PMP Notes

Project time management

- As the project activities are being performed , the majority of the effort in the knowledge area will occur in the [control schedule] process to ensure completion of project work in a timely manner
- Padding is not an acceptable project management practice

7 processes

1-Plan schedule management 2-define activities 3-sequence activities

4-estimate activity resources 5-estimate activity duration 6-develop schedule 7- control schedule

Plan schedule management:

- **Process** of establishing the policies , procedures and documentation for planning , developing , managing , executing and controlling project schedule
- **The key benefit** is provides guidance and direction on how the project schedule will be managed throughout the project
- **Plan schedule management** is a component of the project management plan, that establish the criteria and activities for developing, monitoring and controlling the schedule & establish the following:-
  - Project schedule development
  - Level of accuracy
  - Units of measure (hours , days , weeks……etc)
  - Organizational procedures links (provides frame work)
  - Project schedule model maintenance

- Control thresholds: are typically expressed as percentage deviations from the parameters established in the baseline plan
- Rules of performance measurement: earned value management (EVM)
- Schedule performance measurements: schedule variance(SV) , schedule performance index (SPI)
- Reporting formats
- Process description

- **Scope baseline** (includes scope statement+ WBS+ WBS dictionary)
- **Analytical techniques** choosing strategic options to estimate and schedule the project

Define activities:-

- **Process** of identifying and documenting the specific actions to be performed to produce the project deliverables
- **Key benefit** to break down work packages into activities that provide a basis for estimating , scheduling , executing , monitoring and controlling the project work.
- **Work package** decomposed into activities that represent work effort to complete work package
- **Decomposition** technique for dividing and subdividing the project scope and project deliverables into smaller more manageable parts
- **Rolling wave** because of the too many unknowns must plan to a higher level and then wait until the project work has begun and the work is clearer to plan the lower levels , it is a form of progressive elaboration
- **Activity list** comprehensive list that includes all schedule activities required to the project , and activity identifier and a scope of work description for each activity in sufficient detail to ensure the project team members understand what work is required to be completed.

- **Activity attributes** extend the description of the activity by identifying the multiple components associated with each activity.
- **Level of effort (LOE)**
- **Milestone list** significant point or event in a project , they are mandatory(such as those required by contract) or optional (such as those based upon historical information) , have zero durations (point in time)

Sequence activities:-

- **Process** of identifying and documenting relationships among the project activities the result is (network diagram)
- Key benefit defines the logical sequence of work to obtain the greatest efficiency given all project constraints
- **Precedence diagram method (PDM)** technique show the sequence in which the activities are to be performed
- **Dependency determination**
  - Mandatory dependencies (Hard logic , hard dependencies): legally or contractually required or inherent in the nature of the work , often involve physical limitations , technical dependencies may not be mandatory.
  - Discretionary dependencies (Preferred logic , preferential logic): there are other ways it could be done but this is the preferred approach , most important to use when analyzing how to compress the schedule (fast tracking the project)
  - External dependencies: relationship between project activities and non-project activities (determined during process of sequence activities)
  - Internal activities: relationship between project activities and are generally inside the project team's control (determined during the process of sequence activities)
- **Lead** is the amount of time whereby a successor activity can be advanced with respect to a predecessor activity(allow an acceleration of the successor activity)

- **Lag** is the amount of time whereby a successor activity will be delayed with respect to a predecessor activity (waiting time-directs a delay in the successor activity)
- **Project schedule network diagrams** is a graphical representation of the logical relationship , also referred to as dependencies among the project schedule activities

Estimate activity resources:-

- **Process** of estimating the type and quantities of material , human resources, equipment , or supplies required to perform each activity
- **Key benefit** it identifies the type, quantity and characteristics of resources required to complete the activity which allows more accurate cost and duration estimates
- **Resource calendar** identifies the working days and shifts on which each specific resource is available
- **Risk register** may impact resource selection and availability
- **Bottom-up estimating** method of estimating project duration or cost by aggregating the estimates of the lower-level components of the WBS
- **Activity resource requirements** identify types and quantities of resources for each activity in a work package.
- **Resource breakdown structure** is a hierarchical representation of resources by category and type

Estimate activity durations:-

- **Process** of estimating the number of work periods needed to complete individual activities with estimated resources
- **Key benefit** provides amount of time needed for each activity to complete , which is a major input into develop schedule process
- **Analogous estimating** technique for estimating the duration or cost of an activity or a project using historical data(used when limited amount of detailed information exist) , less costly , less time , less accurate

- **Parametric estimating** technique in which algorithm is used to calculate cost or duration based on historical data and project parameters
- **Three-point estimating** duration estimates based on three points with an assumed distribution provide an expected duration and clarify the range of uncertainty around the expected duration
  Most likely [tm]-optimistic[to]-pessimistic[tp]
  Triangular distribution TE = (TO+TM+TP)/3
  Beta distribution(from the traditional PERT technique) te=(TO+4TM+TP)/6
- **Activity duration estimates** quantitative assessments of the likely number of time periods that are required to complete an activity
- **Reserve analysis** project managers have a professional responsibility to establish a reserve to accommodate the risks that remain in the project after the risk management planning processes have been completed. Often In the risk management process, an initial reserve is estimated , the plan risk responses process is performed to reduce the risk , and then revised reserve is created.
  - Contingency reserve(time reserve , buffers) are for the identified schedule baseline
  - Management reserve are additional funds set aside to cover unforeseen risks that would impact the project's ability to meet the schedule
- **Free float** the amount of time an activity can delay without delaying the early start of its successor
- **Total float** the amount of time an activity can delay without delaying the project completion date

Develop schedule:-

- **Process** of analyzing activity sequence , durations , resource requirements , and schedule constraints to create the project schedule model
- **Key benefit** by entering schedule activities , durations , resources , resource availabilities , and logical relationships into the scheduling tool , it generates a schedule model with planned dates for completing project activities

- **Schedule network analysis** a technique that generate the project schedule model.it employs various analytical techniques such as (CPM , CCM)
- **Critical path method (CPM)** critical path is normally characterized by zero total float on the critical path
- **Critical chain method (CCM)** it is developed from the critical path method approach and considers the effects of resource allocation, resource optimization , resource leveling , and activity duration uncertainty on the critical path determined using the critical path method
- **Resource optimization techniques**
  - Resource leveling: a technique which start and finish dates are adjusted based on resource constraints with the goal of balancing demand for resource with the available supply(can often cause the original critical path to change , usually to increase
  - Resource smoothing: a technique that adjusts the activities of a schedule model such that the requirements for resources on the project do not exceed certain predefined resource limits(completion date of activities are not delayed) , a modified forum of leveling
- **Schedule compression** techniques used to shorten the schedule duration without reducing the project scope
  - Crashing: technique used to shorten the schedule duration for the least incremental cost by adding resources(doest not always produce viable alternative and may result in increased risk or coast)
  - Fast tracking: technique in which activities or phases normally done in sequence are performed in parallel for at least a portion of their duration, usually increase risk.
- **Schedule baseline** is the approved version of a schedule model that can be changed only through formal change control procedures and is used as a basis for comparison actual results
- **Project schedule** is an output of a schedule model that presents linked activities with planned dates , durations , milestones , and resources
  Bar charts – milestone charts – project schedule network diagrams
- **Schedule data** is the collection of information for describing and controlling the schedule

- **Project calendars** identifies working days and shift that are available for schedule activities.

Control schedule

- **Process** of monitoring the status of project activities to update progress and manage changes to the schedule baseline to achieve the plan
- **Key benefit** that it provides the means to recognize deviation from the plan and take corrective and preventive actions and thus minimize risk
- **Performance reviews** measure , compare and analyze schedule performance , using various techniques such:
  - Trend analysis , critical path method , critical chain method , earned value management
- **Work performance information** the calculated SV and SPI time performance indicators for WBS components , in particular the work packages and control accounts , are documented and communicated to stakeholders
- **Schedule forecasts** are estimates or predictions of conditions and events in the project's future based on information and knowledge available at the time of the forecast
- **Schedule base line** is the approved version of the project schedule

Project cost management

- Project cost management should consider the stakeholder requirements for managing costs
- In many organizations predicting and analyzing the prospective financial performance of the project's product is performed outside of the project
- The cost management planning effort occurs early in project planning and sets the framework for each of the cost management processes so that performance of the processes will be efficient and coordinated

Plan cost management

- **Process** that establishes the policies , procedures , and documentation for planning , managing , expending and controlling project costs
- **The key benefit** of this process is that it provides guidance and direction on how the project costs will be managed throughout the project
- **Analytical techniques** involve choosing strategic options to fund the project such as:
  Self-funding , funding with equity, or funding with debt
- **The cost management plan** may also detail ways to finance project resources such as making , purchasing , renting , or leasing
- **Techniques** payback period , return of investment , internal rate of return , discounted cash flow , and net present value
- **Cost management plan** is a component of the project management plan and describes how the project costs will be planned , structured , and controlled
  And it establish the following:
  Units of measure – level of precision – level of accuracy – organizational procedures links – control thresholds – rules of performance measurement – reporting formats – process descriptions – additional details

Estimate costs

- **Process** of developing an approximation of the monetary resources needed to complete project activities
- **Key benefit** it determines the amount of cost required to complete project work
- **Cost estimate** are a prediction that is based on the information known at a given point in the time
- **Cost estimate** include the identification and consideration of costing alternatives to initiate and complete the project
- **Human resource management plan** provides project staffing attributes , personnel rates , and related rewards/recognition
- **Project scope statement** provides the product description , acceptance criteria , key deliverables , project boundaries , assumptions , and constraints about the project
- **One basic assumption** that needs to be made when estimating project costs is whether the estimates will be limited to direct project costs only or whether the estimate will also include indirect costs.
- **Project schedule** the type and quantity of resources and the amount of time which those resources are applied to complete the work of the project are major factors in determining the project cost
- **Schedule activity** resources and their respective durations are used as key inputs to this process
- **Activity duration** estimate will affect cost estimate on any project where the project budget includes an allowance for the cost of financing (including interest charges) and where resources are applied per unit of time for the duration of the activity.
- **Analogous estimating** uses the values such as scope , cost , budget , and duration or measures of scale such as size , weight , and complexity from a previous , similar project as the basis for estimating the same parameter or measurement for a current project

- **Analogous cost estimating** is frequently used to estimate a value when there is a limited amount of detailed information about the project, and it use top-down estimating technique
- **Analogous cost estimate** can be applied to a total project or to segments of a project, and is a form of expert judgment
- **Analogous estimating** is most reliable when the previous projects are similar in fact and not just in appearance
- **Parametric estimating** can be applied to a total project or to segments of a project , in conjunction with other estimating methods….example(dollars per module)
- **Bottom-up estimating** is a method of estimating a component of work, the cost of individual work packages or activities is estimated to the greatest level of specified detail
- **Contingency reserves** are part of the cost baseline and the overall funding requirements for the project
- **Vendor bid analysis** may include analysis of what the project should cost , based on the responsive bids from qualified vendors. When projects are awarded to a vendor under competitive processes , additional cost estimating work may be required of the project team to examine the price of individual deliverables and to drive a cost that supports the final total project cost
- **Activity cost estimate** are quantitative assessments of the probable costs to complete project work
- **Supporting detail for activity cost estimates may include:**

-documentation of the basis of the estimate

-documentation of all assumptions made

-documentation of any known constraints

-indication of range of possible estimates

-indication of the confidence level of the final estimate

Determine budget

- **Process** of aggregating the estimated costs of individual activities or work package to establish an authorized cost baseline
- **Key benefit** it determines the cost baseline against which project performance can be monitored and controlled
- **Cost aggregation**....cost estimate aggregated by work packages in accordance with the WBS , the work package cost estimates are then aggregated for the higher component levels of the WBS (such as control accounts) and ultimately for the entire project
- **Historical information** is any historical relationships that result in parametric estimates or analogous estimates involve the use of project characteristics (parameters) to develop mathematical models to predict total project costs
- **Funding limit reconciliation** the expenditure of funds should be reconciled with any funding limits on the commitment of funds for the project . a variance between the funding limits and the planned expenditures will sometimes necessitate the rescheduling of work to level out the rate of expenditure. This is accomplished by placing imposed date constraints for work into the project schedule
- **Cost baseline** is the approved version of the time-phased project budget , excluding any management reserves , which can only be changed through formal change control procedures and is used as a basis for comparison to actual results
- **Control accounts** are aggregated work package cost estimates , along with any contingency reserves estimated for the work packages
- **The summation of the control accounts make up the cost baseline**
- **Management reserve** are added to the cost baseline to produce the project budget
- **The funding requirements and periodic funding requirements** are derived from the cots baseline

