

Introducing Project Management Frameworks & Methodology¹

Prof. Dr. M.F. HARAKE

CEREGE Research Laboratory – University of Poitiers (France)

Abstract

Within the context of hypercompetition in a more globalized market and constant environmental changes, business entities must review their organizational model in order to ameliorate their performance. Project management practices can help organizations achieve their goals and increase the value of their actions. The purpose of this paper is to introduce the various elements that constitutes project management frameworks with the aims of improving operational practice and achieving project efficiency and effectiveness. The paper will present a useful overview to provide guidance to organizations on implementing or restructuring their own project management framework.

Key Words: Project Management; Framework; Methodology; Models; Typology.

1. Introduction

A project never exists in an unframed nature as it is usually conceived and executed by a specific team, within an organization that has established a PM framework – enabling the process. Hence, a framework – whether it is deliberately designed with proper attention to details – or whether it emerged naturally based on the project dynamic, will serve as a working guide for the project team (Pace, 2019).

A framework is usually designed to suit the project needs, goals, executing team, etc. That said, today's business entities are under pressure from the external environment in order innovate and solidify a competitive edge to meet the needs of the customers (Allen et al., 2014). That said, in order to remain competitive, organizations must adopt "innovative" project management practices (e.g. knowledge management, skills, tools, techniques, processes, ideation, etc.) to meet the requirements and objectives of the project. This is done by implementing the appropriate processes and work methodologies (in the organization's development strategy) that are needed to respond to the requirements and objectives of the project – thus, responding to the market needs and developing a competitive advantage.

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As the number and complexity of projects in the business world has increased, the need for the review of the project dynamic (e.g. value system, responsibilities, processes, policies, etc.) that allow projects to achieve organizational objectives must be reviewed. This is done through project implementation according to a formal well-constructed project management methodology rather than ad-hoc processes with weak outcomes (e.g. lack of coordination, wasting resources, etc.).

This paper is a contribution to the existing literature on project management methodology and framework. In other words, we will try to outline the basic principles of project management methodology as well as the different framework which will enable readers and experts alike decrypt their particularities in order to see what process suits their (specific) project the most (and when to choose each model).

2. Project Management Methodology & Framework

2.1. What is a Project Management Methodology?

A project management methodology can be defined as an ensemble of guiding principles that can assist managers when it comes to piloting their project (Pace, 2019). Indeed, there many project methodologies that are available – and the choice of each methodology will depend on internal conditions of the project and the external environment as well (Joslin & Müller, 2015).

A project management methodology helps a manager plan, execute and manage a successful project. Each project management methodology will often have an associated framework that gives project managers processes, procedures and tools based on why they were elaborated (e.g. waste management for Kanban) (Nyman & Öörni, 2023). On the other hand, other project management methodologies such as the Waterfall model, will include all the principles, processes and tools (Allen et al., 2014). Hence, when reviewing which methodology is best for a specific project, it all depends on the project:

- Resources.
- Main objectives.
- External Environment.

2.2. What is a Project Management Framework?

A project management framework is usually used to set the dynamic of the used methods, applied processes, the tasks, the resources and tools needed to pilot a successful project. Usually, a project management framework can be divided into three separate parts (Allen et al., 2014; Nyman & Öörni, 2023):

- Project Lifecycle
- Project control cycle
- Project Tools and templates

2.3. Project Management Framework vs. Project Management Methodology

It would be appropriate to differentiate between the *project management framework* and the *project management methodology*:

- **Project Management Methodology:** It is a set of processes or principles that best help manage a project. A methodology is usually defined and formal – and project managers must strictly abide by it once set.
- **Project Management Framework:** It is the outline of the project – hence, project managers are freer to change rules (or abandon them) with development of project as is. On another note, a framework includes much more detail, and it even has phases that are not included in a methodology (e.g. post-execution assessment and feedback).

