Methodological proposal for the integration of agile methodologies and PMBOK

Francisco Javier Galora-Silva · Alex V. Nuñez

Abstract: Proper project management is a constant need faced by most organizations worldwide. There is a growing focus on combining PMBOK practices with agile principles, creating a hybrid approach that leverages the best of both worlds. In this sense, this paper proposes to deepen and combine the most effective elements of the Project Management Body of Knowledge (PMBOK) with the agile approach to project management. This is done taking into account that adequate project management will allow aligning the organization's objectives and generating value for all parties involved. As a result, it is expected to obtain optimal conclusions from the development of the project and achieve the best results from the application of AGILE+ PMBOK best practices. This will serve as a proposal for other organizations in the sector to continue evolving their management practices.

Keywords Management · Project · Agile · PMBOK · Practices

1 Introduction

In an increasingly complex and competitive world, project management has become crucial to ensure the successful implementation of strategic initiatives. It provides a structure and systematic approach to address projects of diverse nature, from infrastructure construction to software development, new product launches, events, scientific research, and more.

A project can be defined as a set of non-repetitive activities that require planning and the definition of objectives, costs, and time [1] and for this reason, adequate management that involves the application of knowledge, skills, tools and techniques to meet the requested requirements is key.

In recent years, project management is gaining more and more visibility and importance for public and private companies, however, proper management is still a very complicated process [2] since management covers all levels of the organization, which may contain one or many business units and may pay one or hundreds of people, these may range from simple to very complex projects, and may be employed in one location or in several locations in several countries [3].

Project management is based on various methodologies and frameworks, such as PMBOK (Project Management Body of Knowledge), PRINCE2 (Projects IN Controlled Environments), Agile, Scrum, Kanban, among others [4].

These methodologies provide principles, tools and techniques that help project managers meet project specific challenges and adapt to changing conditions[5]. However, many organizations still find it difficult to implement proper project management and therefore fail to maximize the return on their investments in the various projects they undertake.

The use of a project management methodology implies a constant updating, in other words, that the organization of the steps through which a given project will be executed. In this sense, this work proposes to elaborate a proposal of a methodology for integrated management of the agile approach and the most appropriate principles of PMBOK.

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2 Related Works

In the literature it has been identified that there are few studies that develop the integration of agile methodologies and PMBOK for ICT project management, since these are performed independently and not integrating the characteristics of each of these, so the development of this work will be of great contribution to the scientific and academic community.

Initially in [6], comparing the project management processes defined by the PMBOK principles with a number of agile project management processes and methodologies, the paper demonstrates that agile methods do not define all the facets necessary to cover all aspects of project management in the traditional sense and that this result implies that the integration of agile methods with the PMBOK principles will benefit the software project management community.

On the other hand, in [7], compares the PMBOK principles with the agile methodologies, analyzing the advantages and disadvantages of using each of them in project management. It is mentioned that to successfully execute these phases there must be a cultural change in the organization, where it is accepted that continuous improvement of the processes is necessary.

In [8], an analysis of the different phases of PMBOK and their relationship with the approach to agile methodologies in project management is made, stating that the agile approach goes in a completely different direction from traditional methodologies, by rejecting planning and rigid processes, it tries to increase flexibility, so that integrating these two management methodologies would significantly benefit the management of a project.

The CHAOS Report, from The Standish Group company [9], which is generally published every two years since 1994 with the aim of measuring success and failure in more than 50,000 IT projects, mentions the success or failure of software projects. 000 IT projects, mentions the success or failure of software projects, and describes that in 2020, only 31% of all projects surveyed were successful (i.e. delivered on time, within 'budget and with the features and functions required from potential customers), 50% were considered challenging (projects delivered late, over budget and/or with less than the required features and functions), 19% were unsuccessful (projects cancelled before completion or were delivered and never used). However, these results show an increase in project success rates since 2015, when the success rate was only 29%, highlighting the importance of implementing better project management practices [10].

