




بنام خدا

Sharif University of Technology
SPE Student Chapter

شاخه دانشجویی انجمن بین المللی مهندسان نفت دانشگاه صنعتی شریف

کارگاه مدیریت پروژه در صنعت نفت

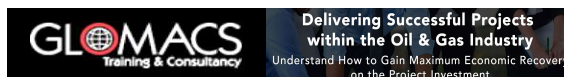
حمید آلاذپوش

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سرفصل ها

- جایگاه مدیریت پروژه، سامانه های مدیریت پروژه وزارت نفت CPMIS و PMIS
- مشخصات پروژه، طرح، پورتفولیو، مگا پروژه های ساخت و دانش بنیان
- مگا پروژه های دانش بنیان نمودن صنعت نفت، برنامه مصوب و اولویت دار وزارت نفت در ایجاد ارتباط ساختیافته صنعت، دانشگاه و دولت
- رویکرد اصلی استانداردهای مدیریت پروژه، PMBOK2017 و واکاوی عملکرد بیست ساله با تاکید بر SOPs
- فرآیندهای پروژه / مدیریت پروژه / مدیریت فناوری
- متدولوژی پروژه و مدیریت پروژه
- چهار متدولوژی مدیریت پروژه، ضرورت ها و الزامات
- مدارک اصلی مدیریت پروژه در PMBOK
- سیستم کنترل مقداری، EVMS انواع تغییرات، کنترل کلی و جامع تغییرات، تصمیم گیری و نحوه مواجهه با Scope Creep
- پیشنهاد بکارگیری چهار دستورالعمل اصلی در مدیریت پروژه های بزرگ صنعت نفت

Un-standard Syllabus & experience makes poor result



- Introduction
- Objectives
- Training Methodology
- Organizational Impact
- Personal Impact
- Who Should Attend?
- Seminar Outline
 - Preparing for Project Delivery
 - Project Planning - Schedule, Cost & Resources
 - Manage Risks & Resources
 - Managing Project Changes while Maintaining Quality
 - Staying Focused, Delivering and Closing your Project

<http://glomacs.ae/seminars/delivering-successful-projects-within-the-oil-gas-industry>

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PM proficiency and competency



requirements.



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Petroleum Project Management: Principles and Practices

- Project management and the project life cycle
- Identifying and establishing a project governance
- Early phase Planning
- Stakeholder analysis and communication planning
- Scope definition
- Establishing of Work Breakdown Structure (WBS)
- Decision gates
- Defining task dependencies and resources for the project schedule
- Determining critical path and float
- Project management & organization
- Planning for quality
- Procurement planning
- Project risk analysis
- Project change control
- Project Monitor and Control
- Economic analysis
- Project quality reviews
- Closing processes and conducting lessons learned

Lecture

Mr. Helge Hatlestad has more than 40 years' experience from the Oil and Gas industry. 3 years with Aker, 37 years with Statoil and to date as a Senior Advisor in Acona. He has had key roles within Project Control / Project Services and Field Development the first ten years, mainly on NCS.

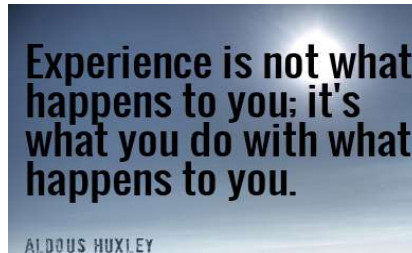
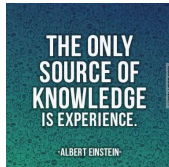
<http://www.acona.com/Product-sheets/AFD%20-%20Petroleum%20project%20management%20-%20Product%20Sheet.pdf>

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Workshop deliverable 01



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What is the single biggest problem facing Project managers, today?

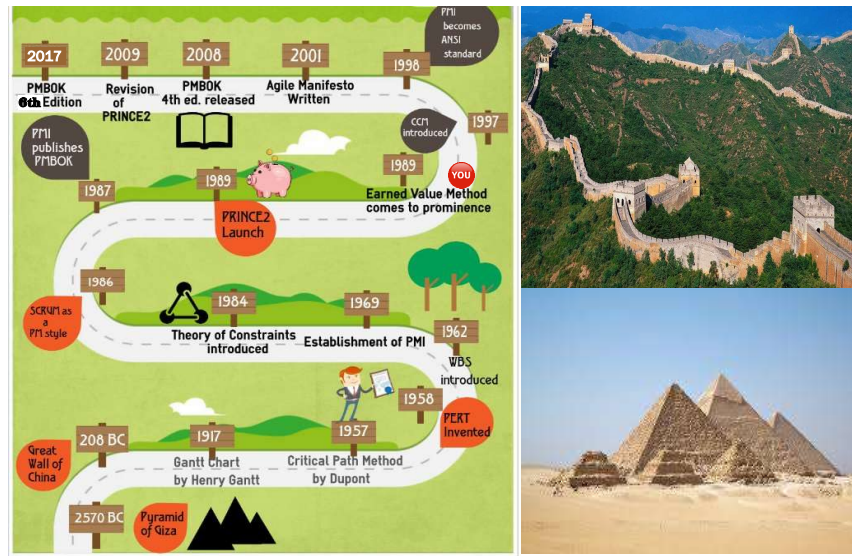
- Projects within the Oil & Gas sector face **many prominent issues** at the moment and the **challenge of delivering** large projects in the industry has become more and more difficult.
- The **challenges are increasingly** complex, delivering innovative and technological solutions, in an environment where **schedules** are compressed, budgets consistently looking for **cost** efficiencies, where **safety** is crucial and every project faces a network of **stakeholders** concerned about its impact on the **environment** and communities.
- what is your solution to the problem?
- what is unique about your solution?
- ...

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Evolution of PM



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A Brief Descriptive Analysis Mega-Science Projects

*MOP's New Approach
for Utilizing and Transfer of Technology
in Upstream and Downstream Areas
through New Petroleum Contracts*

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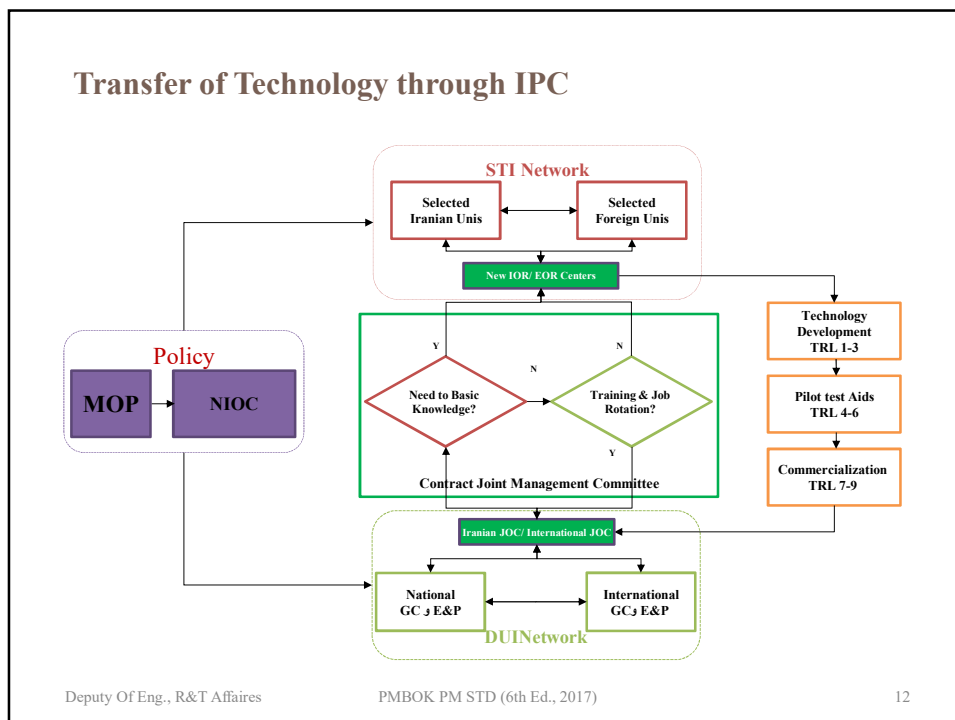
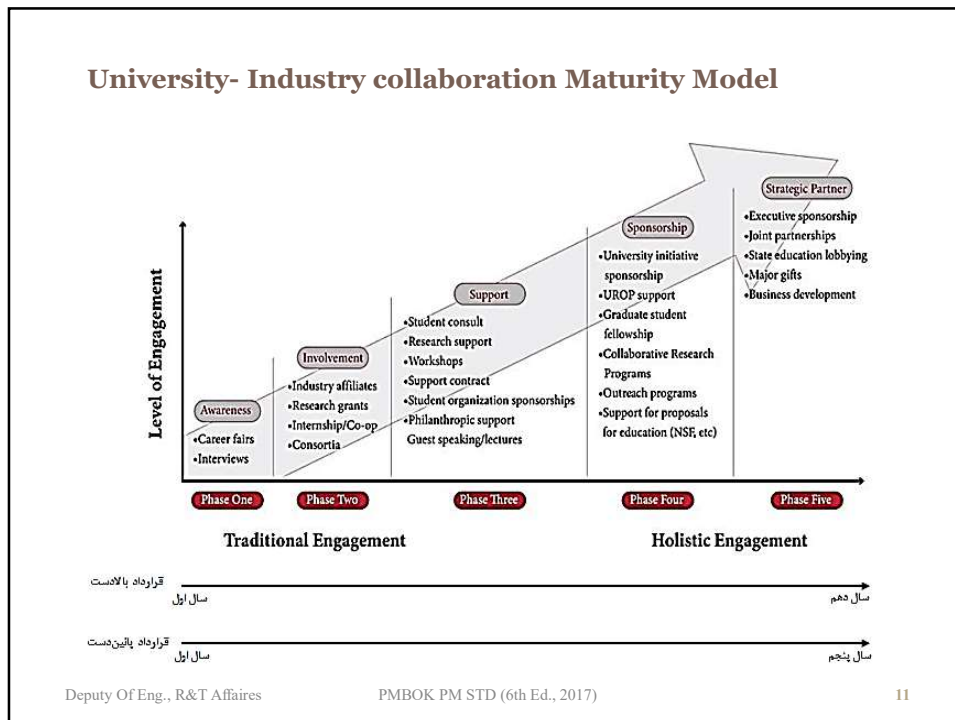
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From Old to New Approach

