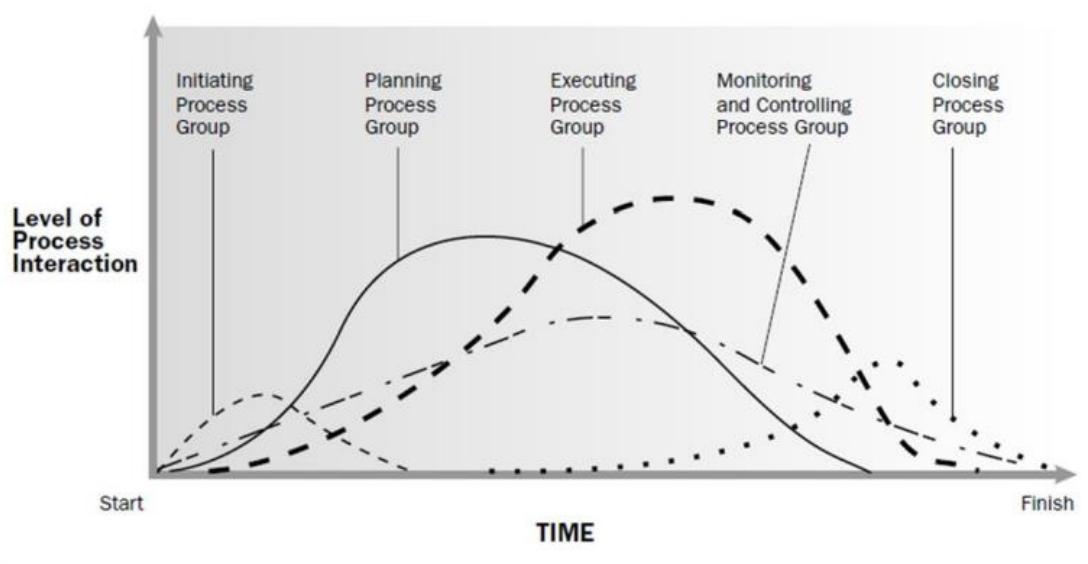


Knowledge Areas	Project Management Process Group				
	Initiating	Planning	Executing	Monitoring & Controlling	Closing
Project Integration Management	1. Develop Project Charter	2. Develop Project Management Plan	3. Direct & manage project work 4. Manage Project Knowledge	5. Monitor & control project work	6. Close Project or Phase
Project Scope Management		1. Plan Scope Management 2. Collect requirements 3. Define Scope 4. Create WBS		5. Validate Scope; 6. Control Scope	
Project Schedule Management		1. Plan Schedule Management 2. Define Activities 3. Sequence Activities 4. Estimate Activity Durations 5. Develop Schedule		6. Control Schedule	
Project Cost Management		1. Plan Cost Management 2. Estimate Costs 3. Determine Budget		4. Control Costs	
Project Quality Management		1. Plan Quality Management	2. Manage Quality	3. Control Quality	
Project Resource Management		1. Plan Resource Management 2. Estimate Activity Resources	3. Acquire Resources 4. Develop Team 5. Manage Team	6. Control Resources	
Project Communication Management		1. Plan Communications Management	2. Manage Communications	3. Monitor Communications	
Project Risk Management		1. Plan Risk Management 2. Identify Risks 3. Perform Qualitative Risk Analysis 4. Perform Quantitative Risk Analysis 5. Plan Risk Responses	6. Implement Risk Responses	7. Monitor Risks	
Project Procurement Management		1. Plan Procurement Management	2. Conduct Procurements	3. Control Procurements	
Project Stakeholder Management	1. Identify Stakeholders	2. Plan Stakeholder Management	3. Manage Stakeholder Engagement	4. Monitor Stakeholder Engagement	





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Information Technology

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IT Project Management

Semester 1, 2019

Lecture 1
Introduction to Project Management

Video 1:

Learning Objectives

- Introduction and the motivation to study IT project management
- Explain what a project is, provide examples of IT projects, list various attributes of projects.
- Difference between projects and operations

Introduction

- Many organizations today have a new or renewed interest in project management.
- The Project Management Institute estimates demand for 15.7 million project management jobs from 2010 to 2020
- The top skills employers look for in new college graduates are all related to project management: team-work, decision-making, problem-solving, and verbal communications
- According to Hays recruiting expert, digital project manager is one of the top 10 hottest tech job in 2019

What Is a Project?

- A **project** is “a temporary endeavor undertaken to create a unique product, service, or result” (PMBOK® Guide, Sixth Edition, 2013)
- Operations is work done to sustain the business
- Projects end when their objectives have been reached or the project has been terminated
- Projects can be large or small and take a short or long time to complete

Project Attributes

- A project
 - has a **unique purpose**
 - is **temporary**, with a definite **start** and **end date**
 - is **developed using progressive elaboration**
 - requires **resources**, often from various areas
 - should have a primary customer or **sponsor**
 - The **project sponsor** usually provides the direction and funding for the project
 - involves **uncertainty**

What Is IT Project?

- An **IT project** involve **using hardware, software, and/or networks** to create a product, service, or result
- Information technology projects typically **have** a:
 - Planned **beginning** and a planned **deadline**
 - Defined **outcome** and key ‘**deliverables**’
 - **Evaluated** as to **time, cost, scope, performance, quality** assurance and are fit for purpose it is intended
 - **Budget**
 - **Team** of skilled specialist people

Examples of IT Projects

- A team of students creates a smartphone application
- A small software development team adds a new feature to an internal software application for the finance department
- A company develops a driverless car
- A government group develops a system to track child immunizations
- Mobile-centric applications and interfaces

Project versus Operations

Project



- A temporary group activity with a start and end date
- Produces a unique product, service or result
- Projects have a fixed budget

Operations



- Ongoing execution of activities
- Produce the same output repeatedly, or provide a repetitive service.
- Operations have to earn profit – it is work done to sustain a business

Video 2: Learning Objectives

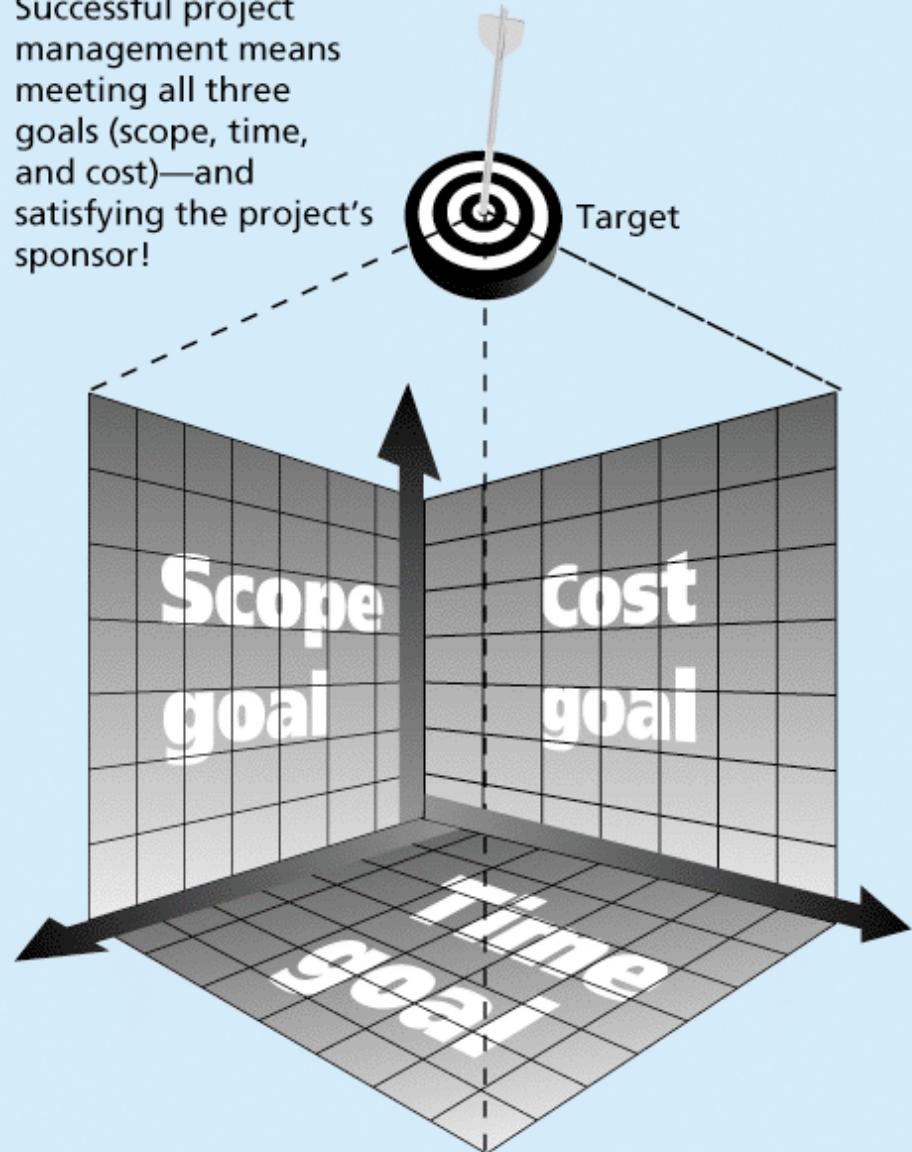
- What is project management?
- What is the triple constraint?
- Discuss key elements of the project management framework, including project stakeholders, the project management knowledge areas, common tools and techniques.

What is Project Management?

- **Project management** is “the application of knowledge, skills, tools and techniques to project activities to meet project requirements” (PMBOK® Guide, Fourth Edition, 2013)
- Project managers strive to meet the **triple constraint** (project scope, time, and cost goals) and also facilitate the entire process to meet the needs and expectations of project stakeholders

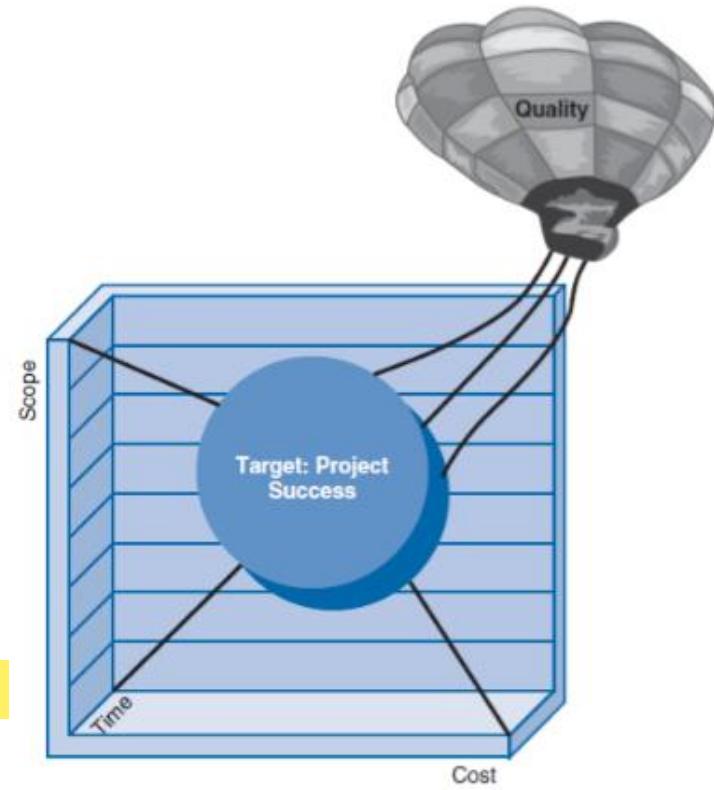
The Triple Constraint of Project Management

Successful project management means meeting all three goals (scope, time, and cost)—and satisfying the project's sponsor!



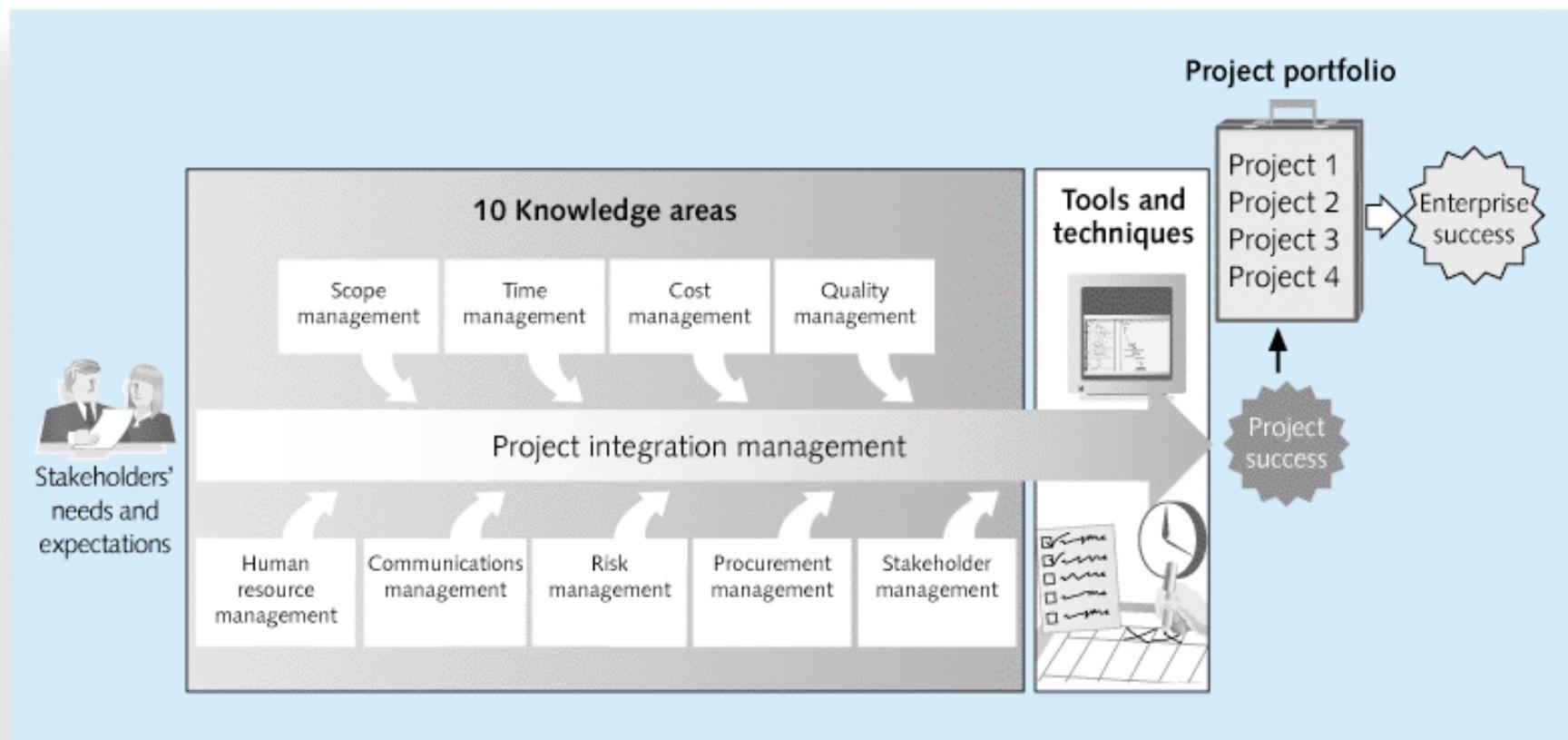
Triple Constraint Juggling Act

- Reducing time allowed will increase cost and may reduce the scope (functions and features) of the system
- Reducing costs (cutting the budget) will increase time (delay schedule) and may reduce the scope of the system
- Increasing scope (adding features) will certainly increase time and/or cost
- Reducing scope may reduce time and cost (and it may also *negatively* affect quality)



<http://scottambler.com/no-common-definition-ofsuccess.html>

Figure 1-2 Project Management Framework



Project Stakeholders

- A **stakeholder** is a person or an organization who has a “**stake**” or an **interest** in the performance or outcome of the project.
Stakeholders include:
 - the project sponsor
 - the project manager
 - the project team
 - support staff
 - customers
 - users
 - suppliers
 - opponents to the project

Who is the Project Sponsor?

- A project sponsor has a **senior management role** in the organisation in which the project is running
- A project sponsor **might also champion or advocate** for the project.
- Having a **committed project sponsor** is **critical** to the success of the project
- Skills: Establish a good relationship and communication with Project Manager for:
 - Objective setting and Up-front planning
 - Key staffing
 - Policies and Priority setting
 - Monitoring and execution
 - Conflict resolution

Project Team

- The success of a project depends on:
 - Working together - **teamwork**
 - How well teams **communicate** with each other and with the project manager and visa versa
 - **Commitment**
 - How **efficient** project teams are in **executing** project goals and objectives
 - Correctly **mapping tasks** to individual team members' competencies – team skills

10 Project Management Knowledge Areas

- **Knowledge areas** describe the **key** competencies that **project** managers must develop
- Project managers must have knowledge and skills in all 10 knowledge areas:
 - Project scope management
 - Project time management,
 - Project cost management,
 - Project quality management
 - Project resource management
 - Project communications management
 - Project risk management
 - Project procurement management
 - Project stakeholder management
 - Project integration management

Project Management Tools and Techniques

- **Project management tools and techniques** assist project managers and their teams in various aspects of project management
- Some specific ones include
 - Project charter, scope statement, and WBS (scope)
 - Gantt charts, network diagrams, critical path analysis, critical chain scheduling (time)
 - Cost estimates and earned value management (cost)
 - ... and many more that we will explore throughout the course of our unit

Super Tools

- “**Super tools**” are those tools that have high use and high potential for improving project success, such as:
 - Software for task scheduling
 - Scope statements
 - Requirements analyses
 - Lessons-learned reports
- Tools already extensively used that have been found to improve project importance include:
 - Progress reports
 - Kick-off meetings
 - Gantt charts
 - Change requests

Project Management Software

- There are hundreds of different products to assist in performing project management
- Three main categories of tools:
 - **Low-end tools:** Handle single or smaller projects well, cost under \$200 per user
 - **Midrange tools:** Handle multiple projects and users, cost \$200-\$1,000 per user
 - **High-end tools:** Also called enterprise project management software, often licensed on a per-user basis
- Several free or open-source tools are also available

Video 3: Learning Objectives

- Discuss the relationship between project, program, and portfolio management and the contributions each makes to enterprise success
- How do we define project success?
- How can we ensure project success?

Program and Project Managers

- A **program** is “a group of related projects managed in a coordinated way to obtain benefits and control not available from managing them individually” (PMBOK® Guide, Sixth Edition, 2013)
- A **program manager** provides leadership and direction for the project managers heading the projects within the program
- Program managers oversee programs; often act as bosses for project managers
- **Project managers** work with project sponsors, project team, and other people involved in a project to meet project goals

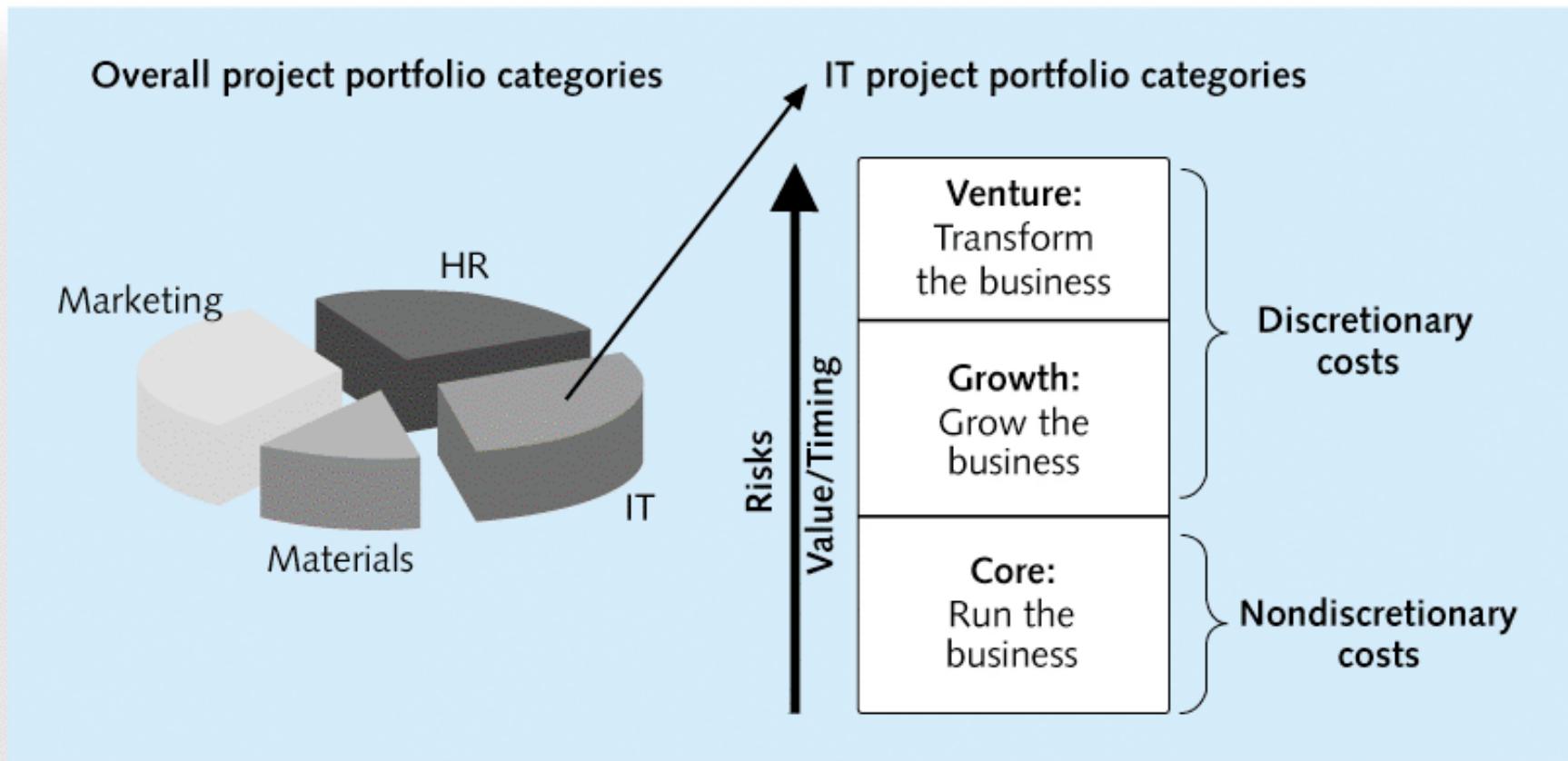
Project Portfolio Management

- As part of **project portfolio management**, organizations group and manage projects and programs as a portfolio of investments that contribute to the entire enterprise's success
- Portfolio managers help their organizations make wise investment decisions by helping to select and analyze projects from a strategic perspective

Project Management Compared to Project Portfolio Management



Sample Project Portfolio Approach



Project Success

- There are several ways to define project success:
 - The project met scope, time, and cost goals
 - The project satisfied the customer/sponsor
 - The results of the project met its main objective, such as making or saving a certain amount of money, providing a good return on investment, or simply making the sponsors happy

What Helps Projects Succeed?*

1. Executive support
2. User involvement
3. Clear business objectives
4. Emotional maturity
5. Optimizing scope
6. Agile process
7. Project management expertise
8. Skilled resources
9. Execution
10. Tools and infrastructure

Advantages of Using Formal Project Management

- Better control of financial, physical, and human resources
- Improved customer relations
- Shorter development times
- Lower costs
- Improved productivity
- Higher quality and increased reliability
- Higher profit margins
- Better internal coordination
- Higher worker morale

What the Winners Do...

- Recent research findings show that companies that excel in project delivery capability:
 - Use an integrated project management toolbox (use standard/advanced PM tools, lots of templates)
 - Grow project leaders, emphasizing business and soft skills
 - Develop a streamlined project delivery process
 - Measure project health using metrics, like customer satisfaction or return on investment

Best Practice

- A **best practice** is “an optimal way recognized by industry to achieve a stated goal or objective”*
- Robert Butrick suggests *that organizations* need to follow basic principles of project management:
 - Make sure your projects are driven by your strategy. Be able to demonstrate how each project you undertake fits your business strategy, and screen out unwanted projects as soon as possible
 - Engage your stakeholders. Ignoring stakeholders often leads to project failure. Be sure to engage stakeholders at all stages of a project, and encourage teamwork and commitment at all times

*Project Management Institute, *Organizational Project Management Maturity Model (OPM3) Knowledge Foundation* (2003), p. 13.

Video 4:

Learning Objectives

- Understand the role of project managers by describing what they do, what skills they need, and career opportunities for IT project managers
- Describe the project management profession, including its history, the role of professional organizations like the Project Management Institute (PMI), the importance of certification and ethics, and the advancement of project management software

The Role of the Project Manager

Holding project kickoff meeting	Encouraging the team to focus on deadlines
Laying out the project targets, plan and workflow	Evaluating the performance
Negotiating for resources	Briefing the project sponsor
Establishing the project's policies and procedures	Managing the costs - procurement
Obtaining funds	Briefing the team
Executing the plan	Briefing the customer
Closing out the project	

Suggested Skills for Project Managers

- The Project Management Body of Knowledge
- Application area knowledge, standards, and regulations
- Project environment knowledge
- General management knowledge and skills
- Soft skills or human relations skills
- Technical skills

Ten Most Important Skills and Competencies for Project Managers

1. People skills
2. Leadership
3. Listening
4. Integrity, ethical behavior, consistent
5. Strong at building trust
6. Verbal communication
7. Strong at building teams
8. Conflict resolution, conflict management
9. Critical thinking, problem solving
10. Understands, balances priorities

Different Skills Needed in Different Situations

- Large projects: Leadership, relevant prior experience, planning, people skills, verbal communication, and team-building skills were most important
- High uncertainty projects: Risk management, expectation management, leadership, people skills, and planning skills were most important
- Very novel projects: Leadership, people skills, having vision and goals, self confidence, expectations management, and listening skills were most important

Importance of Leadership Skills

- Effective project managers provide leadership by example
- A **leader** focuses on long-term goals and big-picture objectives while inspiring people to reach those goals
- A **manager** deals with the day-to-day details of meeting specific goals
- Project managers often take on the role of both leader and manager

History of Project Management

Early Project Management

- **Until 1900:** most civil engineering projects were managed by engineers, creative architects, and master builders.
- **In the 1950s:** organizations started to **systematically** apply project management **tools** and **techniques** to complex engineering projects.
- Two forefathers of project management are:
 - Henry Gantt
Called the father of planning and control techniques
 - Henry Fayol
Famous for his creation of the management functions that form the foundation of the body of knowledge

Project Management Offices (PMO)

- In the 1990s, many companies began creating PMOs to help them handle the increasing number and complexity of projects
- A **Project Management Office (PMO)** is an organizational group responsible for coordinating the project management function throughout an organization
- 3 key factors that are playing major roles in the growth of PMOs:
 - 1. The growing strategic value of the PMO
 - 2. The increased role of the PMO in training
 - 3. The ever-present challenge of resource management

The Project Management Institute

- The Project Management Institute (PMI) is an international professional society for project managers founded in 1969
- PMI provides certification as a Project Management Professional (PMP)
- PMI has continued to attract and retain members, reporting more than 658,523 active PMPs worldwide by April 2015 and continues to grow
- There are communities of practices in many areas, like information systems, financial services, and health care
- Students can join PMI at a reduced fee and earn the Certified Associate in Project Management (CAPM) certification(visit www.pmi.org)

Ethics in Project Management

- **Ethics**, loosely defined, is a set of principles that guide our decision making based on personal values of what is “right” and “wrong”
- Project managers often face ethical dilemmas
- In order to earn PMP certification, applicants must agree to PMI’s Code of Ethics and Professional Conduct
- Several questions on the PMP exam are related to professional responsibility, including ethics



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IT Project Management

Lecture 2
Organisational structures,
Project and product lifecycles

Video 1:

Learning Objectives

- Describe the systems view of project management and how it applies to information technology (IT) projects
- Understand organisations, including the four frames, organisational structures, and organisational culture

Projects Cannot Be Run in Isolation

- Projects must operate in a broad organisational environment
- Project managers need to use **systems thinking**:
 - taking a holistic view of carrying out projects within the context of the organisation
- Senior managers must make sure projects continue to support current business needs

A Systems View of Project Management

- A **systems approach** emerged in the 1950s to describe a more analytical approach to management and problem solving
- Three parts include:
 - **Systems philosophy:** an overall model for thinking about things as systems
 - **Systems analysis:** problem-solving approach
 - **Systems management:** address business, technological, and organisational issues before making changes to systems

Perspectives on organisations

Structural frame

- Roles and responsibilities, coordination and control.
- Organisational charts help describe this frame.

Human resources frame:

- Providing harmony between needs of the organisation and needs of people.

Organisation Frames

Political frame

- Coalitions composed of varied individuals and interest groups.
- Conflict and power are key issues.

Symbolic frame

- Symbols and meanings related to events.
- Culture, language, traditions, and image are all parts of this frame.

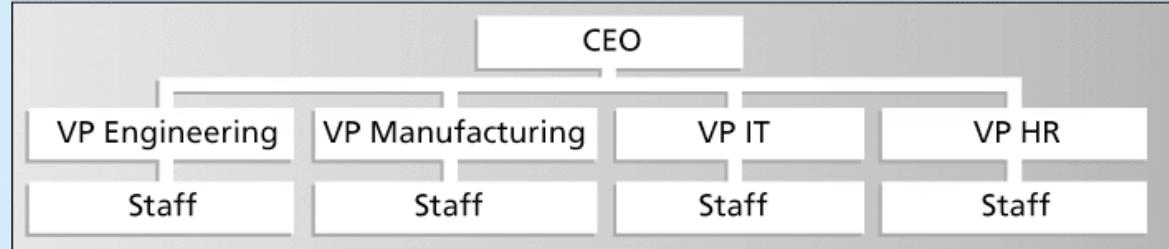


Organisational Structures

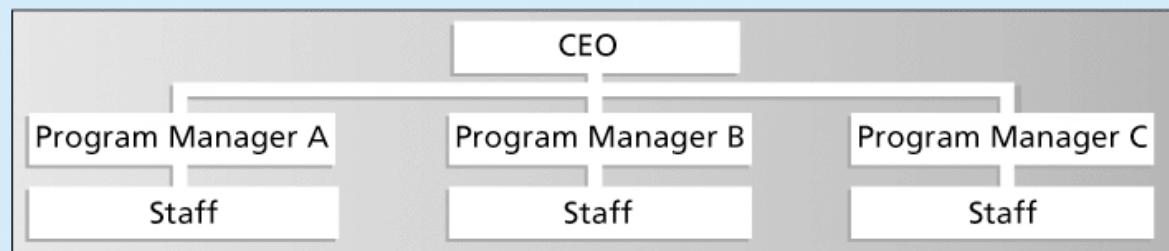
- 3 basic organisation structures
 - **Functional:** functional managers report to the CEO
 - **Project:** program managers report to the CEO
 - **Matrix:** middle ground between functional and project structures; personnel often report to two or more bosses; structure can be weak, balanced, or strong matrix

Functional, Project, and Matrix Organisational Structures

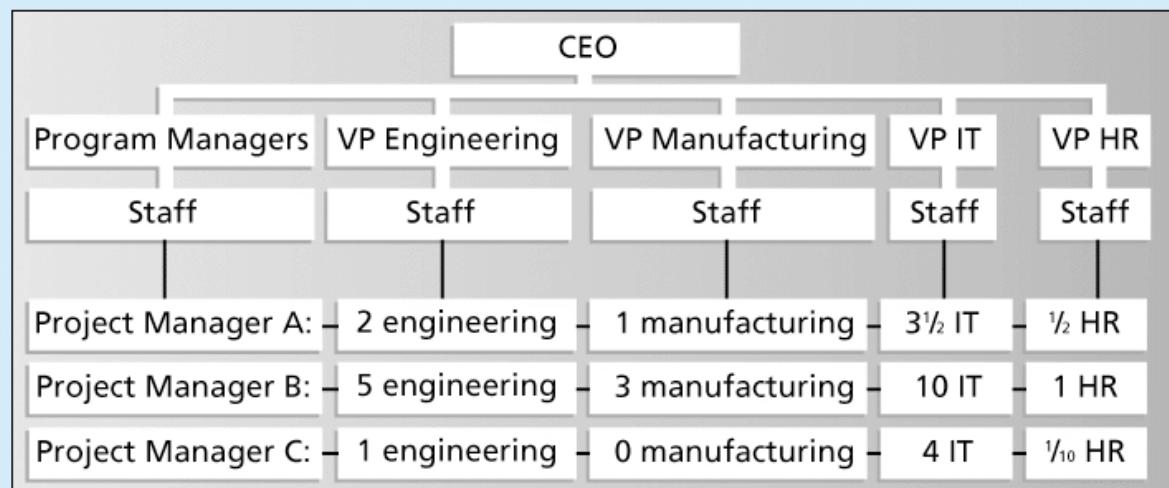
Functional



Project



Matrix



Organisational Structure Influences on Projects

Project Characteristics	Organizational Structure Type				Project
	Functional	Weak Matrix	Balanced Matrix	Strong Matrix	
Project manager's authority	Little or none	Limited	Low to moderate	Moderate to high	High to almost total
Percent of organization's personnel assigned full-time to project work	Virtually none	0–25%	15–60%	50–95%	85–100%
Who controls the project budget	Functional manager	Functional manager	Mixed	Project manager	Project manager
Project manager's role	Part-time	Part-time	Full-time	Full-time	Full-time
Common title for project manager's role	Project coordinator/project leader	Project coordinator/project leader	Project manager/project officer	Project manager/project program manager	Project manager/project program manager
Project management administrative staff	Part-time	Part-time	Part-time	Full-time	Full-time



Organisational Culture

- **Organisational culture** is a set of shared assumptions, values, and behaviours that characterize the functioning of an organisation
- Many experts believe the underlying causes of many companies' problems are not the structure or staff

... but the **culture !!**

Ten Characteristics of Organisational Culture

Project work is most successful in an organisational culture where these items are **strong/high**

- Member identity*
- Group emphasis*
- Risk tolerance*
- Reward criteria*
- Conflict tolerance*
- Unit integration*
- Open systems focus*

Project work is most successful in an organisational culture where these items are **balanced**

- People focus
- Means-ends orientation
- Control



Video 2: Learning Objectives

- Explain why stakeholder management and top management commitment are critical for a project's success
- Understand the concept of a project phase and the project life cycle, and distinguish between project development and product development

Stakeholder Management

- Project managers must take time to identify, understand, and manage relationships with all project stakeholders – both the internal as well as the external stakeholders
- Using the four frames of organisations can help meet stakeholder needs and expectations
- Senior executives/top management are very important stakeholders
- Project Stakeholder Management will be covered in greater depth in Lecture 8

The Importance of Top Management Commitment

- People in top management positions are key stakeholders in projects
- A very important factor in helping project managers successfully lead projects is the level of commitment and support they receive from top management
- Without top management commitment, many projects will fail.
- Some projects have a senior manager called a champion who acts as a key proponent for a project.