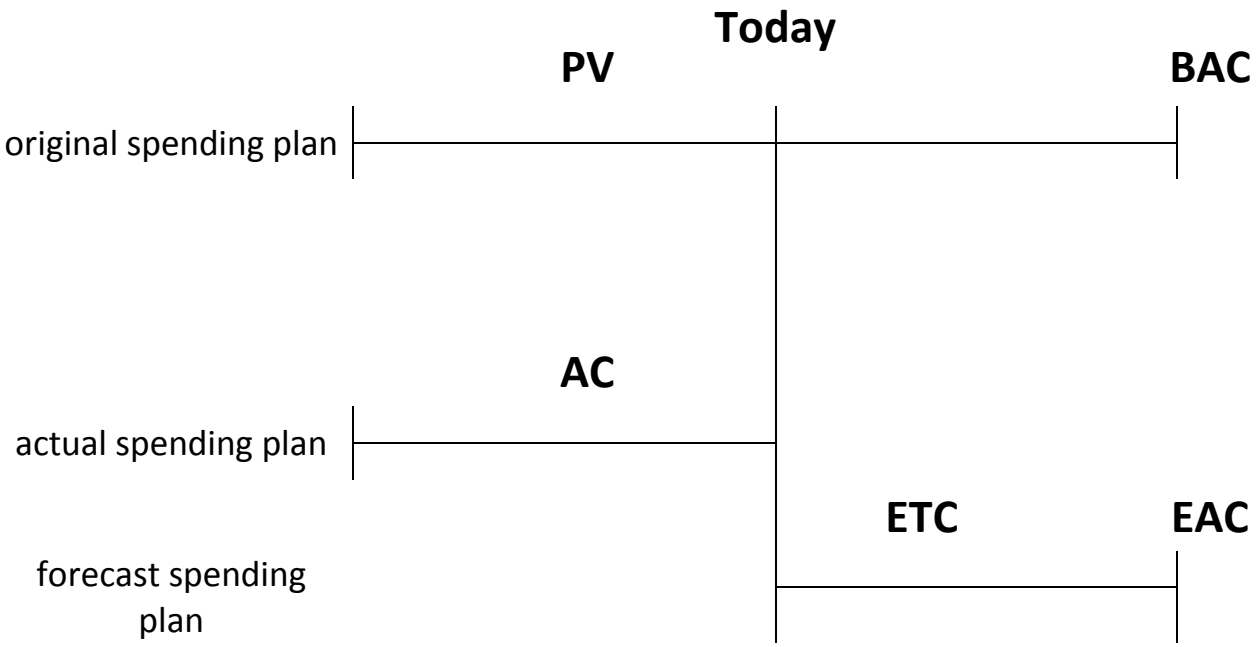
- **Cost baseline** include project expenditure plus anticipated liabilities
- **Funding** often occurs in incremental amounts that are not continuous , and may not be evenly distributed

Control costs

- **Process** of monitoring the status of the project to update the project costs and managing changes to the cost baseline
- **Key benefit** it provides the means to recognize variance from the plan in order to take corrective action and minimize risk
- **Any increase to the authorized budget can only be approved through the perform integrated change control process**
- Much of the effort of cost control involves analyzing the relationship between the consumption of project funds to the physical work being accomplished for such expenditure
- **Project cost control include**
  - Influencing the factors that create changes to the authorized cost baseline
  - Ensuring that all change requests are acted on in a timely manner
  - Managing the actual changes when and as they occur
  - Ensuring that cost expenditure do not exceed the authorized funding by period , by WBS component , by activity , and in total for the project
  - Monitoring cost performance to isolate and understand variances from the approved cost baseline
  - Monitoring work performance against funds expended
  - Preventing unapproved changes from being include in the reported cost or resource
  - Information appropriate stakeholders of all approved changes and associated cost
  - Bringing expected cost overruns with acceptable limits
- **Earned value management (EVM)** it integrates the scope baseline with the cost baseline , along with the schedule baseline , to form the performance baseline , which helps the project management team assess and measure project performance and progress

- **EVM** develop and monitors three key dimensions for each work package and control account
  - Planned value (PV) or performance measurement baseline (PMB) , and the total planned value is budget at completion (BAC)
  - Earned value (EV)
  - Actual cost (AC)
- **Schedule variance(SV)** is a useful metric in that can indicate when a project is falling behind or is ahead of its baseline schedule , is best used in conjunction with critical path methodology (CPM) scheduling and risk management SV=EV-PV
- **Cost variance (CV)** is particularly critical because it indicates the relationship of physical performance to the cost spent. Negative CV is often for the project to recover CV=EV-AC
- **Schedule performance index (SPI)** it measure how efficiency the project team is using it time , and forecast the final project completion estimates.
- **Cost performance index (CPI)** measure of the cost efficiency of budgeted resources
- **Forecasting** means that the project team may develop a forecast for the estimate at completion(EAC) that may differ from the budget at completion(BAC) based on the project performance
- **EACs** are typically based on the actual cost incurred for work completed , plus an estimate to complete(ETC) the remaining work , the most common EAC forecasting approach is a manual , bottom-up summation by the project manager and project team
- **To-complete performance index(TCPI)** measure of the cost performance that is required to 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 remaining budget
- **TPCI** is the calculated cost performance index that is achieved on the remaining work to meet a specified management goal , such as the BAC or the EAC
- If the cumulative CPI falls below the baseline , all future work of the project will need to be performed immediately in the range of the TCPI (BAC)

- **Performance reviews**
  - Variance analysis: cost performance measurements are used to assess the magnitude of variation to the original cost baseline
  - Trend analysis
  - Earned value performance
- **Life cycle costing** is looking at the whole life of the product , not just the cost of the project , and taking in consideration while planning cost the operations and maintenance estimate and cost
- **Value analysis** is focusing to find a less costly way to do the same work , without changing the scope , or loss of performance
- **Benefit cost ration(BCR)** >1 means the benefits grater than the costs
  <1 mean the costs are grater than the benefits
- **Internal rate of return(IRR)** the higher the rate the better the project, an IRR of 0.15 means that you expect the project to return an average of 15% on your investment over a given time period
- **Return on investment(ROI)** a technique to measure the potential profitability of an investment by calculating the benefits received in relation to the cost
- **Discounted cash flow** a technique to estimate the attractiveness of an investment by predicting how much money will be received in the future and discounting it to its current value
- **Type of costs** variable , fixed , direct and indirect
- **Value analysis** seeks to decrease cost while maintaining the same scope
- **Cost management plan** identifies WBS level at which earned value will be calculated
- If it is a variance , the formula is EV minus something
- If it is an index , the formula is EV divided by something
- If the formula relates to cost , use AC
- If the formula relates to schedule , use PV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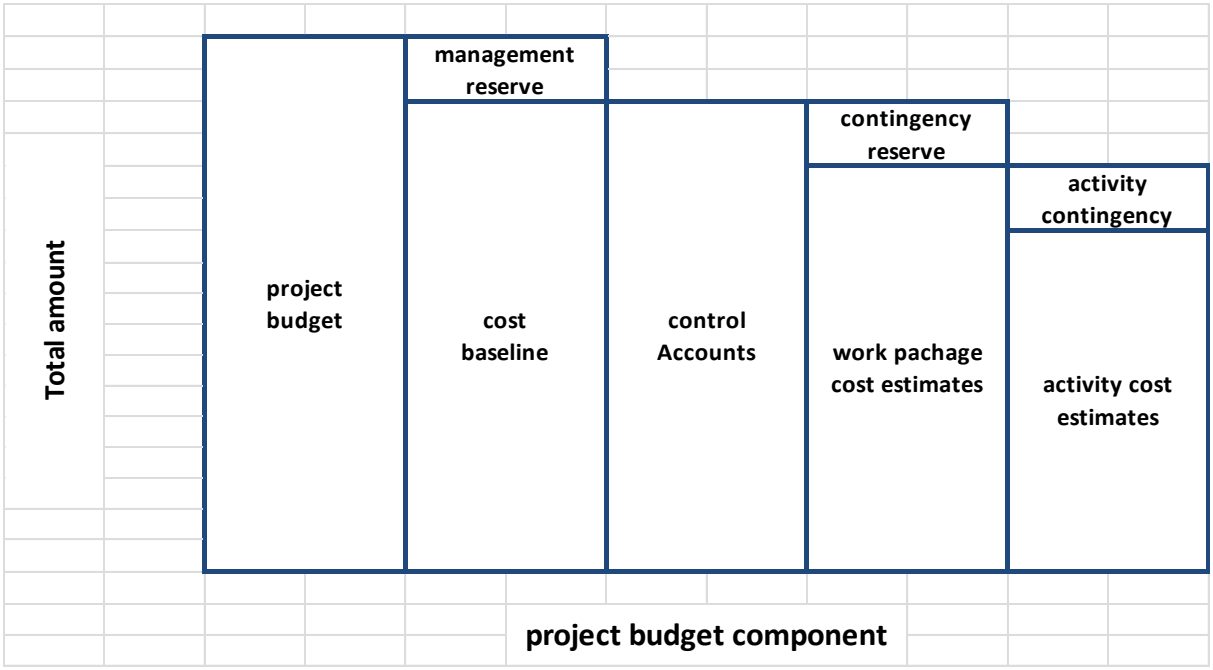

Total amount
project budget
management reserve
cost baseline
control Accounts
contingency reserve
work pachage cost estimates
activity contingency
activity cost estimates
project budget component

Earned value analysis					
Abb	name	Lexicon definition	How used	equation	Interpretation Of result
PV	Planned value	The authorized budget Assigned to schedule 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, with out reference to actual costs	EV=sum of the planned value of completed work	
AC	Actual cost	The realized cost incurred for the work performance 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 planned schedule Negative=over planned 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 same 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	CPI=EV/AC	Greater than 1.0= under planned cost Exactly 1.0=on

			percentage of how much costs over or under the budgeted amount for work accomplished		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	As 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 cost are over or under the budget 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 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 If the initial plan is no longer valid,use If both the CPI and SPI influence the remaining work use	EAC=BAC/CPI EAC=AC+BAC-EV EAC=AC+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 complete the remaining authorized work can be calculated using Reestimate the remaining work from the bottom-up	ETC=EAC-AC ETC=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	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

Project quality management

- **It includes Processes and activities** of the performing organization that determine quality policies, objectives, and responsibilities so that the project will satisfy the needs for which it was undertaken.
- **Quality and grade are not the same concepts**
- **Quality** as a delivered performance or result is ''the degree to which a set of inherent characteristics fulfill requirements
- **Grade** as a design intent is a category assigned to deliverables having the same functional use but different technical characteristics
- While a quality level that fails to meet quality requirements is always a problem , a low grade of quality may not be a problem
    - It may not be a problem if a suitable low-grade software product(one with limited number of features) is of high quality(no obvious defects, readable manual). The product is appropriate
    - It may be a problem if a high-grade software(one with numerous features) is of low quality(man defects, poorly organized). The product is not appropriate.
- International organization for standardization (ISO)
- **Customer satisfaction** require combination of:-
    - Conformance to requirements (to ensure the project produces what it was created to produce)
    - Fitness for use (the product or service needs to satisfy the real needs)
- **Prevention over inspection** quality should be planned , designed , and built into-not inspected the project's management or the project's deliverables
- **Continuous improvement** the PDCA (plan-do-check-act) cycle is the basis for quality improvement, in addition Total quality management(TQM) , six sigma , and lean six sigma could improve the quality of the project's management as well as the quality of the project's product
- **Marginal analysis** the point where the benefits or revenue to be received from improving quality equals the incremental cost to achieve that quality

- **Cost of quality (COQ)** refers to the total cost of the conformance work and the nonconformance work that should be done as a compensatory effort because , on the first attempt to perform that work , the potential exists that some portion of the required work effort may be done incorrectly. The costs for quality work may be incurred throughout the deliverable's life cycle(making sure the project is not spending too much to achieve a particular level of quality).

Cost of conformance	Cost of nonconformance
Prevention costs (build a quality product)	Internal failure costs (failures found by the project)
Quality training	rework
Document processes & equipment	scrap
Appraisal cost (asses the quality)	External failure costs (failure found by the customer)
testing	liabilities
Destructive testing loss	Warranty work
inspections	Lost business
Money spent during the project to avoid failures	Money spent during and after the project because of failures

Cost of conformance should be < cost of nonconformance

Plan quality management

- **Process** of identifying quality requirements and standards for the project and its deliverables
- **Key benefit** provide guidance and direction on how quality will be managed and validated throughout the project
- **Cost-benefit analysis** for each quality activity compares the cost of the quality step to the expected benefit to determine that appropriate quality level and requirements for the project

- **Seven basic quality tools(check figure 8-7 Pmbok page 99-part2)**
- **Cause-and-effect diagrams (fishbone diagrams or Ishikwawa diagrams)**. The problem statement placed at the head of the fishbone is used as a starting point to trace the problem's source back to it actionable root cause. The problem statement typically describes the problem as a gap to be closed or as an objective to be achieved.
- **Flowcharts (process maps) common model SIPOC** because they display the sequence of steps for a process , and shows the activities , decision points , branching loops , parallel paths , and the overall order of processing. Flowcharts may prove useful in understanding and estimating the cost of quality(COQ) in a process, by mapping the expected monetary value of pursing paths of conformance and nonconformance to quality.
    - Useful in planning quality because they can help u define and communicate to the team processes that will be used on the project, and to ''see'' a process and find potential problems
    - In control quality process by analyze quality problems and develop solutions.
- **Checksheets (Tally sheets)** used to keep track of data and gather it such as quality problems uncovered during inspection, and can be translated to (pareto diagram), and document how often a particular defect occurs.
- **Pareto diagrams** it arranges the results from most frequent to least frequent to help identify which root causes are resulting in the most problems. It states that 80 percent of problems are due to 20 of the roots causes.
- **Histograms** are a special form of bar chart and used to describe the central tendency, dispersion and shape of statistical distribution, it represent data in no particular order and without reference to time
- **Control chart** used to determine whether or not a process is stable or has predictable performance, they can also be used to monitor cost and schedule variances ,volume , and frequency of scope changes , or other

management results, can monitor various types of output variables.
process is considered out of control when,
1-a data point exceeds a control limit 2-seven consecutive plot points are above or below the mean
-upper and lower control limits: often shown as two dashed lines on a control chart, they represent the performing organization's standards for quality
-specification limits: they are input from the customer , and they can appear either inside or outside of the control limits.