- Small to Large Sized Projects
- Peripheral to Science based Projects
- Decentralized to Centralized Issues
- Dispersed to Concentrated Implementation
- Partial to Integrated Execution
- Universities as Key Stakeholders





Projects Budget and Schedule (Approved by MOP)



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Workshop deliverable 02

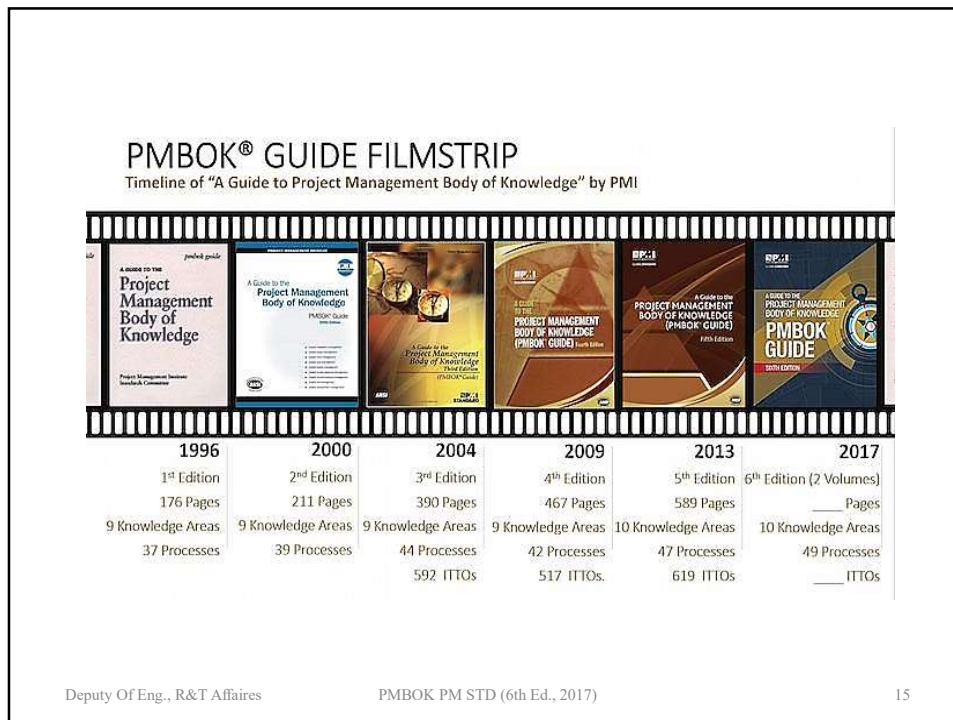
- Mega-Science projects is the Emergent Strategy of MOP New Technology Development
- Project Work Methodology is a serious Issue
- **Project Management Methodology is of great importance**
- Ready to define new International partnerships for TOT projects





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PMBOK PM Standard

- PMBOK is an Standard for Project Management.
 - PMBOK needs to be tailored to fit the needs of a project.
 - PMBOK identifies the processes that are considered good practices on most projects, most of the time
 - PMBOK is different from a methodology.
- 
- 
- A standard is a document established by an authority, custom, or general consent as a model or example.
 - A methodology is a system of practices, techniques, procedures, and rules used by those who work in a discipline. This PMBOK® Guide is a foundation upon which organizations can build methodologies, policies, procedures, rules, tools and techniques, and life cycle phases needed to practice project management.

Project

A temporary endeavor undertaken to create a unique product, service or result.

- **YOU**
 - Definite beginning & a definite end
 - Does not mean short duration
 - Produce a product or artifact, quantifiable, an end item or a component item
 - A capability to perform a service, such as call center
 - A result, such as research results or documents
 - An improvement in an existing product or service



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Project Initiation Context

Organizational leaders initiate projects in response to factors acting upon their organizations.

- **YOU**

There are four fundamental categories for these factors, which illustrate the context of a project as follows:

 - Meet regulatory, legal, or social requirements;
 - Satisfy stakeholder requests or needs;
 - Implement or change business or technological strategies; and
 - Create, improve, or fix products, processes, or services.

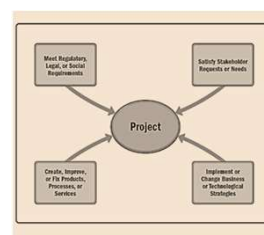


Figure 1-2. Project Initiation Context

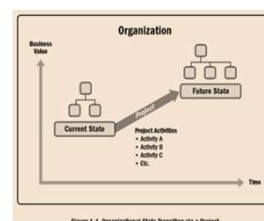


Figure 1-1. Organizational State Transition via a Project

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Project Management

The application of knowledge, skills, tools, & techniques
to project activities to meet project requirements.

PM is accomplished through the appropriate application & integration of the **49 logically grouped PM processes** categorized into 5 process groups:

- Initiating
- Planning
- Executing
- Monitoring & Controlling
- Closing



The Importance of Project Management

- Projects are a key way to **create value & benefits** in organizations.
- In today's business environment, organizational leaders need to be able to manage with **tighter budgets, shorter timelines, scarcity of resources, & rapidly changing technology** .
- The business environment is **dynamic** with an accelerating rate of change.

To remain competitive in the world economy, companies are embracing PM to consistently deliver business value.

Project Management different approach

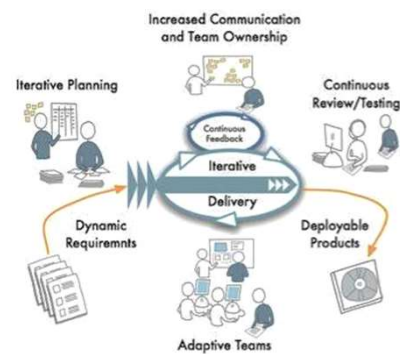
- **PMBOK PM: 1996 -2017**

The application of tools, techniques, knowledge to project activities in order to meet project deliverables & stakeholders satisfaction.

- **Agile PM: 2006**

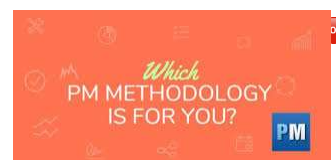
The work of energizing, empowering, & enabling project teams to rapidly & reliably deliver business value by engaging customers & continuously learning & adapting to their changing needs & environments.

It is a way of managing projects to deliver customer value via adaptive planning, rapid feedback, continuous improvement & intense human interaction & collaboration.”



PM different methodologies

- Format driven project management (FDPM)
- Contract driven project management (CDPM)
- Task driven project management (TDPM)
- Resource driven project management (RDPM)



Different changes

- Primary/Secondary, Internal/External, Important/Not important, Dependent /Independent, Body/Environment, Predictable/Predicted/Unpredictable, Visible / Invisible, Measureable / Measured / Non-measurable, Positive/Negative.

How do you answer changes

you

- Directive vs. **Supportive**
- Strategic, **Managerial**, Operational
- Rational, Intuitive, **Algorithmic**, Contingent, Heuristic
- Standardization, **Integration**, Centralization, & Optimization



Workshop deliverable 03



- Which project management approach is relevant and efficient for your project?
- Which project management methodology is for your organization?
- How do you answer to project changes?

Effective PM helps organizations to:

- Meet business objectives;
- Satisfy stakeholder expectations;
- Be more predictable;
- Increase chances of success;
- Deliver the right products at the right time;
- Resolve problems & issues;
- Respond to risks in a timely manner;
- Optimize the use of organizational resources;
- Identify, recover, or terminate failing projects;
- Manage constraints (e.g., scope, quality, schedule, costs, resources);
- Balance the influence of constraints on the project (e.g., increased scope may increase cost or schedule) and;
- Manage change in a better manner.



The result of Poorly or the absence of PM

- Missed deadlines,
- Cost overruns,
- Poor quality,
- Rework,
- Uncontrolled expansion of the project,
- Loss of reputation for the organization,
- Unsatisfied stakeholders, and
- Failure in achieving the objectives for which the project was undertaken



Program Management

It is defined as the application of knowledge, skills, & principles to a program to achieve the program objectives & to obtain benefits & control not available by managing program components individually.

