Project Management Framework

Project: a temporary endeavour undertaken to create a unique product, service or result

A project is:

Temporary –

- definite start & definite end
- project is temporary not the result
- team created for project released at the end
- definite objectives

Unique –

- created for the first time or created differently
- different owner, different design, different location, different risks, different durations, different contractors, different results, different constraints etc

Progressively elaborated -

- proceeds in steps (also described as progressive detailing or rolling wave planning)
- accompanies temporary and unique
- developing in steps
- continuing by increments

Project Management – the application of knowledge, skills, tools and techniques to project activities to meet the project requirements

Tripe constraints – delicate balance of 3 key factors i.e. scope, time and cost, other factors are risks, requirements and quality

Projects Vs Programs Vs Portfolios:

Business value leads to strategy leads to portfolio leads to programs and projects on one hand and operations on the other hand

Project Management Office: central project and programs office ensuring that all projects and programs are executed and monitored in similar way i.e. in accordance with the strategy of the organization. PMO is like the Air Traffic Controller (ATC) of an airport.

Types of PMO –

- Supportive PMO – consultative role
- Controlling PMO - compliance
- Directive PMO –includes both consulting and compliance

PMO roles could be – sharing resources, best practices ownership, centralized configuration management, OPA repository, mentoring, centralized monitoring, and dashboards

EEF – internal or external factors that affect the project i.e. political, geographical etc scenario of the region the project is executed in, the availability of manpower and skills, tools and techniques, raw materials, economic conditions, standards and regulations etc

EEF is an input to 27 out of 47 processes i.e. 57 %

OPA – the organization's processes, policies, procedures and knowledge bases that may influence the success of a project. The PM should make reuse of the Organization Assets

OPA is an input to 38 out of 47 processes i.e. 81 %

Corporate Knowledge base – collective knowledge and lessons learned to be used for future work / projects

Stakeholders – anyone who can either affect or get affected by the project

- Stakeholder requirements must be incorporated in to the project plan
- Stakeholder identification is a continuous process and must be done throughout the project
- Overlooking potentially negative stakeholders can increase risk of failure
- In case of stakeholder conflict the resolution should generally favour the customer

Projects are created because of operations i.e. to create of enhance an existing operation of the organization, the actual end of the project is when the project deliverables are handed over to operations

Organizational culture – norms, beliefs, methods and procedures (degree of project management maturity) attitude toward authority and work ethics etc, it has profound effect of project success

Organizational structures – functional, matrix and projectized

Functional	Matrix	Projectized
- Aligning people by specialization - Also called silo or stovepipe organization - PM tends to have very limited authority - PM is from VP Staff – is called Project Expeditor – little authority - PM from CEO's staff – is called Project Coordinator – still low Advantages – easier management of specialists, clear accountability & reporting Disadvantages – more emphasis on functional speciality than project needs, no career path, project not a priority	Vertical functional lines are maintained but adds a horizontal structure for the project manager Weak matrix – little power, PM role is like expeditor or coordinator Balanced Matrix – equal power for project and functions, PM power is low to moderate Strong Matrix – moderate to high power to PM, in matrix organization team members report to more than one boss	Team members are assigned to a project on a full time basis, PM has high to almost total authority Advantages – ultimate authority to PM, efficient project organization, loyalty to the project, more effective communication, physical collocation of the team Disadvantages – no home when project completes, may not maintain professionalism in functional disciplines, duplication of facilities, job functions and individual resources

Advantages and Disadvantages of Matrix Organization:

Advantages –

- project objectives are more visible,
- improved PM control over resources (compared to functional),

- more support from functional disciplines
- better utilization of resources / time sharing
- people maintain a functional home
- better information flow than functional (vertical and horizontal)

Disadvantages –

- more than one boss for teams
- complex information flow
- different priorities (functional versus projectized)
- team members are borrowed so getting commitment may be difficult
- extensive effort needed to establish policies and procedures
- difficult resource allocation & project priority issues

In a weak matrix PM is not even called a PM, its either coordinator or facilitator or expeditor

Coordinator has more powers than an facilitator or an expeditor

Processes of Project Management – series of activities with defined **Inputs** and **Outputs**, 47 processes grouped in to 10 knowledge areas and five process groups

10 knowledge areas are ISTCQHCRPS; 5 process groups are IPECC

Sponsor is not the customer; sponsor is anyone who appoints the project manager

Sponsoring organization – this may be PMO as well

Competencies of a project manager – can be grouped as knowledge, performance, personal

Interpersonal skills required in project manager – leadership, team building, motivation, communication, influencing, decision making, political and cultural awareness, negotiating, trust building, conflict management, coaching

Organizational governance – checks, measures, processes, reporting structure etc ensures than the organization does projects only which are in line with the organizational strategy

Project governance – an oversight function that encompasses the entire lifecycle of the project, it provides a comprehensive and consistent method of controlling the project and ensure success

Project Lifecycle – sequential or overlapping phases, cost and staffing low at start, peak in the middle and fall off at the end, level of uncertainty / risk is greatest at the start, ability of stakeholders to influence the project outcomes is greatest at the start and grows progressively lower, cost of changes is lower at the start and higher as the project continues

Project Information – 3 distinct stages of project information

1. Work Performance Data – raw data from project at any point of time
2. Work Performance Information – conversion of WPD in to meaningful information
3. Work Performance Report – information in presentable format

Project Team Vs Project Management Team – project team is all people working for the project while project management team is the people managing the project

If people take leaves (even planned) and they are not available when required, this is a resource constraint

If the project manager has to ask permission from the functional manager and can't overrule him, she is working in a functional organization

In a matrix type organization there in improved project manager control over resources compared to a functional organization

Because a project done in a matrix organization involves people from across the organization, communications are more complex

The company policies are managed by the PMO and the project manager should make sure that if any stakeholder (including the team members who were old friends of the project manager) has any concerns / apprehensions about the company policies, he should send them to PMO

The project lifecycle is different for each industry

Manufacturing a new product – it's a process not a project so project charter is not appropriate

Project Integration Management: Six Processes

Develop Project Charter – developing a document that formally authorizes the existence of a project and provides the project manager with the authority to apply organizational resources to project activities, Project Charter is created, documents initial scope, PM is assigned, justifies the project, is signed by Senior Manager or Project Initiator

Inputs	Tools & Techniques	Outputs
Project Scope of Work, Business case, Agreements, EEF and OPA	Expert Judgement, Facilitation Techniques	Project Charter

Develop Project Management Plan – defining, preparing and coordinating all subsidiary plans and integrating them in to a comprehensive project management plan. The project's integrated baselines and subsidiary plans may be included within the project management plan

Inputs	Tools & Techniques	Outputs
Project Charter, Outputs from Planning processes, EEF & OPA	Expert Judgement, facilitation techniques	Project Management Plan

Direct & Manage Project Work – leading and performing work defined in the project management plan and implementing approved changes to achieve the project's objectives

Inputs	Tools & Techniques	Outputs
Project Mgmt Plan, Approved Change Requests, EEF & OPA	Expert Judgement, PMIS, Meeting	Deliverables, Work Performance Data, Change Requests, Proj Mgmt Plan Updates, Proj Doc Updates

Monitor & Control Project Work – tracking, reviewing and reporting project progress against the performance objectives defined in the project management plan, deviations are controlled

Inputs	Tools & Techniques	Outputs
Project Mgmt Plan, schedule forecasts, cost forecasts, validated changes, work performance information, EEF & OPA	Expert Judgement, Analytical Techniques, PMIS, Meetings	Change Request, Work Performance Reports, Proj Mgmt Plan Updates, Proj Doc Updates

Perform Integrated Change Control – reviewing all change requests; approving changes and managing changes to deliverables, organizational process assets, project documents and the project management plan; and communicating their disposition, change control is done here

