Course title: PROJECT MANAGEMENT

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Course Duration in contact and credit hours 12 a.c.h./cr.h. 3.0

Number of hours required for self study: 78 c.h.

1. INTRODUCTION OF THE COURSE

1.1. Brief Description of the course

Basics Project Management
Project Management is an incredibly powerful skill, and pretty much everything in the world relies on it! The Olympics, developing a new disease cure, putting a man on the moon, launching a new product range, or even just planning a birthday party - if you can master Project Management you can lead any project of any size with the same simple process.
However, amazingly, most people are never taught it, and those who are will often be shown an overcomplicated and overwhelming version with confusing software and detailed maths. Instead, in this course, you'll be walked through **step by step** on how to simply and effectively manage any project, in any industry, with any budget.
Basic Project Management is short introduction to the Project Management theorywhich will enable you to apply you theoretical knowledge to manage your real life project. The main aim of this course to give you a clear understanding and prepare the students to plan and run their both academic training and real-life projects even withzero experience in that industry. Students will learn how to build a Gantt Chart and a PERT diagram with ease using no specialist software. Students will be introduced to the

PMI method to do Project Management, making sure that project will be on budget and on time.

Prerequisites

Specific knowledge and skills required for the course (if are not required do not fill this part) – are not required

1.2. Aims

After this course, students will feel calm, collected, well prepared and confident that their project will be a success. You'll know how to come in **on time**, **on budget**, and with **a very happy boss**. We will study real-life project management examples and give you practical tools you can use right away to get better results in your projects. Whether you're managing a small at-home project or an entire global corporate expansion this course will empower you as someone who is always one step ahead.

1.3. Course Objectives

- To give to the students an understanding of the classical PMI approach to the Projects Management
- To give understanding how to manage the projects on time and within a budget
- To learn how to select and prepare a Project and how to plan projects using PERT and CCPM approach
- To learn how to manage the main stakeholders in the most effective way and keep close contact with them
- To give instrument to manage the project risks, resources and characteristics of the recourses and modern approaches to their utilization and optimization

1.4. Learning outcomes

- Knowledge: understanding of the nature and approach to manage the complex projects
- Skills: work break down planning, resource management, project scheduling, project communication and monitoring, stakeholders management
- Competences: business planning & resource management, operational strategy selection and deployment

Concepts, Theories, Styles, Practice of Various regions and Culture	*Integration of new knowledge with previous experience*	*Soft Skills Development*	*Development of critical thinking, analysis and solving business problems*	*Understanding of Business Environment and mail Instruments of Management*
15%	15%	20%	25%	25%

2. METHODS OF TEACHING

2.1. Distribution and net weight of each methods that is applied during the course study

Methods of teaching	Time distribution
Presentations (lectures)	15%
Discussions	15%
Case studies	10%
Common practical assignments	20%
Team practical assignments	20%
Final presentation of the individual work	20%

2.2. Distance learning format

The distance learning format assumes students will work with the Instructor using Distance Learning Platform MOODLE. I case of lockdown restrictions classes will be held in online format on ZOOM Platform or via MS Office Program ¯Teams‖.

All course materials including homeworks will be structured by topics and downloaded on the Platform MOODLE in accordance with schedule of classes. If a student cannot attend a lesson because of a good reason, he/she must study within MOODLE the lesson by him/herself and prepare homework following deadline determined by theinstructor. If any questions during a course student can ask it via e-mail.

3. ASSESSMENT OF STUDENT ACHIEVEMENT

3.1. Types of assignments

Group discussions:
Discussion of the topics and business cases proposed by the Instructor in a group of students.

Homeworks
Include reading and watching recommended resources, preparing for the quizzes/test and a credit pass, performing certain tasks as an individual homework (suggested by the Instructor).
Practical homework includes the studies, researches and presentations on the tasks given by the instructor and uploaded in MOOLE by the time indicated in the study plan.

Testing
Tests and quizzes of the current control are developed on the basis of the studied in classes materials, practical tasks and discussions. During the testing process, it is not permitted to use any materials or/and the Internet. Tests and quizzes are conducted during online classes on MOODLE Platform.

3.2. Requirements to keep deadlines while preparing homework, tests, projects, cases and other assignments

The training course is divided into the topics for each step of the project management body of knowledge. Students will have a possibility to study theoretical materials, participate in a group discussion and learn the basic tools by performing small group activities (15-20 minutes).
Students will also prepare a training project planning which will be presented to the group. For this reason, after each lecture there will be given a task to be fulfilled at home which will help to prepare the final presentation.

3.3. Interrelation of the courses with the corporate world including internationalcontext

During this training, students will learn how to simply and effectively manage any project, in any industry, with any budget.

3.4. Graded Course Activity

Class Attendance – 10%
Class discussion and Participation - 15%
Self Study - 15%
Group Work - 15%
Individual Assignments - 15%
Final Assignment (exam, project, case, test) - 30%

3.5. Letter Grade Assignment

Include an explanation between the relationship of points earned and final letter grade.
Final grades assigned for this course will be based on the percentage of total points earned and are assigned as follows:

The numerical value of the point	%	Description of Grade
5.0	90-100	Excellent
4.0	70-89	Good
3.0	50-69	Satisfactory
2.0	1-49	Fail

3.6. Feedback on the Results of the tasks performed

The instructor is recommended to give immediate feedback on the results of the tasks performed by the students and in the course program, and provide the students with useful advice and recommendations, types of feedback to participants, the regularity of how the intermediate and final evaluation is done - individually or discussed in the group, possible other ways.

4. ACADEMIC RULES

4.1. Plagiarism and Cheating Policy

The administration of the Business School considers plagiarism as one of the forms of academic dishonesty, and deliberate use of plagiarism in any form will lead to unsatisfactory evaluation for the course. The use of any fraudulent actions to borrow thoughts, works or statements of other students, we consider as a form of academic dishonesty, including copying one student from another.

The deliberate use of any form of academic dishonesty, both plagiarism and deletion, will result in an unsatisfactory evaluation of the course being taken by both the student who carried out such actions and the student who did not interfere with such actions.

The Instructor should indicate in the course program what consequences can be in case of detection of plagiarism or deletion in the task performed by the participant.

4.2. Class Attendance

In accordance with the academic policy of the Business School, attending classes is compulsory. The absence of a participant in the classroom affects the quality of the group's work and group dynamics. On absence from the classes for an important reason, the participant should inform the program manager. Absence of a participant without an important reason for more than 25% of lessons from the total number of class hours leads to a decrease in the evaluation, given by the instructor as a whole for the course. The share of the assessment for attending classes is 10%.

The Instructor should point out for what and how much the evaluation will be reduced to the listener for absence in the classroom.

4.3. Usage mobile and other electronic devices

The administration of the Business School and the program does not recommend the use of laptops, mobile phones, or other devices during classes that can distract your attention, the attention of the teacher and other students from the training process. All electronic and other devices must be switched off during classes.

The use of laptops and mobile devices is allowed only when permission is obtained from the instructor, if necessary, to study the course, search for information sources or for other educational purposes.

5. TEACHING MATERIALS

5.1. Teaching materials

Author's training complex with handouts, presentations, assignments, case studies, articles and other teaching materials prepared by the Instructor.

5.2. Textbooks and information sources:

5.2.1 Main Textbook is recommended by instructor:

- A Guide to the Project Management Body of Knowledge (PMBOK® Guide) Sixth Edition
- ACMP Standard

5.2.2 Additional Literature:

- On time within budget Project Management Critical Chain Method by L. Lich
- The Deadline: A Novel About Project Management 1st U.S. Edition, 2nd Printing by Tom DeMarco

5.2.3 Information and Web Resources:
https://www.pmi.org/
https://www.ipma.world/
https://www.prince2.com/

SCHEDULE OF CLASSES

Class Date and Time, Hours	Topic	Literature sections of the textbook, teaching materials, case studies, articles for self of work	Homework (Types of assignments)	Deadlines for assignment's submission Dates of mid-term and final exams and tes
10.01.2024 14.00 - 16.00	**1. Introduction to Project Management** • Definition of the Project Management and its difference from the routine activities **2. Fundamentals of project management:** • Project Restrictions • Five groups of project processes • Ten PMI Knowledge Areas **3. Project team:** • Project Sponsor and it role • Project Manager, his roles and responsibilities • Project team members • Responsibility matrix		1. Define a possible Project, identify its scope and expected deliverables 2. Define a possible Project Sponsor and PM. 3. Define a possible Project Team and prepare a RACI Matrix	14.01.2024 20:00
12.01.2024 11.00 - 13.00	**4. Stakeholders management:** • Identification of the Stakeholders • Project Management vs Change management **5. Initialization and project planning:** • Project Charter & its Approval		4. Make a Stakeholders analysis and describe the Stakeholders Management Strategy 5. Prepare the Project Charter	

15.01.2024
 	
11.00 - 13.00
	6. Project planning & scheduling:
	• Work Structure (WBS)
	• Network diagramm
	• Planning technics:
	  • PERT,
	  • CPM,
	  • CCPM
	6.1 Classical project scheduling approach:
	• Waterfall
	• Project Schedule visualization – Gannt chart
	7. Lean Management & Kaizen:
	• Lean origin & approach
	• Value & Wastes
	• Standardization
	• SDCA & PDCA cycle
	• Flexible project scheduling:
	  • Agile
	  • Lean
	  • Kanban
	  • Scrum
			6. Prepare a WBS & network Diagram
			7. Prepare a Project Schedule
			8. Create a Gannt chart (in MS Project or MS Excel)
			9. Define the Critical Path
				16.01.2024, 20:00

17.01.2024 11.00 - 13.00	**8. Risk Management** • Risk identification • Risk estimation • Risk mitigation plan **9. Project Execution:** • Organization of work in projects • Monitoring and Control • Communication in Projects • Progress Report • Visualization of project status		10. Make a risk assessment and create a Risk management plan	18.01.2024, 20:00

19.01.2024 11.00 - 13.00	**10. Change management** • Definition of a change • Process of the Change management • Phases of the Change acceptance • ADKAR model of CM **11. Closing Projects** • Summarizing • Evaluation of Project Results • Project Presentation • Archiving Project documentation **12. Knowledge Management in Projects**			1. Define project meeting schedule & agenda 2. Prepare the Change management plan
22.01.2024 11:00 - 13:00	Presentation of the individual project plans		Finalize the presentation on the project	21.01.2024 20:00
26.01.2024 10:00 - 18:00	Final testing in Moodle			

WORKING NOTEBOOK

Definition of the Term Project

PROJECT - ¯a temporary endeavor undertaken to create a unique product, service, or result.‖

Notice the following two key words within that definition:

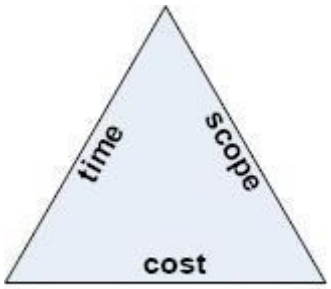
- **Temporary**: It has a defined start and finish date. Some projects seem to go on and on forever, taking up space in the budget like an unwanted house pest. However, this is about as healthy as a house full of mice.
- **Unique**: It produces a product or service that is specific to that project. The product can be similar, or even exactly like, another project, but they are two distinct products.

