

IT Project Management According to the PMBoK Adaptation and Application in a Set of Computing Projects in a Moroccan Public Body

Safaa Errihani, Said Elfezazi, Khalid Benhida

Abstract—With the growth of the computing projects and the limited visibility by the administrators regarding the use of the resources as well as the technologies which lead to the abundance of projects, along with the trend to the subcontracting in external suppliers, the project management becomes the key function (office) for the success of all the technical projects. So the Project Management Body Of Knowledge (Guide PMBOK) of PMI (Project Management Institute) is in phase to become an essential tool for the practitioners in all organizations and business sectors.

The main axis of this article is the PMBoK's analysis and modeling in order to reach a uniform model of project management. The obtained model will be projected on a set of projects within a Moroccan public department. Let's recall that the PMBoK defines the project management in terms of: integration, scope, time, cost, quality, human resources, communication, risk, procurement and the stakeholders of the project.

Key Words: IT project, Modeling, PMBOK, Project Management.

I. INTRODUCTION

Every year, the public bodies as well as sectors have many challenges to overcome: adaptation to national or international legal constraints, new services or innovating products launching, integration of new technologies (ERP, Business Intelligence...) or updating technologies already implanted to remain competitive [1], so they are launching projects to satisfy their needs, but most part of these projects do not succeed easily.

Indeed, activities such as these defy traditional management approaches for planning, organizing, and controlling. They are representative of activities that require modern methods of project management and organization to fulfill difficult technological or market-related performance goals in spite of severe limitations on time and resources. As a distinct area of management practice, project management is still a new idea, and its methods are still unknown to many experienced managers. However, today, project management is being applied in a wide variety of industries and organizations [2].

Therefore, the Project Management Body of Knowledge PMBOK has been elaborated as part of the initiative improvement of projects management technology [3].

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The guide constitutes a unique reference point for all major principles and practices of projects management.

The PMBOK includes the project management's knowledge's set of different professional areas. In its integrality, it also includes the classical practices extensively applied as well as the innovative practices emerging within the profession.

According to the PMBOK « A project is a temporary endeavor undertaken to create a unique product, service or result »[4].

A project always has the following three components:

Specific scope: Desired results or products

Schedule: Established dates when project work starts and ends
Required resources: Necessary amounts of people, funds, and other resources [5].

Thus, a project is unique, it is not a repetitive operation; it is bounded because it has a beginning and a defined end; it is launched following clear and precise objectives. This one also possesses a cost and is subject to a budgeting of means with an independent balance sheet of the organism having different actors. These four aspects (time, budget, scope, and quality) make up what's known as the balance quadrant, which is pictured in fig. 13[6]-[4].

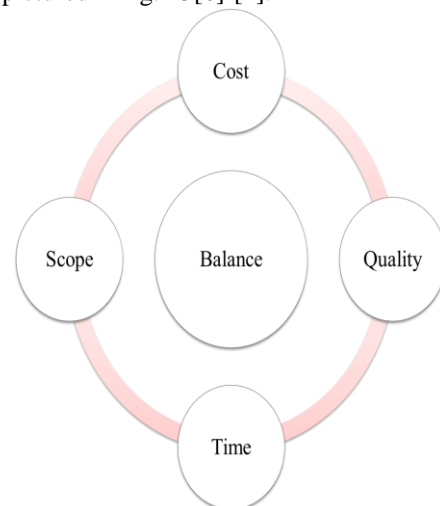


Fig.1 [7] : The balance quadrant

Our work joins the wide domain of project management. However, we focus on the integration, of tools and repository able to bring a more formal framework to the computing projects management. Thus, section 2 is dedicated to a synthetic presentation of various existing project management's repositories of best practices, section 3 approaches the project management's repository, section 4 is relative to the PMBOK's UML model proposed, and section 5 presents the obtained results after our model implementation in a Moroccan public body.

II. BEST PRACTICES REPOSITORY

Several project management’s best practices exist, among which, we can quote:

ITIL [8]-[9]-[10]-[11]-[12]: Information and Technology Infrastructure Library, is a reference around best practices dedicated to the Information and technology. It proposes a setting of structured development in process and centered on the customer.