It focuses on the **interdependencies between projects**, & between projects and the program level to determine the optimal approach for managing them through the following actions:

- Aligning with the organizational or strategic direction that affects program & projects
- Allocating the program scope into program components;
- Managing interdependencies among the components of the program;
- Resolving issues between component projects & the program level;
- Assuring benefits realization from the program & component projects
- Allocating budgets across multiple projects within the program;
- Managing program risks that may impact multiple projects;
- Resolving constraints & conflicts that affect multiple projects; and
- Managing change requests within a shared governance framework;



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Portfolio Management

It is defined as projects, programs, subsidiary portfolios, & operations managed as **a group to achieve strategic objectives** & also confirms that the portfolio is consistent with & aligned with organizational strategies through centralizing management of one or more portfolios.

The aim of portfolio management is to:

- Guide organizational investment decisions.
- Select the optimal mix of programs/projects to meet strategic objectives.
- Prioritize team & physical resource allocation.
- Increase the likelihood of realizing the desired return on investment.
- Centralize the management of the aggregate risk profile of all components.

Maximizing the value of the portfolio requires careful examination of the components that comprise the portfolio.



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Relationship of Project, Program, Portfolio

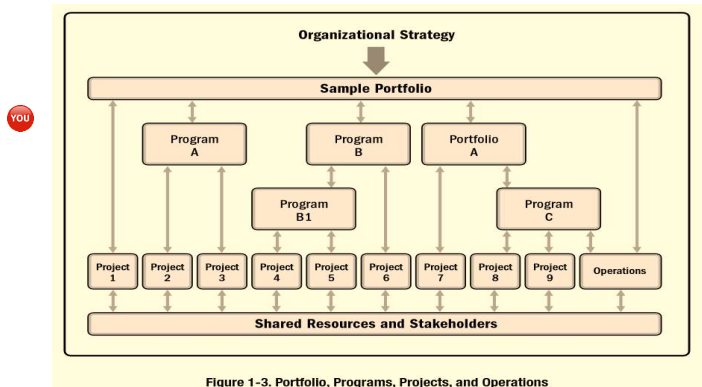


Figure 1-3. Portfolio, Programs, Projects, and Operations

PMBOK® Guide Key Components

PMBOK® Guide Key Component	Brief Description
Project life cycle (Section 1.2.4.1)	The series of phases that a project passes through from its start to its completion.
Project phase (Section 1.2.4.2)	A collection of logically related project activities that culminates in the completion of one or more deliverables.
Phase gate (Section 1.2.4.3)	A review at the end of a phase in which a decision is made to continue to the next phase, to continue with modification, or to end a program or project.
Project management processes (Section 1.2.4.4)	A systematic series of activities directed toward causing an end result where one or more inputs will be acted upon to create one or more outputs.
Project Management Process Group (Section 1.2.4.5)	A logical grouping of project management inputs, tools and techniques, and outputs. The Project Management Process Groups include Initiating, Planning, Executing, Monitoring and Controlling, and Closing. Project Management Process Groups are not project phases.
Project Management Knowledge Area (Section 1.2.4.6)	An identified area of project management defined by its knowledge requirements and described in terms of its component processes, practices, inputs, outputs, tools, and techniques.

PM Process Group

And

Knowledge Area Mapping

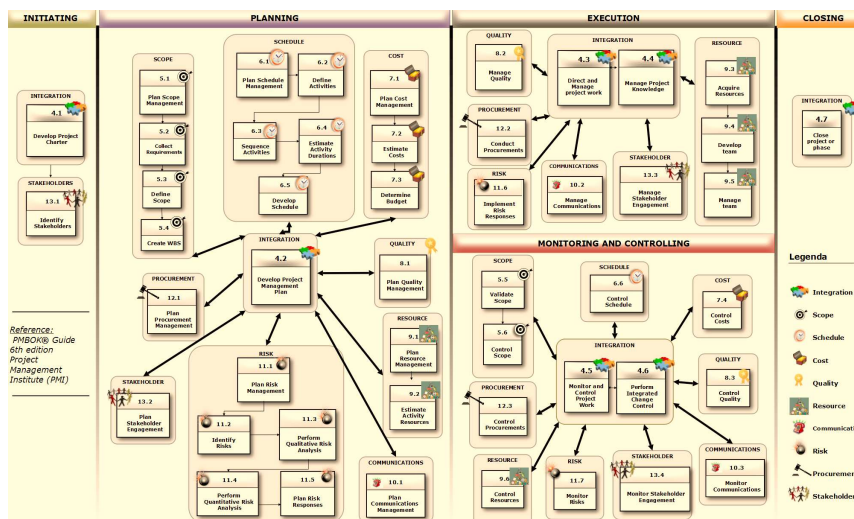
Knowledge Areas	Project Management Process Groups				
	Initiating Process Group	Planning Process Group	Executing Process Group	Monitoring and Controlling Process Group	Closing Process Group
4. Project Integration Management	4.1 Develop Project Charter	4.2 Develop Project Management Plan	4.3 Direct and Manage Project Work 4.4 Manage Project Knowledge	4.5 Monitor and Control Project Work 4.6 Perform Integrated Change Control	4.7 Close Project or Phase
5. Project Scope Management		5.1 Plan Scope Management 5.2 Collect Requirements 5.3 Define Scope 5.4 Create WBS		5.5 Validate Scope 5.6 Control Scope	
6. Project Schedule Management		6.1 Plan Schedule Management 6.2 Define Activities 6.3 Sequence Activities 6.4 Estimate Activity Durations 6.5 Develop Schedule		6.6 Control Schedule	
7. Project Cost Management		7.1 Plan Cost Management 7.2 Estimate Costs 7.3 Determine Budget		7.4 Control Costs	
8. Project Quality Management		8.1 Plan Quality Management	8.2 Manage Quality	8.3 Control Quality	
9. Project Resource Management		9.1 Plan Resource Management 9.2 Estimate Activity Resources	9.3 Acquire Resources 9.4 Develop Team 9.5 Manage Team	9.6 Control Resources	
10. Project Communications Management		10.1 Plan Communications Management	10.2 Manage Communications	10.3 Monitor Communications	
11. Project Risk Management		11.1 Plan Risk Management 11.2 Identify Risks 11.3 Perform Qualitative Risk Analysis 11.4 Perform Quantitative Risk Analysis 11.5 Plan Risk Responses	11.6 Implement Risk Responses	11.7 Monitor Risks	
12. Project Procurement Management		12.1 Plan Procurement Management	12.2 Conduct Procurements	12.3 Control Procurements	
13. Project Stakeholder Management	13.1 Identify Stakeholders	13.2 Plan Stakeholder Engagement	13.3 Manage Stakeholder Engagement	13.4 Monitor Stakeholder Engagement	

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Project Management Process Groups



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PM Data & Information

Project data are **regularly collected & analyzed** throughout the project life cycle regarding project data & information:

- **Work performance data.** The raw observations & measurements identified during activities performed to carry out the project work & are usually recorded in a PMIS System.
- **Work performance information.** The performance data collected from various controlling processes, analyzed in context & integrated based on relationships across areas.
- **Work performance reports.** The physical or electronic representation of work performance information compiled in project documents, which is intended to generate decisions or raise issues, actions, or awareness.

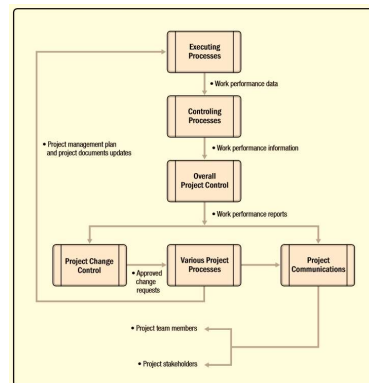


Figure 1-7. Project Data, Information, and Report Flow

The Importance of the Internet of Things (IoT) for PM

One of the biggest predicted PM trends 2016 was the Internet of Things (IoT). It is clear that sooner or later it will also affect project management.

- Changes the way teams collaborate
- Increases efficiency thanks to Big Data
- Enhances the role of the project manager
- Changes PM software tools
- Requires a new standard



Workshop deliverable 04



The project managers select/ adapt the appropriate PM processes, inputs, tools, techniques, outputs, EEFs, & OPAs for using on their specific projects.

YOU

Project Management Plan	Project Documents	
1. Scope management plan	1. Activity attributes	19. Quality control measurements
2. Requirements management plan	2. Activity list	20. Quality metrics
3. Schedule management plan	3. Assumption log	21. Quality report
4. Cost management plan	4. Basis of estimates	22. Requirements documentation
5. Quality management plan	5. Change log	23. Requirements traceability matrix
6. Resource management plan	6. Cost estimates	24. Resource breakdown structure
7. Communications management plan	7. Cost forecasts	25. Resource calendars
8. Risk management plan	8. Duration estimates	26. Resource requirements
9. Procurement management plan	9. Issue log	27. Risk register
10. Stakeholder engagement plan	10. Lessons learned register	28. Risk report
11. Change management plan	11. Milestone list	29. Schedule data
12. Configuration management plan	12. Physical resource assignments	30. Schedule forecasts
13. Scope baseline	13. Project calendars	31. Stakeholder register
14. Schedule baseline	14. Project communications	32. Team charter
15. Cost baseline	15. Project schedule	33. Test and evaluation documents
16. Performance measurement baseline	16. Project schedule network diagram	
17. Project life cycle description	17. Project scope statement	
18. Development approach	18. Project team assignments	

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Two Critical Documents;

YOU

1- Project Charter

A document issued by the project sponsor that **formally authorizes** the existence of a project & provides the project manager with the authority to apply organizational resources to project activities.