The Classical Triple Constraint

From a business perspective, a project is a limited time endeavor aimed at taking an organization from one level of measured performance to a higher level of measured performance. In order to determine if we have achieved the project objective we need good methods of measurement. If we measure the wrong things, then our focus and attention will be diverted away from the important.

The classical Triple Constraint, as a tool for measuring project success, is inadequate as it does not allow us to measure how well we have succeeded with respect to the business opportunity. It measures the wrong things and diverts ourattention away from the real opportunities.

Let us explore the classical Triple Constraint.



cost = f (scope, time)

Triple Constraint: ¯A framework for evaluating competing demands. Project managers often talk of a ¯triple constraint‖ – project scope, time and cost – in managing competing project requirements. (PMI, 2004, p377)

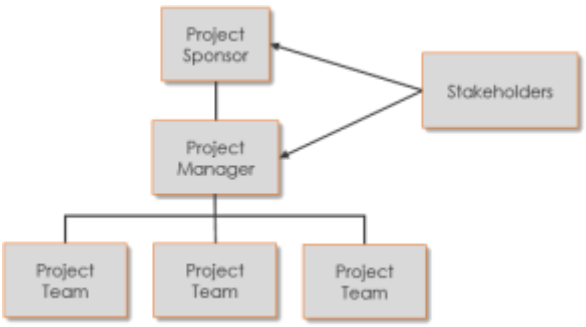
In fact, a Guide to the Project Management Body of Knowledge (PMBOK® Guide) contains three separate knowledge areas directly related to the three

factors of the Triple Constraint - Project Scope Management, Project Time Management, and Project Cost management.

The Triple Constraint says that cost is a function of scope and time or that cost, time and scope are related so that if one changes, then another must also change in a defined and predictable way.

Organization of a Project

The basic organizational structure of a project



The key people involved in a project are defined as follows:

1. **Project Sponsor.** One level above the project manager, this person is the organizational contact for the project. They often deal with funding the project, providing resources and support and are usually accountable for project success. They can be internal or external to the organization carrying out the project.
2. **Project Manager**. The person that handles the day-to-day administration of the project and project team and is directly accountable for its success. Large projects can be managed by a project management team.
3. **Project Team**. The person or people who perform the project's technical work, reporting to the project manager.
4. **Stakeholders**. A party that has an interest in the work being performed by the project. This ranges from investors to affected parties to government regulators. I often refer to the project sponsor as a stakeholder – they are effectively the most important stakeholder – although this might confuse the definition a bit.

Specifying the roles and responsibilities of project team members helps to ensure consistent levels of accountability for each project.

The **Project Sponsor** is the executive with a demonstrable interest in the outcome of the project and who is ultimately responsible for securing funding and resources for the project. Does not need to be one person.

In general, the Project Sponsor will:

- Oversee high-level project progress

- Provide vision for project (overall goal/objective)
- Resolve organizational policy issues as they arise (including budget)
- Considered the ¯champion‖ of the project; communicates with senior management
- Chooses project team members
- Ongoing support and consultation for project development
- Approve project completion

Project manager - the person assigned by the Project Sponsor or an Executive to ensure that the project is completed within scope, budget and timeframe.

The Project Manager works directly and regularly with the client, as well as all other project team members to coordinate the goals, objectives, work process design, meetings, communication.

In general, the Project Manager will:

- Develop project and implementation plans
- Initiate and coordinate meetings related to the project
- Monitor and review all project activities
- Regularly communicate project progress to all stakeholders, as well as request approval/feedback for project deliverables
- Assist with change management
- Maintain project records and create master document for project
- Resolve additional or unforeseen issues as needed

Project Team - the group responsible for conducting project activities. Project team members are selected by the Project Manager and approved by Project Sponsor. The Project Manager may add project team members. The project team can contain internal staff as well as outside contractors.

Customer - the person or group requesting the project. The person or group for whom the project is being completed. The client is responsible for articulating the details of their project request: goals, objectives, specifications and outcomes. After the project is completed, the client becomes the owner of the product produced by the project.

Stakeholders - any person/group whose interests may be impacted by a project or its deliverables. Stakeholders are often members of the project team. Stakeholders should be identified during the initial stages of a project, should be consulted at various stages a project.

Phases of a Project

The foundation upon which the PMBOK is built consists of the five phases that every project goes through:

1. **Initiating**. The tasks required to authorize, fund and define the project, generally on the organizational level (above the project). The organization defines a business need the project is meant to satisfy.
2. **Planning**. The project management team define how the project will be carried out, who will do the work, how long it will take, and so forth. The planning phase should define the project in sufficient detail that all stakeholders' expectations are understood.
3. **Execution**. The project work is completed and the end product or service is achieved while secondary stakeholder requirements are satisfied.
4. **Monitoring & Controlling**. Concurrent to the project work (execution phase) the project management team monitors and controls all aspects of the project – schedule, cost, stakeholder's requirements, etc. If any part causes problems, changes to the project plan are made.
5. **Closing**. The project has completed it's product or service, and the project must be closed.

In each phase, one or more project management documents are created. These consist of:

Phase	**Project Documents**
Initiating	Project Charter
Planning	Project Plan
Execution	Status Updates Stakeholder Communications
Monitoring	Variance analysis Project change documentation
Closing	Final reporting

The part that is frequently underestimated is the second phase: Project planning. The Project Management Institute has suggested that planning effort be roughly 20-30% of the total work.

In fact, the planning group is by far the largest within the PMBOK. It contains more than half of the processes even though it is one out of five process groups. The project management plan that is generated during the planning phase encompasses all of the knowledge areas, and it should be scaled to the size of the project.

These project management knowledge areas bring the project management process to life and ensure that the project meets its success criteria. Please let me know in the comments how these knowledge areas have worked for you.

The Five PMBOK Process Groups:

1. Project Initiating

This phase includes the initial work necessary to create and authorize the project. In the PMBOK it contains only two processes:

- ✓ Develop Project Charter
- ✓ Identify Stakeholders

The project charter's purpose is to incorporate the project and authorize the project manager. It is developed by the performing organization (i.e. above the project) but it can be delegated to the project manager. It contains whatever information is necessary to perform this function, but can also include things like:

- Scope statement
- Initial project budget allocation
- Primary stakeholders

Once the project has been initiated, the project manager proceeds into the planning phase.

Project Planning

This phase is frequently underestimated. In the PMBOK, it contains all 10 project knowledge areas. Project success is usually directly related to the amount of planning that has been performed.

The primary project management document created during this phase is called a Project Management Plan, and it contains the following information:

1. **Success Factors.** The definition of project success is established. This usually includes schedule and budget, but often there are many other smaller factors that cannot be overlooked.
2. **Scope statement.** The work that will be part of the project is identified, and its boundaries established.
3. **Deliverables.** The products and/or services that the project will produce are listed.
4. **Schedule.** The project is broken down into tasks. Timelines of each task are determined and deadlines for each project deliverable are determined.
5. **Budget.** The estimated cost of each task is determined and rolled up into an overall project budget.
6. **Human resource plan.** The project team roles and responsibilities are identified, and the method of acquisition for project team members is established.
7. **Quality management plan.** The quality standards for the deliverables are identified and quality assurance and control metrics established.
8. **Risk management plan.** The most important risks to the project success factors (#1) are determined and analyzed to ensure they can be managed.
9. **Procurement management plan.** The external vendor needs are established and methods for acquisition and control of outside vendors established.

10. **Change procedures.** The documentation and methods by which changes to the project management plan will be handled.

The project management plan should be approved by the project sponsor to kick off the project execution phase. From this point on, changes must be made through the project change control methods described within the plan, which normally should include a re-approval by the project sponsor.

Project Execution

In this phase the bulk of the project work takes place. The project manager directs and manages project work, and the project team carries it out. The project deliverables are produced and delivered to the project sponsor (or whomever they are produced for). The two key project management documents during this phase are:

1. **Project Status Updates.** The project manager produces regular status updates according to the requirements of the project management plan. These updates generally include cost and schedule status as well as future projections.
2. **Stakeholder communications.** Each stakeholder generally needs to be communicated with on their own terms with information specific to them. During project execution this communication is performed as outlined within the project management plan.

Monitoring and Controlling

This phase occurs concurrently and parallel to the project execution phase. The project manager must perform sufficient monitoring and control to ensure that the project's deliverables are produced on time, on budget, and to sufficient quality.

The bulk of a project manager's time in the project monitoring phase will be spent on a process called Earned Value Analysis. In this system the project manager calculates the project status from two standpoints: Schedule and Cost. It can be done at any time and can give you excellent advanced warning of the project going astray.

The variables calculated in this method are:

- **Planned Value (PV)** is the budgeted amount for each task at the specified point of analysis (usually today).
- **Earned Value (EV)**, is the actual completion amount of each task relative to the task budget.
- **Actual Cost (AC)** is the actual expenditure for each task.
- **Cost Variance (CV)** is the amount that the project in a cost overrun or underrun position. CV = EV – AC
- **Cost Performance Index (CPI)** is the relative amount that the project is over or under budget. CPI = EV / AC.
- **Schedule Variance (SV)** is the amount that the project is behind or ahead of schedule. SV = EV – PV.

- **Schedule Performance Index (SPI)** is the relative amount that the project is ahead or behind schedule. SPI = EV / PV.
- More advance variables include **Budget at Completion (BAC)**, **Estimate at Completion (EAC)**, **Variance at Completion (VAC)**, **Estimate to Complete (ETC)**, and **To Complete Performance Index (TCPI)**. Each of these variables is described in our Practical Guide to Earned Value Analysis.