- **Scatter diagrams(correlation diagrams)** this diagram tracks to variables to determine their relationship, a regression line(trend line) is calculated to show the correlation of variables , and then be used for estimation and forecasting.
- **Benchmarking** looks at other projects to get ideas for improvement on the current project and to provide basis to use in measuring quality performance.
- **Design of experiments(DOE)** uses experimentation to determine statistically what variables will improve quality, it allows u systematically change all of the important factors in a process, it can help shorten the time effort required to discover the best condition to produce a quality deliverable.
- **Statistical sampling** involves choosing part of a population of interest for inspection, because studying the entire population would:1-take too long 2-cost too much 3-be too destructive .The sample size and frequency are determined as part of the plan quality management process , and the actual sampling is done in control quality.
- **Additional quality planning tools**
  Brainstorming-force field analysis-nominal group technique(allow ideas to be brainstormed in small group and then reviewed by a larger group)-quality management and control tools.
- **Quality management plan** describes how the organization's quality policies will be implemented, and how the project management team plan to meet the quality requirements set for the project

- **Process improvement plan** details the steps for analyzing project management and product development processes to identify activities that enhance their value
- **Quality metrics** specifically describes a project or product attribute and how the control quality process will measure it, used in the perform quality assurance and control quality processes.
- **Quality checklists** used to verify that a set of required steps has been performed, should incorporate the acceptance criteria included in the scope baseline.

Perform quality assurance

- **Process** of auditing the quality requirements and the results from quality control measurements to ensure that appropriate quality standards and operational definitions is used
- **Key benefit** it facilitates the improvement of quality processes
- **Quality assurance** contributes to the state of being certain about quality by preventing defects through the planning processes or by inspecting out defects during the work-in-progress, and falls under the conformance work category in the cost of quality framework
- **Quality assurance** improve the quality of all processes
- **Continuous improvement** reduces waste and eliminates activities that do not add value
- **Quality control measurements** the tools&techniques used in plan quality management and control quality processes are also used in the perform quality assurance process.
- **Quality control measurements** these tools here help asses whether the practices and procedures are being followed as planned, to improve process, and to determine whether the quality requirements, processes, and standards we planned in are correct ones to ensure the project will deliver to requirements and expectations
- **Quality management and control tools** these tools used also in quality assurance

- **Affinity diagrams** similar to mind-mapping techniques in that they are used to generate ideas that can be linked to form organized patterns of thought about a problem. WBS may be enhanced by using affinity diagram
- **Process decision program charts(PDPC)** used in conjunction with tree diagrams , to decompose a goal into steps required to achieve it, useful for contingency planning
- **Interrelationship digraphs** provide a process for problem solving in complex scenarios that possess intertwined relationships up to 50 relevant items
- **Tree diagrams(systematic diagrams)** may be used to represent decomposition hierarchies such as the WBS , RBS , OBS. In management it Is useful in visualizing the (parent-to-child) relationship. Useful for decision analysis, organize data, and arrive at corrective or preventive action
- **Prioritization matrices** it identify the key issues and the suitable alternatives to be prioritized as a set of decision for implementation
- **Activity network diagrams (arrow diagrams)** they are most commonly used formats of a network diagram. They are used with project scheduling such as program evaluation and review technique (PERT) , critical path method(CPM) ,and precedence diagramming method (PDM(
- **Matrix diagram** a quality management and control tool used to perform data analysis within the organizational structure , it seeks to show the strength of relationships between factors , causes , and objectives
- **Quality audits** is a structured , independent process to determine if project activities comply with organizational and project policies, processes , and procedures , the objective if quality audits include:-
    - Identify all good and best practices being implemented
    - Identify all nonconformity , gaps , and shortcomings
    - It may be scheduled or random , and may be conducted by internal or external auditors
    - Can confirm the implementation of approved change requests

Control quality

- **Process** of monitoring and recording results of executing the quality activities to asses performance and recommend necessary changes
- **Key benefit** ***1***-identifying the causes of poor process or product quality and recommending and taking action to eliminate them. ***2***-validating the project deliverables and work meet the requirements specified by key stakeholders necessary for final acceptance
- **Quality assurance** should be used during the project's planning and executing phases to provide confidence that the stakeholder's requirements will be met
- **Quality control** should be used during the project executing and closing phases to formally demonstrate , with reliable data , that the sponsor and customer's acceptance criteria have been met
- **Prevention** keep errors out of the process
- **Inspection** keep errors out of the hands of the customer
- **Attribute sampling** the result either conforms or does not conform
- **Variable sampling** the result is rated on a continuous scale that measures the degree of conformity
- **Tolerance** specified range of acceptable results
- **Control limits** that identify the boundaries of common variation in a statistically stable process or process performance
- **Approved change requests** Indicates that some changes are approved and some are not. May include modifications such as defect repairs, revised work methods , revised schedule. Time implementation of approved changes needs to be verified
- **Work performance information** is the performance data collected from various controlling processes , analyzed in context and integrated based on relationships across areas
- **OPA updates** some of the included updates **1-**completed checklist **2-**lessons learned documentation

Humen resource management

- The project sponsor works with the project management team ,assisting with matters such as project funding , clarifying scope , monitoring progress , and influencing stakeholders

Plan human resource management

- **Process** of identifying and documenting project roles , responsibilities , required skills , reporting relationships , and creating a staffing management plan
- **Key benefit** establish project roles , responsibilities , including timetable for staff acquisition and release , identify necessary skills for project success
- **Effective human resource planning** should consider the availability of scarce(rare) resources
- **Organizational chart and position description** are three types
  1-hierarchical 2-matrix 3-text oriented
- **Hierarchical** format may be used to represent high-level roles
- **Text-based** format may be better suited to document detailed responsibilities
- **Hierarchical-type charts(organizational breakdown structure OBS)** is arranged to an organization's existing departments ,units, or teams with the project activities or work packages listed under each department
- **Hierarchical-type chart(resource breakdown structure)** is helpful in tracking project costs
- **Matrix-based charts** responsibility assignment matrix(RAM) is a grid that shows the project resources assigned to each work package, it is used to illustrate the connections between work packages or activities and project team members
- **RAM is a RACI** (responsible , accountable , consult , and inform) chart , it is useful tool to use when the team consists of internal and external resources in order to ensure clear divisions of roles and expectations

- **Text-oriented formats** it provide information such as responsibilities , authority , competencies , and qualifications , can be used as templates for future projects

- **Networking** is the formal and informal interaction with others in an organization , industry , or professional environment, can be a useful technique at the beginning of a project

- **Networking** is a constructive way to understand political and interpersonal factors that will impact the various staffing management

- **Organizational theory** provides information regarding the way in which people , teams , and organizational units behave

- **Human resources management plan** provide guidance on how project human resources should be defined , staffed , managed and released

- **Human resource management plan** consist of but not limited to, Roles & responsibilities - project organization charts - staffing management plan
- **Role** is the function assumed by or assigned to a person in the project
- **Authority** the right to apply project resources , make decisions , sign approvals , accept deliverables , and influence others to carry out the work of the project
- **Responsibility** is the assigned duties and work that a project team member is expected to perform in order to complete the project's activities
- **Competency** is the skill and capacity required to complete assigned activities within the project constraints
- **Competency** if not fulfill , proactive responses such as training , hiring , schedule changes , or scope changes are initiated
- **Project organization charts** is a graphic display of project team members and their reporting relationships

- **Staffing management plan** describes when and how project team member will be acquired and how long they will be needed
- **Staffing management plan** consist off
  Staff acquisition – resource calendars – staff release plan – training needs – recognition and rewards – compliance – safety
- **Compliance** is strategies for complying with applicable government regulations , union contracts , and other established human resources policies
- **Resource calendars** identifies the working days and shifts which each specific resource is available , one tool for charting human resources is a resource (Histogram)

Acquire project team

- **Process** of confirming human resource availability and obtaining the team necessary to complete project activities
- **Key benefit** that is consists of outlining and guiding the team selection and responsibility assignment to obtain successful team
- **It Is important to consider following factors while acquiring the team**
  1- Project manager should effectively negotiate others who in position to provide the required human resources
  2- Failure to acquire the necessary human resource may effect project schedule , budgets , customer satisfaction , quality , and risks , in worst case scenario result in project cancellation
  3- If human resources are not available , the project manager may be required to assign alternative resources , perhaps with lower competencies , provided there is no violation of legal , regulatory of other specific criteria
- **Pre-assignment** people being identified as part of competitive proposal , if the project is dependent upon the expertise or particular persons , or if some staff assignments are defined within the project charter

- **Negotiation** the project management team may need to negotiate with others to acquire the desired human resources such as
  Functional managers – other project management teams – external organization , vendors , suppliers
- **Acquisition** when the organization can't provide the staff needed , it acquire it from outside sources , involve hiring individual consultants or subcontracting
- **Virtual teams** got some disadvantages like , misunderstanding , feeling of isolation , difficulties in sharing knowledge(communication planning becomes increasingly important in a virtual team)
- **Multi-criteria decision analysis** the criteria used to develop and rate or score potential team members
  Availability – cost – experience – ability (competencies) – knowledge – skills – attitude – international factors
- **Project staff assignments** project is staffed when appropriate people have been assigned to the team

Develop project team

- **Process** of improving competencies , team member interaction and overall team environment to enhance project performance
- **Key benefit** is that it results in improved teamwork , enhanced people skills and competencies , motivated employees , reduced staff turnover rates
- High team performance can be achieved by using open and effective communication
- **Interpersonal skills** known as ''soft skills'' are behavioral competencies that include proficiencies such as communication skills , emotional intelligence , conflict resolution , negotiation , influence , and group facilitation
- **Training** includes all activities designed to enhance the competencies of the project team member , can be formal or informal
- **Team-building activities** is to help team members work together , team-building strategies are particularly available when they operate from remote locations , is a never ending process

- **Tuckman ladder** describe the team development
  Forming(learning about each other) – storming (challenging each other)
  Norming (working with each other) – performing (working as one)
  Adjourning (team moves to other projects or release)
- **Ground rules** establish clear expectations for acceptable behavior by project team members
- **Colocation(tight matrix)** placing team members in same location
- Team meeting room can also called (war room)
- **Virtual teams** can bring benefits such as use of more skilled resources , reduced costs , less travel.
- **Recognition and rewards** recognize that reward given to any individual will be effective only if it satisfies a need which is valued by that individual , culture should be considered, money viewed as tangible aspect
- **Personal assessment tools** give the project manager and the project team insight into areas of strength and weakness , tools used such as attitudinal surveys , specific assessments , structured interviews ability tests , and focus groups
- **Team performance assessments** should be determined by all appropriate parties and incorporated in the develop project team inputs , project management team makes formal or informal assessments of the project team's effectiveness

Manage project team

- **Process** of tracking team member performance , providing feedback , resolving issues , and managing team changes to optimize project performance
- **Key benefit** it influence team behavior , manage conflict , resolves issues , and appraises team member performance
- **Issue log used** to document who is responsible for resolving specific issues by a target date
- **Work performance** reports provide documentation about the current project status compared to project forecasts

- **Project performance appraisals** include clarification of roles and responsibilities , constructive feedback on team members , discovery of unknown or unresolved issues , establish for future time periods goals
- **Conflict management** team ground rules , group norms , and solid project management practices , like communication planning and role definition , reduce the amount of conflict , greater productivity
- **Conflict management five general techniques**
  Withdrawal/avoid – smooth/accommodate – compromise/reconcile – force/direct – collaborate/problem solving
- **Interpersonal skills** leadership – influencing – effective decision making
- **Seven sources of conflict in order**
  Schedule – project priorities – resources – technical – administrative procedures – cost – personality diff
- **Powers of project manager**
  Formal – reward – expert – penalty – referent

Project scope management

- **Project scope management** includes the processes required to ensure that the project includes all the work required and only the work required to complete the project successfully
- **Product scope** the features and functions that characterize a product , service , or result , completion of it is measured against the product requirements
- **Project scope** the work performed to deliver a product , service , or result with the specified features and functions , completion of it is measured against the project management plan

Plan scope management

- **Process** of creating a scope management plan that document how the project scope will be defined , validated and controlled
- **Components of the scope management plan**
  - Process of preparing a detailed project scope statement
  - Process for creation the WBS from the detailed project scope statement
  - Process that establish how the WBS will be maintained and approved
  - Process that specifies how formal acceptance of the completed project deliverables will be obtained
  - Process to control how request changes will be handled
- **Requirements management** plan describes how requirements will be analyzed , documented and managed

Collect requirements

- **Process** of determining , documenting and managing stakeholders needs and requirements to meet project objectives
- **Project success** is directly influenced by active stakeholder involvement in the discovery and decomposition of needs into requirements

