improvements in technologies advances, not having only impact in the IT PMO but for the collective impact on the company growth.

## **2.5. Enterprise Architecture (EA) and IT PPM**

Nowadays, large companies have found a big support from new software technologies that perform diverse and specific tasks, providing high performance for processes in different functional areas of the enterprise and empowering realization of business strategies. The bigger a company grows, the bigger the investments and the need of IT systems infrastructure can be. If these investments are not properly

managed the company may run the risk of fall into a chaotic IT infrastructure, reaching a complexity level that the company will have to cope with redundancy in the data storage, incompatibilities between the different IT systems components, implementation of similar functionalities that can be covered for other systems already running doing unnecessary investments, and create isolated IT infrastructure unaligned with the business strategies (Gammelgard, et al., 2007). In order to prevent that chaos, companies establish the enterprise architecture (EA) to reduce IT complexity, preventing the business to fall into an ungovernable situation, and to assure that IT supports the business strategy. EA is defined by Niemann (2006) as a structured description of the enterprise and its relationships, which may make it the fundamental management information system for the enterprise. Looking the EA from that angle, it can be defined as a real necessity more than an option for the reason that putting it in place allows organizations to become more agile and competitive, and enables them to accomplish business goals (Van gils & Van Dijk, 2014).

The EA has an effective approach for the decision-making process because its holistic way of manage the entire infrastructure gives the IT organization a wide view that comprises the different business units (the parts) having a better control of its business processes (the whole), giving the capacity to overcome the challenge of the Stovepipe solution (John, 2010). It is important to have a clear understanding of the link that EA make between IT organization, IT systems and business organization. According to Gammelgard, *et al.* (2007), the IT organization is the one that generates business value to the business organization by ensuring that the IT systems operate correctly, and is responsible for long-term planning of the evolution of all IT within the enterprise. See Figure 10 for a general description of the process chart.



**Figure 10 - Link between IT Organization, IT Systems and Business Organization in EA**  
 Source: Figure designed by the Author.

The IT organization is also capable of generating business value direct to the business organization doing users training, support, helpdesk, providing documentation, etc. In the case of the IT systems, they only generate business value when the systems are used in the Business organization. The IT Organization and the business organization are considered layers at high level of the EA, where it is commonly employed for IT consolidation and IT business alignment scenarios. But there are other scenarios where can be involved like IT cost management, compliance management, project initialization, and IT project Portfolio Planning (Winter & Fisher, 2007).

EA as the way to capture all those processes, methods, tools, and responsibilities, needs to build a holistic and integrated view of the enterprise because is the one that should have the highest vision level over the enterprise . EA has to develop a strategically aligned blueprint to bring the logic that business processes require, and provide a continually aligned steering of business for the IT organization to determine which road has to be taken and fit into the business strategies. The blueprint in other words is a standardization and integration requirements of the company’s operating model; it helps to establish a common vision to ensure that strategic objectives of the company are not compromised by the tactical decision-making of the IT Organization and to ensure that the IT systems look after the sustainability of the organization’s strategies and objectives. The starting point of EA involves modeling goals, rules, structure, business units’ processes, and the communication of that strategic information in a clear and understandable manner (Bonham, 2005). After

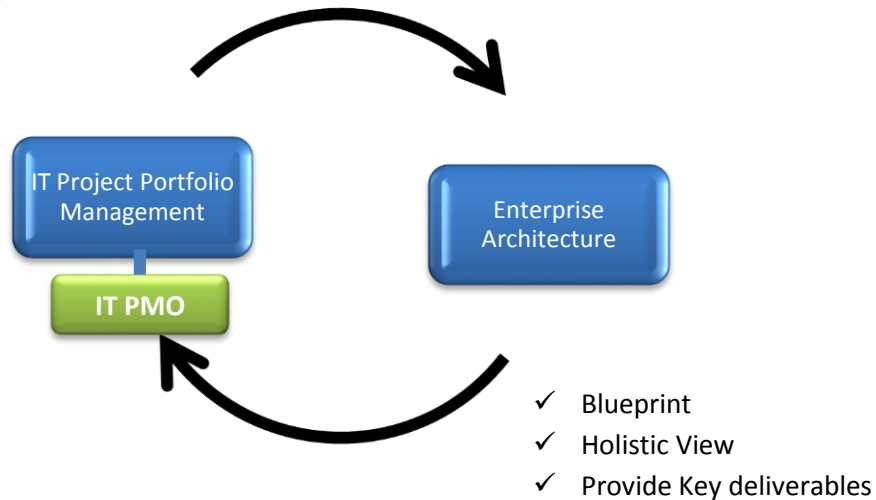
the blueprint is defined, the EA gives a fundamental basis for the definition of the IT Governance which is the processes that ensures the effective and efficient use of IT in enabling an organization to achieve its goals (Gartner, 2013). As explained before, the EA is involved into different scenarios like IT Project portfolio planning which has an important role in definition of methodologies for decision making for the IT based initiatives.

The EA with its holistic approach and the blueprint aligned with the business strategies may give to the IT PMO a way to trace new and already executing IT based initiatives. If the procedures are standardized and easy understandable for the different business areas which want to start with a new IT based initiative, then the collection and classification of the information should be easy to achieve. There is a well-known methodology for doing EA called TOGAF® defined by the Open Group (2011) with the purpose of providing a framework to improve business efficiency, utilize resources more efficiently and effectively, and realize a greater return on investment. Appendix A shows the framework of the latest version of TOGAF® defined by the Open Group (2011), the TOGAF® 9.1.

When the EA provides a definition of a business structure where the stakeholders have clear processes to create new IT based initiatives aligned with the business strategies, leads to an efficient development of the IT PPM. At the same time, the EA can use the information of the portfolio to have a panorama of IT projects and then provide ideas for the improvement of methodologies to classify, asses and make decisions on the new IT based initiatives, ensuring that IT projects deliver the desired business outcomes that fulfill the business strategy. In that point, is the IT PMO who provides the needed information to the EA in a structured form accordingly with the requirements that EA could have (See Figure 11). Those requirements could vary depending of the structure and strategies of each company. Additional, IT PMO provides benefits to EA with the information provided helping on the assurance of the realization of the EA future state and getting the different business areas to embrace EA blueprint. Each part provides significant benefits to the company but

when the EA and the IT PMO work together, the synergistic value of the outcomes they deliver far exceeds the sum of their individual parts (Scott Bittler, R., 2012).

- ✓ Assurance of Future-State Business Capabilities
- ✓ Provide Key deliverables



**Figure 11 - EA & IT PPM mutual Benefits**  
Source: Figure designed by the Author

Even with the importance that both disciplines bring together, in some cases the teams involved in each one don't establish a close relationship missing the opportunity of having benefits to increase their efficiency and to achieve the defined goals. The communication is crucial and IT systems (ERP systems as an example) can be used as a tool for the realization of it. From the side of IT PPM, is the IT PMO the responsible for keeping in constant communication with the EA, and the EA is the one who brings the blueprint for designing the methodologies for new IT initiatives. To provide a greater explanation about the specific responsibilities of the IT PMO and EA within the IT PPM, I have created the Table 8 as a comparison between them, taking as a source the analysis made by Zhu (2013).

Table 8 - IT PMO responsibilities and EA Responsibilities

IT PMO	ENTERPRISE ARCHITECTURE (EA)
✓ Its efforts are focused in the execution phase.	✓ Its efforts are focused in the planning phase.
✓ Gather information from EA for successfully and efficiently direct the enterprise portfolio.	✓ Provides better judgment for portfolio initiatives. Its holistic view allows gather information in high and low level layers.
✓ Make sure IT initiatives are implemented successfully.	✓ Work as tool for the PMO to steer enterprise portfolio for those initiatives that qualify as projects
✓ Might ensure integrity of Projects execution to original plan (alleviating the need for active involvement and engagement of EA).	✓ Should play proactive role in project investment priority, business risk intelligence and change management, to ensure business effectiveness, agility and resilience
✓ Focused on the change enabling and managing capabilities.	✓ Is normally focused on core business capabilities.

Note: Table designed by the author with Information retrieved from Zhu, P. (2013, October 01). *Future of CIO*. Retrieved June 12, 2014, from EA Vs. PMO: <http://futureofcio.blogspot.de/2013/10/ea-vs-pmo.html>

The correct communication between the three parts (IT PMO, IT Governance and EA working together as a triad) assures that the development of the IT will be successful, bringing considerable benefits to the company increasing the efficiency level on different aspects like business performance, creation of value, risk reduction, assurance of the corporate strategies, inter alia.

## 2.6. Criteria for Project Selection and Prioritization

The core process of the IT PPM is located in the second phase where the IT projects are selected and prepared to be approved for its execution. Moreover, with the wrong development of the other four phases will not be possible to have assertive results hindering the decision making process. For that reason, I will give an explanation of the different aspects that have to be considered for the prioritization of projects, supporting information provided in the previous chapters. We will go from the first phase explaining the importance of the documentation of the proposal and

finishing with the fifth phase where the IT PPM keeps monitoring to verify that the expected benefits are realized.