Earned value analysis is instantaneous, that is, it will give you a project status right at the point of analysis. It is a ―snapshot‖ of the project's schedule and budget status at any given time.

If the monitoring of the project results in changes to the project management plan, the change control procedures outlined within the plan are implemented. For small projects this could be as simple as a ―change log‖ form.

Project Closing

Interestingly, project closing is the phase that is most ignored (or minimized) by project managers. This is probably because the project budget is gone, or mostly gone. Or maybe we just want to move on. But regardless of why, the project closing phase is extremely visible to the corporate executives and can have a major impact on project managers' careers.

Closing the project has one project management deliverable: A final report. This report should have the following parts:

1. **Formal closure.** Contracts are finalized, and the project is declared complete.
2. **Funding.** The project's final budget is confirmed and excess funding released into general revenue.
3. **Procurements.** The project's vendor contracts are finalized and completion certificates issued.
4. **Final Details.** Documentation of actual work performed, as-built drawings, or other details that need to be filed away for future reference.
5. **Liabilities.** Warranties, insurance coverage, and bonds need to be established and agreed to.
6. **Release of Resources.** The project team, equipment and other resources need to be returned to their rightful place.
7. **Lessons Learned.** Documentation of lessons learned during the project can be invaluable to future projects.

Knowledge Areas

The five project phases (i.e. process groups) are in chronological order, but within each phase are various parts of different ―knowledge areas.‖ Thus, the ten knowledge areas are encountered at various times during a project.

The 10 PMI knowledge areas are:

- **Project Integration Management**. The stuff that doesn't fit in any other category, like developing the project management plan itself, making changes to the project, etc.
- **Project Scope Management.** Scope is the work that is included in the project. It should be defined in the planning phase (i.e. the project management plan) and changes should be well defined.
- **Project Time Management.** Creating, monitoring and enforcing the project schedule, milestones, and completion dates.
- **Project Cost Management.** Estimating the project costs, and monitoring and controlling them throughout the project.
- **Project Quality Management.** Determining the quality standards that apply to the project and monitoring the quality of work produced.
- **Project Human Resource Management**. Ascertaining the people requirements of the project, acquiring them, and developing them to ensure they produce the required results.
- **Project Communications Management**. Establishing the communication needs of each stakeholder and making sure they are involved to the required degree.
- **Project Risk Management.** Figuring out who the biggest alligators under the bed are, and how to make sure you never see them.
- **Project Procurement Management.** Hiring the outside consultants and contractors necessary to get the job done and managing them.
- **Project Stakeholder Management**. Identifying each stakeholder and making sure they're happy.

The Project Management Plan

The Project Management Plan is the central foundation of project management, and as such we will focus a separate section on it. It is a document that gives the project manager their direction throughout the project, aiding in decision making. It manages the stakeholder's expectations. But most importantly, it tells the project sponsor, who is usually the project manager's boss, how the project will be managed. It should contain enough detail to define the project so that all stakeholders understand how the project will be managed. When project changes occur (deadlines, budgets, etc.) the project management plan should be updated. The project manager should always have a current plan.

This plan should be available to all project stakeholders, if not directly provided to them. But the project sponsor should absolutely be familiar with it and understand how the project is being managed.

Within the project management plan are various sections which define the project and should be updated when project changes occur:

- **Scope Statement**. Many projects encounter problems because it's easy to insert small tasks into the project, veer slightly off course, perform non-important tasks, and the like. The scope statement should be detailed, including exclusions for things that might be part of similar projects (Does the house

include a garage?). It should be set in stone and untouchable without a project change.

- **Stakeholder list**. All of the stakeholders in the project should be identified. But beware, the biggest problems originate with the minor, seemingly insignificant stakeholders that get glanced over because you hope you don't ever have to talk to them. This passivity will only ensure that you eventually will.
- **Task List**. To govern a project effectively, it must be carved up into tasks. Each task will be assigned a duration (time) and budget (cost).
- **Schedule**. For small projects this could involve the specification of few project milestones, ranging up to a full graphical project schedule. For larger projects, each task is assigned a start and end date, and/or dependencies on other tasks (i.e. Task B can't start until Task A finishes). During the project, leaving the schedule simply to gather dust is not acceptable. If the schedule is not being met, action is required by the project manager. Even if the schedule will be ―crashed,‖ meaning more resources applied to get back on track, doing nothing is tantamount to letting the schedule gather dust on the shelf and renders in meaningless.
- **Cost/Budget**. Each task has a cost associated with it. When the actual costs are found to be higher (or lower), even before the task is complete, action should be taken to recover and limit propagation effects to the rest of the project.
- **Quality Standards**. All industries have written quality standards that apply to the products and services that are produces in that industry. Appropriate quality standards should be written into the project management plan, and quality control and quality assurance performed throughout the project.
- **Project Team**. It is often a part of a strong project management plan, when the project team is spelled out as well as their roles and responsibilities. Organizational charts can provide overall perspective. Additionally, the project manager, project sponsor, and other stakeholders on the organizational level could be identified.
- **Vendors**. Any subconsultants, subcontractors, and outside vendors should be identified. Payment methods, unit prices, or standard contracts and the like can be identified. Also, details on how they will be managed can be beneficial, such as action to be taken when they are late, submit scope changes, etc.

Project Integration Management

The Project Integration Management contains the tasks that hold the overall project together and integrate it into a unified whole.

Develop Project Charter. One of only two processes during the Initiation phase, the development of a project charter initiates the project and authorizes the project manager.

Develop Project Management Plan. This is the primary guiding document for the project manager and end result of the planning phase. It is used to ensure a successful outcome to the project. The project management plan is distributed and approved by relevant stakeholders, particularly the project sponsor, and changes are tracked through the change log.

Direct and Manage Project Work. This process encompasses the production of the project's deliverables.

Manage Project Knowledge. Most projects require the acquisition of additional knowledge. This requires active management to ensure the project finishes on time and budget.

Monitor and Control Project Work. This process contains the work necessary to monitor the project, perform earned value analysis and project status reports, and identify potential project changes.

Perform Integrated Change Control. In this process the change control is carried out. Whether your project requires change request forms, project sponsor approvals and other administration or if it's a basic change log, this process manages project changes.

Close Project or Phase. This process contains the tasks necessary to close the project, or the project phases.

Project Scope Management

This knowledge area involves the project scope, that is, the work that is included within the project. Since scope changes are one of the top causes of project changes and grief in general, it is very important that the boundaries of the project be well defined from the outset and monitored rigorously. It is very easy for people to insert unauthorized work into the project when the project appears to be big enough to absorb it, but most projects are estimated with the minimum cost.

When competing for (or obtaining) work, we are motivated towards the minimum scope. But when the project has begun, we are motivated towards the maximum.

1. **Plan Scope Management.** The Scope Management Plan is part of the project management plan and can be a section within it rather than a standalone document.
2. **Collect Requirements.** At this stage the detailed requirements of the final product or service are assembled and itemized.
3. **Define Scope.** A scope statement is created which can be in sentence form or bulleted. You can't delineate every project boundary, but the scope statement should be comprehensive enough that it reduces some of the major risks to the project.
4. **Create WBS.** A Work Breakdown Structure (WBS) contains either a graphical or table-style breakdown of the project work.
5. **Validate Scope.** During the project the deliverables are ¯validated‖ meaning they are approved by the recipient. Note this appears during the Monitoring & Controlling process group, and it refers to the formal acceptance of the deliverables after they have been submitted, not the specifications for the deliverables during the planning phase.
6. **Control Scope.** The scope statement must be revisited regularly in light of the project work that has been completed and current project status. If you are behind

schedule, for example, you may wish to gravitate toward a minimum acceptable scope rather than all the bells and whistles you wanted to produce in the beginning.

Project Schedule Management

This is usually the most time consuming of the knowledge areas. During planning, the project manager must divide the project into tasks and create both a schedule (start and finish dates for each task) and budget for each task. During the project, earned value management determines the project status at regular status intervals. Because most project changes involve a change to the schedule, it must be continuously re-baselined and the project management plan updated (and approved by the project sponsor).

1. **Plan Schedule Management.** The Schedule Management Plan contains information such as how the schedule will be created, who will be responsible for it, how aggressive it will be, and under what circumstances it will be changed.
2. **Define Activities.** The project is divided into tasks. Note that according to the PMBOK this process is different from Create WBS within the Scope Management knowledge area, but in practice they are generally the same. A task list is produced which defines all of the project (not most of it!).
3. **Sequence Activities.** The tasks are ¯sequenced‖ that is, they are ordered and the relationships between them are established. These relationships take the form of Finish-to-Start (FS), Finish-to-Finish (FF), Start-to-Start (SS) and Start-to-Finish (SF). For small projects with simple schedules this is not necessary.
4. **Estimate Activity Durations.** Using its resource list, a duration is estimated for each task.
5. **Develop Schedule.** Firstly, a network diagram is produced which determines the critical pathas well as floats for each task. Secondly, a graphical bar chart schedule is created with each activity plotted on their early start dates. Lastly the resource usage is plotted and tasks are moved along their floats to flatten the resource usage. This is called resource levelling.
6. **Control Schedule.** Earned value analysis is performed on regular project status intervals to determine whether the project is ahead or behind schedule, and byhow much, at that status point.

Project Cost Management

The project budget is usually one of the most sensitive parts of a project. The budget must be established through rigorous estimating techniques and monitored to ensure there are no unnecessary changes that make stakeholders unhappy.

1. **Plan Cost Management.** The Cost Management Plan establishes things like the methodologies with which the project budget will be established, the criteria for changes, and control procedures.
2. **Estimate Costs.** The cost of each task is estimated, taking into account the resources, labor, materials, equipment, and any other item of cost necessary to complete the task.

3. **Determine Budget.** The task budgets are rolled up into an overall project budget.
4. **Control Costs.** Earned value analysis is performed on regular project status intervals to determine the project status at that status point.

Project Quality Management

Quality is one of the triple constraints of Time, Cost, and Quality. As such, when you need better quality, you need to put in more time or cost. Because of this integral nature of the quality of the project's deliverables, the quality level should be established during project planning and specified within the project management plan. Then when issues arise regarding product specifications, there is a plan to deal with it.

1. **Plan Quality Management.** The Quality Management Plan can be a section of the project management plan or a standalone document, and it contains the quality specifications for the product or service. There should be no doubt whether the product being produced is a Mercedes-Benz or a Pinto.
2. **Manage Quality.** The processes that ensure the quality of the deliverables must be inspected regularly to ensure they are working.
3. **Control Quality.** The deliverables themselves are inspected to ensure they conform to the quality standards.

