

Project manager competencies:

- Knowledge = understand when and how to use PM knowledge areas
- Performance = perform and deliver projects successfully thru application of PM knowledge areas
- Personal = soft skills

Interpersonal skills of PM:

- Leadership = focus the efforts of a group of people toward a common goal and enabling them to work as a team
- Team building = process of helping a group of individuals, bound by a common purpose, to work with each other
- Motivation = create an environment to meet project objectives while providing maximum satisfaction related to what people value most (job satisfaction, challenging work, recognition, financial compensation/reward, achievement and growth, etc)
- Communication = achieve effective communication; understand what and when to use different communication styles and channels, listen actively
- Influencing = aim to get others to cooperate towards common goals; strategy of sharing power, lead by example
- Decision making = ability to make decisions; command, consultation, consensus, coin flip (random)
- Political and cultural awareness = understand when and how to use politics and power or cultural differences to project's benefit
- Negotiation = aim to achieve a win-win situation
- Trust building = aim to create a mutual trust among team members
- Conflict management = aim to solve problems to meet project objectives
- Coaching = aim to empower or develop team member skills to a higher level of competency and performance

Operation = no start and end, on-going work or process

Project = temporary (definite beginning & end) endeavor undertaken to create a unique product, service or result

Program = group of related projects that are managed in a coordinated way to obtain benefits not available from managing them individually

Portfolio = group of projects and programs that are managed to achieve strategic objectives

Business value = total sum of tangible (monetary assets, stockholder equity, etc) and intangible (brand, good will, trademarks, etc) elements

Project charter = document issued by sponsor that formally authorizes project manager to start work; contains, but not limited to, the following:

- Project title
- Project description
- Business need
- Project justification
- Pre-assigned resources
- Stakeholders

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- Initial stakeholder requirements
- Product description and/or deliverables
- Project manager authority level
- Constraints and assumptions
- Sponsor approval & signature

Project constraints = scope (fixed), time (variable), cost (variable), risks, quality, resources, customer satisfaction

Type of PMO	Role	Degree of Control
Supportive	Provide consultative role, supply templates, best practices training, lesson learned, etc; serve as project repository	Low
Controlling	Provide support and require compliance	Moderate
Directive	Directly manage projects	High

Organization Structure \ Project Characteristics	Functional	Weak Matrix	Balanced Matrix	Strong Matrix	Projectized
PM 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 manage project budget	FM	FM	Mixed	PM	PM
PM role	Part time	Part time	Full time	Full time	Full time
PM admin staff	Part time	Part time	Part time	Full time	Full time

Project expeditor vs project coordinator = both exist in functional organizations and/or weak matrix organizations, keep track of project status

Project expeditor = no authority

Project coordinator = some authority (minor decision-making)

Stakeholder = An individual, group, or organization who may affect, be affected by, or perceive itself to be affected by a decision, activity, or outcome of a project, program, or portfolio

Stakeholder Types

Sponsor = An individual or a group that provides resources and support for the project, program, or portfolio, and is accountable for enabling success

Customer = An individual or a group that will pay for or acquire the project's product, service, or result

User = An individual or a group that will use or utilize the project's product, service, or result

Seller = A provider of products, services, or results to an organization; usually external; also called vendor, supplier, contractor

Business partner = An external organization that has special relationship with the enterprise; provide specialized expertise or fulfill a specified role

Organizational group = A group of internal stakeholders (functional departments) who are affected by the activities of the project team

Functional manager = Someone with management authority over an organizational unit within a functional organization; also called line manager

Others = Anyone or group that may a) have financial interest in the project, b) contribute inputs to the project or c) have an interest in the outcome of the project

Enterprise environmental factors EEF = conditions, not under the immediate control of the team, that influence, constrain, or direct the project. program, or portfolio; how company does business

Organizational process assets OPA = plans, processes, policies, procedures, and knowledge bases specific to and used by performing organization; group into 2 categories: 1) processes and procedures and 2) corporate knowledge base; how company normally runs its projects

