
Managing Projects
PROJECT
MANAGEMENT
CONTROL
PROJECTS
TIME
COST
PROCESS
ACTIVITIES
COSTS
DEVELOPMENT
PLANNING
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Indian Institute of Management Visakhapatnam

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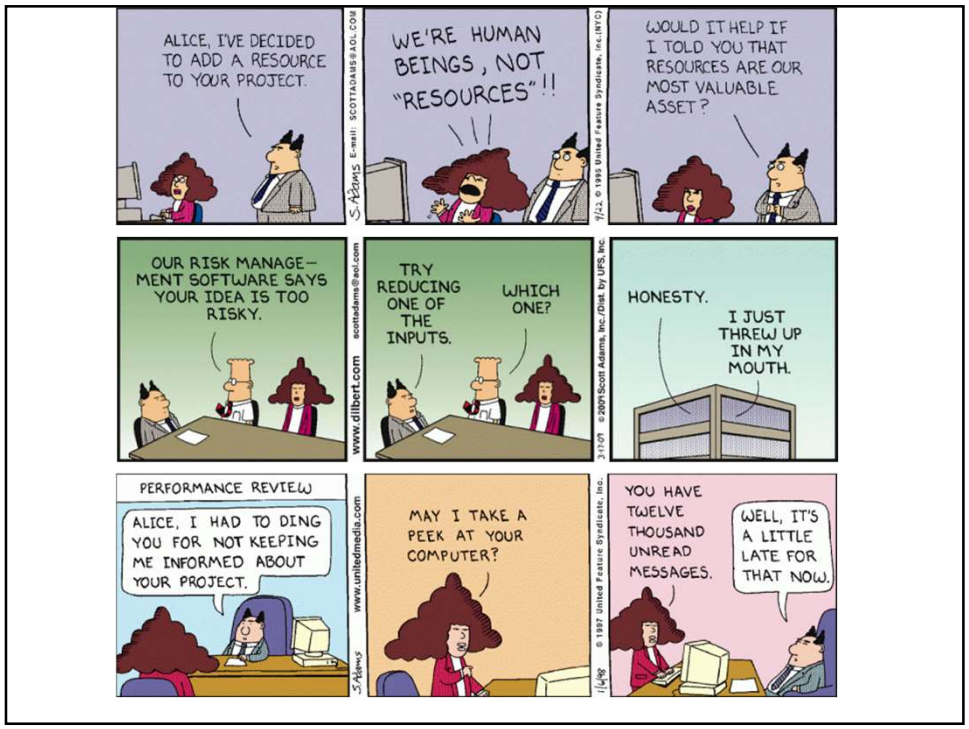
ALICE, I'VE DECIDED TO ADD A RESOURCE TO YOUR PROJECT.
WE'RE HUMAN BEINGS, NOT "RESOURCES"!!
WOULD IT HELP IF I TOLD YOU THAT RESOURCES ARE OUR MOST VALUABLE ASSET?
OUR RISK MANAGE-MENT SOFTWARE SAYS YOUR IDEA IS TOO RISKY.
TRY REDUCING ONE OF THE INPUTS.
WHICH ONE?
HONESTY.
I JUST THREW UP IN MY MOUTH.
PERFORMANCE REVIEW
ALICE, I HAD TO DING YOU FOR NOT KEEPING ME INFORMED ABOUT YOUR PROJECT.
MAY I TAKE A PEEK AT YOUR COMPUTER?
YOU HAVE TWELVE THOUSAND UNREAD MESSAGES.
WELL, IT'S A LITTLE LATE FOR THAT NOW.
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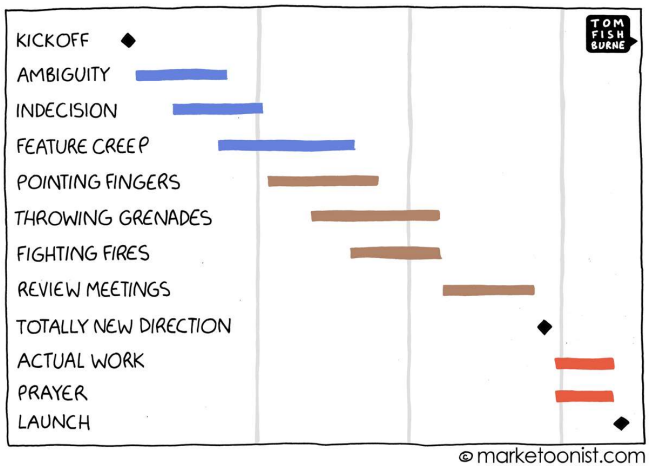
Project plan ☺



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What is a Project?

- A project is "a temporary endeavor undertaken to create a unique product, service, or result"

~ (PMBOK® Guide, Sixth Edition, 2017)

- Temporary endeavor : has a definite beginning and an end.
- Projects may produce deliverables of a social, economic, material or environmental nature
- Repetitive elements may be present in some deliverables and activities.

- Operations is work done to sustain the business
- Projects end when their objectives have been reached or the project has been terminated

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Project / Program / Portfolio / Operations

- A **project** is "a temporary endeavor undertaken to create a unique product, service, or result"
- A **program** is "a group of related projects managed in a coordinated manner to obtain benefits and control not available from managing them individually"
- A **portfolio** is a collection of projects, programs, subsidiary portfolios, and operations managed as a group to achieve strategic objectives.
- Portfolio management focuses on doing the "***right***" programs and projects.
- Operations management is an area that is outside the scope of formal project management as described in PM BoK.
- Operations management is concerned with the ongoing production of goods and/or services. It ensures that business operations continue efficiently by using the optimal resources needed to meet customer demands. It is concerned with managing processes that transform inputs (e.g., materials, components, energy, and labor) into outputs (e.g., products, goods, and/or services).

~ (PMBOK® Guide, Sixth Edition, 2017)

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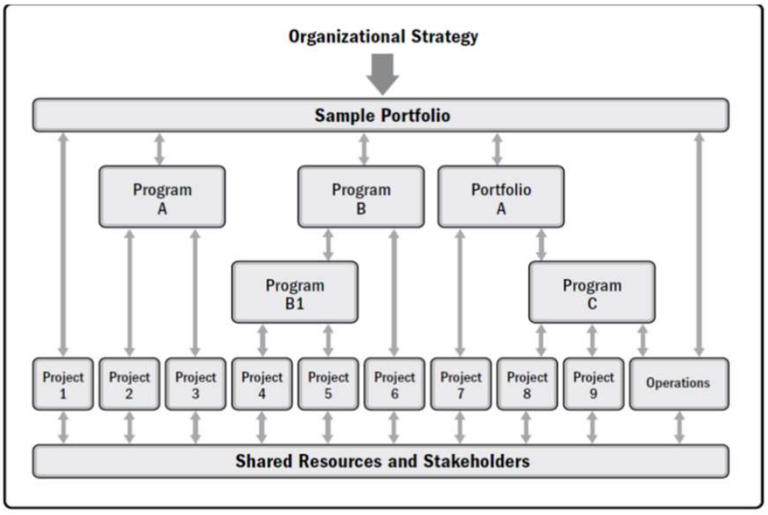
Project / Program / Portfolio



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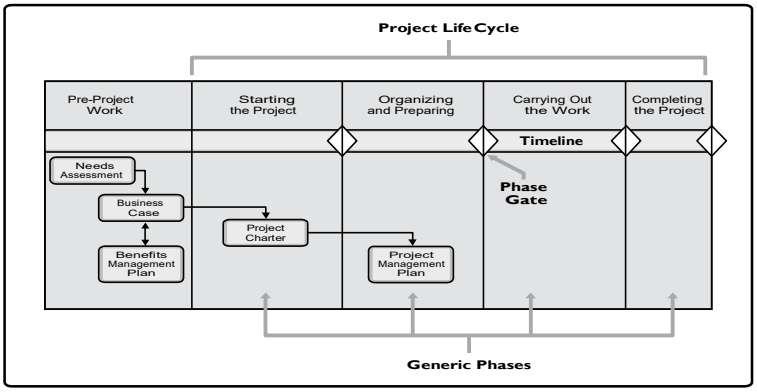
Project Life Cycle

- A project life cycle is the series of phases that a project passes through from its start to its completion. It provides the basic framework for managing the project.
- The phases may be ***sequential, iterative, or overlapping.*** All projects can be mapped to the generic life cycle
- Project life cycles can be ***predictive or adaptive***.



