ICT Project Management
Chapter 11: Project Management Methodologies

11.1. Project Management Methodologies
A methodology tell you what you have to do, to manage your project from start to finish. It describes every step in the project life cycle in depth, so you know exactly which tasks to complete, when, and how.

"A methodology is a set of guidelines or principles that can be tailored and applied to a specific situation. In a project environment, these guidelines might be a list of things to do. A methodology could also be a specific approach, templates, forms, and even checklists used over the project life cycle."

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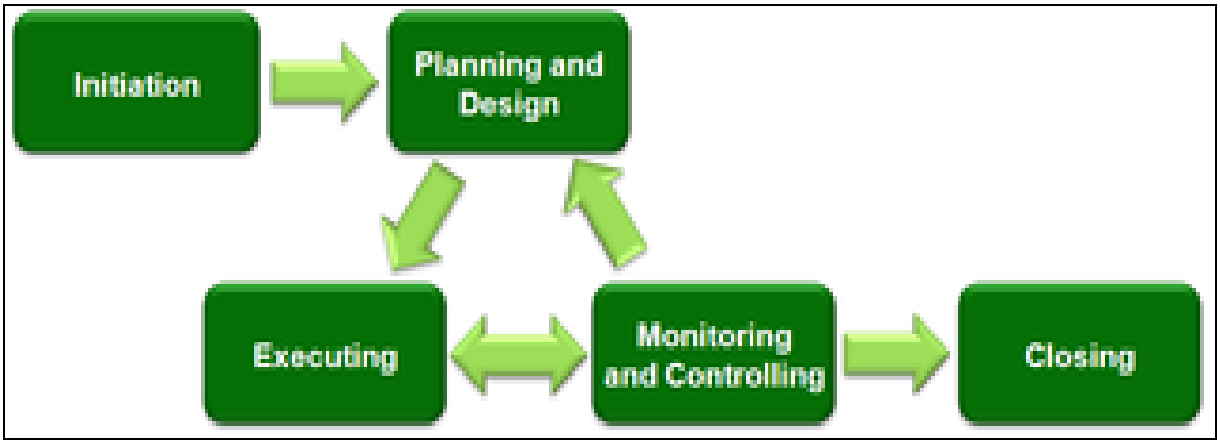
Adopting an incorrect methodology or having no project framework in place can very easily cause you to have:
- Schedule and cost slippages
- Miscommunication within the team
- Wasting [of] time on administrative tasks that have no purpose
- [Reliance] on technical wizardry to get projects done [and]
- Project management burnout"10

1. The traditional approach
A traditional phased approach identifies a sequence of steps to be completed. In the "traditional approach", five developmental components of a project can be distinguished (four stages plus control):



Typical development phases of an engineering project
- initiation;
- planning and design;
- execution and construction;
- monitoring and controlling systems;
- completion.

2. Critical Path Method
The Critical Path Method (CPM) associates each task with a time duration then determines the resources necessary to carry out the project within that time. As one project management professional puts it, “The critical path is simply all the tasks that determine the end date in your project schedule. If one of those tasks is late by one day, then your

project end date will be extended by one day." In other words, the critical path method aligns all tasks to bring about the greatest possible time-efficiency.

Critical Chain Project Management (CCPM) is in contrast to the critical path method in the way that it focuses on resources rather than time constraints. The critical chain is essentially the sequence of tasks that the team members are able to efficiently handle. When a project has limited resources and its time schedules are less strict, CCPM is used to distribute work in a flexible, collaborative way.

3. Critical Chain Project Management

Critical chain project management (CCPM) is a method of planning and managing projects that puts more emphasis on the resources (physical and human) needed in order to execute project tasks. Critical Chain Project Management (CCPM) is in contrast to the critical path method in the way that it focuses on resources rather than time constraints. The critical chain is essentially the sequence of tasks that the team members are able to efficiently handle. When a project has limited resources and its time schedules are less strict, CCPM is used to distribute work in a flexible, collaborative way.

The most complex part involves engineering professionals of different fields (Civil, Electrical, Mechanical etc.) working together. It is an application of the Theory of Constraints (TOC) to projects. The goal is to increase the rate of throughput (or completion rates) of projects in an organization. Applying the first three of the five focusing steps of TOC, the system constraint for all projects is identified as are the resources. To exploit the constraint, tasks on the critical chain are given priority over all other activities. Finally, projects are planned and managed to ensure that the resources are ready when the critical chain tasks must start, subordinating all other resources to the critical chain.

Regardless of project type, the project plan should undergo Resource leveling, and the longest sequence of resource-constrained tasks should be identified as the critical chain. In multi-project environments, resource leveling should be performed across projects. However, it is often enough to identify (or simply select) a single "drum" resource—a resource that acts as a constraint across projects—and stagger projects based on the availability of that single resource.

4. Extreme project management

In critical studies of project management it has been noted that several PERT based models are not well suited for the multi-project company environment of today. Most of them are aimed at very large-scale, one-time, non-routine projects, and currently all kinds of management are expressed in terms of projects.