Inputs	Tools & Techniques	Outputs
Project Mgmt Plan, Work Performance Reports, Change Requests, EEF & OPA	Expert Judgement, Meetings Change Control Tools	Approved Change Requests, Change Log, Proj Mgmt Plan Updates, Proj Doc Updates

Close Project or Phase – finalizing all activities across all of the project management process groups to formally complete the phase or project , Phase or project is closed

Inputs	Tools & Techniques	Outputs
Project Mgmt Plan, Accepted Deliverables, OPA	Expert Judgement, Analytical techniques, meetings	Final Product, service or result transition, OPA updates

Management by objectives – 3 step process to:

1. Establish clear objectives
2. Measure achievements
3. Adjust performance, if needed

A common mechanism for approving or rejecting changes - change control board

3 important things that must be accompanied as a part of closing a project

1. Lessons learned
2. Products / services handover

3. Archival

If a change request affects any baseline it must be taken up by CCB or the PM can handle it

Project Charter – a written document that formally recognizes and authorizes the project

Expert Judgement – Tool for 25 out of 47 processes, ti means person / group whose input would be more crucial in getting the output of the process. Includes sponsor, consultants, stakeholders etc

EEF – all external and internal factors and systems that will influence the relative success of the project

OPA – all of an organization's processes, policies, procedures and knowledge bases

Project charter should document – needs / SOW, purpose, business case, justification, objectives and success criteria, high level project description & requirements, high level project assumptions, constraints and risks, high level risks, budget and milestones, high level stakeholder influences, approval requirements assigned project manager, name and authority of the sponsor

Methods of project selection – PV, NPV & IRR

$PV = FV / (1+i)^n$ or $FV = PV * (1+i)^n$

PV Present Value – financial calculation for finding out the current value of future cash flow, higher the PV the better it is

NPV – Summation of PV for a number of years, positive value of PV is a good thing

IRR – Internal Rate of Return – the interest rate at which net present value (NPV) of the costs equals to the net present value of benefits, Higher the IRR, the better it is

BCR – Benefits Cost Ratio; BEP – Break Even Point; Payback Period – time taken to reach BEP

Depreciation - amount by which things loose their value over time

Opportunity cost – the amount of investment lost by investing in one of the options

Murder Board – method of project selection which is qualitative based rather than quantitative

Project Charter officially sanctions the project, sponsor pays for the project

Develop Project Charter is the first process in any project, project charter gives authority to the PM to spend money and use other company resources

Business Case – tells everyone why the project should be done, project charter tells that the project has actually started

The project charter does not include details about what will be produced or how instead, it contains the summary milestone schedule. What will be produced is in the SOW.

2 Inputs for Develop Project Charter are contract and Statement of Work (SOW) contract is the agreement. SOW lists all the deliverables that the PM & team need to produce

EEF tells you how your company does business, an important EEF is work authorization system, which determines how work is assigned and ensures that tasks are done in the right order

OPA tells you how your company normally runs projects; one of the most important OPA is lessons learned

Project Plan – a key integrative document that is usually developed by the entire team, it is used to guide both the execution and control of the project

Project Management Plan – a formal, approved document used to manage and control the project , should be distributed as defined in the communication mgmt plan. Its formal – which means written down and distributed to the team. You always begin dealing with change by consulting the project manage plan

Changes may include

- Corrective action – to bring expected future performance back in line with the plan
- Preventive action – to reduce the probability of negative consequences
- Defect repair -identification of a defect to repair or replace

Change request is a recommended change. Once it gets approved it is called a change

The body that approves or rejects a change request is called the change control board

16 processes have change requests as Outputs but only ICC has change requests as input because its only in this process where the change requests may be approved or rejected

Everything that is a deviation must go through Integrated Change Control

If the change affects any baseline it must be handled by the CCB or the PM can take care

Closing a phase or project is also referred to as "administrative closure"

Most important thing done in CP process is "lessons learned"

Accepted deliverables are the Inputs to CP process other than project mgmt plan and OPA, its output is final product, service or result transition & OPA updates

An objective is "clear" if different parties can agree on the same meaning

MBO is most successful, if it is supported by the top management. The biggest reason for the failure of MBO is "lack of support from senior management"

Meeting stakeholder needs is a vital part of successful project management

PMIS is tools and technique to two processes – direct & manage proj work and monitor & control proj work

Validated changes is an input to only one process i.e. monitor & control proj work

Work Performance Information is an input to the process monitor & control proj work & its output is Work Performance Report

Approved change requests become input to 3 other processes i.e. 1) direct & manage proj work 2) control quality & 3) control procurements

Close phase or project is the only process out of 47 processes which has accepted deliverables as input. Accepted deliverables is an output from validate scope process from Proj Scope Mgmt

The project charter is an upper management document; sponsor is usually responsible for it

Deliverables is an important output of the process monitor & control proj work

The work authorization system ensures that every work package is performed at the right time and in the proper sequence

If the company has a policy, it must be followed, don't try to work around it

When you get a change request, you need to involve the team only if you don't' have a change control system in place, it is not a good idea to involve the entire team for evaluating each change, if you pull your team for every change, they'll never get their job done.

Work authorization system is defined by the company and its external to the project, its not a part of project charter

Deliverables are not an output from monitor & control project work process; they are the output of direct & manage project work

The first step in handling a change is to document it. That's why change requests are an input to perform integrated change control; the change control process can not begin until the change is written down

One of the 'Tools & Techniques' of the process perform integrated change control is 'Change Control Tools'

Project Scope Management Six Processes

Mapping between Business Analysis and Project Management Processes:

- Needs – not covered by any process
- Scope – create project charter
- Requirements – collect requirements
- Specifications – Define Scope

Plan Scope Mgmt - creating a scope management plan that documents how the project scope will be defined, validated and controlled		
Inputs Proj Mgmt plan, Project Charter, EEF & OPA	**Tools & Techniques** Expert Judgement, Meetings	**Outputs** Scope Management Plan, Requirements Mgmt Plan

Collect Requirements - determining, documenting and managing stakeholder needs and requirements to meet project objectives		
Inputs Scope Mgmt Plan, Requirements Mgmt Plan, Stakeholder Mgmt Plan, Project Charter, Stakeholder Register	**Tools & Techniques** Interviews, focus groups, facilitated workshops, group creativity techniques, group decision making techniques, questionnaires and surveys, observations, prototypes, benchmarking, context diagram, Doc analysis	**Outputs** Requirements Documentation, Requirement Traceability Matrix

Define Scope - developing a detailed description of the project and product		
Inputs Scope Mgmt Plan, Project Charter, Proj Scope Mgmt Plan, Requirements Documentation, & OPA	**Tools & Techniques** Expert Judgement, Product Analysis, Alternatives generation, Facilitated Workshops	**Outputs** Project Scope Statement, Project Document Updates

Create WBS - subdividing project deliverables and project work in to smaller, more manageable components		
Inputs Scope Mgmt Plan, Project Scope Mgmt Plan, Requirements Documentation, EEF & OPA	**Tools & Techniques** Decomposition, Expert Judgement	**Outputs** Scope Baseline (= Scope Statement + WBS + WBS Dictionary), Project Document Updates

Validate Scope – formalizing acceptance of the completed project deliverables, obtaining formal acceptance of project scope by stakeholders		
Inputs Project Mgmt Plan, Requirements Documentation, Requirement Traceability Matrix, Verified Deliverables, Work Performance Data	**Tools & Techniques** Inspection, Group Decision Making Techniques	**Outputs** Accepted Deliverables, Change Requests, Work Performance Information, Project Document Updates

Control Scope - monitoring the status of the project and product scope and managing changes to the scope baseline		
Inputs Project Mgmt Plan, Requirements Documentation, Requirement Traceability Matrix, Work Performance Data, OPA	**Tools & Techniques** Variance Analysis	**Outputs** Work Performance Information, Change Requests, Proj Mgmt Plan Updates, Proj Doc Updates, OPA Updates