2- Project Management Plan

- It is defined as the document that describes how the project will be executed, monitored, & controlled.
- The process of defining, preparing, and coordinating all plan components and consolidating them into an integrated document

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Project Success Measures

One of the most common challenges in PM is determining whether or not a project is successful.

- The PM metrics of **time, cost, scope, & quality** have been the most important factors in defining the project success.
- Project success should be measured regarding to the **project objectives**.
- Project stakeholders may have **different ideas** as to what the successful completion of a project will look like & which factors are the most important.
- It is critical to **clearly document** the project objectives & to select objectives that are measurable.
- The project team needs to be able to assess the project situation, **balance the demands**, & maintain proactive communication with stakeholders to deliver a successful project.

Workshop deliverable 05



A KPI is a measurable value that demonstrates how effectively a company is achieving key business objectives.

- **PMIS, CPMIS** provides access to IT software tools, such as cost & scheduling software tools, work authorization systems, configuration management systems, information collection & distribution systems, as well as interfaces to other online automated systems.
- Automated gathering and reporting on key performance indicators (KPI) can be part of this system. (PMBOK2017)



KPI for Engineering and Design projects

Subject	Indicator	Definition or Calculation
SCOPE	Scope Variance	Variation Orders (\$) / Contractual Value (\$)
	Scope Variance Review	Project Change Requests Submitted (\$) / Project Change Requests Reviewed (\$)
	Approved Scope Variance	Variation Orders (\$) / Project Change Requests (\$)
SCHEDULE	Progress Performance	Work Performed [%] / Work Scheduled [%]
	Schedule Variance (Days)	Number of Days ahead (positive) or behind schedule (negative)
	Schedule Performance Indicator (SPI)	Budgeted cost of work performed (\$) / Budgeted cost of work scheduled (\$)
	Engineering On-Time Delivery (OTD)	Number of Deliverables released on time / Total number of Deliverables
COST	Cost Performance Indicator (CPI)	Budgeted cost of work performed (\$) / Actual cost of work performed (\$)
QUALITY	Engineering First Pass Yield (FPY)	Number of Deliverables submitted without rejection / Total number of Deliverables
	Non-Conformity Resolution	Number of NCRs Resolved / Number of NCRs
	Cost of Non-Conformity	Total Cost Associated to Non-Conformity Resolution
	Cost of Changes	Cost of Non-Billable Changes (\$) / (Contract Amount (\$) + Variation Orders (\$))
	Revised Documents	Number of Revised Documents related with Corrections / Total Number of Documents and or Revisions
	Redesign	Number of Man-Hours Spent on Redesign Tasks
	Omissions	Number of Man-Hours Spent on Omissions Resolution
RESOURCE	Customer Satisfaction	Customer Satisfaction Evaluation
	Outsourcing Rate	Number of external partners / Number of own engineering staff
	Capacity Utilization	Allocated demand of active projects [h] / Total available productive capacity [h]
	Productivity	Earned Man-hours [h] / Spent Man-Hours [h]
RISK	Contentious Payment	Contentious Amount (\$) / (Contract Amount (\$) + Variation Orders (\$))
	Financial Exposure Risk	(Due Amount / Approved Credit) / (Average Payment Aging / Approved Payment Time)
	Descope Risk	Most likely Descope Amount (\$) / (Contract Amount (\$) + Variation Orders (\$))
	Delay Penalty Risk	Most likely Delay Penalty Amount (\$) / (Contract Amount (\$) + Variation Orders (\$))
	Lack of Quality Risk	Most Likely Cost of NCRs, Redesigns and Omissions (\$) / (Contract Amount (\$) + Variation Orders (\$))
FINANCIAL	Milestone Recognition	Payment Milestones Approved (\$) / Payment Milestones Completed (\$)
	Payment Compliance	Overdue Payment (\$)
	Overdue Aging	Sum(Overdue Amount x Overdue Days) / Sum(Overdue Amount)
	Cash-Flow Balance	Payment Cash-Flow (\$) / Expenditure Cash-Flow (\$)

by Daniel Campos | 2018
www.linkedin.com/in/dfcampos

Project manager competences

PMI Framework to the skills needed by project managers is the triangle focuses on three key skill set:

- 1. Technical PM.** The knowledge, skills, & behaviors related to specific domains of project, program, & portfolio management. The technical aspects of performing one's role.
- 2. Leadership.** The knowledge, skills, & behaviors needed to guide, motivate, & direct a team, to help an organization achieve its business goals.
- 3. Strategic & business management.** The knowledge of & expertise in the industry & organization that enhanced performance & better delivers business outcomes.

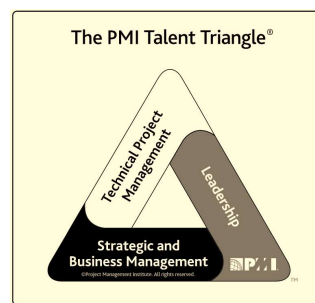


Figure 9-2. The PMI Talent Triangle®

Team management & leadership compared

Management	Leadership
Direct using positional power	Guide, influence, and collaborate using relational power
Maintain	Develop
Administrate	Innovate
Focus on systems and structure	Focus on relationships with people
Rely on control	Inspire trust
Focus on near-term goals	Focus on long-range vision
Ask how and when	Ask what and why
Focus on bottom line	Focus on the horizon
Accept status quo	Challenge status quo
Do things right	Do the right things
Focus on operational issues and problem solving	Focus on vision, alignment, motivation, and inspiration

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Project stakeholders

An individual, group, or organization that may affect, be affected by, or perceive itself to be affected by a decision, activity, or outcome of a project.

There are different stakeholders as follows:

- Actively/ passively **involved**, or unaware of the project.
- Have a positive/ negative **impact** on the project, or by the project.
- **Internal** (Sponsor, Resource manager, PMO, Portfolio steering committee, Program manager, Project managers of other projects, &Team members).
- **External** (Customers, End users, Suppliers, Shareholders, Regulatory bodies, & Competitors)

Stakeholder	Unaware	Resistant	Neutral	Supportive	Leading
Stakeholder 1	C			D	
Stakeholder 2			C	D	
Stakeholder 3				DC	

Figure 13-6. Stakeholder Engagement Assessment Matrix



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Scope Creep

In PM refers to changes, continuous or uncontrolled growth in a project's **scope**, at any point after the project begins. It can occur when the **scope** of a project is not properly defined, documented, or controlled.

Table 5-1. Elements of the Project Charter and Project Scope Statement

Project Charter	Project Scope Statement
Project purpose Measurable project objectives and related success criteria High-level requirements High-level project description, boundaries, and key deliverables Overall project risk Summary milestone schedule Preapproved financial resources Key stakeholder list Project approval requirements (i.e., what constitutes success, who decides the project is successful, who signs off on the project) Project exit criteria (i.e., what are the conditions to be met in order to close or to cancel the project or phase) Assigned project manager, responsibility, and authority level Name and authority of the sponsor or other person(s) authorizing the project charter	Project scope description (progressively elaborated) Project deliverables Acceptance criteria Project exclusions

Workshop deliverable 06



- Is your firm guilty of Scope Creep?
- How much is Scope Creep really costing your firm?
- How do you train your employees to have the right conversations with your clients?
- How do your project managers prevent scope creep, in the organization?
- Set clear expectations
- Mention the monster acknowledge
- Keep track of changes
- Speak up sooner
- Put it in writing
- Get approval and readjust