2.4. Project Management Frameworks

2.4.1. Waterfall Model

The waterfall model is a linear project management framework that includes five dependent phases, with each phase relying on the deliverables of the previous one. For this reason, the project manager needs to complete each phase before moving onto the next.

Figure 01. IPECC Model



The five phases of the waterfall model (IPECC) include (Sophatsathit, 2022; Marques et al., 2023):

- **I - Initiation / Ideation:** In this first phase, information is gathered in order to create a detailed project idea based on internal resources and external requirements.
- **P - Planning:** A detailed project plan is put into place that outlines each stage of the process, key dependencies, timelines, resources, risks, implicated parties, etc.
- **E - Execution:** This is implementation phase – where the activities are put into place in the concerned environment.
- **C - Control:** Control is conducted once the project is implemented to acquire constructive feedback for defects, to identify additional risk, and make modifications to improve performance and add features.
- **C - Closing:** Once control is completed – the project is closed.

The waterfall model offers a clear plan for project managers from the start of the project to its finish. On another note, it enables them (project managers) to identify its (project) requirements early in the process. An emphasis on documentation all along the project (at every stage) will offer clarity to all implicated parties.

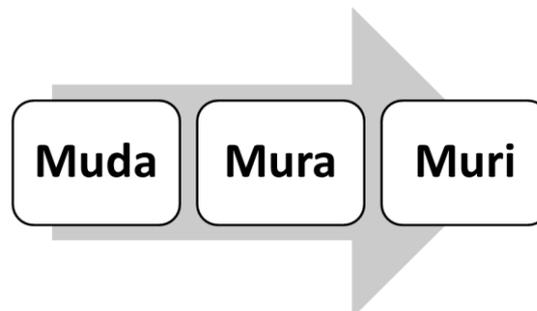
However, it would be appropriate to mention that the waterfall model is a rigid one and does not provide much operational space for maneuverability – especially when it comes to unexpected changes that might arise during the project lifecycle.

2.4.2. Lean Project Model

Originally developed by Toyota for auto-manufacturing, the lean project management model is mainly concerned with delivering value and eliminating waste – which it identifies in three categories by their Japanese names (Alves et al., 2020; Lima, et al., 2023):

- **Muda:** it is concerned with wasted resources that do not add any value for the end user (e.g. time, human resources, etc.).
- **Mura:** it is concerned with overproduction and excess inventory (e.g. stock) accumulated through irregular and unnecessary workflow.
- **Muri:** it is concerned with overburdening employees at any stage of a workflow.

Figure 02. Lean Project Foundations



It should be noted that the lean project management model focuses on improving the project by eliminating waste and empowering employees / staff / implicated project parties. Hence, it helps reduce costs, increase efficiencies, improve project quality as well as staff's morale.

2.4.3. Kanban Model of Project Management

Kanban is a Model of Lean project management that provides a visual overview of the project process from start to finish. This model helps project managers to pilot their workflow by showing exactly who is working on what as well as the status of each project component (Weflen et al., 2022; Zasornova et al., 2022).