How Top Management Can Help Project Managers

- Providing adequate resources
- Approving unique project needs in a timely manner
- Getting cooperation from other parts of the organisation
- Mentoring and coaching on leadership issues

Importance of IT Governance

- **IT governance** addresses the authority and control for key IT activities in organisations, including IT infrastructure, IT use, and project management
- A lack of IT governance can be dangerous, as evidenced by three well-publicized IT project failures in Australia:
 - Sydney Water's Customer Relationship Management System,
 - RMIT Academic Management System, and
 - One.Tel's billing system

Need for Organisational Commitment to Information Technology (IT)

- If the organisation has a negative attitude toward IT, it will be difficult for an IT project to succeed
- Having a Chief Information Officer (CIO) at a high level in the organisation helps IT projects
- Assigning non-IT people to IT projects and increase involvement from end users may also encourage more commitment

Need for Organisational Standards

- Standards and guidelines help project managers be more effective
- Senior management can encourage
 - the use of standard forms and software for project management
 - the development and use of guidelines for writing project plans or providing status information
 - the creation of a project management office or center of excellence

Video 3: Learning Objectives

- Understand the concept of a project phase and the project life cycle, and distinguish between project development and product development

Project Phases and the Project Life Cycle

- A **project life cycle** is a collection of project phases that defines
 - what work will be performed in each phase
 - what deliverables will be produced and when
 - who is involved in each phase, and
 - how management will control and approve work produced in each phase
- A **deliverable** is a product or service produced or provided as part of a project

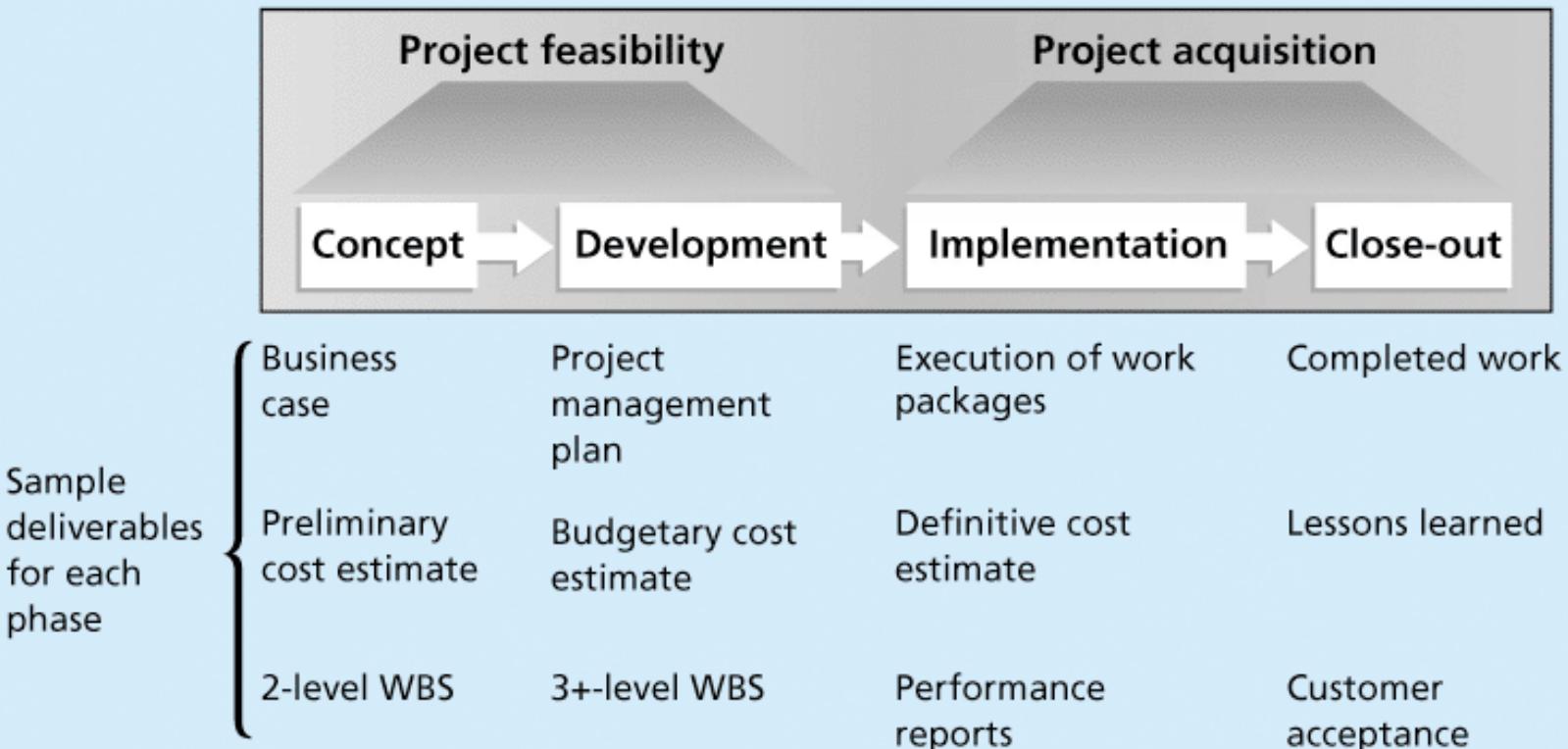
More on Project Phases

- In early phases of a project life cycle
 - resource needs are usually lowest
 - the level of uncertainty (risk) is highest
 - project stakeholders have the greatest opportunity to influence the project
- In middle phases of a project life cycle
 - the certainty of completing a project improves
 - more resources are needed
- The final phase of a project life cycle focuses on
 - ensuring that project requirements were met
 - the sponsor approves completion of the project

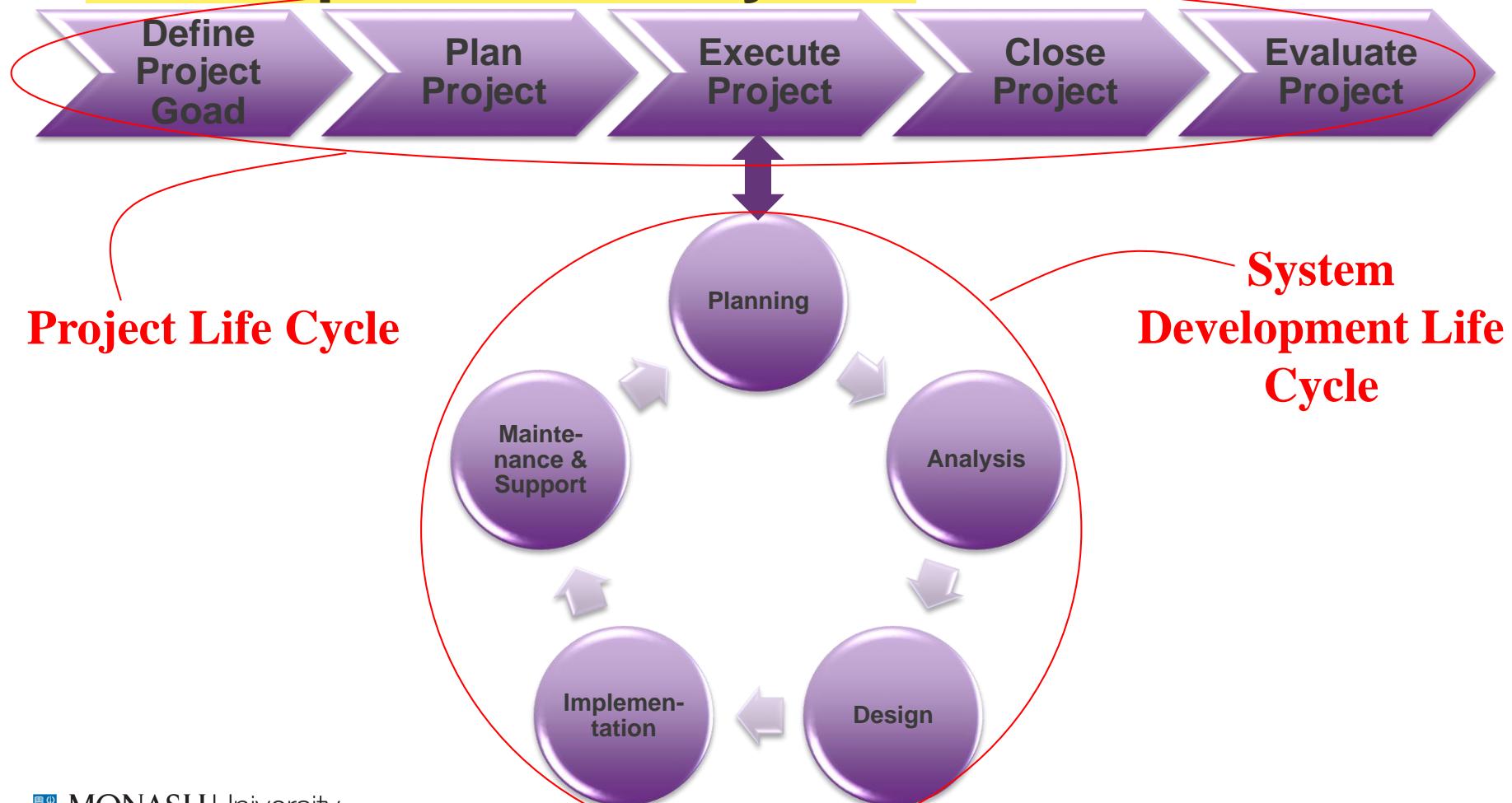
The Importance of Project Phases and Management Reviews

- A project should successfully pass through each of the project phases in order to continue on to the next
- Management reviews, also called phase exits or kill points, should occur after each phase to evaluate the project's progress, likely success, and continued compatibility with organisational goals

Phases of the Traditional Project Life Cycle



Project Life Cycle (PLC) and Systems Development Life Cycles



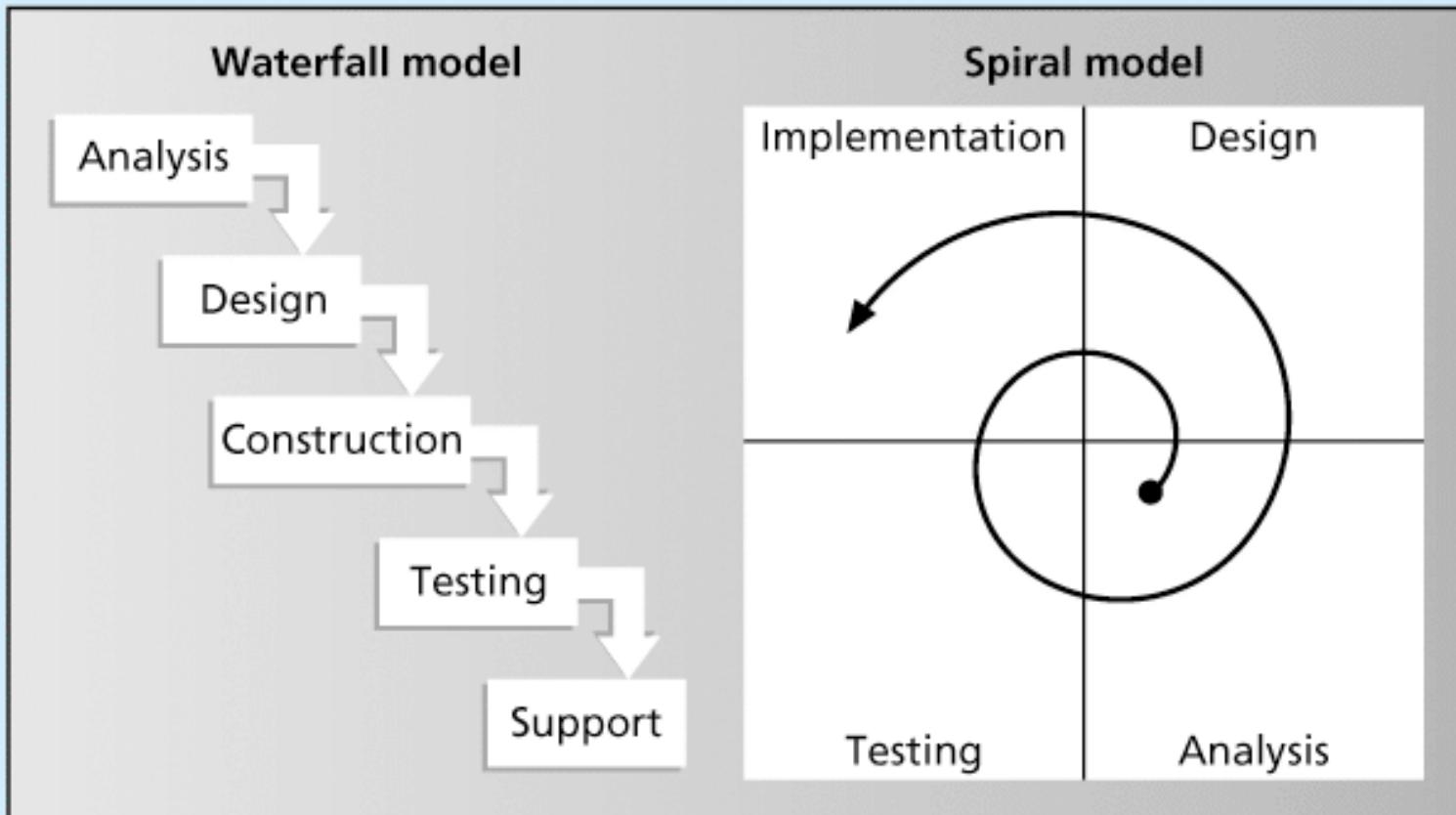
Product Life Cycles

- Products also have life cycles
- The **Systems Development Life Cycle (SDLC)** is a framework for describing the phases involved in developing and maintaining information systems
- Systems development projects can follow
 - **Predictive life cycle:** the scope of the project can be clearly articulated and the schedule and cost can be predicted
 - **Adaptive Software Development (ASD) life cycle:** requirements cannot be clearly expressed, projects are mission driven and component based, using time-based cycles to meet target dates

Predictive Life Cycle Models

- **Waterfall model:** has well-defined, linear stages of systems development and support
- **Spiral model:** shows that software is developed using an iterative or spiral approach rather than a linear approach
- **Incremental build model:** provides for progressive development of operational software
- **Prototyping model:** used for developing prototypes to clarify user requirements
- **Rapid Application Development (RAD) model:** used to produce systems quickly without sacrificing quality

Waterfall and Spiral Life Cycle Models



Agile Software Development

- Examples of ASD:
 - extreme programming, feature driven development, dynamic systems development model, scrum, etc
- Agile software development has become popular to describe new approaches that focus on close collaboration between programming teams and business experts
- We will talk a bit more on agile methodology in the next video and also in Lecture 11.

Video 4: Learning Objectives

- Discuss the unique attributes and diverse nature of IT projects
- Describe recent trends affecting IT project management, including globalization, outsourcing, virtual teams, and agile project management

The Context of IT Projects

- IT projects can be very diverse in terms of size, complexity, products produced, application area, and resource requirements
- IT project team members often have diverse backgrounds and skill sets
- IT projects use diverse technologies that change rapidly. Even within one technology area, people must be highly specialized

Recent Trends Affecting IT Project Management

- Globalization
- Outsourcing:
 - **Outsourcing** is when an organisation acquires goods and/or sources from an outside source.
 - **Offshoring** is sometimes used to describe outsourcing from another country
- Virtual teams: A **virtual team** is a group of individuals who work across time and space using communication technologies
- Agile project management

Important Issues and Suggestions Related to Globalization

- Issues
 - Communications
 - Trust
 - Common work practices
 - Tools
- Suggestions
 - Employ greater project discipline
 - Think global but act local
 - Consider collaboration over standardisation
 - Keep project momentum going
 - Use newer tools and technology

Outsourcing

- Organisations remain competitive by using outsourcing to their advantage, such as finding ways to reduce costs
- Their next challenge is to make strategic IT investments with outsourcing by improving their enterprise architecture to ensure that IT infrastructure and business processes are integrated and standardised
- Project managers should become more familiar with negotiating contracts and other outsourcing issues

Virtual Teams Advantages

- Increasing competitiveness and responsiveness by having a team of workers available 24/7
- Lowering costs because many virtual workers do not require office space or support beyond their home offices.
- Providing more expertise and flexibility by having team members from across the globe working any time of day or night
- Increasing the work/life balance for team members by eliminating fixed office hours and the need to travel to work.

Virtual Team Disadvantages

- Isolating team members
- Increasing the potential for communications problems
- Reducing the ability for team members to network and transfer information informally
- Increasing the dependence on technology to accomplish work
- Some of the factors that help virtual teams succeed:
 - team processes,
 - trust/relationships,
 - leadership style, and
 - team member selection

Agile Project Management

- Agile means being able to move quickly but does project management allow for that?
- Early software development projects often used a waterfall approach. However, this is becoming a challenge.
- Agile uses a method based on iterative and incremental development, in which requirements and solutions evolve through collaboration.
- But, what about the triple constraint?
- See the Resources tab from www.pmttexts.com for more info

Agile Makes Sense for Some Projects..., But Not All

- Many seasoned experts in project management warn people not to fall for the hype associated with Agile.
- For example, J. Leroy Ward, Executive Vice President at ESI International, said that

“Agile will be seen for what it is ... and isn’t....Project management organisations embracing Agile software and product development approaches will continue to grow while being faced with the challenge of demonstrating ROI through Agile adoption.”*

*J. Leroy Ward, “The Top Ten Project Management Trends for 2011,” projecttimes.com (January 24, 2011).

Video 5: Learning Objectives

- Discuss what is the manifesto for Agile Software Development
- Understanding Agile project management

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, www.agilemanifesto.org.

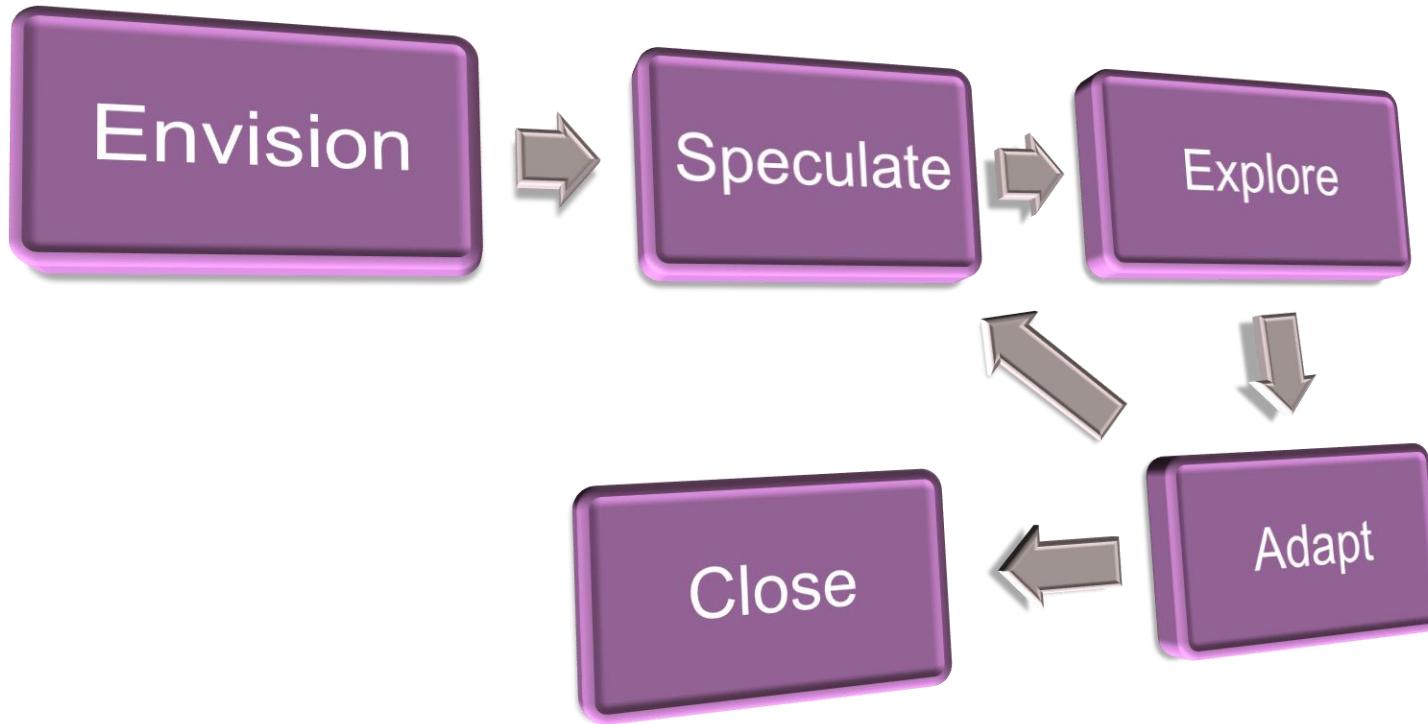
Agile Project Management

- What exactly is Agile Project Management?
- Process by which projects can be managed and implemented in small deliverables.
- Deliver value to the business in frequent small deliveries of product called features
- Recommended when business needs are frequently changing or when the business wants to receive product benefits earlier
- Items are created in small logical chunks of work called iterations or sprints.

Characteristics of Agile Projects

- Sprints are normally 4 – 12 weeks long
- Communication is critical – Face-to-face is encouraged
- Teams should be co-located (or at least virtually)
- 100% Sponsor commitment
- Changes to requirements are anticipated and accommodated
- As with traditional approach:
 - Having a vision for the end goal
 - Clear understanding of the requirements
 - Follow a universally accepted project lifecycle
 - A dedicated team...and communication..communication..

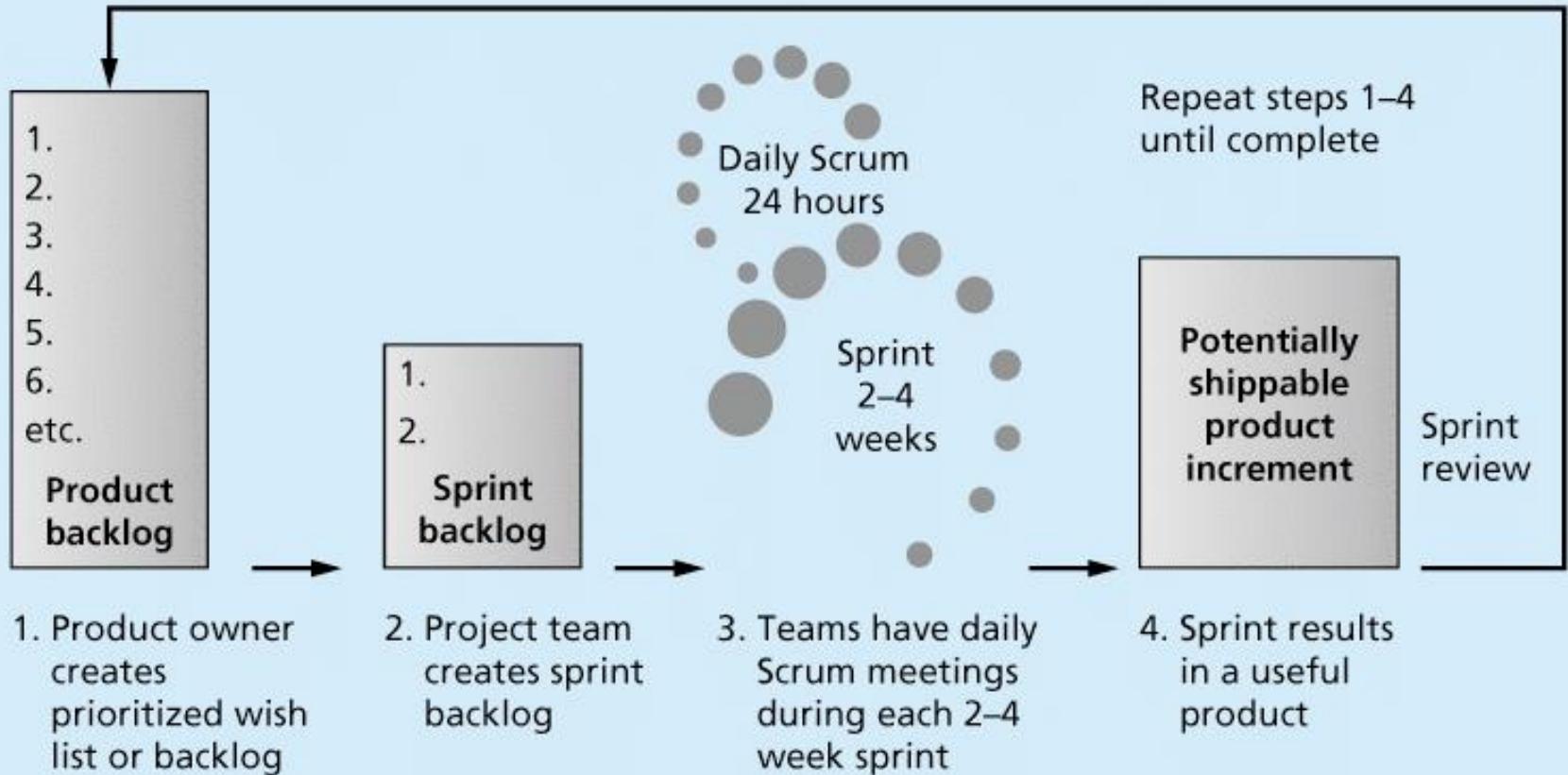
The Agile Lifecycle



Scrum

- What is Scrum?
- The leading agile development method for completing projects with a complex, innovative scope of work.
- The term was coined in 1986 in a Harvard Business Review study
- Scrum was initially applied to software development projects, but today other types of projects use this technique
- Watch the Axosoft video “Scrum in 10 Minutes,” by Hamid Shojaee, an experienced software developer

Scrum Framework



Kanban

- Technique that can be used in conjunction with scrum
- Developed in Japan by Toyota Motor Corporation
- Uses visual cues to guide workflow
- Kanban cards show new work, work in progress, and work completed



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IT Project Management

Lecture 3

Project Integration Management

Video 1:

Learning Objectives

- Describe an overall framework for project integration management as it relates to the other project management knowledge areas and the project life cycle
- Discuss the strategic planning process and apply different project selection methods

The Key to Overall Project Success: Good Project Integration Management

- Project managers must coordinate all of the other knowledge areas throughout a project's life cycle
- Many new project managers have trouble looking at the “big picture” and want to focus on too many details
- Project integration management is *not* the same thing as software integration

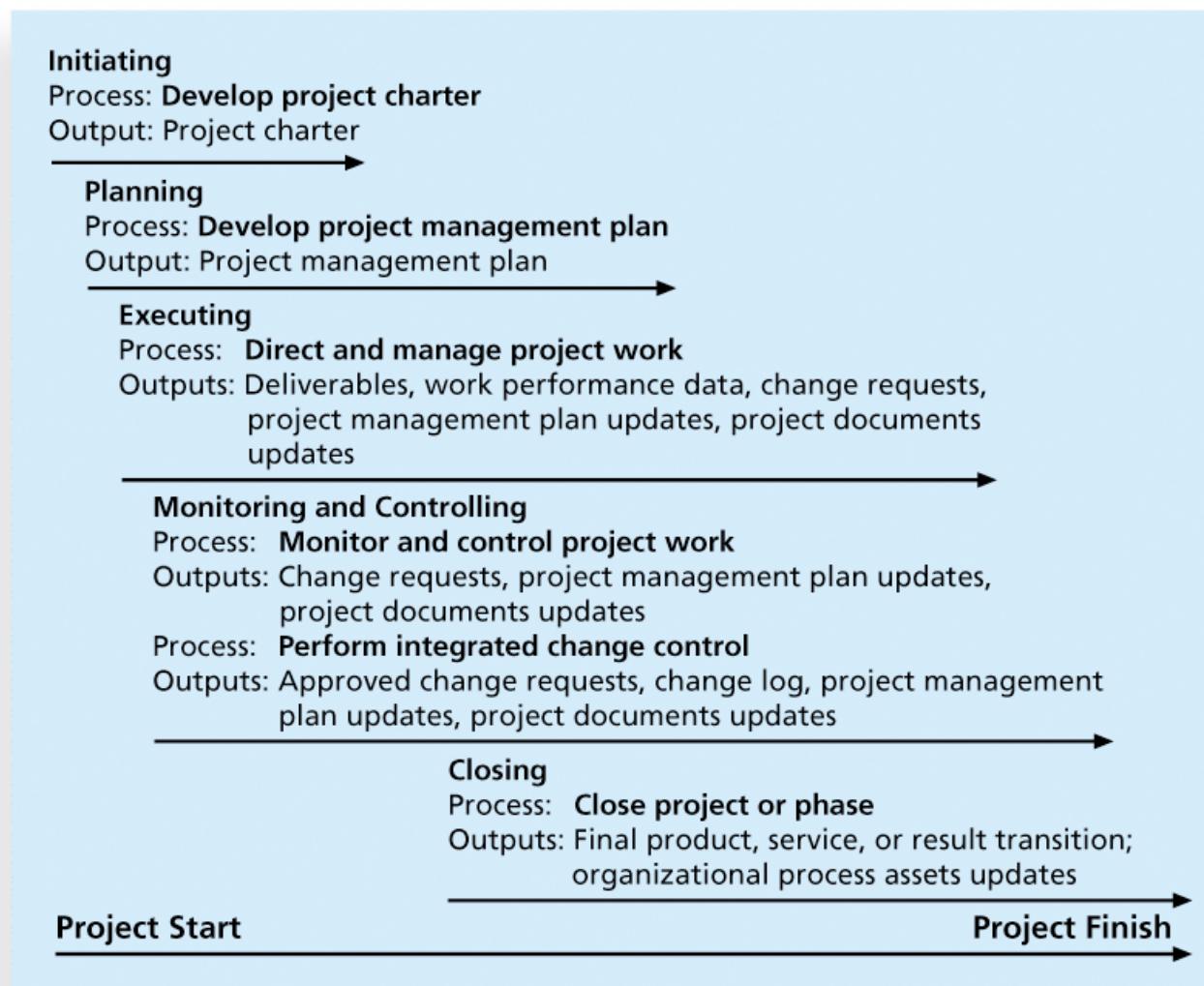
Project Integration Management Processes

1. **Developing the project charter** involves working with stakeholders to create the document that formally authorises a project —the charter.
2. **Developing the project management plan** involves coordinating all planning efforts to create a consistent, coherent document —the project management plan.
3. **Directing and managing project work** involves carrying out the project management plan by performing the activities included in it.

Project Integration Management Processes (cont'd)

4. **Monitoring and controlling project work** involves overseeing activities to meet the performance objectives of the project
5. **Performing integrated change control** involves identifying, evaluating, and managing changes throughout the project life cycle.
6. **Closing the project or phase** involves finalising all activities to formally close the project or phase.

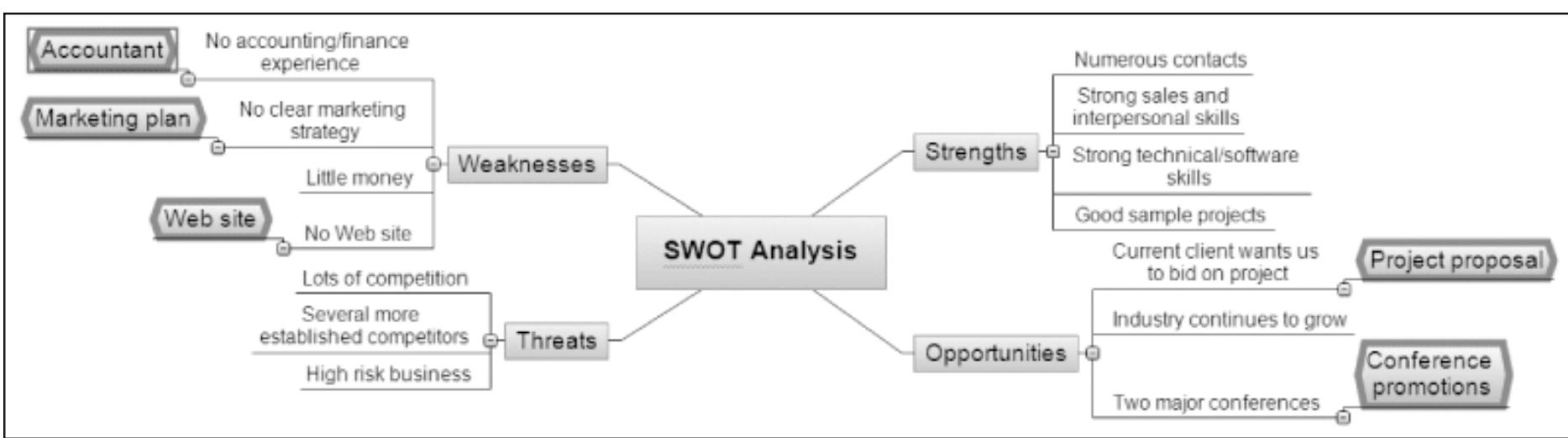
Project Integration Management Summary



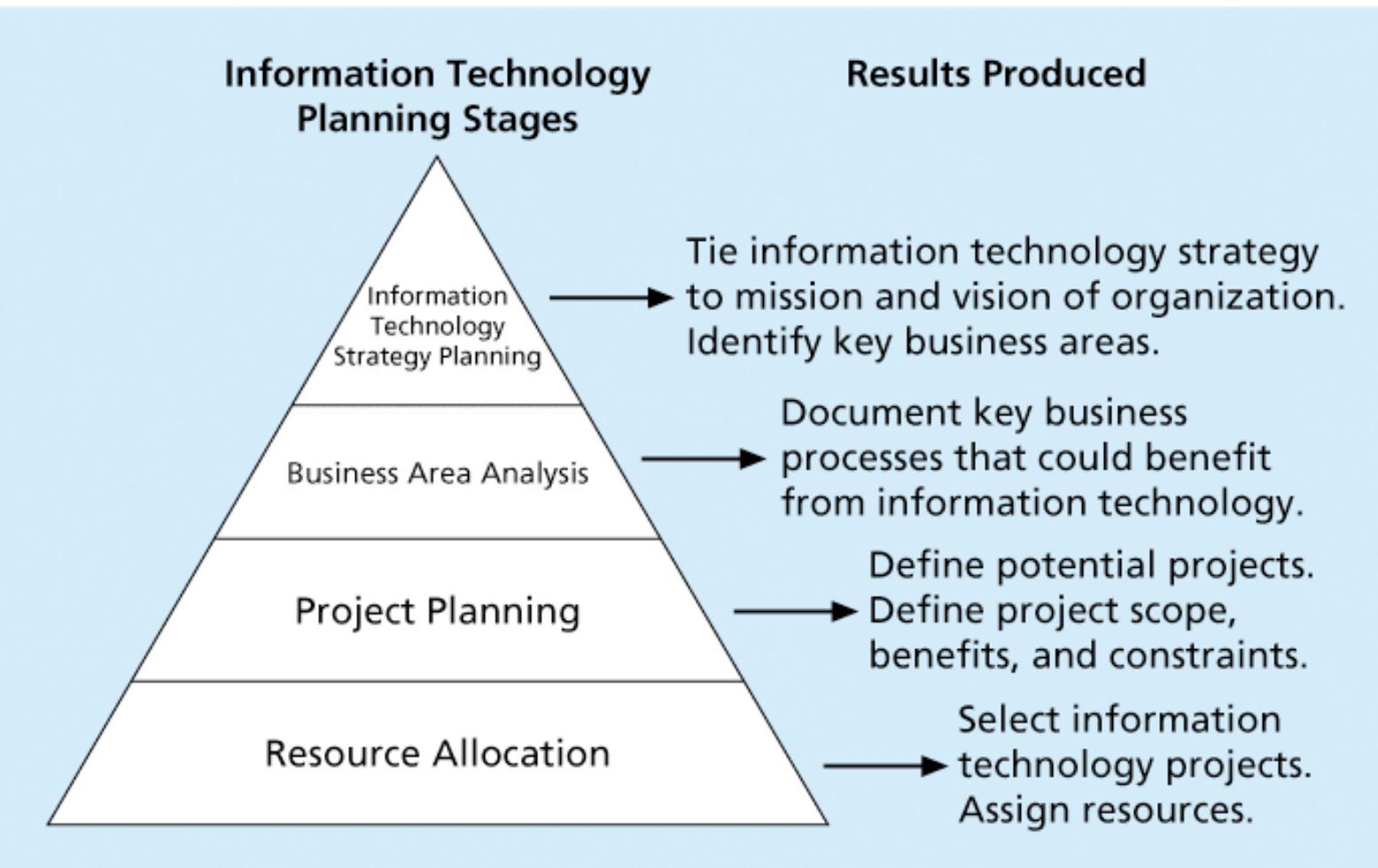
Strategic Planning and Project Selection

- **Strategic planning** involves determining long-term objectives, predicting future trends, and projecting the need for new products and services
- Organisations often perform a **SWOT analysis**
 - analyzing **Strengths, Weaknesses, Opportunities, and Threats**
- As part of strategic planning, organisations
 - identify potential projects
 - use realistic methods to select which projects to work on
 - formalize project initiation by issuing a project charter

Mind Map of a SWOT Analysis to Help Identify Potential Projects



Information Technology Planning Process



Best Practice

- A 2013 survey identified companies most admired for their ability to apply IT-related business capabilities for competitive advantage
- Many organisations rely on effective new product development (NPD) to increase growth and profitability.
- 4 important forces behind NPD's success include the following:
 1. A product innovation and technology strategy for the business
 2. Resource commitment and focusing on the right projects, or solid portfolio management
 3. An effective, flexible, and streamlined idea-to-launch process
 4. The right climate and culture for innovation, true cross-functional teams, and senior management commitment to NPD

Video 2:

Learning Objective:

- Discuss the different methods for project selection

Methods for Selecting Projects

- There are usually more projects than available time and resources to implement them
- Methods for selecting projects include:
 - focusing on broad organisational needs
 - categorising information technology projects
 - performing net present value or other financial analyses
 - using a weighted scoring model
 - implementing a balanced scorecard

Focusing on Broad Organisational Needs

- It is often difficult to provide strong justification for many IT projects, but everyone agrees they have a high value
- “It is better to measure gold roughly than to count pennies precisely”
- Three important criteria for projects:
 - There is a **need** for the project
 - There are **funds** available
 - There’s a strong **will** to make the project succeed

Categorising IT Projects

Selecting projects based on various categorisations:

- **project's impetus** – whether the project addresses:
 - a problem
 - an opportunity, or
 - a directive
- **time window**
 - some potential projects must be finished within a specific time window; otherwise, they are no longer valid
- **overall priority of the project**
 - higher priority projects should be completed first

Financial Analysis of Projects

- Financial considerations are often an important consideration in selecting projects
- Three primary methods for determining the projected financial value of projects:
 - Net present value (NPV) analysis
 - Return on investment (ROI)
 - Payback analysis

Net Present Value Analysis

- Net present value (NPV) analysis is a method of calculating the expected net monetary gain or loss from a project by discounting all expected future cash inflows and outflows to the present point in time
- Projects with a positive NPV should be considered if financial value is a key criterion
- The higher the NPV, the better

Net Present Value Example

Discount rate	10%					
Discount factor	0.91	0.83	0.75	0.68	0.62	
PROJECT 1	Year 1	Year 2	Year 3	Year 4	Year 5	TOTAL
Benefits	\$0	\$2,000	\$3,000	\$4,000	\$5,000	\$14,000
Costs	\$5,000	\$1,000	\$1,000	\$1,000	\$1,000	\$9,000
Cash flow	(\$5,000)	\$1,000	\$2,000	\$3,000	\$4,000	\$5,000
Discounted cash flow	(\$4,545)	\$826	\$1,503	\$2,049	\$2,484	
Cumulative disc cash flow	(\$4,545)	(\$3,719)	(\$2,216)	(\$167)	\$2,316	
NPV	\$2,316.35					
PROJECT 2	Year 1	Year 2	Year 3	Year 4	Year 5	TOTAL
Benefits	\$1,000	\$2,000	\$4,000	\$4,000	\$4,000	\$15,000
Costs	\$2,000	\$2,000	\$2,000	\$2,000	\$2,000	\$10,000
Cash flow	(\$1,000)	\$0	\$2,000	\$2,000	\$2,000	\$5,000
NPV	\$3,201.41					

Note that totals are equal but NPVs are not because of the time value of money



NPV Calculation

$$\frac{1}{(1+0.1)^0}$$

$$\frac{1}{(1+0.1)^1}$$

Assuming cash flow starts at end of period 0 (= beginning of Period 1), i.e. start from Year 0

Discount rate	10%					
Discount factor	1.00	0.91	0.83	0.75	0.68	
Year	0	1	2	3	4	TOTAL
Benefits	\$0	\$2,000	\$3,000	\$4,000	\$5,000	\$14,000
Discounted benefit	\$0	\$1,818	\$2,479	\$3,005	\$3,415	\$10,718
Costs	\$5,000	\$1,000	\$1,000	\$1,000	\$1,000	\$9,000
Discounted costs	\$5,000	\$909	\$826	\$751	\$683	\$8,170
Cash flow	(\$5,000)	\$1,000	\$2,000	\$3,000	\$4,000	\$5,000
Discounted cash flow	(\$5,000)	\$909	\$1,653	\$2,254	\$2,732	\$2,548
Cumulative disc cash flow	(\$5,000)	(\$4,091)	(\$2,438)	(\$184)	\$2,548	
NPV	\$2,547.98	$NPV = \sum_{t=0 \dots n} A_t / (1 + r)^t$				

ROI =
 total discounted benefits
 - total discounted costs
 discounted costs

Or

ROI = $\frac{NPV}{\text{discounted costs}}$

Assuming cash flow starts at end of period 1 (= end of Period 1), i.e. start from Year 1

Discount rate	10%					
Discount factor	0.91	0.83	0.75	0.68	0.62	
Year	1	2	3	4	5	TOTAL
Benefits	\$0	\$2,000	\$3,000	\$4,000	\$5,000	\$14,000
Discounted benefit	\$0	\$1,653	\$2,254	\$2,732	\$3,105	\$9,743
Costs	\$5,000	\$1,000	\$1,000	\$1,000	\$1,000	\$9,000
Discounted costs	\$4,545	\$826	\$751	\$683	\$621	\$7,427
Cash flow	(\$5,000)	\$1,000	\$2,000	\$3,000	\$4,000	\$5,000
Discounted cash flow	(\$4,545)	\$826	\$1,503	\$2,049	\$2,484	\$2,316
Cumulative disc cash flow	(\$4,545)	(\$3,719)	(\$2,216)	(\$167)	\$2,316	
NPV	\$2,316.35					
ROI	31.2%					



Return on Investment

- **Return on investment (ROI)** is calculated by subtracting the project costs from the benefits and then dividing by the costs

$$\text{ROI} = \frac{\text{(total discounted benefits} - \text{total discounted costs)}}{\text{discounted costs}}$$
$$= \text{NPV} / \text{discounted costs}$$

- The higher the ROI, the better
- Many organisations have a **required rate of return** or minimum acceptable rate of return on investment for projects
- **Internal rate of return (IRR)** can be calculated by finding the discount rate that makes the NPV equal to zero

Payback Analysis

- Another important financial consideration is payback analysis
- The **payback period** is the amount of time it will take to recoup, in the form of net cash inflows, the total dollars invested in a project
- Payback occurs when the net cumulative discounted benefits equals the costs
- Many organisations want IT projects to have a fairly short payback period

Weighted Scoring Model

- A weighted scoring model is a tool that provides a systematic process for selecting projects based on many criteria
 - Identify criteria important to the project selection process
 - Assign weights (percentages) to each criterion so they add up to 100%
 - Assign scores to each criterion for each project
 - Multiply the scores by the weights and get the total weighted scores
- The higher the weighted score, the better

Sample Weighted Scoring Model for Project Selection

	A	B	C	D	E	F	
1	Criteria	Weight	Project 1	Project 2	Project 3	Project 4	
2	Supports key business objectives	25%	90	90	50	20	
3	Has strong internal sponsor	15%	70	90	50	20	
4	Has strong customer support	15%	50	90	50	20	
5	Uses realistic level of technology	10%	25	90	50	70	
6	Can be implemented in one year or less	5%	20	20	50	90	
7	Provides positive NPV	20%	50	70	50	50	
8	Has low risk in meeting scope, time, and cost goals	10%	20	50	50	90	
9	Weighted Project Scores	100%	56	78.5	50	41.5	
10							
11							
12							
13							
14	Project 4	42					
15							
16							
17	Project 3	48					
18							
19	Project 2	80					
20							
21	Project 1	58					
22							
23							
24		0	20	40	60	80	100
25							
26							

Implementing a Balanced Scorecard

- Drs. Robert Kaplan and David Norton developed this approach to help select and manage projects that align with business strategy
- A **balanced scorecard**
 - is a methodology that converts an organisation's value drivers, such as **customer service, innovation, operational efficiency, and financial performance**, to a series of defined metrics
- See www.balancedscorecard.org for more information

Video 3: Learning Objectives

- Explain the importance of creating a project charter to formally initiate projects
- Describe project management plan development, understand the content of these plans, and review approaches for creating them
- Explain project execution, its relationship to project planning, the factors related to successful results, and tools and techniques to assist in directing and managing project work
- Describe the process of monitoring and controlling a project

1. Developing a Project Charter

- A **project charter** is a document that formally recognizes the existence of a project and provides direction on the project's objectives and management
- Key project stakeholders should sign a project charter to acknowledge agreement on the need and intent of the project; a **signed charter is a key output of project integration management**

Inputs, Tools and Techniques for Developing a Project Charter

- Inputs:
 - A project statement of work (SOW)
 - A business case
 - Agreements
 - Enterprise environmental factors
 - **Organisational process assets**, which include formal and informal plans, policies, procedures, guidelines, information systems, financial systems, management systems, lessons learned, and historical information
- Tools and Techniques:
 - Expert judgement
 - Facilitation techniques

Project Charter – An Example

Project Title: DNA-Sequencing Instrument Completion Project

Date of Authorization: February 1

Project Start Date: February 1

Projected Finish Date: November 1

Key Schedule Milestones:

- Complete first version of the software by June 1
- Complete production version of the software by November 1

Budget Information: The firm has allocated \$1.5 million for this project, and more funds are available if needed. The majority of costs for this project will be internal labor. All hardware will be outsourced.