The literature identified in previous paragraphs demonstrates the importance of using methodologies in project management, since they are a determining factor in the success or failure of a project. And the integration of several methodologies will allow to generate new knowledge when managing projects and will be a great support in the scientific and academic field.

3 Proposal

Although project management under agile methodologies is mostly focused on highly technical projects, many organizations appreciate the value of using the best practices they recommend and apply them to projects outside the area of software design and development.

An agile project is not predictable in its entirety, only the general requirements of the stakeholder will be known at the beginning, instead, a close accompaniment is planned with the stakeholders to collect the requirements and perform iterations between weeks, if there are changes this does not represent a big problem in the execution of the project. It is proposed to use an
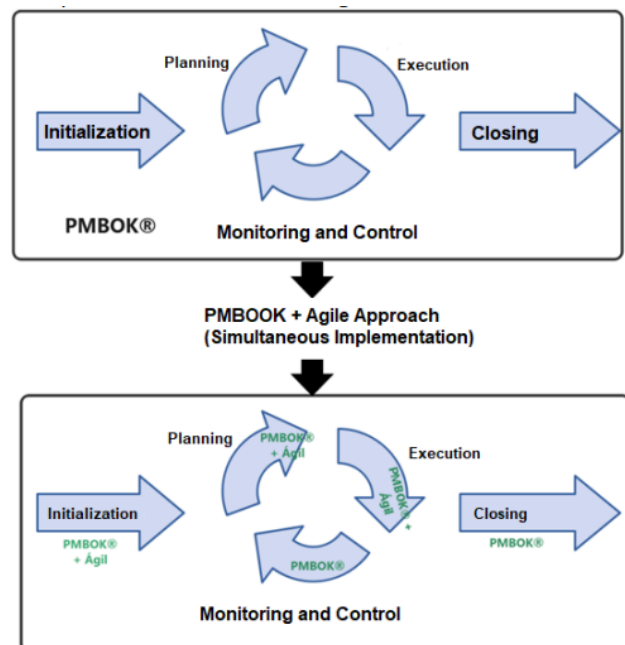

Fig. 1 PMBOK integrated with agile methodology

agile approach throughout the project cycle to optimize the process and increase customer involvement. In the initialization phase, the amount of unnecessary documentation will be reduced and the customer will be encouraged to be actively involved in the development. In the planning stage, an agile approach will also be applied by making use of available frameworks and tools, such as the Kanban board. During the execution of the project, the focus will be on developing modular and functional products in short periods of time, which will allow presenting complete prototypes that the client will be able to test. The process is described in Figure 1.

However, in the monitoring and closure process, the PMBOK recommendations will be followed, since, ac-

cording to the "Agile Alliance" documentation, in projects with stable requirements and low level of uncertainty, an agile approach might not be adequate, since regular controls and reviews would not be necessary if the requirements do not change.

3.1 Initialization phase

This first stage focuses on two important documents detailed in Table 1, one that defines the project (Project Charter) and a document that shows the needs and requirements of the project (Scope Charter). In order to apply an agile approach at this stage, a reduction of the documentation is proposed.

3.2 Planning

This is one of the most extensive, even using an agile approach in the development of the project, the minimum necessary documentation must be generated to be able to keep a correct control of the generation of products, functions, functionalities and answers required by the different stakeholders.

It is within this process where the 10 areas of knowl-

Fig. 2 Kanban board

edge that the Project Manager must manage are put to the test [11]. Once the whole project is planned, we start to take parts of it and define how it will be developed within an iteration, for this we will use a Kanban board (in Figure 2) to manage all the tasks [12].