Figure 03. Example of a Kanban Project Board

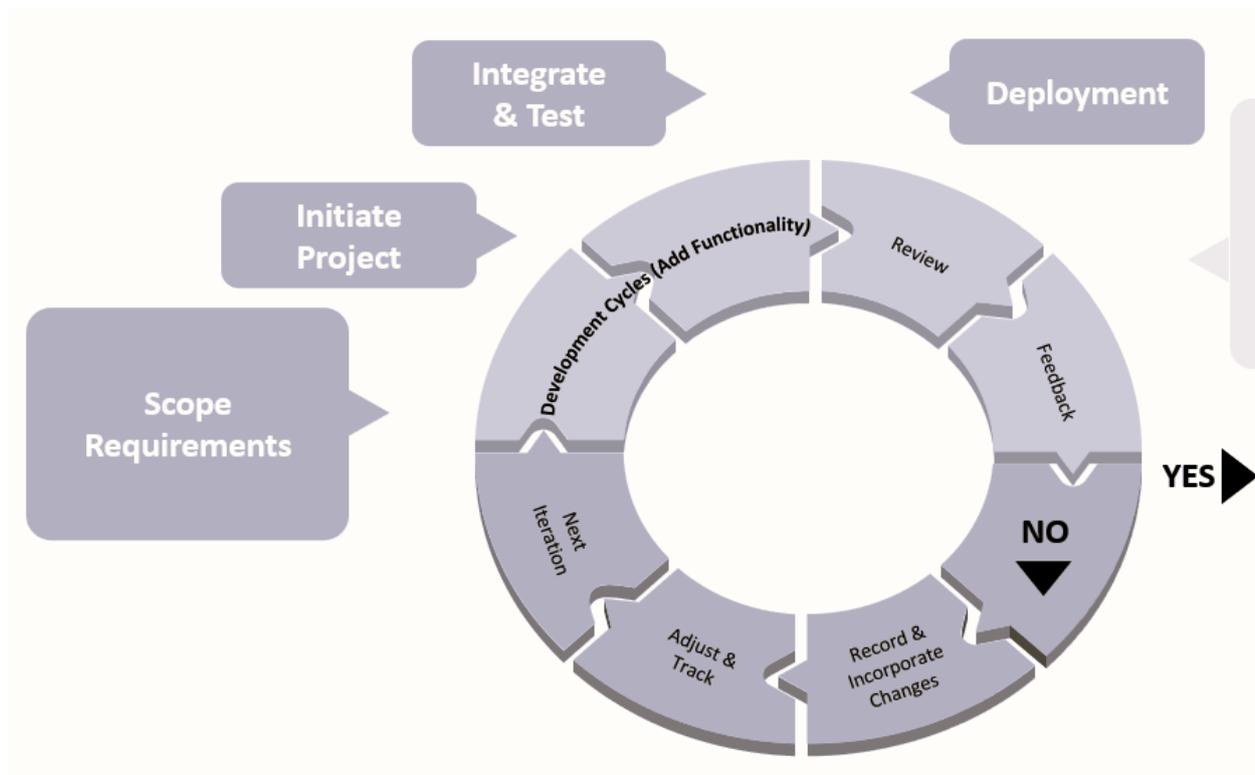
Backlog	In progress	Review	In test	Done	Blocked

2.4.4. Agile Project Management Model

An agile project management model was developed as a response to the “rigidity” of the waterfall model and was inspired by the flexibility and responsiveness of the lean model. Such a model is both iterative and collaborative, and an emphasis is put on delivering value. There are a lot of elements that set its dynamic which includes (Sophatsathit, 2022; Marques et al., 2023):

- Implicated parties and their interactions over the many used project processes and tools;
- A working software is used over a comprehensive documentation;
- Customer collaboration is encouraged over contract negotiation;
- There is a need to respond to change over following a linear plan.