### ***The prequalification***

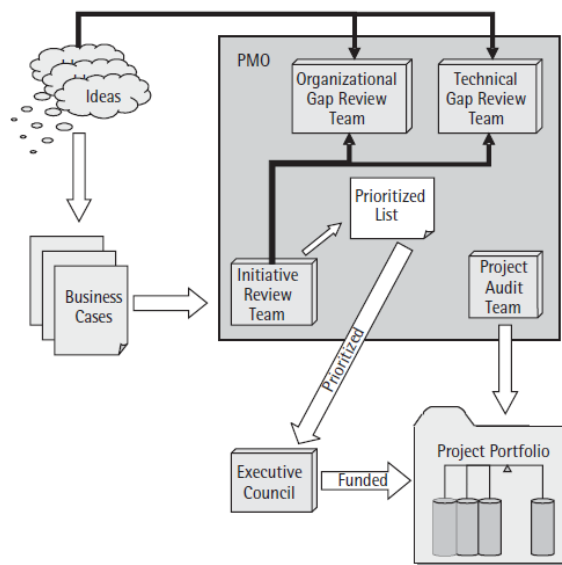
The prequalification is the first process that has to be considered for the IT PPM. In this process the requestor (Sponsor or Stakeholder) will have the role of provide a proposal for the analysis and subsequently the selection to be candidate of the portfolio (For a general process flow of prequalification, see Appendix B). The EA plays an important role in the prequalification because is the one who defines the framework for the proposals that have to be requested to fit with the IT-initiatives that the company needs to fulfill the corporate strategies. In other words, the EA provides the vision of the actual objectives which the company is aiming for its future, and the strategies that has implemented to achieve them. After the framework is defined, is the IT PMO has to develop structured and understandable and guides provide them to the stakeholder for the creation of the business case and assure that the information provided is the needed for the analysis, avoiding double work with wrong structuration of business cases, and forcing the IT PMO to send back the proposal for re-definition. The information contained in the business case template should include a sort of questions that help the stakeholder to answer in order to fill the information. That template will be divided by parts for each subject area, giving a better understanding to the person that is filling it, and should request the necessary initial information with a standard set of criteria for the proposal assessment. The assessment could include quantitative measures (such as value-creation potential, sales cycle time, and human resource requirements) and qualitative measures (such as consistency with the company's strategy) (Bonham, 2005).

The template for the business case works as a self-regulation, where the stakeholder can identify if the idea he has really follows the acceptance criteria and then continue with the process. If not, the stakeholder will desist of issuing the proposal, saving time to the IT PMO in make the analysis focusing on those projects that can fit in the portfolio pipeline and providing the information to the executive

level located in the IT Governance board to proceed with the decision Making. Levine (2005) identifies the following reasons that explain why the IT PMO should reject a project proposal after its analysis:

- ✓ Not in line with available resources, mission, or other criteria
- ✓ Not sound politically, socially, or for business relationships
- ✓ Feasible technologically but not economically
- ✓ Feasible economically but not technologically
- ✓ Involve excessive risk or are not within the risk culture

It's up to IT PMO to find a balance on the template that does not be too complex or too basic, finding the perfect fit to be sure that the selection criteria are simple to manage and appropriate to the specific company, . Also, the values defined in the template need to be constantly updated with new changes in the company in accordance to corporate strategies, tactical plans, and EA framework modifications. The process chart in the Figure 12 shows a general schema of the prequalification process to follow the actual strategies and definitions of the company (Bonham, 2005). After the collection of information from the different proposals, the IT PMO starts the selection and prioritization. IT PMO should have well-defined criteria for



**Figure 12 - Initiative review process flow with PMO support**

Source: Bonham, S. S. (2005). *IT Project Portfolio Management*. Norwood, MA: Artech House Inc.

the selection of proposals that can start to be part of the Portfolio, and a ranking system for the prioritization of the selected ones. The well-defined criteria prevent the IT PMO to not make the mistake to reject projects that could be potential for creation of benefits and value. As described before, the measurement could be quantitative or qualitative.

### ***Definition of a size for IT PPM pipeline***

Crawford et al. (2005) identify in his research that one of most common situations that lead to the failure of projects for delivering business strategies resides in the wrong pipeline size definition. The selection and implementation of too many projects beyond the organizations capability and capacity makes the IT PPM fail in its objectives, experiencing a lack of resources for supporting the projects, and because the number of projects exceed the capacity of the IT PMO to keep control and audit them. With the theory of constraints (TOC) size pipeline can be defined. The TOC is a system approach based on the premise that there is at least one constraint (known as bottlenecks, delays, and barriers) in every organization that prevents the organization from utilizing its capability and capacity to achieve the organizational objectives (Goldratt, 1997). The TOC focuses in five steps to get a productivity maximized in a system (See Appendix D for TOC five steps process flow):

1. *Identify the system's constraints:* The system works as a chain, and is stronger as the weakest link. In the IT PPM is necessary to identify the element that is restricting the system (The weakest link) in order to improve the system.
2. *Decide how to exploit the system's constraints:* After the system constrain is identified, the system has to be adapted to work maximized with that restriction, assuring that the corporate strategies will continue being achieved successfully.
3. *Subordinate everything else to the above decision:* The Non-Bottleneck parts of the system should support the bottleneck part to increase the efficiency, or those Non-Bottleneck parts will have to reduce the work at the level that the

Bottleneck part can provide in its maximum capacity and find the balance within the system.

4. Elevate the system's constraints: Once the capacity of the system is exhausted, the company will have to invest in increase the capacity of the systems constrain (Managers should exhaust the possibilities in the first three steps before considering going for the fourth step). That means the company will have to add more people or time.
5. *Prevent inertia from becoming the constraint*: After elevating the actual constraint, you will have to analyze the system again to identify new constrains. This process is a strategy to continuously improve the system, making it be an ongoing process. (See Appendix C for TOC five steps process chart).

### ***Categorization of projects***

After that the information of the candidate projects is in place and the size of the projects pipeline is defined, the selection and prioritization process starts. Companies manage normally different types of projects that are interconnected and aligned with the company strategies. Thus, they need to be categorized for facilitating the selection and prioritization in the IT PPM. Today there are different theories being applied for several years and that are still those that are on the forefront for project management. Some of the most known models for the projects categorization are the following (Le & Nguyen, 2007):

1. Categorization based on the project development (Wheelwright & Clark, 1992):
  - a. *Derivative*: ranging from cost-reduced versions of existing products to add-ons or enhancements for an existing production process,
  - b. *Breakthrough*: involving significant changes to existing products and processes,
  - c. *Platform*: offering fundamental improvements in cost, quality, and performance over preceding generations,

- d. *R&D*: is the creation of the know-how and know-why of new materials and technologies
- e. *Alliances and partnerships*: formed to pursue any type of project above.

## 2. Strategic Portfolio Classification:

This framework is based on the need to select projects in accordance with their strategic impact and to form a policy for project selection, since many projects compete for the same resources (Shenhar & Dvir, 2007). This framework suggest an approach for the selection in three steps: divide projects into groups based on their strategic impact, then divide based on their strategic impact allocating resources to each group based on the company or business strategic direction, and select the individual projects in each group accordingly with a criteria defined by the IT PMO. The framework manages two dimensions: strategic goal dimension (operational and strategic projects), and the customer dimension (external and internal customers). (See Appendix H for explanation of the dimensions in detail).

## 3. The NCTP Model: This model is defined in 4 dimensions (Novelty, Complexity, Technology, Pace) described below (Shenhar & Dvir, 2007):

- a. **PRODUCT NOVELTY**: Defines de impact that the product causes on the customers, identifying the customers that are already familiarized with that kind of product, the way the product will be used, and the benefits that the product can carry. Wheelwright & Clark have subdivided (1992) this dimension in three major new product categories to manage the company's product portfolio and to create an aggregate project plan (See Appendix I for detailed description of Product Novelty Level):
  - i. *Derivatives*: They are extensions and improvements of existing products.
  - ii. *Platform*: They are new generations in existing product families.
  - iii. *Breakthroughs*: They are new-to-the-world products:

- b. TECHNOLOGICAL UNCERTAINTY: This is the dimension who manages most of the uncertainty because deals with technology development process. When new technology comes to replace the mature or well-known technology generates that uncertainty in different kind of projects, which are analyzed in the following four categories (See Appendix J for detailed description of Technological Uncertainty):
  - i. *Low-tech*: existing and well established technologies,
  - ii. *Medium-tech*: mainly existing or base technologies combined with new features,
  - iii. *High-tech*: new but existing technology,
  - iv. *Super-tech*: new technology, well defined project goals.
- c. PROJECT COMPLEXITY (System Scope): Defines the projects accordingly with Different levels of complexity. Depending on how deep a project is structured and documented (system Scope) we can define the level of complexity it can involve (See Appendix K for detailed description of Project characteristics and System Scope). In most of the cases, a lower scope level may be seen as a subsystem of the next-higher level (Pinto & Morris, 2007).
  - i. *Assembly*: a set of various devices is combined into a single unit serving for a single function.
  - ii. *System*: consistent of elements or sub-system that together builds a complex interactive construct. It offers various functions for a specific operational performance.
  - iii. *Array*: a network of large, detached systems that combines all functions for a common goal.
- d. PACE: Defines the time available for the project execution and what happens if the time goal is not met. It is divided in 3 categories (See Appendix L for detailed description of Pace Levels):

- i. *Regular*: time is not critical for success.
- ii. *Fast-competitive*: time driven as they are initiated to capitalize on market opportunities, strategic advantages.
- iii. *Critical blitz projects*: time is key factor to success; projects are a result to emergent events that have the potential to deter the organization.

#### 4. Multidimensional System

Crawford, *et al.*, (2006) describe three models that can be hierarchical or parallel systems, or composite attributes. For the hierarchical system, the categorization is made of one common parameter (e.g. project size: small, medium, and large), and then subcategories can apply for each category (See Appendix E for categorization mind map). The Parallel system categorizes projects according to the attributes like complexity, technology, and strategic importance (See Appendix F for attributes mind map). The use of both systems results into a composite system (Appendix G shows the structure for the composite system). As described before, those are just some models available of the total existing in the market. They can be used as basis for designing a personalized categorization model from scratch that fits better with the company's requirements. "*There is no universal method, dominant theme or generic model*" (Bonham, 2005).