3.3 Execution

In this stage, all the procedures necessary to complete the work established in the project management plan are carried out in order to meet the established requirements. The Execution Process Group (see Figure 3) [13] comprises the actions to complete the work defined in the project management plan and satisfy the project requirements. This involves coordinating resources, managing stakeholder involvement, and integrating and executing project activities as set out in the project management plan.
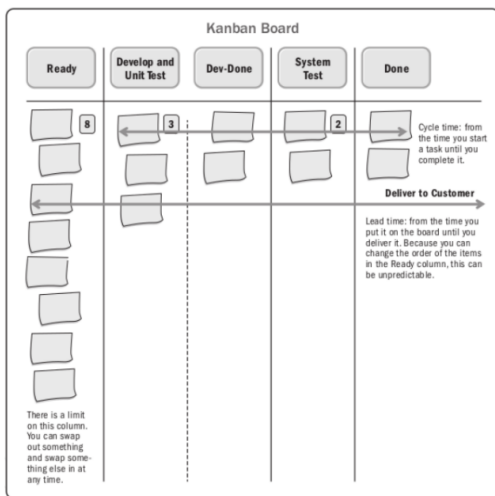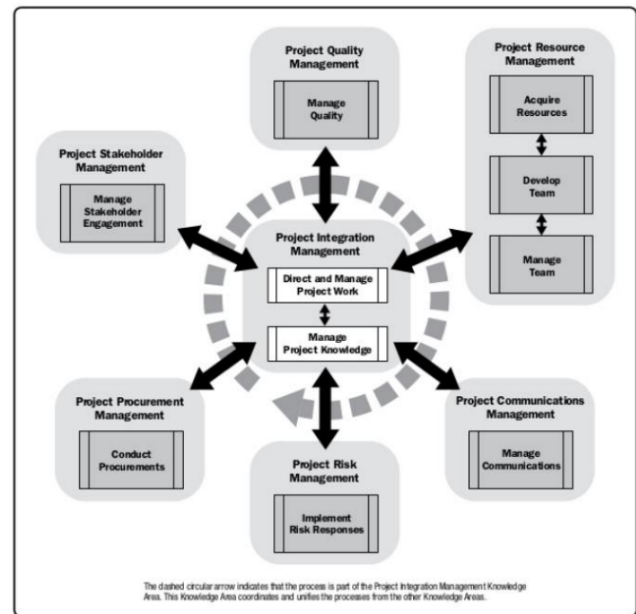

Fig. 3 Execution process group

The main benefit of this Process Group is that it ensures that the work necessary to meet the project requirements and objectives is carried out according to the established plan. Much of the project's budget, resources and time are dedicated to the execution of these processes. It is important to mention that during this stage, change requests may arise that, if approved, may result in one or more planning processes to modify the project management plan, project documents and possibly baselines.

Another crucial aspect during the execution stage is procurement and resource management. This involves ensuring that all necessary resources are managed and available to the team according to the planned schedule.

In terms of procurement management, it is critical to meet the requirements to accomplish the tasks of the current iteration. This includes contacting suppliers, reviewing the agreements established with them, verifying that the products purchased are the correct ones, and ensuring timely delivery of the products to the work team. In addition, within procurement manage-

Table 1   Documents of the initial phase

Project Charter	Scope Charter
Purpose or justification of the project	Description of the project scope
General and clear objectives	Acceptance criteria for the different modules or deliverables
High level requirements	List of deliverable
High level description of the project	Project exclusions
Timeline of important dates	Project constraints
Budget summary	Project assumptions
List of stakeholders	
Name of person responsible for approving deliverables	
Formal assignment of the project to the project manage	
Name of persons who have authority over the project	

ment, the Project Manager is often faced with managing potential risks associated with these procurements.

3.4 Monitoring and control

In this phase, a performance evaluation will be carried out according to the established schedule. The proposed agile approach provides options for control and testing. For this project, the continuous integration approach will be adopted, along with meetings to discuss and share the tasks to be carried out in each iteration and to verify the correct functioning of the implemented product.