Types of Requirements

- Business requirements
- Stakeholder Requirements
- Solution Requirements

- Functional Requirements
- Non Functional Requirements
- Transition Requirements
- Regulatory Requirements
- Quality Requirements

Product Specifications should be developed by project engineer / technical staff

Scope definition – developing detailed description of project and product; If project complexity increases, level of risk will also probably increase

Total Scope = (Product Scope + Project Scope);

Product Scope – features & functions, Project Scope – mgmt activities

Primary tool for validate scope is – Inspection

Scope Creep =common name for uncontrolled changes

WBS Dictionary – detailed description of each work package

Cost Account – cost category that represents work assigned to a single responsible organizational unit (also called Control account)

Activities at the lowest level of WBS are called "work packages"

Validate Scope = formalized acceptance of completed project deliverables; Validate Scope is acceptance of work while control quality is ensuring the correctness of work, Validate scope is at the end of each phase and at the end of the project

Only Tool for control scope is variance analysis

Decomposition – subdivision of project deliverables into smaller components

Code of account / chart of account – a numbering system used to identify each element in WBS

Project Charter essentially has the scope mentioned in it, which defines boundary of the project i.e. what is included and what is not included in the project

Two Outputs of the process plan scope mgmt are scope mgmt plan and requirement mgmt plan

Requirements are defined as conditions or capability needed by a stakeholder to solve a problem or achieve a solution

Each requirement must be SMART (Specific Measurable Achievable Reasonable Traceable)

NGT is enhanced version of brainstorming where voting & prioritization of ideas is used

Affinity Diagram – used just after brainstorming and NGT, allows large no of ideas to be grouped for review

Group Decision Making Techniques include – unanimity, majority, plurality, dictatorship, majority is more than 50%, plurality is the largest voting share even if it is less than 50%

Two Outputs of collect requirements process are Requirements Documentation and Requirement Traceability Matrix

Scope baseline is an output of Create WBS process

 WBS method, when used for estimating is called bottom up estimating

Scope Statement is an output of the process Define Scope.

Scope Statement = creating a document that describes all the specifications needed to make the deliverables

Project Time Management Seven Processes

Plan Schedule Management - establishing the policies, procedures, and documentation for planning, developing, managing, executing, and controlling the project schedule		
Inputs	**Tools & Techniques**	**Outputs**
Proj Mgmt Plan, Project Charter, EEF & OPA	Expert Judgement, Analytical Techniques, Meetings	Schedule Management Plan

Define Activities – identifying and documenting the specific activities to be performed		
Inputs	**Tools & Techniques**	**Outputs**
Schedule Mgmt Plan, Plan Baseline, EEF & OPA	Decomposition, Rolling Wave Planning, Expert Judgement	Activity List, Activity Attributes, Milestone List

Sequence Activities –identifying and documenting relationships among the project activities		
Inputs	**Tools & Techniques**	**Outputs**
Schedule Mgmt Plan, Activity List, Activity Attributes, Milestone List, Proj Scope Statement, EEF & OPA	Precedence diagramming method, dependency determination, leads & lags	Project Schedule, Network Diagrams, Project Document Updates

Estimate Activity Resources – estimating the type and quantities resources needed for each activity		
Inputs	**Tools & Techniques**	**Outputs**
Schedule Mgmt Plan, Activity List, Activity Attributes, Resource Calendars, Risk Register, Activity Cost Estimates, EEF & OPA	Expert Judgement, Alternatives analysis, published estimating data, bottom-up estimating, Project Mgmt Software	Activity Resource Requirements, Resource Breakdown Structure, Project Document Updates

Estimate Activity Durations – estimating the number of work periods needed to complete individual activities with estimated resources		
Inputs	**Tools & Techniques**	**Outputs**
Schedule Mgmt Plan, Activity List, Activity attributes, activity resource requirements, resource calendars, project scope statement, risk register, risk breakdown structure EEF & OPA	Expert Judgements, Analogous estimating, parametric estimating, 3 point estimates, group decision making techniques, reserve analysis	Activity duration estimates, Project Document Updates

Develop Schedule – analysing activity sequences, durations, resource requirements, and schedule constraints to create the project schedule		
Schedule Mgmt Plan, Activity List, Activity Attributes, Project Schedule N/W Diagrams, Activity Resource Requirements, Resource Calendars, Activity Duration Estimates, Project Scope Statement, Risk Register, Proj Staff Assignments, Resource Breakdown Structure, EEF & OPA	**Tools & Techniques** Schedule N/W analysis, critical path method, critical chain method, resource optimization techniques, modelling techniques, leads & lags, schedule compression, scheduling tool	**Outputs** Schedule baseline, project schedule, schedule data, project calendars, project mgmt plan updates, project document updates

Control Schedule– monitoring the status of the project to update progress and managing changes to the schedule baseline		
Inputs	**Tools & Techniques**	**Output**
Project Mgmt Plan, Project Schedule, Work Performance Data, Project Calendars, schedule data, OPA	Performance Reviews, Project Mgmt Software, Resource Optimization techniques, modelling techniques, leads & lags, schedule compression, scheduling tool	Work Performance Information, Schedule Forecasts, change requests, proj mgmt plan updates, proj documentation updates, OPA updates

Precedence Diagramming Method

- Finish to Start – Start of successor depends on Finish of predecessor (Most commonly used)
- Finish to Finish – Finish of successor depends of Finish of predecessor

- Start to Start – Start of successor depends of Start of predecessor
- Start to Finish – Finish of successor depends on Start of Predecessor (Impractical)

PDM provides flexibility in sequencing activities by allowing four types of logical dependencies, it adds to the concept of lead and lag times between activities

Activities on critical path have zero float / slack

Schedule compression techniques:

- Crashing – cost and schedule tradeoffs e.g. add more resources to do it fast (increases cost)
- Fast Tracking – doing things in parallel (increases risks and need for coordination)

Four categories of dependencies in projects

- Mandatory
- Discretionary
- External and
- Internal

Heuristics – problem solving techniques producing "acceptable" or "good enough" results (Rule of Thumb)

PERT weighted average = 3 point estimate = (O + 4M + P) / 6; PERT Standard Deviation = (P – O) / 6

Contingency Reserve is buffer for identified risks (known unknowns) while management reserve is the buffer for unidentified risks (unknown unknowns)

- Total Float – Free time for an activity without delaying the project
- Free Float – Free time for an activity without delaying the subsequent activity

Resource constrained critical path is known as critical chain. Critical chain method is a technique that's part of Develop Schedule; it lets you figure out how to handle the problems that come with having limited resources. You use it to shuffle both activities and resources on your critical path.

One important aspect of critical chain method is that you use it to add buffers to the schedule to reduce the risk of certain activities

Resource smoothing – ensures that the project schedule does not extend the critical path while floats are utilized to compensate for the resource constraints. Does not extend project duration

Resource Levelling – the activities start dates and finish dates are adjusted based on the resource constraint. This may end up extending the critical path. So generally avoided in projects

Modelling – Simulation technique i.e. Monte Carlo. Simulation provides a range of potential project durations with associated probabilities

Conditional Design – GERT (Graphical Evaluation & Review Technique), branches and loops based on conditions

Scope management plan has nothing to do with Plan Schedule Management

Bottom up estimating is a "Tools & Techniques" of 2 processes i.e. estimate activity resources and estimate costs

Project Cost Management Four Processes

Plan Cost Management – establishing the policies, procedures, and documentation for planning, managing, expending, and controlling project costs			
Inputs Project Mgmt Plan, Project Charter, EEF & OPA		**Tools & Techniques** Expert Judgement, Analytical techniques, Meetings	**Outputs** Cost Management Plan