#### ***Projects selection and Prioritization***

At the moment that the projects have been categorized, the IT PPM will have a basis for select and prioritize the projects forming the Portfolio in order to achieve the following objectives (Chiang & Nuñez, 2013):

- ✓ Projects aligned with corporate strategies.
- ✓ The portfolio encloses high-value projects.
- ✓ Budget aligned with strategy alignments .
- ✓ The portfolio has the right number of projects for the resources available.

The IT PMO will define the metrics for the prioritization of projects as they consider are the most convenient to measure the projects accordingly with the requirements of the company and the stakeholders. It is also responsibility of the IT PMO to establish some minimum acceptable hurdles or gates that are defined with economic models, and they will need to be modified accordingly to new budget restrictions or EA changes. With the gates defined, the review team will compare the different proposals for their prioritization. They can use different models for that purpose such as mathematical programming, decision analyses, and interactive/comparative methods which are described in Table 9, (Bonham, 2005).

Companies that are implementing the IT PPM by first time can start managing basic models with excel sheets for the prioritization of projects while the portfolio reaches its maturity, having a mixture of the different methods for facilitating the decision making process. When best practices are managed, roles are well defined and the portfolio has reached an optimized stage (as described in section 2.2), then the company can decide to invest in more specialized models with the support of external consultant for the implementation.

The implementation of specialized software designed for the Portfolio management is also an option for the company for the IT PPM in an optimized stage. After the projects are prioritized and a decision about which projects approve, the IT PMO keeps monitoring the projects to verify that they are throwing the expected results, that the resources are used efficiently, and the project sponsor is satisfied with progress and results. The IT PMO decides in which point the project has to be audited as described in Figure 13, and should assign auditors that are not involved with the project for assuring transparency (In optimized portfolios, the presence of external auditing companies could be an option).

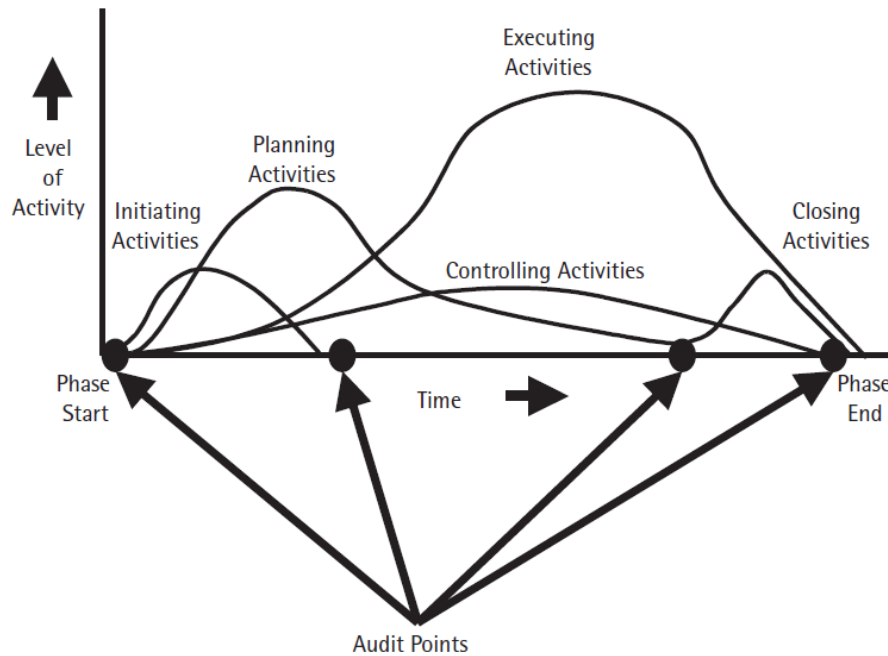
Table 9 - Methods for selecting and prioritizing projects

METHODS	APPROACHES
Economic models	<ul style="list-style-type: none"> <li>✓ Internal rate of return (IRR).</li> <li>✓ Net Present Value (NPV).</li> <li>✓ Payback Period (PB period).</li> <li>✓ Return of Investment (ROI).</li> <li>✓ Cost-benefit analysis<sup>4</sup>.</li> <li>✓ Option pricing theory.</li> <li>✓ Average rate of return.</li> <li>✓ Profitability index.</li> </ul>
Mathematical programming	<ul style="list-style-type: none"> <li>✓ Integer programming.</li> <li>✓ Linear programming.</li> <li>✓ Non-linear programming.</li> <li>✓ Goal programming.</li> <li>✓ Dynamic programming.</li> </ul>
Decision analysis	<ul style="list-style-type: none"> <li>✓ Multi-attribute utility theory.</li> <li>✓ Decision trees (e.g. EMV<sup>5</sup> Method).</li> <li>✓ Risk analysis.</li> <li>✓ Analytic hierarchy process.</li> <li>✓ Unweighted 0–1 factor model.</li> <li>✓ Unweighted (1–n) factor scoring model.</li> <li>✓ Weighted factor scoring mode.</li> <li>✓ Bubble diagrams or portfolio maps.</li> </ul>
Interactive comparative models	<ul style="list-style-type: none"> <li>✓ Delphi.</li> <li>✓ Q-sort.</li> <li>✓ Behavioral decision aids.</li> <li>✓ Decentralized hierarchical modeling.</li> </ul>

Note: Information retrieved from Bonham, S. S. (2005). *IT Project Portfolio Management*. Norwood, MA: Artech House Inc.

<sup>4</sup> See Appendix M, Point B for the Explanation of Cost-Benefit Analysis

<sup>5</sup> See Appendix M, Point A for the explanation of the ECV Method



**Figure 13 - Example of audits plan for the project execution**

Source: Bonham, S. S. (2005). *IT Project Portfolio Management*. Norwood, MA: Artech House Inc.

The projects will be monitored and audited in base on the metrics defined by the IT PMO for the selection and approval. If those metrics are not being achieved, then the project will have to be taken into consideration for its redefinition or the cancellation (Decision that should is taken by the IT Governance Board). As soon that the project is released, the IT PMO will take care of the realization of benefits within the expected time. Then, the released project will monitored to verify if in that expected time the project realized the benefits, keeping control with the information contained in the business case, and the metrics defined for the selection and prioritization of projects.

### **3. Research Methodology**

In order to achieve the main objective to provide a methodology of IT PPM that can be implemented by the Project Management Department accordingly with the requirements of the Company analyzed, a case study was selected as a research methodology because it allows to make a general analysis no statistical of the current situation (Phenomena), giving a clear understanding of how the actual IT projects are managed, and how those processes could fit with the new company requirements for an implementation of an IT PPM methodology.

For the development of a case study methodology, two Methods have been identified: The Harvard Case Method and the Yin Method. Although both methodologies are well accepted worldwide for the research of the business phenomena, Harvard Case Method is more focused in didactic teaching objectives and techniques that are developed inside classrooms. Yin instead, has transcended over Harvard going forward restating the Study Case as an empirical research methodology that contributes to scientific methods of generalized use, providing a deeper definition for the development of a study case, classifying it in different types as described in Table 10 and, in addition, providing a criteria for judging the quality of research design (Construct validity, Internal validity, External Validity and reliability) (Castro M., 2010). Therefore, the Yin methodology has been chosen for developing this Study case. It is important to highlight other authors like Stake, R.; Hernández, R.; Fernández, C.; Baptista, P.; among others, that have also contributed in the improvement and defense of the case study to be accepted as a research methodology, but for this research only Yin was considered to not make the research too broad and lose the scope and essence of it.

Table 10 - Definitions of Different Types of Case Studies

Case Study Type	Description
Explanatory	This type of case study would be used if you were seeking to answer a question that sought to explain the presumed causal links in real-life interventions that are too complex for the survey or experimental strategies. In evaluation language, the explanations would link program implementation with program effects.
Exploratory	This type of case study is used to explore those situations in which the intervention being evaluated has no clear, single set of outcomes.
Descriptive	This type of case study is used to describe an intervention or phenomenon and the real-life context in which it occurred.
Illustrative	These are primarily descriptive studies. They typically utilize one or two instances of an event to show what a situation is like. Illustrative case studies serve primarily to make the unfamiliar familiar and to give readers a common language about the topic in question.
Multiple-case studies	A multiple case study enables the researcher to explore differences within and between cases. The goal is to replicate findings across cases. Because comparisons will be drawn, it is imperative that the cases are chosen carefully so that the researcher can predict similar results across cases, or predict contrasting results based on a theory.

Note: Adapted from Baxter, P., & Jack, S. (2008). *Qualitative Case Study Methodology: Study Design and The Qualitative Report*, 13(4), 544-559.

Yin (2009) states that to identify the need of a case study, the researcher has to consider 2 aspects: First, the situation to be analyzed can't be controlled by the researcher, and second, the situation should be contemporary. In order to identify the two aspects, the researcher can use the questions how? And Why? Following those aspects, it's possible to identify that I (as a researcher) have no control of the situation that will be analyzed because I have no decision power inside the company and therefore in the Project Management department; the IT PPM is a topic which is actually discussed in the business world; it is a situation that is happening at the moment in the company analyzed which makes it a Contemporary situation. Then, the ground questions are defined from the initial analysis of the Phenomena for a

better understanding of the framework for the study case<sup>6</sup>: Why the company needs to implement IT PPM? How can be the IT PPM implemented to improve the management of IT projects? What's the actual methodology that the company is using for Project Management? How can I aboard the situation for getting a better understanding of it?