- **Requirements** categorize into business(stakeholder need) , technical solutions(how those needs will be implemented)
    - Business requirements: higher-level needs of the organization
    - Stakeholder requirements
    - Solution requirements: describe features , functions , and characteristics of the (product, service , result) that will meet the business and stakeholder requirements
    - Transition requirements: describe temporary capabilities , such as data conversion and training requirements
    - Project requirements: actions , processes
    - Quality requirements: any condition or criteria needed to validate the project deliverable
- **Focus group** bring together prequalified stakeholders and subject matter expert to learn about their expectations about a proposed product
- **Facilitated workshops** are focused sessions that bring key stakeholders together to define product requirements
- **Group creativity techniques**
    - Brainstorming: used to generate and collect multiple ideas
    - Nominal group technique: enchase brainstorming with a voting process to rank the most useful ideas
    - Idea/mind mapping: created through individual brainstorming sessions and consolidated into a single map
    - Affinity diagram: allows large numbers of ideas to be classified into groups
    - Multicriteria decision analysis: use a decision matrix to provide a systematic analytical approach
- **Group decision-making techniques:**
    - Unanimity: a decision that is reached whereby everyone agrees on a single course of action
    - Majority: a decision is reached with support of more than 50%
    - Plurality: a decision is reached whereby the largest block in group decides
    - Dictatorship

- **Prototypes** method of obtaining early feedback on requirements by proving a working model of the expected product
- **Benchmarking** involves comparing actual or planned practices , such as processes and operations , to those of comparable organization to identify best practices
- **Context diagram** visually depict the product scope by showing a business system(process,equipment) and how people interact with it
- **Document analysis** is used to elicit requirements by analyzing existing documentation and identifying information relevant to it
- **Requirements documentation** describes how individual requirements meet the business need for the project
- **Requirements traceability matrix** is a grid that links product requirements from their origin to the deliverables that satisfy them , helps ensure that each requirement adds business value by linking it to the business and project objectives

Define scope

- **Process** of developing a detailed description of the project and product
- **Key benefit** that it describes the (project,service,result) boundaries by defining which of the requirements collected will be included in and excluded from the project scope
- **Product analysis** each application area has one or more generally accepted methods for translating high-level product descriptions into tangible deliverables , include techniques as product breakdown , systems analysis , requirements analysis , system engineering , value engineering
- **Alternatives generation** is a technique used to develop as many potential options as possible in order to identify different approaches to execute and perform the work of the project
- **Project scope statement** is a description of the project scope , major deliverables , assumptions and constrains, it describe in details the project's deliverables and the work required to create those deliverables
    - **Product scope description**

    - **Acceptance criteria**
    - **Deliverable**
    - **Project exclusion**
    - **Constraints**
    - **Assumptions**
- **Project charter** contains high-level information
- **Project scope** statement contains a detailed description of the scope elements

Create WBS

- **Process** of subdividing project deliverables and project work into smaller , more manageable components
- **Key benefit** it provides a structured vision of what has to be delivered
- **WBS** is a hierarchical decomposition of the total scope of work to be carried out by the project team to accomplish the project objectives and create the required deliverables
- **Work packages** is the planned work contained within the lowest level of WBS components
- **Decomposition** is a technique used for dividing and subdividing the project scope and project deliverables into smaller more manageable parts
- **Verifying** the correctness of the decomposition requires determining that the lower-level WBS components are those that are necessary and sufficient for completion of the corresponding higher-level deliverables
- **Rolling wave planning** is when project management team waits until the deliverables or subcomponent is agreed on , so the details of the WBS can be developed
- **100 percent rule** is the total work at the lowest levels should roll up to the higher levels so that nothing is left out and no extra work is performed
- **Scope baseline** is the approved version of (scope statement-WBS-WBS dictionary) that only can be changed throw formal change control procedures

- **WBS dictionary** is a document that provides detailed deliverables , activity , and scheduling information about the WBS Components

Validate scope

- **Process** of formalizing acceptance of the completed project deliverables
- Validate scope process differs from the control quality process in that the former is primarily concerned with acceptance of the deliverables , while quality control is primarily concerned with correctness of the deliverables
- **Inspection(reviews-audits-walkthroughs)** include activities such as measuring , examining and validating

Control scope

- **Process** of monitoring the status of the project and product scope and managing changes to the scope baseline
- **Scope creep** is the uncontrolled expansion to product or project scope without adjustments to time , cost and resources to referred to
- **Variance analysis** is a technique used to determine the cause and degree of difference between the baseline and actual performance
- **Work performance information** it is the correlated information on how the project scope is performing compared to the scope baseline

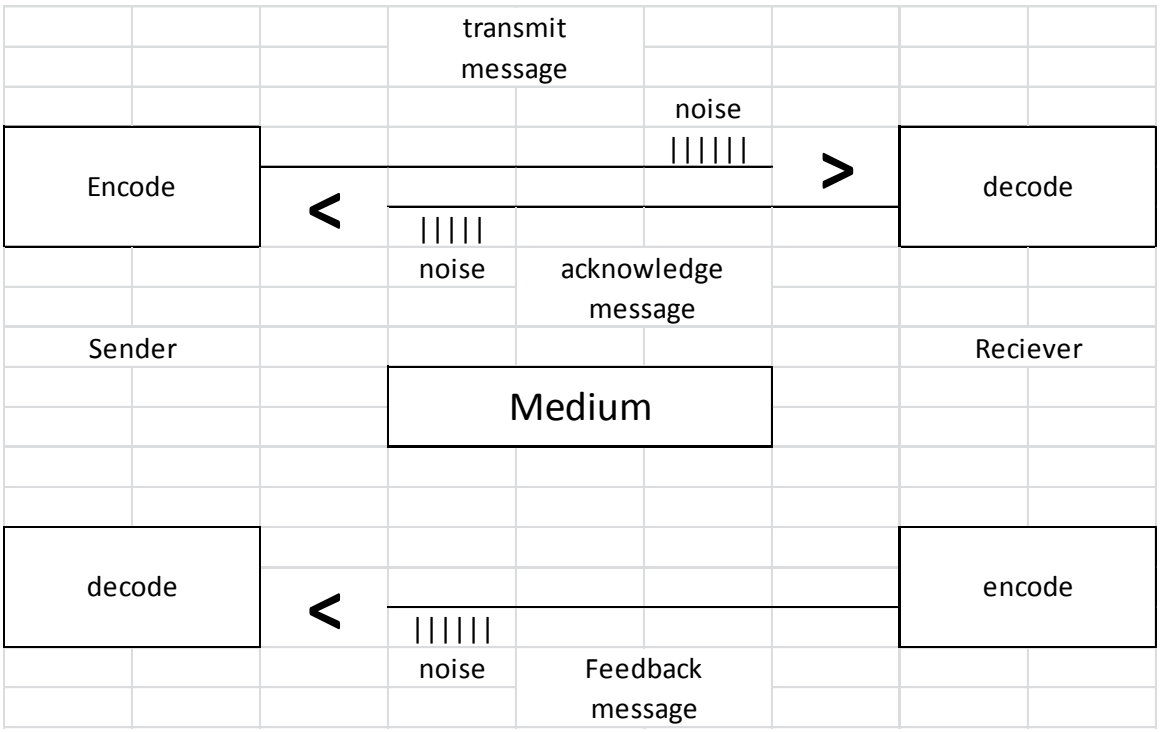
Project communication management

- **Process** that are required to ensure timely and appropriate planning , collection creation , distribution , storage , retrieval , management , control , monitoring , and the ultimate disposition of project information
- **Project managers** spend almost 90% of their time in communicating

Plan communications management

- **Process** of developing an appropriate approach and plan for project communications based on stakeholder's information needs and requirements , and available organizational assets
- **Key benefit** it identifies and documents the approach to communicate most effectively and efficiently with stakeholders
- **Efficient communication** means providing only the information that is needed
- **Communication requirements analysis** determines the information needs of the project stakeholders
- **Project resources** should be expended only on communication information that contributes to the success of the project or where a lack of communication can lead to failure
- **Potential number of communication channels** = N(N-1) ÷ 2
  Where N represents the number of stakeholders
- **Sources of information used to identify communication requirements**
  - Organizational charts , disciplines , departments , logistics of how many people involved , external&internal information , stakeholder information
- **Communication technology and factors that effect it**
  - Urgency of the need for information
  - Availability of technology
  - Ease of use
  - Project environment
  - Sensitivity and confidentiality of the information

- **Communication models & sequence of steps in basic communication model**



- **Sender** is responsible for ensuring information being communicated in clar way , and confirming the communication is correctly understood
- **Receiver** is responsible for ensuring that information is received in its entirety , understood correctly and respond to it
- **Communication methods**
  - Interactive communication : between two or more parties performing a multidirectional exchange
  - Push communication : doesn't ensure that the information is actually reached or was understood by the intended audience
  - Pull communication : used for very large volumes of information or very large audience

Communication type	When used
Formal written	Complex problems , project management plan , project charter , communicating over long distances
Formal verbal	Presentations , speeches
Informal written	E-mail , handwritten notes , text messages , instant Mesg.
Informal verbal	Meetings , conversations

Manage communication

- **Process** of creating , collecting , distributing , storing , retrieving , and the ultimate disposition of project information in accordance to the communication management plan
- **Key benefit** enables an efficient and effective communication flow between project stakeholders
- **Techniques and considerations for effective communications**
  - Sender-receiver models
  - Choice of media
  - Writing style
  - Meeting management techniques
  - Presentation techniques
  - Facilitation techniques
  - Listening techniques
- **Performance reporting** is the act of collecting and distributing performance information , including status reports , progress measurements ,and forecasts
- **Performance reporting** remember u should not spend all ur time reporting , reports are just about the past , finding information about the past means it is to late to prevent the problem. You need to keep managing the project , rather than just reporting on it , to make a project succeful.
- **Performance reporting** involves the periodic collection and analysis of baseline versus actual data to understand and communicate the project progress and performance as well as to forecast the project results

- **Project communications** may include but not limited to 1- performance reports 2-deliverables status 3-schedule progress 4-cost incurred

Control communications

- **Process** of monitoring and controlling communications throughout the entire project life cycle to ensure the information needs of the project stakeholders are met
- **Key benefit** Is that it ensure an optimal information flow among all communication participants
- **Communication blockers**
  - Noisy surroundings , distance between parties , improper encoding of messages , making negative statements , hostility , language , culture
- **There are different types of performance reports**
  - Status report: this report describe where the project currently stand regarding the performance measurement baseline
  - Progress report: a progress report describes what has been accomplished
  - Trend report: this report examines project results over time to see if performance is improving or deteriorating
  - Forecasting report: this report predicts future project status and performance
  - Variance report: this report compares actual results to baseline
  - Earned value report: and earned value report integrates scope , cost , and schedule measures to asses project performance , using the terms described In the cost management chapter(PV,AC,EV)
  - Lessons learned documentation: reports on performance are used as lessons learned for future projects

Project risk managemen

- Known risks that cannot be managed is (contingency reserve)
- Unknown risks that cannot be managed is (management reserve)
- negative risk is considered an issue
- risk appetite is the degree of uncertainty an entity is willing to take on in anticipation of a reward
- risk tolerance is the degree that an organization or individual will withstand
- risk threshold refers to measures along the level of uncertainty or the level of impact at which a stakeholder may have a specific interest
- project background information is part of organizational process assets

plan risk management

- process of defining how to conduct risk management activities for a project
- risk management context = stakeholder risk+strategic risk of project
- risk management plan includes
  - methodology – roles and responsibilities – budgeting – timing – risk categories – definitions of risk probability and impact – probability and impact matrix – revised stakeholders' tolerance – reporting formats – tracking
- beta and triangular distributions are frequently used in quantitative risk analysis
- 90 percent of the threats identified can be eliminated during the process
- Type of risk business (risk of gain or lose) – pure risk(only a risk of loss)

identify risk

- process of determining which risk may affect the project and documenting their characteristics
- all project personnel should be encouraged to identify risks
- information gathering techniques
  - brainstorming
  - Delphi technique is a way to reach a consensus of experts using questionnaire to solicit ideas
  - Interviewing

    - Root cause analysis
- **Checklist analysis** based on historical information , the lowest level of RBS(risk breakdown structure) can also be used as a risk checklist
- **Diagramming techniques**
    - Cause and effect diagrams (Ishikawa)
    - System or process flow charts
    - Influence diagrams are graphical representation of situations showing causal influences , time ordering of events , and other relationships
- **SWOT analysis** examines the project from each of the strengths , opportunities , and threats. Perspective to increase the breadth of identified risks by including internally generated risks
- **Risk register** primary output from identify risks is the initial into the risk register
    - List of identified risk
    - List of potential responses
- **Risk register** contain in this stage (the identified risks and potential responses , not the response plans which come later on)
- **When the risk management process are responses documented**
    - In both during identified risks (potential responses)
    - Plan risk responses (as selected responses)

Perform qualitative risk analysis

- **Process** of prioritizing risks for further analysis or action by assessing and combing their probability of occurrence and impact (subjective analysis)
- **Key benefit** it enables to reduce uncertainty , and focus of high risks
- **Risk probability and impact assessment** investigates the potential effect on a project objective such as schedule , cost , quality , or performance including both negative effects or threats and positive effects or opportunities
- **Risks with low ratings** will be included within the risk register as part of the watch list for future monitoring