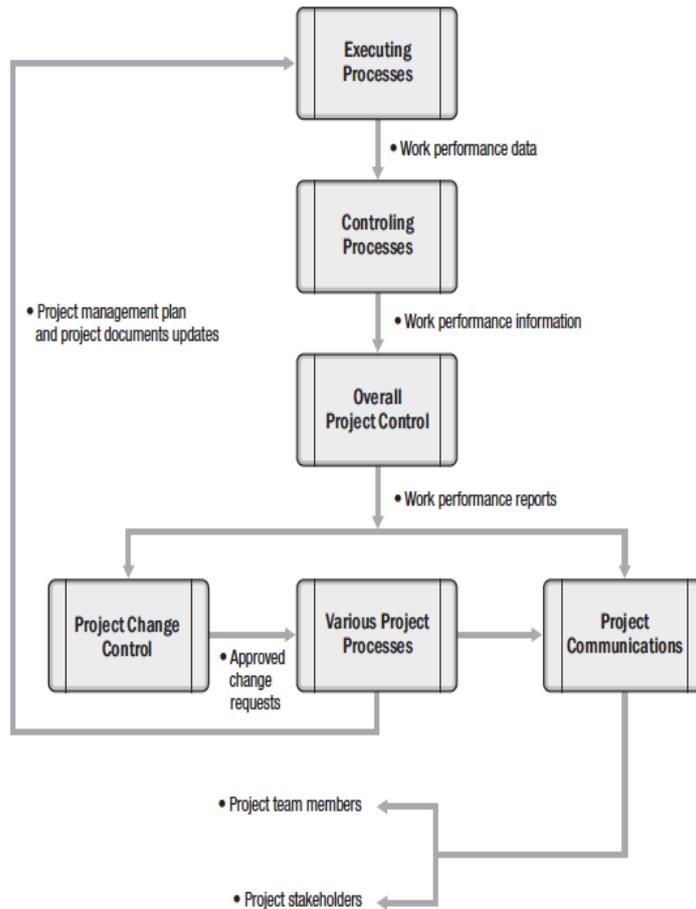
Progressive elaboration = the iterative process of increasing the level of detail in a project management plan as greater amounts of information and more accurate estimates become available

Rolling wave planning = an iterative planning technique in which the work to be accomplished in the near term is planned in detail, while the work in the future is planned at a higher level

Project Information

- Work performance data= raw observations and measurements identified during activities performed to carry out the project work
- Work performance information= work performance data collected from various controlling processes, analyzed in context and integrated based on relationships across area
- Work performance reports = physical or electronic representation of work performance information compiled in project documents, intended to generate decisions or raise issues, actions, or awareness

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Project selection

- ROI = higher the better
- NPV = higher the better
- IRR = higher the better
- Payback period = shorter the better
- Benefit to cost ratio = the higher the better (benefit same as revenue)

Opportunity cost = cost of not selecting that project

Corrective action = intentional activity to realign the performance of project work with PM plan

Preventive action = intentional activity the ensures the future performance of project work is aligned with PM plan

Defect repair = intentional activity to modify a non-conforming product or its component

Project management plan = a set of subsidiary plans, include but not limited to:

- Scope management plan
- Requirements management plan
- Schedule management plan
- Cost management plan
- Quality management plan
- Resource management plan
- Communications management plan
- Risk management plan
- Procurement management plan
- Stakeholder engagement plan
- Change management plan
- Configuration management plan
- Scope baseline (approved version of project scope statement + work breakdown structure + WBS dictionary)
- Schedule baseline (approved version of project schedule)
- Cost baseline (approved version of project budget)
- Performance measurement baseline
- Project life cycle description
- Development approach

Project documents = any documents that are not part of PM plan, include but not limited to:

- Activity attributes
- Activity list
- Assumption log
- Basis of estimates
- Change log
- Cost estimates
- Cost forecasts
- Duration estimates
- Issue log
- Lesson learned register
- Milestone list
- Physical resource assignments
- Project calendars
- Project communications
- Project schedule
- Project schedule network diagrams
- Project scope statement
- Project team assignments
- Quality control measurements
- Quality metrics
- Quality report
- Requirements documentation
- Requirements traceability matrix
- Resource breakdown structure
- Resource calendars
- Risk register
- Risk report

- Schedule data
- Schedule forecasts
- Stakeholder register
- Team charter
- Test and evaluation documents

Product scope = features and functions of product, service, or result

Project scope = work that needs to be done to deliver product, service, or result

Scope creep = the uncontrolled expansion to product or project scope without adjustment to time, cost, and resources

Gold plating = additional features/functions added without stakeholder noticing

Group decision making techniques = unanimity (everyone), majority (>50%), plurality, (most votes), dictatorship (single person)

Scope baseline = approved version of project scope statement + WBS + WBS dictionary; output of create WBS process

WBS dictionary = details of work package from WBS, usually contains, but not limited to, the following:

- ID & name
- Statement of work
- Responsible parties
- Account identifier (for accounting purposes)
- Schedule
- Acceptance criteria / quality requirements
- Required resources
- Cost estimate
- Dependencies (predecessor & successor)

Schedule baseline = approved version of project schedule; output of develop schedule process

Critical path = the sequence of activities that represents the longest path through a project, which determines the shortest possible duration; path with 0 float (slack) in network diagram

Critical path method = a method used to estimate the minimum project duration and determine the amount of scheduling flexibility on the logical network paths within the schedule model

Critical chain method = a schedule method that allows the project team to place buffers on any project schedule path to account for limited resources and project uncertainties

Crashing = a schedule compression technique used to shorten the schedule duration for the least incremental cost by adding resources; more costs

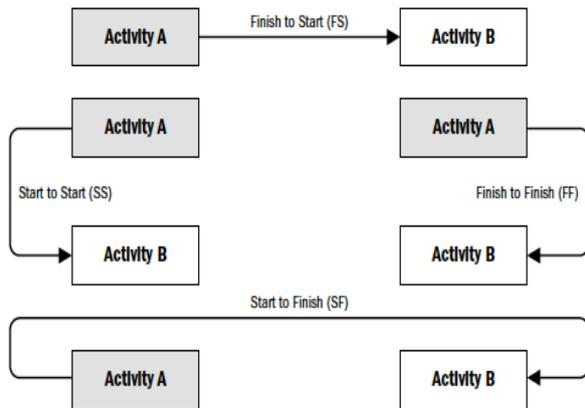
Fast tracking = a schedule compression technique in which activities or phases normally

done in sequence are performed in parallel for at least a portion of their duration; more risks

Network diagram

Dependency determination = external, internal, mandatory (legal/regulatory), discretionary

Relationships = a) finish to start, b) start to start (start at same time), c) finish to finish



(finish at same time) or d) start to finish (some overlap)