After defining the ground questions, Yin (2009) explains that is important to design a protocol for collecting the data: It is necessary to do a simple or multiple study cases? Which sources of evidence are needed to aboard the Phenomena? For this thesis, a simple Illustrative Study Case was designed: simple because of the nature of the phenomena to study has a single case "*IT PPM methodology*" for a single context "*IT projects management department*"; and illustrative because the main objective for the company is to understand the better approach and benefits of implementing IT PPM. The sources of evidence were selected considering to answer the questions defined. These are: Documentation, Archival records, Interviews, and Participant-Observation. The Table 11 give a better explanation of the different sources available for collecting the data.

After defined the structure and collection of data, the next step was to identify the objects to study in the project management department as the context where the IT PPM methodology is needed (and in addition, the Internal IT provider company who shares common business practices) to collect the necessary information and try to answer the questions.

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<sup>6</sup> The project was made mainly as a company requirement. Thus, the theme was given (Definition of IT PPM Methodology). The researcher only had to analyze how to aboard the situation that for this circumstance was done with the Case Study.

Table 11 - The six sources of evidence, strength and Weaknesses

Source of Evidence	Strengths	Weaknesses
<b>Documentation</b>	<ul style="list-style-type: none"> <li>• Stable – Can be reviewed repeatedly.</li> <li>• Unobtrusive – not created as a result of the case study.</li> <li>• Exact – Contains exact names, references and details of an event.</li> <li>• Broad coverage – Long span of time, many events, and many settings.</li> </ul>	<ul style="list-style-type: none"> <li>• Retrievability – can be low.</li> <li>• Biased selectivity, if collection is incomplete.</li> <li>• Reporting bias – Reflects (Unknown) bias of author.</li> <li>• Access – May be deliberately blocked.</li> </ul>
<b>Archival Reports</b>	<ul style="list-style-type: none"> <li>• <i>[Same as above for documentation]</i></li> <li>• Precise and quantitative.</li> </ul>	<ul style="list-style-type: none"> <li>• <i>[Same as above for documentation]</i></li> <li>• Accessibility due to privacy reasons.</li> </ul>
<b>Interviews</b>	<ul style="list-style-type: none"> <li>• Targeted – Focuses directly on case study topic.</li> <li>• Insightful – Provides perceived causal inferences.</li> </ul>	<ul style="list-style-type: none"> <li>• Bias due to poorly constructed questions.</li> <li>• Response bias.</li> <li>• Inaccuracies due to poor recall.</li> <li>• Reflexivity – Interviewee gives what interviewer wants to hear.</li> </ul>
<b>Direct Observations</b>	<ul style="list-style-type: none"> <li>• Reality – Covers events in real time.</li> <li>• Contextual – Covers context of event.</li> </ul>	<ul style="list-style-type: none"> <li>• Time consuming</li> <li>• Selectivity – Unless board coverage.</li> <li>• Reflexivity – event may proceed differently because it is being observed.</li> <li>• Cost – Hours needed by human observers.</li> </ul>
<b>Participant Observation</b>	<ul style="list-style-type: none"> <li>• <i>[Same as above for direct observations]</i></li> <li>• <i>Insightful into interpersonal behavior and motives.</i></li> </ul>	<ul style="list-style-type: none"> <li>• <i>[Same as above for direct observations]</i></li> <li>• Bias due to investigator’s manipulation of events.</li> </ul>
<b>Physical Artifacts</b>	<ul style="list-style-type: none"> <li>• Insightful into cultural features</li> <li>• Insightful into technical operations</li> </ul>	<ul style="list-style-type: none"> <li>• Selectivity</li> <li>• Availability</li> </ul>

Note: Information retrieved from Yin, R. K. (2009). *Case study research: Design and methods*. Thousand Oaks: Sage.

In order to gather the information from the company and to understand how the project management is developed in the Project Management Department, the necessary information was collected doing the activities described in the Table 11 as follow:

- ✓ Documentation: Gather information from the different resources available in the Project Management Department to understand the processes and methodologies that are already implemented and executed.
- ✓ Archival Records: Gather Information from the data base available in the intranet of the company to understand the corporate Governance, the Project Management Department structure, and the different roles and tasks involved.
- ✓ Interviews: Carry out different interviews with the members of the Project Management Department to understand how the actual process in project management works, identifying the tools and methodologies that are defined for the management of the assessment and approval of project proposals, and the monitoring of the project execution.
- ✓ Interviews: Carry out interviews with people from the Company provider of IT services and manager of the IT infrastructure for the pharmaceutical company, which is related with the execution of several IT projects (as a provider for IT projects and services), to understand the connection managed between both
- ✓ Participant-Observation: Inside View on project execution, participating in Jour Fixe meetings and communications strategies.

The activities described above and proposed to support the research methodology, bring a basis to present a model for the further implementation of an IT PPM for the management of the different projects at the pharmaceutical company. In addition, the activities provide the necessary information to make an analysis and suggest the criteria to be considered for the assessment of the portfolio projects, providing as a conclusion the reasons of that the methodology defined in this research will assure the stakeholder expectations. The case study in combination with the theoretical research will provide the necessary fundamentals for the definition of a rough IT-PPM model that could be used as a basis for the implementation in the Project Management Department for the Pharmaceutical Company.

## **4. Research Results**

### **4.1. The Project Management Department**

The Project Management Department as its name describes, is in charge of the IT projects management, and monitors the processes managed to provide IT services in the different countries where the company subsidiaries are present. Its main target is to ensure that the company's IT sustains and extends the business strategies and objectives. Therefore, The Project Management Department is responsible for defining strategies and priorities; support and manage relevant projects and monitor costs. Actually, the department is looking for the in the implementation of an IT PPM to increase the efficiency in maximization of company value, assure the realization of projects benefits, create transparency in the project management processes, and facilitate the decision making process for the future proposals.

The Project Management Department serves as business partner for all IT supported processes including integrated learning. It defines the IT architecture for the company, manages the required IT services and respective suppliers. As the one in charge of the IT project management has established methodologies, processes and tools for the assessment of projects proposals and the control of projects that are executed. With the active participation of IT Governance Group and IT Enterprise Architecture in the definition of methodologies, the Project Management Department can assure the linkage between operations and IT project management counting with the necessary divisions described in Figure 14 to make that possible. The following section 4.2 will describe the methodology applied by the Project Management Department for projects management, including one of the most important projects related with ERP systems.

That project is the biggest business program launched by the company to enable future growth to become the leader of integrated in the market segment. Throughout 2012, the company built a harmonized ERP backbone system, supporting the

business and its entrepreneurship, driving operational excellence in the back office functions and being compliant with market and legal regulations and industry standards. The scope of this project is related impacts several countries and the business case is based on integrated business processes, leveraging the ERP systems.



**Figure 14 – Divisions of the Project Management Department**  
 Source: Pharmaceutical Company internal Database

## 4.2. The Project Management Department Process

To create visibility and control over the IT activities across the countries, the Project Management Department has categorized the different kinds of request accordingly to the relation of the operations side or the IT-Based projects. The first group of request is categorized as IT Standard services that are provided the different countries based on a catalogue from which standard services can be selected. The second group is categorized as IT Demands which is related with all non-standard requirements (in difference with the IT Standard services that are defined by the catalog), consume IT budget and require IT resources. The third group of requests

is categorized as IT incident management, which in difference with the other two is not directly related to the Project Management Department. The Figure 15 shows the three categories describe in a generalized process chart to have a better description and understanding.

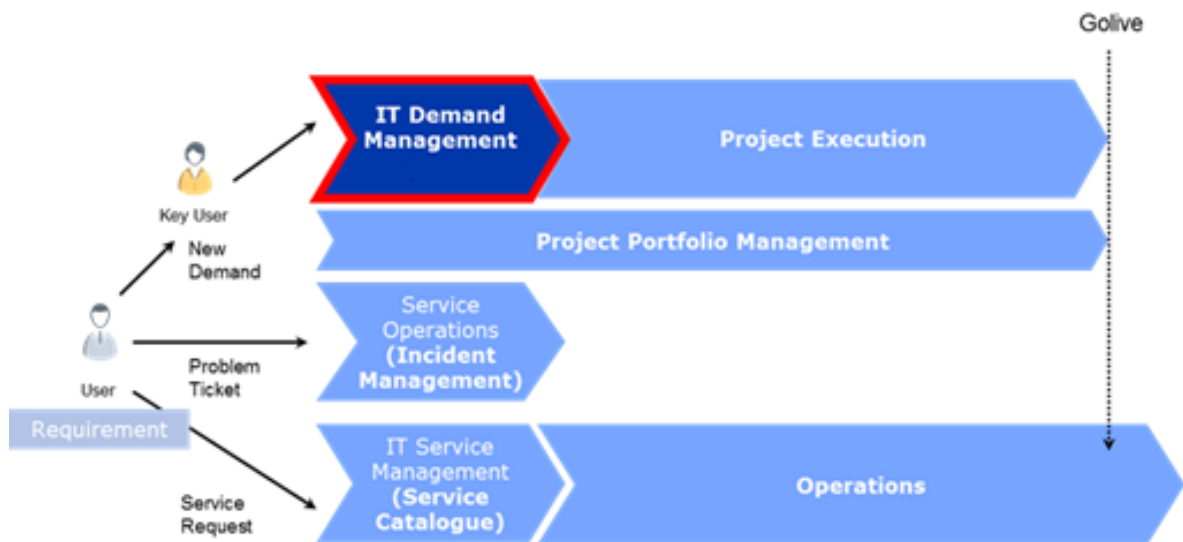


Figure 15 - IT Requirements categorization  
Source: Pharmaceutical Company internal Database

**IT Standard Service Management:** These kinds of request are those that require services that are already Pre-Defined in a standard catalogue. In other words, the users can request products or services included in the catalogue (such Software, hardware, user network creation, between others IT Solutions) with prices already predefined. For this requirement, the user that requests the service is aligned by IT Service Management process group where the requests have simplified and standardized approval procedures.