Project Resource Management

The project team is usually one of the most important factors in the success of a project. If you have a good team, you will have a successful project. This knowledge area is concerned with acquiring the right team, ensuring their satisfaction, and tracking their performance.

1. **Plan Resource Management**. The Human Resource Management Plan identifies the roles/positions required by the project, the minimum requirements for those roles, and how they fit into the overall project structure.
2. **Estimate Activity Resources**. To ensure the necessary resources are available, the quantity of each resources needs to be estimated.
3. **Acquire Resources.** Once the required number of resources has been estimated, the resources can be acquired.
4. **Develop Team.** The project team often requires training to develop the necessary competencies to complete the project, but the development of the teamenvironment and interaction between team members is also actively managed.
5. **Manage Team.** The project team is actively managed to ensure their production is maximized and they are satisfied.
6. **Control Resources.** The resources are monitored and their performance evaluated to ensure maximum productivity.

Project Communications Management

Communication with stakeholders is often the key factor that allows stakeholders to be satisfied even when unexpected changes happen. It is essential to develop a communications plan to keep all stakeholders ¯in the loop‖ throughout the project and communicate early and often when unexpected issues occur.

1. **Plan Communications Management.** The Communications Management Plan identifies the regular communication requirements of each stakeholder, such as investor circulars, progress updates, and so forth. It also identifies any specific communications procedures for unexpected issues or project changes.
2. **Manage Communications.** During project execution the communications plan is put into practice and communications are actively managed.
3. **Monitor Communications.** During regular status points the project communications are reviewed and revisions to the communications plan are initiated.

Project Risk Management

Managing project risk is one of the most underrated aspects of project management. Major risk are very seldom identified up front and analyzed within the project management plan, but when they are project stakeholders tend to forgive the unexpected issues much quicker. Not to mention they hold the project manager in high regard for strong safeguarding of their investments.

1. **Plan Risk Management.** The Risk Management Plan identifies how the risks will be itemized, categorized, and prioritized.
2. **Identify Risks.** The major risks to the project are identified and placed into a risk register (list of risks). Most projects have one or two risk that take significant precedence over all others, and these should often get special attention.
3. **Perform Qualitative Risk Analysis.** Once the biggest risks are identified, they are classified into categories of likelihood and impact, and then ranked accordingto priority.
4. **Perform Quantitative Risk Analysis.** Once the risks are ranked according to priority, the biggest priority risks are numerically analyzed according to their impact to the project budget, schedule, or any other part of the project.
5. **Plan Risk Responses.** For the most important risks, response plans are drafted such that all parties are aware of how to respond to the occurrence of the risk.
6. **Implement Risk Responses.** The risk responses identified in the previous step are carried out.
7. **Monitor Risks.** At regular status points the risk register is inspected and risks that have expired are crossed off.

Project Procurement Management

Almost all projects have some form of outside procurement. Hiring subcontractors can get the job done quicker or with better expertise but sacrifices the ability to control the

quality, schedule, or other factors. Also, the fine print often results in budget and schedule overruns that were not envisioned.

Plan Procurement Management. The Procurement Management Plan identifies the outside procurement needs of the project and parameters under which the contractors will be procured.

Conduct Procurements. The contractors are hired. This process involves producing the statements of work, terms of reference, request for proposals, and such, as well as soliciting the responses and choosing a vendor.

Control Procurements. During project execution the contractors must be managed and the contracts monitored to provide early warning of project changes.

Project Stakeholder Management

There is nothing more important than the project's stakeholders. You could, in theory, declare a project a success if the stakeholders are satisfied but the project was a disaster (although I wouldn't recommend this line of thinking). The stakeholders should be actively managed and addressed within the project management plan.

Identify Stakeholders. During the project initiation phase the major stakeholders are identified and their concerns established.

Plan Stakeholder Engagement. The Stakeholder Management Plan lists each stakeholder and prioritizes their concerns and potential impacts on the project.

Manage Stakeholder Engagement. During project execution the stakeholders must have their needs addressed and communication lines must remain open.

Monitor Stakeholder Engagement. During status intervals each stakeholder must be considered to determine if their needs and being addressed and if changes need to make to ensure that they are.

Project Management Organizational Structure

Project management structure is very vital to the success of any project team; an organization or project team that is structured gives support to the work that's being done. Misaligned project management teams or organizations create a negative impact on the outcome of a project. This is simply because the organizational structure has an influence on the authority of the project manager, thereby affecting how projects arerun. It goes without saying that non-structured project management teams often lack guidance and a guided team drives successful projects.

Organization could be defined as a group of persons who come together to accomplish set goals; in order to successfully achieve those set goals, a project manager would need to familiarize himself with the project management office structure.

Organizational structure refers to the way a company or organization is setup. It is usually defined using a hierarchy chart that shows how groups or functions report within the organization.

For Project Managers, a company's organizational structure type will affect how resources are allocated to the project and will be a factor in how much influence the Project Manager will have within the organization.

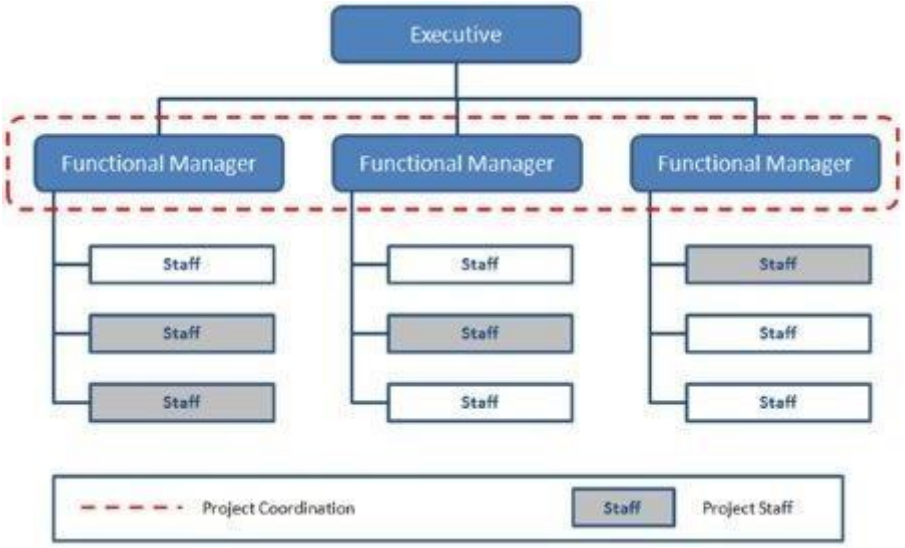
Organizational Structure Types

There are three basic types of organizational structures...

- Functional Organizational Structure
- Project-Based Organizational Structure
- Matrix Organizational Structure

Functional organizational structure

Functional organizations are structured around the organization's primary functions.



Functional Organizational Structure

Examples of functions within a company are:

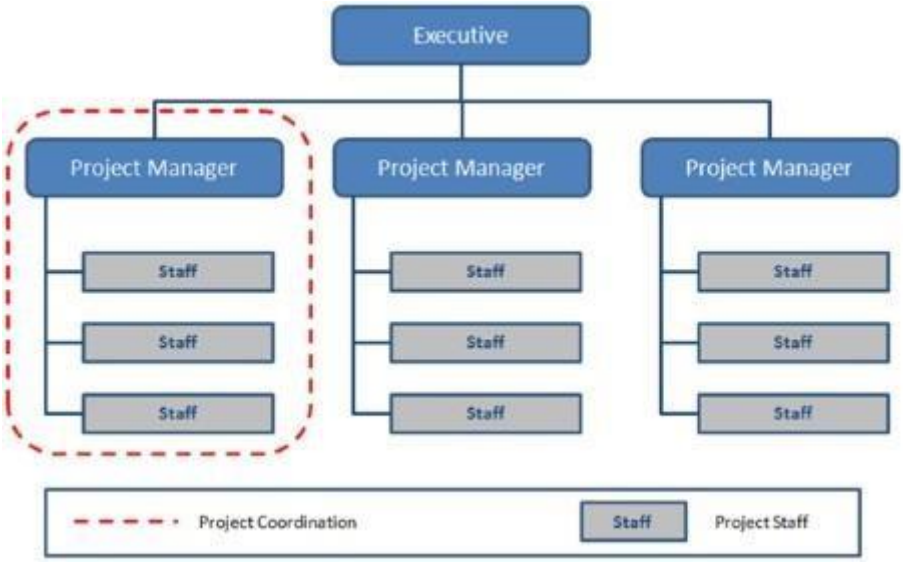
- Advertising
- Engineering
- Human Resources
- Manufacturing

In a functional organization, every employee is positioned within only one function and has one manager they report to, the Functional Manager. The Functional Manager

assigns and manages the employees work and handles administrative tasks such as employee compensation.

Project-based organizational structure

Project-based organizations are structured around projects and not functions. This type of structure is also called a projectized organizational structure.



Project-Based Organizational Structure

In a project-based organization most of the organization's resources are involved in project work. Project Managers have high levels of independence and authority for the project and control the project resources.

Matrix organizational structure

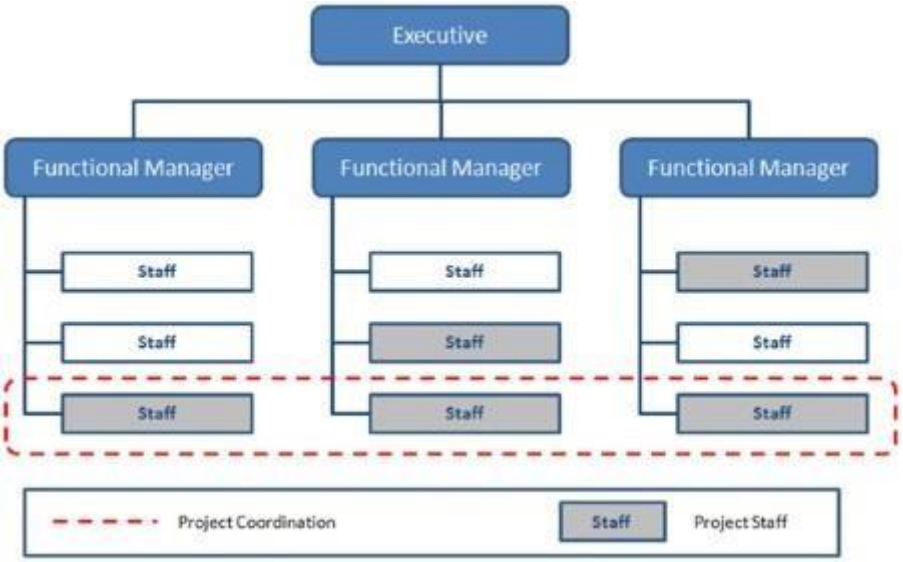
Matrix organizations blend features of project-based and functional organizational structures.