Using complex models for "projects" (or rather "tasks") spanning a few weeks has been proven to cause unnecessary costs and low maneuverability in several cases. Instead, project management experts try to identify different "lightweight" models, such as Agile Project Management methods including Extreme Programming for software development and Scrum techniques.

The generalization of Extreme Programming to other kinds of projects is extreme project management, which may be used in combination with the process modeling and management principles of human interaction management.

5. Event chain methodology

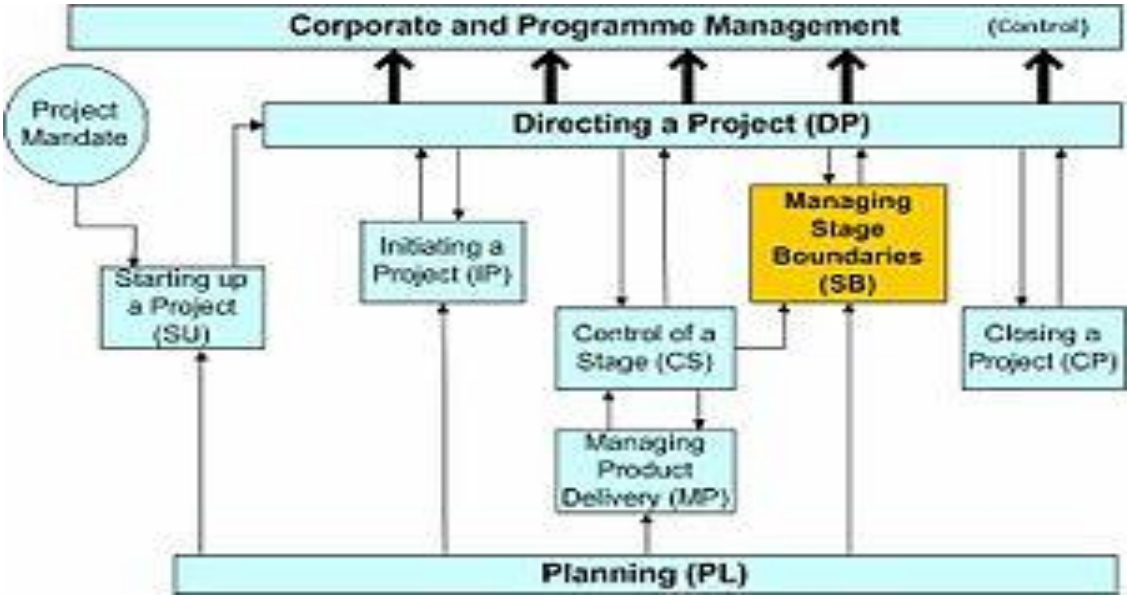
Event chain methodology is another method that complements critical path method and critical chain project management methodologies. Event Chain Methodology (ECM) is used for projects with tasks that initiate chains of events. Each task, upon completion, causes a new event in which a new task must be worked on. Because these events can be either anticipated or unanticipated, risky or safe, they must be managed very carefully in order to achieve the desired results.

Event chain methodology is an uncertainty modeling and schedule network analysis technique that is focused on identifying and managing events and event chains that affect project schedules. Event chain methodology helps to mitigate the negative impact of psychological heuristics and biases, as well as to allow for easy modeling of uncertainties in the project schedules. Event chain methodology is based on the following principles.

- Probabilistic moment of risk: An activity (task) in most real-life processes is not a continuous uniform process. Tasks are affected by external events, which can occur at some point in the middle of the task.

- Event chains: Events can cause other events, which will create event chains. These event chains can significantly affect the course of the project. Quantitative analysis is used to determine a cumulative effect of these event chains on the project schedule.
- Critical events or event chains: The single events or the event chains that have the most potential to affect the projects are the "critical events" or "critical chains of events." They can be determined by the analysis.
- Project tracking with events: Even if a project is partially completed and data about the project duration, cost, and events occurred is available, it is still possible to refine information about future potential events and helps to forecast future project performance.
- Event chain visualization: Events and event chains can be visualized using event chain diagrams on a Gantt chart.

6. PRINCE2



The PRINCE2 process model

PRINCE2 is a structured approach to project management, released in 1996 as a generic project management method. It combined the original PROMPT methodology (which evolved into the PRINCE methodology) with IBM's MITP (managing the implementation of the total project) methodology.

PRINCE2 provides a method for managing projects within a clearly defined framework. PRINCE2 describes procedures to coordinate people and activities in a project, how to design and supervise the project, and what to do if the project has to be adjusted if it does not develop as planned. In the method, each process is specified with its key inputs and outputs and with specific goals and activities to be carried out. This allows for automatic control of any deviations from the plan. Divided into manageable stages, the method enables an efficient control of resources. On the basis of close monitoring, the project can be carried out in a controlled and organized way.

PRINCE2 provides a common language for all participants in the project. The various management roles and responsibilities involved in a project are fully described and are adaptable to suit the complexity of the project and skills of the organization.