Project Management Tools and Techniques

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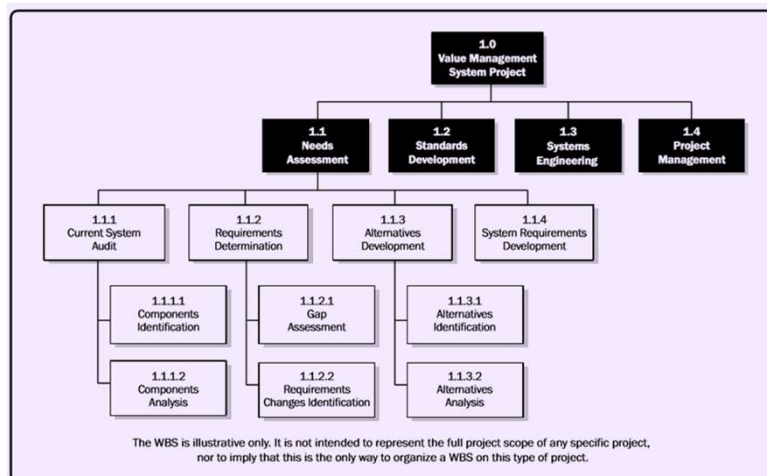
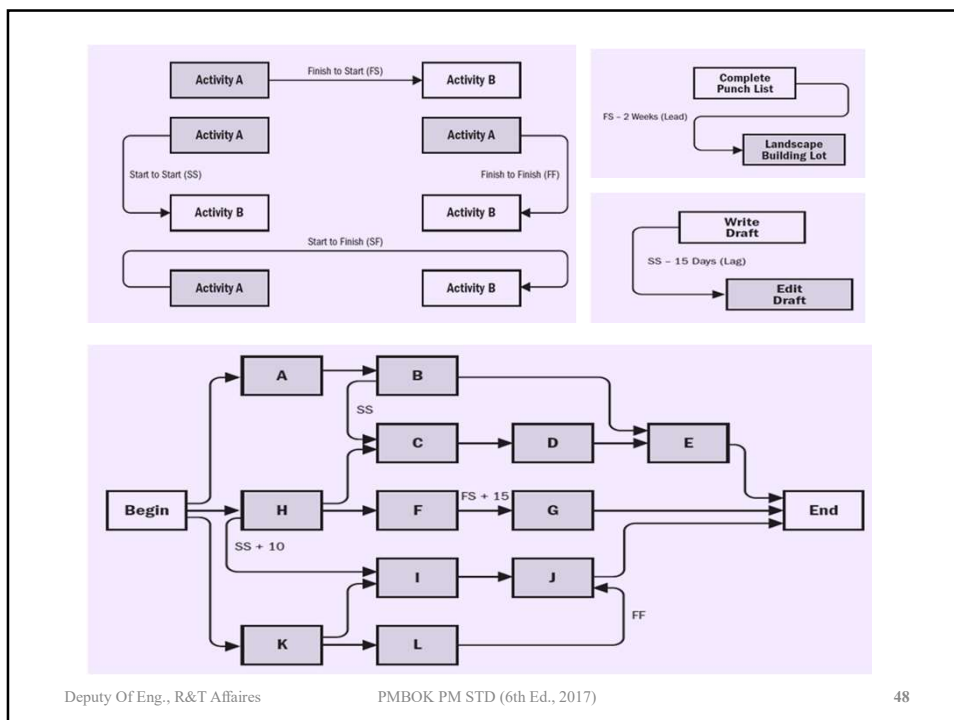
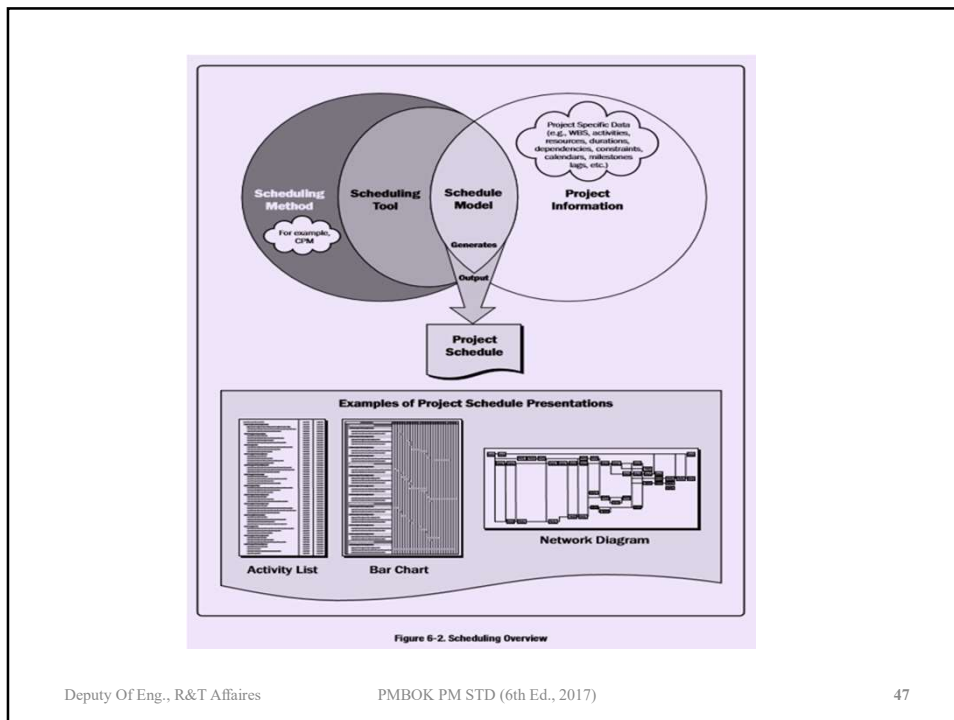
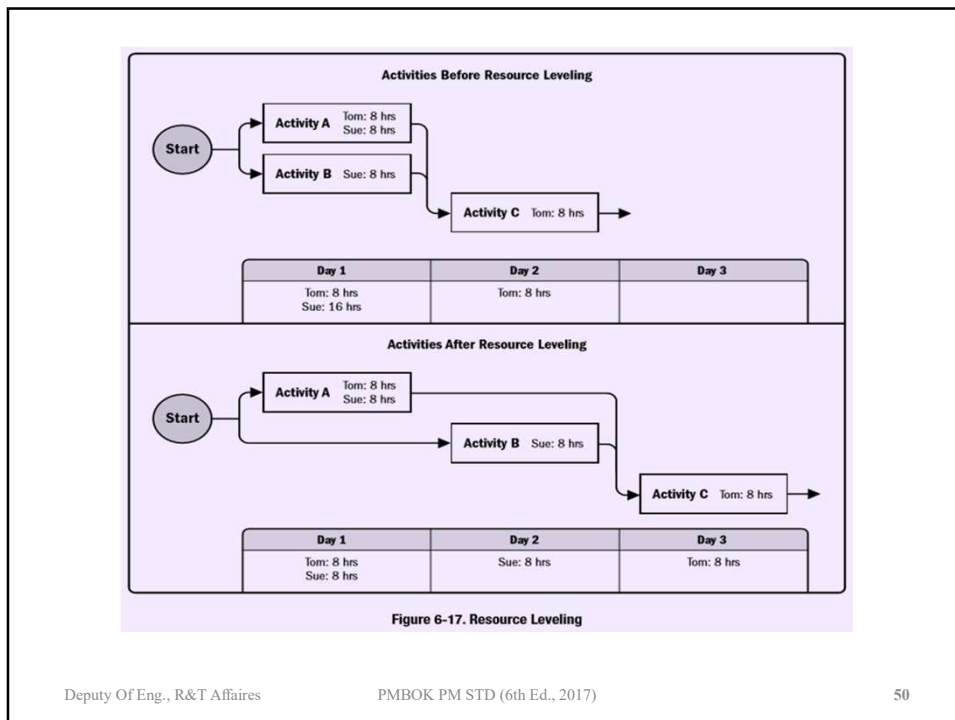
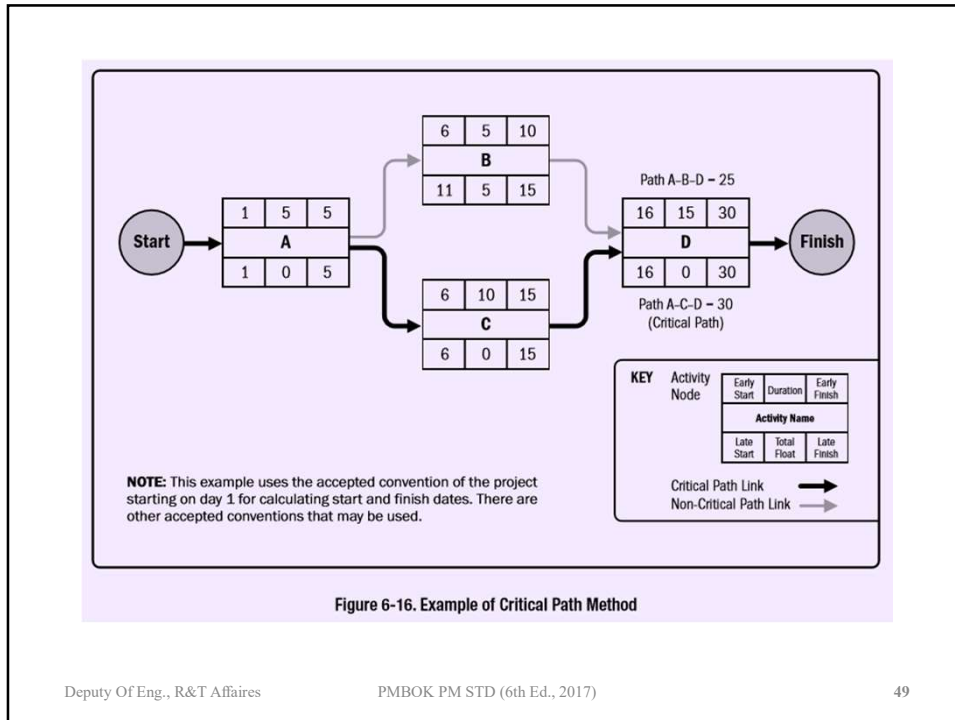