**IT Demand Management (ITDM):** IT Demand Management is part of the new Company IT Strategy. The main objective is to coordinate IT Governance across the company, managing and evaluating new IT Demands from a business and technical perspective. The requirements categorized within this group, are unique request and are Demand based, which means, each request has to be

formally documented, evaluated and approved. The demands considered into this category are subcategorized in the following groups according its cost or relevance (They will be explained in more detail in the section 4.3):

1. BUSINESS PROCESS RELEVANT: The Company has executed the big project for standardized and harmonized process template within the ERP systems across all subsidiaries. Therefore, all Business Process Changes of the company's process template have to be assessed and aligned with the help of Demand Management to fit in the new harmonized process template.
2. IT DEMAND: IT Demand Management is part of the new company's IT Strategy. The main objective is to coordinate IT Governance. The intention of the processes is to manage and assess new IT Demands from a business and technical perspective. The demands are divided in two types: the Small IT Demand with specific amount of investment the risk is not high. The evaluation and approval is executed via fast track with the purpose of keeping administrative efforts low. The second type is the large IT Demand that are all demands that exceed a higher amount of investment (Over the investment limit defined for the Small IT Demands), or also can cost less than the specific amount limit but its risk is considered high level (Risk consideration will be explained later on). The assessment and approval of the large IT demand requires a more complex process that goes on central as well as on regional level, being assessed and approved by formal governance boards and groups. The goal of both kinds of Demands is to optimize budget/resource allocation.

***IT Incident Report:*** This kind of requirement is to report failures of a specific IT solution, where the system is not running according to specification. The incident management itself is not handled by the Project Management Department but mostly outsourced, that because is already an operation (e.g. Email software is not working, problems with laptop).

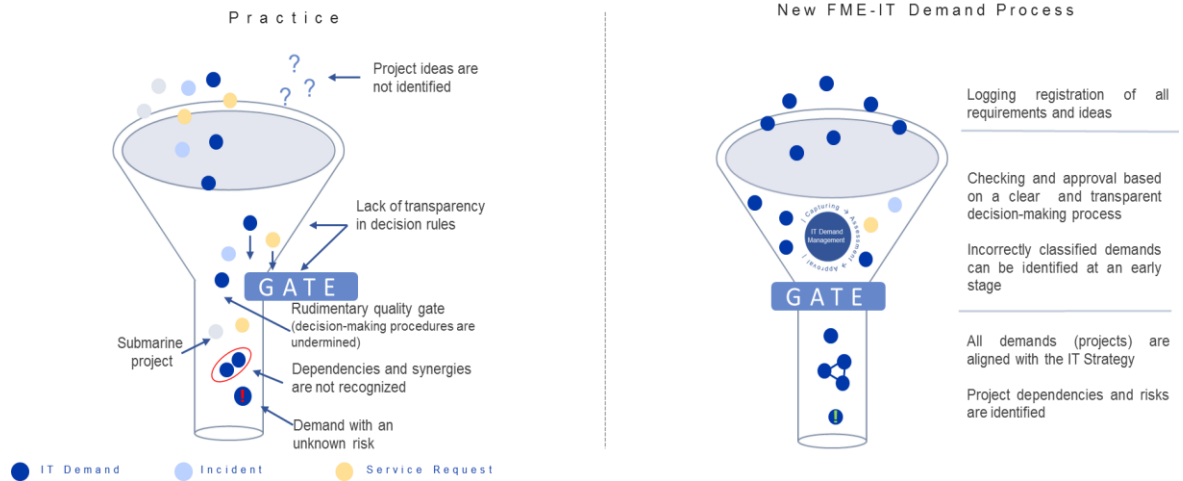
Those three categories are important for the Project Management Department, but only the IT Demand will be on the scope for the definition of the portfolio management due to the nature of the consumption of the company Budget. The IT demand needs investments that will be realized as benefits, consuming also IT resources for its execution. These kind of requests need to be aligned with both corporate and IT strategy because of it depends the maximization of value and realization of benefits that the projects generate to the company. On the other hand, IT Standard services and IT incident Management are operating expenditures and not Budget consuming, being managed via Cost controlling. From now on, the research will be focused on the analysis of the IT demand process. Besides analyzing the IT demand, we will go through the project execution which is the process that follows the IT Demand. This process also provides important input for feeding the project portfolio.

#### **4.3. The IT Demand Management (ITDM) process**

The ITDM is a relatively new process that is being implemented in the company for the management of any requirement from business or IT related that is not standard service. With this new process, unified methodologies and tools give the opportunity to assess and prioritize IT demands strategically, have a reduction in IT complexity, identify and realize the existence of synergies between projects, and simplify the assessment of the different IT demands. Also, with the assurance of the IT strategies alignment and the clearness and transparency, the decision making for the approval of the IT demands will require less time and efforts.. With the IT Demand, the company will bring the following benefits as shown in the Figure 16:

- ✓ Avoid risk in projects with a well-defined Risk Management process.
- ✓ Assure Governing in processes to aid ITdecision making.
- ✓ Create Synergies by encouraging re-use of standard solutions and the harmonization of processes
- ✓ Facilitate the implementation and management of an IT Project Portfolio

- ✓ Assure that the IT Projects are Aligned with business strategies.
- ✓ Ensure transparency in all process managed for requests reception.

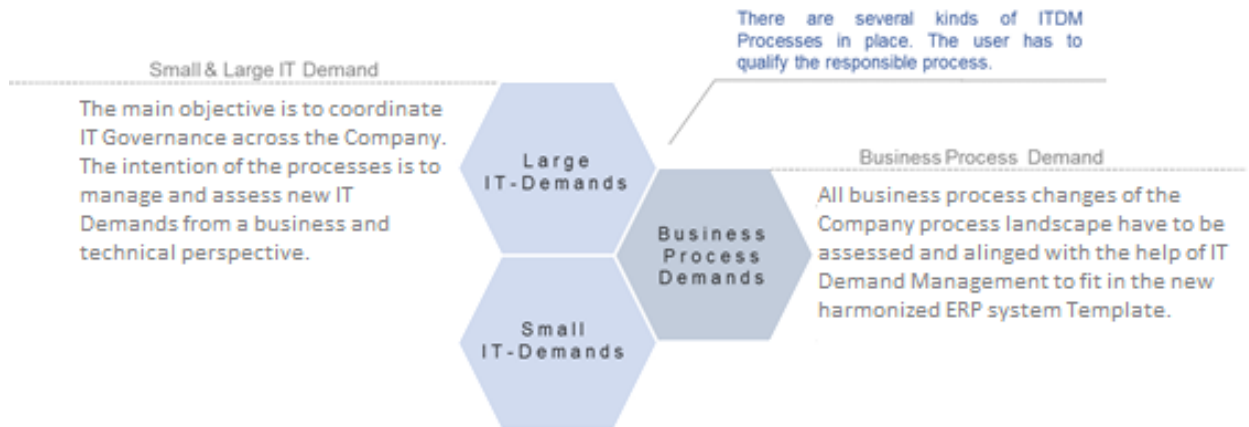


**Figure 16 - IT Demand Management, the ideal case and the practice**  
 Source: Pharmaceutical Company internal Database

The requests categorized in the IT Demand Management are subcategorized in three groups according its cost or relevance as described in Figure 17: Small and large IT Demands (For IT or business requirements), and the Business Process Demand (For process changes only for countries executing the ERP Systems standardization project).

Smaller IT demands will be directly executed by applying formal IT operations processes to keep administrative effort low. IT demands resulting in strategic and/or tactical IT programs and projects of significant IT investments (large IT demands) will be assessed and approved on formal governance boards and groups. This includes consistent evaluation of risk, strategic fit and business value from experts staffed by IT and business representatives in working and steering groups giving recommendations for Advisory and Executive Board level to finally decide on invest in an IT requests. The overall goal of the process is to identify synergies across business units by aligning business requirements and IT know-how at an early stage of the IT request evaluation. The Business Process Change as described in the Figure 17, is related with the changes of the armonized ERP System template

implemented in the Company's Business process landscape by the ERM Systems Standardization project executed and where the program has been already rolled out.



**Figure 17 -Categorization of IT Demands**  
Source: Pharmaceutical Company internal Database

Accordingly to the type of IT Demand, a specific process is developed for the assessment and approval for its execution. The next section 4.4 intends to explain in a high level the different processes, roles involved on each process, and the criterias followed for the assessment of the requests.

#### 4.4. ITDM assessments Overview

In order to provide an explanation about the evaluation of the different types of demands, it is necessary to understand the end-to-end process that the ITDM of the company has defined for each type. The Figure 18 describes the process in a high level for small demands, and the Figure 19 describes the process in a high level for large demands.



**Figure 18 - Small IT Demands process description**  
Source: Pharmaceutical Company internal Database



Figure 19 - Large IT Demands process description

Source: Pharmaceutical Company internal Database

The Figure 20 describes the process defined for the BPM Demands for changes in the ERP Systems standard template. This template only applies for the countries that are involved in the execution of the project.