Project Manager: Nick Carson, (650) 949-0707, nearson@dniconsulting.com

Project Objectives: The DNA-sequencing instrument project has been underway for three years. It is a crucial project for our company. This is the first charter for the project, and the objective is to complete the first version of the software for the instrument in four months and a production version in nine months.

Main Project Success Criteria: The software must meet all written specifications, be thoroughly tested, and be completed on time. The CEO will formally approve the project with advice from other key stakeholders.

Project Charter (cont.)

Approach:

- Hire a technical replacement for Nick Carson and a part-time assistant as soon as possible.
- Within one month, develop a clear work breakdown structure, scope statement, and Gantt chart detailing the work required to complete the DNA sequencing instrument.
- Purchase all required hardware upgrades within two months.
- Hold weekly progress review meetings with the core project team and the sponsor.
- Conduct thorough software testing per the approved test plans.

ROLES AND RESPONSIBILITIES

Name	Role	Position	Contact Information
Ahmed Abrams	Sponsor	CEO	aabrams@dniconsulting.com
Nick Carson	Project Manager	Manager	ncarson@dniconsulting.com
Susan Johnson	Team Member	DNA expert	sjohnson@dniconsulting.com
Renyong Chi	Team Member	Testing expert	rchi@dniconsulting.com
Erik Haus	Team Member	Programmer	ehaus@dniconsulting.com
Bill Strom	Team Member	Programmer	bstrom@dniconsulting.com
Maggie Elliot	Team Member	Programmer	melliot@dniconsulting.com
Sign-off: (Signatures of all the above stakeholders)			
<i>Ahmed Abrams</i>		<i>Nick Carson</i>	
<i>Susan Johnson</i>		<i>Renyong Chi</i>	
<i>Erik Haus</i>		<i>Bill Strom</i>	
<i>Maggie Elliot</i>			

Comments: (Handwritten or typed comments from above stakeholders, if applicable)

"I want to be heavily involved in this project. It is crucial to our company's success, and I expect everyone to help make it succeed." —Ahmed Abrams

"The software test plans are complete and well documented. If anyone has questions, do not hesitate to contact me." —Renyong Chi



2. Developing a Project Management Plan

- A **project management plan** is a document used to coordinate all project planning documents and help guide a project's execution and control
- Plans created in the other knowledge areas are subsidiary parts of the overall project management plan
- It should be dynamic, flexible, and subject to change when the environment or project changes.
- Main inputs: project charter, outputs from planning processes, enterprise environment factors, and organisational process assets
- Main tool and technique: expert judgment
- Output: **project management plan**

3. Directing and Managing Project Work

- Involves managing and performing the work described in the project management plan
- The majority of time and money is usually spent on execution
- The application area of the project directly affects project execution because the products of the project are produced during execution

Coordinating Planning and Execution

- Project planning and execution are intertwined and inseparable activities
- Those who will do the work should help to plan the work
- Project managers must solicit input from the team to develop realistic plans

Providing Leadership and a Supportive Culture

- Project managers must lead by example to demonstrate the importance of creating and then following good project plans
- Organisational culture can help project execution by
 - providing guidelines and templates
 - tracking performance based on plans
- Project managers may still need to break the rules to meet project goals, and senior managers must support those actions

4. Monitoring and Controlling Project Work

- Changes are inevitable on most projects, so it's important to develop and follow a process to monitor and control changes
- Monitoring project work includes collecting, measuring, and disseminating performance information
- Inputs: The project management plan, schedule and cost forecasts, validated changes, work performance information, enterprise environmental factors, and organizational process assets
- A **baseline** is the approved project management plan plus approved changes

Video 4:

Learning Objectives

- Understand the integrated change control process, planning for and managing changes on information technology (IT) projects, and developing and using a change control system
- Explain the importance of developing and following good procedures for closing projects
- Describe how software can assist in project integration management

5. Performing Integrated Change Control

- Three main objectives are:
 - Influencing the factors that create changes to ensure that changes are beneficial
 - Determining that a change has occurred
 - Managing actual changes as they occur
- Inputs to the integrated change control process:
 - project management plan, work performance information, change requests, enterprise environmental factors, and organisational process assets
- Outputs from the integrated change control process:
 - project management plan, work performance information, change requests, enterprise environmental factors, and organisational process assets



Change Control on Information Technology Projects

- Former view: The project team should strive to do exactly what was planned on time and within budget
- Problem: Stakeholders rarely agreed up-front on the project scope, and time and cost estimates were inaccurate
- Modern view: Project management is a process of constant communication and negotiation
- Solution: Changes are often beneficial, and the project team should plan for them

Change Control System

- A **change control system** is a formal, documented process that describes when and how official project documents and work may be changed
- Describes who is authorised to make changes and how to make them
- Includes:
 - a change control board,
 - configuration management, and
 - a process for communicating changes

Change Control Board (CCB)

- A **change control board** is a formal group of people responsible for approving or rejecting changes on a project
- CCBs provide guidelines for preparing change requests, evaluate change requests, and manage the implementation of approved changes
- Includes stakeholders from the entire organisation

Making Timely Changes

- Some CCBs only meet occasionally, so it may take too long for changes to occur
- Some organisations have policies in place for time-sensitive changes
 - “48-hour policy” allows project team members to make decisions, then they have 48 hours to reverse the decision pending senior management approval
 - Delegate changes to the lowest level possible, but keep everyone informed of changes

Configuration Management

- Configuration management ensures that the descriptions of the project's products are correct and complete
- Involves identifying and controlling the functional and physical design characteristics of products and their support documentation
- Configuration management specialists identify and document configuration requirements, control changes, record and report changes, and audit the products to verify conformance to requirements
- See www.icmhq.com for more information

Communicating changes

- Communication is an important factor in change control
- Could be formal or informal
 - Formal: written and oral performance reports
 - Informal: Phone or “Stand-up” meetings
- Why is good communication so critical to success?
 - Everyone is coordinated and informed
 - Easier to integrate all project changes so that the project stays on track

6. Closing Projects or Phases

- To close a project or phase, you must finalize all activities and transfer the completed or cancelled work to the appropriate people
- Main inputs to this process:
 - project management plan, accepted deliverables, and organisational process assets.
- The main tool and technique is expert judgment.
- Main outputs include
 - Final product, service, or result transition
 - Organisational process asset updates

Using Software to Assist in Project Integration Management

Several types of software can be used to assist in project integration management

- Documents can be created with word processing software
- Presentations are created with presentation software
- Tracking can be done with spreadsheets or databases
- Communication software can facilitate communications
- Project management software can pull everything together and show detailed and summarized information



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IT Project Management

Lecture 4
Project Scope Management

Video 1: *Project Scope Management*

Learning Objectives

- Describe the process of planning scope management

What is Project Scope Management?

- **Scope** refers to all the work involved in creating the products of the project and the processes used to create them
- A **deliverable** is a product produced as part of a project, such as hardware or software, planning documents, or meeting minutes
- Project scope management **includes** the processes involved in defining and controlling what is or is not included in a project

Project Scope Management Processes

- **Planning scope:** determining how the project's scope and requirements will be managed
- **Collecting requirements:** defining and documenting the features and functions of the products produced during the project as well as the processes used for creating them
- **Defining scope:** reviewing the project charter, requirements documents, and organisational process assets to create a scope statement
- **Creating the WBS:** subdividing the major project deliverables into smaller, more manageable components
- **Validating scope:** formalising acceptance of the project deliverables
- **Controlling scope:** controlling changes to project scope throughout the life of the project

Project Scope Management Summary

Planning

Process: **Plan scope management**

Outputs: Scope management plan, requirements management plan

Process: **Collect requirements**

Outputs: Requirements documentation, requirements traceability matrix

Process: **Define scope**

Outputs: Project scope statement, project documents updates

Process: **Create WBS**

Outputs: Scope baseline, project documents updates

Monitoring and Controlling

Process: **Validate scope**

Outputs: Accepted deliverables, change requests, work performance information, project documents updates

Process: **Control scope**

Outputs: Work performance information, change requests, project management plan updates, project documents updates, organizational process assets updates

Project Start

Project Finish



Planning Scope Management

- The project team uses **expert judgment** and **meetings** to develop two important outputs: the **scope management plan** and the **requirements management plan**
- The **scope management plan** is a subsidiary part of the project management plan
- A **scope statement** describes the characteristic of the product that the project should deliver. It should include:
 - Project justification
 - Brief description of the project's deliverables
 - Summary of all project deliverables
 - Statement of what determines project success – user acceptance criteria

Scope Management Plan Contents

- How to prepare a detailed project scope statement
- How to create a WBS
- How to maintain and approve the WBS
- How to obtain formal acceptance of the completed project deliverables
- How to control requests for changes to the project scope

Requirements Management Plan

- The PMBOK® Guide, Fifth Edition, describes requirements as:
 - “conditions or capabilities that must be met by the project or present in the product, service, or result to satisfy an agreement or other formally imposed specification”
- Requirements need to be elicited, analyzed, and recorded in enough detail to be included in the scope baseline and be measured once project execution begins.
- The **requirements management plan** documents how project requirements will be analyzed, documented, and managed

Methods for Collecting Requirements

- Interviewing
- Focus groups and facilitated workshops
- Using group creativity and decision-making techniques
- Questionnaires and surveys
- Observation
- Prototyping
- **Benchmarking**, or generating ideas by comparing specific project practices or product characteristics to those of other projects or products inside or outside the performing organisation, can also be used to collect requirements



Requirements Documentation

- **Functional** and **non-functional** requirements
 - **non-functional** requirements describe **how the system works**, while **functional** requirements describe **what the system should do**
- **Business rules**
- **Impacts** on any other systems and/or departments
- Support and **training requirements**
- Specific **acceptance criteria** for each requirement
- **Quality** requirements

Requirements Traceability Matrix

- A **requirements traceability matrix (RTM)** is a table that lists requirements, various attributes of each requirement, and the status of the requirements to ensure that all requirements are addressed
- Sample entry in an RTM

Requirement No.	Name	Category	Source	Status
R32	Laptop memory	Hardware	Project charter and corporate laptop specifications	Complete. Laptops ordered meet requirement by having 4GB of memory.

Video 2: *Project Scope Management*

Learning Objectives

- Explain the scope definition process and describe the contents of a project scope statement
- Discuss the process for creating a work breakdown structure using the analogy, top-down, bottom-up, and mind-mapping approaches

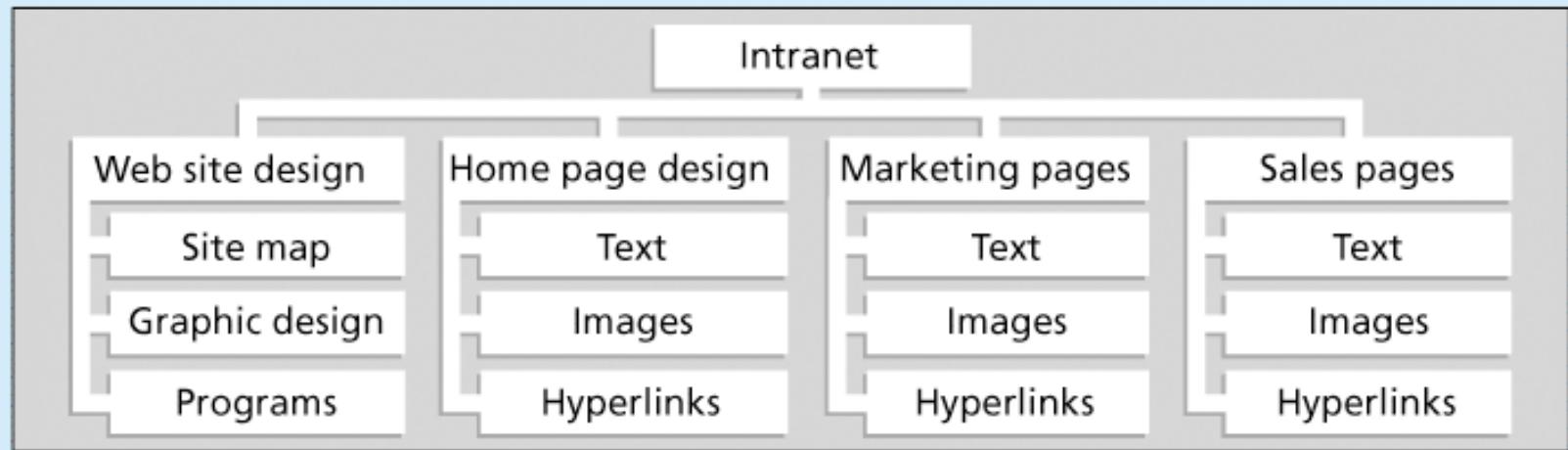
Defining Scope

- **Project scope statements** should include at least a product scope description, product user acceptance criteria, and detailed information on all project deliverables.
- It is also helpful to document other scope-related information, such as the project boundaries, constraints, and assumptions.
- The project scope statement should also reference supporting documents, such as product specifications
- As time progresses, the scope of a project should become more clear and specific

Creating the Work Breakdown Structure (WBS)

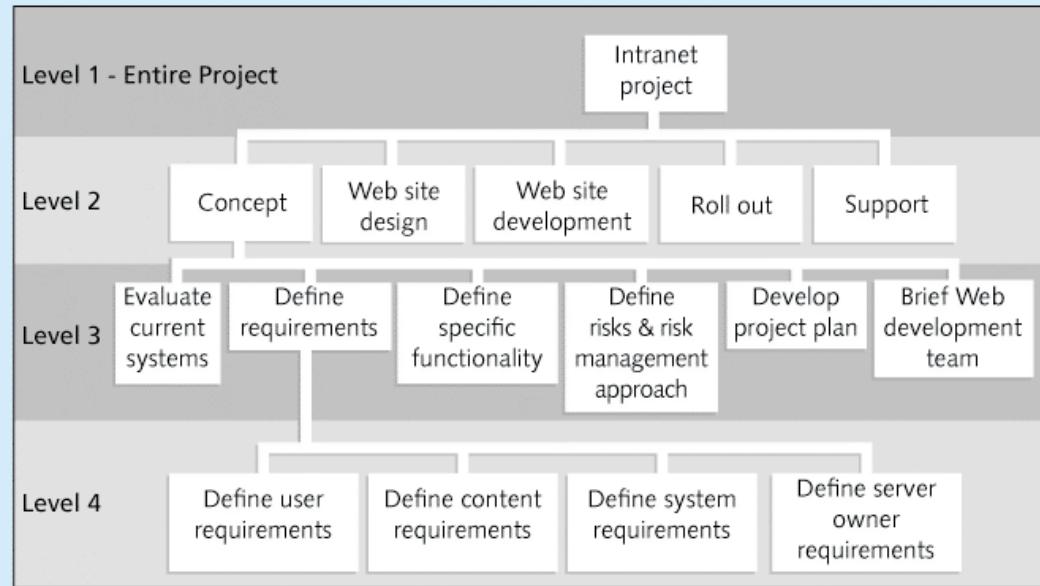
- A **WBS** is a deliverable-oriented grouping of the work involved in a project that defines the total scope of the project
- WBS is a foundation document that provides the basis for planning and managing project schedules, costs, resources, and changes
- **Decomposition** is subdividing project deliverables into smaller pieces
- A **work package** is a task at the lowest level of the WBS
- The **scope baseline** includes the approved project scope statement and its associated WBS and WBS dictionary

Sample Intranet WBS Organised by Product



Sample Intranet WBS Organized by Phase

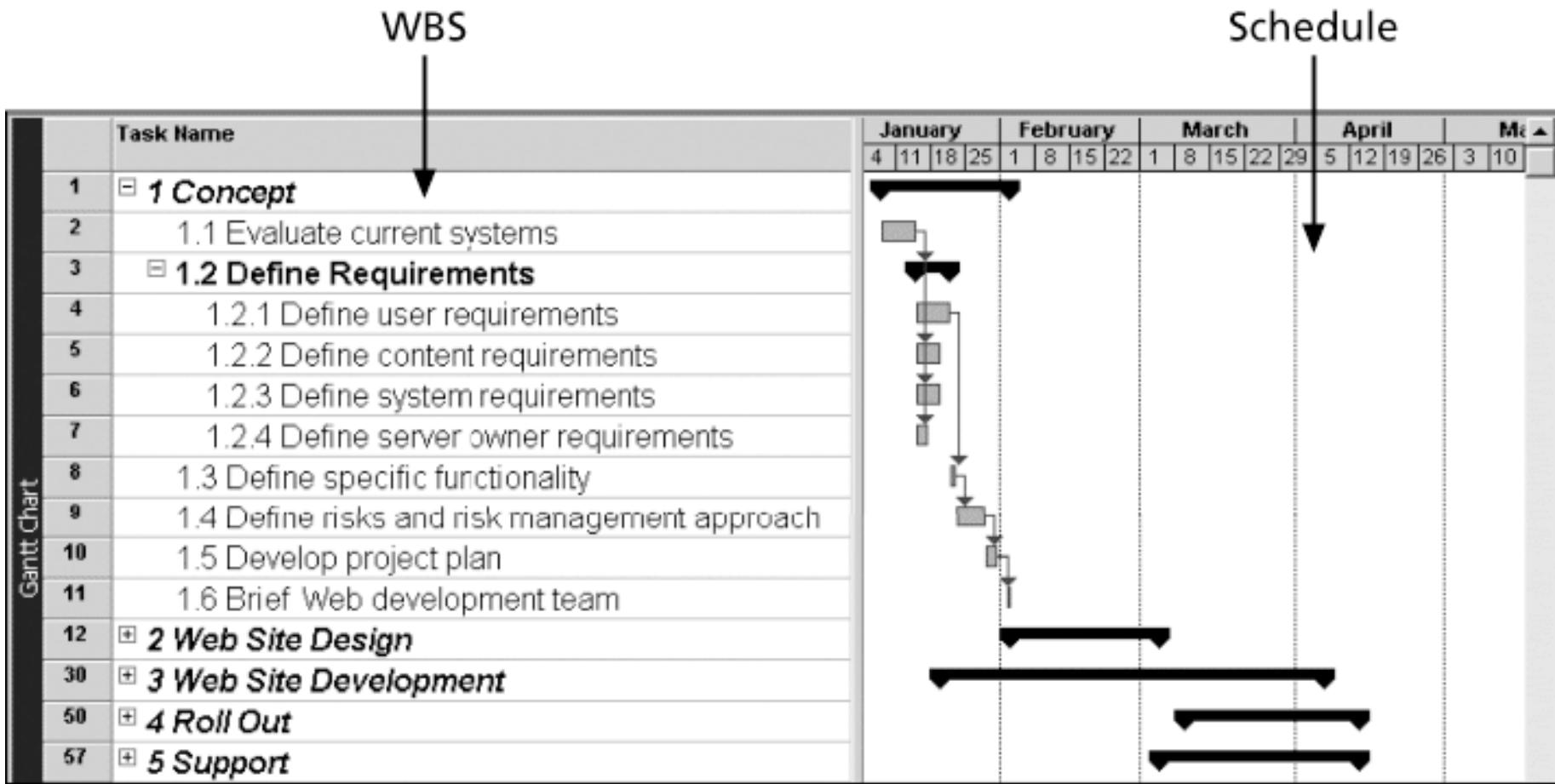
Chart form →



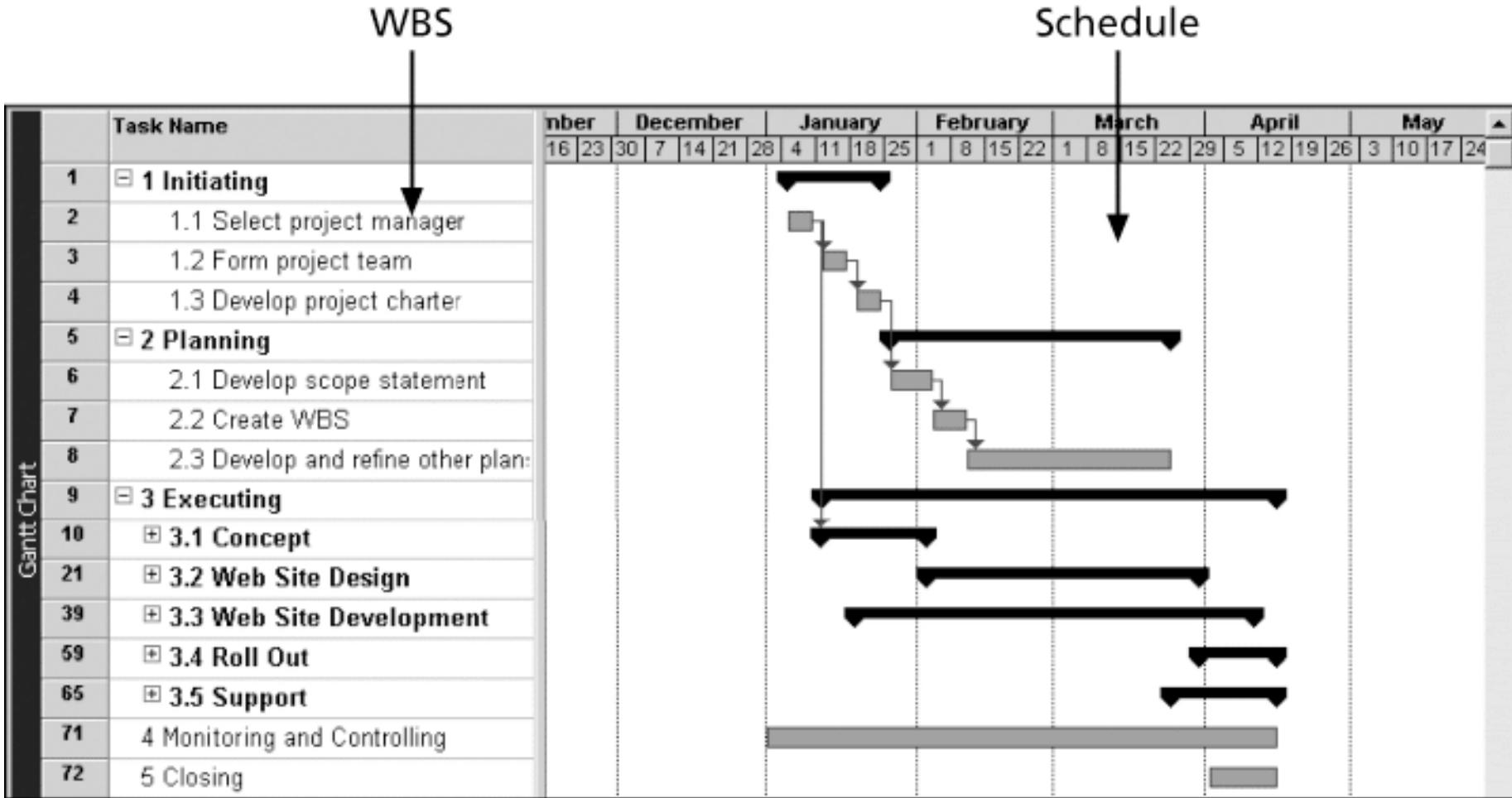
Tabular form with PMI numbering

- 1.1 Concept
 - 1.1.1 Evaluate current systems
 - 1.1.2 Define requirements
 - 1.1.2.1 Define user requirements
 - 1.1.2.2 Define content requirements
 - 1.1.2.3 Define system requirements
 - 1.1.2.4 Define server owner requirements
 - 1.1.3 Define specific functionality
 - 1.1.4 Define risks and risk management approach
 - 1.1.5 Develop project plan
 - 1.1.6 Brief Web development team
- 1.2 Web site design
- 1.3 Web site development
- 1.4 Roll out
- 1.5 Support

Intranet WBS and Gantt Chart in Microsoft Project



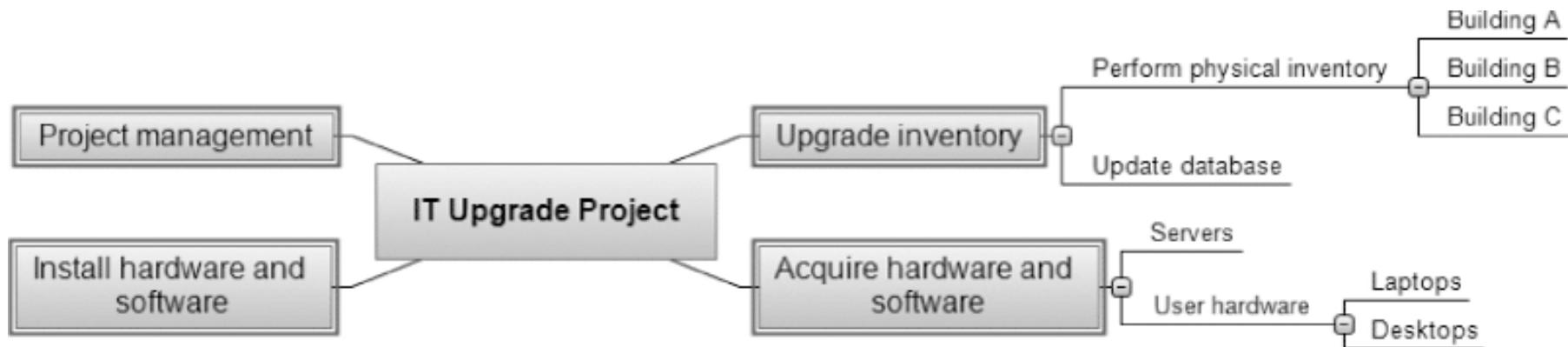
Intranet Gantt Chart Organized by Project Management Process Groups



Approaches to Developing WBSs

- Using guidelines: Some organisations, like the DOD, provide guidelines for preparing WBSs
- The **analogy approach**: Review WBSs of similar projects and tailor to your project
- The **top-down approach**: Start with the largest items of the project and break them down
- The **bottom-up approach**: Start with the specific tasks and roll them up
- Mind-mapping approach: **Mind mapping** is a technique that uses branches radiating out from a core idea to structure thoughts and ideas

Sample Mind-Mapping Approach for Creating a WBS



Source: MatchWare's MindView 4 Business Edition

The WBS Dictionary and Scope Baseline

- Many WBS tasks are vague and must be explained more so people know what to do and can estimate how long it will take and what it will cost to do the work
- A **WBS dictionary** is a document that describes detailed information about each WBS item
- Refer to the textbook (Pg 207) on advice in creating a good WBS

Video 3: *Project Scope Management*

Learning Objectives

- Explain the importance of validating scope and how it relates to defining and controlling scope
- Understand the importance of controlling scope

Validating Scope

- It is very difficult to create a good scope statement and WBS for a project
- It is even more difficult to verify project scope and minimize scope changes
- **Scope validation** involves formal acceptance of the completed project deliverables
- Acceptance is often achieved by a customer inspection and then sign-off on key deliverables

Controlling Scope

- Scope control involves controlling changes to the project scope
- Goals of scope control are to
 - influence the factors that cause scope changes
 - assure changes are processed according to procedures developed as part of integrated change control, and
 - manage changes when they occur
- **Variance** is the difference between planned and actual performance

What Went Wrong?

- A project scope that is too broad and grandiose can cause severe problems
 - Scope creep and an over-emphasis on technology for technology's sake resulted in the bankruptcy of a large pharmaceutical firm, Texas-based FoxMeyer Drug
 - In 2001, McDonald's fast-food chain initiated a project to create an intranet that would connect its headquarters with all of its restaurants to provide detailed operational information in real time. After spending \$170 million on consultants and initial implementation planning, McDonald's realized that the project was too much to handle and terminated it

Some Best Practices

- Best practices to avoid major scope problems:
 1. Keep the scope realistic.
 2. Involve users in project scope management.
 3. Use off-the-shelf hardware and software whenever possible.
 4. Follow good project management processes.
- Principles from IBM's Rational Unified Process® (RUP):
 - Adapt the process
 - Balance competing stakeholder priorities
 - Collaborate across teams
 - Demonstrate value iteratively
 - Elevate the level of abstraction
 - Focus continuously on quality

Video 4: *Project Scope Management*

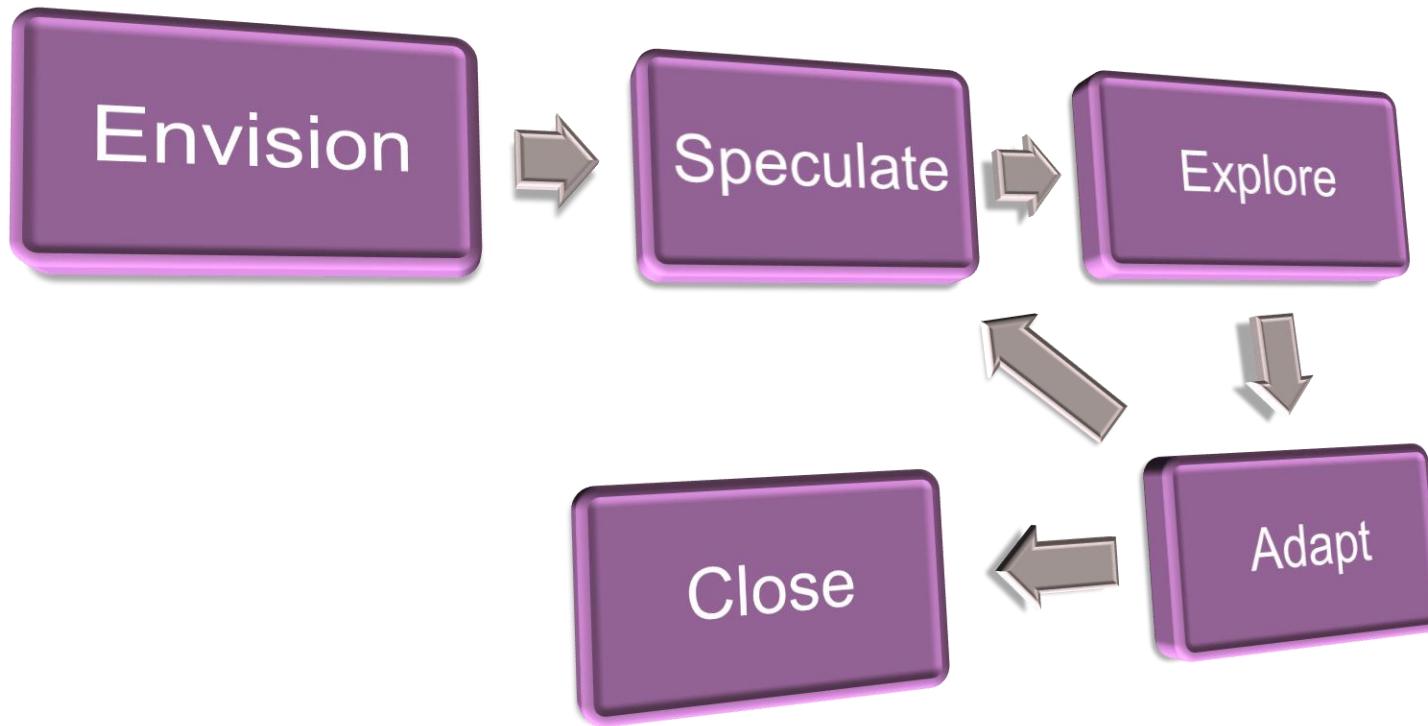
Learning Objectives

- Understand how scope management works in an Agile environment

What is ‘Scope Creep’?

- is it applicable in an Agile framework?
- Scope Creep
 - changes to the scope baseline of a project (i.e. the addition of new product features that occur after the project scope has been determined and/or approved)
- Is it a bad thing?
- How do we accommodate change?
- Enter “Agile”... does this changes how we manage scope?