Estimate Costs – developing an approximation of the monetary resources needed to complete project activities			
Inputs Cost Mgmt Plan, HRM Plan, Scope Baseline, Proj Schedule, Risk Register, EEF & OPA	**Tools & Techniques** Expert Judgement, Analogous estimating, parametric estimating, bottom up estimating, 3 Point estimates, reserve analysis, Cost of Quality, Proj Mgmt Software, Vendor Bid Analysis, Group Decision Making Techniques		**Outputs** Activity Cost Estimates, basis of estimates, Project Documentation Updates

Determine Budget – aggregating the estimated costs of individual activities or work packages to establish an authorized cost baseline			
Inputs Cost Mgmt Plan, Scope Baseline, Activity cost estimates, basis of estimates, proj schedule, resource calendars, risk register, agreements, OPA	**Tools & Techniques** Cost aggregation, reserve analysis, expert judgement, historical relationships, funding limit reconciliation		**Outputs** Cost baseline, Project Funding Requirements, Project Documentation Updates

Control Costs – monitoring the status of the project to update the project costs and managing changes to the cost baseline			
Inputs Project Mgmt Plan, Project Funding Requirements, Work Performance Data, OPA	**Tools & Techniques** Earned Value Management, Forecasting, To Complete Performance Index, Performance Reviews, Proj Mgmt Software, Reserve Analysis		**Outputs** Work Performance Information, Cost Forecasts, Change Requests, Proj Mgmt Plan Updates, Proj Documentation Updates, OPA Updates

Expected Present Value = multiplying the probabilities

Economic Value Added = Net Operating Profit After Tax (NOPAT)

Cost Variance = EV – AC or BCWP – ACWP; CPI = EV / AC or BCWP / ACWP

EAC = Estimated at completion, this can be calculated in several ways – EAC = BAC / CPI; EAC = AC + (BAC – EV); EAC = AC + Fresh Estimated costs; EAC = AC + [(BAC – EV)/CPI * SPI]

Purpose of Management Reserve is to reduce the chance of a cost overrun

IRR – Internal Rate of Return – an estimate of project's profitability expressed as percentage

Approximate range of accuracy for bottom up estimates is -5% to 10%

Regression analysis relies on Parametric cost estimating

Cost Baseline – a time phased budget used to measure and monitor cost performance

Sunk cost – cost already expended and no longer under control, It is irrelevant to decide future of a partially complete project

Learning curve theory – holds that costs will decrease as you get better at doing a task.

Law of diminishing returns – using more and more resources and getting less and less results

EVM is the "Tools & Techniques" for Control Costs process

The ability to influence costs is greatest in the early stages of a project; therefore early scope definition is critical to successful cost performance

Control threshold – an allowable amount of variation before corrective action is triggered

Earned Value Rules – rules for calculating how much credit to take for partially completed activities

The accuracy of estimates tends to improve as the project moves through its life cycle

Estimating costs in done in many ways:

- Order of Magnitude or "Ballpark" figures – range of accuracy = -25% to + 75%
- Budge Estimates based on better data & funding available - range of accuracy = -10% to + 25%
- Definite Estimates – detailed bottom up estimating for WBS items – range of accuracy = -5% to 10%

Risk Register is an input to the estimate costs so that projected risk mitigation costs may be included in the cost estimates

Analogous estimating is also called Top- Down estimating or Gross Value Estimating (this uses actual costs from similar projects)

Parametric estimation is the estimation based on per unit of measurement e.g. per sq foot construction cost

Cost of quality includes activities such as training and audits

Cost baseline is established in the process – determine budgets – the cost baseline includes authorized budgets and contingency reserves, it does not include management reserve

Scope baseline, is an input to Determine Budget; includes scope statement, WBS and WBS Dictionary

Risk Register is an input to Determine Budget; supports calcuting Expected Monetary Value (EMV)

Cost Baseline – time phased budget, developed by summing estimated costs by time periods, cost baseline is normally displayed as "S-Curve"

Four kinds of estimating techniques used in the process Estimate Costs are :

- Analogous Estimating
- Parametric Estimating
- Bottom up Estimating
- Three Point Estimating

Project Funding Requirements is the output of Determine Budget becomes an input to control costs

Earned Value Management is the Tools & Techniques of Control Costs

Cost Forecasts is an output of the process "Control Costs" becomes an input to Monitor & Control Project Work process

Cost Variance = EV – AC (BCWP – ACWP) i.e. budgeted cost of work performed minus actual cost of work performed; CPI = EV / AC

Working Capital = current assets minus current liabilities

Life Cycle Cost (LCC) takes in to account the cost of projects even when it has moved to operations, its Total Cost of Ownership (TCO)

Two conditions under which analogous estimating works best

- The previous project was really similar to the current one and
- The estimators have the needed expertise

50:50 Rule – one way to determine the BCWP is 50% at the start and 50% at the end on completion; the 50:50 rule is most accurate if the work packages are of the same size

Parametric modelling is most reliable when

- The historical information used to develop the model was accurate
- The parameters used in the model are quantifiable
- The model is scalable

On larger projects there may be multiple cost baselines if one wants to measure different aspects of cost performance

Order of magnitude – guestimate or ballpark estimate at the initial stage of the project

Definitive estimate – detailed, accurate estimate prepared for techniques i.e. bottom up estimating

If you see a question about opportunity cost of selecting one project over another, the anser is the value of the project that was not selected

EV = BAC * Actual % Completion or Actual % Completion = EV / BAC

The first thing to do when an issue is noticed during a project is to gather information and assess the impact of the change on project constrains. If you wish to raise a change request, it must be documented first

When you plug in a bunch of values into a formula or computer program and it generates an estimate, it is called parametric estimation. Parametric estimation often uses some historical data, but that does not mean it's the same as analogous estimation

Cost Change Control System defines the processes that you must follow in order to implement the change, when a stakeholder needs to make a change that will affect the budget

The change control system defines the procedures that you use to carry out the changes versus control costs which has its own set of procedures, called the cost change control system

The cost baseline gets updated when you implement the change after approval

If the TCPI is above 1, you need to manage costs aggressively. It means that you need to meet your goals without spending as much as you have been doing for the rest of the project

Project Quality Management Three Processes

Plan Quality Management – identifying quality requirements and / or standards for the project and its deliverables and documenting how the project will demonstrate compliance with quality requirements and / or standards		
Inputs Project Mgmt Plan, Stakeholder Register, Risk Register, Requirements Documentation, EEF & OPA	**Tools & Techniques** Cost benefit analysis, cost of quality, 7 basic quality tools, benchmarking, design of experiments, statistical sampling, additional quality planning tools ,meetings	**Outputs** Quality Mgmt Plan, Process Improvement Plan, Quality Metrics, Quality Checklists, Proj Documentation Updates
Perform Quality Assurance – auditing the quality requirements and the results from quality control measurements to ensure that appropriate quality standards and operational definitions are used		
Inputs Quality Mgmt Plan, Process Improvement Plan, Quality Metrics, Quality Control Measurements, Proj Documents	**Tools & Techniques** Quality Mgmt & control tools, quality audits, process analysis	**Outputs** Change Requests, Proj Mgmt Plan updates, Proj Documents Updates OPA updates
Control Quality – monitoring and recording results of executing the quality activities to assess performance and recommend necessary changes		
Inputs Proj Mgmt Plan, Quality Metrics, Quality Checklists, Work Performance Data, Approved Change Requests, Deliverables, Proj Documents, OPA	**Tools & Techniques** 7 basic quality tools, statistical sampling, inspection, approved change requests review	**Outputs** Quality control measurements, validated changes, verified deliverables, work performance information, change requests, project mgmt plan updates, proj document updates, OPA updates

Quality = the degree to which a set of inherent characteristics fulfil requirements; its conformity to requirements + fitness of Use

Deming – 85% Rule – 85% of the reasons why are there is bad quality at the shop floor is because of inaction of senior management towards quality and lack of investment in quality

Marginal Analysis – cost of the incremental improvements to a process or product versus the increase in revenue because of that improvement

Kaizen – philosophy of applying continuous small improvements to reduce costs and esnure consistency or project performance

JIT (also known as KANBAN) – keeping the inventory bare minimum to force quality focus and avoid waste

Deming – 85% rule & PDCA; Juran – fitness of use & cost of quality; Crosby – conformance to requirements and zero defects; Taguchi – design of experiments, Ishikawa – Fishbone / Cause Effect

Six Sigma – 99.9997 % accuracy (3.4 in a million); Three Sigma – 99.7% accuracy (3 in thousand)

Gold Plating – giving extra than required, this should be avoided

Quality should be planned in, not inspected in

Quality is not grade. Grade means higher level of features present. A product can be low in grade, yet meet the quality requirements

Precision is consistency; accuracy means correctness. Consistency is more important than accidental accuracy. When a consistent process is optimized for accuracy it becomes a consistently accurate process.