Figure 20 - BPM Demand process description

Source: Pharmaceutical Company internal Database

The roles defined clearly bring IT Governance and transparency to the ITDM for the different processes, assigning responsibilities to the users involved for the correct development of the processes, including both central level (Users located in headquarters) and local level (User located in other places different to Headquarters). There are different aspects taken into consideration by the Project Management Department for the evaluation and selection of requests in the IT Demand, such as the identification and addressing of any potential synergies, risks and side effects as early as possible. Currently there are five different assessment templates available which will be described in detail in section 4.5:

- ✓ Decision Memo
- ✓ Business Case
- ✓ Company relevance
- ✓ IT Risk Assessments
- ✓ Strategic Fit Assessments

The area of IT Architecture and Service Management of the Project Management Department has designed a tool with the help of the Company IT Supplier (service provider) for the assessment templates to collect the requirements of new demands. The ITDM can capture the information of the IT demands for each category in a

centralized data base for its assessment. The different roles of the ITDM process have different access rights for documentation of the request in the specific template, assessment and approvals.

#### 4.5. Introduction assessment templates within ITDM

The ITDM has defined five different assessment templates for the analysis, selection, and approval of the IT Demands. Each category has assigned specific templates as described in the Figure 21, that in order to provide the necessary information in the first step of the ITDM (Demand Capturing) and could pass the filters of the following steps and assure the approval for its execution.

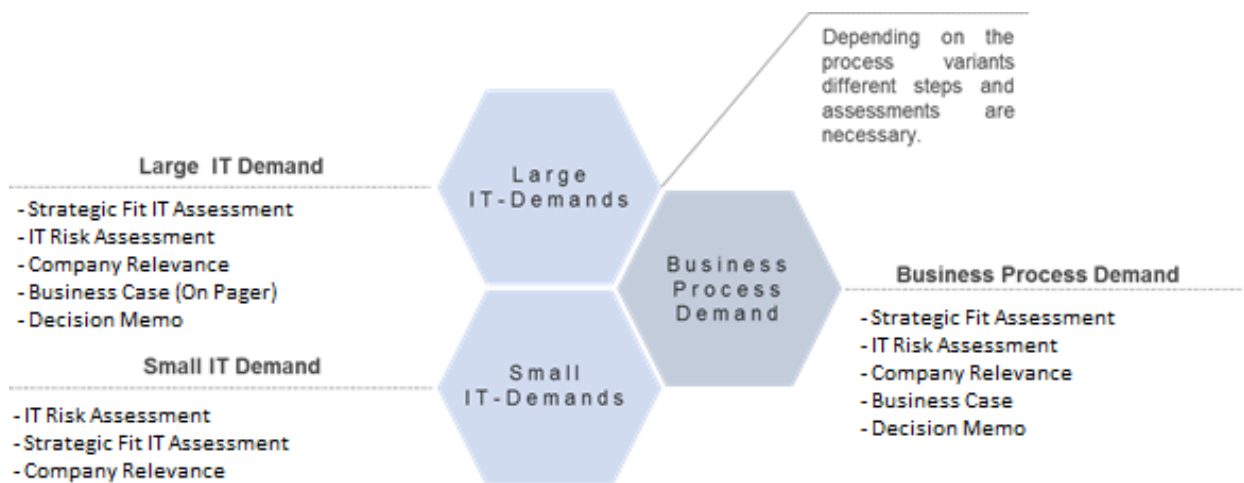


Figure 21 - Assessment Overview

Source: Pharmaceutical Company internal Database

##### 4.5.1. Strategic Fit IT Assessment

The Intention of the Strategic Fit IT Assessment is to evaluate the Demand importance by mapping the demand with Architecture Principles. This ensures the Governance of committed Applications, IT infrastructure and the “One function - One solution”<sup>7</sup> strategy. The Strategic Fit IT Assessment is based on defined Enterprise

<sup>7</sup> “One function - One solution” refers to the IT solutions that are implemented within the company should be standard globally. E.g. it is not feasible to manage Windows operative systems in some countries and

Architecture Principles for the Company. The principles shall be used to focus on decision making processes to achieve business objectives, and assess the demands in relation to Compliance, Efficiency and Growth. The formal definition of these principles helps to harmonize decision making throughout their decentralized organization:

- ✓ Standardization
- ✓ Buy Before Make
- ✓ Harmonization
- ✓ Patient Safety
- ✓ Continuous Improvement
- ✓ Fight for Profitability
- ✓ Best Practice
- ✓ Consistent Approach
- ✓ Organizational Efficiency
- ✓ Local Entities Responsible for Truly Local Issues

#### **4.5.2. IT Risk Management**

The identification process for a high risk project consists of an objective evaluation of IT risk for the IT Demands individually. This process supports the decision making within the demand management process, providing important input for the definition of a business case. The Project Management Office identifies three critical points to consider a project as a high risk level: Compliance/ SOX Relevance, GxP Relevance, and IT Security Relevance. Each point is described by a sort of specific questions. If one of those questions is answered as positive, the request will be considered a high risk Demand. The Demands that are requested to fulfill legal requirements will be immediately accepted and approved for execution.

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Macintosh Operative Systems in others. There should be a standardized Operative System working across the countries for compatibility and efficiency.

The first point analyses the GxP (Good" and end in "Practice) risk. When we talk about GxP, we talk about Validation. GxP summarizes the requirements that need to be fulfilled by the company. According to the FDA (2011), validation means: *“Establishing documented evidence which provide a high degree of assurance that a specific process will consistently produce a product meeting its pre-determined specifications and quality attributes”*. With the validation, a project will be developed, implemented, operated, and maintained in a controlled manner following the regulations that the GxP demands. The analysis gives the assurance that the system will consistently meet its pre-defined specifications and will be suitable for its intended use.

The second Point is the SOX (Sarbanes–Oxley Act) risk. The SOX is a United States federal law that set new or enhanced standards for all U.S. public company boards, management and public accounting firms. The main purpose of this financial reporting law is to keep investor confidence in the accuracy of published financial data of companies that are subject to U.S. laws. The Project Management Department must identify when an IT Demand is related with the manipulation or impact on the company Financial Data.

The third Point is the IT & data Security Risk. When an IT Demand is generated, and this request is related with the use for getting access to business processes and data or Master Data, with the purpose of create, maintain, delete information, or work under the rules of Data Privacy; then the request will be considered a High Risk IT Demand.

#### **4.5.3. Company Relevance**

This template provides an indicator regarding the Company Relevance of the IT Demand. The criteria template consists of General questions (e. g. synergies on Business Units level), actual initiatives of working groups which serve as an input basis leading to group relevant topics, and Standards & guidelines. The general

questions for the analysis of this template are created in base on the premise that if the demand would only be implemented in one division of the Company, then:

- ✓ Are there any synergies missed on general level?
- ✓ Are there any processes affected which are also used in another division of the Company?
- ✓ Will the costs increase for another division of the Company?
- ✓ Will any risk occur for another division of the Company?

With the answer of this general question, the ITDM will have the possibility to classify the Demands as Company relevant. It means that the project will not impact only division of the company, but it's whole.

#### **4.5.4. Business Case**

The main objective of a Business Case is to collect the necessary evidence to support the decision making process. This template appears in the tool as an excel template for the Business process Demand, that has to be filled with the information for the analysis, and then should be attached to the description of the request in the same ITDM tool. In the case of the large IT Demands, the tool provides one single sheet called business case (On pager) on the Figure 21 for the analysis of the business value, estimated efforts, and recommendations. For the Business Process Demand, the Business case provides fundamental reasons for initiating a project as well as comparing its benefits with estimated costs. Additional, the business case is used to obtain approval for financial spending and to prioritize IT investments that can generate the most impact between the different Business process Demands that arrive to the ITDM. The Business Case includes assumptions about the business value that project aims to realize, Risks and strategic fit of the project. The Business Case contains statements regarding reasons, business value (benefits), estimated effort (costs), payback period, return on investment and risk of the project. In essence, a business case should answer the following questions:

“What is proposed?”

“What is the value of the investment?”

“How will the benefits be delivered?”

“How much investment will the project require?”

“What are potential risks and how likely are they?”

“How well the Demand fit into the corporate strategies”

In order to get a complete description of the initiatives, the business case has been divided in 3 parts to analyze different criteria: The benefit analysis, cost analysis, and the business case Overview.

#### Part 1: Benefit Analysis

As part of the process step “Demand capturing”, the Key User defines reasons for the proposed initiative and analyzes local benefits. During the “Local demand assessment” the LBPO completes and verifies the local benefit analysis which has already been performed on the part of the Key User. While conducting the “Central demand assessment” the BPA determines the relevance of the demand for other countries. For Roles description, Appendix N.

#### Part 2: Cost Analysis

As part of the process step “Offer assessment” the BPA analyzes project effort, investments and operating costs using the second sheet “Cost Analysis” of the template.

#### Part 3: Business Case Overview

This part compares the financial value of the proposed investment with its costs. The BPO uses the financial metrics Return on Investment and Payback Period in order to take an evidence based decision concerning the approval of the proposed investment (“Demand and Offer Approval”).

#### **4.5.5. *Decision Memo***

The decision Memo provides a compilation of major demand information as well as a recommendation for the central and local management approval. The Decision Memo can be used for central information of all stakeholders and working groups. This template is based on the decision process across the demand management working group. The Decision Memo offers advices on critical decisions and recommends a course of action. The template shall simply summarize complex information and underline the consequences of decisions regarding the considered demand. It consists of a Demand Brief, Alignment topics, and Decision documentation.