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Development Life Cycle

- Within a project life cycle, there are generally one or more phases that are associated with the development of the product, service, or result. These are called a development life cycle.
- In a **predictive life cycle**, the project scope, time, and cost are determined in the early phases of the life cycle. Any changes to the scope are carefully managed. Predictive life cycles may also be referred to as **waterfall life cycles**.
- In an **iterative life cycle**, the project scope is generally determined early in the project life cycle, but time and cost estimates are routinely modified as the project team's understanding of the product increases. Iterations develop the product through a series of repeated cycles, while increments successively add to the functionality of the product.
- In an **incremental life cycle**, the deliverable is produced through a series of iterations that successively add functionality within a predetermined time frame. The deliverable contains the necessary and sufficient capability to be considered complete only after the final iteration.
- **Adaptive life cycles** are agile, iterative, or incremental. The detailed scope is defined and approved before the start of an iteration. Adaptive life cycles are also referred to as agile or change-driven life cycles.
- A **hybrid life cycle** is a combination of a predictive and an adaptive life cycle. Those elements of the project that are well known or have fixed requirements follow a predictive development life cycle, and those elements that are still evolving follow an adaptive development life cycle.

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Project Life Cycles

The project Life Cycle is a framework for describing the phases of developing a project

Systems development projects can follow :

1. **Predictive life cycle** : The scope, schedule, and cost are determined early, and changes to scope are carefully managed. PMI also refers to predictive life cycles as waterfall.
2. **Iterative life cycle** : The scope is determined early, but time and cost estimates are modified as the understanding of the product increases.
3. **Incremental life cycle**: Deliverables are produced through a series of iterations that add functionality within a set time frame. The deliverable is not complete until after the final iteration
4. **Adaptive life cycle** :Stakeholders define and approve the detailed scope before the start of an iteration, producing a useable product at the end of each iteration. PMI also refers to predictive life cycles as Agile or Change driven life cycles.
5. **Hybrid life cycle** : A combination of approaches is used based on the nature of the work.

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PMI – Code of Ethics and Professional Conduct

The PMI Code of Ethics and Professional Conduct is based on **four values** that were identified as most important to the project management community:

1. **Responsibility**: Responsibility is our duty to take ownership for the decisions we make or fail to make, the actions we take or fail to take, and the consequences that result.
2. **Respect** : Respect is our duty to show a high regard for ourselves, others, and the resources entrusted to us. Resources entrusted to us may include people, money, reputation, the safety of others, and natural or environmental resources. An environment of respect engenders trust, confidence, and performance excellence by fostering mutual cooperation—an environment where diverse perspectives and views are encouraged and valued.
3. **Fairness** : Fairness is our duty to make decisions and act impartially and objectively. Our conduct must be free from competing self interest, prejudice, and favoritism
4. **Honesty** : Honesty is our duty to understand the truth and act in a truthful manner both in our communications and in our conduct.)

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PMI – Code of Ethics

The 12 principles of project management are aligned with the values identified in the *PMI Code of Ethics and Professional Conduct*. They do not follow the same format, and they are not duplicative, rather the principles and the Code of Ethics are complementary.

1. Be a diligent, respectful, and caring steward
2. Create a collaborative project team environment
3. Effectively engage with stakeholders
4. Focus on value
5. Recognize, evaluate, and respond to system interactions
6. Demonstrate leadership behaviors
7. Tailor based on context
8. Build quality into processes and deliverables
9. Navigate complexity
10. Optimize risk responses
11. Embrace adaptability and resiliency
12. Enable change to achieve the envisioned future state

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Recent Trends Affecting Project Management

- Globalization
- **Outsourcing:** Outsourcing is when an organization acquires goods and/or sources from an outside source.
- **Virtual teams:** A virtual team is a group of individuals who work across time and space using communication technologies
- Agile project management

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Agile

- Agile means being able to move quickly and easily, but some people feel that project management, as they have seen it used, does not allow people to work quickly or easily
- Early software development projects often used a waterfall approach
  - As technology and businesses became more complex, the approach was often difficult to use because requirements were unknown or continuously changing
- Agile today means using an approach where requirements and solutions evolve through collaboration

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Agile

- Manifesto for Agile Software Development
  - In February 2001, a group of 17 people that called itself the Agile Alliance developed and agreed on the Manifesto for Agile Software Development, as follows:
  - "We are uncovering better ways of developing software by doing it and helping others do it. Through this work we have come to value:
    - Individuals and interactions over processes and tools
    - Working software over comprehensive documentation
    - Customer collaboration over contract negotiation
    - Responding to change over following a plan"*
- *Agile Manifesto.

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Project Management Process groups

- A Project Management Process Group is a logical grouping of project management processes to achieve specific project objectives. **Process Groups are independent of project phases.**
- Project management processes are grouped into five Project Management Process Groups

1. **Initiating Process Group:** Those processes performed to define a new project or a new phase of an existing project by obtaining authorization to start the project or phase.
2. **Planning Process Group:** Those processes required to establish the scope of the project, refine the objectives, and define the course of action required to attain the objectives that the project was undertaken to achieve.
3. **Executing Process Group:** Those processes performed to complete the work defined in the project management plan to satisfy the project requirements.
4. **Monitoring and Controlling Process Group:** Those processes required to track, review, and regulate the progress and performance of the project; identify any areas in which changes to the plan are required; and initiate the corresponding changes.
5. **Closing Process Group:** Those processes performed to formally complete or close the project, phase, or contract

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Project Management Knowledge Areas

- A **Knowledge Area** is an identified area of project management defined by its knowledge requirements and **described in terms of its component processes, practices, inputs, outputs, tools, and techniques.**
- Project managers must have knowledge and skills in all 10 knowledge areas:
  1. **Scope,**
  2. **Schedule,**
  3. **Cost,**
  4. **Quality,**
  5. **Resource,**
  6. **Communications,**
  7. **Risk,**
  8. **Procurement,**
  9. **Stakeholder, and**
  10. **Project integration management**

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Project Management Knowledge Areas

1. **Project Integration Management:** Includes the processes and activities to identify, define, combine, unify, and coordinate the various processes and project management activities within the Project Management Process Groups.
2. **Project Scope Management:** Includes the processes required to ensure the project includes all the work required, and only the work required, to complete the project successfully.
3. **Project Schedule Management:** Includes the processes required to manage the timely completion of the project.
4. **Project Cost Management:**. Includes the processes involved in planning, estimating, budgeting, financing, funding, managing, and controlling costs so the project can be completed within the approved budget.
5. **Project Quality Management:** Includes the processes for incorporating the organization's quality policy regarding planning, managing, and controlling project and product quality requirements, in order to meet stakeholders' expectations.
6. **Project Resource Management:** Includes the processes to identify, acquire, and manage the resources information needed for the successful completion of the project.

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Project Management Knowledge Areas

7. **Project Communications Management:** Includes the processes required to ensure timely and appropriate planning, collection, creation, distribution, storage, retrieval, management, control, monitoring, and ultimate disposition of project
8. **Project Risk Management:** Includes the processes of conducting risk management planning, identification, analysis, response planning, response implementation, and monitoring risk on a project.
9. **Project Procurement Management:** Includes the processes necessary to purchase or acquire products, services, or results needed from outside the project team.
10. **Project Stakeholder Management:** Includes the processes required to identify the people, groups, or organizations that could impact or be impacted by the project, to analyze stakeholder expectations and their impact on the project, and to develop appropriate management strategies for effectively engaging stakeholders in project decisions and execution.