Lead time = when a task gets started before its predecessor is done

Lag time = when a task waits awhile before it gets started

Float or slack = $LS - ES$ or $LF - EF$

Duration = $EF - ES$ or $LF - LS$

$ES_{current} = \max(EF_{previous}) + 1$

$EF_{current} = ES_{current} + D_{current} - 1$

$LS_{current} = \max(LF_{previous}) + 1$

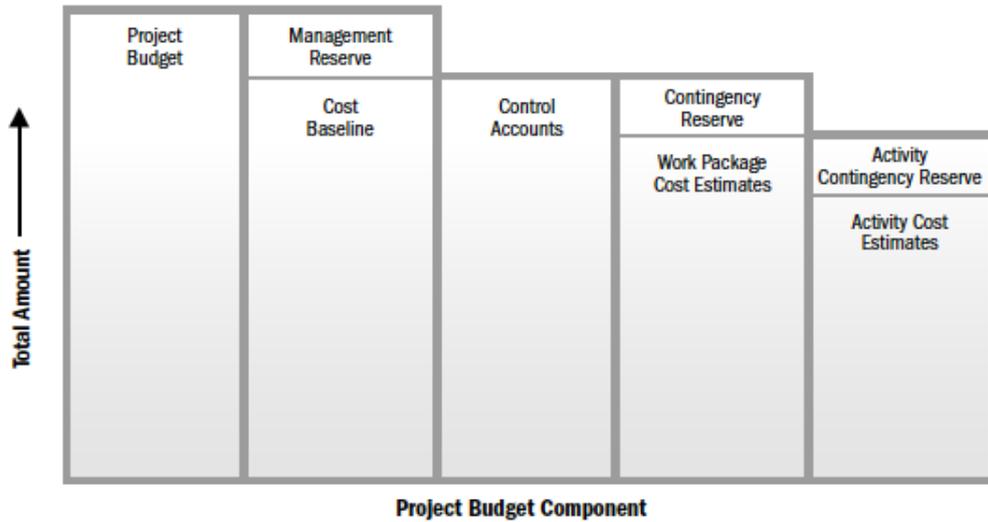
$LF_{current} = LS_{current} + D_{current} - 1$

3-point estimation

beta or PERT = $(O + 4M + P) / 6$; standard deviation = $(P - O) / 6$; variance = $(SD)^2$

triangular = $(O + M + P) / 3$; variance = $[(P - O)^2 + (M - P)(M - O)] / 18$; SD = $\sqrt{\text{variance}}$

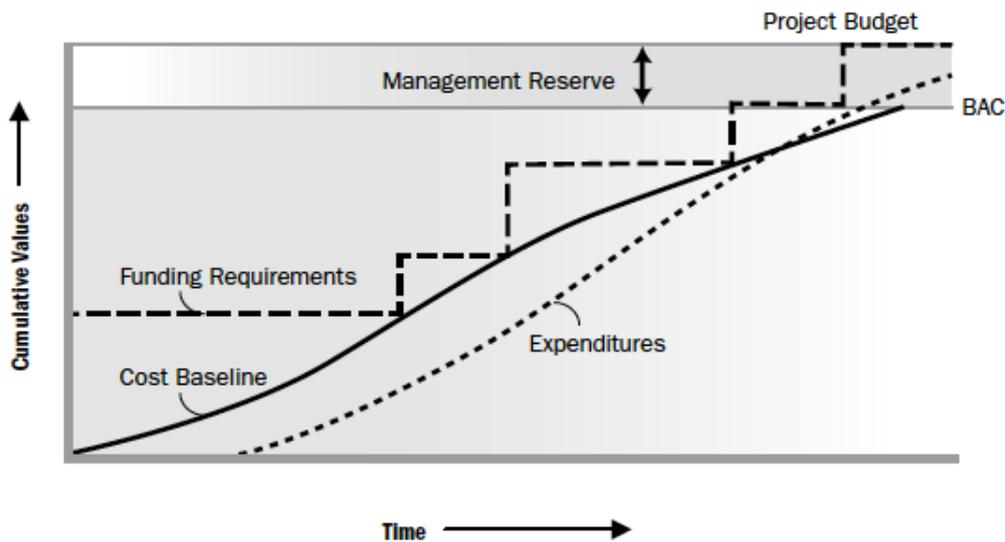
Rough order of magnitude ROM = -25% to +75%; use during initiating stage when planning has not started