The key challenge with a matrix organization is that every employee has two (or more) managers they report to, their Functional Manager and the Project Manager. If they are working on multiple projects, they may have even more managers to report to.

There are three types of matrix organizations:

- Weak Matrix
- Balanced Matrix
- Strong Matrix

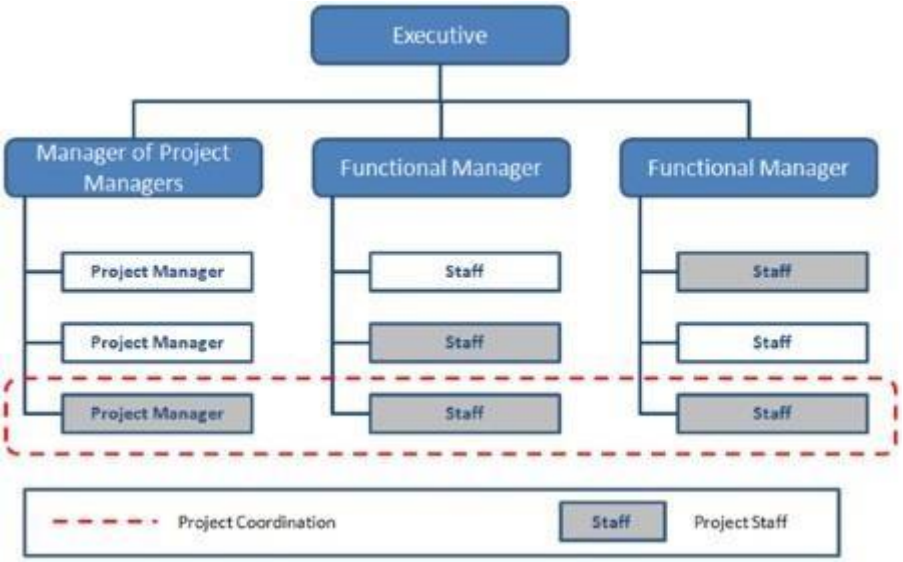
Weak Matrix



Weak Matrix Organizational Structure

A weak matrix organizational structure maintains many of the features of the functional organizational structure. The role of the Project Manager is more that of a Project Coordinator. Their ability to make or enforce decisions is low and most of the authority remains with the Functional Manager.

Strong Matrix

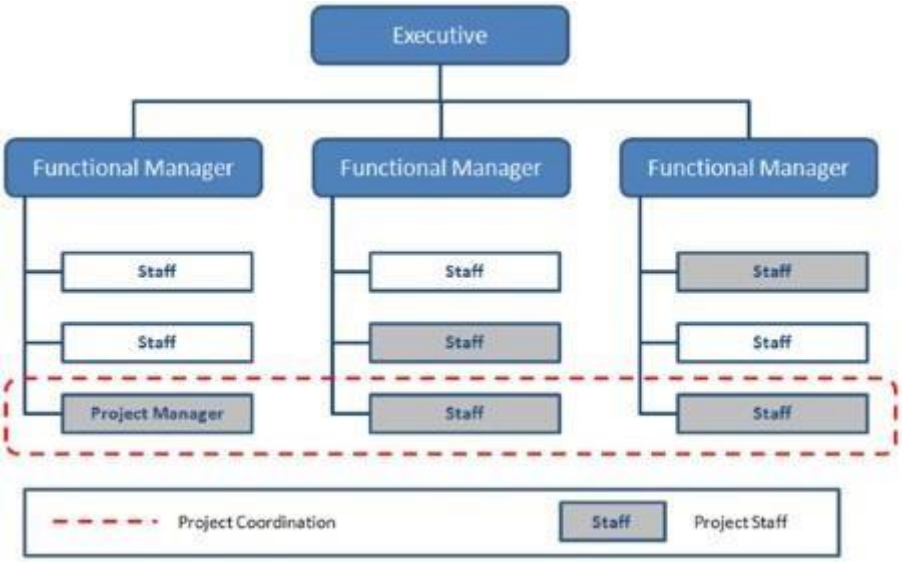


Strong Matrix Organizational Structure

A strong matrix organizational structure has many of the features ofthe projectized organizational structure. They have full-time Project Managers and

project administrative staff. Project Managers have considerable authority over the project in this organizational structure.

Balanced Matrix

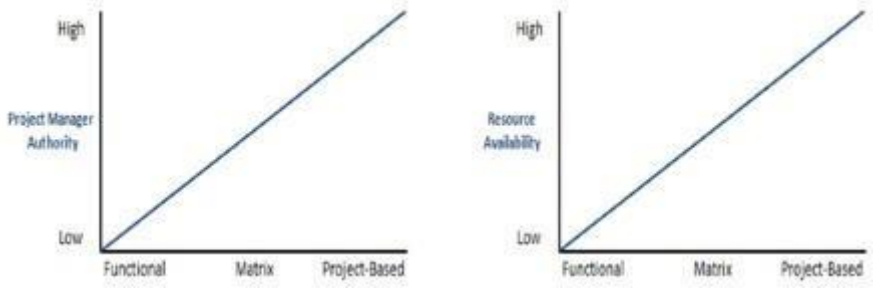


Balanced Matrix Organizational Structure

A balanced matrix organizational structure recognizes the need for a Project Manager. However, the Project Manager does not have full authority over the project, project staff or project budget.

How Organizational Structure Influences Project Management

Two of the key project aspects affected by organizational structure typesare Project Manager Authority and Resource Availability.



Organizational Structure Spectrum

As you move across the spectrum from Functional to Matrix to Project- Based organizational structure types, the organization will move from favoring ongoing operations to favoring projects.

On the left side of the spectrum are Functional Organizational Structures. As a Project Manager, you will have limited positional authority in these type of organizations. You will need to rely on expert authority and referent authority to get project tasks completed. Because of this, you will need to develop your influencing and negotiating skills if you want to be successful.

From a Resource Availability perspective, you will be dependent on the Functional Managers in your organization to provide you with resources. In these cases,the project resources will report indirectly to you.

On the right side of the spectrum are Project-Based Organizations. As a Project Manager, you will have more positional authority the further right your project sits on the spectrum. This doesn't mean you can just command others, but you will have more formal authority for getting project tasks completed.

From a Resource Availability perspective, you will also have greater control over your project resources since they will be more likely to directly report to you and not to a functional manager.

Understanding what type of organizational structure is used by your company will help you determine how you should manage your project.

A **Project Charter** is a formal document that authorizes the start of a project. It names and appoints a project manager, assigns a summary budget, establishes a project timeline, and documents key assumptions and constraints. The project boundary, its key deliverables – the mission of the project are documented as much as possible.

One key thing to remember is that although the project management team may help to write the project charter, approval and funding are handled external to the project boundaries. This means that the funding and go ahead for the project is given by someone external to the project. This could be the Management of the company who is authorizing the project for strategic reasons. These people are not involved in the day to day running of the project but are the driving force behind the project.

Importance of the Project Charter

PMI gives a lot of significance to the Project Charter. In fact, one of the 42 process is named ―**Develop Project Charter**‖ in the Initiating Process group / Integration Management Knowledge Area. This alone can tell you how significant the project charter in the PMP exam is.

The project charter will state the initial requirements to satisfy the stakeholder's needs and expectations and also formally authorizes the project.

Unfortunately, most real-life project start without a project charter. In fact, it is not uncommon for project managers to be completely unaware about what a project charter is.

I was working in a large MNC, and projects were often started when I waswalking to the Gents with my boss, and he'd mention how he had met with the VP of some department yesterday and the problems they discussed, and that I was to go and review the problem areas, and fix them. This was the beginning of countless medium to large-scaled project for a long time… and finally I started to dread these walks with my

boss… If you happen to be in a similar boat where you've not see the lights of a project charter, best is to understand that there is a big gap in your knowledge and day to day project management practice, compared to PMI. If you do not study the project charter, you are in for a big surprise in the PMP exam.

How Long is a Project Charter?

A project charter can be as short as 1 page, and as long as 200 pages. Typically though it is only about 1-3 pages in length. Writing too much detail in early stages is difficult, as too much detail may not even be available. It is better to have this document at a summary level, and then keep on elaborating it in the coming time, once the project is authorized.

PMBOK Definition of Project Charter - a document issued by the project initiator or sponsor that formally authorizes the existence of a project and provides a project manager with the authority to apply organizational resources to project activities.

This used to cause significant distress in previous versions of the PMBOK – students used to argue that a project manager could not write the charter because the project manager itself was appointed in the charter. Well, the fact is that the Sponsor or initiator may not have the necessary skills or time to develop the project charter. In the PMBOK, it clearly says that ¯a project sponsor or initiator will either create the project charter or delegate that duty to the project manager. ‖

Work-Breakdown Structure

A Work-Breakdown Structure (WBS) in project management and systems engineering, is a deliverable-oriented breakdown of a project into smaller components. A work breakdown structure is a key project deliverable that organizes the team's work into manageable sections. The Project Management Body of Knowledge (PMBOK 5) defines the work-breakdown structure "A hierarchical decomposition of the total scope of work to be carried out by the project team to accomplish the project objectives and create the required deliverables."

A work-breakdown structure element may be a product, data, service, or any combination thereof. A WBS also provides the necessary framework for detailed cost estimating and control along with providing guidance for schedule development and control.

WBS is a hierarchical and incremental decomposition of the project into phases, deliverables and work packages. It is a tree structure, which shows a subdivision of effort required to achieve an objective; for example a program, project, and contract. In a project or contract, the WBS is developed by starting with the end objective and successively subdividing it into manageable components in terms of size, duration, and responsibility (e.g., systems, subsystems, components, tasks, subtasks, and work packages) which include all steps necessary to achieve the objective.

The work-breakdown structure provides a common framework for the natural development of the overall planning and control of a contract and is the basis fordividing work into definable increments from which the statement of work can be developed and technical, schedule, cost, and labor hour reporting can be established.