- **Probability and impact matrix** can be prioritized for further quantitative analysis and planning risk responses based on their risk rating
- **Risk data quality assessment** is a technique to evaluate the degree to which the data about risks is useful for risk management (extent of understanding of the risks-data available – quality of the data- reliability and integrity of data)
- **Risk categorization** by sources of risk , the area of project affected can be
  - External – internal – technical – unforeseeable
- **Risk categorization** helps determine work packages , activities , project phases or even roles in project , which can lead to the development of effective risk responses (Can be organized in RBS)
- **Qualitative risk analysis can be used in**
  - Compare the risk of the project to the overall risk of other projects
  - Determine whether the project should be continued or not
  - Determine whether to perform quantitative risk analysis or plan risk responses processes

Perform quantitative risk analysis

- **Process** of numerically analyzing the effect of identified risks on overall project deliverables
- **Used for** further investigate the highest rated risks on the project
  - Perform sensitivity analysis to determine which risks have the most impact on the project
  - Determine how much quanitified risk the project have throw (Monte Carlo – EVM (expected monetary value)
- **Data gathering and representation techniques**
  - Interviewing
  - Probability distributions (beta and triangular)
- **Quantitative risk analysis and modeling techniques**
  - Sensitivity analysis helps to determine which risks have the most potential impact on the project (Tornado diagram)

- Expected monetary value analysis(EMV) calculates the average outcome when the future includes scenarios that may or may not happen
- EMV a common use of this type of analysis is a decision tree analysis
- Modeling and simulation translate the specified detailed uncertainties of the project into their potential impact on project objectives , typically performed using the (Monte Carlo)

- **Monte Carlo** uses the network diagram and estimates to perform the project many times and to simulate the cost or schedule results of the project
- **Monte Carlo** used for
  - Evaluates overall risk in the project
  - Determines the probability of completing the project on any specific date or for any specific cost
  - Determines the probability of any activity actually being on the critical path
  - Translate uncertainties into impacts to the total project
  - Results in a probability distribution
- **Decision TREE** if u have to choose between many alternatives
  - can take into account future events in making a decision today
  - it calculates the EMV in more complex situations

Plan risk responses

- **Process** of developing options and actions to enhance opportunities and to reduce threats to project objectives
- **Reserves** is finalized in this process
- **Strategies for negative risks or threats**
  - Avoid eliminate the threat by eliminating the cause , such as removing work packages , or person. Might even expand the scope
  - Transfer make another party responsible for the risk (insurance-performance bonds-warranties) or guarantees by outsourcing the work

        - Mitigate reduce the probability
        - Accept do nothing (if it happens , it happens)
        - Active acceptance may involve the creation of contingency plans to be implemented
        - Passive acceptance leaves actions to be determined as needed
    - **Strategies for positive risks or opportunities**
        - Exploit (the reverse of avoid) add work or change the project to make sure the opportunity occurs
        - Enhance increase the likelihood of impact of the opportunity
        - Share allocate ownership of the opportunity to third party
        - Accept do nothing (if it happens , it happens)
    - **Contingent responses strategies** risk responses identified using this technique are often called contingency plans or fallback plans and include identified triggering events
    - **How to fix major problem** by implementing the contingency plan first, rather than choice discussing possible solutions to it if it occurred
    - **Avoidance and mitigation** would generally used for high-priority impacts
    - **Transference and acceptance** are appropriate for low-priority risks
    - **Transfer a risk** will leave some risk behind (residual)
    - **A response to certain risk such as fire** is to purchase insurance it exchange unknown cost impact of a known risk , for a known cost impact
    - **Communicating about risk** is essential in order to gain buy-in to the strategy
    - **Fallback plans** are plans to do when the contingency plans fall apart
    - **Total EMV** (contingency reserve)= threats value (- VE) + opportunities value (+VE)
    - **Noncritical risks** we document them in a watch list , and revisit them periodically
    - **Would u choose one risk response strategy?** No , you can select a combination of choices
    - **What is the most important item in project team meetings?** RISK

- **What risk management activities are done during the execution?**
  - Watching for watch-list(noncritical) risks that increase in importance , and looking for new risks

Control risks

- **Process** of implementing risk responses plans , tracking identified risk , monitoring residual risks , identify new risks , and evaluating risk process effectiveness throughout the project
- **Risk audits** examine and document the effectiveness of risk responses in dealing with identified risks and their root causes.
- **Project manager** is responsible for ensuring that risk audits are performed at an appropriate frequency
- **Workarounds** when project deviate from baseline , the team may take a corrective action to bring it back.
- **Workarounds** are unplanned responses developed to deal with the occurrence of unanticipated events or problems on a project
- **Contingency reserve** are only used to handle specific risk that it was set aside for , so if problem is new we add cost or time to project (make preventive action or corrective – fast track – crash)
- **Look table on IPad page (457)**

Plan risk	Identify risk	qualitative risk	Quantitative risk	Plan risk responses	Control risk
Actions					
How will you perform risk management on the project? What risk management policies exist for use on project and what new ones	Identify''all'' the risks on the project Use tools such as brainstorming . Root cause analysis , and documentatio	Qualitatively determine which risk events warrant a response Assess the quality of the risk data	Numerically evaluate the top risks Quantitatively Determine which risks warrant a response Determine	Decrease project threats and increase opportunities Determine secondary and residual risks	Respond to risk triggers Monitor residual risks Create workaround Evaluate

are needed? When will the processes or risk management performed? How will risks be identified, and what tools will be used? What are stakeholder's roles and responsibilities for risk management? How will you budget for risk management?	n review to facilitate risk identification Involve the stakeholders	Complete a risk urgency assessment Subjectively determine the probability and impact of all risks Determine if you will go to quantitative analysis or go directly to risk response planning Document the watch list(noncritical risks) Determine overall risk ranking for the project	initial reserve Create realistic time and cost objectives Determine the probability of meeting project objectives	Calculate final reserves Determine risk owners Create contingency and fallback plans Identify risk triggers Accept risks , where appropriate	effectiveness of plans Look for additional risks, then qualify and plan responses for them Revisit the watch list Update plans Communicate risk status Close risks Recommend changes, including corrective and preventive actions

Plan risk	**Identify risk**	**Qualitative risk**	**Quantitative risk**	**Plan risk responses**	**Control risk**
Outputs					
risk management plan	risk register including: -list of risks	Risk register including: -risk ranking of the	Risk register including: -prioritized list of	Updates to the project management plan and	work performance information

	-list of potential risk responses -root cause of risks -updated risk categories	project as compared to other projects -list of prioritized risks -risks by category -risks needing additional analysis and response -watch list -trends	quantified risk -initial reserves -project completion dates and costs -probability of achieving project objectives -trends	project documents Risk register including: -residual and secondary risks -contingency and fallback plans -risk owners -triggers -final reserves -contracts -accepted risks	risk register updates including: -risk reassessment and risk audits -new risks -closed risks -details of risk occurrences -lessons learned Workarounds -change requests including corrective and preventive actions -updates to the project management plan and OPA

Project procurement management

- **Contract** represents a mutually binding agreement that obligates the seller to provide something of value(product , service , result) and obligates the buyer to provide monetary or other valuable compensation
- **Project management team's** responsibility to make certain that all procurements meet the specific needs of the project while adhering to organizational procurement policies
- **Contract=agreement=understanding=subcontract=purchase order**
- **Seller** may be identified as a contractor , subcontractor , vendor , service , provider or supplier
- **Buyer** may be identified as client , customer, prime contractor , acquiring organization , service requestor , or purchaser
- **Seller** can be viewed during the contract life cycle first as a bidder , then as the selected source , and then as the contracted supplier or vendor

Plan procurement management

- **Process** of documenting project procurement decisions , specifying the approach , and identifying potential sellers
- **Key benefit** is that it determines whether to acquire outside support , and if so , what is acquire , how to acquire it , how much is needed , and when to acquire it
- **Plan procurement management** identifies those project needs that can best be met by acquiring product outside the project organization, versus those project needs which can be accomplished by the project team
- **When project obtains product** required for project performance from outside the performing organization , the processes from plan procurement management through close procurement are performed for each item
- **Type of contracts**
  - **Fixed price contracts** involves setting a fixed total price for a defined product

Firm fixed price contract (FFP)
Contract=1,000,000

- **Fixed price incentive fee(FPIF)** adjusted based on the seller meeting specified performance criteria such as getting the work done faster

Fixed price incentive fee contract
Contract=1,100,000 for every month early the project is finished , an additional $10,000 is paid to the seller

- **Fixed price award fee(FPAF)** the buyer pays a fixed price plus an award amount based on performance, very similar to (FPIF) except the total possible award amount is determined

Fixed price award fee (FPAF)
Contract= $1,100,000 for every month performance exceeds the planned level by more than 15 percent , and additional $5000 is awarded to the seller , with maximum award of $50,000

- **Fixed price economic price adjustment (FPEPA)** will cover a multiyear period , there may be uncertainties about future conditions

Fixed price economic price adjustment contract(FPEPA)
Contract=$1,100,000 , but a price increase will be allowed in year two based on the us consumer price index report for year one

- **Purchase order** is normally signed by one party instead of both parties , it is usually for simple commodity procurements

Purchase order
30 linear meters of wood at $9 per meter

- **Time and material contracts(T&M)** used for staff augmentation , acquisition of experts , and any outside support when a precise statement of work cannot be quickly prescribed

Time and material contract
Contract=$100 per hour plus expenses or materials at cost

- **Cost-reimbursable contracts** involves payments (cost reimbursements) to the seller for all legitimate actual costs incurred for completed work , plus a fee representing seller profit
- **Cost plus fixed fee(CPFF)** actual cost plus a negotiated fee, the fee is fixed before the work begins , and does not change with actual costs

Cost plus fixed fee
Contract=cost plus a fee of $100,000

- **Cost plus incentive fee(CPIF)** actual cost plus fee adjusted based on specific performance , a original estimate of the total cost is made and a fee for the work is determined (a target fee)

Cost plus incentive fee
$500,000 target cost plus $50,000 target fee the buyer and seller share any costs savings or overruns at 80% to the buyer and 20% to the seller

- **Cost plus award fee(CPAF)** all actual cost and a base fee plus an award amount based on performance

Cost plus award fee contract
cost plus a base fee award for meeting buyer-specified performance criteria , maximum award available is $50,000

- **Payments** are made no matter what type contract is used , will state when are to be made to the seller , may be made as work completed , as costs are incurred
- **Make-or-buy analysis** determine whether particular work can best be accomplished by the project team , or should be purchased from outside sources
- **Market research** includes examination of industry and specific vendor capabilities
- **Procurement statement of work (SOW)** is developed from the project scope baseline and defines only that portion of the project scope to be included within the related contract
- **SOW** describes the procurement item in sufficient detail to allow prospective seller to determine if they are capable of providing the products
- **Procurement documents** are used to solicit proposals from prospective sellers
  - Request for proposal (RFP)
  - Invitation for bid (IFB)
  - Request for quotation (RFQ)
  - Request for information (RFI)
  - Invoices = bills

- **Source selection criteria** used to rate seller proposals , can be objective or subjective , some criteria like
  - Understanding of need , overall cost , risk , technical capability , management approach , warranty , financial capacity , production capacity , business size and type , intellectual property
- **Make-or-buy decisions** whether particular work can best be accomplished by the project team or needs to be purchased from outside sources
- **Terms and definitions**
  - Price: this is the amount the seller charges the buyer
  - Profit(fee): this is planned into the price the seller provides the buyer
  - Cost: how much item costs the seller to create. A buyer's costs can include seller's costs and profits
  - Target price: used to compare the end result with what was expected, target cost plus target fee = target price
  - Sharing ratio: incentives usually expressed as a ratio 90/10
  - Celling price: the highest price the buyer will pay , a way for the buyer to encourage the seller to control cost

Conduct procurement

- **Process** of obtaining seller responses , selecting a seller , and awarding a contract
- **Key benefit** it provides alignment of internal and external stakeholder expectations through established agreements
- **Procurement statement of work** provides supplier with a clearly stated set of goals , requirements and outcomes from which they can provide quantifiable response include
  - Specifications , quantity , quality , performance data ,schedule , work location
- **Bidder conferences** are meetings between the buyer and the prospective seller prior to submittal of a bid or proposal ,
- **Proposal evaluation techniques** a formal evaluation review process will be defined by the buyer's procurement policies

- **Procurement negotiations** project manager may not be the lead negotiator on procurement , he and other team members may be present during negotiations to provide assistance and , if needed to add clarification of the project technical , quality and management requirements , techniques
  - Attacks , personal insults , deadline , lying , good guy-bad guy , limited authority , missing man , fair and reasonable , delay , extreme demands , withdrawal , fait accompli
- **Agreements** includes terms and conditions , and may incorporate other items that buyer specifies regarding what the seller is to perform, including
  - SOW , schedule baseline , performance reporting , pricing , payments terms , place of delivery , warranty , fees and retainer , penalties , incentives , insurance , change request handling
- **Letter of intent** not a contract , but simply a letter , without legal binding , that says the buyer intends to hire the seller , it provide the seller with confidence to order equipment or hire staff
- **If u don't use a competitive process** than u are entering one of two
  - Single source: you contract directly with your preferred seller
  - Sole source: there is only one seller
- **Objective of negotiations**
  - Obtain a fair and reasonable price
  - Develop good relationship with the seller