Figure 5-12. Sample WBS Decomposed Down Through Work Packages





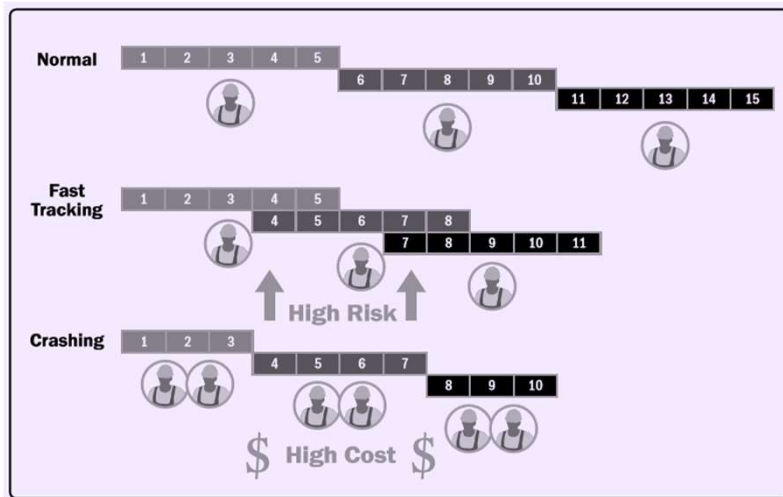


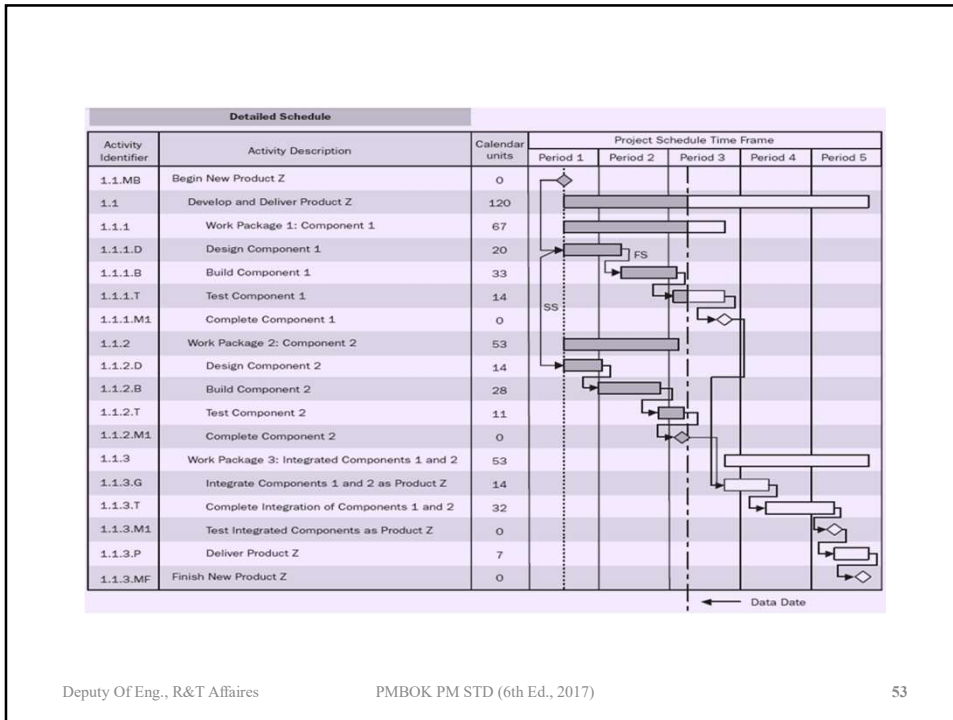
Figure 6-19. Schedule Compression Comparison

Milestone Schedule							
Activity Identifier	Activity Description	Calendar units	Project Schedule Time Frame				
			Period 1	Period 2	Period 3	Period 4	Period 5
1.1.MB	Begin New Product Z	0	◆				
1.1.1.M1	Complete Component 1	0			◆		
1.1.2.M1	Complete Component 2	0			◆		
1.1.3.M1	Complete Integration of Components 1 & 2	0					◆
1.1.3.MF	Finish New Product Z	0					◆

← Data Date

Summary Schedule							
Activity Identifier	Activity Description	Calendar units	Project Schedule Time Frame				
			Period 1	Period 2	Period 3	Period 4	Period 5
1.1	Develop and Deliver New Product Z	120	[Bar chart showing duration from Period 1 to Period 5]				
1.1.1	Work Package 1: Component 1	67	[Bar chart showing duration from Period 1 to Period 3]				
1.1.2	Work Package 2: Component 2	53	[Bar chart showing duration from Period 1 to Period 2]				
1.1.3	Work Package 3: Integrated Components 1 and 2	53	[Bar chart showing duration from Period 2 to Period 5]				

← Data Date



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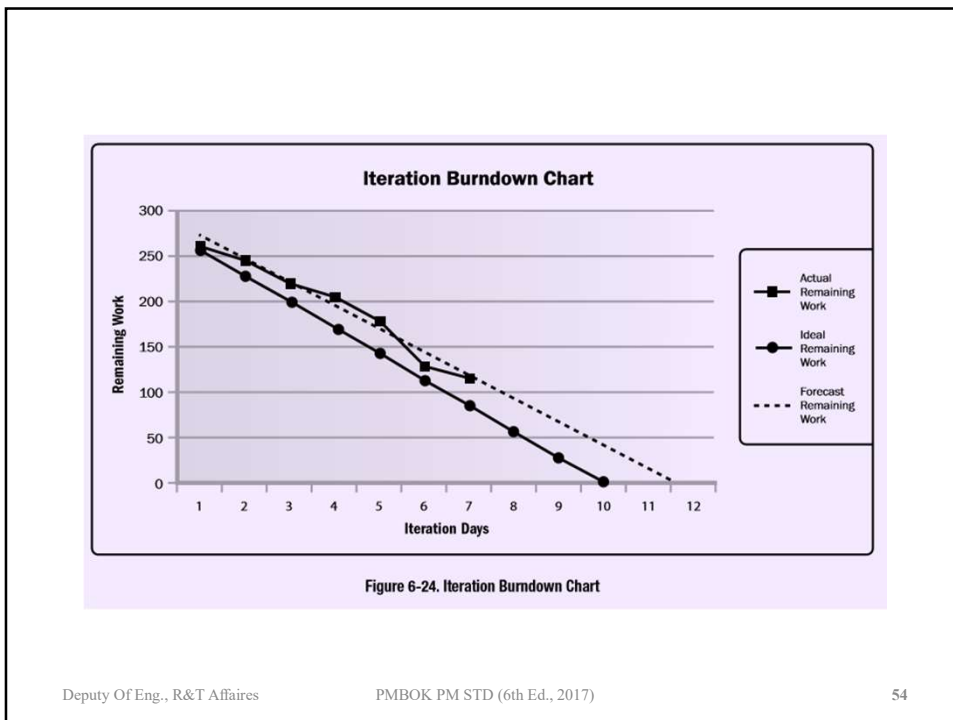
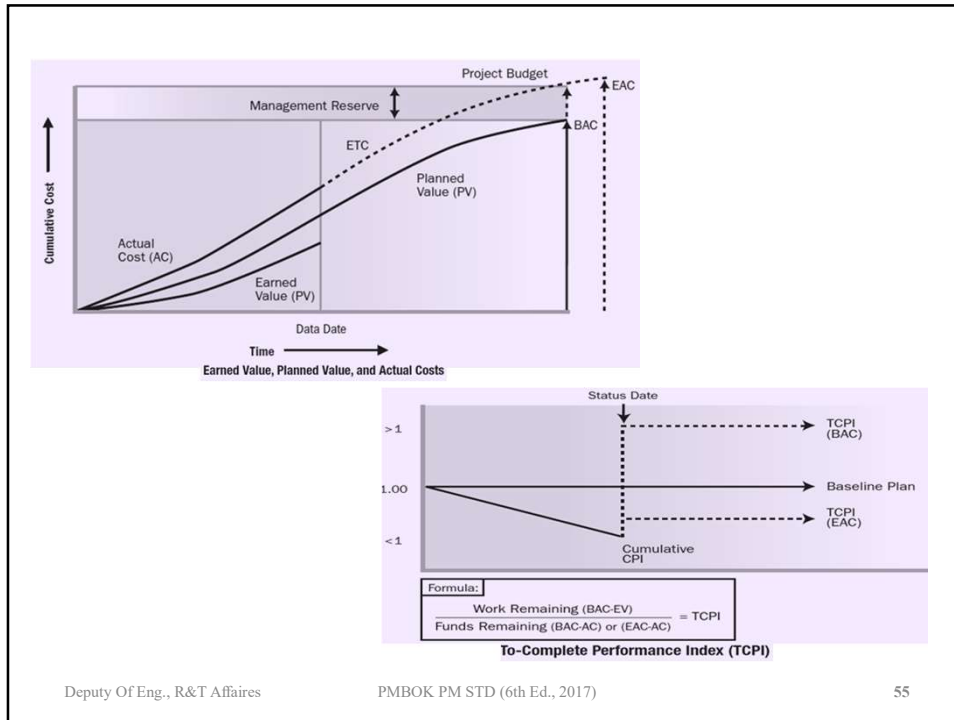