The needs of a specific project may require one or more additional Knowledge Areas, for example, construction may require **financial management or safety and health management.**

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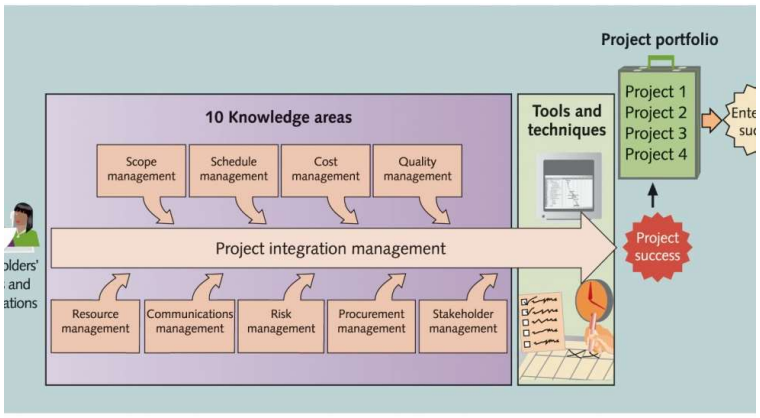

RE 1-2 Project management framework

Project Management – Knowledge Areas

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Project Management Process Group and Knowledge Area Mapping

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

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Project Constraints

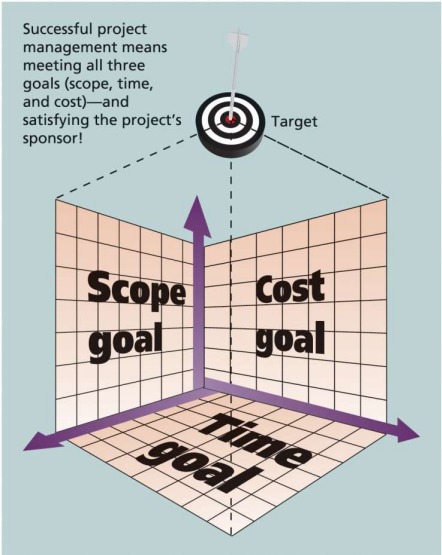

FIGURE 1-1 Project constraints

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PM Competencies

- Recent PMI studies applied the Project Manager Competency Development (PMCD) Framework to the skills needed by project managers through the use of The PMI Talent Triangle®

The talent triangle focuses on three key skill sets:

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

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PM Competencies

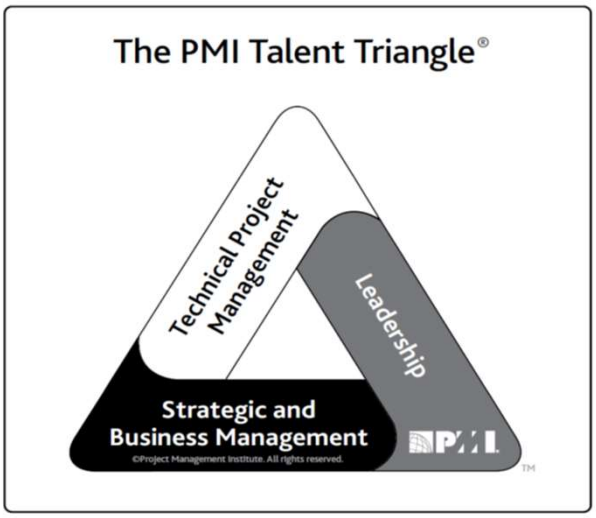

Figure 3-2. The PMI Talent Triangle®

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Technical Project Management Skills

- **Technical project management skills are defined as the skills to effectively apply project management knowledge to deliver the desired outcomes.**
- Project managers frequently rely on expert judgment to perform well. Being aware of personal expertise and where to find others with the needed expertise are important for success as a project manager.
- Focus on the critical technical project management elements and having the right artifacts readily available. At the top of the list were the following:
  - Critical success factors for the project,
  - Schedule,
  - Selected financial reports, and
  - Issue log.
  - Tailor both traditional and agile tools, techniques, and methods for each project.
  - Make time to plan thoroughly and prioritize diligently.
  - Manage project elements, including, but not limited to, schedule, cost, resources, and risks.

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Strategic and Business Management Skills

- **Strategic and business management skills involve the ability to see the high-level overview of the organization and effectively negotiate and implement decisions and actions that support strategic alignment and innovation.**
- This ability may include a working knowledge of other functions such as finance, marketing, and operations.
- Strategic and business management skills may also include developing and applying pertinent product and industry expertise (domain knowledge).

The project manager should be aware of the business and strategic factors that could affect the project

- Risks and issues,
- Financial implications,
- Cost versus benefits analysis
- Business value,
- Benefits realization expectations and strategies, and
- Scope, budget, schedule, and quality.

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Leadership Skills

- Leadership skills involve the ability to guide, motivate, and direct a team.
- These skills may include demonstrating essential capabilities such as negotiation, resilience, communication, problem solving, critical thinking, and interpersonal skills.
- Projects are becoming increasingly more complicated with more and more businesses executing their strategy through projects.
- Project management is more than just working with numbers, templates, charts, graphs, and computing systems.
- A common denominator in all projects is people. People can be counted, but they are not numbers.

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Qualities and Skills of a Leader

Research shows that the qualities and skills of a leader, which include :

- Being a visionary (e.g., help to describe the products, goals, and objectives of the project; able to dream and translate those dreams for others);
- Being optimistic and positive;
- Being collaborative;
- **Managing relationships and conflict by:**
  - Building trust;
  - Satisfying concerns;
  - Seeking consensus;
  - Balancing competing and opposing goals;
  - Applying persuasion, negotiation, compromise, and conflict resolution skills;
  - Developing and nurturing personal and professional networks;
  - Taking a long-term view that relationships are just as important as the project; and
  - Continuously developing and applying political acumen.
- **Communicating by:**
  - Spending sufficient time communicating
  - Managing expectations;
  - Accepting feedback graciously;
  - Giving feedback constructively; and
  - Asking and listening.
- Being respectful (helping others retain their autonomy), courteous, friendly, kind, honest, trustworthy, loyal, and ethical;
- Exhibiting integrity and being culturally sensitive, courageous, a problem solver, and decisive;
- Giving credit to others where due;
- Being a life-long learner who is results- and action-oriented;

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Politics, Power, Negotiation and getting things done

- Leadership and management are ultimately about being able to get things done.
- Ability to deal with politics, exercise influence, negotiation, autonomy, and power.
- Ability to understands how the organization works,

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Power

- Positional (sometimes called formal, authoritative, legitimate) (e.g., formal position granted in the organization or team);
- Informational (e.g., control of gathering or distribution);
- Referent (e.g., respect or admiration others hold for the individual, credibility gained);
- Situational (e.g., gained due to unique situation such as a specific crisis);
- Personal or charismatic (e.g., charm, attraction);
- Relational (e.g., participates in networking, connections, and alliances);
- Expert (e.g., skill, information possessed; experience, training, education, certification);
- Reward-oriented (e.g., ability to give praise, monetary or other desired items);
- Punitive or coercive (e.g., ability to invoke discipline or negative consequences);
- Ingratiating (e.g., application of flattery or other common ground to win favor or cooperation);
- Pressure-based (e.g., limit freedom of choice or movement for the purpose of gaining compliance to desired action);
- Guilt-based (e.g., imposition of obligation or sense of duty);
- Persuasive (e.g., ability to provide arguments that move people to a desired course of action); and
- Avoiding (e.g., refusing to participate).

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Management Vs Leadership

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

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Leadership Styles

Research describes numerous leadership styles that a project manager can adopt. Some of the most common examples of these styles include but are not limited to:

- **Laissez-faire** (e.g., allowing the team to make their own decisions and establish their own goals, also referred to as taking a hands-off style);
- **Transactional** (e.g., focus on goals, feedback, and accomplishment to determine rewards; management by exception);
- **Servant leader** (e.g., demonstrates commitment to serve and put other people first; focuses on other people's growth, learning, development, autonomy, and well-being; concentrates on relationships, community and collaboration; leadership is secondary and emerges after service);
- **Transformational** (e.g., empowering followers through idealized attributes and behaviors, inspirational motivation, encouragement for innovation and creativity, and individual consideration);
- **Charismatic** (e.g., able to inspire; is high-energy, enthusiastic, self-confident; holds strong convictions); and
- **Interactional** (e.g., a combination of transactional, transformational, and charismatic)

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Personality

Personality refers to the individual differences in characteristic patterns of thinking, feeling, and behaving.