The Agile Lifecycle



Scoping your project and managing the scope

Envision Stage

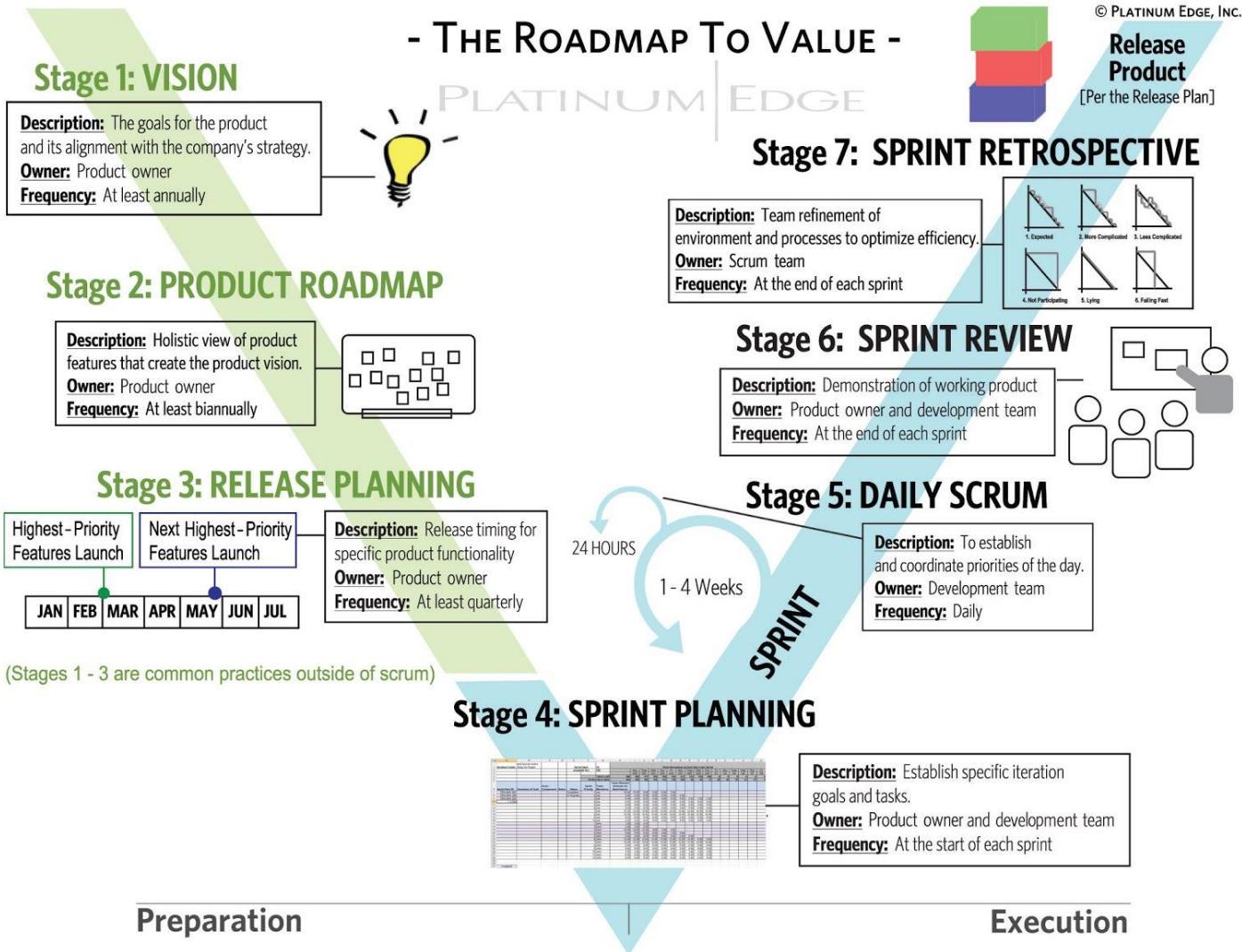
- Determine user requirements
- Confirm team members
- Set up team collaboration tools
- A documented project charter –describing scope and overall objectives
- Creation of Product Data Sheet (PDS)
 - Project description
 - Project objectives
 - Timelines
 - Cost estimates
 - Constraints
 - Prioritisation

Scoping your project and managing the scope

Speculate Stage

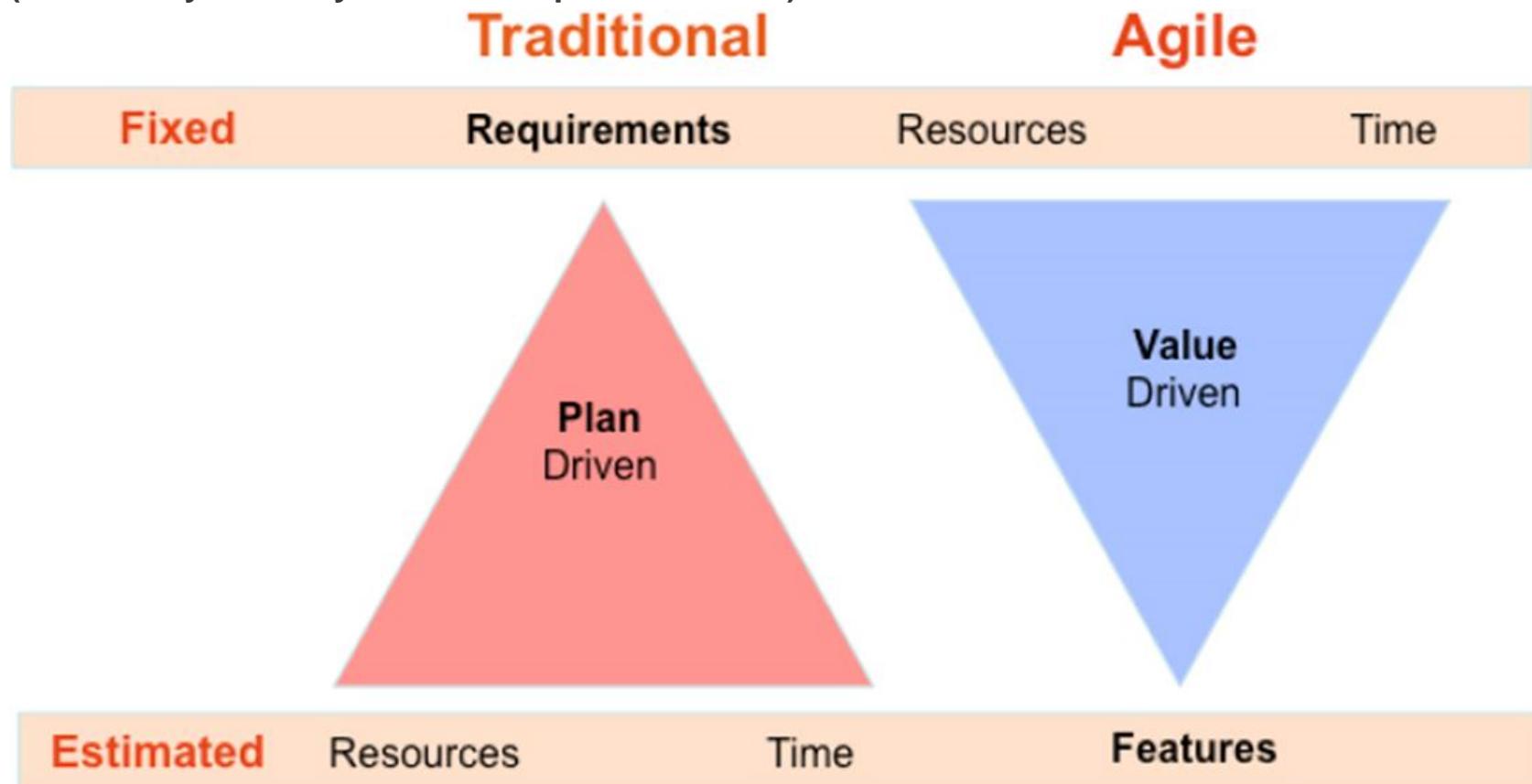
- Feature based delivery plan
- Estimates for each feature
- A set of requirements for the Sprint
- A list of features to be developed
- Effort estimates for each feature
- Risks will be identified

Understanding scope throughout the project



Flipping the Triangle (DSDM Consortium)

(DSDM = Dynamic System Development Method)



Agile Principles in regards to Scope Management

The agile principles that relate to scope management:

- (1) The highest priority is to satisfy the customer through early and continuous delivery of valuable software.
- (2) Changing requirements are welcomed – even late in development. Agile processes harness change for the customer's competitive advantage.
- (3) To deliver working software frequently, from a couple of weeks to a couple of months, with a preference to the shorter timescale.

Does Agile Projects have control mechanisms?

- Agile-specific techniques help manage and monitor your Agile Projects.
- Scope is managed by the backlog list.
- Scope is controlled by completing features and adding new features
- Never adjust the scope of the current sprint!

What's different between traditional and Agile Scope Management

Traditional Approach	Agile Approach
Project teams attempt to identify and document complete scope at the beginning of the project	High level requirements are gathered at the beginning of the project and refined throughout the project
Organizations view scope change after the requirements phase is complete as negative.	Organizations view change as a positive way to improve a product as the project progresses.
Project managers rigidly control and discourage changes once stakeholders sign off on requirements.	Change management is an inherent part of agile processes. The product owner determines the value and priority of new requirements and adds to the product backlog.

What's different between traditional and Agile Scope Management (cont...)

Traditional Approach	Agile Approach
The cost of change increases over time, while the ability to make changes decreases.	You fix resources and schedule initially. New features with high priority don't necessarily cause budget or schedule slip; they simply push out the lowest-priority features. Iterative development allows for changes with each new sprint.
Projects often include scope bloat, unnecessary product features included out of fear of mid-project change.	Scope is determined based on which features directly support the project vision, the release goal, and the sprint goal. Creates the most valuable features first to guarantee their inclusion. Less valuable features might never be created.

Which to use?

- Agile methods are not for EVERY kind of project.
- For projects where scope will not change, more traditional methods are perhaps a better choice.
- For projects with high levels of change, Agile methods tend to be a better choice.
- Agile frameworks are designed to welcome and manage change – change is expected and accepted throughout the life of the project.
- PMI does not advocate any particular methodology



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Lecture 5 Project Schedule Management

Video 1:

Learning Objectives

- Understand the importance of project schedules and good project time management
- Discuss the process of planning schedule management
- Define activities as the basis for developing project schedules

Importance of Project Schedules

- Managers often cite delivering projects on time as one of their biggest challenges
- Schedule issues are the main reason for conflicts on projects, especially during the second half of projects
- Time has the least amount of flexibility; it passes no matter what happens on a project

Individual Work Styles and Cultural Differences Cause Schedule Conflicts

- One dimension of the **Meyers-Briggs Type Indicator** focuses on peoples' attitudes toward structure and deadline
- **Judgment/Perception (J/P) dimension** concerns people's attitudes toward structure.
- Some **people prefer** to **follow schedules and meet deadlines** while others do not (J vs. P)
- Difference cultures and even entire countries have different attitudes about schedules

Media Snapshot

- In 2002 the Salt Lake City Winter Olympic Games (SLOC) was awarded the Project of the Year award by PMI
 - Activities were tied to detailed project information within each department's schedule... “We knew when we were on and off schedule and where we had to apply additional resources.”
- The 2004 Athens Summer Olympic Games
 - “With just 162 days to go to the opening of the Athens Olympics, the Greek capital is still not ready ...”
 - Managed to deliver ...but the games cost more than twice the planned budget
- The 2014 Winter Olympic Games in Sochi, Russia, suffered even greater financial loss and were the most expensive games in history

Project Schedule Management Processes

- **Planning schedule management:** determining the policies, procedures, and documentation that will be used for planning, executing, and controlling the project schedule
- **Defining activities:** identifying the specific **activities** that the project team members and stakeholders must perform to produce the project deliverables
- **Sequencing activities:** identifying and documenting the relationships between project activities
- **Estimating activity resources:** estimating how many **resources** a project team should use to perform project activities Moved to Resource Management in PMBOK 6th edition
- **Estimating activity durations:** estimating the number of work periods that are needed to complete individual activities
- **Developing the schedule:** analyzing activity sequences, activity resource estimates, and activity duration estimates to create the project schedule
- **Controlling the schedule:** controlling and managing changes to the project schedule

Project Schedule Management Summary

Estimate activity resources – this process is now moved to Project Resource Management in the new PMBOK 6th Edition

Planning

Process: **Plan schedule management**

Outputs: Schedule management plan

Process: **Define activities**

Outputs: Activity list, activity attributes, milestone list, project management plan updates

Process: **Sequence activities**

Outputs: Project schedule network diagrams, project documents updates

Process: **Estimate activity resources**

Outputs: Activity resource requirements, resource breakdown structure, project documents updates

Process: **Estimate activity durations**

Outputs: Activity duration estimates, project documents updates

Process: **Develop schedule**

Outputs: Schedule baseline, project schedule, schedule data, project calendars, project management plan updates, project documents updates

Monitoring and Controlling

Process: **Control schedule**

Outputs: Work performance information, schedule forecasts, change requests, project management plan updates, project documents updates, organizational process assets updates

Project Start

Project Finish



Planning Schedule Management

- The project team uses expert judgment, analytical techniques, and meetings to develop the schedule management plan
- A schedule management plan includes:
 - Project schedule model development
 - The scheduling methodology
 - Level of accuracy and units of measure
 - Control thresholds
 - Rules of performance measurement
 - Reporting formats
 - Process descriptions

Defining Activities

- An **activity** or **task** is an element of work normally found on the **work breakdown structure** (WBS) that **has** an **expected duration**, a **cost**, and **resource requirements**
- **Activity definition** involves developing a more detailed WBS and supporting explanations to understand all the work to be done so you can develop realistic cost and duration estimates
- **Goal:** to ensure that the project team completely understands all the work it must do as part of the project scope so the team can start scheduling
- Progressive elaboration of WBS item – “**rolling wave planning**”
- **Outputs:** activity list, activity attributes, a milestone list, and project management plan updates

Activity Lists and Attributes

- An **activity list** is a tabulation of activities to be included on a project schedule that includes
 - the **activity name**
 - an activity **identifier or number**
 - a brief **description** of the activity
- **Activity attributes** provide more information such as predecessors, successors, logical relationships, leads and lags, resource requirements, constraints, imposed dates, and assumptions related to the activity

Milestones

- A **milestone** is a **significant event** that normally has no duration
- It often takes several activities and a lot of work to complete a **milestone**
- They're **useful tools** for setting schedule goals and monitoring **progress**
- Examples include obtaining customer sign-off on key documents or completion of specific products

Wrap up

Project Time Management

Planning

Process: **Plan schedule management**

Outputs: Schedule management plan

Process: **Define activities**

Outputs: Activity list, activity attributes, milestone list, project management plan updates

further defining the scope

Process: **Sequence activities**

Outputs: Project schedule network diagrams, project documents updates

Process: **Estimate activity resources**

Outputs: Activity resource requirements, resource breakdown structure, project documents updates

Process: **Estimate activity durations**

Outputs: Activity duration estimates, project documents updates

Process: **Develop schedule**

Outputs: Schedule baseline, project schedule, schedule data, project calendars, project management plan updates, project documents updates

Monitoring and Controlling

Process: **Control schedule**

Outputs: Work performance information, schedule forecasts, change requests, project management plan updates, project documents updates, organizational process assets updates

Project Start

Project Finish



Video 2: Learning Objectives

- Describe how project managers use network diagrams and dependencies to assist in activity sequencing
- Understand the relationship between estimating resources and project schedules
- Explain how various tools and techniques help project managers perform activity duration estimates

Sequencing Activities

- Involves reviewing activities and determining dependencies
- A **dependency** or **relationship** is the sequencing of project activities or tasks
- Relationships or dependencies among activities has a significant impact on developing and managing a project schedule

Three types of Dependencies

- **Mandatory dependencies:** inherent in the nature of the work being performed on a project, sometimes referred to as hard logic
- **Discretionary dependencies:** defined by the project team., sometimes referred to as soft logic and should be used with care since they may limit later scheduling options
- **External dependencies:** involve relationships between project and non-project activities

Network Diagrams

- Network diagrams are the preferred technique for showing activity sequencing
- A **network diagram** is a schematic display of the logical relationships among, or sequencing of, project activities
- Two main formats:
 - Arrow diagramming methods (or Activity-on-Arrow)
 - Precedence diagramming methods (or Activity-on-Node)

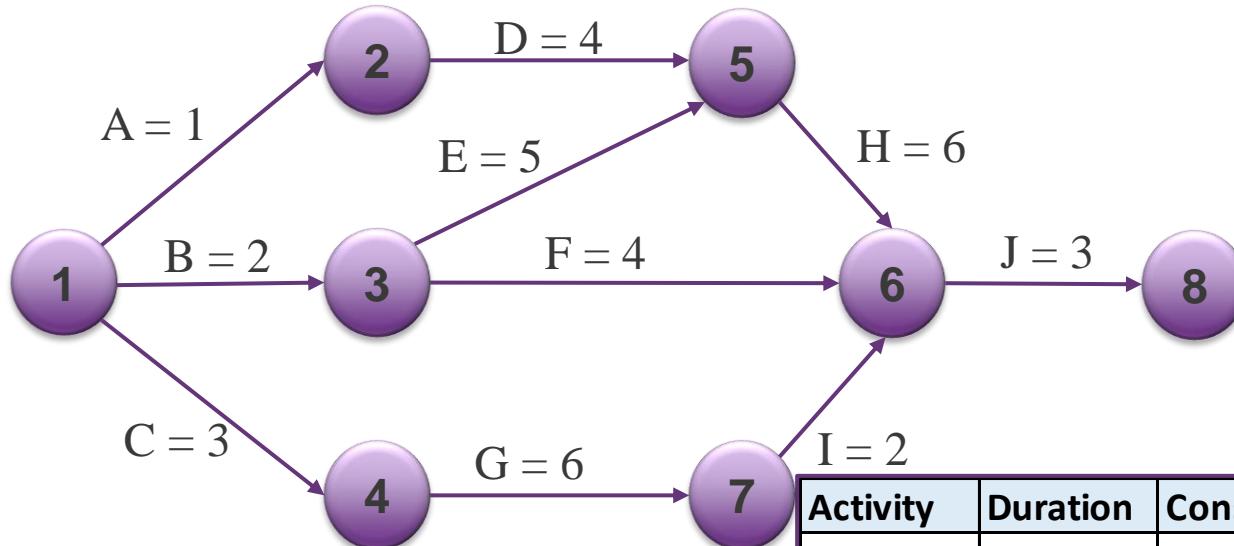
Arrow Diagramming Method (ADM)

- Also called **activity-on-arrow (AOA)** network diagrams
- **Activities** are represented by arrows
- **Nodes** or circles are the starting and ending points of activities
- Can only show **finish-to-start** dependencies; may have some difficulties showing other dependencies.

Process for Creating AOA Diagrams

1. Find all of the activities that start at node 1. Draw their finish nodes and draw arrows between node 1 and those finish nodes. Put the activity letter or name and duration estimate on the associated arrow
2. Continuing drawing the network diagram, working from left to right. Look for bursts and merges.
 - **Bursts** occur when a single node is followed by two or more activities.
 - A **merge** occurs when two or more nodes precede a single node
3. Continue drawing the project network diagram until all activities are included on the diagram that have dependencies
4. As a rule of thumb, all arrowheads should face toward the right, and no arrows should cross on an AOA network diagram

Example: ADM (or AOA) Network Diagram



Assume all durations are in days; A = 1 means Activity A has a duration of 1 day.

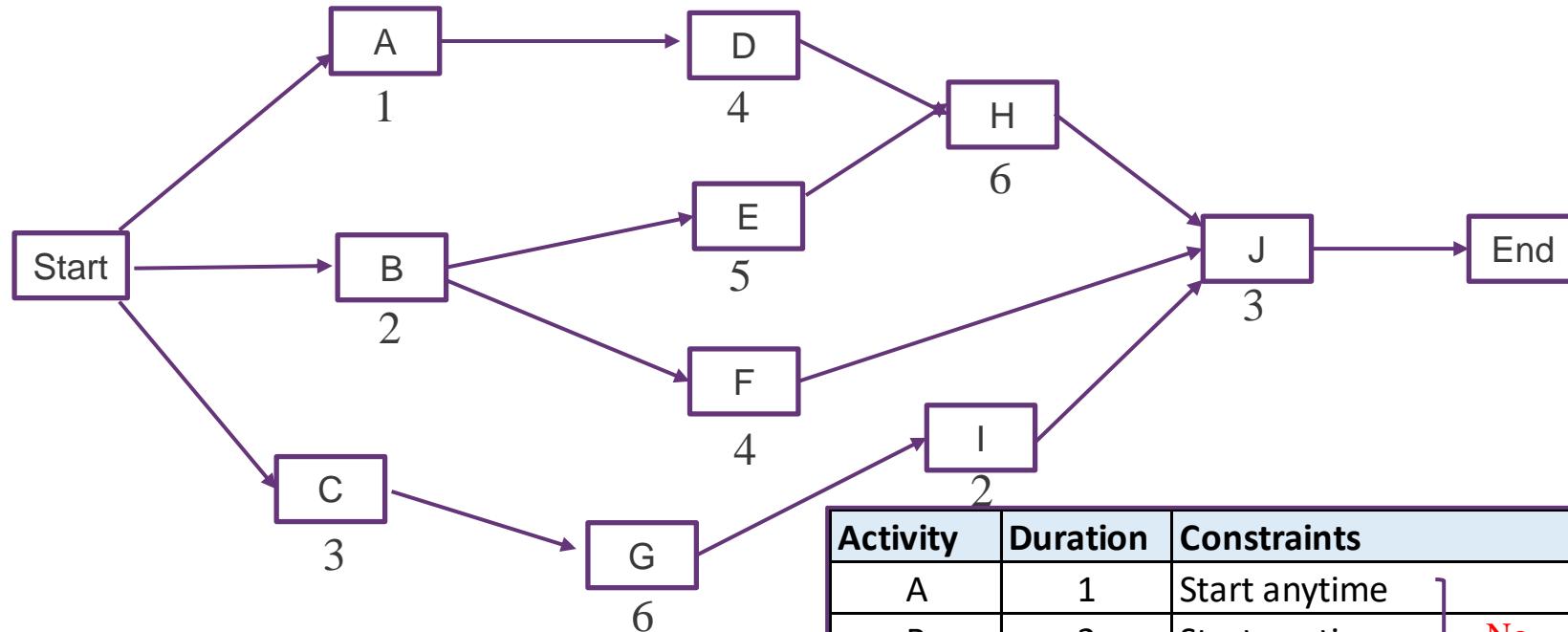
Activity	Duration	Constraints
A	1	Start anytime
B	2	Start anytime
C	3	Start anytime
D	4	Start after A has finished
E	5	Start after B has finished
F	4	Start after B has finished
G	6	Start after C has finished
H	6	Start after both D & E have finished
I	2	Start after G has finished
J	3	Start after both H, F & I have finished



Precedence Diagramming Method (PDM)

- Also known as **Activity-on-Node (AON)**
- **Activities** are represented by boxes
- **Arrows** show relationships between activities
- More popular than ADM method and used by project management software
- Better at showing different types of dependencies

Example: PDM (or AON) Network Diagram

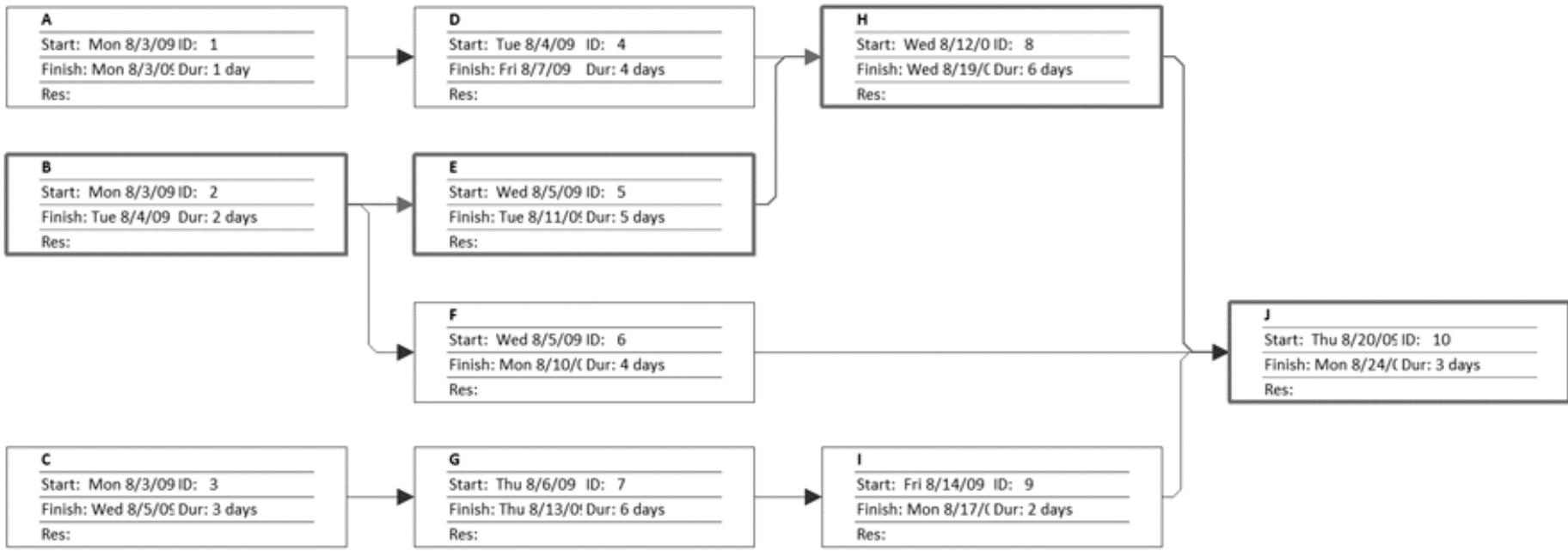


Assume all durations are in days; A = 1 means Activity A has a duration of 1 day.

Activity	Duration	Constraints
A	1	Start anytime
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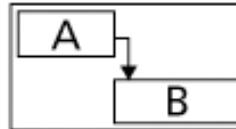
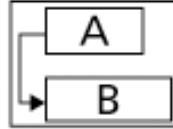
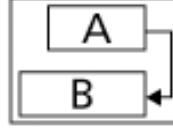
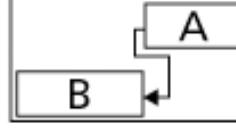
PDM Example Using Microsoft Project



Task Dependency Types

Task dependencies

The nature of the relationship between two linked tasks. You link tasks by defining a dependency between their finish and start dates. For example, the “Contact caterers” task must finish before the start of the “Determine menus” task. There are four kinds of task dependencies in Microsoft Project.

Task dependency	Example	Description
Finish-to-start (FS)		Task (B) cannot start until task (A) finishes.
Start-to-start (SS)		Task (B) cannot start until task (A) starts.
Finish-to-finish (FF)		Task (B) cannot finish until task (A) finishes.
Start-to-finish (SF)		Task (B) cannot finish until task (A) starts.



Video 3: Learning Objectives

- Understand the relationship between estimating resources and project schedules
- Explain how various tools and techniques help project managers perform activity duration estimates
- Use a Gantt chart for planning and tracking schedule information

Estimating Activity Resources

- Before estimating activity durations, you must have a good idea of the quantity and type of resources that will be assigned to each activity; **resources** are people, equipment, and materials
- Consider important issues in estimating resources
 - How difficult will it be to do specific activities on this project?
 - What is the organization's history in doing similar activities?
 - Are the required resources available?
- A **resource breakdown structure** is a hierarchical structure that identifies the project's resources by category and type

Activity Duration Estimating

- **Duration** includes the actual amount of time worked on an activity *plus* elapsed time
- **Effort** is the number of workdays or work hours required to complete a task
- Effort does not normally equal duration
- People doing the work should help create estimates, and an expert should review them

Three-Point Estimates

- Instead of providing activity estimates as a discrete number, such as four weeks, it's often helpful to create a **three-point estimate**
 - an estimate that includes an optimistic, most likely, and pessimistic estimate, such as three weeks for the optimistic, four weeks for the most likely, and five weeks for the pessimistic estimate
- Three-point estimates are needed for PERT and Monte Carlo simulations

Program Evaluation and Review Technique (PERT)

- PERT is a network analysis technique used to estimate project duration when there is a high degree of uncertainty about the individual activity duration estimates
- PERT uses probabilistic time estimates
 - applies the critical path method (CPM) to a weighted average duration estimate
 - duration estimates based on using optimistic, most likely, and pessimistic estimates of activity durations, or a three-point estimate

PERT Formula and Example

- PERT weighted average =
optimistic time + 4X most likely time + pessimistic time

6

- Example:

PERT weighted average =

$$\frac{8 \text{ workdays} + 4 \times 10 \text{ workdays} + 24 \text{ workdays}}{6} = 12 \text{ days}$$

where optimistic time= 8 days

most likely time = **10 days**, and

pessimistic time = 24 days

Therefore, you'd use **12 days** on the network diagram instead of 10 when using PERT for the above example

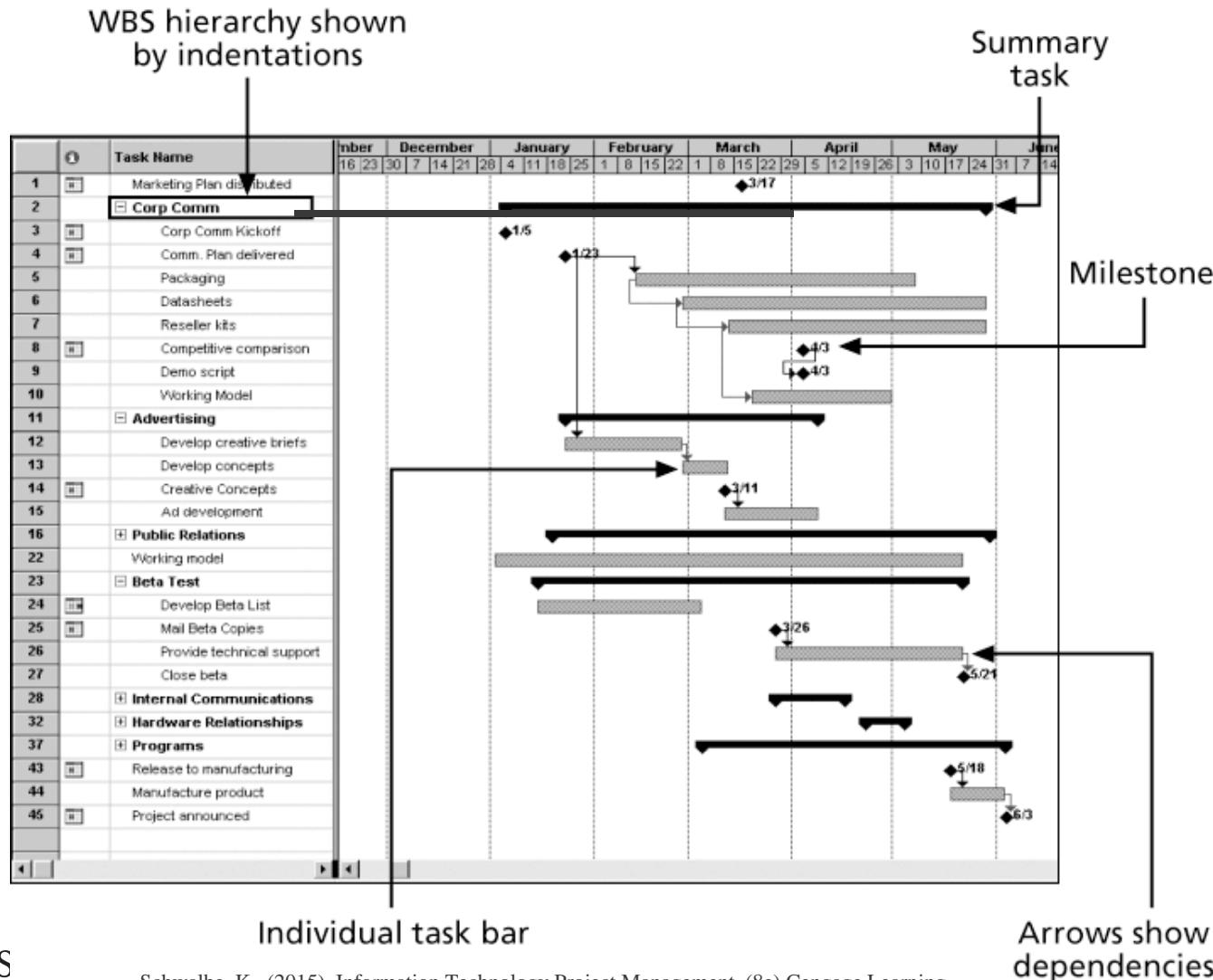
Developing the Schedule

- Uses results of the other time management processes to determine the start and end date of the project
- Ultimate goal is to create a realistic project schedule that provides a basis for monitoring project progress for the time dimension of the project
- Important tools and techniques include:
 - Gantt charts,
 - critical path analysis,
 - critical chain scheduling, and
 - PERT (Program Evaluation and Review Technique) analysis

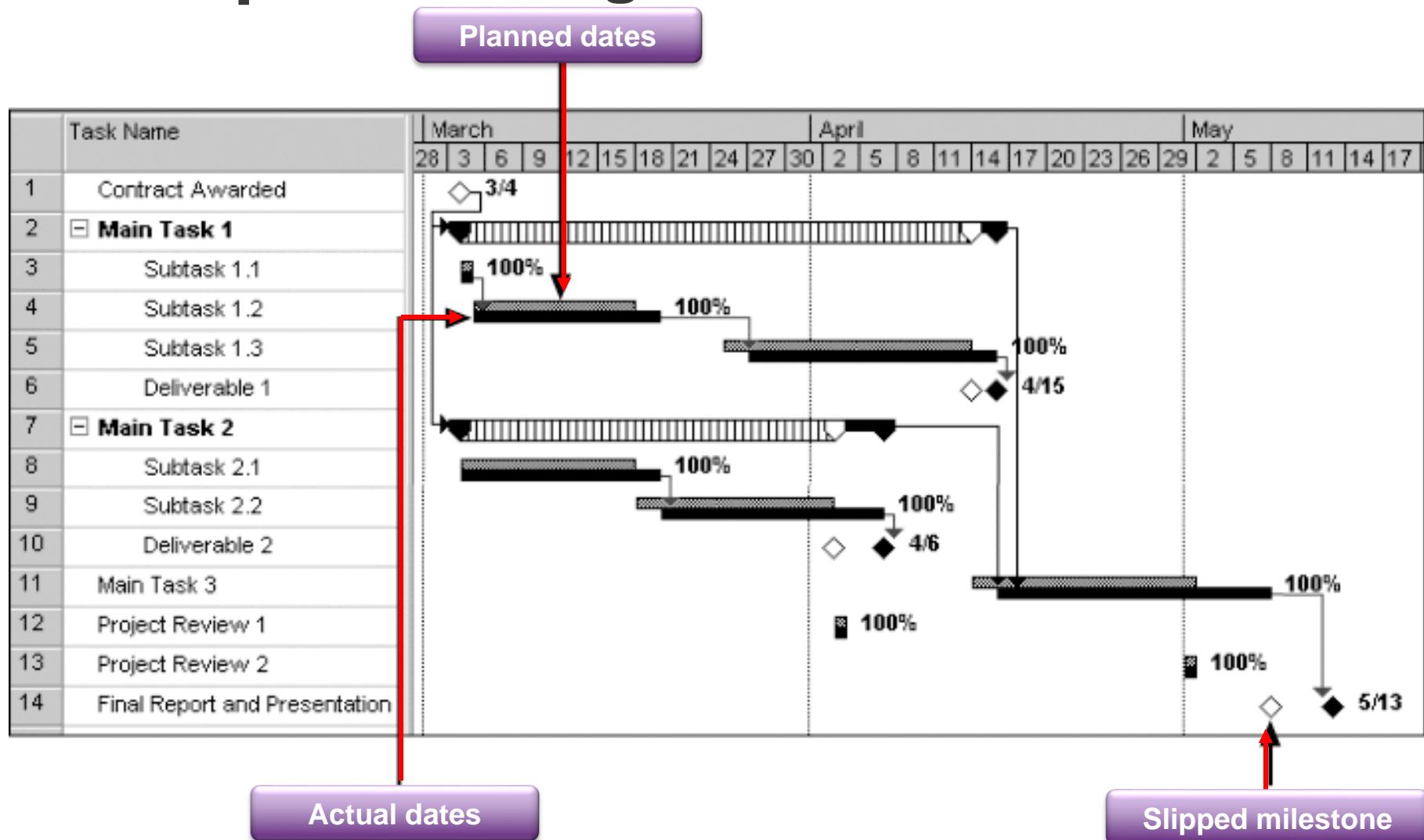
Gantt Charts

- Gantt charts provide a standard format for displaying project schedule information by listing project activities and their corresponding start and finish dates in a calendar format
- Adding Milestones to Gantt Charts
 - Milestones emphasize important events or accomplishments on projects
 - Normally create milestone by entering tasks with a zero duration, or you can mark any task as a milestone
- SMART Criteria – Milestones should be :
 - Specific
 - Measurable
 - Assignable
 - Realistic
 - Time-framed

An example of a Gantt Chart



Sample Tracking Gantt Chart



Supplementary Video – Critical Path Analysis

Learning Objectives

- Find the critical path for a project
- Describe how critical chain scheduling and the Program Evaluation and Review Technique (PERT) affect schedule development

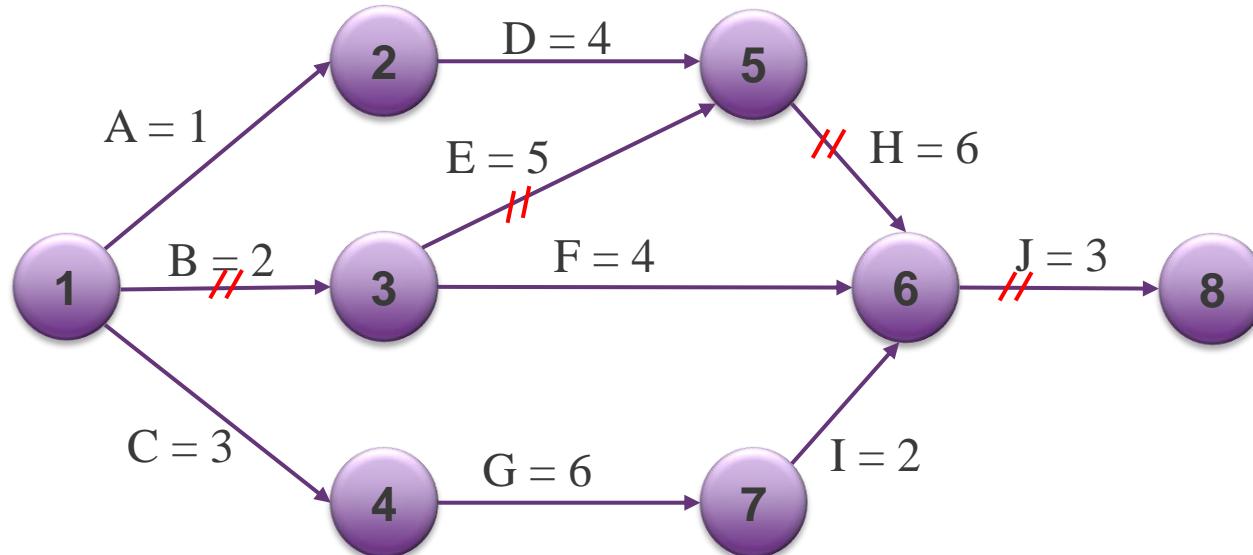
Critical Path Method (CPM)

- CPM is a network diagramming technique used to predict total project duration
- A critical path for a project is the series of activities that determines the *earliest time* by which the project can be completed
- The critical path is the *longest path* through the network diagram and has the least amount or zero slack or float
- Slack or float is the amount of time an activity may be delayed without delaying a succeeding activity or the project finish date

Calculating the Critical Path

- First develop a good network diagram
- Add the duration estimates for all activities on each path through the network diagram
- The longest path is the critical path
- If one or more of the activities on the critical path takes longer than planned, the whole project schedule will slip *unless* the project manager takes corrective action
- There can be more than one critical path if the lengths of two or more paths are the same
- The critical path can change as the project progresses

Determining the Critical Path



Note: Assume all durations are in days.

Path 1: A-D-H-J Length = $1+4+6+3 = 14$ days

Path 2: B-E-H-J Length = $2+5+6+3 = 16$ days

Path 3: B-F-J Length = $2+4+3 = 9$ days

Path 4: C-G-I-J Length = $3+6+2+3 = 14$ days

Since the critical path is the longest path through the network diagram, Path 2, B-E-H-J, is the critical path for Project X.