Cost of Quality has two parts: cost of conformance and cost of non conformance

The QA system should provide three things – auditing, feedback and correction

Quality Evaluation should be – formative (quality audits) and summative (quality improvements)

The quality control does not have to be done on each and every deliverable, they can be done on a well chosen representative sample and the results projected on entire population

Quality control is the feedback for the quality planning and quality assurance processes.

Cost of quality is a tool and technique to only 2 out of 47 processes – they are estimate costs and plan quality management

7 basic quality tools are Tools & Techniques to 2 out of 47 processes – the yare plan quality management and control quality – both are from plan quality mgmt knowledge area

Design of Experiments is a unique tool and technique to plan quality management

Quality checklists, which is an output of Plan Quality Mgmt is an input to Perform Quality Assurance and Control Quality

Process Improvement Plan which is an output of Plan Quality Management is an input to Perform Quality Assurance

The Quality Control Measurements is an output of control quality; it goes back to Perform Quality Assurance as an input

Quality Mgmt and Control tools, quality audits and Process Analysis are unique to Perform QA

Quality Metrics and Quality Checklists are Inputs to control quality, they come from plan quality mgmt

One output of control quality is "verified deliverables" this becomes an input to validate scope

Statistical sampling is a tool & technique to plan quality mgmt and control quality

Who is responsible for project quality – the project manager (its Project Quality)

An assignable cause of variance indicates that there is a problem that is probably not just the result of random events and therefore needs to be corrected

7 basic tools of quality are:

- Cause & effect diagrams
- Control charts
- Flow charts
- Histogram
- Pareto charts
- Checksheets

- Scatter Diagram

Benchmarking – comparing actual or planned practices to those of other projects or organizations in search for improvements and also in an attempt to reach those standards

Pareto Chart is a quality control tool that shows the greatest source of defects on the left and fewest on the right

KAIZEN – A Japanese concept meaning small incremental continuous improvements

Who has responsibility for quality on a task – the person / employee performing the task

Sampling is most useful when:

1. The population is large
2. Cost of inspection is high
3. Destructive testing is required
4. You believe that there are not many defects

When compared to cost and schedule, quality should be given equal importance

Prevention is keeping errors out of the process; inspection is keeping errors out of the hands of the customer

Attribute Sampling versus Variance Sampling – attribute sampling checks whether a result conforms or not. Attributes can be subjective or objective. While Variable Sampling measures the result on a continuous scale. (Measures the degree of conformity)

Special causes are unusual events that may signal a problem that needs correction. Random causes are simply normal process variations i.e. nothing is wrong)

Checksheets is the quality control tool that helps you count the number of defects and their location.

Four Possible effects of poor quality are:

1. Increased costs i.e. cost of non conformances
2. Decreased productivity
3. Increased risk
4. Increased cost of monitoring

Specification limits Vs Control limits – specification limits are contractual tolerances agreed while control limits describe the capability of a particular process

Inspection – examination of a work product to determine conformance to requirements. Inspection often involves measurements, also called audits, walk throughs and reviews

KANBAN – a communication technique used to signal that a workstation is ready for more input from the previous station in the process. This is applicable when using the JIT approach.

Control Charts – a graphical display of process results taken over a period of time. They help determine if a process is under control

Trend Analysis – a quality control tool that uses mathematical techniques to forecast future outcomes based on historical results. Run Charts & Scatter Diagrams are 2 tools for trend analysis

Low quality is always a problem but low grade may not be

A project manager using histogram to analyse defects found during inspection – he is in control quality process

Defect Repair Review is – reviewing the repaired defect to make sure it was fixed properly

Project Human Resource Management Four Processes

Plan Human Resource Management – identifying and documenting project roles, responsibilities, required skills, reporting relationships, and creating a staffing management plan		
Inputs	**Tools & Techniques**	**Outputs**
Proj Mgmt Plan, Activity Resource Requirement, EEF & OPA	Organization Charts and Position Description, Networking, Organizational Theory, Expert Judgement, Meetings	Human Resource Mgmt Plan

Acquire Project Team – confirming human resource availability and obtaining the team necessary to complete project activities		
Inputs	**Tools & Techniques**	**Outputs**
HRM Plan, EEF & OPA	Pre-assignment, Negotiation, Acquisition, Virtual Teams, Multi criteria decision analysis	Project Staff Assignments, Resource Calendars, Proj Mgmt Plan Updates

Develop Project Team – improving competencies, team member interaction and overall team environment to enhance project performance		
Inputs	**Tools & Techniques**	**Outputs**
HRM Plan, Proj Staff Assignments, Resource Calendar	Interpersonal skills, training, team building activities, ground rules, co-location, recognition and rewards, personal assessment tools	Team Performance Assessments, EEF Updates

Manage Project Team – tracking team member performance, providing feedback, resolving issues, and managing changes to optimize project performance		
Inputs	**Tools & Techniques**	**Outputs**
HRM Plan, Proj Staff Assignments, Team Performance Assessments, Issue log, Work Performance Reports, OPA	Observation and conservation, Proj Performance Appraisals, Conflict Mgmt, Interpersonal Skills	Change Requests, Proj Mgmt Plan Updates, Project Document Updates, EEF Updates & OPA Updates

Human Resource Management involves organizing, managing and leading the project teams

3 categories of organization charts – Hierarchical, Matrix Based, Text Oriented

RACI – Responsible, accountable, consulted and informed

RAM Chart – R - Responsible, S - Support Required, C - Must be consulted, N - Must be Notified, G - Gate Reviewer, A - Approval Required

Work Breakdown Structure, OBS – Organization Breakdown Structure, RBS, Resource Breakdown Structure / Risk Breakdown Structure

PMI identifies following skills for team development – PLINCM

- P Problem Solving
- L Leadership
- I Influencing
- N Negotiation & Conflict Mgmt
- C Communication
- M Motivation

Team Building Activities – Tuckman Model – FSNPA

- F Forming
- S Storming
- N Norming

- P Performing
- A Adjourning

Six methods of resolving conflicts – (From Best to Worst)

- Problem Solving / Confronting
- Collaborating
- Compromising
- Smoothing / accommodating
- Forcing
- Withdrawing / avoiding

Types of Power

- Legitimate or Formal Power
- Expert or Technical Power
- Reward Power
- Referent Power
- Coercive or Penalty Power
- Bureaucratic or Administrative Power
- Interpersonal or Charisma Power

PMI recommends maximum use of reward and expert power and minimal use of coercive power

The worst form of power being referent power & the first one that a new project manager uses with a new team is formal

Maslow's Theory of Needs – Physiological, Safety, Social, Self Esteem & Self Actualization – self actualization is the highest level to which a human being can aspire

McGregor's Theory X & Theory Y

- Theory X – workers are lazy, self centred, lack ambition thus require top down mgmt
- Theory Y – workers are inherently motivated and eager to accept responsibility – thus empower them

Herzberg's Hygiene Factors – Poor attention to hygiene factors may cause low motivation / cooperation, this is bare minimum which must be present at the workplace

Ouchi's Theory Z – Japanese culture of lifetime employment – believes that people get motivation with lifetime employment

Leadership styles – autocratic, democratic, laissez-faire

PMI advises that the Project Manager must follow a "Directing Leadership style" during planning phase of the project," Facilitating and Coaching Leadership Styles" during Execution & Controlling and "Supportive Leadership Style" during closing phase

What not to delegate – hiring, firing, pay, organizational policy, management of key stakeholders

Kick off meetings – occur at the end of planning and just before execution, KOM is the responsibility of the project manager

Halo Effect – the tendency to appoint someone to the position of a PM simply because the person has technical prowess, the tendency to consistently rate someone high or low based on an impression

Project War Room – creates greater sense of identity among team members, a room where a team can sit together and get closer communication. They are part of co-location. It's a way to keep your entire team in one room so they don't have communication gaps.