Personality characteristics or traits include :

- **Authentic** (e.g., accepts others for what and who they are, show open concern);
- **Courteous** (e.g., ability to apply appropriate behavior and etiquette);
- **Creative** (e.g., ability to think abstractly, to see things differently, to innovate);
- **Cultural** (e.g., measure of sensitivity to other cultures including values, norms, and beliefs);
- **Emotional** (e.g., ability to perceive emotions and the information they present and to manage them; measure of interpersonal skills);
- **Intellectual** (e.g., measure of human intelligence over multiple aptitudes);
- **Managerial** (e.g., measure of management practice and potential);
- **Political** (e.g., measure of political intelligence and making things happen);
- **Service-oriented** (e.g., evidence of willingness to serve other people);
- **Social** (e.g., ability to understand and manage people); and
- **Systemic** (e.g., drive to understand and build systems).

An effective project manager will have some level of ability with each of these characteristics in order to be successful.
Each project, organization, and situation requires that the project manager emphasize different aspects of personality.

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Performing Integration

The role of the project manager is two fold when performing integration on the project:

- Project managers play a key role in **working with the project sponsor to understand the strategic objectives and ensure the alignment of the project objectives and results with those of the portfolio, program, and business areas.** In this way, project managers contribute to the integration and execution of the strategy.

- Project managers are **responsible for guiding the team to work together to focus on what is really essential at the project level. This is achieved through the integration of processes, knowledge, and people.**

Integration is a critical skill for project managers.

Integration at Process Level, Cognitive level and Context level

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Project Scope Management

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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.**

Managing the project scope is primarily concerned with **defining and controlling what is and is not included in the project.**

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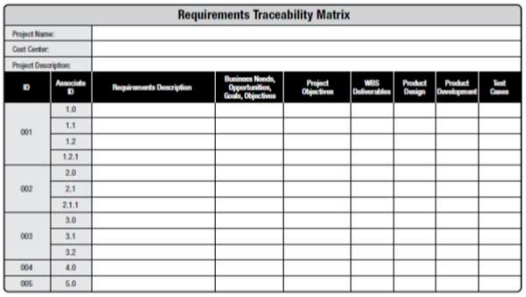
R T M

- The requirements traceability matrix (RTM) is a grid that links product requirements from their origin to the deliverables that satisfy them.
- The implementation of a requirements traceability matrix helps ensure that each requirement adds business value by linking it to the business and project objectives.
- It provides a means to track requirements throughout the project life cycle, helping to ensure that requirements approved in the requirements documentation are delivered at the end of the project.
- Finally, it provides a structure for managing changes to the product scope.



Requirements Traceability Matrix								
Project Name:								
Cost Center:								
Project Description:								
ID	Associate ID	Requirements Description	Business Needs, Opportunities, Goals, Objectives	Project Objectives	WBS Deliverables	Product Design	Product Development	Test Cases
001	1.0							
	1.1							
	1.2							
	1.2.1							
002	2.0							
	2.1							
	2.1.1							
003	3.0							
	3.1							
	3.2							
004	4.0							
005	5.0							

Figure 5-7. Example of a Requirements Traceability Matrix

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Project Scope Statement

The project scope statement :

- description of the project scope, major deliverables, assumptions, and constraints.
- documents the entire scope, including project and product scope.
- describes the project's deliverables in detail. It also provides a common understanding of the project scope among project stakeholders.
- contains explicit scope exclusions that can assist in managing stakeholder expectations.
- enables the project team to perform more detailed planning, guides the project team's work during execution, and provides the baseline for evaluating whether requests for changes or additional work are contained within or outside the project's boundaries.

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Project Schedule Management

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The Importance of Project Schedules

- Managers often cite delivering projects on time as one of their biggest challenges
  - Time has the least amount of flexibility; it passes no matter what happens on a project
- Individual work styles and cultural differences may also cause schedule conflicts
  - Different cultures and even entire countries have different attitudes about schedules

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Three-point Estimating

The accuracy of single-point duration estimates may be improved by considering estimation uncertainty and risk.

- Using three-point estimates helps define an approximate range for an activity's duration:
  - **Most likely (*tM*).** This estimate is based on the duration of the activity, given the resources likely to be assigned, their productivity, realistic expectations of availability for the activity, dependencies on other participants, and interruptions.
  - **Optimistic (*tO*).** The activity duration based on analysis of the best-case scenario for the activity.
  - **Pessimistic (*tP*).** The duration based on analysis of the worst-case scenario for the activity.
- Depending on the assumed distribution of values within the range of the three estimates, the expected duration, t*E*, can be calculated. One commonly used formula is triangular distribution:
  - $tE = (tO + 4 * tM + tP) / 6$.

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Project Cost Management

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The Importance of Project Cost Management

Projects have a poor track record for meeting budget goals

- Cost overrun is the additional percentage or dollar amount by which actual costs exceed estimates
- A 2011 *Harvard Business Review* study reported an average cost overrun of 27 percent

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What Went Wrong?

- The United Kingdom's National Health Service IT modernization program was called the greatest IT disaster in history with an estimated $26 billion overrun
- Program had problems due to incompatible systems, resistance from physicians, and arguments among contractors about who's responsible for what? and was scrapped in 2011

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What is Cost?

Cost is a resource sacrificed or foregone to achieve a specific objective or something given up in exchange

Usually measured in monetary units that must be paid to acquire goods and services

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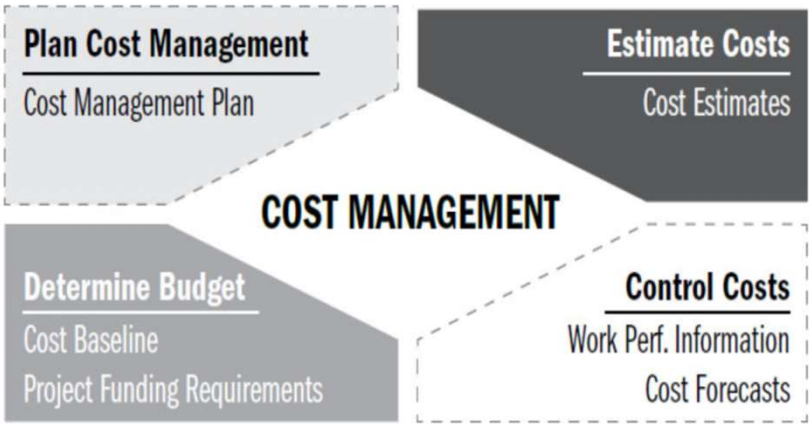
Project Cost Management



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Estimating Costs

Project managers must take cost estimates seriously if they want to complete projects within budget constraints

- Types of cost estimates
- Tools and techniques for estimating costs
- Typical problems associated with cost estimates

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Estimating Costs

Type of Estimate	When Done	Why Done	Typical Range
Rough order of magnitude (ROM)	Very early in the project life cycle, often 3–5 years before project completion	Provides estimate of cost for selection decisions	-50% to + 100%
Budgetary	Early, 1–2 years out	Puts dollars in the budget plans	-10% to +25%
Definitive	Later in the project, less than 1 year out	Puts dollars in the budget plans	-5% to +10%

Table Types of cost estimates

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Estimating Costs

The number and type of cost estimates vary by application area

- The Association for the Advancement of Cost Engineering International identifies five types of cost estimates for construction projects
  - Order of magnitude, conceptual, preliminary, definitive, and control
- Estimates are usually done at various stages of a project
  - Should become more accurate as time progresses
- It is important to provide supporting details for estimates and updates to project documents.
- A large percentage of total project costs are often labor costs

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Cost Estimation Tools and Techniques

- Analogous or top-down estimates
  - Use the actual cost of a previous, similar project as the basis for estimating the cost of the current project
- Bottom-up estimates
  - Involve estimating individual work items or activities and summing them to get a project total
- Three-point estimates
  - Involve estimating the most likely, optimistic, and pessimistic costs for items
- Parametric estimating
  - Uses project characteristics (parameters) in a mathematical model to estimate project costs

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Typical Problems with Cost Estimates

- Reasons for inaccuracies
  - Estimates are done too quickly
  - People lack estimating experience
  - Human beings are biased toward underestimation
  - Management desires accuracy

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Controlling Costs

Activities involved in controlling project costs

- Monitoring cost performance
- Ensuring that only appropriate project changes are included in a revised cost baseline
- Informing project stakeholders of authorized changes to the project that will affect costs

Several tools and techniques assist in project cost control

- Expert judgment, data analysis, project management information systems, and the to-complete performance index

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Project Resources Management

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What is Project Resource Management?