Control procurement

- **Process** of managing procurement relationships , monitoring contract performance , and making changes and corrections to contracts as appropriate
- **Key benefit** it ensures that both the seller's and buyer's performance meets procurement requirements according to the terms of the legal agreement
- **Inspections and audits** required by the buyer and supported by the seller , as specified in the procurement contract , can be conducted during execution of the project to verify compliance in the seller's work processes or deliverables

- **Payment systems** are typically processed by the accounts payable system of the buyer after certification work by an authorized person on the project team
- **Claims administration** changes requests and potential constructive changes are those requested where the buyer and seller cannot reach an agreement on compensation for the change or cannot agree that a change has occurred (claims=disputes=appeals)
- **Many claims are not resolved until after the work is completed**
- **Records management system** is used by the project manager to manage contract and procurement documentation and records
- **Project spending to much dealing with contract** changes should be reevaluated , the contract may need to be renegotiated or terminated , depending of the desire of both parties

Close procurement

- **Process** of completing each procurement
- **Key benefit** if documents agreements and related documentation for future reference
- **Early termination** is a special case of procurement closure that can result from a mutual agreement by both parties
- **Formal acceptance** if seller want to close procurement he should get formal acceptance from the buyer , and may also have to measure customer satisfaction

questions	Cost-reimbursable	Time and material	Fixed price
What is being bought	Service (some product may be included)	service	product
How might the costs to the buyer be stated in the contract	Costs are variable but the fee is fixed	Hourly rate or price per unit	As a set currency amount
How might the profit be stated	Listed separately and known to the	Included in the hourly rate and	Included in the price and

in the contract	buyer	may be unknown to the buyer	unknown to the buyer
What is the cost risk to the buyer	high	Medium	low
How important is a detailed procurement statement of work to the buyer?	low	low	high
How much negotiations is usually required to sign the contract	high	Low or none	none
What level of effort will the buyer need to devote to managing the seller	high	Medium	low
How are costs billed to the buyer	Actual costs as incurred , profit at project completion , or apportioned as allowed in the contract	Hourly or per unit rate	According to a payment schedule as work is completed and as allowed in the contract
How much auditing of the seller's costs will the buyer need	high	none	low

Project stakeholder management

Identify stakeholders

- **Process** of identifying the people , groups , or organizations that could impact or be impacted by a decision , activity , or outcome of the project , analyzing and documenting relevant information regarding their interests , involvement , influence impact on project success
- **Stakeholder analysis** technique of systematically gathering and analyzing quantitative and qualitative information to determine whose interests should be taken into account throughout the project
- **Stakeholder analysis general steps**
  - Identify – analyze – assess
- **Key stakeholders** are usually easy to identify , they include anyone in a decision-making or management role
- **Classification models**
  - Power/interest grid
  - Power/influence grid
  - Influence/impact
  - Salience model: describing the classes base on (power-urgency-legitimacy)
- **Stakeholder register** this contains all details related to stakeholders
  - Identification information – assessment information – stakeholder classification

Plan stakeholder

- **Process** of developing appropriate management plan strategies of effectively engage stakeholders throughout the project life cycle , based on the analysis of their needs , interests , and potential impact on project success
- **Analytical techniques** the current engagement level of all stakeholders needs to be compared to the planned engagement levels required for successful project completion
  - Unaware – resistant – neutral – supportive – leading

- **The current engagement can be documented using stakeholders engagement assessment matrix**
- **Analytical techniques** through this , gaps between the current desire engagement can be identified , actions and communications required to close these gaps can be identified by the project team using , expert judgment

Manage stakeholder engagement

- **Process** of communicating 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
- **Key benefit** to allows the project manager to increase support and minimize resistance from stakeholders
- **Manage stakeholder engagement involves**
  - Engaging stakeholders at project stages – managing stakeholder expectations – addressing potential concerns – clarifying and resolving issues
- They ability of stakeholders to influence the project is highest during the initial stages and gets progressively lower as the project progress
- **Interpersonal skills**
  - Building trust – resolving conflict – active listening – overcoming resistance to change

Control stakeholder engagement

- **Process** of monitoring overall project stakeholder relationships and adjusting strategies and plans for engaging stakeholders
- **Information management systems** provides a standard tool for the project manager to capture , store and distribute information to stakeholders about the project cost , schedule progress , and performance

Project integration management

- **Process and activities** to identify , combine , unify , coordinate the various processes and project management activities within the project management process groups

Develop project charter

- **Process** of 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
- **Key benefit** is a well-defined project start and project boundaries , creation of a formal record of the project , and a direct way for senior management to formally accept and commit to the project
- **Project charter** still used to establish internal agreements within an organization to assure proper delivery under the contract
- **Project manager** is assigned as early in the project as is feasible , preferably while the project charter is being developed and always prior to the start of planning
- **Project** are initiated by an entity external to the project such as a sponsor , program , or (PMO) , or a portfolio
- **Project statement of work** narrative description of products to be delivered by a project (for internal projects , project initiator or sponsor provides the statement) , (for external projects , statement of work can be received from the customer as part of a bid document)
    - SOW references the following , business need , product scope description , strategic plan
- **Business case** describes the necessary information from a business standpoint to determine whether or not the project worth it
    - Market demand , organizational need , customer request , technological advance , legal requirement , ecological impacts , social need
- **Contracts** is used when a project is being performed for an external customer

- **Facilitation techniques** brainstorming , conflict resolution , problem solving
- **Project charter** document issued by the project initiator or sponsor formally authorizes the existence of a project and provides the project manager with authority to apply organizational resources to project activities
    - Justification , measurable objective , high-level requirements , assumptions and constraints , high-level project description , boundaries , high-level risk , milestones , summary budget , stakeholder list , approval requirements , assigned project manager , (project sponsors authorizing this project)
- **Project selection** project manager are not typically involved in this process
    - Benefit measurement methods: murder board – peer view – scoring models – economic models(present value, net present value , internal rate of return , payback period , cost-benefit analysis)
    - Constrained optimization methods: linear programming – integer programming – dynamic programming – multi-objective programming
- **Opportunity cost** is the value of the project not selected
- **Suck costs** are expended costs
- **Law of diminishing returns** states that after a certain point , adding more input will not produce a proportional increase in productivity
- **Working capital** is the amount of money the company has available to invest
- **Depreciation** large assets purchased by a company lose value over time
    - Straight line depreciation – accelerated depreciation
-

Develop project management plan

- **Process** of defining , and coordinating all subsidiary plans and integrating them into a comprehensive project management plan
- **Project management plan** all baselines and subsidiary plans from other areas (OUTPUTS) are input into the project management plan

- *The format and level of detail of management plans should be customized to fit the needs of the project, the style of the project manager , and the organizational influences*
- **Project management plan also include**
  - Life cycle , description of how work will be executed , change management plan , configuration management plan , key management reviews for content
- **Project management plan** when it is approved and baselined , it may only change throw generated change request , and approved through perform integrated change control process

Project management plan	Project documents	
Change management plan	Activity attributes	Project staff assignments
Communication M.g plan	Activity cost estimates	Project statement of work
Configuration M.g plan	Activity duration estimates	Quality checklists
Cost baseline	Activity list	Quality measurements
Cost M.g plan	Activity resource requirements	Quality metrics
HR M.g plan	Agreements	Risk register
Process improvement plan	Basis of estimates	Requirements documentation
Procurement M.g plan	Change log	Requirements traceability matrix
Scope baseline	Forecasts	Resource breakdown structure
Quality M.g plan	Issue log	Resource calendars
Requirements M.g plan	Milestone list	Schedule data
Risk M.g plan	Procurement documents	Seller proposals
Schedule baseline	Procurement statement of work	Source selection criteria

Schedule M.g plan	Project calendars	Stakeholder register
Scope M.g plan	-Project charter -Project funding requirements -Project schedule -Project schedule network diagrams	-work performance data -work performance information -work performance reports
Stakeholder M.g plan	Change requests	Team performance assessments

- **Change management plan** is a plan for managing changes and the change process on the project
- **Configuration management plan** is a plan for managing changes to the DOCUMENTATION about the deliverables and processes of the project
- **Performance measurement baseline** (scope baseline+schedule baseline+cost baseline) against which the PM will report the performance
- **Deviations** from BASELINES are often due to incomplete risk identification and risk management

Direct and manage project work

- **Process** of leading and performing the work defined in the project management plan and implementing approved changes
- **Work activities included in direct and manage is:**
  - Perform activities to accomplish project objectives
  - Create project deliverables
  - Provide , train and manage the team members
  - Manage , and use resources including materials , tools and facilities
  - Implement the planned methods and standards
  - Establish and manage project communication channels
  - Generate work performance data
  - Issue change requests and implement approved changes
  - Manage risks
  - Manage seller and suppliers
  - Manage stakeholders
  - Collect and document lessons learned

- **Change implementation of approved changes**
  - Corrective action: an intentional activity that realigns the performance of the project work with the project management plan
  - Preventive action: an intentional activity that ensures the future performance of the project work is aligned with project management plan(need more experience than calculation)
  - Defect repair: an intentional activity to modify a nonconforming product
- **Approved change requests** output of perform integrated change control process , and include those requests reviewed and approved for implementation by the change control board (CCB)
- **Project management information system** which is part of the EEF , provides access to tools , such as a scheduling tool , a work authorization system , a configuration management system , an information collection and distribution system , or interfaces to other online automated systems
- **Deliverables** are any unique product , result , or service that required to complete a phase , process or project
- **Work performance data** Data are often viewed as the lowest level of detail from which information is derived by other processes
- **Change requests** formal proposal to modify any document , deliverables , or baseline

Monitor and control project work

- **Process** of tracking , reviewing and reporting the progress to meet the performance objectives defined in the project management plan
- **Key benefit** that it allows the stakeholders to understand the current state of the project , and forecasts
- **Monitor and control project work process**
  - Comparing actual project performance against the project management plan
  - Identifying new risks , and monitoring existing project risks
  - Maintaining an accurate , timely information base concerning the project's product

    - Providing information to support status reports
    - Providing forecasts
    - Monitoring implementation of approved changes as they occur
- **Validated changes** approved changes that result from the perform integrated change control process , require validation to ensure that the change was appropriately implemented
- **Work performance information** data in itself cannot be used in the decision-making process as it has only out-of-context meaning. Work performance information , however is correlated and contextualized , and provides a sound foundation for project decisions
- **Analytical techniques** applied in project management to forecasts potential outcomes based on possible variations of project environmental variables and their relationships with other variables
    - Techniques used , regression analysis , grouping methods , causal analysis , root cause analysis , forecasting methods , failure mode , fault tree analysis , trend analysis , EVM , variance analysis
- **Work performance reports** are the physical or electronic representation of work performance information complied in project documents , intended to generate decisions , actions or awareness
- **In order to Fully evaluate the impact of a change**
    - U need a realistic project management plan
    - A complete product scope and project scope

Perform integrated change control

- **Process** of 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
- **Key benefit** of this process is that it allows for documented changes within the project to be considered in an integrated fashion while reducing risks , which often rises from changes made without consideration to the overall project objectives or plans

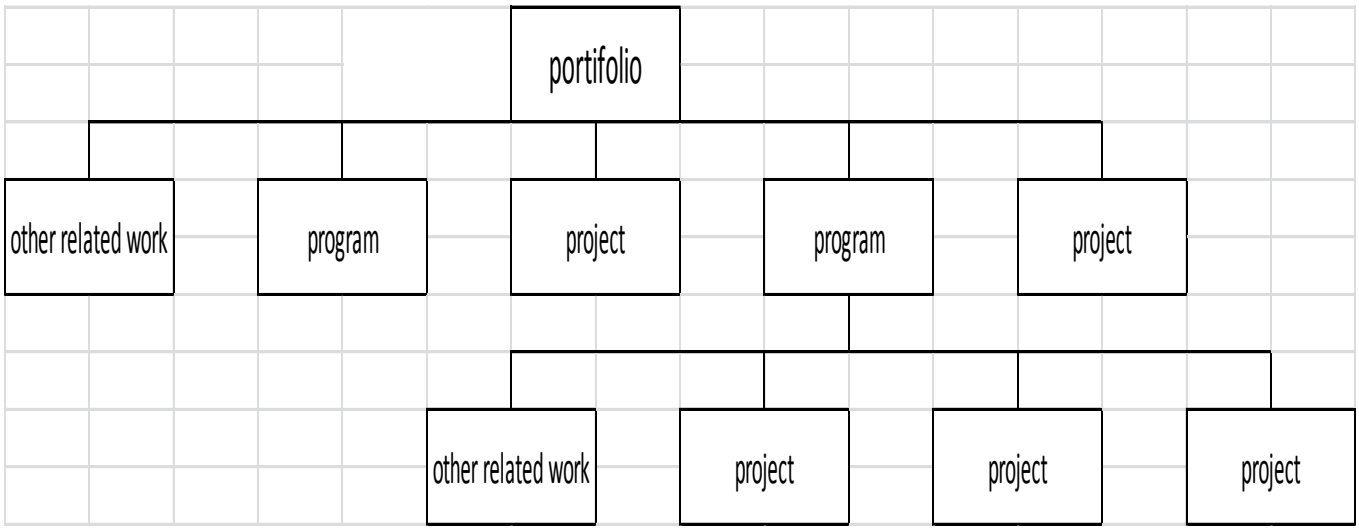
- **Perform integrated change control** is conducted from project inception through completion and is the ultimate responsibility of the project management
- **Configuration control** is focused on the specification of both the deliverables and the processes
- **Change control** is focused on identifying , documenting , and approving or rejecting changes to the project documents , deliverables , or baselines
- **Approving change requests** processed according to the change control system by the (project manager-CCB- or by an assigned team member)
- **Change log** is used to document changes that occur during project(accepted or rejected)
- **Change is inevitable on projects** , but a project manager should work to prevent the root cause of changes whenever possible. and in many cases , the root cause may be that the project manager did not probably plan the project