Figure 6-24. Iteration Burndown Chart

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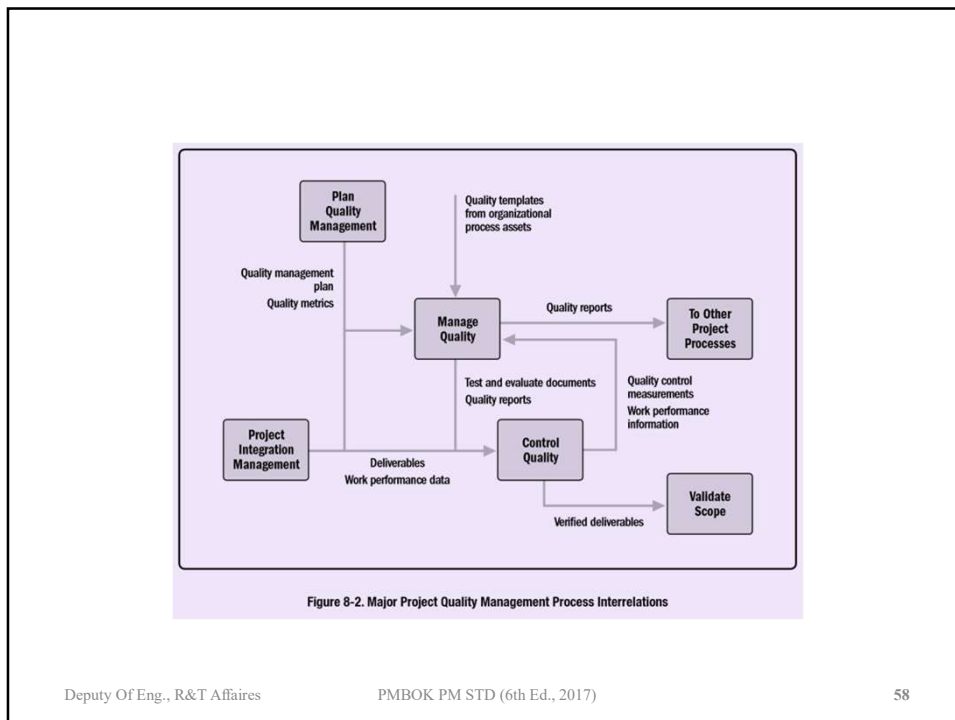
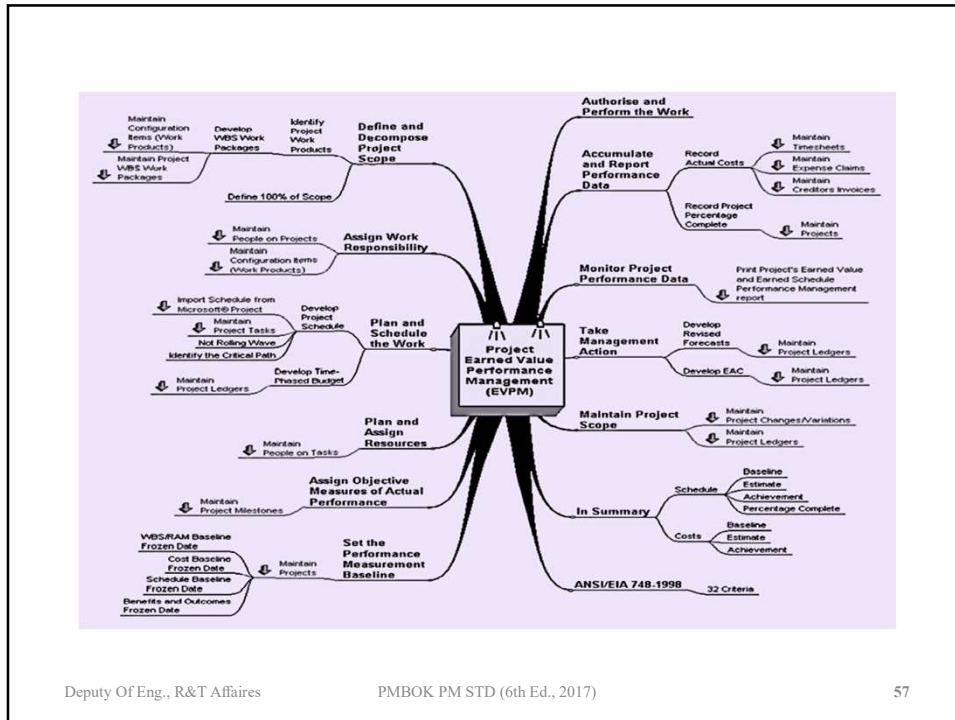
Table 7-1. Earned Value Calculations Summary Table

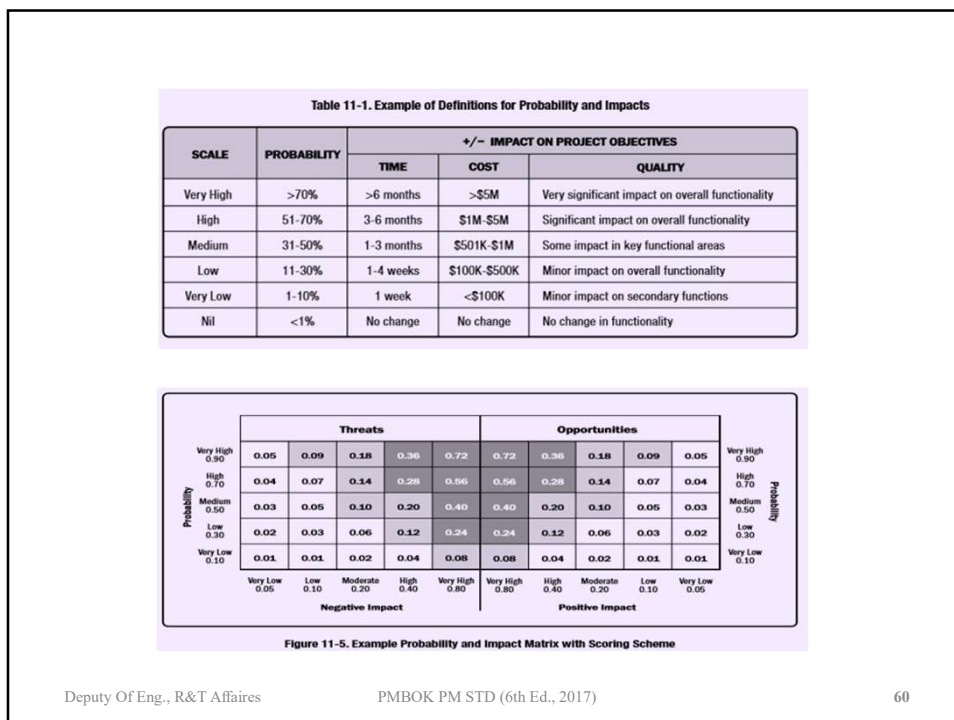
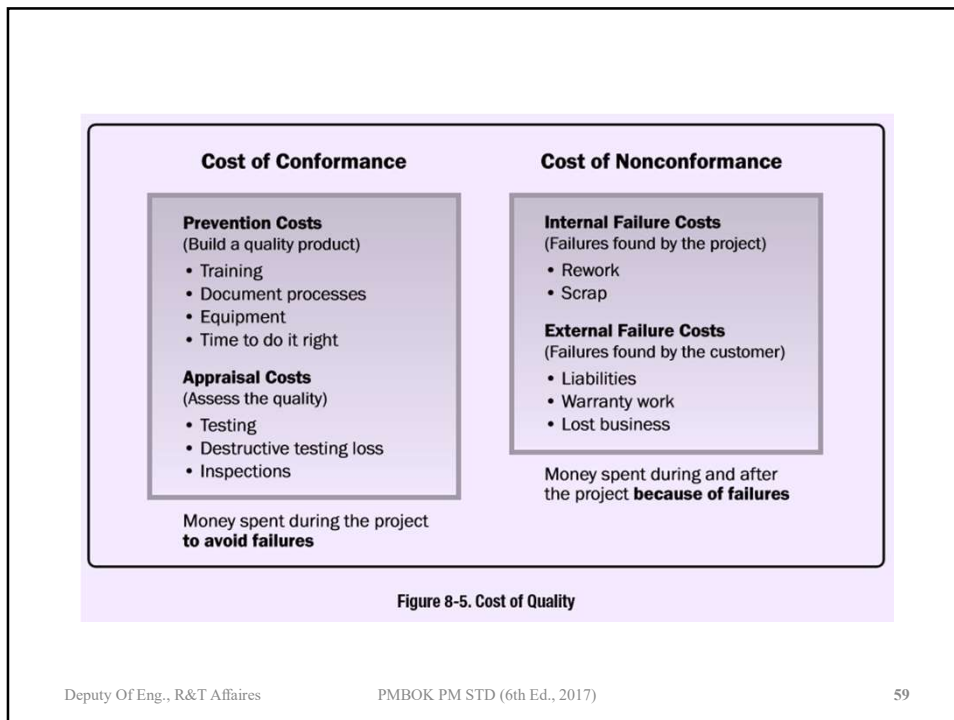
Earned Value Analysis					
Abbreviation	Name	Lesson Definition	How Used	Equation	Interpretation of Result
PV	Planned Value	The authorized budget assigned to scheduled work.	The value of the work planned to be completed to a point in time, usually the data date, or project completion.		
EV	Earned Value	The measure of work performed expressed in terms of the budget authorized for that work.	The planned value of all the work completed (earned) to a point in time, usually the data date, without reference to actual costs.	$EV = \text{sum of the planned value of completed work}$	
AC	Actual Cost	The realized cost incurred for the work performed on an activity during a specific time period.	The actual cost of all the work completed to a point in time, usually the data date.		
BAC	Budget at Completion	The sum of all budgets established for the work to be performed.	The value of total planned work, the project cost baseline.		
CV	Cost Variance	The amount of budget deficit or surplus at a given point in time, expressed as the difference between the earned value and the actual cost.	The difference between the value of work completed to a point in time, usually the data date, and the actual costs to the same point in time.	$CV = EV - AC$	Positive – Under planned cost Neutral – On planned cost Negative – Over planned cost
SV	Schedule Variance	The amount by which the project is ahead or behind the planned delivery date, at a given point in time, expressed as the difference between the earned value and the planned value.	The difference between the work completed to a point in time, usually the data date, and the work planned to be completed to the same point in time.	$SV = EV - PV$	Positive – Ahead of Schedule Neutral – On schedule Negative – Behind Schedule
VAC	Variance at Completion	A projection of the amount of budget deficit or surplus, expressed as the difference between the budget at completion and the estimate at completion.	The estimated difference in cost at the completion of the project.	$VAC = BAC - EAC$	Positive – Under planned cost Neutral – On planned cost Negative – Over planned cost
CPI	Cost Performance Index	A measure of the cost efficiency of budgeted resources, expressed as the ratio of earned value to actual cost.	A CPI of 1.0 means the project is exactly on budget, that the work actually done so far is exactly the same as the cost so far. Other values show the percentage of how much costs are over or under the budgeted amount for work accomplished.	$CPI = EV/AC$	Greater than 1.0 – Under planned cost Exactly 1.0 – On planned cost Less than 1.0 – Over planned cost
SPI	Schedule Performance Index	A measure of schedule efficiency, expressed as the ratio of earned value to planned value.	An SPI of 1.0 means that the project is exactly on schedule, that the work actually done so far is exactly the same as the work planned to be done so far. Other values show the percentage of how much costs are over or under the budgeted amount for work planned.	$SPI = EV/PV$	Greater than 1.0 – Ahead of schedule Exactly 1.0 – On schedule Less than 1.0 – Behind schedule
EAC	Estimate At Completion	The expected total cost of completing all work expressed as the sum of the actual cost to date and the estimate to complete.	If the CPI is expected to be the same for the remainder of the project, EAC can be calculated using: If future work will be accomplished at the planned rate, use: $EAC = AC + BAC - EV$ If the actual plan is no longer valid, use: $EAC = AC + \text{Bottom-up ETC}$ If both the CPI and SPI influence the remaining work, use: $EAC = AC + ((BAC - EV) / (CPI * SPI))$	$EAC = BAC/CPI$ $EAC = AC + BAC - EV$ $EAC = AC + \text{Bottom-up ETC}$ $EAC = AC + ((BAC - EV) / (CPI * SPI))$	
ETC	Estimate to Complete	The expected cost to finish all the remaining project work.	Assuming work is proceeding on plan, the cost of completing the remaining authorized work can be calculated using: Reestimate the remaining work from the bottom-up.	$ETC = EAC - AC$ $ETC = \text{Reestimate}$	
TCPI	To Complete Performance Index	A measure of the cost performance that must be achieved with the remaining resources in order to meet a specified management goal, expressed as the ratio of the cost to finish the outstanding work to the budget available.	The efficiency that must be maintained in order to complete on plan. The efficiency that must be maintained in order to complete the current EAC.	$TCPI = (BAC - EV) / (BAC - AC)$ $TCPI = (BAC - EV) / (EAC - AC)$	Greater than 1.0 – Harder to complete Exactly 1.0 – Same to complete Less than 1.0 – Easier to complete Greater than 1.0 – Harder to complete Exactly 1.0 – Same to complete Less than 1.0 – Easier to complete