- Making the most effective use of the human and physical resources involved with a project
  - Planning resource management
  - Estimating activity resources
  - Acquiring resources
  - Developing the project team
  - Managing the project team
  - Controlling resources

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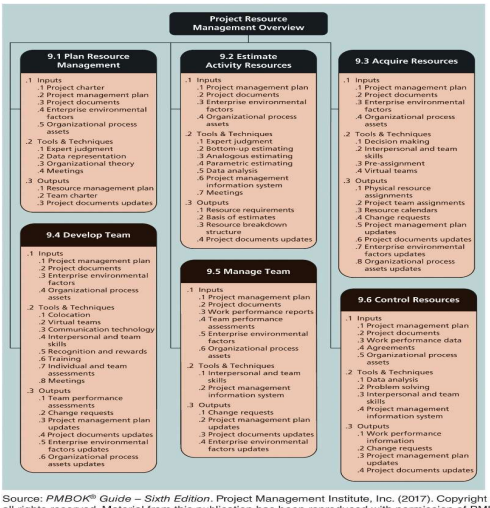
What is Project Resource Management?



Source: *PMBOK® Guide – Sixth Edition*. Project Management Institute, Inc. (2017). Copyright and all rights reserved. Material from this publication has been reproduced with permission of PMI.

FIGURE 9-1 Project resource management overview

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Keys to Managing and Leading People

- Psychologists and management theorists have devoted much research and thought to the field leading people at work
  - Motivation theories
  - Influence and power
  - Effectiveness
  - Emotional intelligence
  - Leadership

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Project Quality Management

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What Is Project Quality Management?

- International Organization for Standardization (ISO) definition of quality
  - "Totality of characteristics of an entity that bear on its ability to satisfy stated or implied needs" (ISO8042:1994)
  - "The degree to which a set of inherent characteristics fulfils requirements" (ISO9000:2000)
- Other definitions of quality
  - Conformance to requirements
    - Project's processes and products meet written specifications
  - Fitness for use
    - Product can be used as it was intended

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What Is Project Quality Management?

- Project quality management ensures the project will satisfy the needs for which it was undertaken
- Project quality management processes
  - **Planning quality management**: identifying which quality standards are relevant to the project and how to satisfy them; a metric is a standard of measurement
  - **Managing quality**: translating the quality management plan into executable quality activities
  - **Controlling quality:** monitoring specific project results to ensure they comply with the relevant quality standards

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Project Communications Management

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Project Communications Management

- **Greatest threat to many projects is a failure to communicate**
- **You cannot separate technical skills and soft skills when working on projects**
- **For projects to succeed, every project team member needs both types of skills**

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Project Communications Management

Project Communications Management includes **the processes necessary to ensure that the information needs of the project and its stakeholders are met through development of artifacts and implementation of activities designed to achieve effective information exchange.**

Project Communications Management consists of two parts.

- The first part is **developing a strategy to ensure communication is effective for stakeholders.**
- The second part is **carrying out the activities necessary to implement the communication strategy.**

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Project Communications Management

1. **Plan Communications Management :** The process of developing ***an appropriate approach and plan for project communication activities based on the information needs of each stakeholder or group, available organizational assets, and the needs of the project.***

2. **Manage Communications :** The process of ***ensuring timely and appropriate collection, creation, distribution, storage, retrieval, management, monitoring, and the ultimate disposition of project information.***

3. **Monitor Communications :** *The process of* ***ensuring the information needs of the project and its stakeholders are met.***

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Project Communications Management Overview

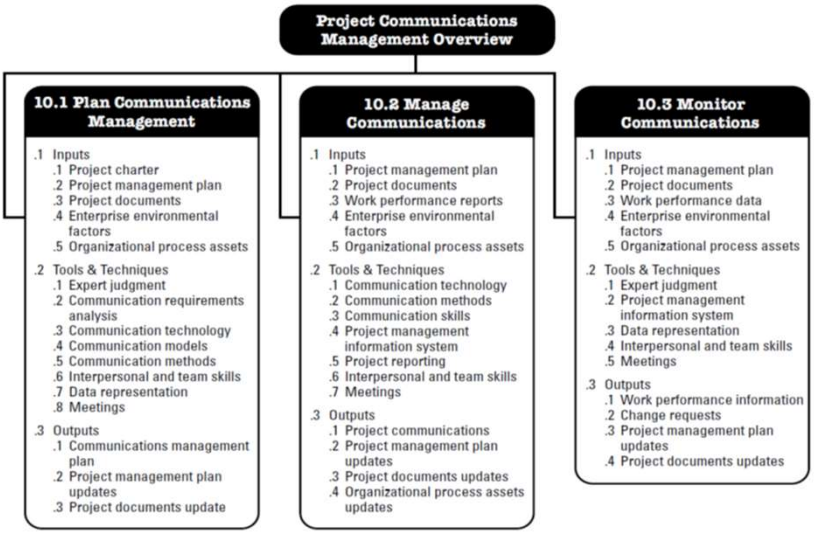

Figure 10-1. Project Communications Overview

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Key Concepts

Communication is the exchange of information, intended or involuntary.

Communications encompass the various methods through which information can be transmitted or received. This includes both ***interactive communication activities like meetings and presentations, as well as tangible artifacts such as emails, social media posts, project reports, and project documentation.***

The information exchanged can be in the form of ideas, instructions, or emotions.

The mechanisms by which information is exchanged can be in:

- **Written form** : Either physical or electronic.
- **Spoken** : Either face-to-face or remote.
- **Formal or informal** (as in formal papers or social media).
- **Through gestures** : Tone of voice and facial expressions.
- **Through media** : Pictures, actions, or even just the choice of words.
- **Choice of words** : There is often more than one word to express an idea; there can be subtle differences in the meaning of each of these words and phrases.

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Communication Skills

The 5Cs of written communications are supported by communication skills, such as:

- **Listening actively.** Staying engaged with the speaker and summarizing conversations to ensure effective information exchange.
- **Awareness of cultural and personal differences.** Developing the team's awareness of cultural and personal differences to reduce misunderstandings and enhance communication capability.
- **Identifying, setting, and managing stakeholder expectations.** Negotiating with stakeholders reduces the existence of conflicting expectations among the stakeholder community.
- **Enhancement of skills.** Enhancing the skills of all team members in the following activities:
  - Persuading a person, a team, or an organization to perform an action;
  - Motivating people and providing encouragement or reassurance;
  - Coaching to improve performance and achieve desired results;
  - Negotiating to achieve mutually acceptable agreements between parties and reduce approval or decision delays; and
  - Resolving conflict to prevent disruptive impacts.

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Attributes of Effective Communication

- **Clarity on the purpose of the communication**: defining its purpose;
- **Understanding as much as possible about the receiver of the communications, meeting needs, and preferences**; and
- **Monitoring and measuring the effectiveness of the communications**.

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Trends and Emerging practices

Implementing appropriate communication strategies is vital to maintaining effective relationships with stakeholders.

Trends and emerging practices for Project Communications Management include :

- **Inclusion of stakeholders in project reviews**.
- **Inclusion of stakeholders in project meetings.**
- **Increased use of social computing.**
- **Multifaceted approaches to communication.**

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Communication Methods

Natural disasters often disrupt communications around the world

- Japan's communications infrastructure damage after a 9.0 magnitude earthquake in March 2011 was unprecedented
- During the April 2015 earthquake in Nepal, people turned to older technology like ham radios to communicate.

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Communication Methods

There are several communication methods that are used to share information among project stakeholders.

- **Interactive communication**: *Between two or more parties performing a multidirectional exchange of information in real time*. It employs communications artifacts such as meetings, phone calls, instant messaging, some forms of social media, and videoconferencing.
- **Push communication :** *Sent or distributed directly to specific recipients who need to receive the information*. This ensures that the information is distributed but does not ensure that it actually reached or was understood by the intended audience. Push communications artifacts include letters, memos, reports, emails, faxes, voice mails, blogs, and press releases.
- **Pull communication :** *Used for large complex information sets, or for large audiences, and requires the recipients to access content at their own discretion subject to security procedures*. These methods include web portals, intranet sites, e-learning, lessons learned databases, or knowledge repositories.