Using Critical Path Analysis to Make Schedule Trade-offs

- **Free slack or free float** is the amount of time an activity can be delayed without delaying the early start of any immediately following activities
- **Total slack or total float** is the amount of time an activity may be delayed from its early start without delaying the planned project finish date
- A **forward pass** through the network diagram determines the early start and finish dates
- A **backward pass** determines the late start and finish dates



Refer to supplementary video on Network Calculation

Network calculations

Legend:
 ES = early start
 EF = early finish
 LS = late start
 LF = late finish

FF	ES	Activity	EF
LS	Duration		LF

FF = Free Float
 TF = Total Float

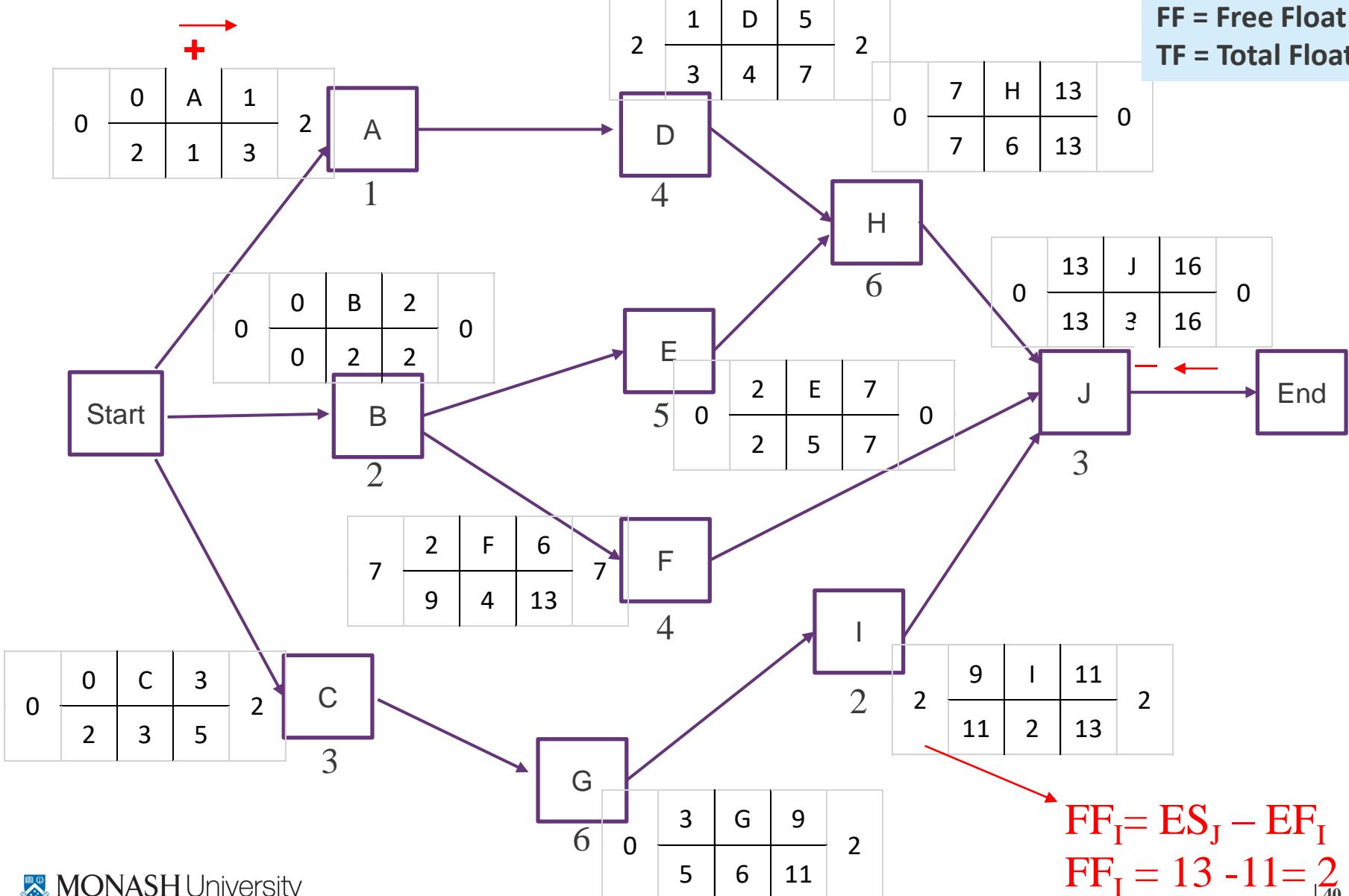


Table 6-1. Free and Total Float or Slack for

Task Name	Start	Finish	Late Start	Late Finish	Free Slack	Total Slack
A	8/3/15	8/3/15	8/5/15	8/5/15	0d	2d
B	8/3/15	8/4/15	8/3/15	8/4/15	0d	0d
C	8/3/15	8/5/15	8/5/15	8/7/15	0d	2d
D	8/4/15	8/7/15	8/6/15	8/11/15	2d	2d
E	8/5/15	8/11/15	8/5/15	8/11/15	0d	0d
F	8/5/15	8/10/15	8/14/15	8/17/15	7d	7d
G	8/6/15	8/13/15	8/10/15	8/17/15	0d	2d
H	8/12/15	8/19/15	8/12/15	8/19/15	0d	0d
I	8/14/15	8/17/15	8/18/15	8/19/15	2d	2d
J	8/20/15	8/24/15	8/20/15	8/24/15	0d	0d

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Using the Critical Path to Shorten a Project Schedule

- Three main techniques for shortening schedules
 - Shortening durations of critical activities/tasks by adding more resources or changing their scope
 - Crashing activities by obtaining the greatest amount of schedule compression for the least incremental cost
 - Fast tracking activities by doing them in parallel or overlapping them

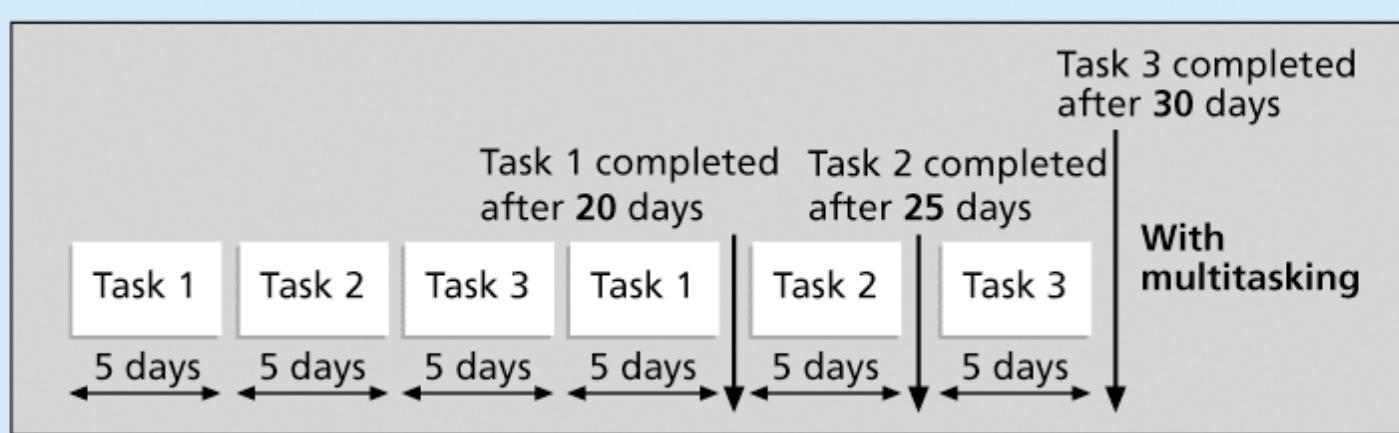
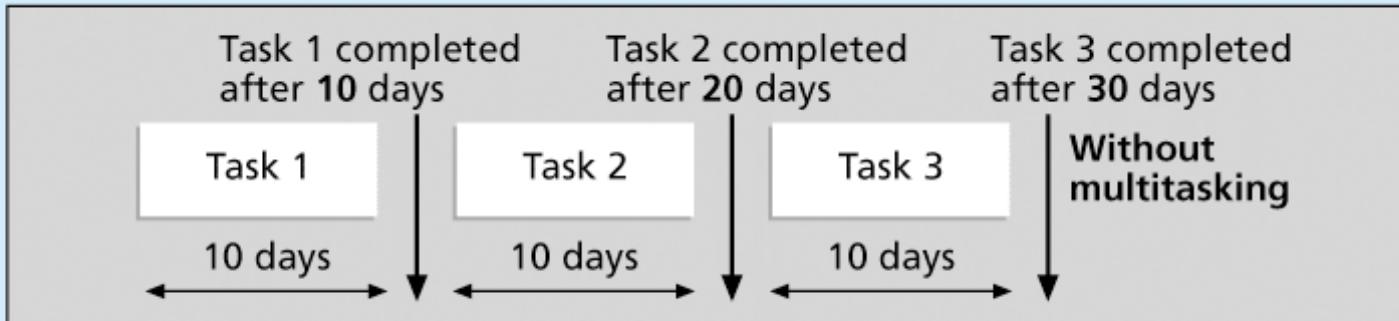
Importance of Updating Critical Path Data

- It is important to update project schedule information to meet time goals for a project
- The critical path may change as you enter actual start and finish dates
- If you know the project completion date will slip, negotiate with the project sponsor

Critical Chain Scheduling

- **Critical chain scheduling**
 - a method of scheduling that considers limited resources when creating a project schedule and includes buffers to protect the project completion date
- **Uses the Theory of Constraints (TOC)**
 - management philosophy developed by Eliyahu M. Goldratt and introduced in his book *The Goal* (www.goldratt.com)
 - improving other things besides the constraint does nothing to improve the system
 - an important concept is the availability of scarce resources.
- **Attempts to minimize multitasking**
 - when a resource works on more than one task at a time

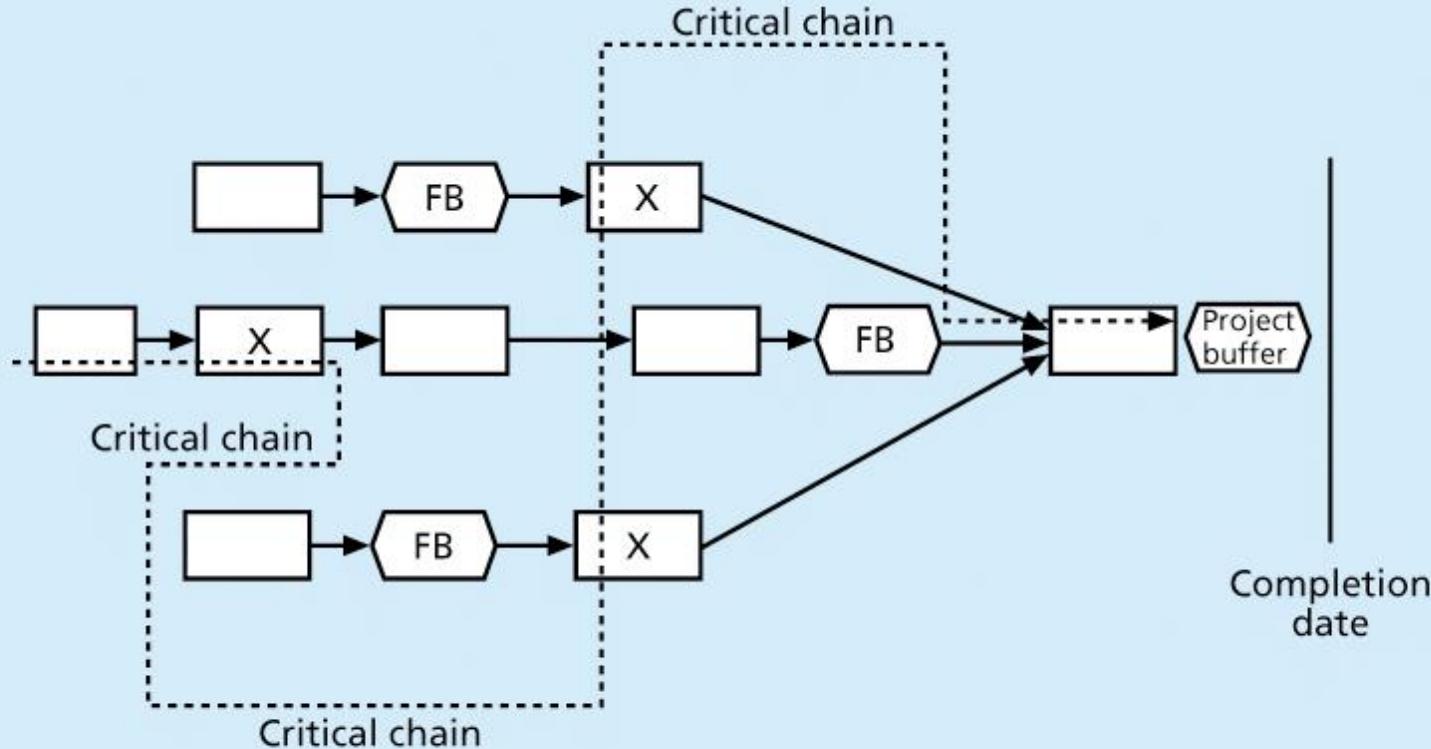
Multitasking Example



Buffers and Critical Chain

- In traditional estimates, people often add a buffer to each task and use it if it's needed or not
- A **buffer** is additional time to complete a task
- **Murphy's Law** states that if something can go wrong, it will
- **Parkinson's Law** states that work expands to fill the time allowed
- Critical chain scheduling removes buffers from individual tasks and instead creates
 - a **project buffer** or additional time added before the project's due date
 - **feeding buffers** or additional time added before tasks on the critical path

Example of Critical Chain Scheduling



X = Tasks done by limited resource
FB = Feeding buffer

Video 4: Learning Objectives

- Understand how time management is addressed using Agile
- Discuss how reality checks and discipline are involved in controlling and managing changes to the project schedule

Controlling the Schedule

- Goals are to know the status of the schedule, influence factors that cause schedule changes, determine that the schedule has changed, and manage changes when they occur
- Tools and techniques include
 - Progress reports
 - A schedule change control system
 - Project management software, including schedule comparison charts like the tracking Gantt chart
 - Variance analysis, such as analyzing float or slack
 - Performance management, such as earned value
 - Resource optimization techniques, such as resource leveling

Agile and Time Management

- Core values of the Manifesto for Agile Software Development are
 - Customer collaboration over contract negotiation
 - Responding to change over following a plan
- The product owner defines and prioritizes the work to be done within a sprint, so collaboration and time management are designed into the process
- Teams focus on producing a useful product in a specified timeframe with strong customer input
- Don't emphasize defining all the work before scheduling it

Schedule Control Suggestions

- Perform reality checks on schedules
- Allow for contingencies
- Don't plan for everyone to work at 100% capacity all the time
- Hold progress meetings with stakeholders and be clear and honest in communicating schedule issues

Reality Checks on Scheduling

- First review the draft schedule or estimated completion date in the project charter
- Prepare a more detailed schedule with the project team
- Make sure the schedule is realistic and followed
- High-level periodic reviews
- Alert top management well in advance if there are schedule problems

Working with People Issues

- Strong leadership helps projects succeed more than good PERT charts
- Project managers should use
 - empowerment
 - incentives
 - discipline
 - negotiation

Using Software to Assist in Time Management

- Software for facilitating communications helps people exchange schedule-related information
- Decision support models help analyze trade-offs that can be made
- Project management software can help in various time management areas

Lecture Summary

- Project time management is often cited as the main source of conflict on projects, and most IT projects exceed time estimates
- Main processes include
 - Plan schedule management
 - Define activities
 - Sequence activities
 - Estimate activity resources
 - Estimate activity durations
 - Develop schedule
 - Control schedule



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IT Project Management

Lecture 6
Project Cost Management

So Far...

Knowledge Areas	Project Management Process Group				
	Initiating	Planning	Executing	Monitoring & Controlling	Closing
Project Integration Management	1. Develop Project Charter	2. Develop Project Management Plan	3. Direct & manage project work 4. Manage Project Knowledge	5. Monitor & control project work	6. Close Project or Phase
Project Scope Management	Lecture 3	1. Plan Scope Management 2.. Collect requirements 3. Define Scope 4. Create WBS		5. Validate Scope; 6. Control Scope	
Project Schedule Management	Lecture 4	1. Plan Schedule Management 2. Define Activities 3. Sequence Activities 4. Estimate Activity Durations 5. Develop Schedule		6. Control Schedule	
Project Cost Management	Lecture 5			4. Control Costs	
	Lecture 6	1. Plan Cost Management 2. Estimate Costs 3. Determine Budget			



Video 1:

Learning Objectives

- Understand the importance of project cost management
- Discuss what project cost management involves
- Explain basic project cost management principles, concepts, and terms



The Importance of Project Cost Management

- IT projects have a poor track record for meeting budget goals
- A 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.
- The most important finding was the discovery of a large number of gigantic overages or “black swans” in IT projects
- A perceived reason for cost overruns is that many IT projects involve new technology or business processes and thus pose an inherent risk.
- However, using good project cost management can change this false perception.

What Went Wrong?

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

What is Cost and Project Cost Management?

- **Cost** is a resource sacrificed or foregone to achieve a specific objective or something given up in exchange
- Costs are usually measured in monetary units like dollars
- **Project cost management** includes the processes required to ensure that the **project** is completed within an **approved budget**



Project Cost Management Processes

- **Planning cost management**: determining the policies, procedures, and documentation that will be used for planning, executing, and controlling project cost.
- **Estimating costs**: developing an approximation or estimate of the costs of the resources needed to complete a project
- **Determining the budget**: allocating the overall cost estimate to individual work items to establish a baseline for measuring performance
- **Controlling costs**: controlling changes to the project budget

Figure 7-1. Project Cost Management

Planning

Process: **Plan cost management**

Outputs: Cost management plan

Process: **Estimate costs**

Outputs: Activity cost estimates, basis of estimates, project documents updates

Process: **Determine budget**

Outputs: Cost baseline, project funding requirements, project documents updates

Monitoring and Controlling

Process: **Control costs**

Outputs: Work performance information, cost forecasts, change requests, project management plan updates, project documents updates, organizational process assets updates

Project Start

Project Finish

Basic Principles of Cost Management

- Most members of an executive board better understand and are more interested in financial terms than IT terms , so **IT project managers must speak their language**
 - **Profits** are revenues minus expenditures
 - **Profit margin** is the ratio of revenues to profits
 - **Life cycle costing** considers the total cost of ownership, or development plus support costs, for a project
 - **Cash flow analysis** determines the estimated annual costs and benefits for a project and the resulting annual cash flow

Types of Costs and Benefits

- **Tangible costs or benefits** are those costs or benefits that an organisation can easily measure in dollars
- **Intangible costs or benefits** are costs or benefits that are difficult to measure in monetary terms
- **Direct costs** are costs that can be directly related to producing the products and services of the project
- **Indirect costs** are costs that are not directly related to the products or services of the project, but are indirectly related to performing the project
- **Sunk cost** is money that has been spent in the past; when deciding what projects to invest in or continue, you should *not* include sunk costs

More Basic Principles of Cost Management

- **Learning curve theory** states that when many items are produced repetitively, the unit cost of those items decreases in a regular pattern as more units are produced
- **Reserves** are dollars included in a cost estimate to mitigate cost risk by allowing for future situations that are difficult to predict
 - **Contingency reserves** allow for future situations that may be partially planned for (sometimes called **known unknowns**) and are included in the project cost baseline
 - **Management reserves** allow for future situations that are unpredictable (sometimes called **unknown unknowns**)

Video 2: Learning Objectives

- Describe the process of planning cost management
- Discuss different types of cost estimates



Project Cost Management Summary

Planning

Process: **Plan cost management**

Outputs: Cost management plan

Process: **Estimate costs**

Outputs: Activity cost estimates, basis of estimates, project documents updates

Process: **Determine budget**

Outputs: Cost baseline, project funding requirements, project documents updates

Monitoring and Controlling

Process: **Control costs**

Outputs: Work performance information, cost forecasts, change requests, project management plan updates, project documents updates, organizational process assets updates

Project Start

Project Finish



Planning Cost Management

- The project team uses expert judgment, analytical techniques, and meetings to develop the cost management plan
- A cost management plan includes:
 - Level of accuracy and units of measure
 - Organisational procedure links
 - Control thresholds
 - Rules of performance measurement
 - Reporting formats
 - Process descriptions



Estimating Costs

- Project managers must take cost estimates seriously if they want to complete projects within budget constraints
- Estimates are usually done at various stages of a project and should become more accurate as time progresses
- A large percentage of total project costs are often labor costs
- It's important to know the types of cost estimates, how to prepare cost estimates, and typical problems associated with IT cost estimates

Types of Cost Estimates

Type of Estimate	When Done	Why Done	How Accurate
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	Provides details for purchases, estimates actual costs	–5% to +10%



Cost Estimation Tools and Techniques

- Basic tools and techniques for cost estimates:
 - **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
 - **Parametric modeling** uses project characteristics (parameters) in a mathematical model to estimate project costs

Typical Problems with IT Cost Estimates

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

Surveyor Pro Project Cost Estimate

Surveyor Pro Project Cost Estimate Created October 5

	# Units/Hrs.	Cost/Unit/Hr.	Subtotals	WBS Level 2 Totals	% of Total
WBS Items					
1. Project Management				\$306,300	20%
Project manager	960	\$100	\$96,000		
Project team members	1920	\$75	\$144,000		
Contractors (10% of software development and testing)			\$66,300		
2. Hardware				\$76,000	5%
2.1 Handheld devices	100	\$600	\$60,000		
2.2 Servers	4	\$4,000	\$16,000		
3. Software				\$614,000	40%
3.1 Licensed software	100	\$200	\$20,000		
3.2 Software development*			\$594,000		
4. Testing (10% of total hardware and software costs)			\$69,000	\$69,000	5%
5. Training and Support				\$202,400	13%
Trainee cost	100	\$500	\$50,000		
Travel cost	12	\$700	\$8,400		
Project team members	1920	\$75	\$144,000		
6. Reserves (20% of total estimate)			\$253,540	\$253,540	17%
Total project cost estimate				\$1,521,240	

*See software development estimate.

Surveyor Pro Software Development Estimate

1. Labor Estimate	# Units/Hrs.	Cost/Unit/Hr.	Subtotals	Calculations
Contractor labor estimate	3000	\$150	\$450,000	$3000 * 150$
Project team member estimate	1920	\$75	\$144,000	$1920 * 75$
Total labor estimate			\$594,000	Sum above two values
2. Function point estimate	Quantity	Conversion Factor	Function Points	Calculations
External inputs	10	4	40	$10 * 4$
External interface files	3	7	21	$3 * 7$
External outputs	4	5	20	$4 * 5$
External queries	6	4	24	$6 * 4$
Logical internal tables	7	10	70	$7 * 10$
Total function points			175	Sum above function point values
Java 2 language equivalency value			46	Assumed value from reference
Source lines of code (SLOC) estimate			8,050	$175 * 46$
Productivity \times KSLOC $^{\wedge}$ Penalty (in months)			29.28	$3.13 * 8.05^{\wedge}1.072$ (see reference)
Total labor hours (27 hours/function point)*			4,725	$27 * 175$
Cost/labor hour (\$120/hour)			\$120	Assumed value from budget expert
Total function point estimate			\$567,000	$4,725 * 120$

* Based on historical data

Video 3: Learning Objectives

- Understand the processes of determining a budget and preparing a cost estimate for an information technology (IT) project
- Understand the benefits of earned value management and project portfolio management to assist in cost control



Project Cost Management Summary

Planning

Process: **Plan cost management**

Outputs: Cost management plan

Process: **Estimate costs**

Outputs: Activity cost estimates, basis of estimates, project documents updates

Process: **Determine budget**

Outputs: Cost baseline, project funding requirements, project documents updates

Monitoring and Controlling

Process: **Control costs**

Outputs: Work performance information, cost forecasts, change requests, project management plan updates, project documents updates, organizational process assets updates

Project Start

Project Finish



Determining the Budget

- **Cost budgeting** involves allocating the project cost estimate to individual work items over time
- The WBS is a required input to the cost budgeting process since it defines the work items
- Important goal is to produce a **cost baseline**
 - a time-phased budget that project managers use to measure and monitor cost performance
 - Team members should document any assumptions made when developing the cost baseline

Surveyor Pro Project Cost Baseline

Surveyor Pro Project Cost Baseline Created October 10*

WBS Items	1	2	3	4	5	6	7	8	9	10	11	12	Totals
1. Project Management													
1.1 Project manager	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000	96,000
1.2 Project team members	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	144,000
1.3 Contractors		6,027	6,027	6,027	6,027	6,027	6,027	6,027	6,027	6,027	6,027	6,027	66,300
2. Hardware													
2.1 Handheld devices				30,000	30,000								60,000
2.2 Servers					8,000	8,000							16,000
3. Software													
3.1 Licensed software				10,000	10,000								20,000
3.2 Software development	60,000	60,000	80,000	127,000	127,000	90,000	50,000						594,000
4. Testing			6,000	8,000	12,000	15,000	15,000	13,000					69,000
5. Training and Support													
5.1 Trainee cost									50,000				50,000
5.2 Travel cost									8,400				8,400
5.3 Project team members							24,000	24,000	24,000	24,000	24,000	24,000	144,000
6. Reserves				10,000	10,000	30,000	30,000	60,000	40,000	40,000	30,000	3,540	253,540
Totals	20,000	86,027	92,027	172,027	223,027	198,027	185,027	173,027	148,427	90,027	80,027	53,567	1,521,240

*See the lecture slides for this chapter on the companion Web site for a larger view of this and other figures in this chapter. Numbers are rounded, so some totals appear to be off.



Controlling Costs

- Project cost control includes
 - Monitoring cost performance
 - Ensuring that only appropriate project changes are included in a revised cost baseline
 - Informing project stakeholders of authorised changes to the project that will affect costs
- Change control system to define procedures for changing the cost baseline is necessary
- Tools and techniques to assist in project cost control:
 - Performance review meetings
 - Performance measurement – Earned value management (EVM)



Earned Value Management (EVM)

- **EVM** is a project performance measurement technique that integrates scope, time, and cost data
- Given a **baseline** (original plan plus approved changes), you can determine how well the project is meeting its goals
- You must enter actual information periodically to use EVM
 - whether or not a WBS item was completed
 - how much of the work was completed
 - how much the completed work actually cost

Earned Value Management Terms

- The **planned value (PV)**, formerly called the budgeted cost of work scheduled (BCWS), also **called the budget**, is that portion of **the approved total cost estimate planned to be spent** on an activity during a given period
- **Actual cost (AC)**, formerly called actual cost of work performed (ACWP), is the **total of direct and indirect costs incurred in accomplishing work** on an activity during a given period
- The **earned value (EV)**, formerly called the budgeted cost of work performed (BCWP), is an estimate of the value of the physical work actually completed
- **EV is based on the original planned costs for the project or activity and the rate at which the team is completing work** on the project or activity to date

Rate of Performance

- **Rate of performance (RP)** is the ratio of actual work completed to the percentage of work planned to have been completed at any given time during the life of the project or activity
- Brenda Taylor, Senior Project Manager in South Africa, suggests this term and approach for estimating earned value
- For example, suppose the server installation was halfway completed by the end of week 1. The rate of performance would be 50% because by the end of week 1, the planned schedule reflects that the task should be 100 percent complete and only 50 percent of that work has been completed

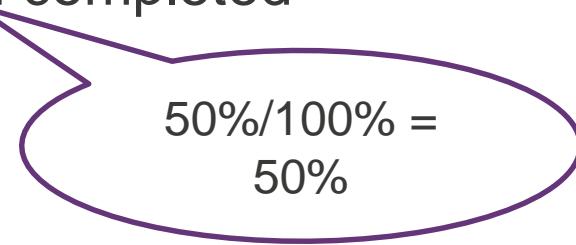

$$50\%/100\% = 50\%$$

Table 7-3. Earned Value Calculations for One Activity After Week One

ACTIVITY	WEEK 1
Earned Value (EV)	5,000
Planned Value (PV)	10,000
Actual Cost (AC)	15,000
Cost Variance (CV)	-10,000
Schedule Variance (SV)	-5,000
Cost Performance Index (CPI)	33%
Schedule Performance Index (SPI)	50%

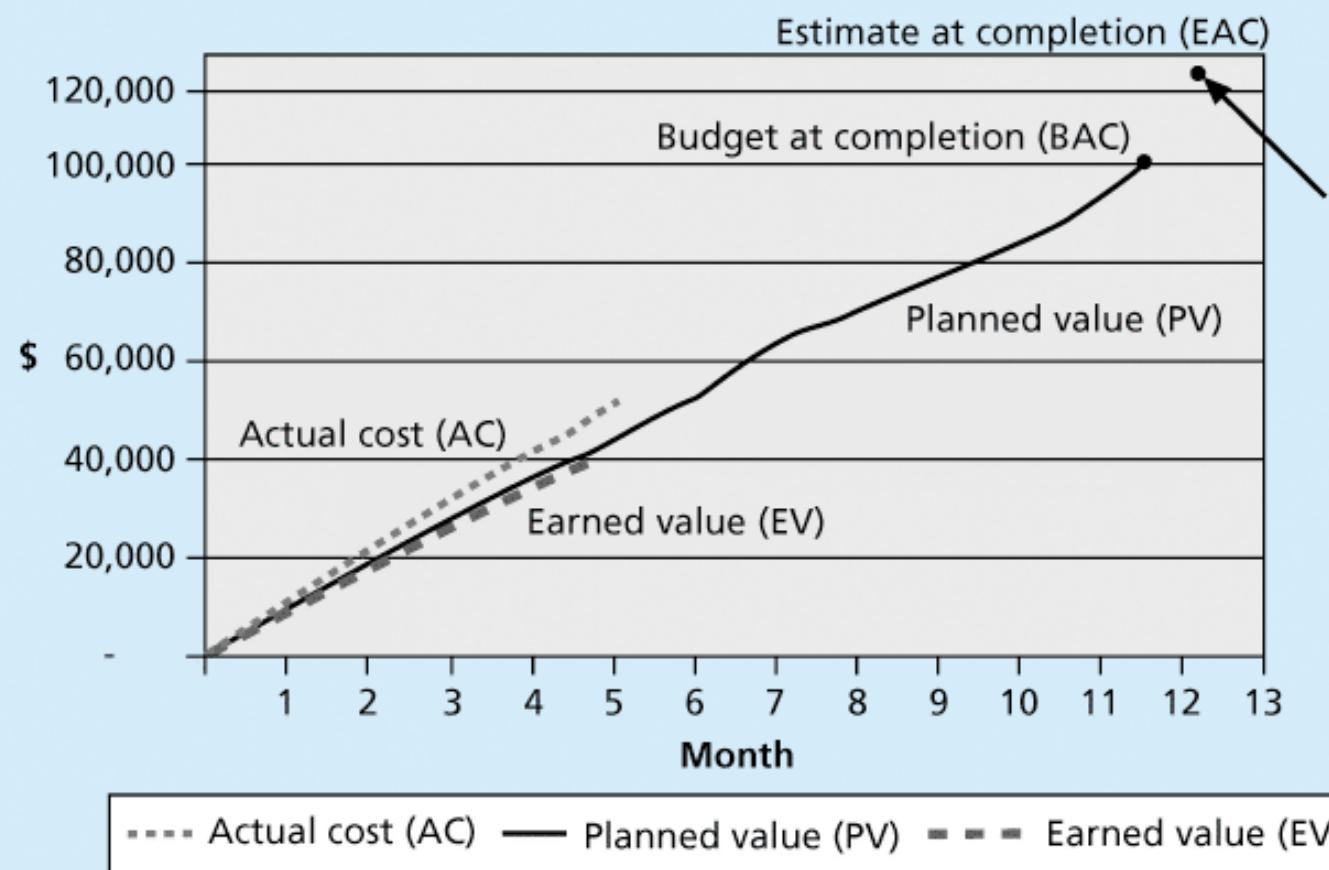
Table 7-4. Earned Value Formulas

Term	Formula
Earned value (EV)	$EV = PV \text{ to date} * RP$
Cost variance (CV)	$CV = EV - AC$
Schedule variance (SV)	$SV = EV - PV$
Cost performance index (CPI)	$CPI = EV/AC$
Schedule performance index (SPI)	$SPI = EV/PV$
Estimate at completion (EAC)	$EAC = BAC/CPI$
Estimated time to complete	Original time estimate/SPI

Rules of Thumb for Earned Value Numbers

- Negative numbers for cost and schedule variance indicate problems in those areas
- CPI and SPI less than 100% indicate problems
- Problems mean the project is costing more than planned (over budget) or taking longer than planned (behind schedule)
- The CPI can be used to calculate the **estimate at completion** (EAC)—an estimate of what it will cost to complete the project based on performance to date.
- The **budget at completion** (BAC) is the original total budget for the project

Earned Value Chart for Project after Five Months



Project Portfolio Management

- Many organisations collect and control an entire suite of projects or investments as one set of interrelated activities in a portfolio
- Five levels for project portfolio management
 1. Put all your projects in one database
 2. Prioritize the projects in your database
 3. Divide your projects into two or three budgets based on type of investment
 4. Automate the repository
 5. Apply modern portfolio theory, including risk-return tools that map project risk on a curve



Benefits of Portfolio Management

- Schlumberger saved \$3 million in one year by organizing 120 information technology projects into a portfolio
- Reduced redundant projects and coordinated those with overlap
- IT projects can be huge investments, so it makes sense to view them as portfolios and track their progress as a whole
- Portfolio management software can help reduce costs
- Brandon Stewart (Borland):
 - “The most successful organisations are taking a holistic view of focusing, managing, and measuring their IT efforts...Portfolio management enables IT to make fact-based investment decisions in unison with business stakeholders, thus ensuring alignment, improving visibility, and shifting the burden of investment decisions from the CIO to all stakeholders.”

Best Practice

- Alvin Alexander wrote a book called *Cost Estimating in an Agile Development Environment* in 2015
- Function points are a means of measuring software size in terms that are meaningful to end users
- User stories are a common way to describe requirements in a simple, concise way
- Developers can analyse user stories to estimate function points and person-hours

Ref: Alvin Alexander, *Cost Estimating in an Agile Development Environment* (2015).

alvinalexander.com/downloads/Book3-EstimatingInAnAgileDevelopmentEnvironment.pdf

David Longsteet. “Function Points?” www.softwaremetrics.com/files/OneHour.pdf, p.16

Video 4: Learning Objectives

- Explore the difference between traditional and agile cost management



What's different between traditional and Agile Cost Management

Traditional Approach	Agile Approach
Cost (like time), is based on fixed scope.	Project schedule, not scope, has the biggest impact on cost.
Organisations estimate project costs and fund projects before the project starts.	Product owners often secure project funding after the product roadmap stage is complete and sometimes even fund agile projects one release at a time.
New requirements would most likely mean higher costs. Therefore, cost overruns are common.	Project teams can replace lower-priority requirements with new, equivalently-sized high-priority requirements with no impact on time or cost.

What's different between traditional and Agile Cost Management (cont...)

Traditional Approach	Agile Approach
Scope bloat may happen and so money wasted on features that is not required.	Only the product features that users really need are created as agile development teams complete requirements by priority.
Projects cannot generate revenue until the project is complete.	Project teams can release working, revenue-generating functionality early, creating a self-funding project.

Managing Cost in Agile

- In agile projects, cost is mostly a direct expression of project time
- Quite easy to determine team cost – as scrum teams consist of full-time, dedicated team members, they have a set team cost that should be the same for each sprint.
- Once we estimate the velocity (development speed), we can determine how many sprints the project will take (i.e. how long the project will be) and thus how much the scrum team will cost for the whole project.
- Other project cost includes the cost for resources like hardware, software, licenses, and other supplies needed to complete the project.

Ways to lower project costs (in Agile)

- **Self-funding project**
- Lowering cost by increasing velocity
 - Eg: Product backlog contains 300 story points
Development team velocity ~ 10 story points per sprint
Project duration = 60 weeks
Cost: \$20,000 per 2-week sprint → Total = \$600,000
→ Increasing velocity from 10 to 12, project duration will be shortened to 50 weeks ($300/12 \times 2$) → Total cost = \$500,000
- Lowering cost by reducing time
 - Lowering the number of sprints required by not completing lower-priority requirements

No. of sprints = $300/10 = 30$ sprints

If 2-week sprint = $30 \times 2 = 60$ weeks



MONASH University

Information Technology

FIT2002

IT Project Management

Lecture 7
Project Risk Management

Video 1:

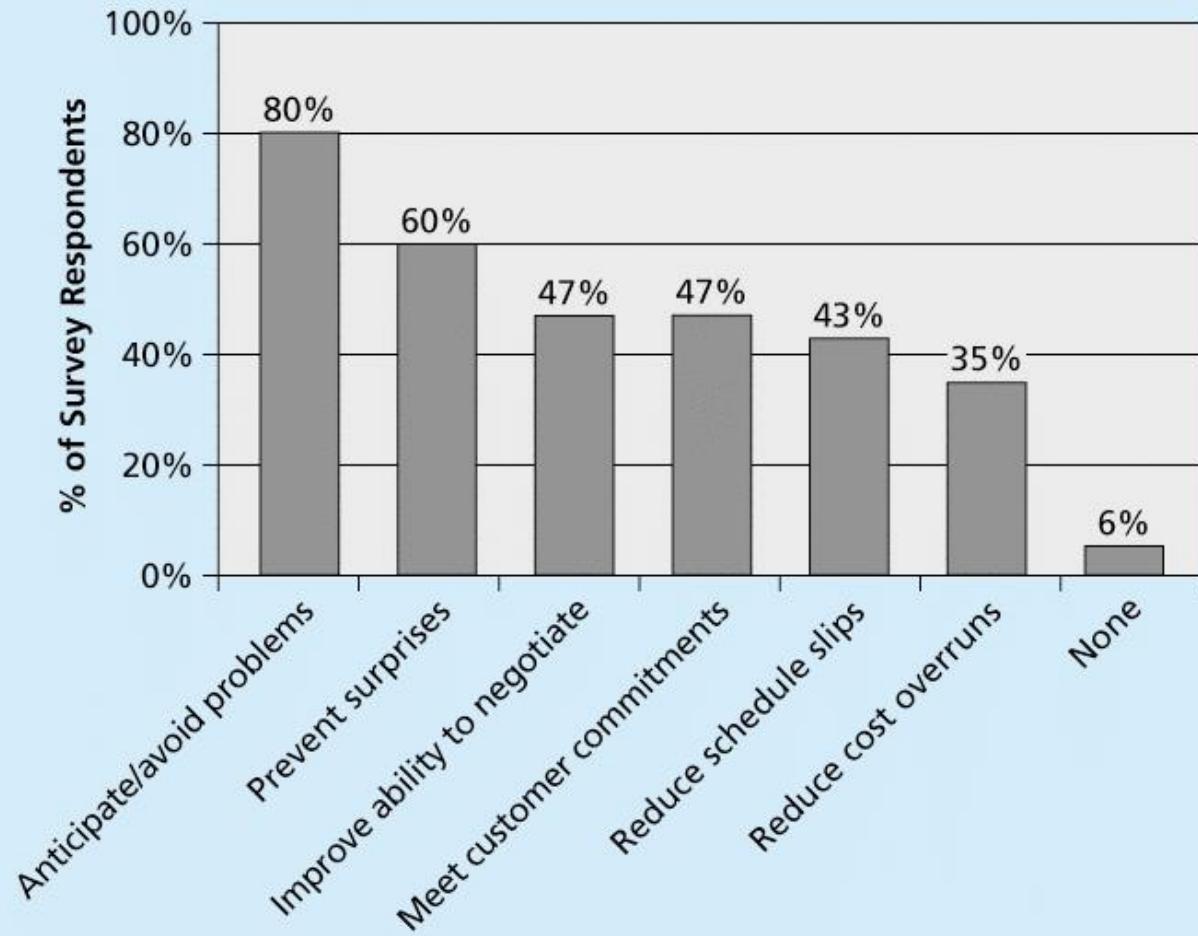
Learning Objectives

- Understand risk and the importance of good project risk management
- Discuss the elements of planning risk management and the contents of a risk management plan

The Importance of Project Risk Management

- Project risk management is the art and science of identifying, analysing, 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
- Helps project stakeholders understand the nature of the project, and helps to integrate other project management knowledge areas.