CMMi[13]-[14]-[15]: Capability Maturity Model Integration. It has as a main purpose to measure the ability of projects to be completed correctly in terms of time, functionality and budget.

CobiT [16]-[17]-[18]: Common Objectives for Business Information Technology, is an audit’s referential and information system’s governance, it’s a progressive and aligned approach on enterprise’s professions and strategy, it’s descended from the best technologies and information’s check practices.

PMBOK [2]-[3]-[4]: the Project Management body Of Knowledge is the sum of knowledge within the profession of project management. its integrality, includes the extensively applied classic practices as well as the innovative practices in emergence within the complete PMBoK including proven traditional practices that are widely applied, hand in hand with the innovative practices that are emerging in the profession. The Guide of the PMBOK projects management has been elaborated in the setting of the enhancement initiative of the technology projects management. The guide constitutes a point of unique reference for all big principles and convenient of projects management.

Besides, the Project Management Institute (PMI) is founded on the idea that numerous common practices of the projects management exist in various domains. Thus, the publications of standards and guides of the Project Management Institute, Inc. (PMI), including the PMBOK, are elaborated by a process of development of standards by which expert volunteers in management of technical projects reach a consensus.

This process gathers participants looking for the viewpoints of people interested by the project management.

We should also indicate that some authors proposed the merging of some referentials as for example the merging of PMBOK with the CMMI [19]. Indeed, both models share overlapping content with regard to project management, but

as there are still differences, each of the models offers different advantages [20].

The referential that we considered in our study is the PMBOK. We will propose an UML modeling of this referential and a corresponding application for a Moroccan public body.

III. THE PROJECT MANAGEMENT FRAMEWORK

It is generally admitted that an efficient project management requires the portfolio management. This term refers to the centralized management of one or more portfolios, which includes identifying, prioritizing, authorizing, managing and controlling projects, programs, and other related work, to achieve specific strategic business objectives.

The project managers or the organization divides projects into phases for a better control, by maintaining the suited links with the current operations of the business director. All the phases constitute the project’s life cycle

Otherwise, the project management is made through processes which use the knowledge, the skills, the tools and the project management’s techniques, and which receive input data and generate output data.

These processes are gathered in five groups (fig.2) named project management process groups:

- Initiating process group,
- Planning process group,
- Executing process group,
- Monitoring and controlling process group,
- Closing process group.