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Communication Methods

Interpersonal communication : Information is exchanged between individuals, typically face-to-face.

Small group communication : Occurs within groups of around three to six people.

Public communication : A single speaker addressing a group of people.

Mass communication : There is a minimal connection between the person or group sending the message and the large, sometimes anonymous groups for whom the information is intended.

Networks and social computing communication : Supports emerging communication trends of many-to-many supported by social computing technology and media.

Communication artefacts : Notice boards, Newsletters/in-house magazines/e-magazines, Letters to staff/volunteers, Press releases, Annual reports, Emails and intranets, Web portals and other information repositories (for pull communication),Phone conversations, Presentations, Team briefings/group meetings, Focus groups, Face-to-face formal or informal meetings between various stakeholders, Consultation groups or staff forums, and Social computing technology and media.)

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Communication Management Plan

- Stakeholder communication requirements;
- Information to be communicated, including language, format, content, and level of detail;
- Escalation processes;
- Reason for the distribution of that information;
- Timeframe and frequency for the distribution of required information and receipt of acknowledgment or response, if applicable;
- Person responsible for communicating the information;
- Person responsible for authorizing release of confidential information;
- Person or groups who will receive the information, including information about their needs, requirements, and expectations;
- Methods or technologies used to convey the information, such as memos, email, press releases, or social media;
- Resources allocated for communication activities, including time and budget;
- Method for updating and refining the communications management plan as the project progresses and develops, such as when the stakeholder community changes as the project moves through different phases;
- Glossary of common terminology;
- Flow charts of the information flow in the project, workflows with possible sequence of authorization, list of reports, meeting plans, etc.; and
- Constraints derived from specific legislation or regulation, technology, organizational policies, etc.

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Manage Communication

- **Writing style:** Appropriate use of active versus passive voice, sentence structure, and word choice.
- **Meeting management :** Preparing an agenda, inviting essential participants, and ensuring they attend. Dealing with conflicts within the meeting or resulting from inadequate follow-up of minutes and actions, or attendance of the wrong people.
- **Presentations :** Awareness of the impact of body language and design of visual aids.
- **Facilitation** : Building consensus and overcoming obstacles such as difficult group dynamics and maintaining interest and enthusiasm among group members.
- **Active listening:** Listening actively involves acknowledging, clarifying and confirming, understanding, and removing barriers that adversely affect comprehension.

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Formal and Informal Methods

- Many people prefer informal communications:
  - Several colleagues and managers want to know the people working on their projects and develop a trusting relationship with them
  - Oral communication also helps build stronger relationships among project personnel and project stakeholders
  - Effective creation and distribution of information depends on project managers and project team members having good communication skills

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Running Effective Meetings

- Guidelines to help improve time spent at meetings
  - Determine if a meeting can be avoided
  - Define the purpose and intended outcome of the meeting
  - Determine who should attend the meeting
  - Provide an agenda to participants before the meeting
  - Prepare handouts and visual aids, and make logistical arrangements ahead of time
  - Run the meeting professionally
  - Set the ground rules for the meeting
  - Build relationships

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Using Technology for Communications

- Guidelines to use e-mail as a more effective communication tool
  - Be sure to send information to the right people
  - Use meaningful subject lines and limit the content of emails to one main subject
  - Be as clear and concise as possible
  - Reread your e-mail before you send it
  - Limit the number and size of e-mail attachments
  - Delete e-mail that you do not need to save or that does not require a response
  - Make sure the virus protection software is up to date
  - Respond to e-mail quickly

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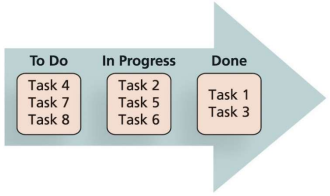
Good Practice

- One of the main features of kanban is visualizing workflow, which is often done by using kanban boards
  - People using kanban boards can tailor the concepts to meet their needs



Source: Kathy Schwalbe, *An Introduction to Project Management*, Fifth Edition (2015)

FIGURE 10-3 Sample kanban board

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Project Risk Management

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Importance of Project Risk Management

- Project risk management is the art and science of identifying, analyzing, and responding to risk throughout the life of a project and in the best interests of meeting project objectives
  - Risk management is often overlooked in projects, but it can help improve project success by helping select good projects, determining project scope, and developing realistic estimates
- Research shows a need to improve project risk management
  - Study by Ibbs and Kwak shows risk management has the lowest maturity rating of all knowledge areas
- Worldwide banking and insurance sectors will spend about $78.6 billion on risk in 2015, growing to $96.3 billion by 2018

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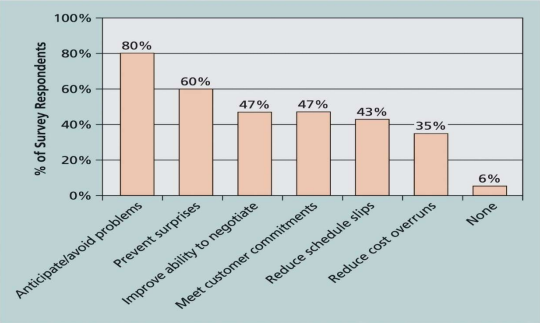
Project Risk Management

KLCI study shows the benefits of following good risk management practices



Source: Kulik and Weber, KLCI Research Group

FIGURE 11-1 Benefits from software risk management practices

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Project Risk Management

A dictionary definition of risk is "the possibility of loss or injury"

- General definition of a project risk: an uncertainty that can have a negative or positive effect on meeting project objectives.
- Managing negative risks involves a number of possible actions that project managers can take to avoid, lessen, change, or accept the potential effects of risks on their projects.
- Positive risk management is like investing in opportunities

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Project Risk Management

Project Risk Management includes ***the processes of conducting risk management planning, identification, analysis, response planning, response implementation, and monitoring risk on a project.***

The objectives of project risk management are ***to increase the probability and/or impact of positive risks and to decrease the probability and/or impact of negative risks, in order to optimize the chances of project success.***

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Project Risk Management

- **Plan Risk Management:** The process of defining how to conduct risk management activities for a project.
- **Identify Risks** : The process of identifying individual project risks as well as sources of overall project risk, and documenting their characteristics.
- **Perform Qualitative Risk Analysis :** The process of prioritizing individual project risks for further analysis or action by assessing their probability of occurrence and impact as well as other characteristics.
- **Perform Quantitative Risk Analysis :** The process of numerically analyzing the combined effect of identified individual project risks and other sources of uncertainty on overall project objectives.
- **Plan Risk Responses:** The process of developing options, selecting strategies, and agreeing on actions to address overall project risk exposure, as well as to treat individual project risks.
- **Implement Risk Responses :** The process of implementing agreed-upon risk response plans.
- **Monitor Risks** : The process of monitoring the implementation of agreed-upon risk response plans, tracking identified risks, identifying and analyzing new risks, and evaluating risk process effectiveness throughout the project.

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Project Stakeholders Management

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Importance of Stakeholder Management

- Because stakeholder management is so important to project success, the Project Management Institute decided to create an entire knowledge area devoted to it in 2013
- The purpose of project stakeholder management is to identify all people or organizations affected by a project, to analyze stakeholder expectations, and to effectively engage stakeholders

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Project Stakeholders Management

- Project Stakeholder Management includes the processes required to identify the people, groups, or organizations that could impact or be impacted by the project, to analyze stakeholder expectations and their impact on the project, and to develop appropriate management strategies for effectively engaging stakeholders in project decisions and execution.

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Project Stakeholders Management Processes

The Project Stakeholder Management processes are:

- **Identify Stakeholders**—The process of identifying project stakeholders regularly and analyzing and documenting relevant information regarding their interests, involvement, interdependencies, influence, and potential impact on project success.
- **Plan Stakeholder Engagement**—The process of developing approaches to involve project stakeholders based on their needs, expectation, interests, and potential impact on the project.
- **Manage Stakeholder Engagement**—The process of communicating and working with stakeholders to meet their needs and expectations, address issues, and foster appropriate stakeholder engagement involvement.
- **Monitor Stakeholder Engagement**—The process of monitoring project stakeholder relationships and tailoring strategies for engaging stakeholders through the modification of engagement strategies and plans.