A work breakdown structure permits summing of subordinate costs for tasks, materials, etc., into their successively higher level "parent" tasks, materials, etc. For each element of the work breakdown structure, a description of the task to be performedis generated. This technique (sometimes called a system breakdown structure) is used to define and organize the total scope of a project.

The WBS is organized around the primary products of the project (or planned outcomes) instead of the work needed to produce the products (planned actions). Since the planned outcomes are the desired ends of the project, they form a relatively stable set of categories in which the costs of the planned actions needed to achieve them can be collected. A well-designed WBS makes it easy to assign each project activity to one and only one terminal element of the WBS. In addition to its function in cost accounting, the WBS also helps map requirements from one level of system specification to another, for example a requirements cross reference matrix mapping functional requirements to high level or low-level design documents. The WBS may be displayed horizontally in outline form, or vertically as a tree structure (like an organization chart).

The development of the WBS normally occurs at the start of a project andprecedes detailed project and task planning.

PROJECT SCHEDULE

A Project schedule lists all of a project's milestones, activities, and deliverables, each with start and finish dates and sequenced in a manner that allows for efficient execution. The project activities are linked by relationships, also called dependencies.

Project schedules are normally created in a software program, such as Microsoft Projects or Primavera. Another way to create a project schedule is to use a basic methodology called ball and stick, which draws out the schedule using balls for starts and finishes and the stick for durations.

Inputs & Outputs of Project Scheduling

When you sit down to plan your project schedule, you have several factors to consider. The first factor to consider is the scope of the project by answering the question: What are you trying to accomplish? The second factor is to determine your deliverables by answering: What is the end product of your project? You will then usethe technique of decomposition to help you divide your project scope and deliverables into smaller, more manageable parts. And, finally, you will use your expert project management judgment to provide input for project activities, durations, and relationships.

Once you have considered and inputted your project scope, deliverables, and decomposition, you will have three reports to help you with your project schedule. You will have an activities list, which is a comprehensive list that includes all activities to complete the project. You will also have a milestone list, which will show you portions of the project that are significant events for the project. And, you will also have a sequencing plan. Once your planning is completed, the activities and milestone lists will be sequenced in a manner to allow for efficient workflow.

Types of Scheduling Relationships

Project schedules fall under four types of scheduling relationships. Before we discuss these relationships, we need to understand two different types of tasks: **predecessor** and **successor**. A predecessor task is a task that is followed by another task once the predecessor task is finished. A successor task is one which must wait to start until the predecessor task is completed, or at least started. Now we can discussthe scheduling relationships.

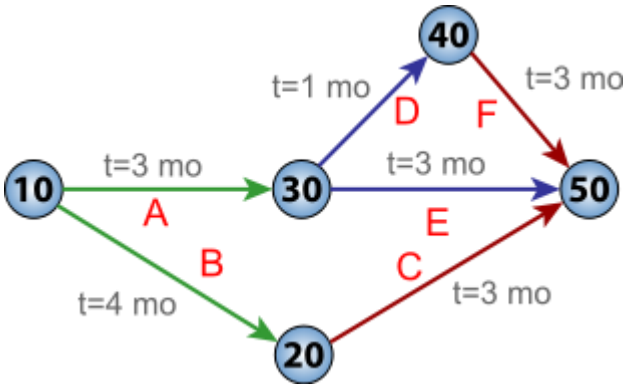
They are as follows:

- **Finish to start (FS)**: This is a logical relationship in which the successor cannot start until the predecessor is completed
- **Finish to finish (FF):** This type of activity is one in which the successor cannot finish until a predecessor finishes.
- **Start to start (SS):** This type of relationship is where a successor cannot start until a predecessor has been started
- **Start to finish (SF)**: This type of relationship is where a successor cannot finish until a predecessor starts

Please note that you can schedule leads or lags, such as a start-to-start relationshipplus one day.

The **program (or project) evaluation** and **review technique (PERT)** is a statistical tool used in project management, which was designed to analyze and represent the tasks involved in completing a given project.

First developed by the United States Navy in the 1950s, it is commonly used in conjunction with the critical path method(CPM).



PERT network chart for a seven-month project with five milestones (10 through 50) and six activities (A through F).

PERT is a method of analyzing the tasks involved in completing a given project, especially the time needed to complete each task, and to identify the minimum time needed to complete the total project. It incorporates uncertainty by making it possible to schedule a project while not knowing precisely the details and durations of all the

activities. It is more of an event-oriented technique rather than start- and completion-oriented, and is used more in projects where time is the major factor rather than cost. It is applied to very large-scale, one-time, complex, non-routine infrastructure and Research and Development projects.

Program Evaluation Review Technique (PERT) offers a management tool, which relies "on arrow and node diagrams of activities and events: arrows represent the activities or work necessary to reach the events or nodes that indicate each completed phase of the total project."

PERT and CPM are complementary tools, because "CPM employs one time estimate and one cost estimate for each activity; PERT may utilize three-time estimates (optimistic, expected, and pessimistic) and no costs for each activity. Although these are distinct differences, the term PERT is applied increasingly to all critical path scheduling."

Critical Path Methodology

Critical path methodology is used to estimate the minimum project duration (what will delay the project's completion) and how flexible the schedule can be. This flexibility is called slack, which is the amount of time that a task can be delayed without pushing the end date of the project. This is also known as free slack or free float. You can have negative float; this is also known as behind schedule. If the task's slack is negative, then the task is behind schedule. If the task's slack is positive, then that is amount of time the task can be delayed prior to delaying the project. For instance, if the task slack is two, then the task can be delayed two hours before it will negatively affect the project. If the task slack is equal to zero, then the activity is on critical path.

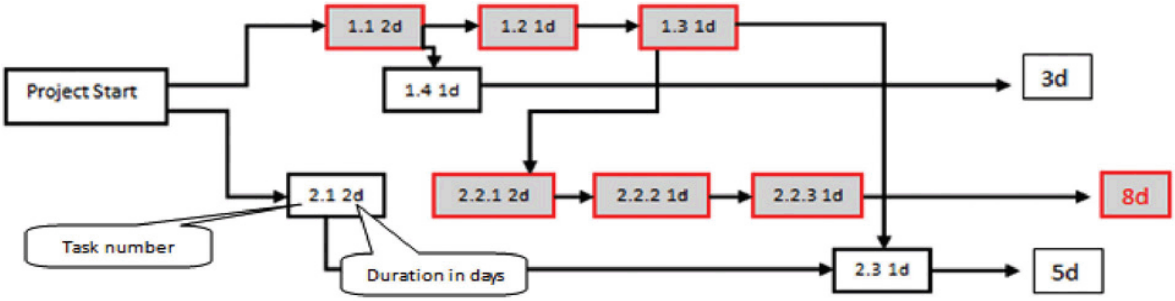


Figure Critical Path

Starting dates can be assigned to each activity by doing a forward pass proceeding from left to right in the network diagram beginning with the project start date. The dates derived by this method are the early start (ES) dates. The early start date for an activity is the earliest date the activity can begin. The estimate considers durations and resource availability calendars. To calculate early start dates, begin with the project start date and assign that date as the start date of activities that have no predecessor activities. Follow these steps to calculate the early start dates of subsequent activities, assuming finish-start relationships:

Add the predecessor activity's duration to its start date. Add the lag time or subtract the lead time.

Float, sometimes called **Slack**, is the amount of time an activity, network path, or project can be delayed from the early start without changing the completion date of the project.

Total float is the difference between the finish date of the last activity on the critical path and the project completion date. Any delay in an activity on the critical path would reduce the amount of total float available on the project. A project can alsohave negative float, which means the calculated completion date of the last activity is later than the targeted completion date established at the beginning of the project.

If activities that are not on the critical path have a difference between their early start date and their late start date, those activities can be delayed without affecting the project completion date. The float on those activities is called **free float**.

Total slack is the amount of time the whole project can be delayed without pushing the end date of the project. This is calculated by using early and late starts and early and late finishes for tasks. Total slack is calculated as the smaller value of the late finish minus the early finish when compared to early start minus the late start.

Total slack can be either **positive** or **negative**. If total slack is positive, then it indicates the amount of time the project can be delayed without extending the project. If the total slack is negative, then the project is behind schedule.

If any activity on the critical path is delayed, the completion of the project will be delayed by an equal amount. To determine the critical path, add the amount of time estimated for the duration of each activity to the previous activity. Durations are indicated in days and activities on the critical path are shaded. The critical path through these tasks takes at least eight days.

How to Calculate Slack Time in PERT Charts

Slack time, used in Program Evaluation and Review Technique (PERT), denotes how much an activity can be delayed beyond its earliest start date, without causing any problems in the completion of the project by its due date.

Also known as float, slack time is applicable only to those activities which do not lie on the critical path of the PERT chart. For all activities that lie on the critical path the earliest start time will be the same as latest start time and the earliest finish time will be the same as latest finish time.

On the other hand, all activities that lie along other paths of the PERT chart will have some difference between the earliest start time and the latest start time, and between the earliest finish time and the latest finish time. This difference in time is used to determine how much an activity can be delayed while still allowing the subsequent activities and the overall project to get completed as per schedule. The activities that lie on the critical path of the PERT chart are the most significant and must be started and completed strictly without any delay, as any delays in these activities will result in an overall delay in finishing the project.

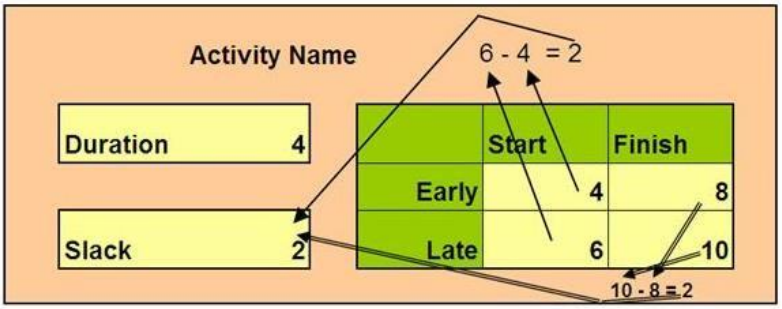
Calculating Slack Time

Calculating the slack time for an activity in a PERT chart is very easy and does not involve any complex calculations. There are two things that are needed to calculate the slack time:

- ES – the earliest time when an activity can be started
- LS – the latest time when an activity must be started

The slack time is calculated as:

Slack Time = LS-ES



Alternatively, slack time can also be calculated as the difference between the latest finish time and the early finish time. Slack time must be calculated for all activities involved in the project. Calculating the slack time is another way of tracing the critical path on a PERT chart. All activities which return a ZERO as the slack time, are the critical activities.