Close project or phase

- **Process** of finalizing all activities across all of the project management process groups to formally complete the project or phase
- **Key benefit** is that it provides lessons learned , the formal ending of project work , and the release of organization resources to pursue new endeavors
- When closing a project , the project manager reviews all prior information from the previous phase closures to ensure that all project work is completed and that the project has met its objectives

Farmwork & life cycle

- **Project** is a temporary endeavor undertaken to create product , service or result
- **Organizational culture consist of (it is Enterprise environmental factor)**
  - Shared visions , values , policies , procedures , risk tolerance , reward system , hierarchy , authority relationships , work ethic , work hours , operating environment
- **Organizational communications** management success in an organization is highly dependent on an effective organizational communication style , especially in the face of globalization



- **Project management** application of knowledge , tools and techniques to project activities to meet the project requirements (accomplished through the appropriate application of the 47 logically management processes
- **Managing project typically include**
  - Identify requirements , addressing the various needs , communication among stakeholders , balancing constrains (scope-quality-schedule-budget-resources-risks)

- **Progressive elaboration** involves continuously improving and detailing a plan as more detailed and specific information and more accurate estimates become available
- **Organizational project management (OPM)** is a strategy execution framework utilizing project , program , and portfolio management as well as organizational enabling practices to consistently and predictably deliver organizational strategy producing better performance

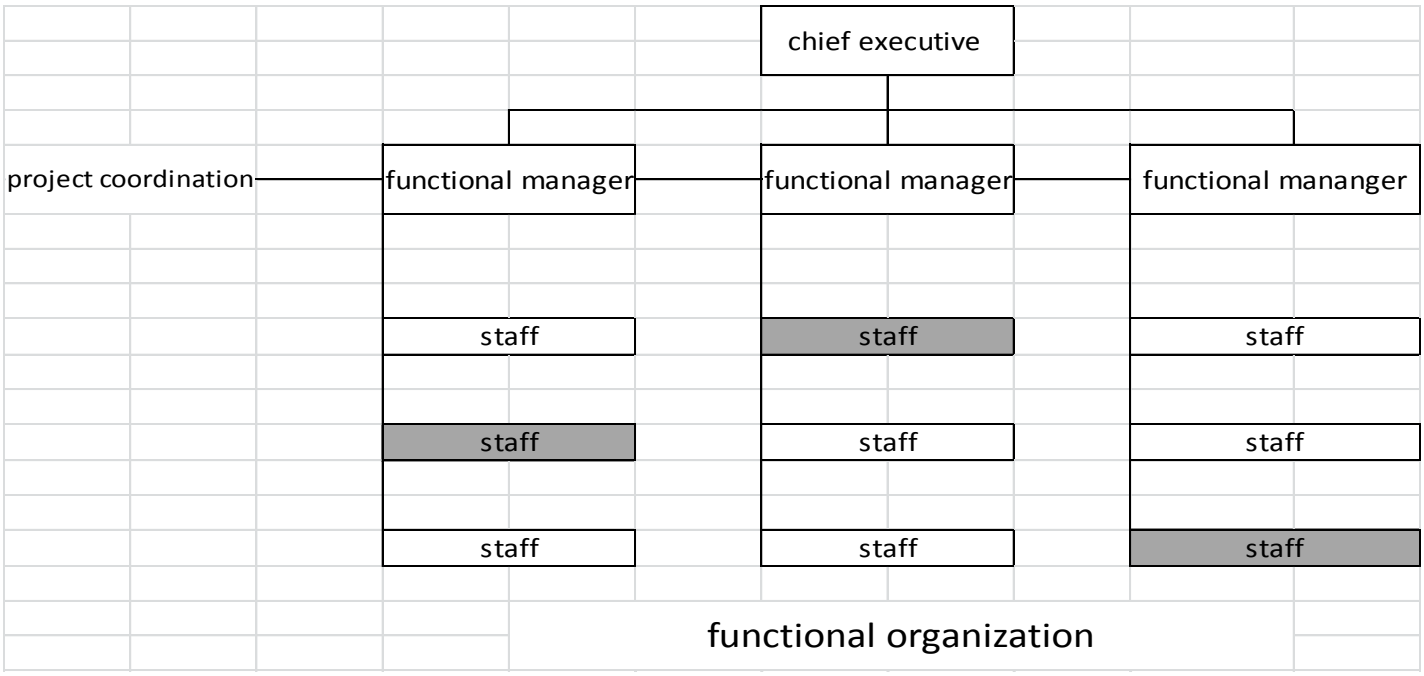
Organizational project management			
	projects	programs	Portfolios
scope	Projects have defined objectives , scope is progressively elaborated throughout the project life cycle	Have a large scope and provide more significant benefits	Have an organizational scope that changes with the strategic objectives of the organization
change	Project managers expect change and improvement processes to keep change controlled	Program managers expect change from both inside and outside the program and here prepared to manage it	Portfolio managers continuously monitor changes in the boarder internal and external environment
planning	Project managers , progressively elaborate high-level information into detailed plans throughout the project life cycle	Program managers develop the overall program plan and create high-level plans to guide detailed planning at the component level	Portfolio managers create and maintain necessary processes and communication relative to the aggregate portfolio
management	Project managers manage the project team to meet the project objectives	Program managers manage the program staff and the project managers , they provide vision and overall leadership	Portfolio managers may manage or coordinate portfolio management staff, or program and project staff that may have reporting responsibilities into the aggregate portfolio
Success	Success is measured by product and project quality timeliness , budget compliance	Success is measured by the degree to which the program satisfies the needs	Is measured in terms of the aggregate investment performance and

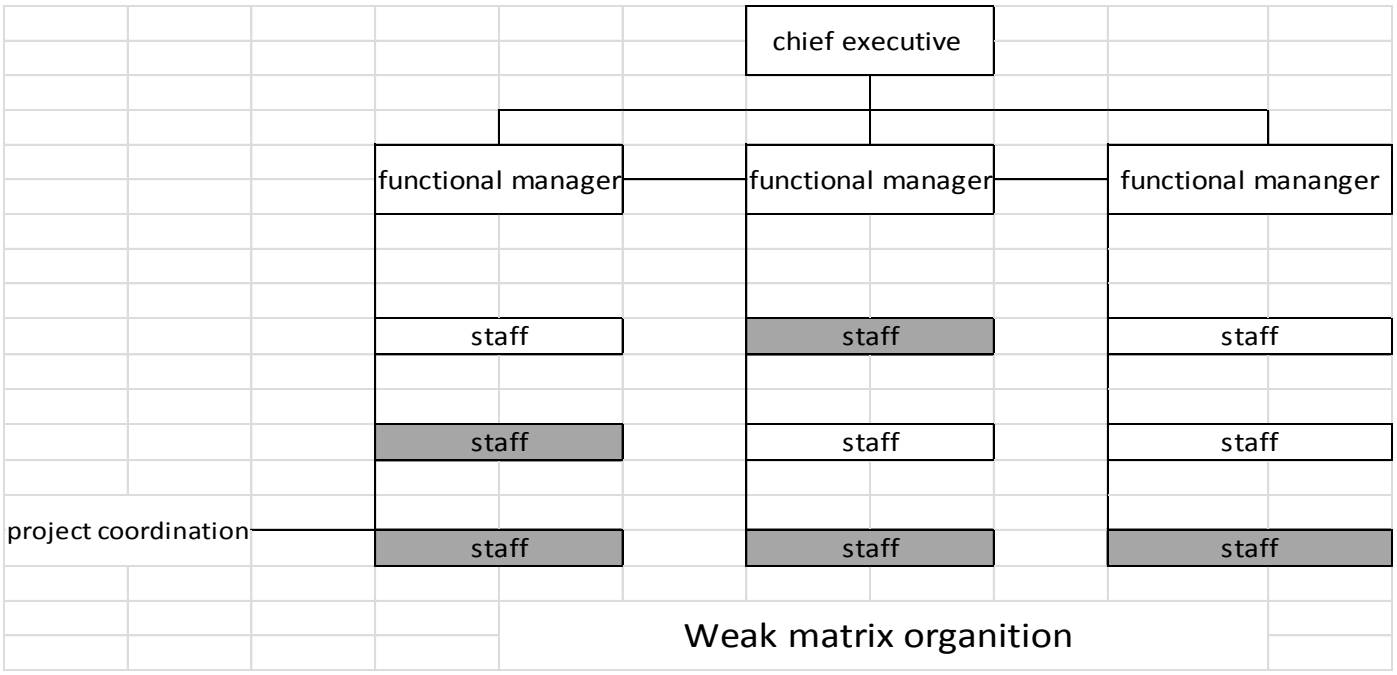
	and degree of customer satisfaction	and benefits for which it was undertaken	benefit realization of the portfolio
monitoring	Project managers monitor and control the work of producing the product that the project was undertaken for	Program managers monitor the progress of program components to ensure the overall goals , schedules , budget and benefits of the program will be met	Portfolio managers monitor strategic changes and aggregate resource allocation , performance results , and risk of the portfolio

- **PMO** is a management structure that standardizes the project-related governance processes and facilitates the sharing of resources , methodologies , tools and techniques
  - Supportive : provide consultative role , supplying templates , training , lesson learned
  - Controlling: provide support and project management frameworks , using specific templates
  - Directive: control of the projects by directly managing project , and provide project managers

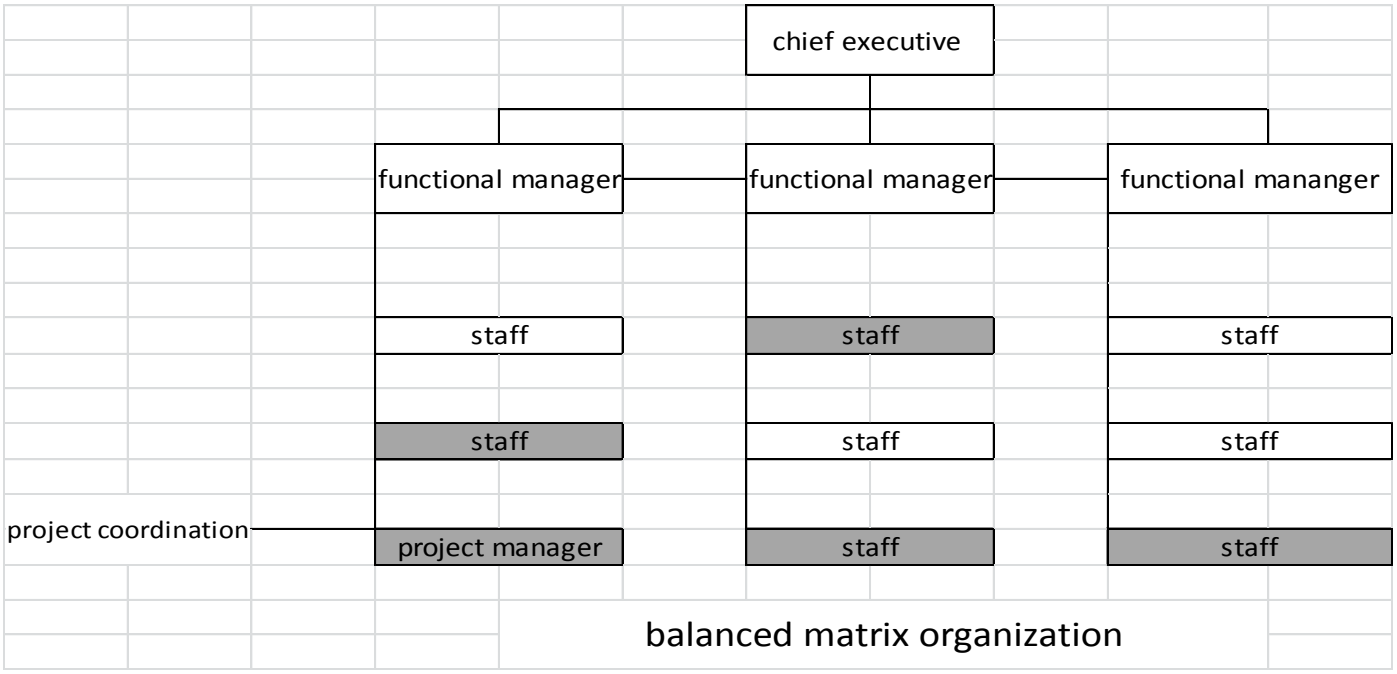
Project manager	PMO
-focuses on the specified project objectives -control assigned project resources to best meet project objectives -manage the constrains of the individual project	-manages major program scope changes , which opportunities seen to better business objectives -use of shared organizational resources across all projects -manages the methodologies , overall risks , metrics , and interdependencies among projects all the enterprise level