Benefits from Software Risk Management Practices*



*Source: Kulik and Weber, KLCI Research Group

Global Issues

- According to a global survey of 316 financial services executives, over 70 percent of respondents believed that the losses stemming from the credit crisis were largely due to failures to address risk management issues
- Worldwide banking and insurance sectors will spend about \$78.6 billion on risk information technologies and services in 2015, growing to \$96.3 billion by 2018

Negative Risk

- A dictionary definition of risk is “the possibility of loss or injury”
- **Negative risk** involves understanding potential problems that might occur in the project and how they might impede project success
- Managing negative risks involves a number of possible actions such as to **avoid, lessen, change, or accept** the potential effects of risks on projects

Risk Can Be Positive

- Positive risks are risks that result in good things happening; sometimes called opportunities
- A general definition of project risk is an uncertainty that can have a negative or positive effect on meeting project objectives
- The goal of project risk management is to minimize potential negative risks while maximizing potential positive risks

Risk Management

- Risk management is an investment—costs are associated with it
- Cost for risk management should not exceed the potential benefits
- Organisation should not only address tactical and negative risks
- David Hillson, (www.risk-doctor.com) suggests to as integrated risk management by widening the scope of risk management to encompass both strategic risks and upside opportunities

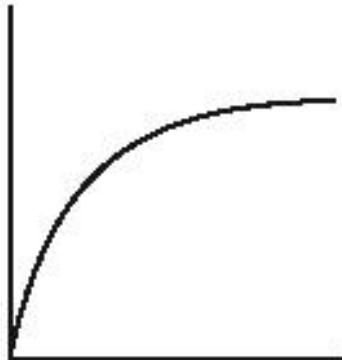
Some ‘Risk’ Terms

- **Risk appetite** – the degree of uncertainty an entity is willing to take on, in anticipation of a reward
- **Risk tolerance** – the maximum acceptable deviation an entity is willing to accept as the potential impact.
- **Risk utility** is the amount of satisfaction or pleasure received from a potential payoff
- **Known risks** – Risks that the project team has identified and analyzed and that can be managed proactively.
- **Unknown risks** – Risks that have not been identified and analysed and cannot be managed.

Risk Utility Function and Risk Preference

Risk-Averse

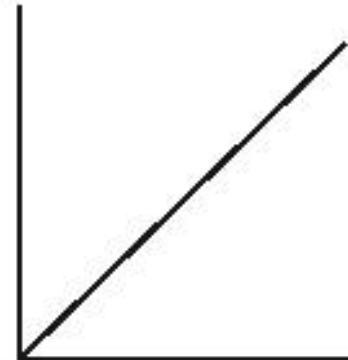
utility



potential payoff

Risk-Neutral

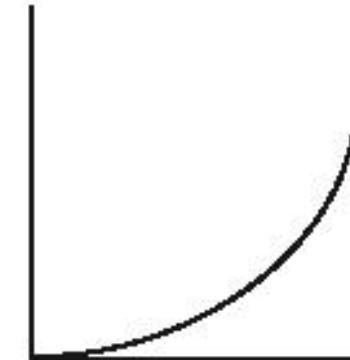
utility



potential payoff

Risk-Seeking

utility



potential payoff

Utility rises at a decreasing rate for people who are risk-averse

Risk-neutral approach achieves a balance between risk and payoff

Risk-seekers have a higher tolerance for risk & satisfaction increases with higher payoffs



Project Risk Management Processes

- **Planning risk management** : Deciding how to approach and plan the risk management activities for the project
- **Identifying risks**: Determining which risks are likely to affect a project and documenting the characteristics of each
- **Performing qualitative risk analysis**: Prioritizing risks based on their probability and impact of occurrence

Project Risk Management Processes (cont'd)

- **Performing quantitative risk analysis:** Numerically estimating the effects of risks on project objectives
- **Planning risk responses:** Taking steps to enhance opportunities and reduce threats to meeting project objectives
- **Controlling risk:** Monitoring identified and residual risks, identifying new risks, carrying out risk response plans, and evaluating the effectiveness of risk strategies throughout the life of the project

Project Risk Management Summary

Planning

Process: **Plan risk management**

Outputs: Risk management plan

Process: **Identify risks**

Outputs: Risk register

Process: **Perform qualitative risk analysis**

Outputs: Project documents updates

Process: **Perform quantitative risk analysis**

Outputs: Project documents updates

Process: **Plan risk responses**

Outputs: Project management plan updates, project documents updates

Monitoring and Controlling

Process: **Control risks**

Outputs: Work performance information, change requests, project management plan updates, project documents updates, organizational process assets updates

Project Start

Project Finish

Planning Risk Management

- The main output of this process is a **risk management plan**—a plan that documents the procedures for managing risk throughout a project
- The project team should review project documents and understand the organization's and the sponsor's approaches to risk
- The level of detail will vary with the needs of the project

Topics Addressed in a Risk Management Plan

- Methodology
- Roles and responsibilities
- Budget and schedule
- Risk categories
- Risk probability and impact
- Revised stakeholders' tolerances
- Tracking
- Risk documentation

Video 2: Learning Objectives

- Discuss the different categories of risk
- Describe a risk breakdown structure
- Describe the process of identifying risks and create a risk register (in supplementary video)

IT Success Potential Scoring Sheet

Success Criterion	Relative Importance
User Involvement	19
Executive Management support	16
Clear Statement of Requirements	15
Proper Planning	11
Realistic Expectations	10
Smaller Project Milestones	9
Competent Staff	8
Ownership	6
Clear Visions and Objectives	3
Hard-Working, Focused Staff	3
Total	100



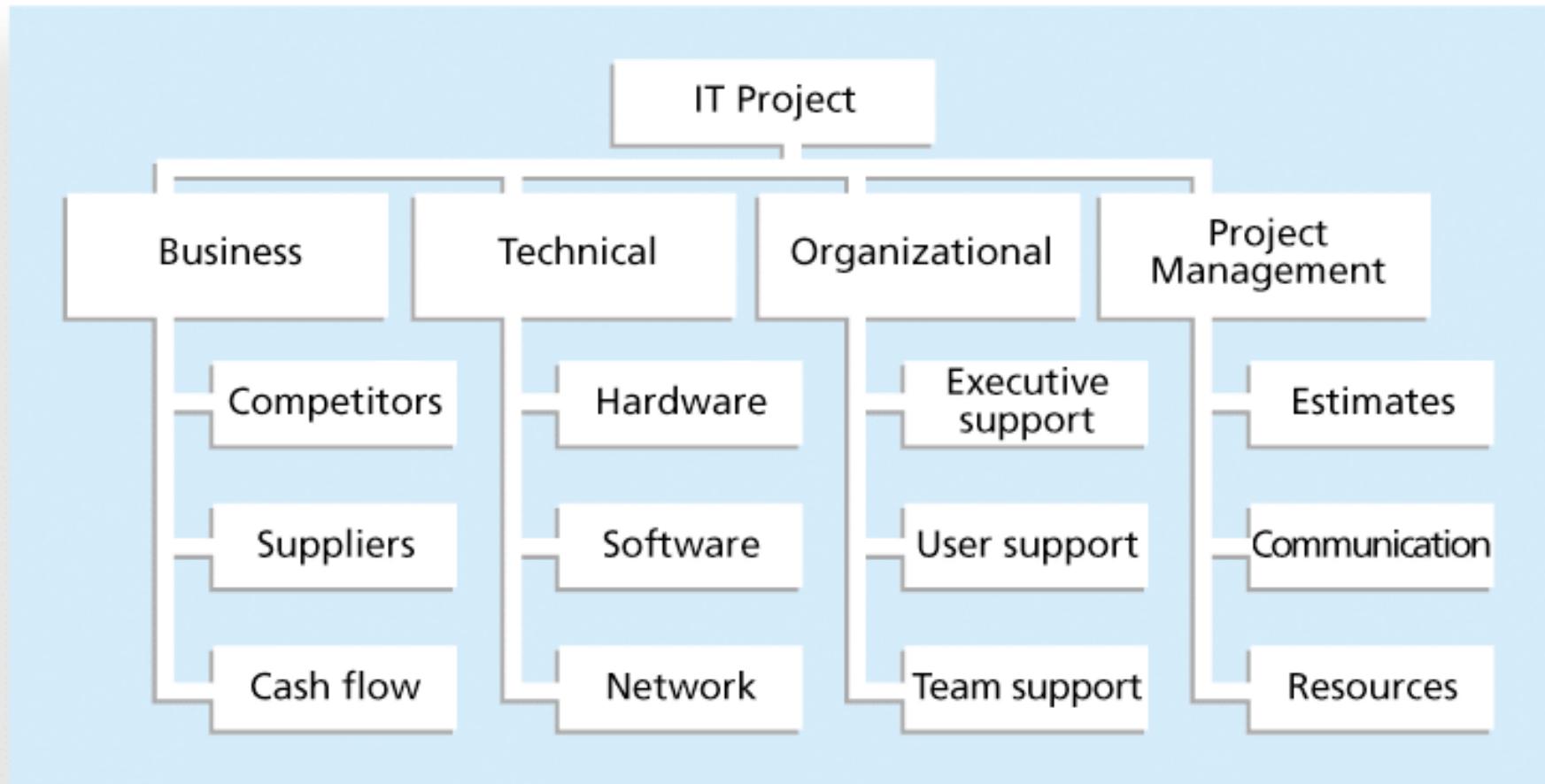
Broad Categories of Risk

- Market risk
- Financial risk
- Technology risk
- People risk
- Structure/process risk

Risk Breakdown Structure

- A **risk breakdown structure** is a hierarchy of potential risk categories for a project
- Similar to a work breakdown structure but used to identify and categorize risks

Sample Risk Breakdown Structure



Potential Negative Risk Conditions Associated With Each Knowledge Area

Knowledge Area	Risk Conditions
<i>Integration</i>	Inadequate planning; poor resource allocation; poor integration management; lack of post-project review
<i>Scope</i>	Poor definition of scope or work packages; incomplete definition
<i>Time</i>	Errors in estimating time or resource availability; errors in determining the critical path; poor allocation and management of float; early release of competitive products
<i>Cost</i>	Estimating errors; inadequate productivity, cost, change, or contingency
<i>Quality</i>	Poor attitude toward quality; substandard design, materials, and workmanship; inadequate quality assurance program
<i>Human resource</i>	Poor conflict management; poor project organization and definition of responsibilities; absence of leadership
<i>Communications</i>	Carelessness in planning or communicating
<i>Risk</i>	Ignoring risk; unclear analysis of risk; poor insurance management
<i>Procurement</i>	Unenforceable conditions or contract clauses; adversarial relations
<i>Stakeholders</i>	Lack of consultation with key stakeholder

Identifying Risks

- Identifying risks is the process of understanding what potential events might hurt or enhance a particular project
- Another consideration is the likelihood of advanced discovery
- Risk identification tools and techniques include:
 - Brainstorming
 - The Delphi Technique
 - Interviewing
 - SWOT analysis

Brainstorming

- **Brainstorming** is a technique by which a group attempts to generate ideas or find a solution for a specific problem by amassing ideas spontaneously and without judgment
- An experienced facilitator should run the brainstorming session
- Be careful not to overuse or misuse brainstorming.
 - Psychology literature shows that individuals produce a greater number of ideas working alone than they do through brainstorming in small, face-to-face groups
 - Group effects often inhibit idea generation

Delphi Technique

- The **Delphi Technique** is used to derive a consensus among a panel of experts
- It is a **systematic, interactive** procedure based on independent and **anonymous** input from project risk experts.
- Facilitator uses repeated rounds of questioning and written responses and consensus may be reached in a few rounds of this process
- It avoids the biasing effects possible in oral methods, such as brainstorming

Interviewing

- **Interviewing** is a fact-finding technique for collecting information in face-to-face, phone, e-mail, or instant-messaging discussions
- Interviewing people with similar project experience or stakeholders and subject matter experts is an important tool for identifying potential risks

Root Cause Analysis and SWOT Analysis

- **Root cause analysis** – a technique used to identify a problem, discover the underlying causes and then develop preventive measures
- **SWOT analysis** (strengths, weaknesses, opportunities, and threats) can also be used during risk identification
- SWOT analysis helps identify the broad negative and positive risks that apply to a project

Diagramming Techniques

- **Cause and effect diagrams** – also known as Ishikawa or fishbone diagram
- **Systems or process flowchart** – show how various elements of a system interrelate
- **Influence diagram** – showing causal influences and relationships among variables and outcomes

Risk Register

- The main output of the risk identification process is a list of identified risks and other information needed to begin creating a risk register
- A **risk register** is:
 - A document that contains the results of various risk management processes often presented in a table
 - A tool for documenting potential risk events and related information
- **Risk events** refer to specific, uncertain events that may occur
 - to the detriment (due to negative risk event) or
 - enhancement (due to positive risk event) of the project

Sample Risk Register

No.	Rank	Risk Description	Category	Root Cause	Triggers	Potential Responses	Risk	Probability	Impact	Status
R44	1									
R21	2									
R7	3									

- No.: R44
- Rank: 1
- Risk: New customer
- Description: We have never done a project for this organization before and don't know too much about them. One of our company's strengths is building good customer relationships, which often leads to further projects with that customer. We might have trouble working with this customer because they are new to us.
- Category: People risk
- Etc.

Risk Register **Contents**

- An **identification number** for each risk event
- A **rank** for each risk event
- The **name** of each risk event
- A **description** of each risk event
- The **category** under which each risk event falls
- The **root cause** of each risk

Risk Register Contents (cont'd)

- Triggers for each risk; **triggers** are indicators or **symptoms of actual risk events**
- Potential responses to each risk
- The **risk owner** or person who will own or take responsibility for each risk
- The probability and impact of each risk occurring.
- The status of each risk

Video 3: Learning Objectives

- Discuss qualitative risk analysis
- Explain how to calculate risk factors, create probability/impact matrixes and apply the Top Ten Risk Item Tracking technique to rank risks

Performing Qualitative Risk Analysis

- Assess the likelihood and impact of identified risks to determine their magnitude and priority
- Risk quantification tools and techniques include:
 - Probability/impact matrixes
 - The Top Ten Risk Item Tracking
 - Expert judgment

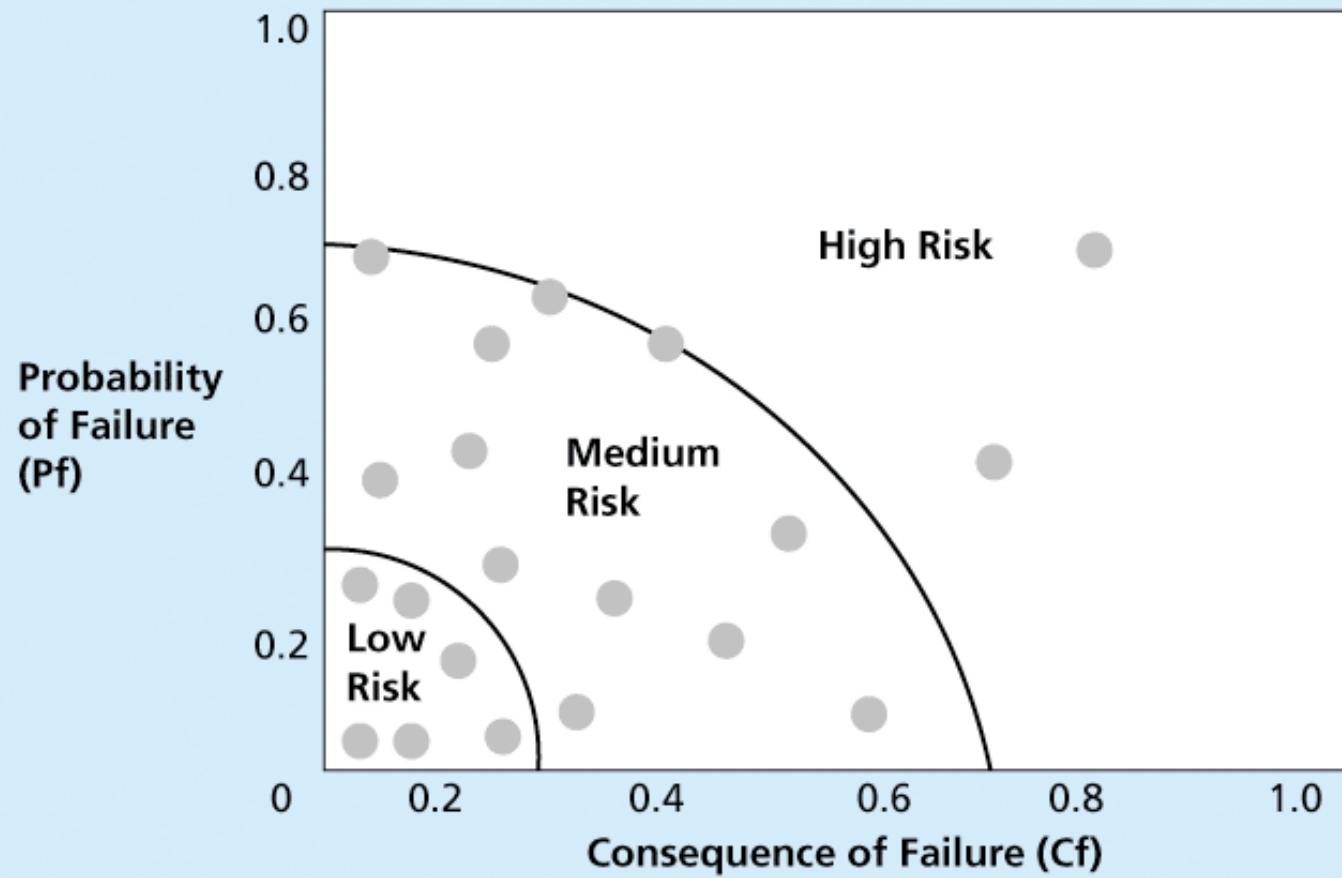
Probability/Impact Matrix

- A **probability/impact matrix or chart** lists the **relative probability** of a risk occurring on one side of a matrix or axis on a chart and the **relative impact of the risk** occurring on the other
- List the **risks** and then label each one as **high, medium, or low** in terms of its **probability of occurrence** and its **impact if it did occur**
- Can also calculate **risk factors**:
 - Numbers that represent the overall risk of specific events based on their probability of occurring and the consequences to the project if they do occur

Sample Probability/Impact Matrix

Probability	Low	Medium	High
Low	risk 6	risk 9	risk 1 risk 4
Medium	risk 3 risk 7	risk 2 risk 5 risk 11	
High		risk 8 risk 10	risk 12

Chart Showing High-, Medium-, and Low-Risk Technologies



Top Ten Risk Item Tracking

- **Top Ten Risk Item Tracking** is a qualitative risk analysis tool that helps to identify risks and maintain an awareness of risks throughout the life of a project
- Establish a periodic review of the top ten project risk items
- List the current ranking, previous ranking, number of times the risk appears on the list over a period of time, and a summary of progress made in resolving the risk item

Example of Top Ten Risk Item Tracking

MONTHLY RANKING

RISK EVENT	RANK THIS MONTH	RANK LAST MONTH	NUMBER OF MONTHS IN TOP TEN	RISK RESOLUTION PROGRESS
Inadequate planning	1	2	4	Working on revising the entire project management plan
Poor definition	2	3	3	Holding meetings with project customer and sponsor to clarify scope
Absence of leadership	3	1	2	After previous project manager quit, assigned a new one to lead the project
Poor cost estimates	4	4	3	Revising cost estimates
Poor time estimates	5	5	3	Revising schedule estimates

Risk Management Review

- **Objectives** of risk management review:
 - keeps management (and probably customer) aware of major influences that could prevent or enhance the project's success;
 - to consider alternative strategies for addressing the risks;
 - promotes confidence in the project team by demonstrating that the team is aware of significant risks, has a strategy in place and is effectively carrying out that strategy
- A **watch list** is a list of risks that are low priority, but are still identified as potential risks
- Qualitative analysis can also identify risks that should be evaluated on a quantitative basis

Video 4: Learning Objectives

- Explain quantitative risk analysis and
- How to apply decision trees, simulation, and sensitivity analysis to quantify risks

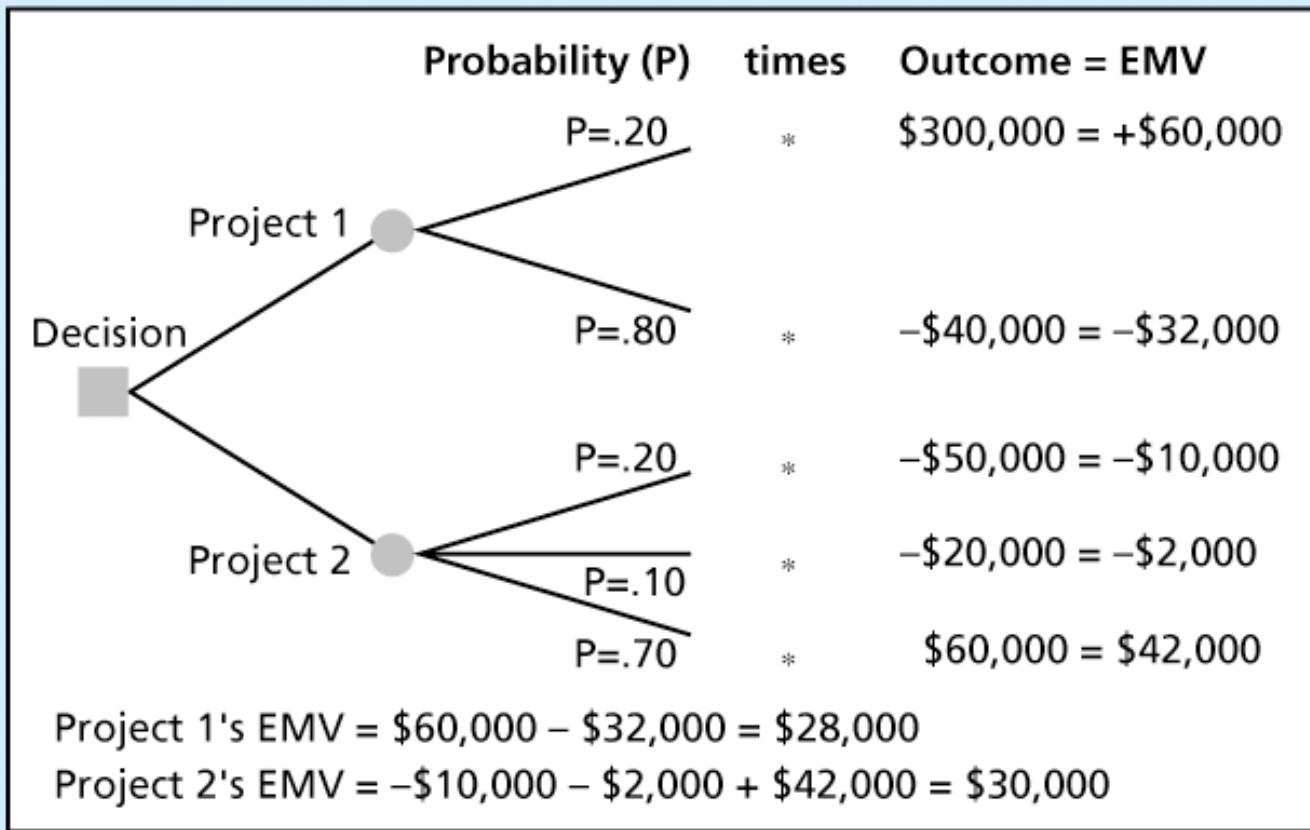
Performing Quantitative Risk Analysis

- Often follows qualitative risk analysis, but both can be done together
- Large, complex projects involving leading edge technologies often require extensive quantitative risk analysis
- Main techniques include:
 - Data gathering
 - Interviewing experts
 - collecting probability distribution information
 - Analysis and modelling techniques:
 - Decision tree analysis
 - Simulation
 - Sensitivity analysis

Decision Trees and Expected Monetary Value (EMV)

- A **decision tree** is a diagramming analysis technique used to help select the best course of action in situations in which future outcomes are uncertain
- **Estimated monetary value (EMV)** is the product of a risk event probability and the risk event's monetary value
- You can draw a decision tree to help find the EMV

Expected Monetary Value (EMV) Example



Simulation

- Simulation uses a representation or model of a system to analyze the expected behavior or performance of the system
- **Monte Carlo analysis** simulates a model's outcome many times to provide a statistical distribution of the calculated results
- To use a Monte Carlo simulation, you must have three estimates (most likely, pessimistic, and optimistic) plus an estimate of the likelihood of the estimate being between the most likely and optimistic values

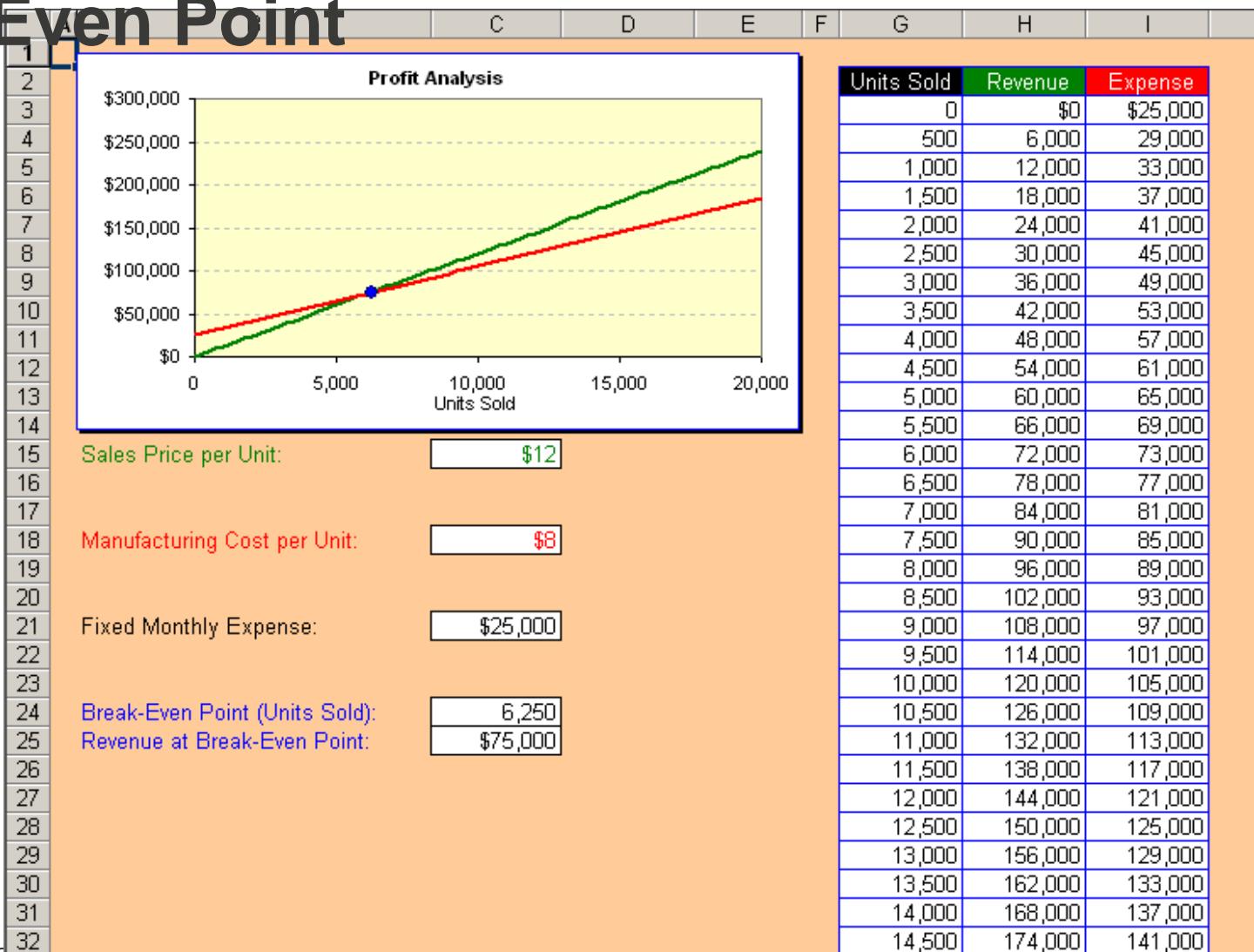
Steps of a Monte Carlo Analysis

1. Assess the range for the variables being considered
2. Determine the probability distribution of each variable
3. For each variable, select a random value based on the probability distribution
4. Run a deterministic analysis or one pass through the model
5. Repeat steps 3 and 4 many times to obtain the probability distribution of the model's results

Sensitivity Analysis

- **Sensitivity analysis** is a technique used to show the effects of changing one or more variables on an outcome
- For example, sensitivity analysis may be used to determine the monthly payments for a loan at different interest rates or periods of the loan, or for determining break-even points based on different assumptions
- Spreadsheet software, such as Excel, is a common tool for performing sensitivity analysis

Sample Sensitivity Analysis for Determining Break-Even Point



Video 5: Learning Objectives

- Provide examples of using different risk response planning strategies to address both negative and positive risks
- Discuss how to control risks

Planning Risk Responses

- After identifying and quantifying risks, you must decide how to respond to them
- Developing options and defining strategies for reducing negative risks and enhancing positive risks
- Four main response strategies for negative risks (**TARA**)
 - Risk Transference
 - Risk Avoidance
 - Risk Mitigation (Reduction)
 - Risk Acceptance

General Risk Mitigation Strategies for Technical, Cost, and Schedule Risks

TECHNICAL RISKS	COST RISKS	SCHEDULE RISKS
Emphasize team support and avoid stand-alone project structure	Increase the frequency of project monitoring	Increase the frequency of project monitoring
Increase project manager authority	Use WBS and CPM	Use WBS and CPM
Improve problem handling and communication	Improve communication, project goals understanding, and team support	Select the most experienced project manager
Increase the frequency of project monitoring	Increase project manager authority	
Use WBS and CPM		

Response Strategies for Positive Risks

- Risk exploitation
- Risk sharing
- Risk enhancement
- Risk acceptance

Residual and Secondary Risks

- It's also important to identify residual and secondary risks
- **Residual risks** are risks that remain after all of the response strategies have been implemented
- **Secondary risks** are a direct result of implementing a risk response

Controlling Risks

- Involves executing the risk management process to respond to risk events and ensuring that risk awareness is an ongoing activity performed by the entire project team throughout the entire project
- A redistribution of resources devoted to risk management may be necessary because of changes in risk exposure
- **Monitoring risks** based on **defined milestones** and making **decisions** regarding risks and their response strategies
- **Workarounds** are **unplanned responses** to risk events that must be done when **there are no contingency plans**

Contingency and Fallback Plans, Contingency Reserves

- **Contingency plans** are predefined actions that the project team will take if an identified risk event occurs
- **Fallback plans** are developed for risks that have a **high impact** on meeting project objectives, and are **put into effect** if attempts to reduce the risk are not effective
- **Contingency reserves** or **allowances** are **provisions held by** the project sponsor or organization to reduce the risk of cost or schedule overruns to an acceptable level;
- **Management reserves** are **funds held for unknown risks** that are NOT part of the cost baseline but ARE part of the budget and funding requirements

Controlling Risks – Outputs, Tools & Techniques

- Main outputs of risk control are:
 - Work performance information
 - change requests
 - updates to the project management plan, other project documents, and organisational process assets
- Tools and Techniques:
 - risk reassessment or audits
 - variance and trend analysis
 - technical performance measurements
 - reserve analysis
 - status meetings/periodic risk reviews – Top Ten Risk Item Tracking

Results of Good Project Risk Management

- Unlike crisis management, good project risk management often goes unnoticed
- Well-run projects appear to be almost effortless, but a lot of work goes into running a project well
- Managing project risks requires dedicated and talented professionals



MONASH University

Information Technology

FIT2002

IT Project Management

Lecture 8
Project Quality and Procurement
Management

Video 1: Project Quality Management

Learning Objectives

- Define project quality management and understand how quality relates to various aspects of IT projects
- Describe quality management planning and how quality and scope management are related

What Is Project Quality?

- The International Organisation for Standardization (ISO) defines **quality** as “the degree to which a set of inherent characteristics fulfils requirements” (ISO9000:2000)
- Other experts define quality based on:
 - **Conformance to requirements:** The project’s processes and products meet written specifications
 - **Fitness for use:** A product can be used as it was intended

What Is Project Quality Management?

- **Project quality management** ensures that the project will satisfy the needs for which it was undertaken
- Processes include:
 - **Planning quality management:** Identifying which quality standards are relevant to the project and how to satisfy them; a **metric** is a standard of measurement
 - **Performing quality assurance:** Periodically evaluating overall project performance to ensure the project will satisfy the relevant quality standards
 - **Performing quality control:** Monitoring specific project results to ensure that they comply with the relevant quality standards

Project Quality Management Summary

Planning

Process: **Plan quality management**

Outputs: Quality management plan, process improvement plan, quality metrics, quality checklists, and project documents updates

Executing

Process: **Perform quality assurance**

Outputs: Change requests, project management plan updates, project documents updates, and organizational process asset updates

Monitoring and Controlling

Process: **Perform quality control**

Outputs: Quality control measurements, validated changes, validated deliverables, work performance information, change requests, project management plan updates, project documents updates, and organizational process asset updates

Project Start

Project Finish



Planning Quality

- Implies the ability to **anticipate situations** and **prepare actions** to bring about the desired outcome
- Important to **prevent defects** by:
 - Selecting proper materials
 - Training and indoctrinating people in quality
 - Planning a process that ensures the appropriate outcome
- **Design of experiments** – a technique that helps identify which variables have the most influence on the overall outcome of a process

Scope Aspects of IT Projects

- **Functionality** is the degree to which a system performs its intended function
- **Features** are the system's special characteristics that appeal to users
- **System outputs** are the screens and reports the system generates
- **Performance** addresses how well a product or service performs the customer's intended use
- **Reliability** is the ability of a product or service to perform as expected under normal conditions
- **Maintainability** addresses the ease of performing maintenance on a product

Video 2: Project Quality Management

Learning Objectives

- Discuss the importance of quality assurance
- Summarise the contributions of noteworthy quality experts to modern quality management

Performing Quality Assurance

- **Quality assurance** includes all the activities related to satisfying the relevant quality standards for a project
- Another goal of quality assurance is continuous quality improvement. **Kaizen** is the Japanese word for improvement or change for the better
- **Lean** involves evaluating processes to maximize customer value while minimizing waste
- **Benchmarking** generates ideas for quality improvements by comparing specific project practices or product characteristics to those of other projects or products within or outside the performing organisation
- A **quality audit** is a structured review of specific quality management activities that help identify lessons learned that could improve performance on current or future projects

Modern Quality Management

- Modern quality management:
 - Requires customer satisfaction
 - Prefers prevention to inspection
 - Recognizes management responsibility for quality
- Noteworthy quality experts include Deming, Juran, Crosby, Ishikawa, Taguchi, and Feigenbaum

Quality Experts

- Deming was famous for his work in rebuilding Japan and his 14 Points for Management
- Juran wrote the *Quality Control Handbook* and ten steps to quality improvement
- Crosby wrote *Quality is Free* and suggested that organisations strive for zero defects
- Ishikawa developed the concepts of quality circles and fishbone diagrams
- Taguchi developed methods for optimizing the process of engineering experimentation
- Feigenbaum developed the concept of total quality control

ISO Standards

- ISO 9000 is a quality system standard that:
 - Is a three-part, continuous cycle of planning, controlling, and documenting quality in an organisation
 - Provides minimum requirements needed for an organisation to meet its quality certification standards
 - Helps organisations around the world reduce costs and improve customer satisfaction
- ISO offer standards to provide a framework for the assessment of software processes
- See www.iso.org for more information

Improving Information Technology Project Quality

- Several suggestions for improving quality for IT projects include:
 - Establish **leadership** that promotes quality
 - Understand the **cost of quality**
 - Focus on **organisational influences and workplace factors** that affect quality
 - Follow **maturity models**

Leadership

- As Joseph M. Juran said in 1945, “It is most important that top management be quality-minded. In the absence of sincere manifestation of interest at the top, little will happen below”*
- A large percentage of quality problems are associated with management, not technical issues.

*American Society for Quality (ASQ), (www.asqc.org/about/history/juran.html).