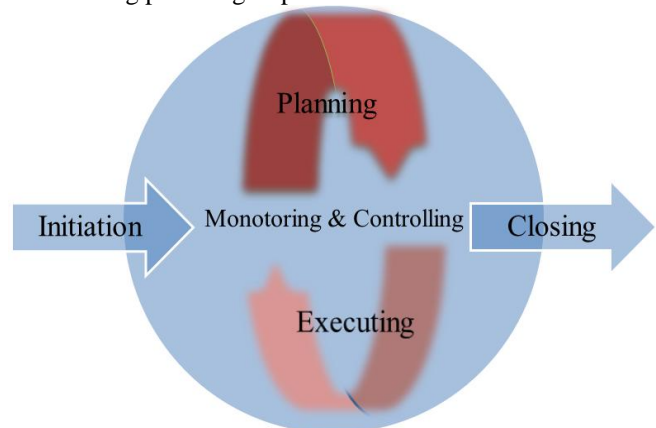


Fig. 2 [3] Project management processes groups interaction

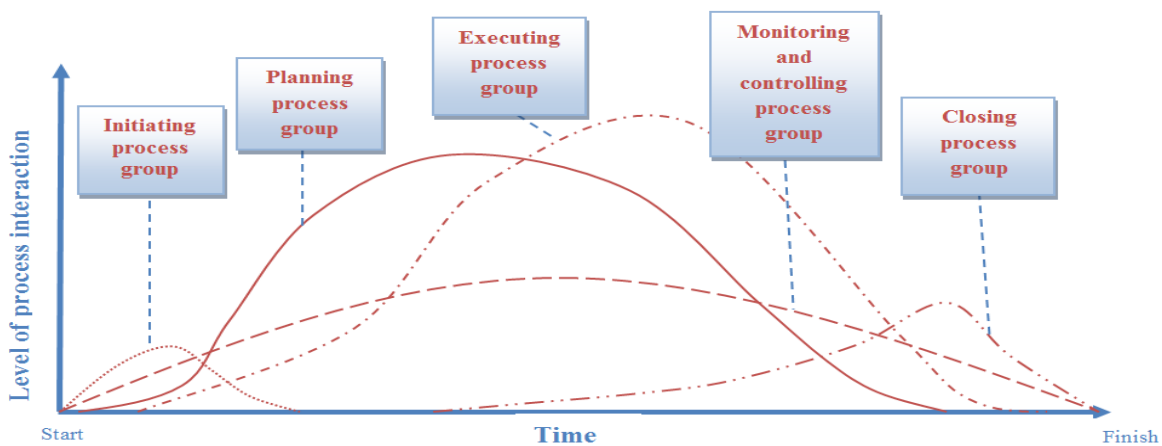


Fig. 3 [3]: process groups Interaction in a project

In order to accomplish all technical projects, three main documents are described in Guide PMBOK, each having a specific goal:

- The project charter: allow formally the project,
- The project scope statement: describes the job to accomplish and the deliverable to produce,
- The project management plan: defines how the job will be achieved.

IV. PMBOK ANALYSIS AND MODELING ACCORDING TO PROJECT MANAGEMENT KNOWLEDGE AREAS:

The project management knowledge areas that PMBOK treats are:

- Project integration Management
- Project scope Management
- Project time Management
- Project cost Management
- Project quality Management
- Project human resource Management

- Project communications Management
- Project risk Management of the of the
- Project procurement Management
- Project stakeholder Management

We are going to content ourselves with detailing the procurement knowledge management area to establish an UML model

The procurement project management consists of purchasing processes or products acquisition, external services or results necessary for a team to execute the task. Two provision's perspectives exist.

The organization can be the buyer or the seller of the product, the service or the profits governed by a contract.

The project procurement management also includes the management contracts processes and modifications control necessary for the contracts administration or purchase order emitted by authorized team members.

We modeled these elements which are presented on the use case UML diagram fig 4.

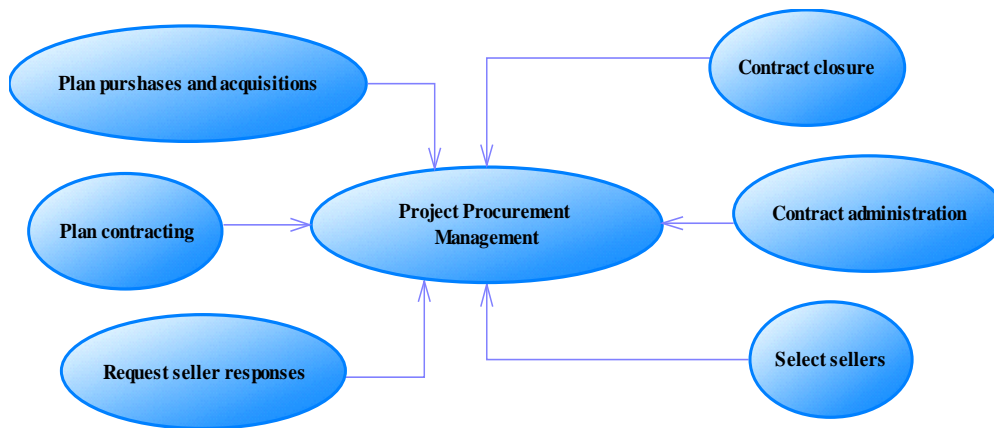


Fig. 4: Project procurement management use cases

We modeled otherwise the relations between these elements presented in fig. 5 and 6.