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Project stakeholder Management

- Every project has stakeholders who are impacted by or can impact the project in a positive or negative way.
- Some stakeholders may have a limited ability to influence the project's work or outcomes; others may have significant influence on the project and its expected outcomes.
- Academic research and analyses of high-profile project disasters highlight the importance of a structured approach to the identification, prioritization, and engagement of all stakeholders.
- The ability of the project manager and team to correctly identify and engage all stakeholders in an appropriate way can mean the difference between project success and failure.
- To increase the chances of success, the process of stakeholder identification and engagement should commence as soon as possible after the project charter has been approved, the project manager has been assigned and the team begins to form.

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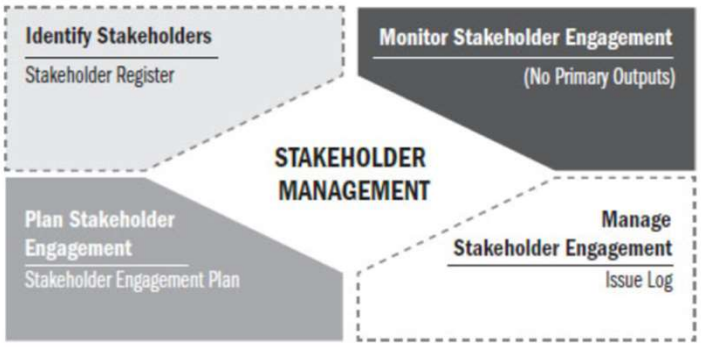
Project stakeholder Management

- Stakeholder satisfaction should be identified and managed as a project objective.
- The key to effective stakeholder engagement is a focus on continuous communication with all stakeholders, including team members, to understand their needs and expectations, address issues as they occur, manage conflicting interests, and foster appropriate stakeholder engagement in project decisions and activities.



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Identifying Stakeholders

A stakeholder register includes basic information on stakeholders

- Identification information: stakeholders' names, positions, locations, roles in the project, and contact information
- Assessment information: stakeholders' major requirements and expectations, potential influences, and phases of the project in which stakeholders have the most interest
- Stakeholder classification: is the stakeholder internal or external to the organization? Is the stakeholder a supporter of the project or resistant to it?

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Name	Position	Internal/ External	Project Role	Contact Information
Stephen	VP of Operations	Internal	Project sponsor	stephen@globaloil.com
Betsy	CFO	Internal	Senior manager, approves funds	betsy@globaloil.com
Chien	CIO	Internal	Senior manager, PM's boss	chien@globaloil.com
Ryan	IT analyst	Internal	Team member	ryan@globaloil.com
Lori	Director, Accounting	Internal	Senior manager	lori@globaloil.com
Sanjay	Director, Refineries	Internal	Senior manager of largest refinery	sanjay@globaloil.com
Debra	Consultant	External	Project manager	debra@gmail.com
Suppliers	Suppliers	External	Supply software	suppliers@gmail.com

Sample stakeholder register

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Identifying Stakeholders

After identifying key project stakeholders, you can use different classification models to determine an approach for managing stakeholder relationships

- A power/interest grid can be used to group stakeholders based on their level of authority (power) and their level of concern (interest) for project outcomes

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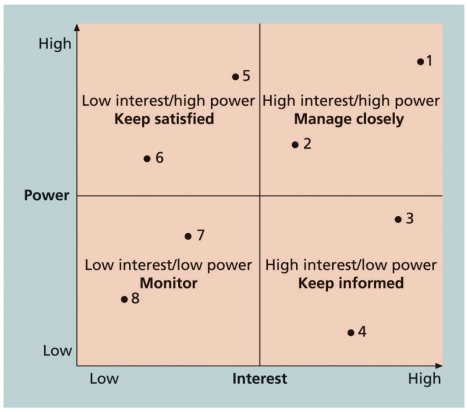
Identifying Stakeholders



Source: Kathy Schwalbe, *An Introduction to Project Management*, Fourth Edition (2012)

FIGURE 13-2 Power/interest grid

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Identifying Stakeholders

Stakeholder engagement levels

- Unaware: unaware of the project and its potential impacts on them
- Resistant: aware of the project yet resistant to change
- Neutral: aware of the project yet neither supportive nor resistant
- Supportive: aware of the project and supportive of change
- Leading: aware of the project and its potential impacts and actively engaged in helping it succeed

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What Went Right?

Instead of just saying "no" when your project sponsor asks for something unreasonable, it is better to explain what is wrong with the request and then present a realistic way to solve the problem at hand

- Christa Ferguson, a PMP® and independent program manager in San Francisco, described how she handled a request from a project sponsor to deliver a new tablet device in two months when she knew she would need more time
  - Based on her experience, she knew the RFQ for the effort alone would take almost a month
  - Christa quickly researched the facts to propose a realistic delivery schedule
  - The project sponsor reset expectations once he learned what it took to produce the tablets

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Planning Stakeholder Management

After identifying and analyzing stakeholders, project teams should develop a plan for management them

- May be formal or informal, based on the needs of the project

The stakeholder management plan can include:

- Current and desired engagement levels
- Interrelationships between stakeholders
- Communication requirements
- Potential management strategies for each stakeholders
- Methods for updating the stakeholder management plan

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Planning Stakeholder Management (2 of 2)

Because a stakeholder management plan often includes sensitive information, it should not be part of the official project documents, which are normally available for all stakeholders to review

- In many cases, only project managers and a few other team members should prepare the stakeholder management plan
- Parts of the stakeholder management plan are not written down, and if they are, distribution is strictly limited

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Managing Stakeholder Engagement

Issue #	Description	Impact	Date Reported	Reported By	Assigned to	Priority (H/M/L)	Due Date	Status	Comments
1	Need requirements categorized As mandatory And optional	Cannot do much without it	Feb. 4	Ryan	Stephen	H	Feb. 8	Closed	Requirements clearlylabeled
2	Need shorter list of potential suppliers —no more than 10	Will delay evaluation without it	Feb. 6	Debra	Ryan	H	Feb. 12	Open	Almost finished; needed requirements categorized first
Etc.									

Sample issue log

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Project Procurement Management

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Project Procurement Management

- Project Procurement Management includes the *processes necessary to purchase or acquire products, services, or results needed from outside the project team.*
- Project Procurement Management includes the *management and control processes required to develop and administer agreements such as contracts, purchase orders, memoranda of agreements (MOAs), or internal service level agreements (SLAs).*
- The personnel authorized to procure the goods and/or services required for the project may be members of the project team, management, or part of the organization's purchasing department if applicable.

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Project Procurement Management Processes

- Project Procurement Management processes include:
- **Plan Procurement Management** - The process of documenting project procurement decisions, specifying the approach, and identifying potential sellers.
- **Conduct Procurements** - The process of obtaining seller responses, selecting a seller, and awarding a contract.
- **Control Procurements** - The process of managing procurement relationships, monitoring contract performance, making changes and corrections as appropriate, and closing out contracts.

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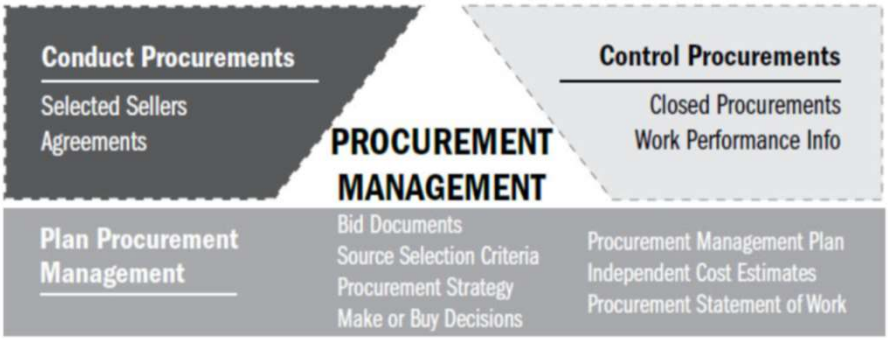

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Enterprise Environmental Factors

The enterprise environmental factors that can influence the Plan Procurement Management process include but are not limited to:

- Marketplace conditions;
- Products, services, and results that are available in the marketplace;
- Sellers, including their past performance or reputation;
- Typical terms and conditions for products, services, and results or for the specific industry;
- Unique local requirements, such as regulatory requirements for local labor or sellers;
- Legal advice regarding procurements;
- Contract management systems, including procedures for contract change control;
- Established multi-tier supplier system of prequalified sellers based on prior experience; and
- Financial accounting and contract payments system.