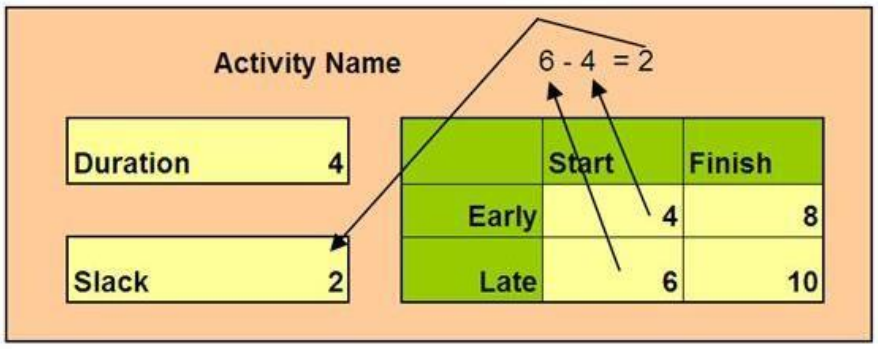
The Importance of Slack Time

Slack time is a very integral part of the project process and it must be clearly shown on the PERT chart. Ignoring slack time can lead to consequences that may compromise the overall performance and efficiency of the project. Only when the slack times have been identified will it be possible to use them to the project's advantage.

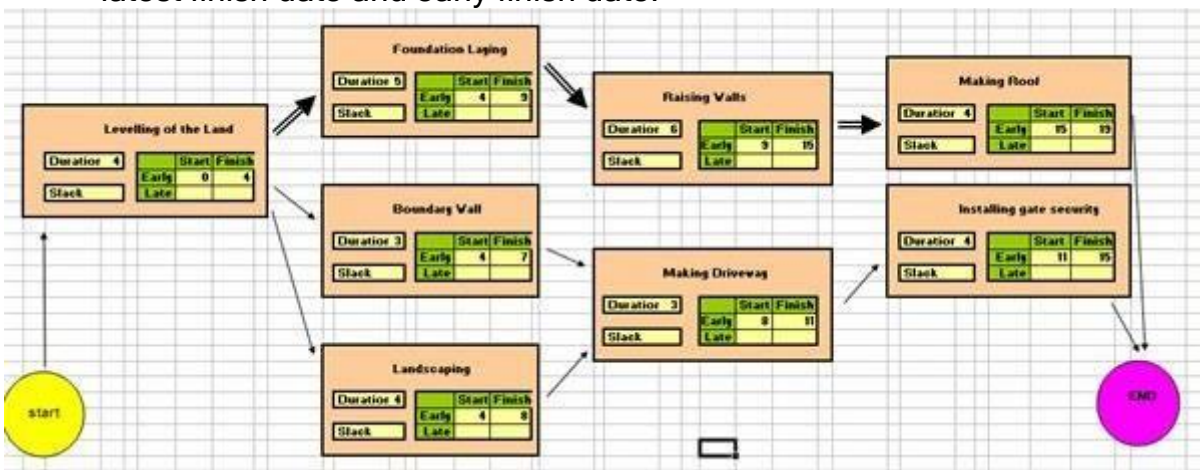
Activities which have some slack time can be delayed if resources need to be diverted elsewhere for critical activities. Also at times, devising strategies to reduce slack time brings about an overall improvement in the productivity. The process of allocating resources to shorten the critical path and thus remove or reduce slack time from the PERT chart is termed as crashing. However, crashing a project should be donewith caution as it is a cost intensive way of speeding up the process and involves heavy overhead costs, which could radically affect the total project budget.

How to Calculate and Show Slack Time on PERT Charts

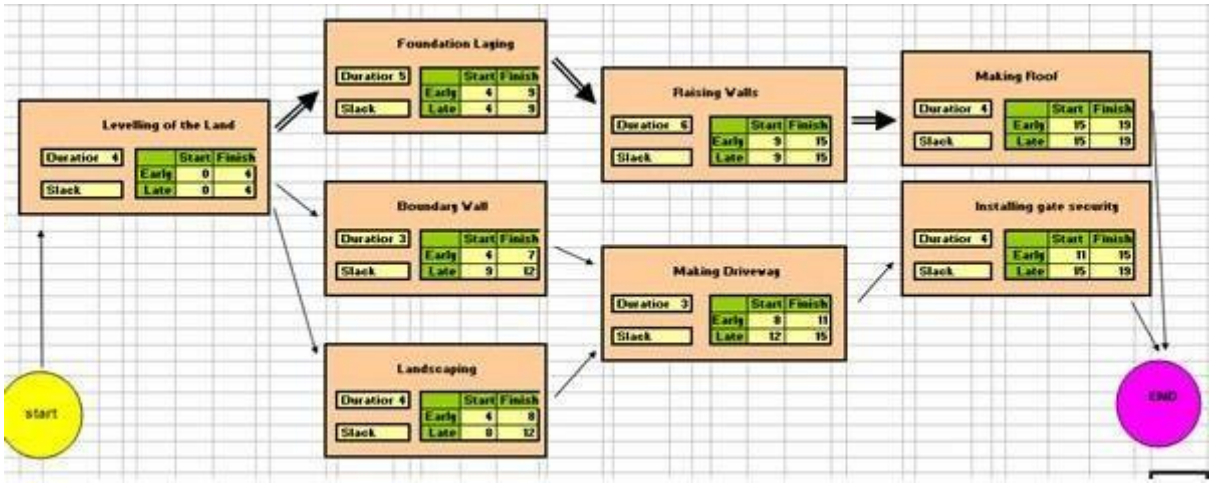
When drawing the PERT activity chart, use an activity card that shows all the time details for an activity, like the one shown in the screenshot here. The time details that all activity cards must contain are:



1. Duration: time required to complete an activity
2. Early start date
3. Early finish date – adding duration to the early start date
4. Latest start date
5. Latest finish date – adding duration to latest start date
6. Slack time – difference between latest start date and early start date or between latest finish date and early finish date.



To start filling in the time details into the activity card, begin from the first activity and fill in the early start and early finish time for each activity. The early start time for the subsequent activities will be the early finish time of the preceding activity. In case there are too many preceding activities, use the finish time of the activity which ends after all the others.



The next thing needed to calculate slack time is to determine the latest start and finish times for each activity. For this, the calculations will begin backward, from end toward start, and the maximum time needed to complete the entire project should be used as the late finish time for all the final activities. The latest start time can be calculated by subtracting the duration for each activity from its latest finish time. Where there are two or more successor activities, use the smallest late start time from among all of the activities, as the latest finish time.

Finally, to calculate the slack time for each activity, either subtract late start from early start or subtract late finish from early finish. Put in the slack time in the space provided in the activity card. To find out the critical path for the PERT chart, just follow the path of the activities where the slack time is zero.

What is Agile Project Management?

Agile project management is an iterative approach to product delivery that builds incrementally from the start of the project, instead of trying to deliver the entire product at once near the end. The approach is based on the Agile Manifesto (2001).

Agile works by breaking projects down into little bits of user functionality, prioritizing them, and then continuously delivering them in 2–4-week cycles called iterations or sprints.

Teams operate in short cycles aimed at continuous improvement to develop only what the users want. Work goals are defined by the team before each cycle starts. The team communicates directly with the customer if they have any questions concerning the function. The customer's priorities are analyzed by the Product Owner and fed into the team to keep them working on the highest priority items. The team estimates how much time work will take in an iteration, as well as how to do the work.

Performance is measured by customers at the end of the iteration. The lessons learned in each iteration are captured in retrospectives and used in future iterations. In this way, the products are constantly improved and the process for developing them also improved.

Benefits of Implementing Agile Methodologies

During the project, end-user involvement is encouraged, providing visibility and transparency. There is continuous planning and feedback throughout the process, delivering value to the business from the beginning of the project.

Companies embrace this idea of delivering business value early in the process making it easier to lower risks associated with development. Some of the main benefits of agile project management are:

<u>High Product Quality:</u>

- Regular testing to see that the product is working during the development
- Defining and elaborating requirements just in time
- Incorporating continuous integration and daily testing into the development process
- Sprint retrospectives to continuously improve processes and work
- Product is developed in incremental, rapid cycles.

Higher Customer Satisfaction

- Demonstrating working functionalities to customers
- Delivering products to market quicker and more often with every release
- Keeping customers involved and engaged

Increased Project control

- Daily Sprint meetings
- Transparency though information radiators

Reduced Risks

- Developing in sprints, ensuring a brief time between feature development
- Agile gives freedom when recent changes need to be implemented
- Adaptation to the client's needs and preferences through the development process

Faster ROI

- Focusing on Business value allowing the client to determine the priority of features
- A functional 'ready to market' product after few iterations
- Agile means fast product releases and ability to gauge customer reaction

Responsibility Assignment Matrix

A **Responsibility Assignment Matrix** (RAM), also known as **RACI** matrix or Linear Responsibility Chart (LRC), describes the participation by various roles in completing tasks or deliverables for a project or business process.

It is especially useful in clarifying roles and responsibilities in cross-functional/departmental projects and processes. RACI is an acronym derived from the four key responsibilities most typically used:

Responsible - Those who do the work to achieve the task. There is typically one role with a participation type of Responsible, although others can be delegated to assist in the work required.

Accountable. sometimes also knows as Approver or final Approving authority. This is the one ultimately accountable for the correct and thorough completion of the deliverable or task, and the one to whom Responsible is accountable. In other words,

an Accountable must sign off (Approve) on work that a Responsible provides. There must be only one Accountable specified for each task or deliverable.

Consulted - those whose opinions are sought; and with whom there is two-way communication.

Informed - those who are kept up to date on progress, often only on completion of the task or deliverable; and with whom there is just one-way communication.

MANAGING OVERALL PROJECT RISK

Introduction

Project team members at various levels identify and handle risks in different flavours. However, this will be ineffective without a structured risk management framework, as this leads to:

- Incomplete impact evaluation, leading to loss of:
  - Knowledge of the overall impact on the project objectives, like scope, time, cost, and quality
  - Identification of secondary or new risks arising from the already identified risks
- Lack of transparency and a communication gap within and outside the team

Thus, it is very important for any project organization to set up an effective risk management framework. Instituting such a practice as a project team culture ensures:

- Conscious and focused risk identification and management
- Project progress as desired, with the least amount of deviations or surprise, and in line with project and organizational objectives
- Early and effective communication of project issues to organization and project stakeholders
- An effective team building tool, as team buy-in and acceptance is assured

Exhibit shows that risk management is an iterative process and each facet of risk management should be planned and followed during each phase of the project.