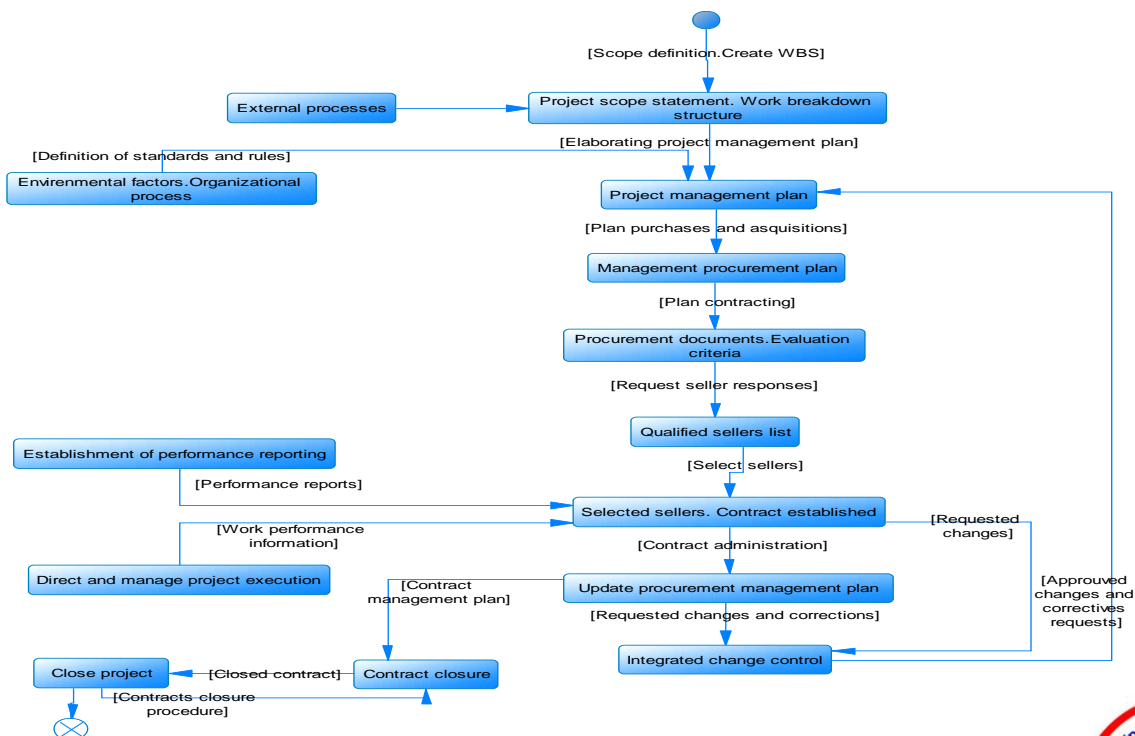


Fig. 5: Activity-transition for the project procurement management

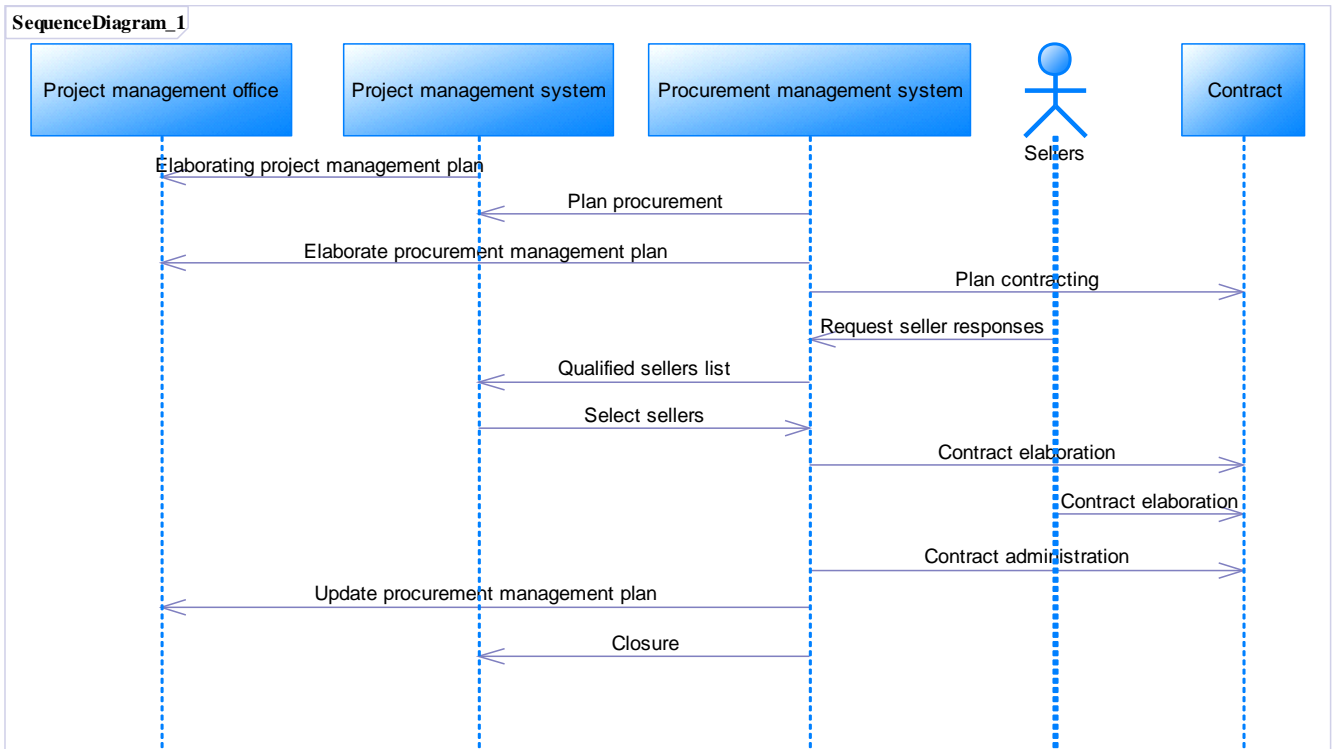


Fig. 6: Sequence of the project procurement management

Same as previous are defined the other knowledge areas of We therefore present in fig. 7 the UML class diagram, project management.

Otherwise, we analyzed the different elements that compose the PMBOK knowledge areas.