If both parties employ forcing – the outcome will be stalemate

Distinctive features of MBO is – management and workers jointly establish objectives

PMI encourages early involvement of key team members in the planning process to improve the plan and to increase commitment

PMI emphasises that team development occurs throughout the entire project lifecycle.

Networking is a Tools & Techniques of Plan Human Resource Management

The input of the process Plan Human Resource Management called Activity Resource Requirements comes from estimate activity resources (from Project Time Management)

Two dangers associated with using forcing to resolve a conflict:

- Creation of personal antagonism
- Stalemate (No Resolution)

Top sources of conflicts of projects are: resources, technical opinions, priorities and personalities, Salaries do not come in this list

Developing the Team is where you evaluate performance and setup motivational factors. Manage Project Team is where your solve conflicts, so "Team Performance Assessments" are an output of the Process Develop Project Team

Resource Calendars is an output of two processes 1) Acquire Project Team & 2) Conduct Procurements

Project Communication Management Three Processes

Plan Communication Management – determining the information needs of stakeholders and defining communication approach		
Inputs	**Tools & Techniques**	**Outputs**
Proj Mgmt Plan, Stakeholder Register, EEF & OPA	Communication Requirement Analysis, Communication Technology, Communication Models, Communication Methods, Meetings	Communication Management Plan, Project Documents Updates
Manage Communication – creating, collecting, distributing, storing, retrieving and disposition of project information as planned		
Inputs	**Tools & Techniques**	**Outputs**
Communication Mgmt Plan, Work Performance Reports, EEF & OPA	Communication technology, communication models, communication methods, information mgmt systems, performance reporting	Project Communications, Proj Mgmt Plan Updates, Project Documents Updates, OPA Updates
Control Communication – monitoring & controlling the communication across project life cycle		
Inputs	**Tools & Techniques**	**Outputs**
Proj Mgmt Plan, Project Communications, Issue Log, Work Performance Data, OPA	Information Mgmt Systems, Expert Judgement, Meetings	Work Performance Information, Change Requests, Proj Mgmt plan Updates, Proj Documents Updates, OPA Updates

Communication Methods dimensions:

- Formal Vs Informal
- Written Vs Verbal
- Internal Vs External
- Horizontal Vs Vertical

Oral Communication

- Vocal / Verbal words = 7% of total communication
- Paralingual = 38% of total communication
- Body Language = Remaining 55% of total communication

So in a teleconference you get listening or words 7% + understanding the tone 38%; this makes 45% of the communication, rest 55% is the body language which is not available during tele-conference

Basic Communication Model is – Encode >> Transmit Msg >> Decode >> Acknowledge >> Feedback / Response

The sender is responsible for

- Making the information clear, unambiguous and complete
- Confirming the receiver's understanding

The Receive is responsible for

- Making sure the entire message was received
- Confirming the message was understood correctly

This requires active listening and paraphrasing

Formal Communication is best handled in writing

Advantages of Verbal Communication include – fast immediate feedback (ability to clarify) and supports the brainstorming needed to solve complex problems

Effective Listening includes – asking for clarification, repeating what you heard / seeking confirmation

Communication Methods – Push, Interactive and Pull

Four Aspects of Effective Listening

- Repeating what was said
- Asking for clarifications
- Watching non verbal clues
- Maintaining Eye Contact

Six Methods of resolving conflict – problem solving / confronting, collaborating, compromising, smoothing / accommodating, withdrawing / avoiding and forcing

Major Key to successful communication – the project manager who is a good communicator, Project Manager spends 80% - 90% of his time on communication

Tight Matrix – an environment where team members work in a single, physical office space; a tight matrix improves communication and reduces distraction

Use of both formal and informal communication is likely to enhance project integration

Six barriers to effective communication

- Cultural differences
- Lack of clear communication channels
- Physical / temporal distance
- Technical language
- Distracting environment
- Poor attitudes (personal antagonism)

PMI says there are four important roles for a meeting chairperson. They are:

- Encourage participation
- Handle differences of opinions
- Prevent drift and disruption
- Periodically summarize key issues

Issue log which is an input to the process "Control Communications" is an output of the process manage stakeholder engagements

Presence of communication barriers in a project is likely to produce / increase conflicts

When team members react differently to the same problem the likely cause is differing perspectives

Effective communications have empathy i.e. consideration for the thoughts and feeling of others

Disseminating the project plan – reduces uncertainty

If a project team is experiencing increasing levels of conflict the project manager should provide an offsite team building workshop

Four guidelines for effective meetings: Purpose, Agenda, Location, Length (PALL)

3 categories of performance reporting – status / progress / forecasting

Communication Planning is often tightly linked with organizational planning, therefore successful communication an proper flow of information are affected by organization design

Communication blockers – negative statements that kill good ideas

Project War Room – helps provide a sense of identity for team members

Project Risk Management Six Processes

Plan Risk Management – defining how to conduct Risk Management Activities		
Inputs	**Tools & Techniques**	**Outputs**
Project Mgmt Plan, Project Charter*, Stakeholder Register, EEF & OPA	Analytical techniques, expert judgement, meetings	Risk Management Plan

Identify Risks – determining which risks might affect the project, its throughout the project		
Inputs	**Tools & Techniques**	**Outputs**
Risk Mgmt Plan, Cost Mgmt Plan, Schedule Mgmt Plan, Quality Mgmt Plan, HRM Plan, Scope Baseline, Activity cost estimates, activity duration estimates, stakeholder register, project documents, procurement documents, EEF & OPA	Documents Reviews, Information gathering techniques, checklists analysis, assumption analysis, diagramming techniques, SWOT analysis, Expert Judgement	Risk Register

Perform Qualitative Risk Analysis – qualitative analysis and prioritization of risks		
Inputs	**Tools & Techniques**	**Outputs**
Risk Mgmt Plan, Scope Baseline, Risk Register, EEF & OPA	Risk Probability & Impact assessment, Probability & Impact Matrix, Risk Data Quality Assessment, Risk Categorization, Risk Urgency Assessment, Expert Judgement	Project Documents Updates

Perform Quantitative Risk Analysis – numerically analysing identified risks		
Inputs	**Tools & Techniques**	**Outputs**
Risk Mgmt Plan, Cost Mgmt Plan, Schedule Mgmt Plan, Risk Register, EEF & OPA	Data Gathering & Representation Techniques, Quantitative Risk Analysis and Modelling Techniques, Expert Judgement	Project Documents Updates

Plan Risk Responses – how to enhance opportunities and reduce threats		
Inputs	**Tools & Techniques**	**Outputs**
Risk Mgmt Plan & Risk Register	Strategies for –ve risks, Strategies for +ve risks, contingent response strategies, Expert Judgement	Proj Mgmt Plan Updates , Proj Documents Updates

Control Risks – Identifying new risks, tracking identified risks, implementing risk response plans, and evaluating risk management activities		
Inputs	**Tools & Techniques**	**Outputs**
Proj Mgmt Plan, Risk Register, Work Performance Data, Work Performance Reports	Rish Reassessment, Risk Audits, Variance & Trend analysis, Technical Performance Measurement, Reserve Analysis, Meetings	Work Performance Information, Change Request, Proj Mgmt Plan Updates, Proj Documents Updates, OPA Updates