Approaches such as Acceptance Test Driven Development (ATDD), Test Driven Development (TDD) and Behavior Driven Development (BDD) will not be used [14], as these methodologies are more oriented to software development. The acceptance criteria will be defined during the initial task socialization meeting for the iteration, without adding more conditions afterwards. It is important to keep in mind that any delay represents a waste of economic resources or a mismatch in the schedule that must be corrected. A delay in development affects both the critical path and the efforts to correct it. Project progress control can be approached from several perspectives, such as monetary expenditure or development time and schedule.

In this paper, it is proposed to focus only on monetary expenditure control, as it is the most relevant information for the PMO and the customers.

The control of the implementation of the products described at the beginning of the iteration is not exhaustively detailed, as it is based on the expected results and the established requirements. All requirements are analyzed according to the characteristics of a good requirement, both individually and as a group, and within these characteristics, verifiability stands out. The review of the correct functioning of the prototype or implementation will be carried out through demonstrations, in which the team will show the developed or implemented elements. If sufficient functionalities are achieved to satisfy a specific requirement, this could be considered a milestone, and it is suggested that the demonstration be carried out together with the client to approve the progress or indicate if changes or improvements are required, thus ensuring that the whole project moves in the right direction.

3.5 Closing

The execution of formal closures focuses on the complete closure of the project, although it is also possible to perform formal closures after certain stages. During this process, various activities are carried out, such as formal acceptance of deliverables, closure of administrative issues, and disbanding of teams that collaborated together. In addition, lessons learned are shared and final reports are produced. If an agile methodology is used, the socialization of opinions on its use and possible improvements will be encouraged. Although methodologies such as Scrum perform closures with reviews and retrospectives in each sprint or iteration, in this proposal only the closing event will take place at the end of the project, without using such framework.

It is important to keep in mind that, although it is expected that the project will achieve all the proposed objectives and satisfy the client, this is not always possible. However, a project, by its very definition, must be formally closed through the signing of closing documents, such as the Project Charter and the Scope Charter. Agreements with suppliers must also be closed and all processes that have been initiated to assist in the development of the project must be formally finalized.

4 Discussion

The integration of PMBOK and agile methodologies has been a topic of discussion in the project management arena for the past several years. Both approaches have their advantages and challenges, and the combination of both philosophies can offer significant benefits

to project teams and organizations in general [6].

On the one hand, the PMBOK provides a solid and comprehensive structure for traditional project management. It defines a series of processes, knowledge areas and best practices that cover all stages of the project life cycle [15]. This includes detailed planning, rigorous control and extensive documentation, providing clarity and control over the project scope, schedule and budget. On the other hand, agile methodologies focus on adaptability, collaboration and incremental delivery of value. Agile teams work in short iterations, which allows for rapid adaptation to changes and higher stakeholder satisfaction by delivering frequent and functional results. They also promote effective communication and ongoing collaboration between team members and stakeholders.

The integration of these two approaches can bring greater flexibility and agility to project management, which is especially beneficial in environments where requirements change frequently or uncertainty is high. By combining the structure and discipline of the PMBOK with the adaptability and collaboration of agile methodologies, teams can better address emerging challenges and take advantage of new opportunities.

However, this integration can also present some challenges. Organizational culture and resistance to change can make it difficult to adopt agile methodologies, especially in organizations that have been using traditional approaches for a long time. In addition, coordination between teams and management of different frameworks may require careful planning and communication.

5 Conclusions

The integration of PMBOK and agile methodologies can be highly beneficial for organizations seeking to combine the efficiency and control of the traditional approach with the flexibility and adaptability of agile methodologies. However, it is important to address potential challenges and tailor the combination of approaches according to the specific needs and characteristics of each project and organization. The key is to find a balance that allows getting the best of both approaches and maximizing project success.

The methodological proposal by integrating PMBOK® and the agile manifesto considers the opportunities for improvement of the current situation, the good practices identified, the documentation found and the observation made, resulting in a methodology that adapts to the needs of the project or company and solves the current problems.

As future work is intended to implement the methodological proposal in a real case, in this way it will be possible to verify the real benefits or drawbacks that may present the proposal developed in this research.

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