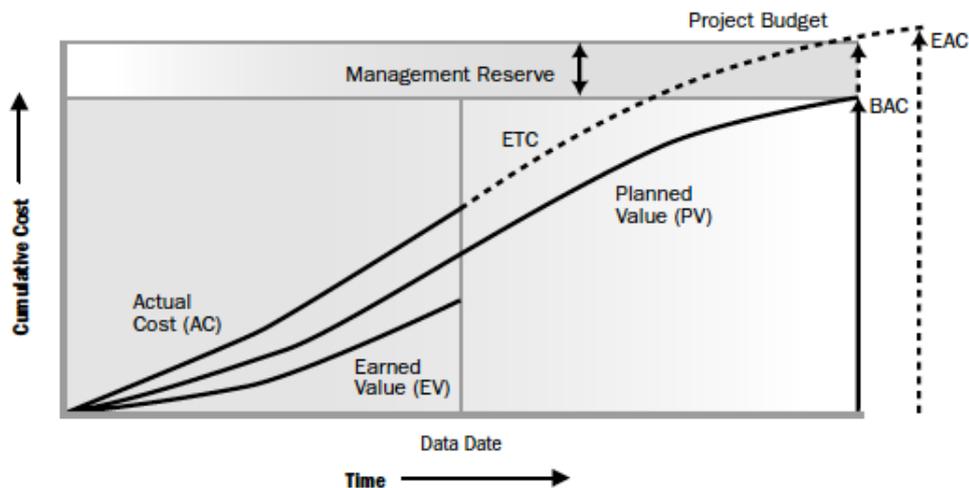
Cost baseline = approved version of project budget; output of determine budget

Management reserve = for unknown unknown; included in project's funding; not included in project's cost and schedule baselines; management board controls this reserve (not PM)

Contingency reserve = for known unknown; included in project's cost and schedule baselines; PM has authority to make use of this reserve



Earned Value Management



budget at completion BAC = allocated budget

planned value PV = BAC x planned % complete = EV / SPI = EV - SV

earned value EV = BAC x actual % complete = SPI x PV = SV + PV = CPI x AC = CV + AC

actual cost AC = EV / CPI = EV - CV

schedule performance index SPI = EV / PV <1 behind schedule, >1 ahead of schedule

schedule variance SV = EV - PV <0 behind schedule, >0 ahead of schedule

cost performance index CPI = EV / AC <1 over budget, >1 within budget

cost variance CV = EV - AC <0 over budget, >0 within budget

to complete performance index TCPI = (BAC - EV) / (BAC - AC) for within budget

TCPI = (BAC - EV) / (EAC - AC) for over budget

high TCPI means tight budget

estimate at completion

EAC = BAC/CPI if CPI is expected to be same for remaining of project

EAC = AC + BAC - EV if future work will be accomplished at planned rate

EAC = AC + bottom up ETC if initial plan no longer valid

EAC = AC + [(BAC-EV) / (CPI x SPI)] if both CPI and SPI influence remaining work

estimate to completion ETC = EAC - AC assuming work is proceeding on plan

variance at completion VAC = BAC - EAC <0 over budget, >0 within budget

Quality = customer satisfaction, fitness for use and conformance to requirements

Quality Control = micro level (product and/or project)

Quality Assurance = macro level (company and/or process)

7 basic quality tools

- Control chart = graph showing samples bounded by upper and lower control limits; if 7 continuous samples lie on one side (rule of 7) means "out of control"
- Cause and effect diagram = fishbone or Ishikawa; good for root cause analysis
- Pareto chart = plot of frequency of defects in descending order (80/20 rule = 80% of defects from 20% of causes)
- Flow chart = diagram showing decision making process
- Histogram = group category accordingly
- Check sheet = check list or tally sheet; track what to test and their results
- Scatter diagram = show how different data relate to each other

RACI matrix = responsible, accountable, consult, inform

Team Building Stages = Forming → Storming → Norming → Performing → Adjourning

Conflict resolution strategies

- Withdrawal (avoid situation)
- Smoothing (play down situation)
- Compromising (give up something)
- Forcing (following someone else's solution)
- Collaborating (get everyone viewpoint)
- Confronting (actually solving problem)

Legitimate Power = title/position or seniority

Reward Power = fair play through reward (eg bonus) scheme

Expert Power = knowledge and expertise

Referent Power = admiration or loyalty

Punishment Power = scolding

Maslow's Hierarchy of Needs = pyramid, satisfy lower needs before higher ones

McGregor's Theory X & Y = X micromanage; Y trust

Herzberg's Motivation-Hygiene Theory = hygiene (eg paycheck, security, etc) needs to be fulfilled before motivation (eg achievement, growth, recognition etc) can kick in