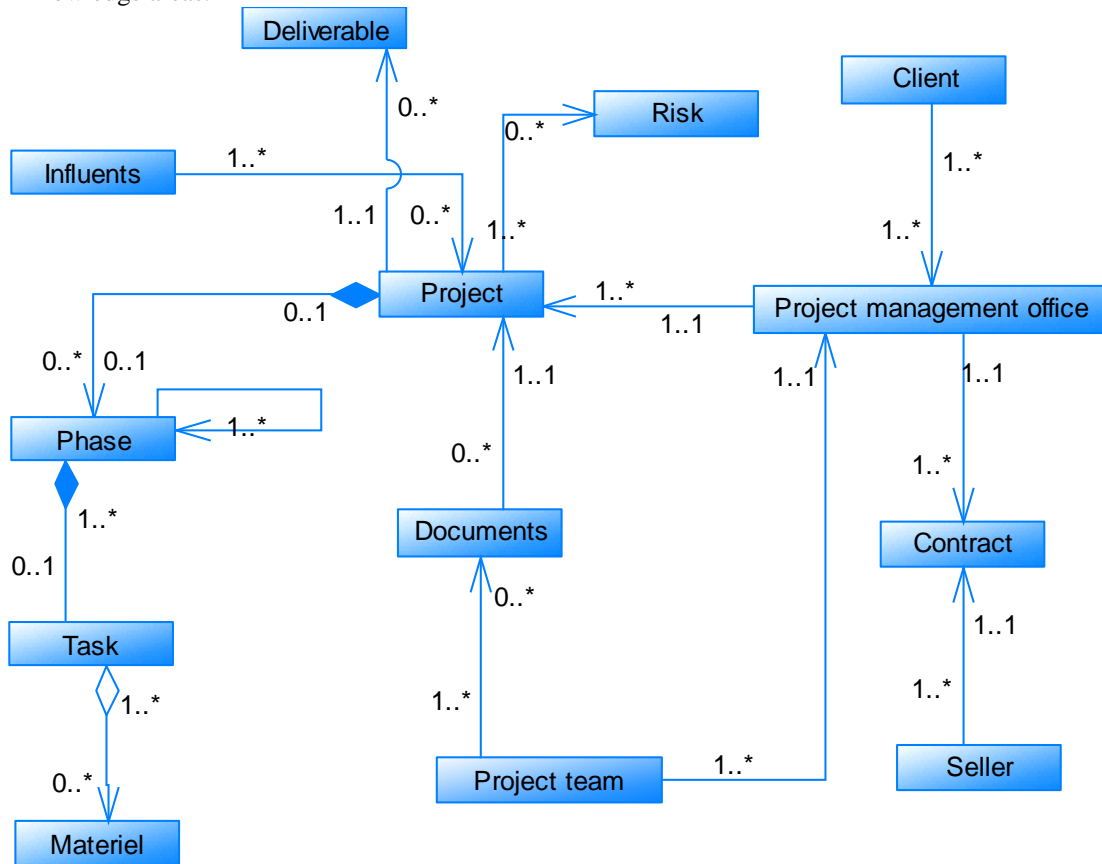


Fig. 7: proposed layout PMBOK class diagram

This diagram represents a model adapted to a set of computing projects in a Moroccan public body: an IT study project, a networks setting up project or an IT development project. We will develop them in the next section.

V.CASE STUDY

To concretize this study, we applied this standard model on three projects in a Moroccan public department:

- A networking setting up project , that includes the wiring, the routing equipment installation, switching, security, traffic check as well as the assets configuration to have a homogenous and secured data flow.
- An IT development project, which starts from the customer's need expression, the project framework, the conception, the achievement and the implementation as well as deployment of the solution.
- An IT study Project.

In what follows, we are going to content ourselves with clarifying the model obtained in class's diagram, applied to an IT study project. Indeed, the master plan of an information system is an evaluation plan designed to prepare the environment evolution and adaptation of the information system and IT infrastructure. So, the global Master plan elaboration objectives of the Information system come as follows:

- The current information system situation assessment in order to determine its potential to answer the requirements and the fixed objectives.

- The strategic orientations definition which must be assigned to a future information system, followed by the short-term action plan's elaboration to remedy the deficiencies found, to mobilize the necessary means for the current projects outcome and to assure the system security and its smooth running during the transition period.
- The future information system's definition has to be aligned with the strategies fixed by the project's sponsors allowing the accomplishment, in the best conditions, the fixed objectives. Analysis and proposal of various functional, technical and organizational capabilities to achieve the future system account the needs expressed and human resources, organizational and current techniques;
- The analysis and the proposal of the various, functional, technical and organizational possibilities able to achieve the future system. It takes into account the expressed needs and the current available resources.
- The alignment strategic plan elaboration, allowing declining concretely the system implementation plan, while holding in project portfolio, human resources, financial and organizational means as well as the change management plan.

The waited phases are organized according to the following fig. :