Project Charter provides high level risks for the project

Risk – an uncertain even, if occurs, can have either a negative or positive impact on the project objectives, each ris may have one or more causes / one or more effect

Known Risks – those have been identified – budget set aside as contingency reserve

Unknown Risks – those have not been identified- budget set aside as management reserve

Risk Management – identifying, analysing and responding to project risks, minimizing negative factors and maximizing positive factors. Predicting issues / problems in advance

Risk is measure through Probability * Impact

Plan Risk Management – defining how to conduct risk management activities, should begin during the earlier stages of project initiation, should be completed early in project planning process

Risk Attitudes, Risk Appetite, Risk Tolerance, Risk Threshold

Residual Risks – those which remain even after implementing risk responses

Secondary Risks – those which are generated because of the solution implemented

Risk Verus Range – when estimating, the wider the range is, more uncertain the project is

PMI states that organizations that fail to proactively manage risks increase the change of negative impacts and / or project failure

Risk Trigger is a symptom or warning sign that a risk is about to occur e.g. CPI moving out of acceptable thresholds

Strategies for –ve risks or threats are: Avoid, Transfer, Mitigate, Accept (ATMA)

Strategies for +ve risks or opportunities are: Exploit, Share, Enhance, Accept (ESEA)

The process identify risks has only one output that is 'Risk Register'

Watchlists are used to monitor low priority risks. The risk register should include watchlists of low priority risks, and you should review those risks at every status meeting to make sure that none of them have occurred.

To identify risks you contacted a team of experts, asked them to list risks and send in anonymously, this is Delphi. Using the Delphi Technique, experts supply their opinions of risks for your project anonymously so that they each get a chance to think about the project without influencing each other.

The probability and impact matrix is a tool that you use to analyse risks, you might find it in your project management plan, but tit is not included in the risk register

If an unplanned event happened for the project, is that a Risk? No, it is a project problem, riather than doing any qualitative / quantitative risk analysis you should just focus on the solution for it. E.g. a supplier gone is not a risk, its already happened, the probability is 100%, so no qualitative / quantitative risk analysis, just find a new supplier

The overall risk rating of the project is high when the total % of risks in the critical section is high compared to all the risks identified.
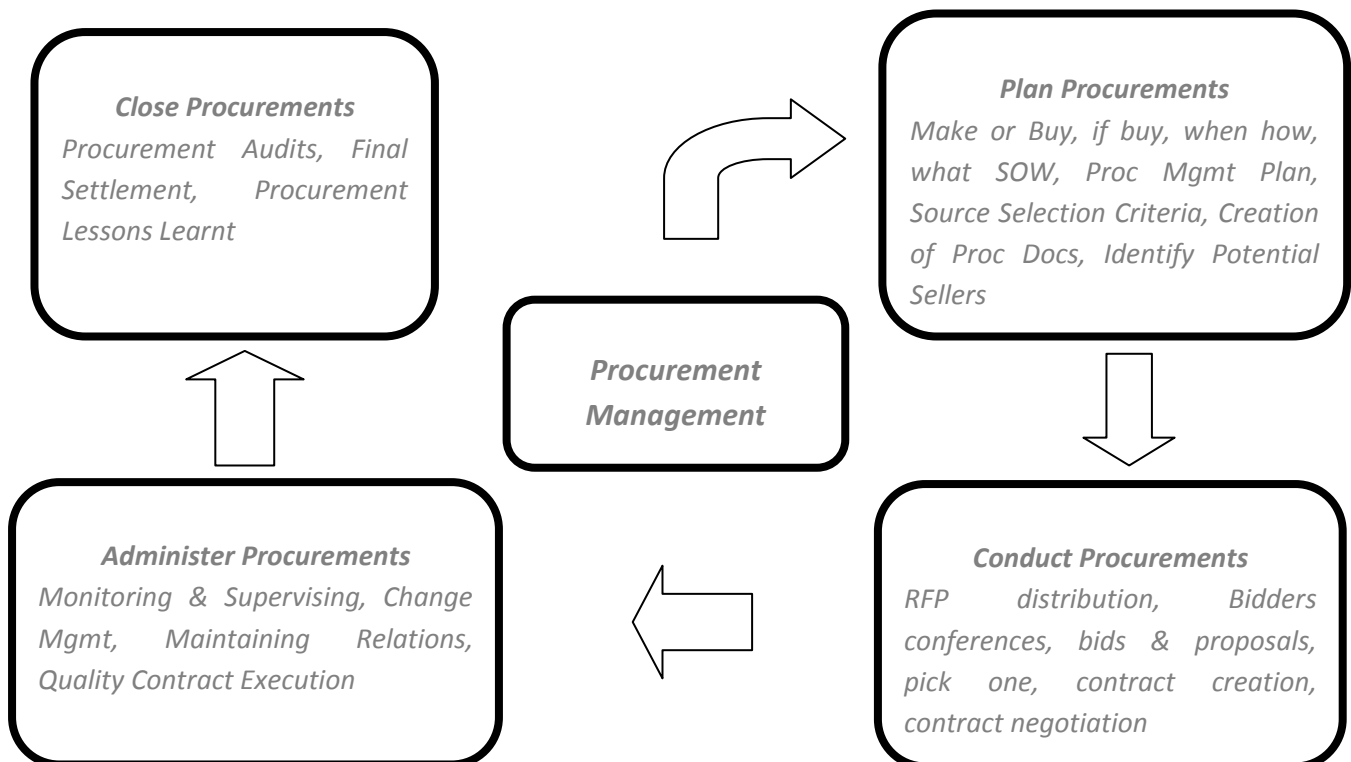
Risk Prioritization happens in Perform Qualitative Risk Analysis Process

Negative risks are called an issue, when they occur. Positive risks are called a benefit, when they occur. Sometimes also called gain or windfall

Sensitivity of a risk is identified using Tornado diagram.

Project Procurement Management Four Processes

Plan Procurements – determining what to purchase, from whom and how		
Inputs	**Tools & Techniques**	**Outputs**
Proj Mgmt Plan, Requirement Documents, Risk Register, Activity Resource Requirement, Proj Schedule, Activity cost estimates, stakeholder register, EEF & OPA	Make or Buy Analysis, Expert Judgement, Market Research, Meetings	Procurement Mgmt Plan, Procurement SOW, Procurement Documents, Source Selection Criteria, Make of Buy decisions, change requests, Proj Documents Updates
Conduct Procurements – obtaining seller responses, selecting sellers and awarding contracts		
Inputs	**Tools & Techniques**	**Outputs**
Procurement Mgmt Plan, Procurement Documents, Source Selection Criteria, Seller proposals, proj documents, make or buy decisions, procurement SOW & OPA	Bidder conference, proposal evaluation techniques, independent estimates, expert judgement, advertising, analytical techniques, procurement negotiations	Selected sellers, agreements, resource calendars, change requests, proj. mgmt plan updates, project documents updates
Administer Procurements – managing procurement relationships, monitoring contract performance, making changes as needed		
Inputs	**Tools & Techniques**	**Outputs**
Proj Mgmt Plan, Procurement Documents, Agreements, Approved Change Requests, Work Performance Reports, Work Performance Data	Contract Change Control System, Procurement Performance Review, Inspections & Audits, Performance Reporting, Payment Systems, Claims Administration, Records Mgmt System	Work Performance Information, Change Requests, Proj Mgmt Plan Updates, Project Documents Updates, OPA Updates
Close Procurements – completing project procurements		
Inputs	**Tools & Techniques**	**Outputs**
Proj Mgmt Plan, Procurement Documents	Procurement Audits, Procurement Negotiations, Record Mgmt System	Closed Procurements, OPA Updates