Figure 04. Agile Project Management



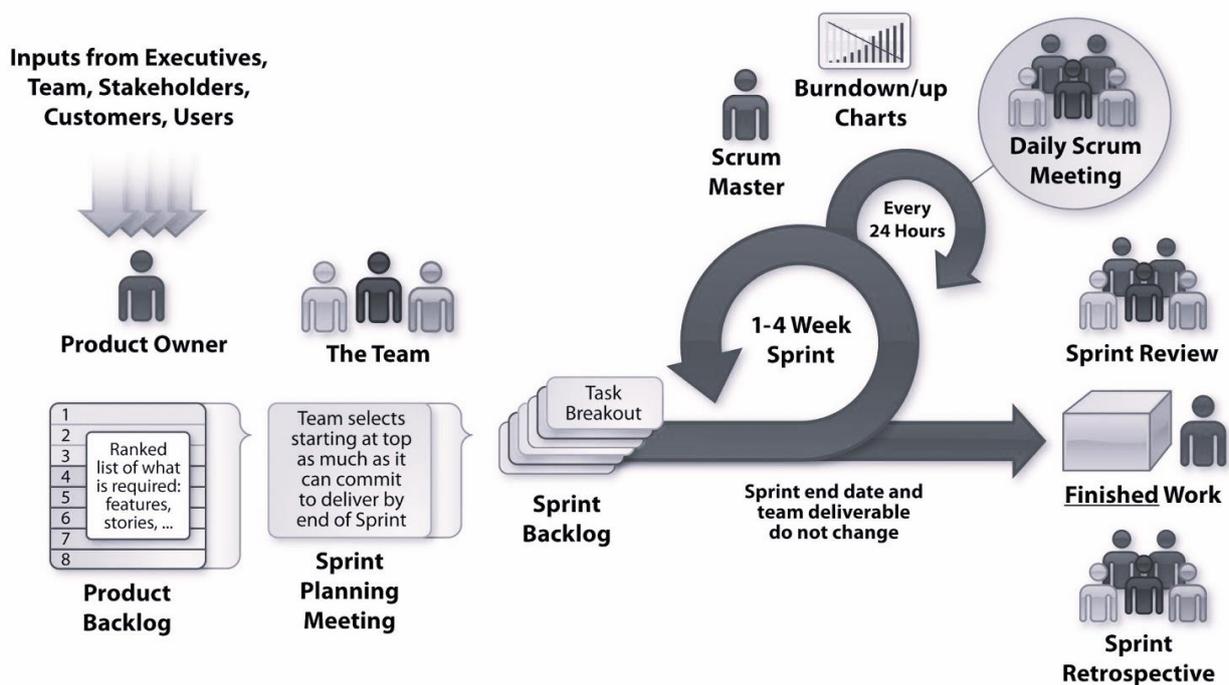
These principles will allow for quick iterations that will increase both the productivity and efficiency of the project as is. On another note, it will address all the changing requirements throughout the project lifecycle. However, it would be appropriate to note that by eliminating documentation and relying on individual interaction – this could impede scalability and

continuity across teams, especially within larger organizations. Hence, agile is best for small teams where both developers and stakeholders have a clear agreement and understanding about business needs and constraints.

2.4.5. Scrum Framework

A scrum framework manages a simple process of communication, planning, execution and feedback – designed for small teams (Zasornova et al., 2022).

Figure 05. Scrum Model



Scrum teams work in “sprints” according to a specific timeline (e.g. two to four weeks) (Pietroń, 2019; Budiman et al., 2022):

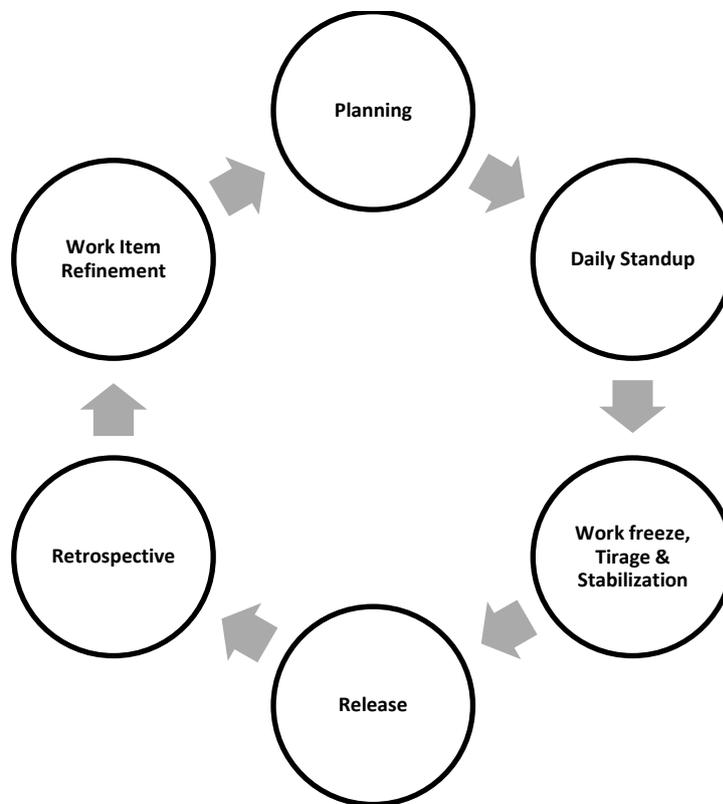
- The team first usually plans the goals and objectives of the sprint;
- The team also agrees on the deliverables to complete in that period (e.g. 01 to 04 weeks);
- The team then meets daily for a short period of time (e.g. “scrum” or “stand-up”), where each team member shares progress and constraints toward the goal.
- At the end of each sprint, the team holds a longer meeting for sprint review to present the finished work and get proper feedback and suggestions for future work.