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Organizational Process Assets

The various types of contractual agreements used by the organization also influence decisions for the Plan Procurement Management process :

Preapproved seller lists : Lists of sellers that have been properly vetted can streamline the steps needed to advertise the opportunity and shorten the timeline for the seller selection process.

Formal procurement policies, procedures, and guidelines : Most organizations have formal procurement policies and buying organizations. When such procurement support is not available, the project team should supply both the resources and the expertise to perform such procurement activities.

Contract types : All legal contractual relationships generally fall into one of two broad families:

either fixed-price or cost-reimbursable.

Importance of Project Procurement Management

- Project procurement management
  - Acquiring goods and services for a project from outside the performing organization
- Main processes
  - **Planning procurement management**: determining what to procure and when and how to do it
  - **Conducting procurements**: obtaining seller responses, selecting sellers, and awarding contracts
  - **Controlling procurements**: managing relationships with sellers, monitoring contract performance, making changes as needed, and closing out contracts

Project Procurement Management

Identifying which project needs can best be met by using products or services outside the organization

- Involves deciding *whether to procure, how to procure, what to procure, how much to procure, and when to procure*
- An important *output of this process is the make-or-buy decision*
- If there is no need to buy any products or services from outside the organization, then there is no need to perform any of the other procurement management processes

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Types of Contracts

Different types of contracts can be used in different situations

- **Fixed price or lump sum contracts**: involve a fixed total price for a well-defined product or service
- **Cost-reimbursable contracts**: involve payment to the seller for direct and indirect costs
- Cost plus incentive fee, cost plus fixed fee, and cost plus percentage of costs
- Time and material contracts: hybrid of both fixed price and cost reimbursable contracts
- Unit price contracts: require the buyer to pay the seller a predetermined amount per unit of service

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Fixed price contracts/ variants

Fixed-price contracts. This category of contracts involves setting a fixed total price for a defined product, service, or result to be provided. These contracts should be used when the requirements are well defined and no significant changes to the scope are expected. Types of fixed-price contract include:

Firm fixed price (FFP). The most commonly used contract type is the FFP. It is favored by most buying organizations because the price for goods is set at the outset and not subject to change unless the scope of work changes.

Fixed price incentive fee (FPIF). This fixed-price arrangement gives the buyer and seller some flexibility in that it allows for deviation from performance, with financial incentives tied to achieving agreed-upon metrics. Typically, such financial incentives are related to cost, schedule, or technical performance of the seller. Under FPIF contracts, a price ceiling is set, and all costs above the price ceiling are the responsibility of the seller.

Fixed price with economic price adjustments (FPEPA). This type is used whenever the seller's performance period spans a considerable period of years, or if the payments are made in a different currency. It is a fixed-price contract, but with a special provision allowing for predefined final adjustments to the contract price due to changed conditions, such as inflation changes or cost increases (or decreases) for specific commodities.

Cost Price / Variants

Cost-reimbursable contracts. This category of contract involves payments (cost reimbursements) to the seller for all legitimate actual costs incurred for completed work, plus a fee representing seller profit. This type should be used if the scope of work is expected to change significantly during the execution of the contract.

Cost plus fixed fee (CPFF). The seller is reimbursed for all allowable costs for performing the contract work and receives a fixed-fee payment calculated as a percentage of the initial estimated project costs. Fee amounts do not change unless the project scope changes.

Cost plus incentive fee (CPIF). The seller is reimbursed for all allowable costs for performing the contract work and receives a predetermined incentive fee based on achieving certain performance objectives as set forth in the contract. In CPIF contracts, if the final costs are less or greater than the original estimated costs, then both the buyer and seller share costs from the departures based upon a prenegotiated cost-sharing formula, for example, an 80/20 split over/under target costs based on the actual performance of the seller.

Cost plus award fee (CPAF). The seller is reimbursed for all legitimate costs, but the majority of the fee is earned based on the satisfaction of certain broad subjective performance criteria that are defined and incorporated into the contract. The determination of fee is based solely on the subjective determination of seller performance by the buyer and is generally not subject to appeals.

Types of Contracts

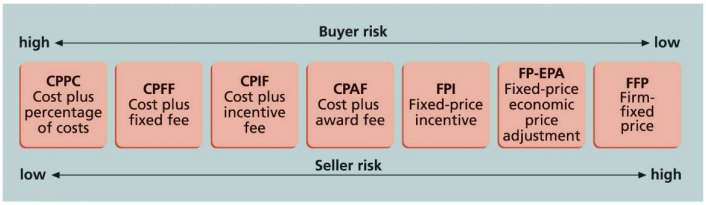

FIGURE 12-2 Contract types versus risk

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Contract / Risk ownership

Type of Contract	Risk owner	Explanation
Time and Material	Buyer	The buyer pays the seller for all time and materials the seller applies to the project. The buyer bears the most risk of cost overruns.
Fixed Price	Seller	Since the price is fixed, cost overruns may not be passed on to the buyer and must be borne by the seller.
Cost Plus Fixed Fee	Buyer	Since all costs must be reimbursed to the seller, the buyer bears the risk of cost overruns.
Cost Plus Incentive Fee	Buyer and Seller	The buyer bears most of the risk here, but the incentive fee for the seller motivates that seller to keep costs down.

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Media Info

Contract incentives can be extremely effective

- On August 1, 2007, tragedy struck Minneapolis, Minnesota, when a bridge on I-35W collapsed, killing 13 motorists, injuring 150 people, and leaving a mass of concrete and steel in the river and on its banks.
- Peter Sanderson, project manager for the joint venture of Flatiron-Manson led his team in completing the project
- The contractors earned $25 million in incentive fees on top of their $234 million contract for completing the bridge three months ahead of schedule
- MnDOT justified the incentive payment by saying that each day the bridge was closed it cost road users more than $400,000

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Approaches to Contracts

Least Cost - This may work well when the quality is not in question. (an ISO standard)

Qualifications Only - When a product or service is small enough that it does not warrant an elaborate procurement process, the buyer may use "qualifications only" as the sole criterion.

Quality-Based (technical score) - Most procurements come down to value (quality and cost). The seller with the highest quality ranking is selected if a suitable financial arrangement can be negotiated.

Quality and Cost-Based - This is very similar to the previous one except that quality and cost are both ranked and are both considered in the decision.

Sole Source - This is an unusual type of proposal that is requested from only one vendor. In that case, the buyer negotiates with that one seller. There is no competition in this scenario, which can eliminate much of the benefit of conducting a procurement.

Fixed Budget - In this procurement scenario, the buyer discloses the budget to the seller, and the two parties negotiate on scope, quality, and schedule. This type of procurement would not work well when scope changes are anticipated.

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Types of Contracts

Contracts should include specific clauses to take into account issues unique to the project

- Time and material contracts and unit-price contracts can be high or low risk, depending on the nature of the project and other contract clauses
- A termination clause allows the buyer or supplier to end the contract

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Planning Procurement

Typical steps in Planning of procurement :

- Prepare the procurement statement of work (SOW) or terms of reference (TOR).
- Prepare a high-level cost estimate to determine the budget.
- Advertise the opportunity.
- Identify a short list of qualified sellers.
- Prepare and issue bid documents.
- Prepare and submit proposals by the seller.
- Conduct a technical evaluation of the proposals including quality.
- Perform a cost evaluation of the proposals.
- Prepare the final combined quality and cost evaluation to select the winning proposal.
- Finalize negotiations and sign contract between the buyer and the seller. 114

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Thank You

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