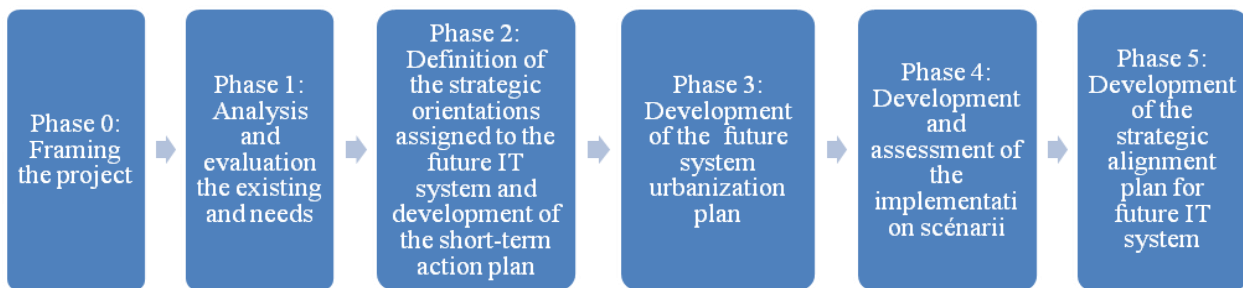
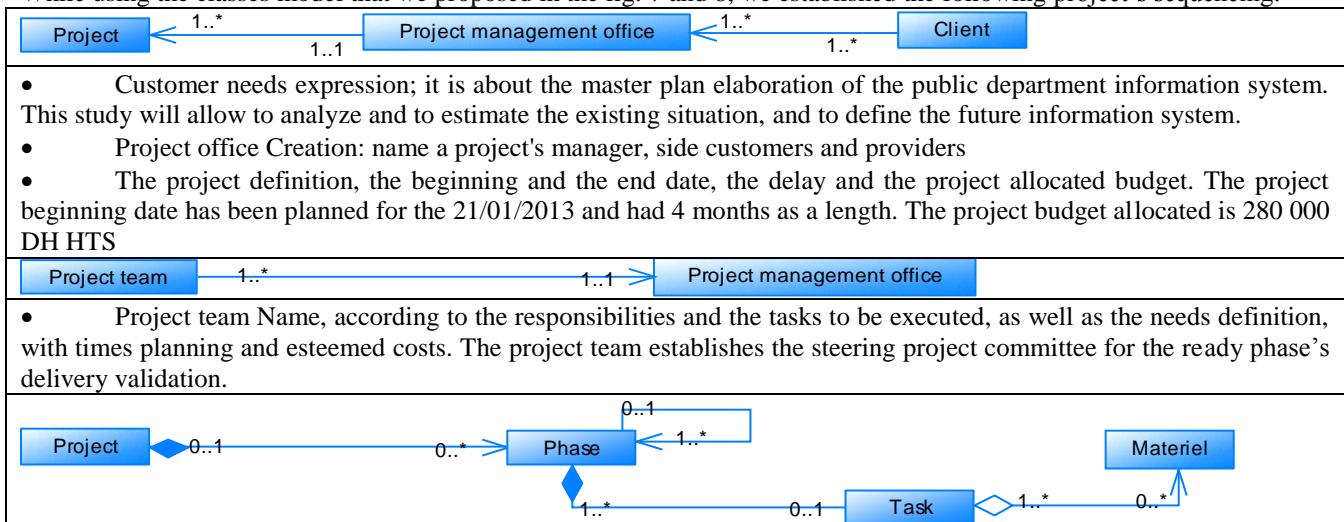
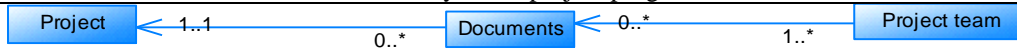


Fig. 9: master plan project development Phases

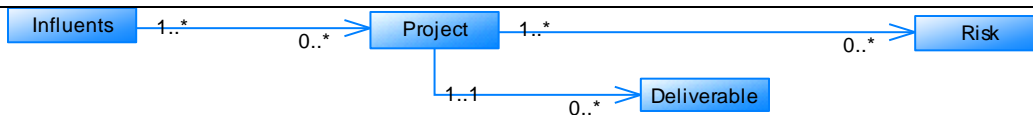
While using the classes model that we proposed in the fig. 7 and 8, we established the following project's sequencing:



- All the phases and their tasks constitutes the project life cycle. This project was besides divided into 6 main phases
 - Phase 0: Framing the project
 - Phase 1: Analysis and evaluation the existing and needs
 - Phase 2: Definition of the strategic orientations assigned to the future IT system and development of the short-term action plan
 - Phase 3: Development of the future system urbanization plan
 - Phase 4: Development and assessment of the implementation scénarii
 - Phase 5: Development of the strategic alignment plan for future IT system
- The material Provision necessary to the project progress.



- Project plan description and its documents specification: the charter, the projected schedule, Plan of quality assurance which contains the ready for delivery, project structure (see table I) and the risks management plan (see table II).



- Risks can arise during the project execution, as the validation delays of the ready delivery. They can be avoided by establishing the risk register and the project risks management plan.
- The project is submitted by external or internal influential, especially the budgets definition constraints for the projects to middle and long-term, and the faster technological development in the computer domain.
- The project deliveries are made at the end of every phase after their validation. The finals deliveries represent the leading schema of the department information system for 5 years later:

Phase 1: Analysis and evaluation the existing and needs

- Detailed report of "Analysis and evaluation the existing and needs".
- security IT audit report,
- the phase synthesis report.

Phase 2: Definition of the strategic orientations assigned to the future IT system and development of the short-term action plan

- benchmark analysis synthesis
- Future information system's strategic orientations.
- Short-term action plan.

Phase 3: Development of the future system urbanization plan

- report of urbanization plan's phase of the future system and its functional definition;
- Synthetic report of the phase.