2.4.6. Scrumban Framework

The Scrumban model is hybrid of both “Scrum” and “Kanban” models (Shker & Saoud, 2023) :

- It follows a scrum workflow;
- It visualizes work on Kanban board with three columns:
 - To Do;
 - Doing;
 - Done.

Figure 06. Scrumban Model



When using Scrumban, project team members usually pull tasks from “To Do” as they have bandwidth, rather than committing to timeboxed sprints. On another note, teams usually keep a daily stand-up but do not necessarily hold an end-of-sprint review. Instead, they usually conduct project planning and review on an as-needed basis as tasks are completed and the project is developed.

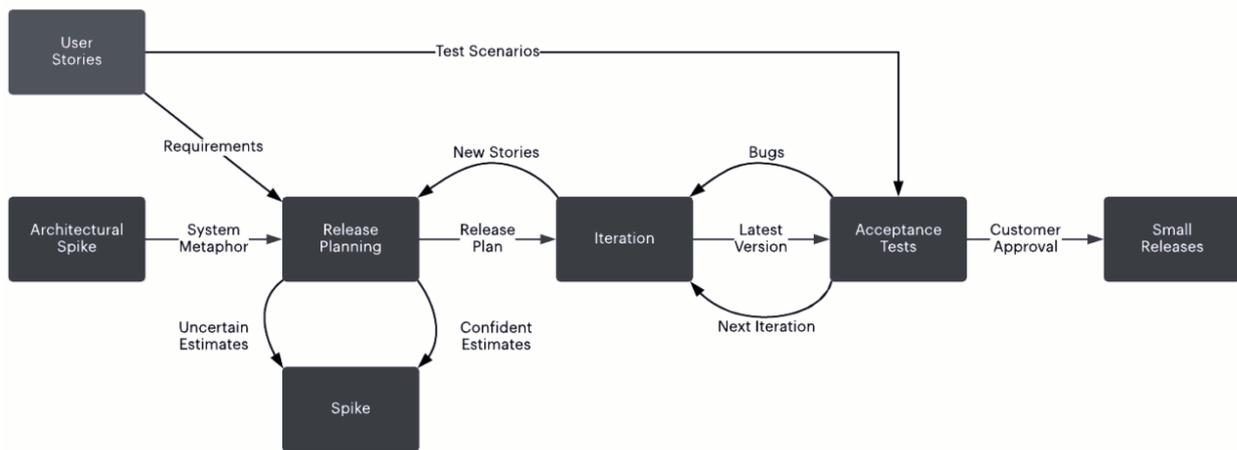
2.4.7. Extreme Programming (XP) Model

Mainly focused on software development, XP project management emphasizes on internal communication, project simplicity on all levels, feedback and testing; It heavily relies on “feedback loops”, where coding usually takes place – without waiting for comprehensive design

or planning upfront, and iterations usually follow feedback from testing (Tabassum et al., 2017; Wiratama et al., 2023).