Expectancy Theory = achievable target to gain reward

McClelland's Achievement Theory = recognition, praise, affiliation, etc

Total number of communication channels = $[n \times (n - 1)] / 2$

Formal written = contracts, specifications

Informal written = memos, emails

Formal verbal = presentations

Informal verbal = phone calls

Nonverbal communications = facial expression, physical appearance, gestures

Paralingual communications = tone and pitch of voice

Feedback = response or acknowledgment

Pull communication = for large volume of information or large audiences eg intranet sites, e-learning, etc

Push communication = to specific recipients eg email, SMS, voice mail, press release, etc

Risk appetite = ability to take some risks

Risk tolerance = a measurable amount of acceptable risk

Risk threshold = specific point at which risk is not acceptable

Risk adverse = not want to take risks

Expected Monetary Value EMV = ABS[SUM(probability x impact)] where impact can be positive or negative

Secondary risk = new risk that may arise from risk response planning

Residual risk = remaining risk that cannot be eliminated thru risk response planning

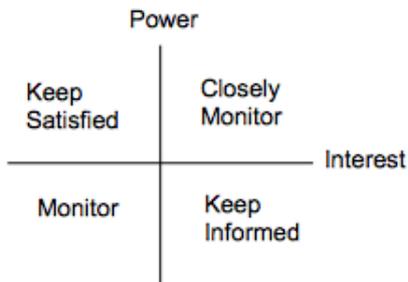
Risks	Strategies
Negative (Threats) (Negative impact)	Escalate = outside scope of project objectives, pass on to program or portfolio level Avoid = prevent threat from happening Mitigate = tackle threat such that minimal damage is done Transfer = get third party to accept threat such as insurance Accept = if it happens, it happens
Positive (Opportunities) (Positive impact)	Escalate = outside scope of project objectives, pass on to program or portfolio level Exploit = take advantage of opportunity Enhance = make opportunity more probable Share = let third party in on the opportunity Accept = if it happens, it happens

Types of Contracts	Descriptions
Fixed Price	<p>Firm Fixed Price FFP = fixed total price given the scope of work DOES NOT change</p> <p>Fixed Price Incentive Fee FPIF = fixed total price with (positive/negative) incentive such as early delivery or delay</p> <p>Fixed Price Award Fee FPAF = fixed total price with (positive/negative) award, usually determined in advance, given buyer's subjective evaluation of seller's performance</p> <p>Fixed Price with Economic Price Adjustment FP-EPA = fixed total price with special provision such as inflation changes or market conditions</p>
Cost Reimbursable	<p>Costs Plus Fixed Fee CPFF = pay seller back costs for doing the project with fixed amount given scope of work DOES NOT change</p> <p>Cost Plus Incentive Fee CPIF = pay seller back costs for doing the project with (positive/negative) incentive such as early delivery or delay</p> <p>Cost Plus Award Fee CPAF = pay seller back costs for doing the project with (positive/negative) award, usually determined in advance, given buyer's subjective evaluation of seller's performance</p>
Time & Material T&M	<p>hybrid of cost reimbursable and fixed price; usually for hourly or daily rates</p>

Point of total assumption = the point where project costs exceeded (intended) amount received in fixed price contracts so that seller needs to start paying the costs

Level of stakeholder engagement = Unaware → Resistant → Neutral → Supportive → Leading

Classification Models	Attributes
Power/interest grid	Authority and concern
Power/influence grid	Authority and involvement
Influence/impact grid	Involvement and ability to change
Salience model	Power (authority), urgency (attention) and legitimacy (involvement)



CMMI Levels = Initial → Managed → Defined → Quantitatively Managed → Optimized

Six Sigma Methods: DMAIC = Define, Measure, Analyze, Improve, Control or DMADV = Define, Measure, Analyze, Design, Verify

1 sigma = 68.26%; 2 sigma = 95.46%; 3 sigma = 99.73%; 6 sigma = 99.99985%