7. Process-Based Management

Also furthering the concept of project control is the incorporation of process-based management. This area has been driven by the use of Maturity models such as the CMMI (capability maturity model integration) and ISO/IEC15504 (SPICE – software process improvement and capability estimation).

8. Agile project management

Agile project management approaches based on the principles of human interaction management are founded on a process view of human collaboration. This contrasts sharply with the traditional approach. In the agile software development or flexible product development approach, the project is seen as a series of relatively small tasks conceived and executed as the situation demands in an adaptive manner, rather than as a completely pre-planned process.

Below are a few other *project management methodologies*, processes, and frameworks more specific to the IT industry. As these tend to be much more complicated, their names are only listed:

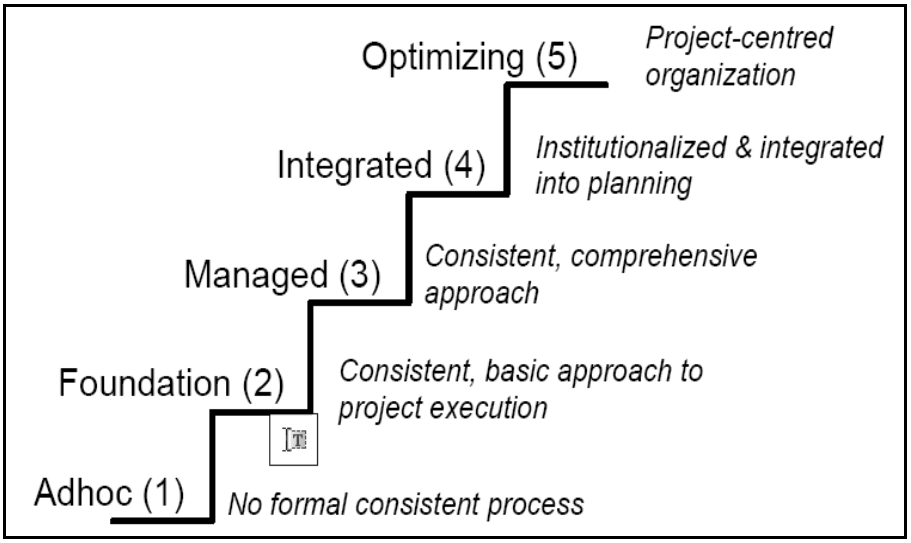
- Six Sigma
- Scrum
- Crystal
- FDD (Feature Driven Development)
- DSDM (Dynamic Systems Development)
- Adaptive Software Development
- RUP (Rational Unified Process)

11.2. Project Management Maturity Model

Project Management Maturity Model defines the industry standard for measuring project management maturity. Project Management Maturity models (PMMM) provide a systematic means to perform benchmarking and hence are adding considerable value to contemporary organizations. The maturity models provide an assessment framework that enables an organisation to compare its project delivery with best practice or against competitors, ultimately defining a structured route to improvement. Project Management Maturity Model, Second Edition is a roadmap showing an organization how to systematically move to higher levels of organizational behavior, improving project success and organizational performance.

It's a comprehensive tool for enhancing project management practices, covering areas critical to organizational improvement, such as the project office, management oversight, and professional development. It also provides methods for optimizing project management processes.

A common method of determining the current level of project management capability and maturity is to use the project management maturity model illustrated by five distinct levels of maturity as shown in the following diagram:



Level 1 – Adhoc:

No formal, consistent process to execute a project

Key Characteristics:

- Many, incomplete, informal approaches – each project handled differently
- Highly dependent on Project Manager
- Project outcomes unpredictable
- Little organizational support for project management
- Lesson learned are not gathered and passed on to other projects

Level 2 – Foundation

Consistent, basic approach to project execution is adopted

Key Characteristics:

- Managed support for project management
- Repeatable processes are applied to basic project management steps
- Project outcomes are more predictable
- Use of common tools and techniques for key project management processes

Level 3 – Managed

Consistent, comprehensive approach to project execution

Key Characteristics:

- Senior management support for project management
- Organization can efficiently plan, manage, integrate and control single projects
- Repository of previous project experience is maintained and utilized
- Team members and project managers trained in project management
- Consistent use of tools and techniques for project management processes

Level 4 – Integrated

Project portfolio management is institutionalized and integrated into the organization's business planning process

Key Characteristics:

- Active senior management support for integration of business planning and project execution
- Organization can efficiently plan, manage, integrate and control multiple projects
- Database of previous project data is maintained and utilized

Level 5 – Optimization

Project centered organization with an established approach to continuous improvement of project management

Key Characteristics

- Project management environment improvement is actively encouraged
- Flexible, project centred organization structure
- Career program for project managers
- Project management training is a key component in staff development

Why is Project Management Maturity Important?

Research indicates that organisations that improve their project management maturity experience cost savings, increased schedule predicability, and improved quality. All of these contribute to improved return on investment and customer satisfaction