The XP project model is best suited for project teams where programmers and other implicated stakeholders have a good understanding of the entire project. This is due to the fact that with the lack of formal management and documentation – there is the emergence of many risks associated with miscommunication, changes, etc. which can in turn create scope creep which becomes extremely costly over time.

Figure 07. Extreme Programming (XP) project Model



2.4.8. PRINCE2 Model

The PRINCE2 model, which stands for “Projects in Controlled Environments” was created by the UK government in 1996 as a new version of the waterfall project model (a new representation of its elements). It is based on seven basic principles which start with a clear business case and include stakeholders’ management, initiation, planning, control, project progress monitoring, and acceptance (Wang et al., 2020).

Figure 08. PRINCE2 Project Model



On another note, the seven process steps of PRINCE2 include (Tanovic & Orucevic, 2011; Zhang et al., 2012):

- **Starting a project:** This is done by submitting a project plan that defines the business case.
- **Directing a project:** The project team reviews the plan and decides whether to move forward or not.
- **Initiating a project:** The project board designates a project manager who elaborates a more detailed project plan.
- **Controlling a project:** In order to make it both more operational and easier to control, the project manager breaks down the project into more manageable stages.
- **Managing product delivery:** The project manager ensures the project's progress and assesses assigned quality standards.
- **Managing stage boundaries:** The project board will hold a review at the end of each project stage before deciding whether to move forward or not.
- **Closing a project:** Once the project is completed, the project manager will write the final closing report.

The PRINCE2 model is widely used in today's projects as it is considered more flexible than the traditional waterfall method. However, PRINCE2 can also be very time-consuming given the number of processes that can slow down a small project. Hence, it is best used for more complex projects where quality standards are both high and rigorous.

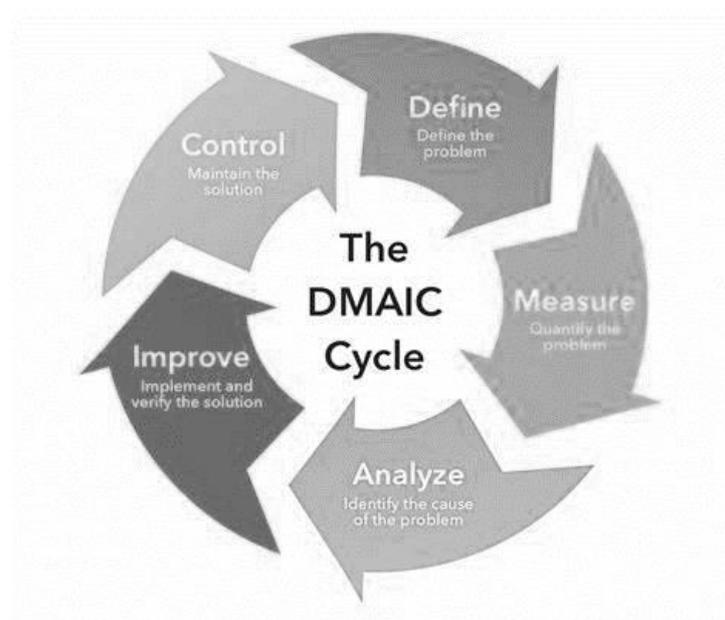
2.4.9. Six Sigma / DMAIC Project Model

The Six Sigma project model was developed by Motorola in order to improve their business processes by eliminating any defects and errors in the process. Such a model uses statistical

elements to properly and continuously improve quality management to guarantee a successful project outcome. The Six Sigma project model is also called DMAIC Cycle (Alves et al., 2020; Antony et al., 2021):

- **Define:** Outline the project goals with a project scope or business case.
- **Measure:** Collect data on the current state of the project.
- **Analyze:** Review the data to identify root causes of problems.
- **Improve:** Fix or improve the root cause in the process.
- **Control:** Create safeguards to ensure the issue doesn't persist.