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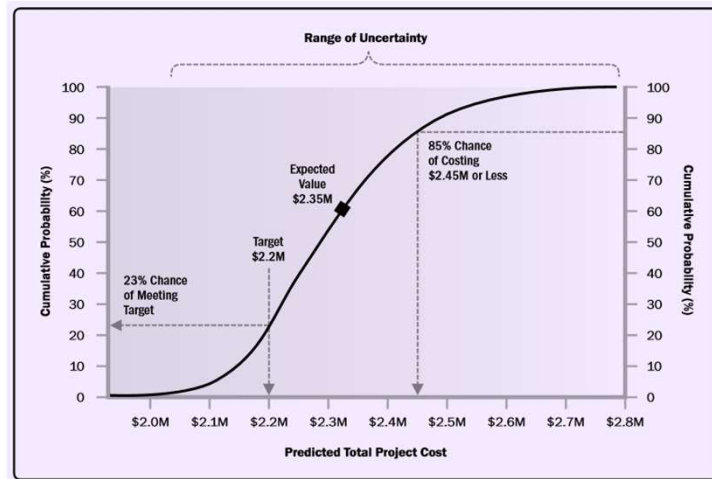


Figure 11-13. Example S-Curve from Quantitative Cost Risk Analysis

Table 12-1. Comparison of Procurement Documentation

Procurement Management Plan	Procurement Strategy	Statement of Work	Bid Documents
How procurement work will be coordinated and integrated with other project work, particularly with resources, schedule, and budget	Procurement delivery methods	Description of the procurement item	Request for information (RFI), Request for quote (RFQ), Request for proposal (RFP)
Timetable for key procurement activities	Type of agreements	Specifications, quality requirements and performance metrics	
Procurement metrics to manage the contract	Procurement phases	Description of collateral services required	
Responsibilities of all stakeholders		Acceptance methods and criteria	
Procurement assumptions and constraints		Performance data and other reports required	
Legal jurisdiction and currency used for payment		Quality	
Information on independent estimates		Period and place of performance	
Risk management issues		Currency; payment schedule	
Prequalified sellers, if applicable		Warranty	

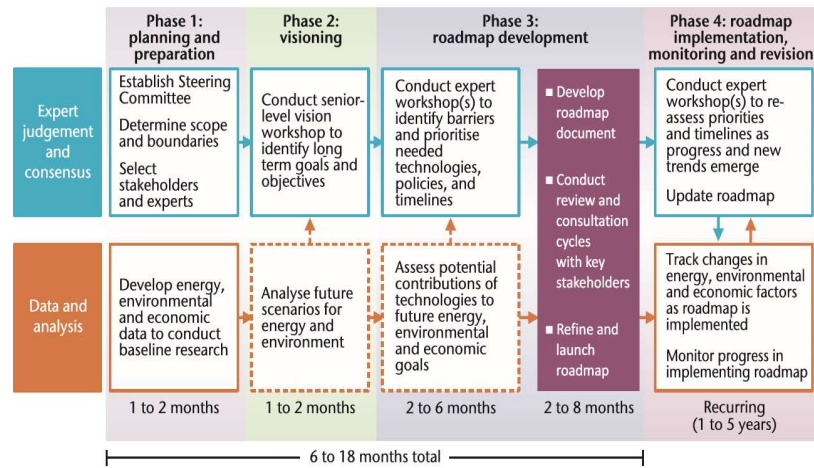


Key elements of a successful roadmap

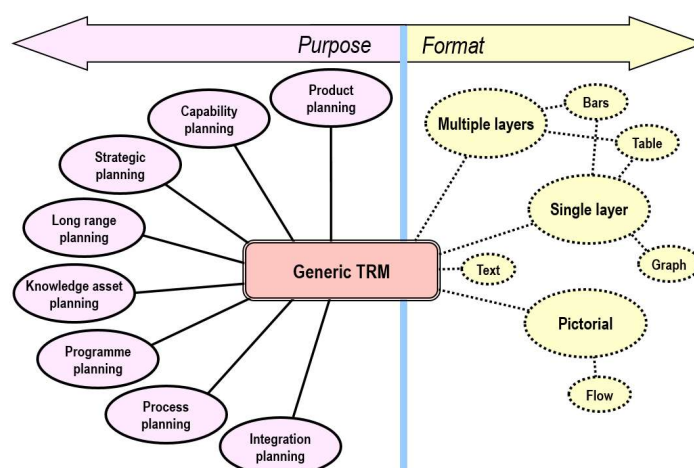
- **Goals** a clear and concise set of targets :
, that, if achieved will result in the desired outcome;
- **Milestones**: the interim performance targets for achieving the goals,
- **Gaps and barriers**: a list of any potential gaps to achieving the goals and milestones
- **Action items**: actions that can be taken to overcome any gaps or barriers that stand in the way of achieving the goals
- **Priorities and timelines**: a list of the most important actions that need to be taken in order to achieve the goals & the time frames, taking into account interconnections among those actions & stakeholder roles & relationships.



The roadmap development process



Types of roadmap: purpose and format



Tailoring the roadmap process

There is no right way to develop a roadmap. **Identifying the level of stakeholder participation** a designing in step important most the is .process roadmap

Key factors to consider

There are six vital aspects to consider when designing a roadmap process:

- stakeholder participation
- resource constraints
- critical inputs
- roadmap design
- buy-in and dissemination
- monitoring and tracking.

follow process & progress will follow!

Thank you for your attention

Reference:

- Project Management Institute (2017), “A Guide to the Project Management Body of Knowledge”, sixth edition, PMI press
- Energy Technology Roadmaps (2014), “A guide to development and implementation”, International Energy Agency