The Cost of Quality

- The **cost of quality** is the cost of conformance plus the cost of nonconformance
 - **Conformance** means delivering products that meet requirements and fitness for use
 - **Cost of nonconformance** means taking responsibility for failures or not meeting quality expectations
- A study reported that software bugs cost the U.S. economy \$59.6 billion each year and that one third of the bugs could be eliminated by an improved testing infrastructure

Five Cost Categories Related to Quality

- **Prevention cost:** Cost of planning and executing a project so it is error-free or within an acceptable error range
- **Appraisal cost:** Cost of evaluating processes and their outputs to ensure quality
- **Internal failure cost:** Cost incurred to correct an identified defect before the customer receives the product
- **External failure cost:** Cost that relates to all errors not detected and corrected before delivery to the customer
- **Measurement and test equipment costs:** Capital cost of equipment used to perform prevention and appraisal activities

Organisational Influences, Workplace Factors, and Quality

- Study by DeMarco and Lister showed that organizational issues had a much greater influence on programmer productivity than the technical environment or programming languages
- Study found no correlation between productivity and programming language, years of experience, or salary.
- A dedicated workspace and a quiet work environment were key factors to improving programmer productivity

Maturity Models

- **Maturity models** are frameworks for helping organisations improve their processes and systems
 - The **Software Quality Function Deployment Model** focuses on defining user requirements and planning software projects
 - The Software Engineering Institute's **Capability Maturity Model Integration** is a process improvement approach that provides organisations with the essential elements of effective processes
 - CMMI levels, from lowest to highest, are:
 - Incomplete → Performed → Managed → Defined → Quantitatively Managed → Optimizing

PMI's Maturity Model

- PMI released the Organisational Project Management Maturity Model (OPM3) in December 2003
- Help organizations assess and improve their project management capabilities
- Addresses standards for excellence in project, program, and portfolio management best practices and explains the capabilities necessary to achieve those best practices

Video 3: Project Quality Management

Learning Objectives

- Understand the tools and techniques for quality control, such as the Seven Basic Tools of Quality, statistical sampling, Six Sigma, and testing

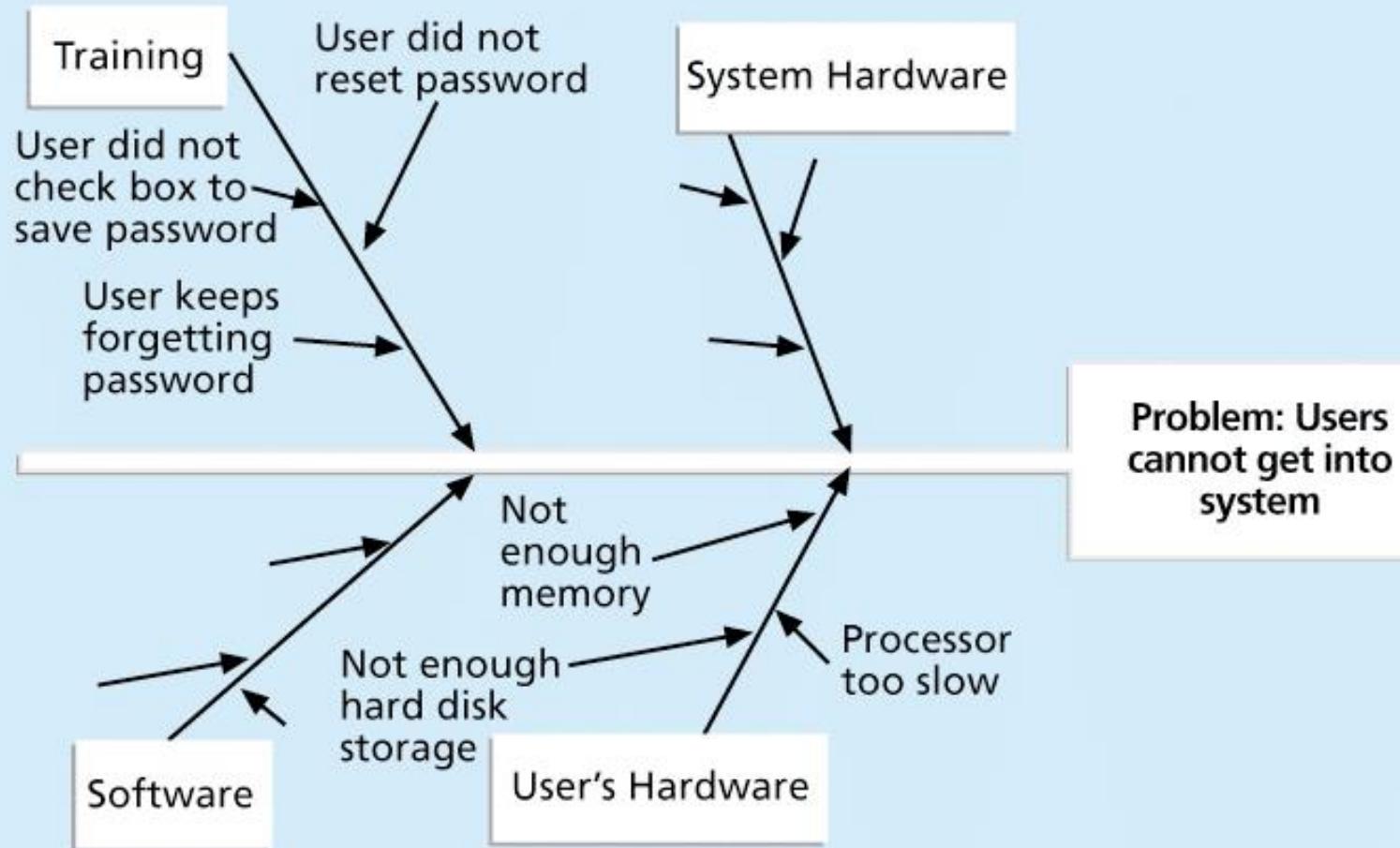
Controlling Quality

- The main outputs of quality control are:
 - Acceptance decisions
 - Rework
 - Process adjustments
- There are Seven Basic Tools of Quality that help in performing quality control

Cause-and-Effect Diagrams

- **Cause-and-effect diagrams** trace complaints about quality problems back to the responsible production operations
- They help you find the root cause of a problem
- Also known as **fishbone or Ishikawa diagrams**
- Can also use the **5 whys** technique where you repeatedly ask the question “Why” (five is a good rule of thumb) to peel away the layers of symptoms that can lead to the root cause

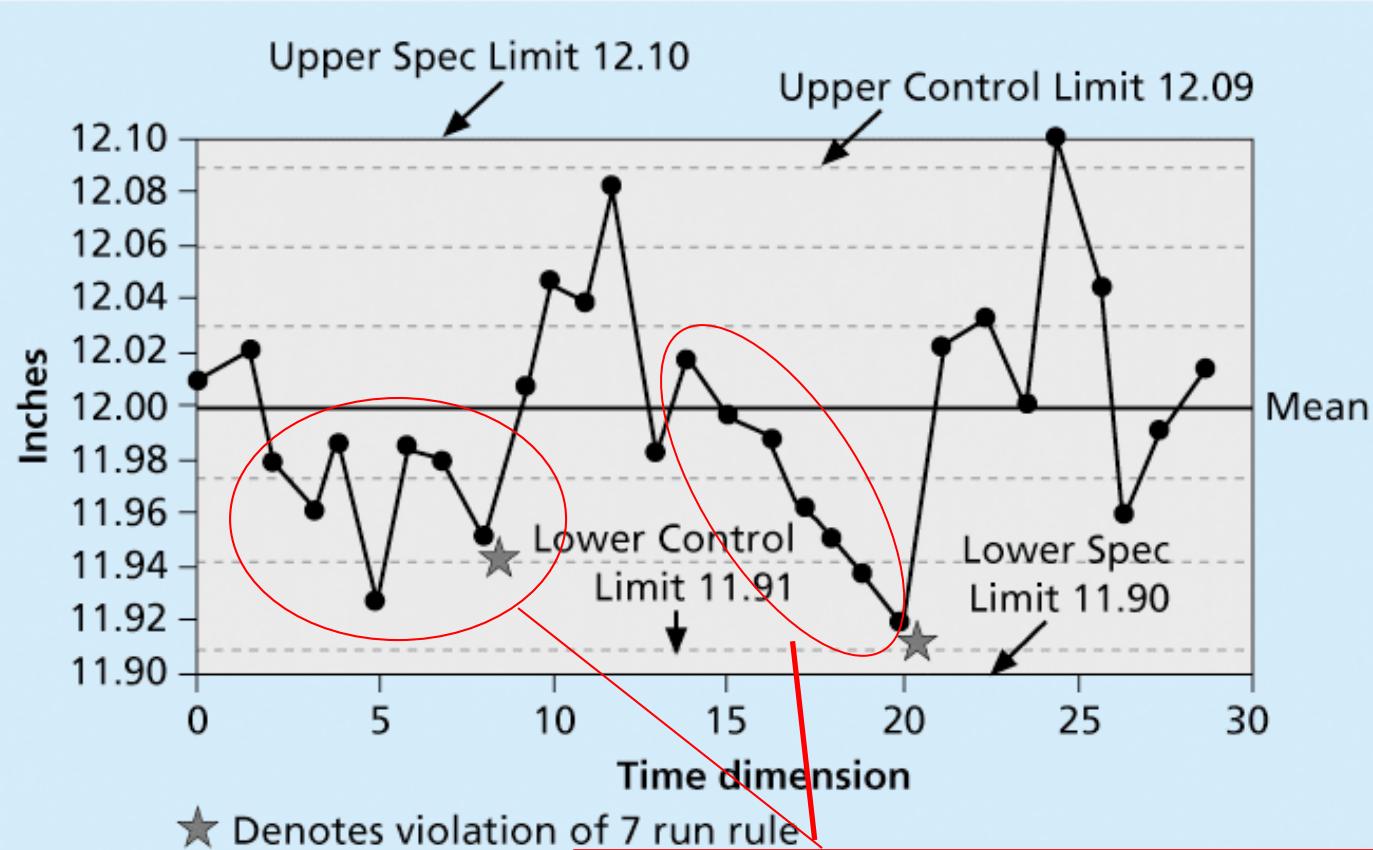
Sample Cause-and-Effect Diagram



Quality Control Charts

- A **control chart** is a graphic display of data that illustrates the results of a process over time
- The main use of control charts is to **prevent defects**, rather than **to detect or reject them**
- Quality control charts **allow you to determine whether a process is in control or out of control**
 - When a process is **in control**, any variations in the results of the process are created by **random events**; processes that are in control do not need to be adjusted
 - When a process is **out of control**, variations in the results of the process are caused by **non-random events**; you need to identify the causes of these events and adjust the process to correct or eliminate them

Sample Quality Control Chart



★ Denotes violation of 7 run rule

seven run rule: If seven data points in a row are all below the mean, above the mean, or are all increasing or decreasing, then the process needs to be examined for non-random problems



Check sheet

- A check sheet is used to collect and analyse data
- It is sometimes called a tally sheet or checklist, depending on its format
- This information might be useful in improving the process for handling complaints

In this example, most complaints arrive via text message, and there are more complaints on Monday and Tuesday than on other days of the week

Source	System Complaints							Total
	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday	
Email								12
Text								29
Phone call								8
Total	11	10	8	6	7	3	4	49

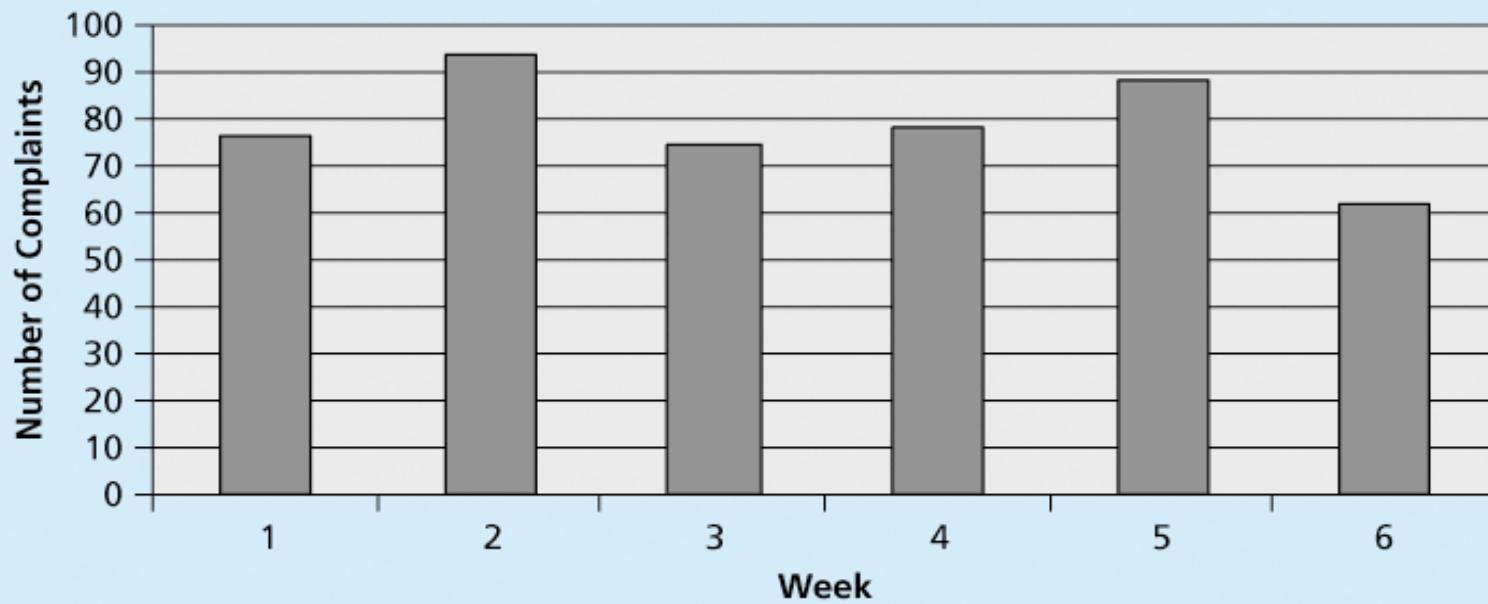
Scatter diagram

- A **scatter diagram** helps to show if there is a relationship between two variables
- The closer data points are to the ‘line of best fit’, the more closely the two variables are related



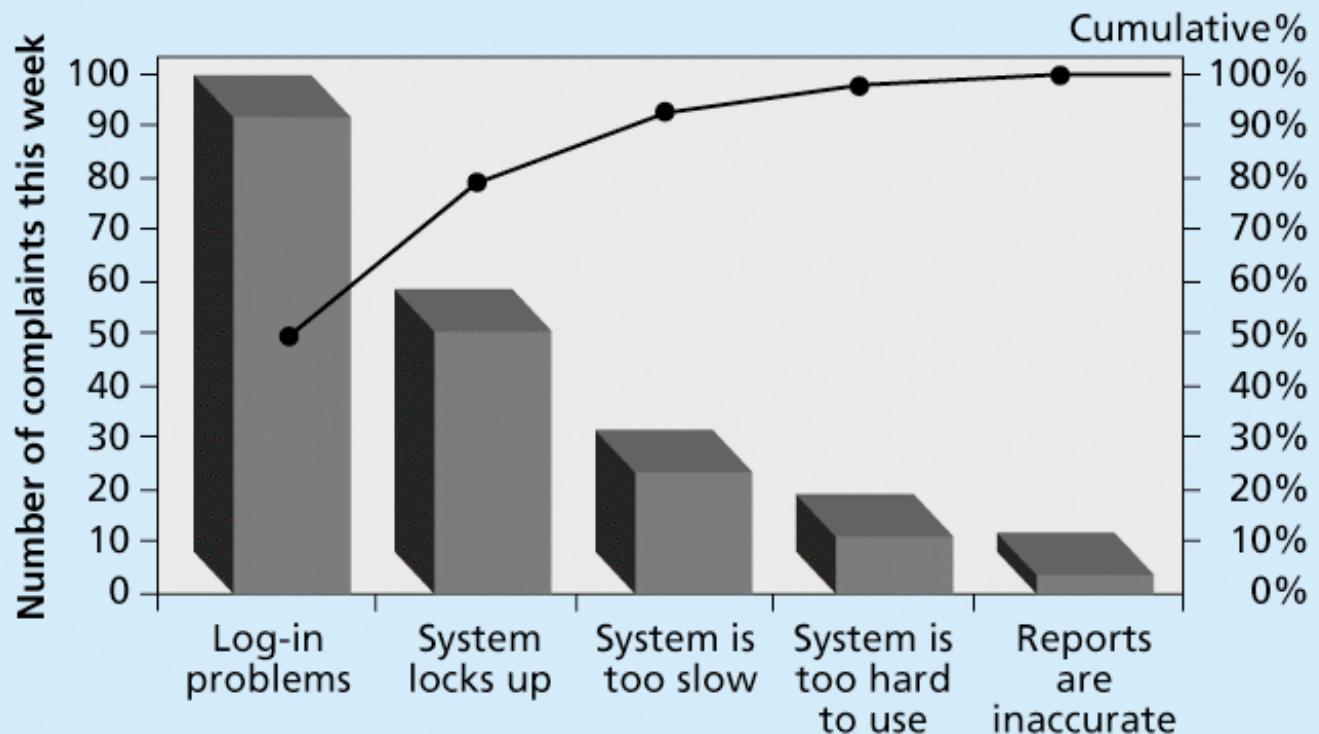
Histograms

- A **histogram** is a bar graph of a distribution of variables
- Each bar represents an attribute or characteristic of a problem or situation, and the height of the bar represents its frequency



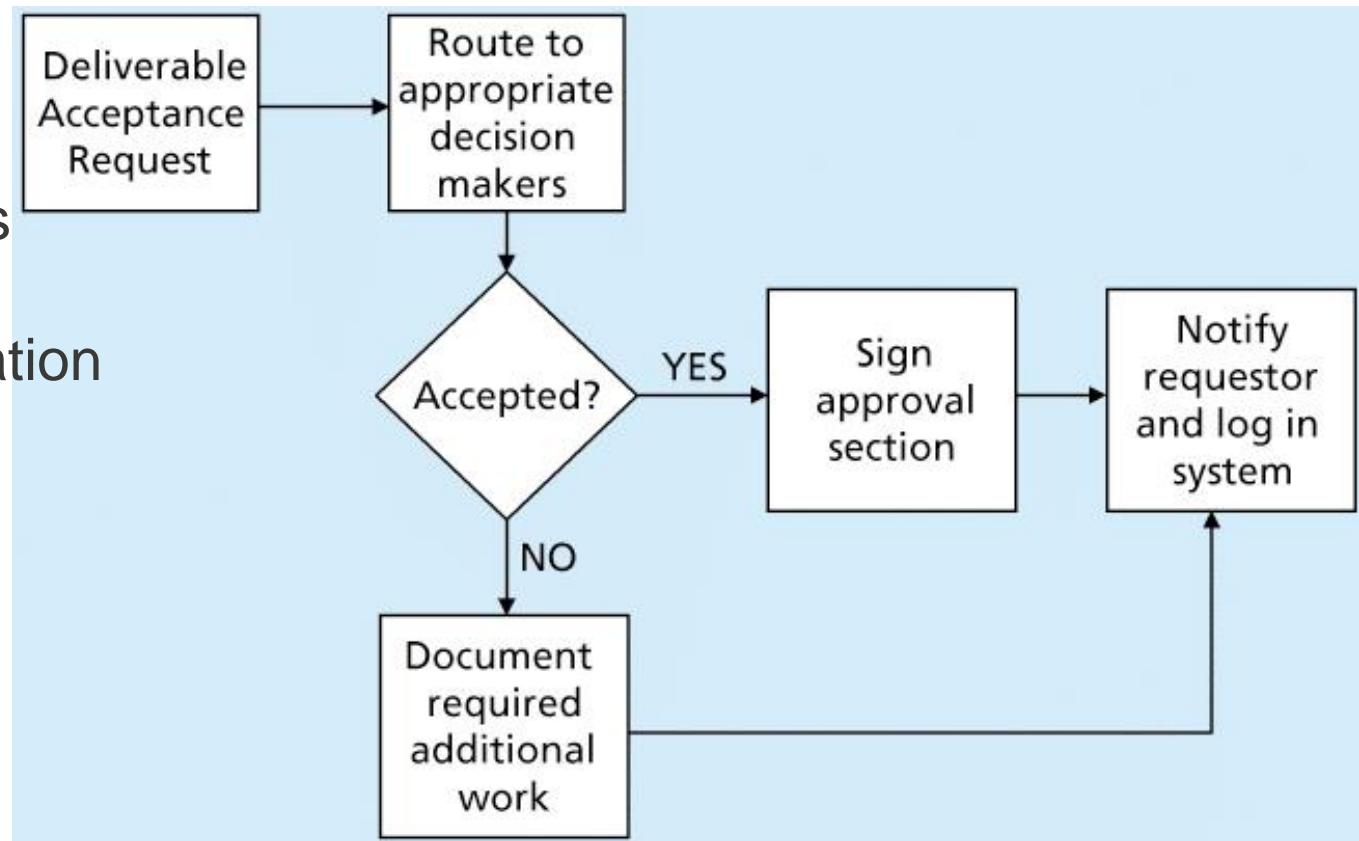
Pareto Charts

- A **Pareto chart** is a histogram that can help you identify and prioritize problem areas
- **Pareto analysis** is also called the 80-20 rule, meaning that 80 percent of problems are often due to 20 percent of the causes



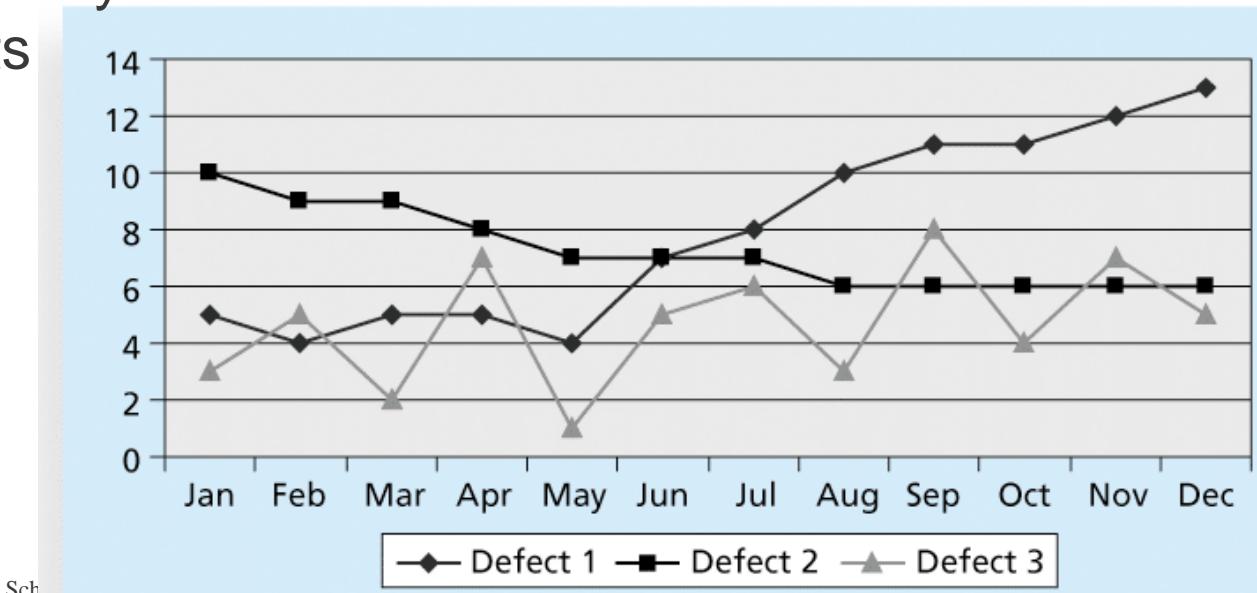
Flowcharts

- Flowcharts are graphic displays of the logic and flow of processes that help you analyse how problems occur and how processes can be improved
- They show activities, decision points and the order of how information is processed



Run Charts

- In addition to flowcharts, run charts are also used for stratification, a technique that shows data from a variety of sources to see if a pattern emerges
- A **run chart** displays the history and pattern of variation of a process over time.
- To perform trend analysis and forecast future outcomes based on historical results



Statistical Sampling

- **Statistical sampling** involves choosing part of a population of interest for inspection
- The size of a sample depends on how representative you want the sample to be
- Sample size formula:

DESIRED CERTAINTY	CERTAINTY FACTOR
95%	1.960
90%	1.645
80%	1.281

Sample size = $.25 \times (\text{certainty factor}/\text{acceptable error})^2$

- Be sure to consult with an expert when using statistical analysis

Six Sigma

- **Six Sigma** is “a comprehensive and flexible system for achieving, sustaining, and maximizing business success. Six Sigma is uniquely driven by close understanding of customer needs, disciplined use of facts, data, and statistical analysis, and diligent attention to managing, improving, and reinventing business processes”*
- The target for perfection is the achievement of no more than 3.4 defects per million opportunities (DPMO)
- The principles can apply to a wide variety of processes
- Six Sigma projects normally follow a five-phase improvement process called DMAIC

*Pande, Peter S., Robert P. Neuman, and Roland R. Cavanagh, *The Six Sigma Way*, New York: McGraw-Hill, 2000, p. xi.



DMAIC

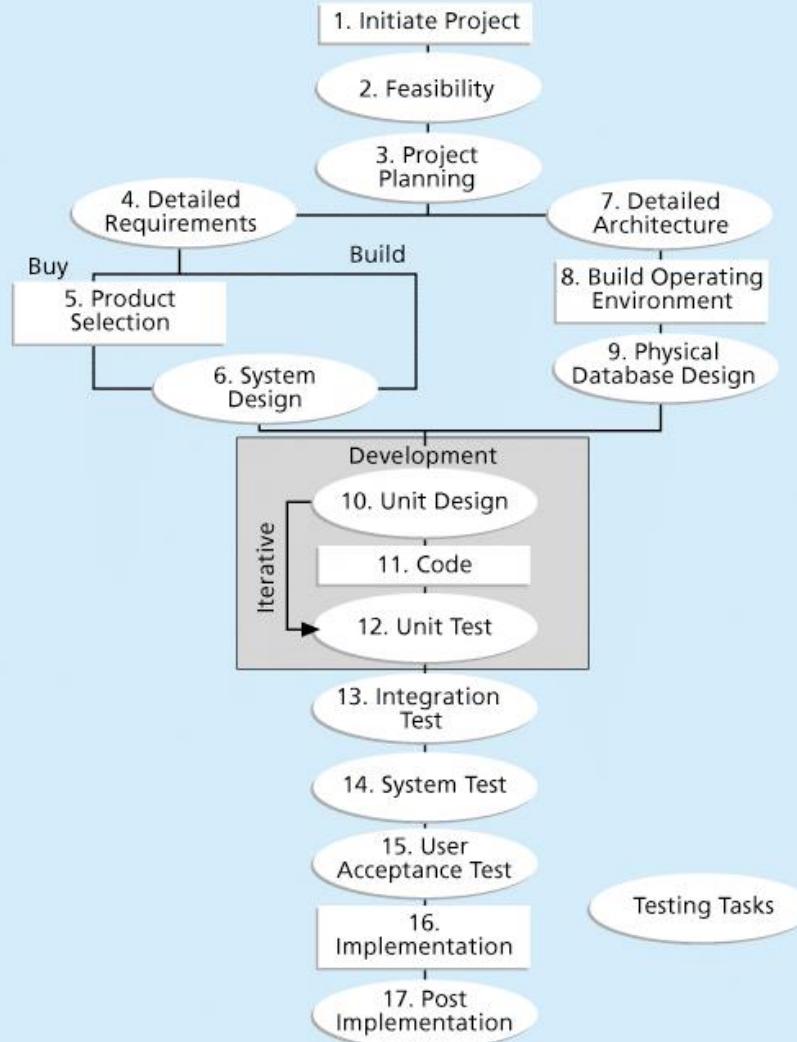
- DMAIC is a systematic, closed-loop process for continued improvement that is scientific and fact based
- DMAIC stands for:
 - Define: Define the problem/opportunity, process, and customer requirements
 - Measure: Define measures, then collect, compile, and display data
 - Analyse: Scrutinise process details to find improvement opportunities
 - Improve: Generate solutions and ideas for improving the problem
 - Control: Track and verify the stability of the improvements and the predictability of the solution

Six 9s of Quality

- **Six 9s of quality** is a measure of quality control equal to 1 fault in 1 million opportunities
- In the telecommunications industry, it means 99.9999 percent service availability or *30 seconds of down time a year*
- This level of quality has also been stated as the target goal for the number of errors in a communications circuit, system failures, or errors in lines of code

Testing

- Many IT professionals think of testing as a stage that comes near the end of IT product development
- Testing should be done during almost every phase of the IT product development life cycle



Testing Tasks in the Software Development Life Cycle

Types of Tests

- **Unit testing** tests each individual component (often a program) to ensure it is as defect-free as possible
- **Integration testing** occurs between unit and system testing to test functionally grouped components
- **System testing** tests the entire system as one entity
- **User acceptance testing** is an independent test performed by end users prior to accepting the delivered system

Testing Alone Is Not Enough

- Watts S. Humphrey, a renowned expert on software quality, defines a **software defect** as anything that must be changed before delivery of the program
- Testing does not sufficiently prevent software defects because:
 - The number of ways to test a complex system is huge
 - Users will continue to invent new ways to use a system that its developers never considered
- Humphrey suggests that people rethink the software development process to provide *no* potential defects when you enter system testing; developers must be responsible for providing error-free code at each stage of testing

Video 4: Project Procurement Management

Learning Objectives

- Understand the importance of project procurement management and the increasing use of outsourcing for information technology (IT) projects
- Describe the work involved in planning procurements for projects, including determining the proper type of contract to use and preparing a procurement management plan

Importance of Project Procurement Management

- **Procurement** means acquiring goods and/or services from an outside source
- Other terms include purchasing and outsourcing
- Experts predict that global spending on computer software and services will continue to grow
- People continue to debate whether offshore outsourcing helps their own country or not

IT Outsourcing Market Continues to Grow

- Australian companies are transferring a lot of work abroad, especially in the areas of IT infrastructure, application development and maintenance, and innovation processes
- India, China, and the Philippines are the preferred locations for outsourcing
- Besides cost savings, a shortage of qualified personnel are reasons for global outsourcing of IT services

Why Outsource?

- To access skills and technologies
- To reduce both fixed and recurrent costs
- To allow the client organisation to focus on its core business
- To provide flexibility
- To increase accountability

Project Procurement Management Processes

- **Project procurement management:** Acquiring goods and services for a project from outside the performing organisation
- Processes include:
 - **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, and making changes as needed
 - **Closing procurements:** Completing and settling each contract or agreement, including resolving of any open items

Project Procurement Management Summary

Planning

Process: **Plan procurement management**

Outputs: Procurement management plan, procurement statements of work, procurement documents, source selection criteria, make-or-buy decisions, change requests, project documents updates

Executing

Process: **Conduct procurements**

Outputs: Selected sellers, agreements, resource calendars, change requests, project management plan updates, project documents updates

Monitoring and Controlling

Process: **Control procurements**

Outputs: Work performance information, change requests, project management plan updates, project documents updates, organizational process assets updates

Closing

Process: **Close procurements**

Outputs: Closed procurements, organizational process assets updates

Project Start

Project Finish



Planning Procurement Management

- Identifying which project needs can best be met by using products or services outside the organisation
- Important decision – Make-or-buy decision
- If there is no need to buy any products or services from outside the organisation, then there is no need to perform any of the other procurement management processes
- Procurement Management Plan:
 - Describes how the procurement processes will be managed, from developing documentation for making outside purchases or acquisitions to contract closure
 - Contents varies based on project needs

Contracts

- A **contract** is a mutually binding agreement that obligates the seller to provide the specified products or services and obligates the buyer to pay for them
- Contracts can **clarify responsibilities** and sharpen focus on key deliverables of a project
- Because contracts are legally binding, there is more accountability for delivering the work as stated in the contract

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
 - Firm-fixed-price (**FFP**), fixed-price incentive fee (**FPI**), Fixed-price with economic price adjustment (**FP-EPA**)
 - **Cost reimbursable** contracts: Involve payment to the seller for direct and indirect costs
 - **Time and material** contracts: Hybrid of both fixed price and cost reimbursable contracts, often used by consultants
 - **Unit price** contracts: Require the buyer to pay the seller a predetermined amount per unit of service
- A single contract can actually include all four of these categories, if it makes sense for that particular procurement

Point of Total Assumption

- The **Point of Total Assumption (PTA)** is the **cost** at which the **contractor assumes total responsibility** for each additional dollar of contract cost
- Contractors **do not** want to reach the point of total assumption, because it hurts them financially, so they have an incentive to prevent cost overruns
- The PTA is calculated with the following formula:

$$\text{PTA} = (\text{ceiling price} - \text{target price})/\text{government share} + \text{target cost}$$

Ceiling price = \$1,250

Target price = \$1,100

Target cost = \$1,000

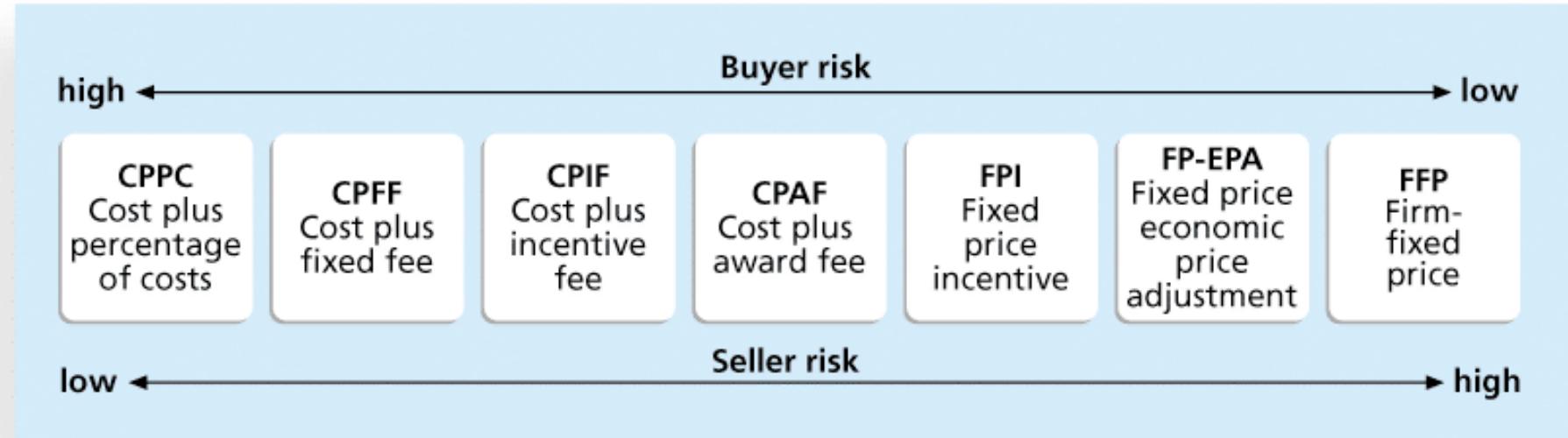
Government share: 75%

$$\text{PTA} = (\$1,250 - \$1,100)/0.75 + \$1,000 = \$1,200$$

Cost Reimbursable Contracts

- **Cost plus incentive fee (CPIF):** The buyer pays the supplier for allowable performance costs plus a predetermined fee and an incentive bonus
- **Cost plus fixed fee (CPFF):** The buyer pays the supplier for allowable performance costs plus a fixed fee payment usually based on a percentage of estimated costs
- **Cost plus percentage of costs (CPPC):** The buyer pays the supplier for allowable performance costs plus a predetermined percentage based on total costs. This is the least desirable type of contract from the buyer's perspective.

Contract Types Versus Risk



Contract Clauses

- Contracts should include specific clauses to take into account issues unique to the project
- Can require various educational or work experience for different pay rights
- A **termination clause** is a contract clause that allows the buyer or supplier to end the contract

Video 5: Project Procurement Management

Learning Objectives

- Discuss statement of work, source selection criteria, and make-or-buy analysis
- Discuss how to conduct procurements and strategies for obtaining seller responses, selecting sellers, and awarding contracts
- Understand the process of controlling procurements by managing procurement relationships and monitoring contract performance

Tools and Techniques for Planning Purchases and Acquisitions

- Expert judgment
- Market research
- **Make-or-buy analysis:** General management technique used to determine whether an organisation should make or perform a particular product or service inside the organisation or buy from someone else

Make-or-Buy Example

- Assume you can lease an item you need for a project for \$800/day. To purchase the item, the cost is \$12,000 plus a daily operational cost of \$400/day
- How long will it take for the purchase cost to be the same as the lease cost?

Solution:

Let d = the number of days you need the piece of equipment

$$800d = \$12,000 + 400d$$

$$400d = 12,000 \rightarrow d = 30$$

=> If you need the item for more than 30 days, it is more economical to purchase

Contract Statement of Work (SOW)

- A **statement of work** is a description of the work required for the procurement
- If a SOW is used as part of a contract to describe only the work required for that particular contract, it is called a **contract statement of work**
- A SOW is a type of scope statement
- A good SOW gives bidders a better understanding of the buyer's expectations

Statement of Work (SOW) Template

Statement of Work (SOW)

- I. **Scope of Work:** Describe the work to be done in detail. Specify the hardware and software involved and the exact nature of the work.
- II. **Location of Work:** Describe where the work must be performed. Specify the location of hardware and software and where the people must perform the work.
- III. **Period of Performance:** Specify when the work is expected to start and end, working hours, number of hours that can be billed per week, where the work must be performed, and related schedule information.
- IV. **Deliverables Schedule:** List specific deliverables, describe them in detail, and specify when they are due.
- V. **Applicable Standards:** Specify any company or industry-specific standards that are relevant to performing the work.
- VI. **Acceptance Criteria:** Describe how the buyer organization will determine if the work is acceptable.
- VII. **Special Requirements:** Specify any special requirements such as hardware or software certifications, minimum degree or experience level of personnel, travel requirements, and so on.