Phase 4: Development and assessment of the implementation scénarii

- phase report understanding application's scenario and options choice
- Synthetic report of the phase.

Phase 5: Development of the strategic alignment plan for future IT system

- The material Provision necessary to the project progress.
- application's plan
- Financial plan ;
- implementation's calendar;
- the control change plan
- Strategic alignment plan.



- The project office concluded a contracts with suppliers to deliver hardware and software necessary for the current project

Thus, the project of the master plan elaboration of a public department in survey on this document, and the projects of development and data networking, have been managed and achieve the waited objectives as referring to the standard model of project management extracting from PMBoK. Indeed, by using this model, the project cost was mastered; the delay was also respected, according to the customer and

the estimable planning specifications (from 21/01/2013 to 20/05/2013). Thus, the project quality answered the fixed objectives.

Otherwise, the risks bound to this project have been managed by following the risks management plan and the deliverable are put back in time at the every phase end.

Table I: project work breakdown structure

No.	Designation	code activity	activity
1	Implementation of the phase 0: Framing the project	1.1	The project charter development
		1.2	Development of the Quality assurance Plan
		1.3	Development of the estimable planning retained of the project
2	Implementation of the phase 1: Analysis and evaluation the existing and needs	2.1	Functional analysis of the present system and collection of the needs
		2.2	Analysis of the computer path
		2.3	Detailed survey of the present computing system
		2.4	Analysis of the security of the present information system
		2.5	Analysis of the projects in progress
3	Implementation of the phase 2: Definition of the strategic orientations assigned to the future IT system and development of the short-term action plan	3.1	Definition of the strategic orientations assigned to the future SI
		3.2	Development of the short-term action plan
4	Implementation of the phase 3: Development of the future system urbanization plan	4.1	Development of the mapmaking applicative targets
		4.2	Development of the technical mapmaking targets
5	Implementation of the phase 4: Development and assessment of the implementation scénarii	5.1	Development and assessment of the scenario concerning the following axes : <ul style="list-style-type: none"> ○ The applicatifs choices; ○ The technical architectures, the components required for each; ○ The scenario of infrastructures adequate networks for every type of solution applicative and technique.
6	Implementation of the phase 5: Development of the strategic alignment plan for future IT system	6.1	Development of the plans of implementation
		6.2	Development of the plan of alteration conduct
		6.3	Organization of the computer path
		6.4	Development of the strategic alignment plan

Table II: Plan of risk management

No.	Risk	Strategy of answers to the risk	Plan of answers to the risk
1	risk due to an incoherence of the problem specifications	To avoid	Continuous check
2	Previous experience absence for some types of tasks	To avoid	Experiences of the consultants
3	Date of completion of the too optimistic or unrealistic project	To avoid	Continuous check
4	Linked risk to the quality	To avoid	Continuous check
5	Non availability of the internal resources implied in the project	To attenuate	Management of the scheduling
6	Delay of supply of the deliverable	To avoid	To respect the holding of the follow-up committees according to the identified frequency

VI.CONCLUSION

Project management is a set of knowledge, skills, methods, techniques, and tools that people use to effectively plan and manage project work. It establishes a sound basis for effective planning, scheduling, resourcing, decision making, managing, and plan revision. The objective of project management is to ensure that projects meet agreed goals of time, cost, and scope [21]. Today, public and private sector organizations alike are coming to realize the benefits of having one standard and repeatable project management process that can be used across the enterprise [22].

As the project management value is more and more recognized, PMBOK Guide is henceforth on the whole an even more indispensable tool for the practitioners. Indeed, in this job's setting, we were interested to study a set of projects management referential. We focused thereafter on the PMBOK's referential.

After a deepened analysis of the PMBOK's parts and their modeling in diagram UML, we pulled a structural and formal setting of computing project management.

The main idea is to return the class's diagram a uniform referencing for the computing projects management according to the PMBoK application on networks setting up project, IT development project and IT study project within a Moroccan public body. Besides, further to this study, and the obtained model application on these project types we could see the implementation's efficiency in terms of cost, delay a quality comparing to an arbitrary management that can entail a delays and budget overflow, or the deliverable no in conformity with the specifications. This model can be referenced to manage IT projects(study, development, network) in a Moroccan body.

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