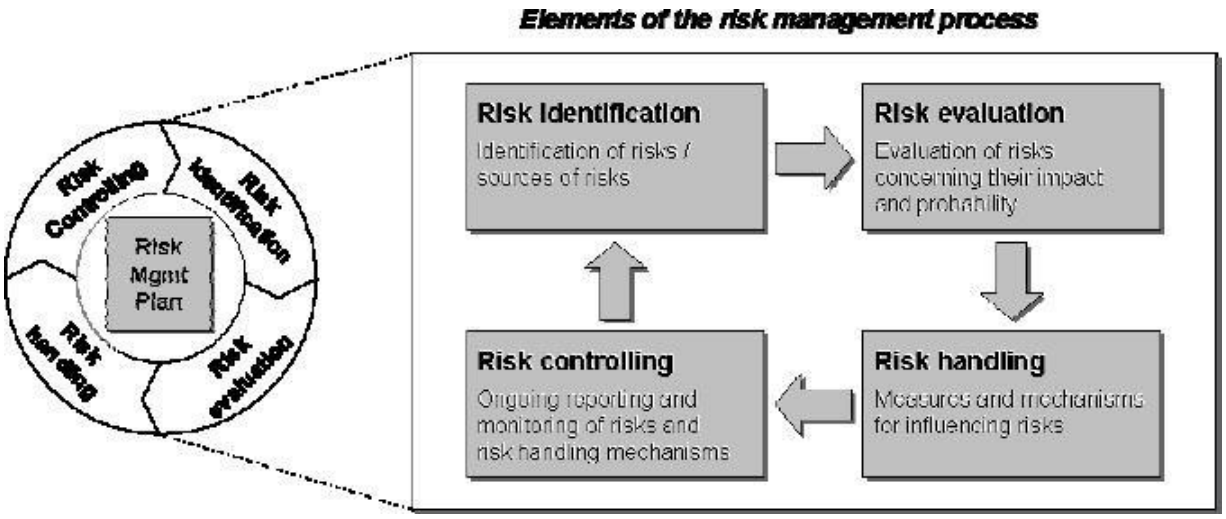


Exhibit – Risk Management Process

The risk management framework followed at Nokia Siemens Networks provides guidelines for:

- Continuous risk identification
- Risk evaluation
- Risk mitigation and contingency measure definition
- Risk monitoring and control
- Risk identification efficiency measurement

The risk management framework also provides templates and tools, such as:

- A risk register for each project to track the risks and issues identified
- A risk checklist, which is a guideline to identify risks based on the project life cycle phases
- A risk repository, which is all the risks identified across projects so far

Risk Management Plan

The organization-mandated risk management framework is reviewed and tailored to define the project risk management plan when the project is initiated. The risk management plan includes these definitions and guidelines:

- List of possible risk sources and categories
- Impact and probability matrix
- Risk reduction and action plan
- Contingency plan

- Risk threshold and metrics

Risk Identification

Risks are to be identified and dealt with as early as possible in the project. Risk identification is done throughout the project life cycle, with special emphasis during the key milestones.

Risk identification is one of the key topics in the regular project status and reporting meetings. Some risks may be readily apparent to the project team–known risks; others will take more rigor to uncover but are still predictable.

The medium for recording all identified risks throughout the project is the risk register, which is stored in the central project server.

The following tools and guidelines are used to identify risks in a structured and disciplined way, which ensures that no significant potential risk is overlooked.

1. Risk Sources

Risk Source	Description
Risk repository	The risk repository is the history data containing the list of risks identified for completed projects. The risk repository can be used to arrive at a list of potential risks for the project. This risk repository can also be filtered based on risk sources, categories, and projects.
Checklist analysis	The risk identification checklist is a questionnaire that helps identify gaps and potential risks. It is developed based on experience and project type.
Expert judgement	Risk identification is also done by brainstorming with or interviewing experienced project participants, stakeholders, and subject matter experts.
Project status	The project status includes project status meeting reports, status reports, progress reports, and quality reports. These reports provide the current project progress, issues faced, and threshold violations. These provide insight into the status of the project and potential new risks.

2. Risk Category

Risk category provides a list of areas that are prone to risk events. The organization recommends high-level, standard categories, which have to be extended based on the project type.

Risk Category	Extended categories
Technical	Requirements, Technology, Interfaces, Performance, Quality, etc.
External	Customer, Contract, Market, Supplier, etc.
Organizational	Project Dependencies, Logistics, Resources, Budget, etc.
Project Management	Planning, Schedule, Estimation, Controlling, Communication, etc.

Risk Analysis

Risk analysis involves examining how project outcomes and objectives might change due to the impact of the risk event.

Once the risks are identified, they are analyzed to identify the qualitative and quantitative impact of the risk on the project so that appropriate steps can be taken to mitigate them. The following guidelines are used to analyses risks.

3. Probability of Risk Occurrence

a. High probability – (80 % ≤ x ≤ 100%)
b. Medium-high probability – (60 % ≤ x < 80%)
c. Medium-Low probability – (30 % ≤ x < 60%)
d. Low probability (0 % < x < 30%)

4. Risk Impact

a. High – Catastrophic (Rating A – 100)
b. Medium – Critical (Rating B – 50)
c. Low – Marginal (Rating C – 10)

5. Risk Exposure

Risk Exposure or Risk Score is the value determined by multiplying the Impact Rating with Risk Probability.

		Probability			
		1 = high (80% ≤ x ≤ 100%)	2 = medium high (60% ≤ x < 80%)	3 = medium low (30% ≤ x < 60%)	4 = low (0% < x < 30%)
Impact	A=high (Rating 100)	(Exposure – Very High) (Score 100)	(Exposure – Very High) (Score 80)	(Exposure – High) (Score 60)	(Exposure – Moderate) (Score 30)
	B=medium (Rating 50)	(Exposure – High) (Score 50)	(Exposure – Moderate) (Score 40)	(Exposure – Moderate) (Score 30)	(Exposure – Low) (Score 15)
	C=low (Rating 10)	(Exposure – Low) (Score 10)	(Exposure – Low) (Score 8)	(Exposure – Low) (Score 6)	(Exposure – Low) (Score 3)

Exhibit 5 – Impact-Probability Matrix

The colors represent the urgency of risk response planning and determine reporting levels.

6. Risk Occurrence Timeframe

The timeframe in which this risk will have an impact is identified. This is classified into one of the following:

Timeframe	Description
Near	Now- until one month
Mid	next 2-6 months
Far	>6 months

In addition to classifying risks according to the above guidelines, it is also necessary to describe the impact on cost, schedule, scope, and quality in as muchdetail as possible based on the nature of the risk.

Risk Response Planning

There may not be quick solutions to reduce or eliminate all the risks facing a project. Some risks may need to be managed and reduced strategically over longer periods. Therefore, action plans should be worked out to reduce these risks. These action plans should include:

- Risk description with risk assessment
- Description of the action to reduce the risk
- Owner of the risk action
- Committed completion date of the risk action

All risk action plans should be allotted to the person identified to carry out the action plan.

1. Risk Response Plans

For each risk, a risk response must be documented in the risk register in agreement with the stakeholders. This should be ensured by the project manager.

Risk response plans are aimed at the following targets:

1. Eliminating the risk
2. Lowering the probability of risk occurrence
3. Lowering the impact of the risk on the project objectives

Risk response plans usually impact time and costs. It is therefore mandatory that the time and cost for the defined response plan are calculated as precisely as possible. Thisalso assists in selecting a response plan from the alternatives, and in verifying whether the response plan is costlier or has more impact on one of the project objectives thanthe risk itself.

After successfully implementing a set of response plans, the score of a risk could be lowered in consultation with the stakeholders.

Risk Metrics

The efficiency of risk analysis and management is measured by capturing the following metrics during project closure. The analysis results are used to decipher lessons learned, which is updated in the organization's lessons learned database.

- Number of risks that occurred / Number of risks that were identified
- Was the impact of the risks as severe as originally thought?
- How many risks recurred?
- How do the actual problems and issues faced in a project differ from the anticipated risks?

Risk Audit

This is an independent expert analysis of risks, with recommendations to enhance maturity or effectiveness of risk management in the organization. This evaluates:

- How good are we at identifying risk?
- Exhaustiveness and granularity of risks identified
- Effectiveness of mitigation or contingency plan

- Linkage of project risks to organizational risks

This is not a ―process adherence‖ audit, but an aid to enhance the quality of risk identification and risk analysis. This is also used as a forum to benchmark and identify good practices of risk management among various projects in the organization.

The risk audit is done by a group of independent domain or technical experts through documentation review and interviews. The key deliverables of this risk audit are:

- Customized checklist to evaluate the risks of a project
- Identify areas of importance for risk analysis for a project (risk taxonomy)
- Risk radar – risk-prone areas of the product group
- Potential additional risks identified based on the review
- Top 10 risks in the organization from key projects, which requires management attention

Project review

An **After-Action Review (AAR)** is a structured review or de-brief (debriefing) process for analyzing what happened, why it happened, and how it can be done better by the participants and those responsible for the project or event.

After-action reviews in the formal sense were originally developed by the U.S. Army. Formal AARs are used by all US military services and by many other non-US organizations. Their use has extended to business as a knowledge management tool and a way to build a culture of accountability.

An AAR occurs within a cycle of establishing the leader's intent, planning, preparation, action and review. An AAR is distinct from a de-brief in that it begins with a clear comparison of intended vs. actual results achieved. An AAR is distinct from a post-mortem in its tight focus on participant's own action; learning from the review is taken forward by the participants. Recommendations for others are not produced. AARs in larger operations can be cascaded in order to keep each level of the organization focused on its own performance within a particular event or project.

There are basically two types of military AARs—formal and informal. Formal AARs require more detailed planning, preparation, and resources. They are normally scheduled and conducted as a part of external and internal evaluations. Informal AARs require less planning and preparation than formal AARs and are often on-the-spotreviews of soldier and collective training performance at crew, squad, or platoon level

Formal AAR meetings are normally run by a facilitator, and can be chronological reviews or tightly focused on a few key issues selected by the team leader.

Short cycle informal AARs are typically run by the team leader or assistant and are very quick.