For the cost definition and analysis of the different templates described before, it is necessary to request for the approval as described on the steps in section 4.3. It means that the information captured and analyzed on the steps that are before the step “request for quotation” is used for the filtration and selection of projects. After an offer from the external provider arrives, the ITDM proceeds to prioritize the projects to then be analyzed and approved for the roles involved for each demand categories in the last step “Demand & offer Approval”. Once the Demand is executed, is controlled with the standard template defined by the IT Governance, called the Project (Or Program) Status Report.

## **5. Recommendations & Conclusions**

### **5.1. Recommendations**

The IT PPM as an efficient practice for managing projects became well accepted for the implementation in companies that want to optimize their management of IT projects. Going beyond than IT Project management, IT PPM integrates different processes and tools that a company has for the management of projects, aiming on the achievement of corporate strategies and maximization of value for the companies. Thus, the enterprisewide management process of IT PPM allows executives to keep a Bird's eye view on the IT of the company, and provide support for strategic decision making. The Project Management Department has identified all those benefits that this practice can give, and has decided to improve the way they manage project in the Company, deciding to implement IT PPM.

There are some aspects identified in the case study of the Project Management Department that that can work on behalf of facilitating the implementation the IT PPM. According to the literature, the company has to define the processes for the two parts that compose the IT PPM in a high level: the projects selection processes for funneling set of ideas and strive to be part of the portfolio; and the maintenance and control of the projects that become part of the portfolio until the benefits are realized. The Project Management Department has already structured the defined processes for the first part of the IT PPM, creating the ITDM for the capturing, selection and approval processes. The second part is developed apart with the Project or Program Status Report. The implementation of the IT PPM appears for the company as an initiative to integrate the two parts and manage centralized information for the IT project management and decision making.

It is important also to highlight that according to the nature of the projects for the ITDM, the portfolio would be managed with different perspectives to assess the requests of the different categories. Even though, the information collected from the different portfolios that can be considered sub-portfolios, should feed information to

a general Portfolio to provide information about the projects prioritized for knowledge of the executive level. The main purpose of the IT PPM should not be distorted, that's the reason to collect the information of all the different projects in one point and show them to have a bird's eye view of the IT environment, know which kind of projects are those that are prioritized the most, which projects are realizing the projected benefits, and then take that information in consideration as a base for future decision making.

Having a look through the 7 steps defined in the literature review in section 2.2, we can identify that the Project Management Department already fulfills some of those steps for the implementation of the IT PPM. The aspects that help to fulfill partially or completely those seven steps are described below:

1. For embracing the principles, the Project Management Department with the implementation of the ITDM has established some principles that act as key for the assurance of the compliance on the business strategies. They should be reflected on the results that the projects approved realize for the company (Meaning that the objectives and goals are accomplished as described in the initial Demand capture).
2. The ITDM is the chosen approach that was defined to fit with the company's IT project management needs. But, this is just one part of the complete definition of the IT PPM. This is because the ITDM only covers the first two steps of the IT PPM process (Described in section 2.1). The task that the Project Management Department has now is to define how audits on executed projects and the Program Status Report will get linked with the information provided by the ITDM for the ranking and prioritization of the different portfolios. This process will be described later, together with the possible template that can be used for prioritization.

3. The Project Management Department has secured support from executive management for decision making. Adding the IT Governance Board for approvals in large demands strengthen the support from the corporate perspective as well and brings transparency in the decisions made for approval of projects.
4. An IT business Governance is already defined for the ITDM. But, with the implementation of the IT PPM, the identification of roles has to be done. There are some roles that can be identified in addition to those described in Table 4 (such as BPM) that could be potential roles for the conformation of the IT PMO. As a responsible of the correct execution of the IT PPM, the IT PMO will be in charge on the integrated tools like those managed in the ITDM, methodologies and processes.
5. The ITDM has already defined a value-measurement framework, identifying the estimations and analyzing tangible and intangible values, risk and cost that the projects generate, using them for the decision making process. At the moment of the implementation of the IT PPM, these estimators, values, risk and cost will be affected also by the projects executed, changing the prioritization output influenced by projects that get out of scope or do not accomplish the time expected, and in the worst of the cases should be canceled. The criteria analysis should be modified in those points where the goal was not achieved (E.g. Strategic Fit, group relevance). After the modification, the prioritization list will change, showing new projects within the range of approval that were out before the project failed. Also some quantitative criteria that the Project Management Department could be manage (e.g. Budget size) will change as in the case of the budget availability (With the example of Budget size criteria, money was spent in the failed project, that means that the new budget will not be the same for re-categorization of projects).
6. The ITDM has already defined standard processes that will be part of the first two phases of the IT PPM. The processes for controlling projects with the Project Status Report and periodical Steering committee meetings are also defined. With

the implementation of the IT PPM and the linkage of the 5 phases could be a possibility of having to modify some of those processes to fulfill the new IT PPM requirements. In this point will be necessary to have a periodical external audit for those who manage and audit the IT PPM (That means to audit the IT PMO), to assure that the processes are managed correctly, assuring a healthy IT PPM development.

7. After implementing the IT PPM, The IT PMO with the collaboration of the Enterprise Architecture and the IT Governance Board, should Institutionalize essential capabilities learned from the daily basic management of the IT PPM. With the maturity of the IT PPM, best practices can be identified and standardized, new capabilities could be implemented in tools or processes. The communication between different parts involved could be improved. In this point, the IT PPM should be showing its optimization and the benefits of being implemented in the company.

Regarding the methodology for prioritization of projects, I suggest to start with a basic template sheet that collects the information from the ITDM for ranking and prioritization. That suggestion is taken in base that the IT PPM in the case studied could be located in a developing stage (See Table 5 for the maturity model of the IT PPM). For that stage, advanced tools and models will not be recommended because they will just hinder the IT PPM development, considering that advanced tools will incur costs for the Project Management Department for being implemented.

This tool can manage multi-criteria ranking for efficiency and effectiveness, describing the best relations between them. Each Demand category will manage a template because the nature of each one requires different criteria for analyzing and categorizing projects, in that case:

- ✓ For small IT Demands, the metrics “Strategic Fit Assessment, Group Relevance and the Risk assessment” can be chosen as criteria for the analysis of this kind of projects. The template for the Strategic IT Fit assessment includes already a methodology that generates a number as a result of the analysis and projects

can be categorized accordingly to that result. But there will be projects that have the same ranking for Strategic IT Fit and thus the ranking needs to be cross-analyzed with the Group relevance and Risk assessment metrics. For the group relevance analysis, the ITDM should manage a subjective ranking to provide a final output for prioritization. Small Demands don't need to be ranked with quantitative criteria as NPV or Cost of execution, that because the budget is not managed centrally. The decision on invest resides on the specific investor on a local level. So, the question that can appear for ranking this kind of projects will be: Why should we prioritize small request? The answer resides in the importance for Executive management to know the situation in that level, and the measure the capacity that the IT PPM has to manage and audit all projects executed (Pipeline Size). For the risk management, the survey designed can provide a status of the risk level incurred in the project. The IT PPM aims to reduce risk level and maximize benefits. For that reason, the criterion that this metric has to manage is to rank higher those projects that have low risk (e.g. on a 0-10 scale, 0 is the riskier project and 10 is the best option with a low risk). The Table 12 shows the rank for analyzing and prioritizing small IT Demands.

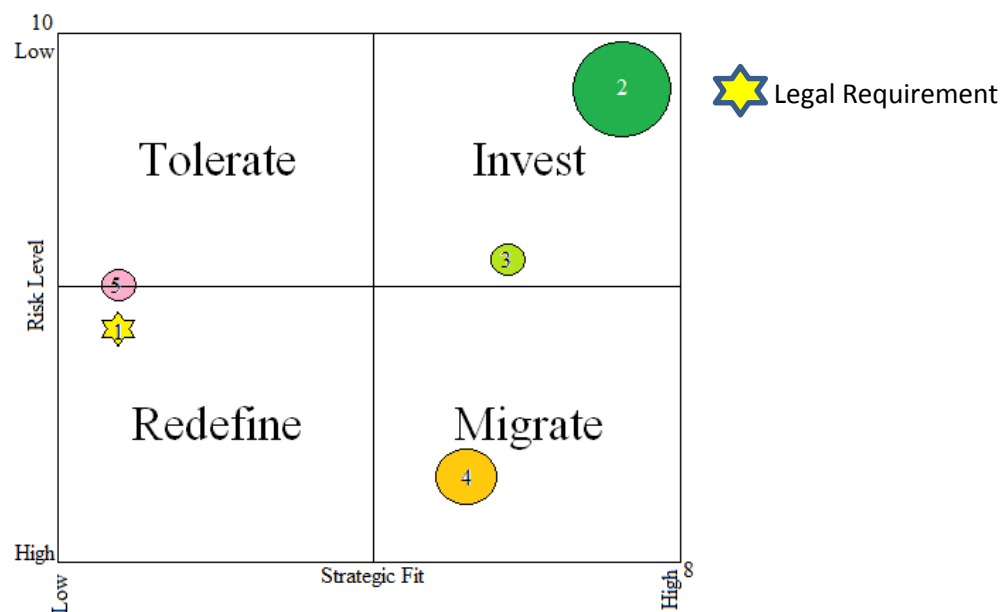
Table 12 - Ranking table for Small IT Demands

		(Weight 40%)	(Weight 20%)	(Weight 40%)		
Ranking	Project	Strat. Fit Assess.	Group Relevance	Risk Assessment	TOTAL	Legal Requirement
1	SP03	2	3	4	3	Yes
2	SP04	7	6	9	7.6	No
3	SP02	6	2	6	5.2	No
4	SP01	5	4	3	4	No
5	SP05	2	2	5	3.2	No

$$\text{Total} = \text{Strat. Fit. Assess. (0.4)} + \text{Group Relevance (0.2)} + \text{Risk Assessment (0.4)}$$

Note: The data input described in the table refer to assumed projects created for bringing an example of how the ranking criteria is useful methodology for projects prioritization. The analysis and weigh ponderation is a proposal realized by the author but is not strictly necessary to follow the same ponderation. The company can distribute the weight accordingly to the level of importance they consider for each criteria.