Figure 09. Six Sigma / DMAIC Project Model

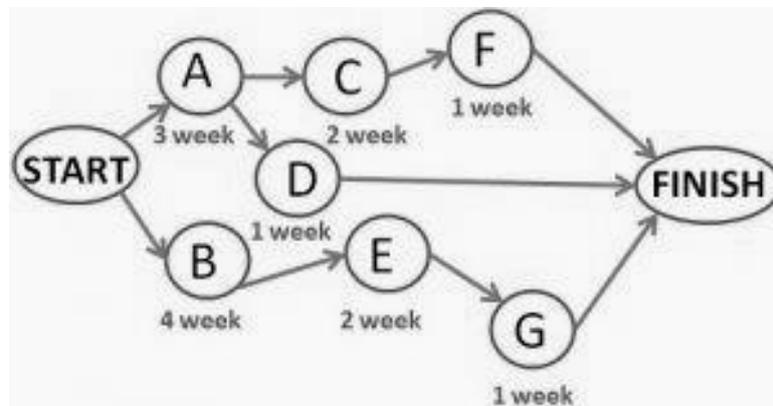


The Six Sigma / DMAIC project model is used by project experts in order to improve quality, eliminate waste, increase operational efficiency, and reduce activities' cost. However, the model is very much complex and usually requires a knowledgeable manager to implement it. Hence, it is usually large entities who are in search of efficiency gains in established processes who adopt this model for their projects.

2.4.10. Critical Path Method (CPM)

The critical path method (CPM) is a project tool used to identify the critical tasks within project, which includes the dependencies and timeframe to completion. The CPM then outlines the longest sequence of critical activities that must be completed by the project team that must be completed to deliver the project on time (Abuhasel, 2023).

Figure 10. CPM



The critical path is usually determined by applying the following process (Petroutsatou, 2019; Ukamaka, 2020):

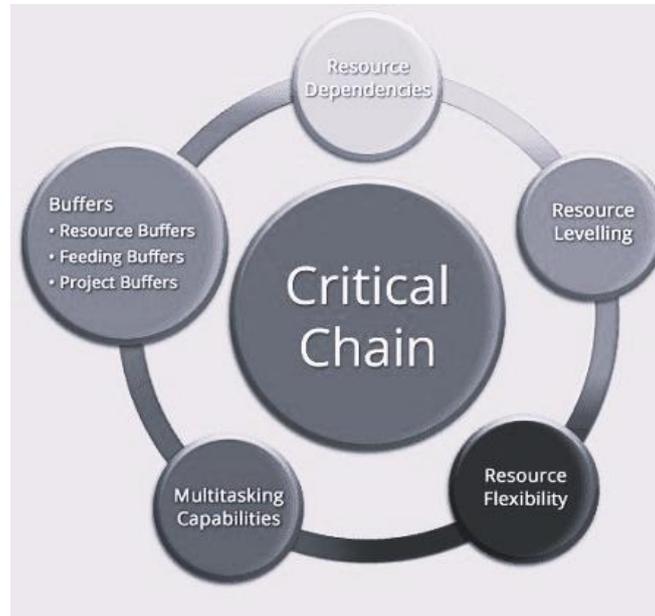
- **List activities:** The project manager must break down the project into a series of activities.
- **Identify dependencies:** The project manager must then identify the activities that are dependent on each other.
- **Build a network diagram:** The project manager must create a flow chart displaying all the activities (visual representation).
- **Estimate the duration:** The project manager must estimate the duration of each stated activity (both best and worst scenarios).
- **Determine the critical path:** The project manager must then calculate the critical path by determining the sequence of activities with the longest duration.
- **Determine your slack:** Finally, the project manager must calculate how much a task can be delayed without impacting the project as a whole.

The CPM method is well appreciated by project managers. However, it can be sometimes difficult to manage and therefore, it is best left for complex projects with difficult interdependent tasks and operations.