- **Operation management** is responsible for overseeing , directing and controlling business operations. It evolve to support the day-to-day business, ensuring business operations continue efficiently by using the optimum resources needed , customer satisfaction
- **Project-based organizations** may diminish the hierarchy and bureaucracy inside the organizations as the success of the work Is measured by the final result rather than by position or politics
- **OFTEN** the sponsor , portfolio or program manager who identifies alignment or potential conflicts between organizational strategies and project goals and then communicate these to the PROJECT MANAGER
- **Business value** the total sum of all (tangible + intangible) elements , while not all organizations are business driven , all organizations conduct business-related activities
- **Portfolio , program , project management** are used to bridge the GAP between organizational strategy and successful business value
- **Project manager** become the link between strategy and the team
- **Project manager should possess the following competencies**
    - **Knowledge – performance – personal**

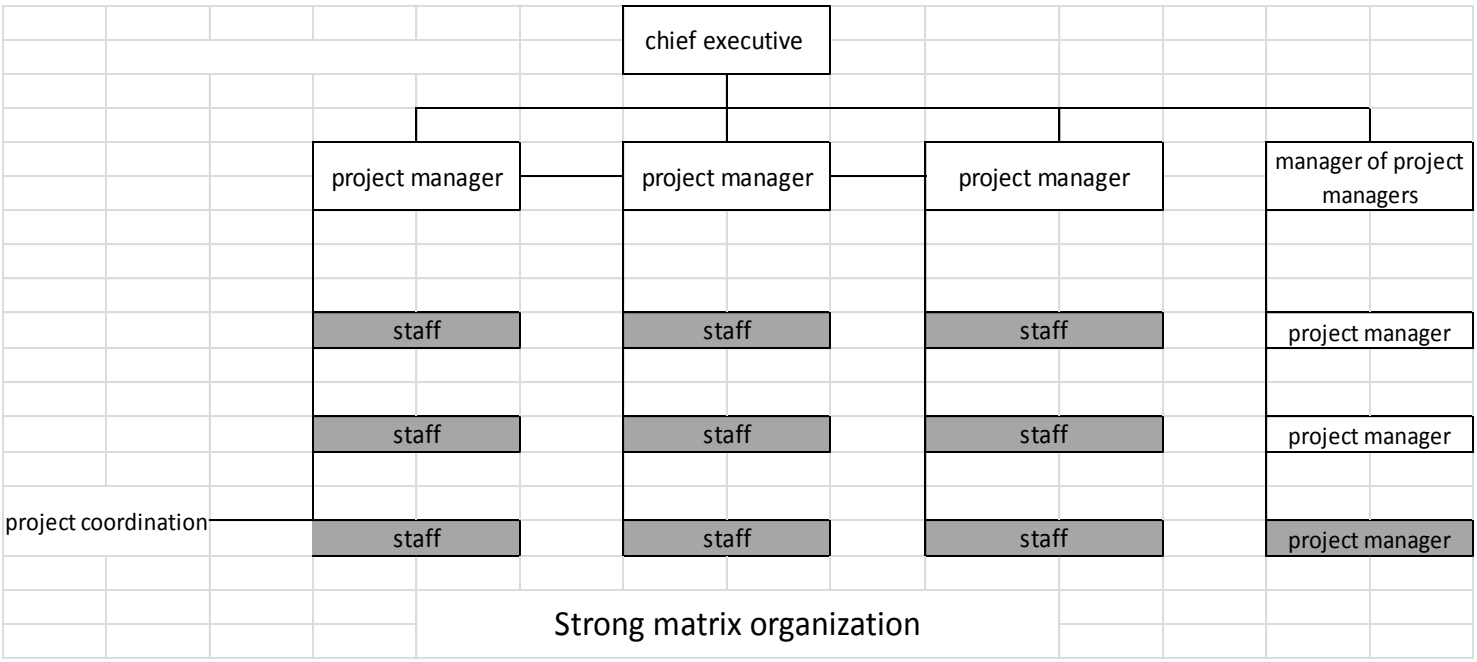




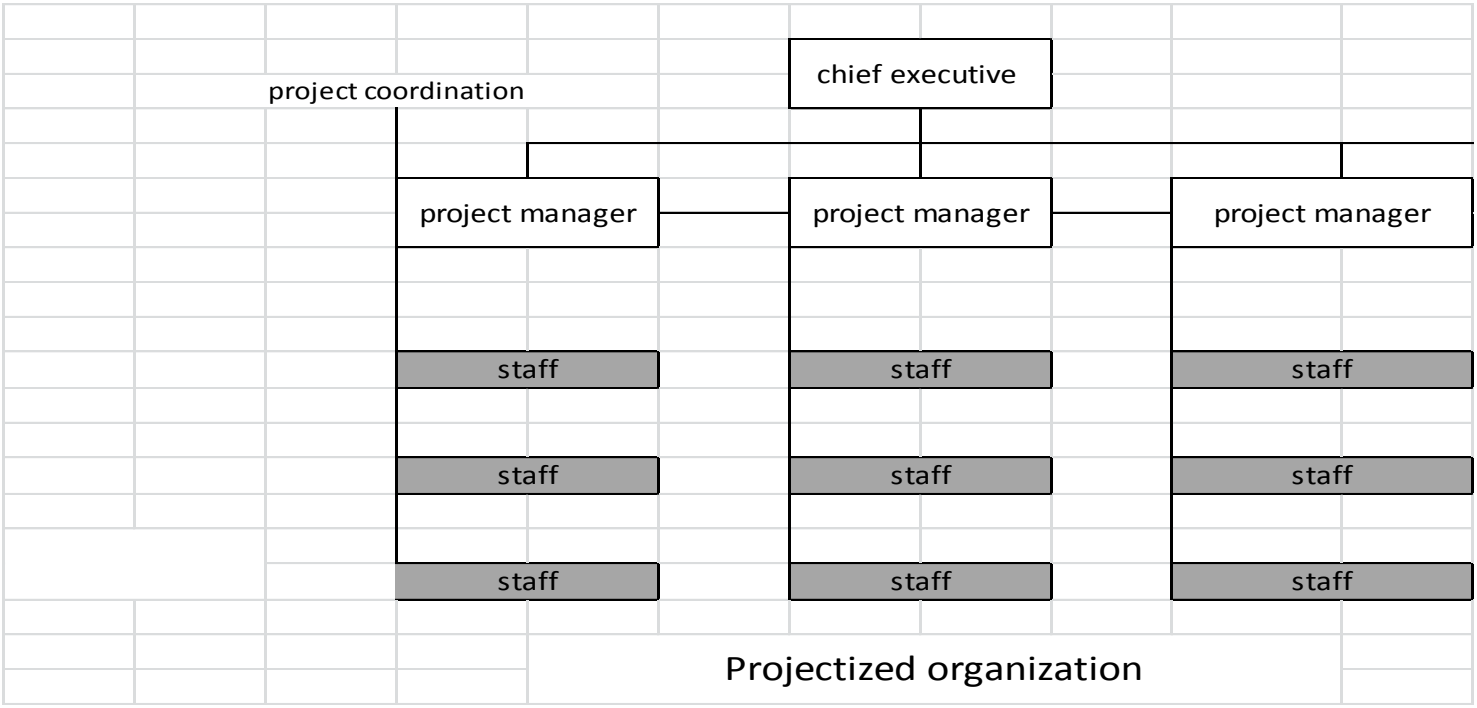
Weak matrix organition



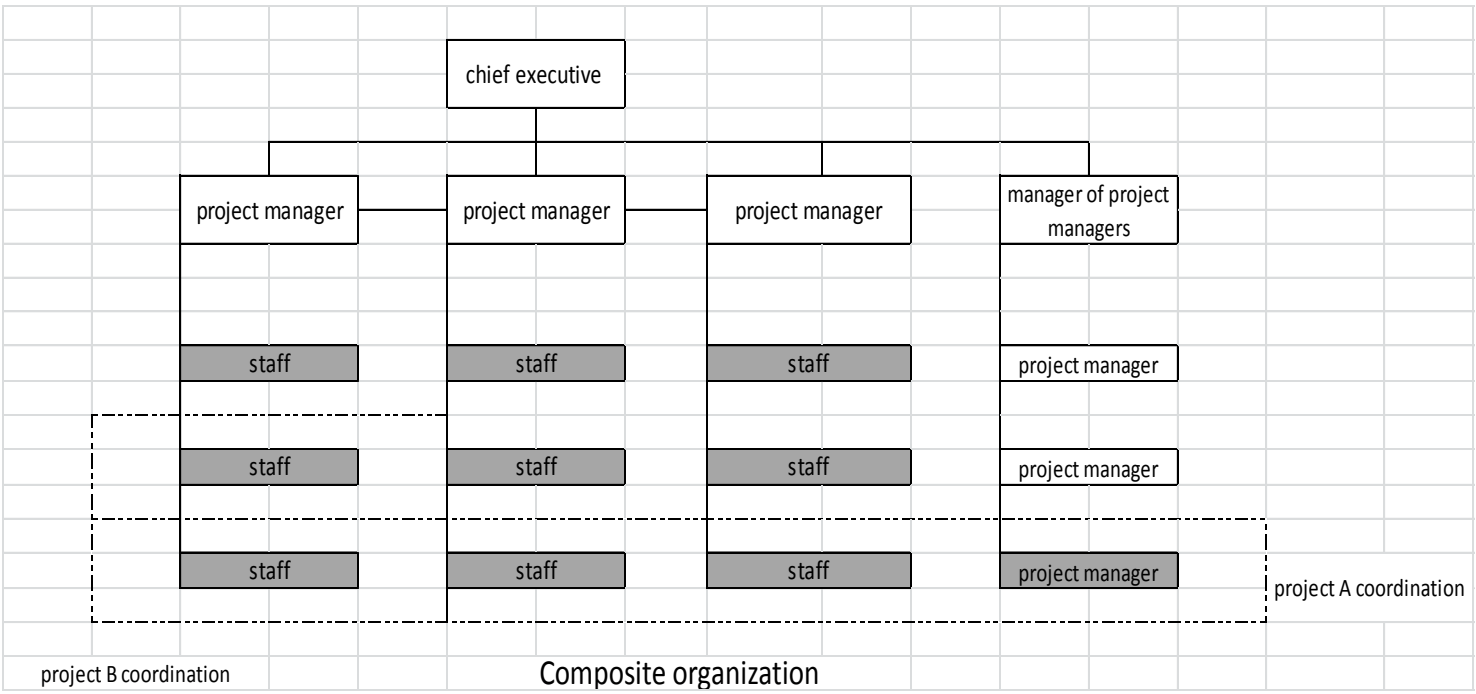
balanced matrix organization



Strong matrix organization



Projectized organization



- **Composite organizations** involve all these structures at various levels
- **Project governance** enables organizations to consistently manage projects and maximize the value of project outcomes and align the projects with business strategy
- **Project team includes**
    - Project management staff – project staff – supporting experts – user or customer representatives – sellers – business partner members
    - May be dedicated(full-time) , or part-time
- **Project phases:** is a collection of logically related project activities that culminates in the completion of one or more deliverables
- **Phases structure** allows the project to be segmented into logical subsets for ease of management , planning and control
- **Phase to phase relationships** sequential relationships , overlapping relationships
- **Predictive life cycle** project scope , and the time and cost required to deliver that scope , are determined as early in the project life cycle as practically possible , are generally when the product is well understood

- **Iterative and incremental life cycles** iterative develop the product through a series of repeated cycles , while increments successively add to the functionality of the product , a high-level vision will be developed for the overall undertaking , but the detailed scope is elaborated one iteration at a time, this method is for (complex projects)
- **Adaptive life cycle** are also iterative and incremental , but differ in that iterations are very rapid (2 or 4 weeks) and are fixed in time and cost , at the end of each iteration , the product should be ready for review by the customer

OPM	Portfolio management	Program management	Project management
Provides a strategic framework to use and guide portfolios , program and project management to deliver organizational strategy	Select and prioritizes programs and projects that will best achieve the organization's strategic goals	Coordinates the management of related projects to achieve specific benefits that support the organization's strategic needs	Manages efforts to develop , specific scope which supports the portfolio or program management objectives and ultimately the organization's goals

- **Project management** is the application of knowledge , skills , tools , and techniques to project activities to meet the project requirements
- **Process** is a set of interrelated actions and activities performed to create a pre-specified product , service or result
- **in order for a project to be successful the project team should**
  - select appropriate processes required to meet the project objectives
  - establish and maintain appropriate communication and engagement with stakeholders
  - comply with requirements to meet stakeholder needs and expectations
  - balance the competing constraints of scope , schedule , budget , quality , resources and risk

- **Tailoring** the PMBOK guide may be used as a resource in managing a project while considering the overall approach and methodology to be followed for the project
- **The process groups** are not project life cycle phases
- **The project management team** may help write the project charter

organizational structure / Project characteristics	functional	Matrix			Projectized
		Weak matrix	Balanced matrix	Strong matrix	
Project manager's authority	Little or none	Low	Low to moderate	Moderate to high	High to almost total
Resource availability	Little or none	low	Low to moderate	Moderate to high	High to almost total
Who manages the project budget	Functional manager	Functional manager	mixed	Project manager	Project manager
Project manager's role	Part-time	Part-time	Full-time	Full-time	Full-time
Project management administrative staff	Part-time	Part-time	Part-time	Full-time	Full-time