Close Procurements
Procurement Audits, Final Settlement, Procurement Lessons Learnt

Plan Procurements
Make or Buy, if buy, when how, what SOW, Proc Mgmt Plan, Source Selection Criteria, Creation of Proc Docs, Identify Potential Sellers

Procurement Management

Administer Procurements
Monitoring & Supervising, Change Mgmt, Maintaining Relations, Quality Contract Execution

Conduct Procurements
RFP distribution, Bidders conferences, bids & proposals, pick one, contract creation, contract negotiation

Contract Types: three types

- Firm Fixed Price
- Cost Reimbursable
- Time & Material

Firm Fixed Price – clear requirements, low risk for buyer, highest risk for the seller

- FFP + Reward or FFP – Penalty
- FP + Economic Adjustments

Point of Total Assumption (PTA) when the cost = FP value, any money spent beyond TPA is a loss of the seller

Cost Reimbursable –

- Cost plus Fixed Fee (CPFF)
- CPFF + Reward or CPFF – Penalty
- Cost plus Award Fee (CPAF)
- Cost plus percentage of Cost (CPPC) – this is considered illegal

Time & Material – no clear requirements, highest risk for the buyer, low risk for the seller

Common Negotiation Tactics

- Deadline
- Good Cop / Bad Cop
- Fait Accompli
- Missing Man
- Limited Authority
- Delay
- Personal Insult
- Fair & Reasonable

Single Source – is the preferred supplier while Sole Source is when only one supplier is available

Force Majeure – "Act of God"

Liquidated Damages – compensation

When procurement is price driven, the terms bid and quotation is used

When procurement is influenced by technical & non financial concerns the term proposal is used

Unilateral contract means a purchase order for routine items at standard (catalogue) prices

Bilateral contract – RFI, sealed bid (invitation for bid), RFQ, RFP

Firm Fixed Price poses the greatest risk for the seller

CPFF poses a greater risk for the buyer

Time and Material (T & M) has charging rate for labour and overhead for material

You use qualified seller list during conduct procurements

The time and material (T & M) contract is the riskiest one for the buyer, because if the project costs are much higher than the original estimates, the buyer has to swallow them, while the seller keeps on getting paid for the time worked.

Contracting is pretty linear process – first you plan the contract, they you put together a package of procurement documents to sent to potential sellers and then you select a seller and start the work – so you send out an RFP after you have put together the procurement document package so that you can select a seller to do the job.

Project Stakeholder Management Four Processes

Identify Stakeholders – identifying the people, groups or organizations that could impact or be impacted by a decision, activity, or outcome of the project and analysing and documenting relevant information regarding their interests, involvement, interdependencies, influence, and potential impact on project success		
Inputs Project Charter, Procurement Documents, EEF & OPA	**Tools & Techniques** Stakeholder Analysis, Expert Judgement, Meetings	**Outputs** Stakeholder Register
Plan Stakeholder Management – developing appropriate management strategies to effectively engage stakeholders throughout the project life cycle, based on the analysis of their needs, interests and potential impact on project success		
Inputs Proj Mgmt Plan, Stakeholder Register, EEF & OPA	**Tools & Techniques** Expert Judgement, Meetings, Analytical Techniques	**Outputs** Stakeholder Mgmt Plan, Project Documents Updates
Manage Stakeholder Engagement – communication and working with stakeholders to meet their needs /expectations, address issues as they occur, and foster appropriate stakeholder engagement in project activities throughout the project life cycle		
Inputs Stakeholder Mgmt Plan, Communication Mgmt Plan, Change Log, OPA	**Tools & Techniques** Communication Methods, Interpersonal Skills, Mgmt Skills	**Outputs** Issue Log, Change Requests, Proj Mgmt Plan Updates, Proj Documents Updates, OPA Updates
Control Stakeholder Engagement – monitoring overall project stakeholder relationships and adjusting strategies and plans for engaging stakeholders		
Inputs Proj Mgmt Plan, Issue Log, Work Performance Data, Project Documents	**Tools & Techniques** Information Mgmt Systems, Expert Judgement, Meetings	**Outputs** Work Performance Information, Change Requests, Proj Mgmt Plan Updates, Proj Documents Updates, OPA Updates

Project Charter is an input to identify stakeholders because it has information about stakeholders

Procurement document becomes an input to identify stakeholders if the project involves outsourcing

Stakeholder analysis has steps to identify, analyse and assess the stakeholders' impact on the project objectives. There are various grids used for stakeholder analysis, they are:

- Power / Interest
- Power / Impact
- Influence / Impact
- Salience Model

Stakeholder Register is the list of stakeholders with needs and objectives along with identified key stakeholders. The register includes:

- Identification information
- Assessment information
- Stakeholder classification

Analytical techniques is one of the "Tools & Techniques" of Plan Stakeholder Management, this analyses the engagement levels of stakeholders, which are: URNSL (Urine Slow)

- Unaware

- Resistant
- Neutral
- Supportive
- Leading

After stakeholder analysis is done in identify stakeholder process –

- Primary stakeholders are managed closely
- High interest / Low power are kept informed
- High Power / Low interest are kept satisfied
- Low Power / Low interest are lightly monitored

Improper identification of stakeholders is the biggest reason of unnecessary change in a project

Salience Model for stakeholder prioritization – describing or categorizing the stakeholders based on their ability to 'get their way' in the project and urgency of work and the legitimacy of their involvement

Issue log is an output of process – "Manage Stakeholder Engagements"

Change Log is an input to "Manage Stakeholder Engagement" which comes from Integrated Change Control

Issue Log is an output of process – "Manage Stakeholder Engagement" is an input to 1) Manage Project Team 2) Control Communications & 3) Control Stakeholder Engagement

Project Management Processes

Knowledge Area	Project Mgmt Process Group				
	Initiating Process Group	Planning Process Group	Executing Process Group	Monitoring & Controlling Process Group	Closing Process Group
4. Project Integration Mgmt	4.1 Develop Project Charter	4.2 Develop Project Mgmt Plan	4.3 Direct & Manage Project Work	4.4 Monitor & Control Project Work 4.5 Perform Integrated Change Control	4.6 Close Project or Phase
5. Project Scope Mgmt		5.1 Plan Scope Mgmt 5.2 Collect Requirements 5.3 Define Scope 5.4 Create WBS		5.5 Validate Scope 5.6 Control Scope	
6. Project Time Mgmt		6.1 Plan Schedule Mgmt 6.2 Define Activities 6.3 Sequence Activities 6.4 Estimate Activity Resources 6.5 Estimate Activity Durations 6.6 Develop Schedule		6.7 Control Schedule	
7. Project Cost Mgmt		7.1 Plan Cost Mgmt 7.2 Estimate Costs 7.3 Determine Budget		7.4 Control Costs	
8. Project Quality Mgmt		8.1 Plan Quality Mgmt	8.2 Perform Quality Assurance	8.3 Quality Control	
9. Project Human Resource Mgmt		9.1 Plan Human Resource Mgmt	9.2 Acquire Project Team 9.3 Develop Project Team 9.4 Manage Project Team		
10. Project Communication Mgmt		10.1 Plan Communication Mgmt	10.2 Manage Communication	10.3 Control Communication	
11. Project Risk Mgmt		11.1 Plan Risk Mgmt 11.2 Identify Risks 11.3 Perform Qualitative Risk Assessment 11.4 Perform Quantitative Risk Assessment 11.5 Plan Risk Responses		11.6 Control Risks	
12. Project Procurement Mgmt		12.1 Plan Procurement Mgmt	12.2 Conduct Procurements	12.3 Control Procurements	12.4 Close Procurements
13. Project Stakeholder Mgmt	13.1 Identify Stakeholders	13.2 Plan Stakeholder Mgmt	13.3 Manage Stakeholder Engagements	13.4 Control Stakeholder Engagements	