2.4.11. Critical Chain Project Management (CCPM) Model

The critical chain project management model is very similar to the critical path method. However, the CCPM focuses on the resources required to complete a project rather than time (the case of the CPM) (Anastasiu *et al.*, 2023). The CCPM assumes that resources are the project's limiting factor and therefore stresses efficient resource capitalization.

Figure 11. The Critical Chain Project Management (CCPM) Model



The CCPM model typically follows the following process (Darji et al., 2023) :

- **Identify the critical path:** The project manager identifies the critical activities required to complete a project using the CPM model.
- **Determine required resources:** The project manager then estimates the needed resources to complete the project by assigning them to each task on the planned chain.
- **Include buffers:** The project manager must also include resource buffers into the estimated to help avoid any bottlenecks.

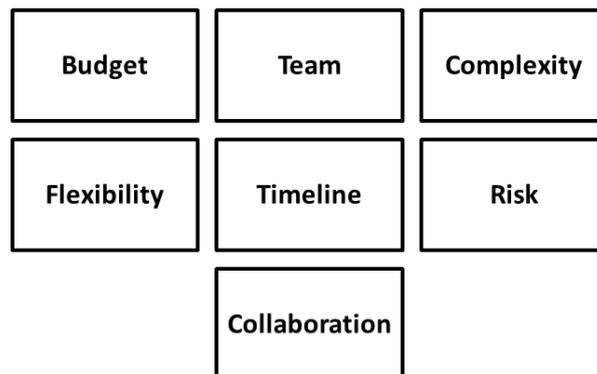
The CCPM model bases its measure of success on how seldom a project manager is able to use the project buffers. If the project manager is not tapping into the buffer of resources, it is a sign that the process is running efficiently. On another note, CCPM can help the project manager save both time and money on a project by efficiently allocating resources. However, it can be complex to manage such a model, hence, it should be used when resources are the main limiting factor of a project.

2.5. How To Choose the Right Project Management Methodology?

It is both quite difficult and important to properly choose the right project management model. The best way to decide which one – will be by assessing the project factors (e.g. budget, team, project complexity, required flexibility / if any, timeline, associated risks, stakeholders implication, etc.). In other words, this is done by reviewing the cited below factors (Ofori, 2013; Pirotti et al., 2020; Strang, 2021; Nyman & Öörni, 2023):

- **Budget:** The size of the allocated project budget will determine how closely the project manager have to manage it as well as how much the latter can afford to implement and manage a complex project model.
- **Team:** The project manager must assess and leverage the size, skills, and competencies of the project team in order to increase the chances of project success.
- **Complexity:** The determination of the level of complexity of the project will in turn determine which model suits it best.
- **Flexibility:** The project manager will also need to determine if rigid processes are to be adopted or agile ones depending on project elements (e.g. unknown elements, need for change, etc.).
- **Timeline:** The project timeline will determine which model to use.
- **Risk:** The level of risk(s) associated with each project will determine the model that is to be adopted.
- **Collaboration:** The implication and associated input of stakeholders will determine the nature of the model that is to be adopted as well.

Figure 12. The Factors determining Project Model Choice



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About the Author



Prof. Dr. M. F. HARAKE

Poitiers, France



Prof. Dr. M. F. HARAKE is a management Professor at GIP CEI based in France. He is currently affiliated to CEREGE Research Laboratory at the University of Poitiers (France), and a visiting research fellow at CABMR Research Center (Paris – France). He is also an Honorary Academic Advisor and Research Scholar at the Project Management World Library (Austin / Texas – USA). He previously served as the Director of the CREFEGE Research Center (Paris – France). His research interests include Post-Conflict Public Management, Crisis and Urgent Operations Management, Humanitarian Logistics, and Project Management in Unstable Environments. He can be contacted at mohamed.fadl.harake@univ-poitiers.fr