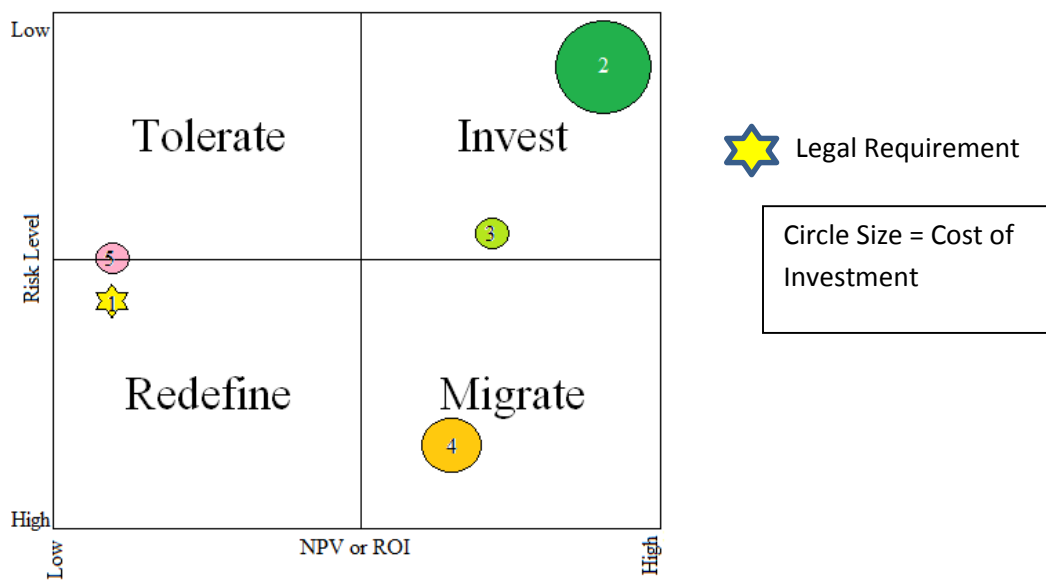
The project SP03 does not have a high score compared with the average but is legal required, being the reason to rank first in the list because has to be executed. For graphic model, the Bubble diagrams can be used (See Appendix M, section C), using the X Axis for Strategic Fit, Y Axis for Risk assessment, and the size of the bubble for the group relevance metric (See Figure 22). It is necessary to define for each axis, which score will be the middle of the axis, e.g. for Strategic Fit, all projects that are ranked below 2 will be located in the low fit quadrant, and everything above 2 will be high Fit.



**Figure 22 - Example of Bubble Chart Template for Small IT Demand**  
 Source: Graphic adapted from Basso, M., Mann, J., & Smulders, C. (2014). *Magic Quadrant for Enterprise file synchronization and sharing*. Stamford, CT: Gartner.

For the Large Demands, the process could be considered the same as the Small IT Demand, but having different criteria for the analysis of the different metrics. In that case, the Large IT Demand will additional to the metrics that the small IT Demand uses. The metrics established by the ITDM in the templates are: Strategic Fit assessment, Group Relevance, business benefit (NPV or ROI), Risk Assessment, Estimated effort (cost incurred). IT PPM can manage different criteria for the assignation of metrics and group them into sub-categories. The possible

assertive analysis for prioritize projects within this type is to compare the 3 most important metrics that can affect the results of the project and that are analyzed in details in the business case: Risk, Benefits (VPN or ROI), cost (As described in Figure 23). The other metrics like strategic Fit Assessment, Group Relevance can be taken in consideration for the selection of initiatives that are captured by the ITDM. So, in that way the IT PPM will have enough criteria for selecting the large IT Demands that pass the filter of the ITDM and then to prioritize those who provide better benefits at a less risk and cost.



**Figure 23 - Example of Bubble Chart Template for Large IT Demand**  
 Source: Graphic adapted from Basso, M., Mann, J., & Smulders, C. (2014). *Magic Quadrant for Enterprise file synchronization and sharing*. Stamford, CT: Gartner.

The same criteria apply for the BPM which is assessed with the same templates as the large Demand. The metrics chosen for the analysis of the different demands can be chosen and adapted to the IT PPM accordingly with the requirements that the approval parts need. The flexibility of the IT PPM allows the company to analyze projects in the most efficient and effective way possible. It is important to understand that those metrics analyzed in the different templates for each Demand should be the metrics that are used for auditing and controlling the projects during its execution and Go-live. Any variation of one of the metrics in one project can vary the initial

result of the Portfolio, throwing a new result for decision making. The analysis on the portfolio should consider the resources (e.g. Budget, Experts, hardware) and pipeline capacity, that because could be the case that there are several projects that fit in the “Invest” quadrant but they can’t be approved at the same time due to those limitations. Then, the Project Management Department will have a transparent documentation, well sustained to explain to stakeholders the reasons of decisions made on those projects that were not approved for execution.

## **5.2. Conclusions**

The introduction of the IT PPM has opened new opportunities to the companies for increasing the efficiency that the classic project management can provide. The extension of boundaries makes the IT PPM a perfect practice to improve not only the world of the IT Projects, but also the operational aspects of the company, because acting as a holistic method, links the different areas that affect the business IT, directly or indirectly. All decisions and processes related with IT have to be filtered by the IT PPM, giving a centralized way to analyze and control. It is also important to highlight that the IT PPM can’t exist without the other parts involved (IT PMO, the IT Governance and the EA); they play an important role as elements for the search of efficiency and assurance of the maximization of benefits and value for the company.

The company characterized for the search of competitiveness, has clear the benefits of the IT PPM. There resides the reason for the company to decide to go for a definition of the IT PPM that fits with the requirements that the company, and most important, the stakeholders. Hence, is important for the company to understand that the IT PPM is not a rigid methodology, on the contrary, it is as described as a set of proven business practices that brings a best way to integrate the world of projects with the world of operations ( (Levine, 2005), (Bonham, 2005), (Pinto & Morris, 2007)). Thus, the IT PPM becomes a methodology that can fit at any company (underlining that every company is particularly unique in the way of doing business, even if those are in the same industry sector), making it attractive for being adopted

as the way for managing systematically a big number of projects, and ensure assertive decisions for investing. The steps for implementing the IT PPM as described in section 2.2, are generalized steps that have defined fundamentals, but the company can decide which set of business practices they want to implement to approach the specific step (As an example, companies could decide to go for PMI<sup>8</sup> or PRINCE2<sup>9</sup> methodology to manage the IT projects that form part of the portfolio of projects). Once the company gets clear the fundamentals for the IT PPM implementation, it will achieve the assurance in corporate strategies and increase the efficiency in managing IT Projects. For the case of the Pharmaceutical Company, the IT project management is not new. In the last years, the company has developed projects for IT-based initiatives to take advantage on new technologies and to increase competitiveness. Thus, the company has established the Project Management Department for taking charge of IT. In the case of Project Management Department, the department centers its efforts on ensuring that the company's IT sustain and extends the business strategies and objectives. With the decision of implementing the ITDM, the Project Management Department is going in the right direction to achieve those goals, and have clear that with the implementation of IT PPM in the department will extend the benefits in great proportions.

The ITDM will be a key for the successful implementation of the IT PPM. But to be sure that it happens, the Project Management Department will need to wait for the ITDM to be optimized before implement the IT PPM. Since the ITDM is quite new, the different roles involved have to adapt to the new processes and methodologies. After the ITDM is fully operational and the users understand all processes, then will be the moment to decide to go for the implementation of the IT PPM. A new phase of Sensitization and adaptation could be experienced with its

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<sup>8</sup> The PMI (Project Management Institute) is a not-for-profit professional membership association. It developed the PMBOK guide (Program Management Body of Knowledge) who provides guidelines, rules and characteristics for project, program and portfolio management.

<sup>9</sup> PRINCE2 (an acronym for **PR**ojects **IN** **C**ontrolled **E**nvironments) is a de facto process-based method for effective project management. Used extensively by the UK Government, and widely recognized and used in the private sector internationally.

implementation, but the key for overcoming it is to start with basic tools and analyze how processes develop, what limitations can be identified and which areas can be performed. That ongoing analysis will bring improvement of the IT PPM until the point of being optimized, opening opportunities to invest in advanced solutions that with the collaboration of expert consultants, will considerably increase the performance and thus, its benefits for the Project Management Department and the company.

The advantage that IT PPM brings to the company for its implementation is that can shape to fit with the requirements on corporate level. IT PPM is not a rigid methodology that is defined with rigid processes, but requires of presence of corporate Governance and Enterprise Architecture to identify the way those processes have to be shaped to achieve the expectations. It is on the hand of the company IT experts and project experts to successfully implement the IT PPM. Following the principles for the definition and having clear objectives and strategies, the IT PPM will become one of the best elements of the company for the achievement of corporate strategies, maximize benefits, create value and secure the company growth.

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