Procurement Documents

- **Request for Proposals:** Used to solicit proposals from prospective sellers
 - A **proposal** is a document prepared by a seller when there are different approaches for meeting buyer needs
- **Requests for Quotes:** Used to solicit quotes or bids from prospective suppliers
 - A **bid**, also called a tender or quote (short for quotation), is a document prepared by sellers providing pricing for standard items that have been clearly defined by the buyer

Source Selection Criteria

- Source selection – evaluating proposals or bids from sellers, choosing the best one, negotiating the contract, and awarding the contract
- It's important to prepare some form of evaluation criteria, preferably before issuing a formal RFP or RFQ Requests for Quotes
- Beware of proposals that look good on paper; be sure to evaluate factors, such as past performance and management approach
- Can require a technical presentation as part of a proposal

Conducting Procurements

- Organisations can advertise to procure goods and services in several ways:
 - Approaching the preferred vendor
 - Approaching several potential vendors
 - Advertising to anyone interested
- Sending appropriate documentation to potential sellers
- Obtaining proposals or bids
- A bidders' conference can help clarify the buyer's expectations
- Shortlisted sellers may be asked to prepare a best and final offer (BAFO).
- Selecting a seller
- Awarding a contract

Controlling Procurements

- Ensures that the seller's performance meets contractual requirements
- Contracts are legal relationships, so it is important that legal and contracting professionals be involved in writing and administering contracts
- It is critical that project managers and team members watch for **constructive change orders**, which are oral or written acts or omissions by someone with actual or apparent authority that can be construed to have the same effect as a written change order

Change Control in Contracts

- Changes to any part of the project need to be reviewed, approved, and documented by the same people in the same way that the original part of the plan was approved
- Evaluation of any change should include an impact analysis.
- Changes must be documented in writing.
- Project managers and teams should stay closely involved to make sure the new system will meet business needs
- Have backup plans
- Use tools and techniques, such as a contract change control system, buyer-conducted performance reviews, inspections and audits

Closing Procurements

- Contract closure involves completing and settling contracts and resolving any open items
- The project team should:
 - ▶ Determine if all work was completed correctly and satisfactorily
 - ▶ Update records to reflect final results
 - ▶ Archive information for future use – using records management system
- Procurement audits identify lessons learned
- The contract itself should include requirements for formal acceptance and closure



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IT Project Management

Lecture 9
Project Communication and
Stakeholder Management

Video 1:

Learning Objectives

- Understand the importance of good communications on projects and the need to develop soft skills, especially for IT project managers and their teams
- Review key concepts related to communications
- Explain the elements of planning project communications and how to create a communications management plan

Importance of Good Communications

- The greatest threat to many projects is a failure to communicate
- Crucial for project managers and their teams to make good communications a priority
- Research shows that IT professionals must be able to communicate effectively and strong verbal and non-technical skills are a key factor in career advancement to succeed in their positions
- For projects to be successful, every project team member needs both technical as well as soft skills

Project Communications Management Processes

- **Planning communications management:** Determining the information and communications needs of the stakeholders
- **Managing communications:** Creating, distributing, storing, retrieving, and disposing of project communications based on the communications management plan
- **Controlling communications:** Monitoring and controlling project communications to ensure that stakeholder communication needs are met

Project Communications Management

Planning

Process: **Plan communications management**

Outputs: Communications management plan, project documents updates

Executing

Process: **Manage communications**

Outputs: Project communications, project documents updates, project management plan updates, and organizational process assets updates

Monitoring and Controlling

Process: **Control communications**

Outputs: Work performance information, change requests, project documents updates, and organizational process assets updates

Project Start

Project Finish



Keys to Good Communications

Project managers spend as much as 90 percent of their time communicating

- Need to focus on group and individual communication needs
- Use formal and informal methods for communicating
- Distribute important information in an effective and timely manner
- Set the stage for communicating bad news
- Determine the number of communication channels

Focusing on Group and Individual Communication Needs

- Understanding individual and group preferences for communications is crucial
- Personal preferences affect communication needs
- Personality differences can lead to miscommunication – seek first to understand...before you can truly communicate
- Receiver may not interpret a message exactly as the sender intended
- Geographic location and cultural background affect the complexity of project communications
 - Different working hours
 - Language barriers
 - Different cultural norms



Formal And Informal Methods for Communicating

- Different people respond positively to different levels or types of communication – formal or informal
- Communicating includes many different dimensions such as writing, speaking, and listening
- Encouraging More Face-to-Face Interactions. Research has indicated that in a face-to-face interaction:
 - 58% of communication is through body language.
 - 35% of communication is through how the words are said
 - 7% of communication is through the content or words that are spoken
- Short, frequent meetings are often very effective in IT projects
- Stand-up meetings force people to focus on what they really need to communicate

Distribute Information in an Effective and Timely Manner

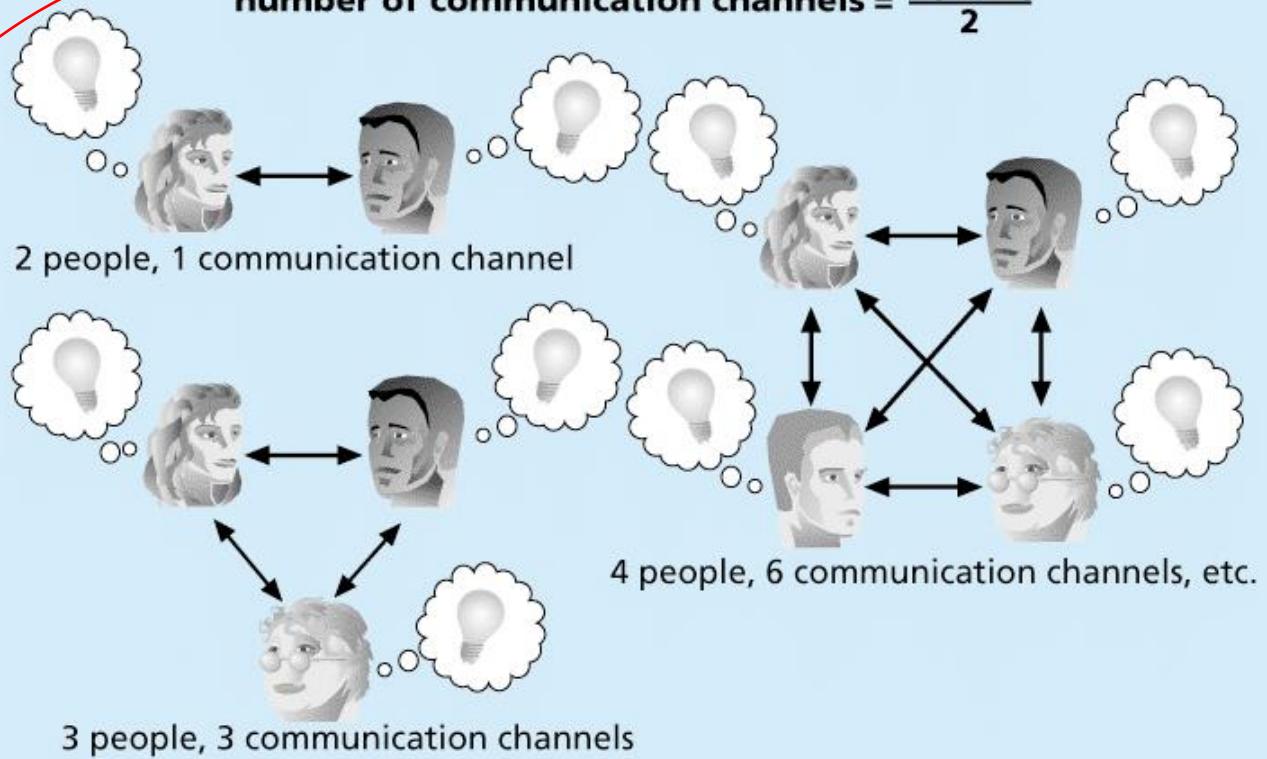
- Important to include detailed technical information that affects critical performance
- Don't bury crucial information
- **Don't be afraid to report bad information**
- Oral communication via meetings and informal talks helps bring important information—good and bad—out into the open
- Important that information about the project is disseminated to the right recipient at the right time using the right mode.

Communications Channels

- As the number of people involved increases, the complexity of communications increases because there are more communications channels or pathways through which people can communicate.

where n is the number of people involved

$$\text{number of communication channels} = \frac{n(n - 1)}{2}$$



Planning Communications Management

- Every project should include some type of **communications management** plan, a document that guides project communications
- The communications management plan varies with the needs of the project, but some type of written plan should always be prepared
- For small projects, the communications management plan can be part of the team contract
- For large projects, it should be a separate document

Communications Management Plan Contents

1. Stakeholder communications requirements
2. Information to be communicated, including format, content, and level of detail
3. Who will receive the information and who will produce it
4. Suggested methods or technologies for conveying the information
5. Frequency of communication
6. Escalation procedures for resolving issues
7. Revision procedures for updating the communications management plan
8. A glossary of common terminology

<http://www.projectmanagementdocs.com/project-planning-templates/communications-management-plan.html>

Sample Stakeholder Analysis for Project Communications

Stakeholders	Document Name	Document Format	Contact Person	Due
Customer management	Monthly status report	Hard copy and meeting	Tina Erndt, Tom Silva	First of month
Customer business staff	Monthly status report	Hard copy	Julie Grant, Sergey Cristobal	First of month
Customer technical staff	Monthly status report	E-mail	Li Chau, Nancy Michaels	First of month
Internal management	Monthly status report	Hard copy and meeting	Bob Thomson	First of month
Internal business and technical staff	Monthly status report	Intranet	Angie Liu	First of month
Training subcontractor	Training plan	Hard copy	Jonathan Kraus	November 1
Software subcontractor	Software implementation plan	E-mail	Najwa Gates	June 1

Video 2:

Learning Objectives

- Describe how to manage communications, including communication technologies, media, and performance reporting
- Discuss methods for controlling communications to ensure that information needs are met throughout the life of the project
- List various methods for improving project communications, such as running effective meetings, using various technologies effectively, and using templates

Managing Communications

- Managing communications is a large part of a project manager's job
- The Stakeholder communications analysis is a good starting point
- Getting project information to the right people at the right time and in a useful format is just as important as developing the information in the first place
- Important considerations include the use of technology, the appropriate methods and media to use, and performance reporting

Classifications for Communication Methods

- *Interactive communication:* Two or more people interact to exchange information via meetings, phone calls, or video conferencing. Most effective way to ensure common understanding
- *Push communication:* Information is sent or pushed to recipients without their request via reports, e-mails, faxes, voice mails, and other means. Ensures that the information is distributed, but does not ensure that it was received or understood
- *Pull communication:* Information is sent to recipients at their request via Web sites, bulletin boards, e-learning, knowledge repositories like blogs, and other means

Media Choice Table

HOW WELL MEDIUM IS SUITED TO:	KEY: 1 = EXCELLENT		2 = ADEQUATE		3 = INAPPROPRIATE		
	HARD COPY	TELEPHONE CALL	VOICE MAIL	E-MAIL	MEETING	WEB SITE	
Assessing commitment	3	2	3	3	1		3
Building consensus	3	2	3	3	1		3
Mediating a conflict	3	2	3	3	1		3
Resolving a misunderstanding	3	1	3	3	2		3
Addressing negative behavior	3	2	3	2	1		3
Expressing support/appreciation	1	2	2	1	2		3
Encouraging creative thinking	2	3	3	1	3		3
Making an ironic statement	3	2	2	3	1		3
Conveying a reference document	1	3	3	3	3		1
Reinforcing one's authority	1	2	3	3	1		2
Providing a permanent record	1	3	3	1	3		1
Maintaining confidentiality	2	1	2	3	1		3
Conveying simple information	3	2	1	1	2		3
Asking an informational question	3	2	1	1	3		3
Making a simple request	3	3	1	1	3		3
Giving complex instructions	3	3	3	2	1		2
Addressing many people	2	3	3 or 1*	2	3		1

Galati, Tess. Email Composition and Communication (EmC2) Practical Communications, Inc. (www.praccomm.com) (2001).

*Depends on system functionality

Reporting Performance

Performance reporting keeps stakeholders informed about how resources are being used to achieve project objectives

- **Status reports** describe where the project stands at a specific point in time
- **Progress reports** describe what the project team has accomplished during a certain period of time
- **Forecasts** predict future project status and progress based on past information and trends

Controlling Communications

- The main goal of controlling communications is to ensure the optimal flow of information throughout the entire project life cycle
- Various reporting systems, expert judgment, and meetings are used to assess how well communications are working.
- May require changes to the earlier processes of planning and managing project communications if any problems exist.
- Can use an external facilitator to assess how well communications are working

Suggestions for Improving Project Communications

- Develop better communication skills
- Run effective meetings
- Use e-mail and other technologies effectively
- Use templates for project communications

Developing Better Communication Skills

- Most companies spend a lot of money on technical training for their employees, even when employees might benefit more from communications training
- Individual employees are also more likely to enroll voluntarily in classes to learn the latest technology than in classes that develop soft skills
- As organisations become more global, they realize they must invest in ways to improve communication with people from different countries and cultures
- It takes leadership to improve communication

Running Effective 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

Sample Collaborative Tools

- Make sure that e-mail, instant messaging, texting, or collaborative tools are an appropriate medium for what you want to communicate
- A **SharePoint portal** allows users to create custom Web sites to access documents and applications stored on shared devices
- **Google Docs** allow users to create, share, and edit documents, spreadsheets, and presentations online
- A **wiki** is a Web site designed to enable anyone who accesses it to contribute or modify Web page content

Using Templates for Project Communications

- Many technical people are afraid to ask for help
- Providing examples and templates for project communications saves time and money
- Organisations can develop their own templates, use some provided by outside organisations, or use samples from textbooks
- Research shows that companies that excel in project management make effective use of templates

Lessons Learned Reports

- The project manager and project team members should each prepare a **lessons-learned report**
 - A reflective statement that documents important things an individual learned from working on the project
 - provide valuable reflections on what worked and what did not
- The project manager often combines information from all of the lessons-learned reports into a project summary report
- Excellent resource that can help future projects run more smoothly

Project Archives and Software to Assist in Project Communications

- **Project archives** are a complete set of organized project records that provide an accurate history of the project
- These archives can provide valuable information for future projects as well
- Many project teams create a project Web site to store important product documents and other information
- Enterprise management software includes new capabilities to enhance virtual communications
- Several project management tools can be used on multiple devices

Video 3: Learning Objectives

- Understand the importance of project stakeholder management throughout the life of a project
- Discuss the process of identifying stakeholders, how to create a stakeholder register, and how to perform a stakeholder analysis

Importance of Project 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 as part of the Fifth Edition of the PMBOK® Guide in 2013
- The purpose of project stakeholder management is to identify all people or organisations affected by a project, to analyse stakeholder expectations, and to effectively engage stakeholders

Projects Often Cause Change

- Projects often cause changes in organisations, and some people may lose their jobs when a project is completed.
- Project managers might be viewed as enemies if the project resulted in job losses for some stakeholders
- By contrast, they could be viewed as allies if they lead a project that helps increase profits, produce new jobs, or increase pay for certain stakeholders
- In any case, project managers must learn to identify, understand, and work with a variety of stakeholders

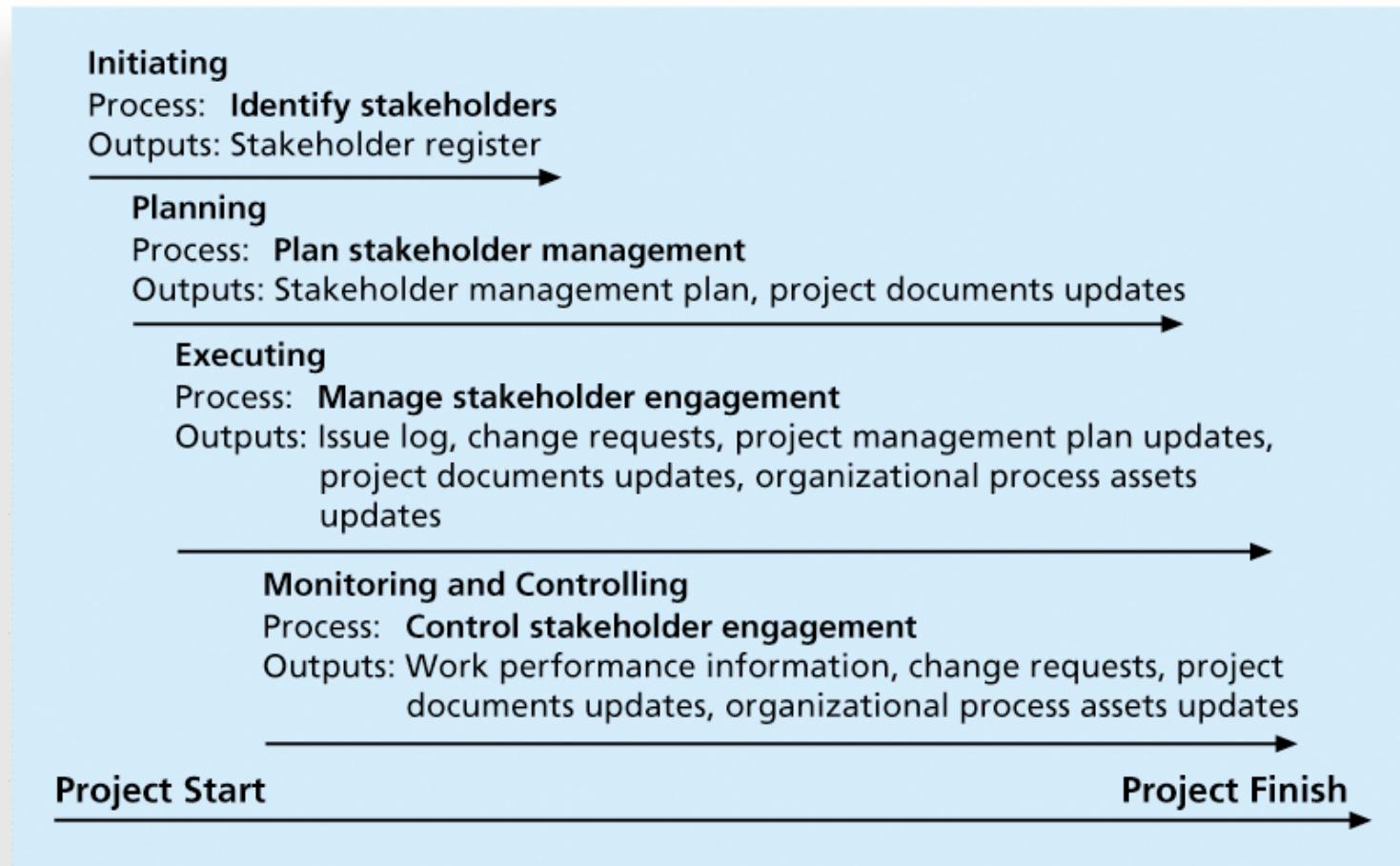
Situations That Lead to Project Sabotage

- Changing the way work is done can send a shock wave through an organisation, leaving many people afraid and even thinking about ways to stop or sabotage a project
- Donald White, founder and program manager at Defense Systems Leaders in Washington, D.C., described situations that can lead to project sabotage:
 - Buy-in blues
 - Short-term profits
 - Overachieving
 - Lack of respect

Project Stakeholder Management Processes

- **Identifying stakeholders:** Identifying everyone involved in the project or affected by it, and determining the best ways to manage relationships with them.
- **Planning stakeholder management:** Determining strategies to effectively engage stakeholders
- **Managing stakeholder engagement:** Communicating and working with project stakeholders to satisfy their needs and expectations, resolving issues, and fostering engagement in project decisions and activities
- **Controlling stakeholder engagement:** Monitoring stakeholder relationships and adjusting plans and strategies for engaging stakeholders as needed

Project Stakeholder Management Summary



Identifying Stakeholders

- *PMBOK® Guide definition:* “Project stakeholders are individuals, groups, or organisations who may **affect**, **be affected** by, or perceive themselves to be affected by a decision, activity, or outcome of a project.”
- **Internal project stakeholders:** include the project sponsor, project team, support staff, and internal customers for the project. Other internal stakeholders include top management, other functional managers, and other project managers because organisations have limited resources
- **External project stakeholders:** include the project’s customers (if they are external to the organisation), competitors, suppliers, and other external groups that are potentially involved in the project or affected by it, such as government officials and concerned citizens



Additional Stakeholders

- www.projectstakeholder.com lists other stakeholders including:
 - Program director
 - Project manager's family
 - Labor unions
 - Potential customers
- It is also necessary to focus on stakeholders with the most direct ties to a project, for example only key suppliers

Stakeholder Register

- A stakeholder register includes basic information on stakeholders:
 - **Identification information:** The stakeholders' names, positions, locations, roles in the project, and contact information
 - **Assessment information:** The 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 organisation? Is the stakeholder a supporter of the project or resistant to it?

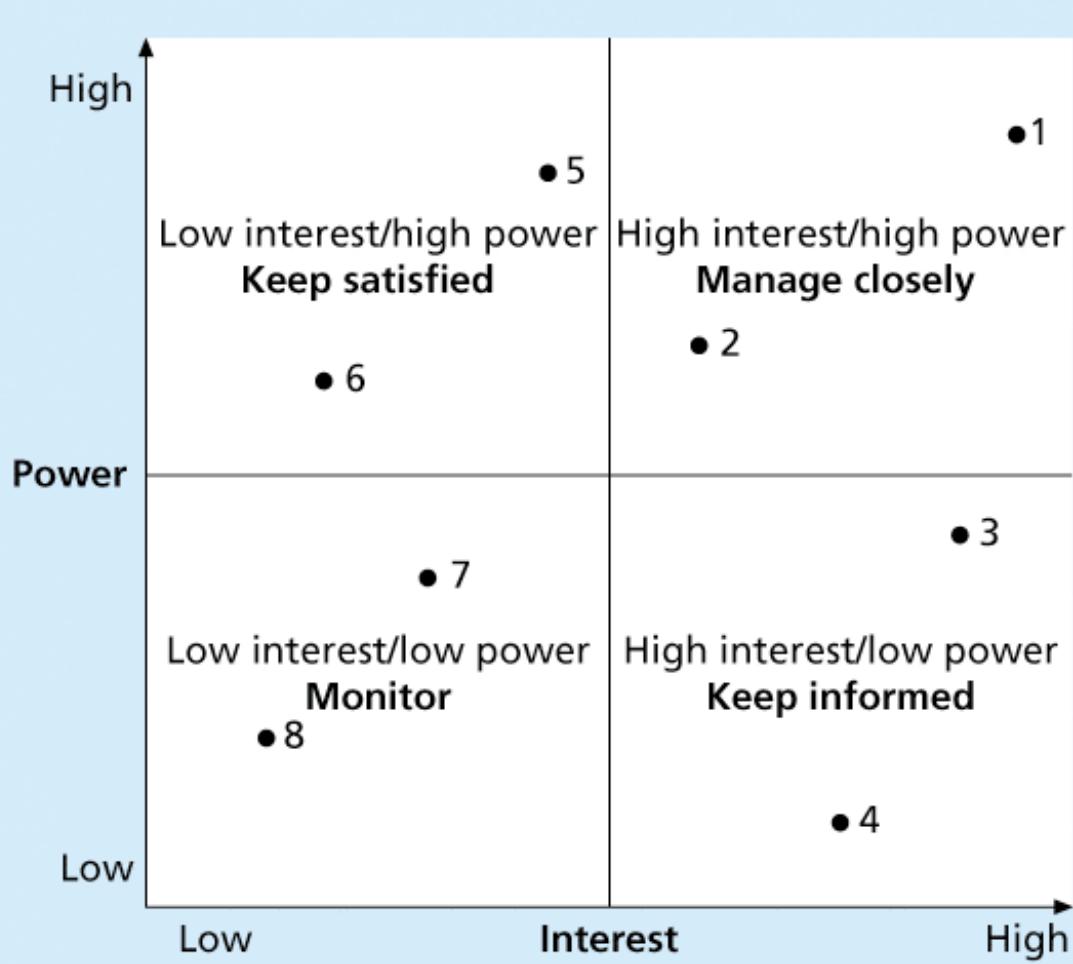
Sample Stakeholder Register

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

Classifying 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

Power/Interest Grid



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

Video 4:

Learning Objectives

- Describe the contents of a stakeholder management plan
- Understand the process of managing stakeholder engagement and how to use an issue log effectively
- Explain methods for controlling stakeholder engagement
- Discuss types of software available to assist in project stakeholder management

Planning Stakeholder Management

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

Sensitive Information

- 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

Sample Stakeholder Analysis

Name	Power/ Interest	Current Engagement	Potential Management Strategies
Stephen	High/high	Leading	Stephen can seem intimidating due to his physical stature and deep voice, but he has a great personality and sense of humor. He previously led a similar refinery upgrade program at another company and knows what he wants. Manage closely and ask for his advice as needed. He likes short, frequent updates in person.
Chien	High/ medium	Resistant	Chien is a very organized yet hardheaded man. He has been pushing corporate IT standards, and the system the PM and sponsor (Debra and Stephen) like best goes against those standards, even though it's the best solution for this project and the company as a whole. Need to convince him that this is okay and that people still respect his work and position.
Ryan	Medium/ high	Supportive	Ryan has been with the company for several years and is well respected, but he feels threatened by Debra. He also resents her getting paid more than he does. He wants to please his boss, Chien, first and foremost. Need to convince him that the suggested solution is in everyone's best interest.
Betsy	High/low	Neutral	Very professional, logical person. Gets along well with Chien. She has supported Debra in approving past projects with strong business cases. Provide detailed financial justification for the suggested solution to keep her satisfied. Also ask her to talk to Chien on Debra's behalf.

Managing Stakeholder Engagement

- Project success is often measured in terms of customer/sponsor satisfaction
- Project sponsors often rank scope, time, and cost goals in order of importance and provide guidelines on how to balance the triple constraint
- This ranking can be shown in an expectations management matrix to help clarify expectations

Expectations Management Matrix

Measure of Success	Priority	Expectations	Guidelines
Scope	1	The scope statement clearly defines mandatory requirements and optional requirements.	Focus on meeting mandatory requirements before considering optional ones. In this case, following corporate IT standards is optional.
Time	1	There is little give in the project completion date. The schedule is very realistic.	The project sponsor must be alerted if any issues might affect meeting schedule goals.
Cost	3	This project is crucial to the organization. If you can clearly justify the need for more funds, they can be made available.	There are strict rules for project expenditures and escalation procedures. Cost is very important, but it takes a back seat to meeting schedule and then scope goals.
Technology/standards	2	There are several potential solutions available, but only one that meets all of the sponsor's technical requirements, especially for accounting.	While corporate IT standards are important, an exception makes sense in this case.

Issue Logs

- Understanding the stakeholders' expectations can help in managing issues
- Issues should be documented in an **issue log**, a tool used to document, monitor, and track issues that need resolution
- Unresolved issues can be a major source of conflict and result in stakeholder expectations not being met
- Issue logs can address other knowledge areas as well

Table 13-4. Sample Issue Log

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 clearly labeled
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.								

Best Practice

- Project managers are often faced with challenges, especially in managing stakeholders
- Sometimes they simply cannot meet requests from important stakeholders
- Suggestions for handling these situations include the following:
 - Be clear from the start
 - Explain the consequences
 - Have a contingency plan
 - Avoid surprises
 - Take a stand

Ways to Control Engagement

- Engagement involves a dialogue in which people seek understanding and solutions to issues of mutual concern
- Setting the tone right – key stakeholders should be invited to actively participate in a kick-off meeting rather than merely attending it
- The project manager should emphasize that a dialogue is expected at the meeting, including texts or whatever means of communication the stakeholders prefer. The project manager should also meet with important stakeholders before the kick-off meeting
- The project schedule should include activities and deliverables related to stakeholder engagement, such as surveys, reviews, demonstrations, and sign-offs.



Using Software to Assist in Project Stakeholder Management

- Productivity software, communications software, and collaboration tools can promote stakeholder engagement
- Social media can also help engage stakeholders. For example, LinkedIn has thousands of groups for project management professionals
- Some project management software includes functionality like Facebook's to encourage relationship building on projects, like giving high fives for a job well done

Social Media for Project Managers

- Elizabeth Harrin, author of Social Media for Project Managers, describes the pros and cons of several social media tools, including blogs, collaboration tools, instant messaging, microblogs like Twitter and Facebook, podcasts, RSS, social networks, vodcasts (video podcasts), webinars, and wikis
- Harrin provides advice for when to use social media and when not to use it
- As the saying goes, “A fool with a tool is still just a fool.” A lot of stakeholder engagement requires old-fashioned techniques like talking to someone!



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IT Project Management

Lecture 10
Project Resource Management



Video 1: Project Resource Management

Learning Objectives

- Define project resource management and understand its processes
- Discuss resource management planning, in particular human resource

What is Project Resource Management?

- To identify, acquire and manage the resources needed for the successful completion of the project.
- Processes include
 1. **Planning resource management**: defining how to estimate, acquire, manage and utilize physical and team resources.
 2. **Estimate activity resources**: estimating team resources and the type and quantities of material, equipment and supplies necessary to perform project work
 3. **Acquiring resources**: getting the necessary resources and personnel required for the project

What is Project Resource Management?

- Processes include (cont...)
 3. **Developing the project team:** building individual and group skills to enhance project performance
 4. **Managing the project team:** tracking team member performance, motivating team members, providing timely feedback, resolving issues and conflicts, and coordinating changes to help enhance project performance
 5. **Control resources:** ensuring that the physical resources assigned and allocated to the project are available as planned, as well as performing corrective action as necessary

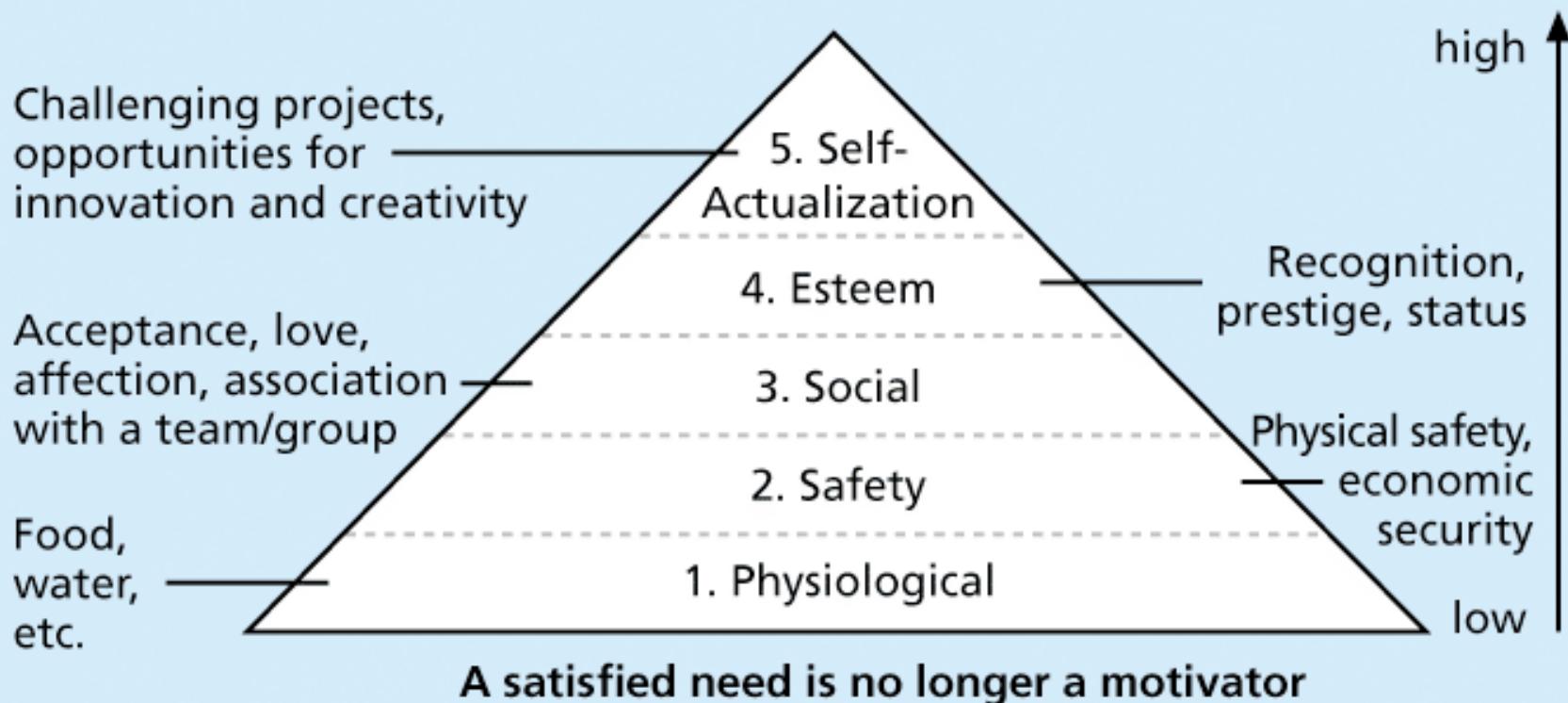
The Importance of Human Resource Management

- Many corporate executives have said, “**People are our most important asset**”
- **People determine the success** and failure of organisations and projects
- Proactive organisations are addressing workforce needs by
 - **improving benefits**
 - **redefining work hours and incentives**
 - **finding future workers**

Keys to Managing People

- Psychologists and management theorists have devoted much research and thought to the field of managing people at work
- Some theories related to human resource management:
 - **Motivation** theories – Maslow, Herzberg & McGregor
 - Covey's 7 habits to improve **effectiveness** on projects
 - Daniel Goleman author of Emotional Intelligence and Primal Leadership
 - **Emotional intelligence** – managing one's own emotions and understanding the emotions of others for improved performance
 - Six **leadership** style – visionary, coaching, affiliative, democratic, pacesetting and commanding

Maslow's Hierarchy of Needs



Herzberg's Motivational and Hygiene Factors

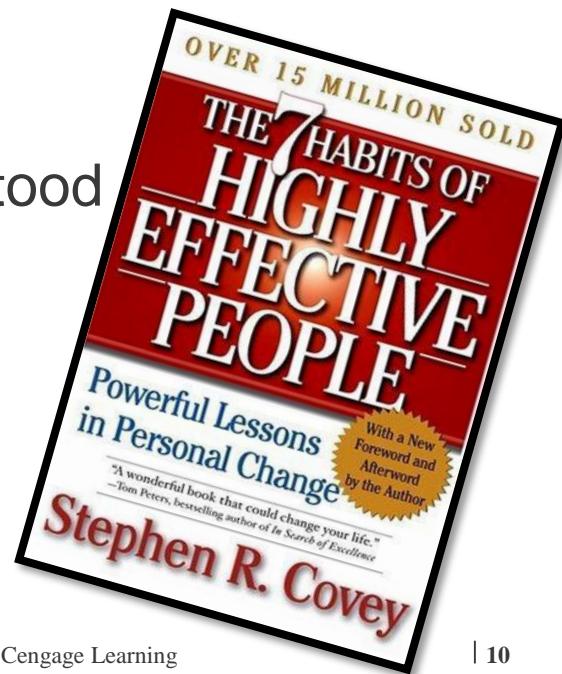
- Frederick Herzberg wrote several famous books and articles about worker motivation. He distinguished between
 - **motivational factors**: achievement, recognition, the work itself, responsibility, advancement, and growth, which produce job satisfaction
 - **hygiene factors**: cause dissatisfaction if not present, but do not motivate workers to do more. Examples include larger salaries, more supervision, and a more attractive work environment

McGregor's Theory X and Y

- Douglas McGregor popularised the human relations approach to management in the 1960s
- **Theory X:** **assumes workers dislike and avoid work**, so managers must use coercion, threats and various control schemes to get workers to meet objectives
- **Theory Y:** **assumes individuals consider work as natural** as play or rest and enjoy the satisfaction of esteem and self-actualization needs
- Theory Z: introduced in 1981 by William Ouchi and is based on the Japanese approach to motivating workers, emphasizing trust, quality, collective decision making, and cultural values

Covey and Improving Effectiveness

- Project managers can apply Covey's 7 habits to improve effectiveness on projects
 - Be proactive
 - Begin with the end in mind
 - Put first things first
 - Think win/win
 - Seek first to understand, then to be understood
 - Synergise
 - Sharpen the saw





Video 2: *Project Resource Management*

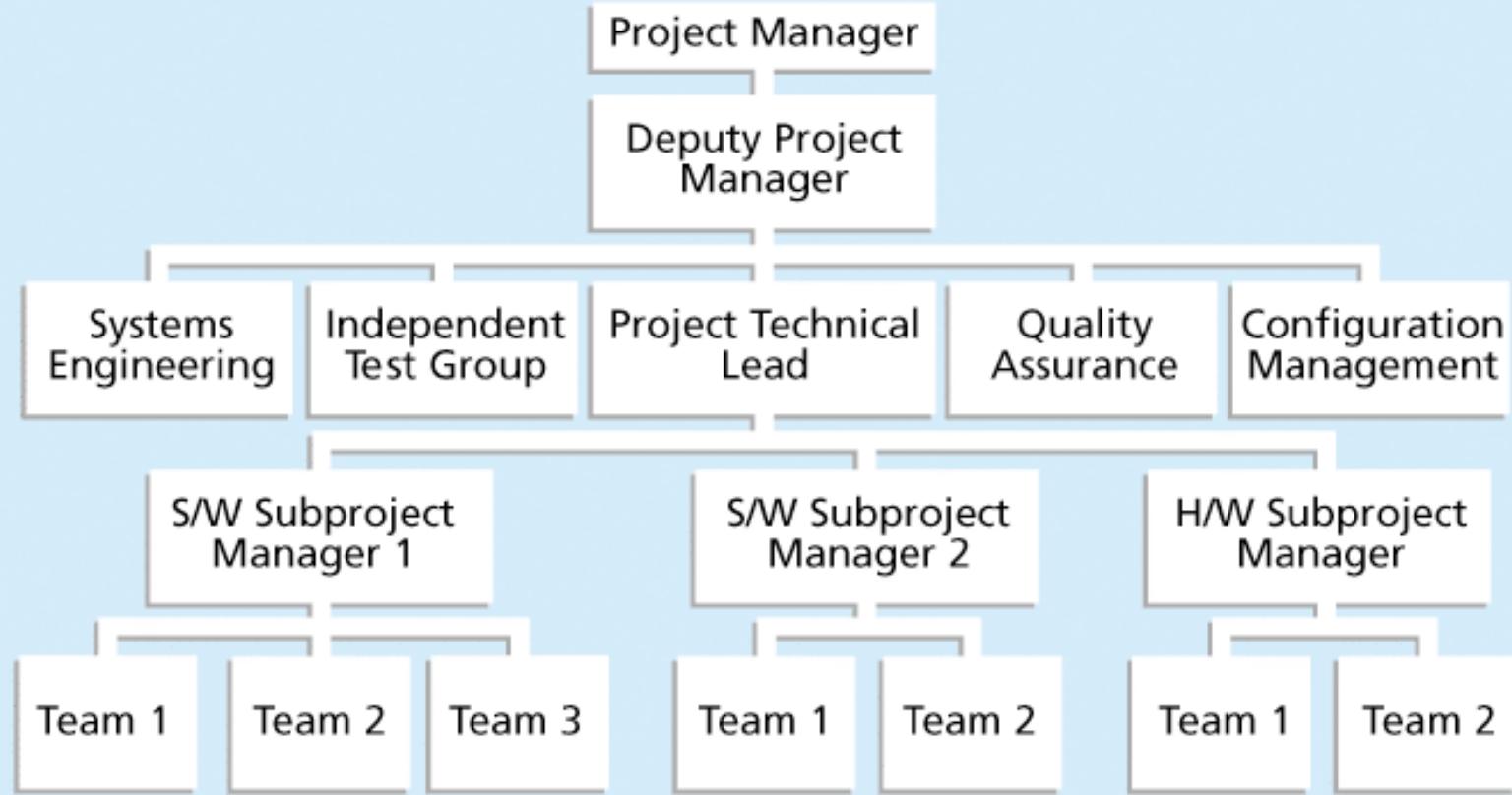
Learning Objectives

- Create a human resource plan, project organisational chart, responsibility assignment matrix, and resource histogram

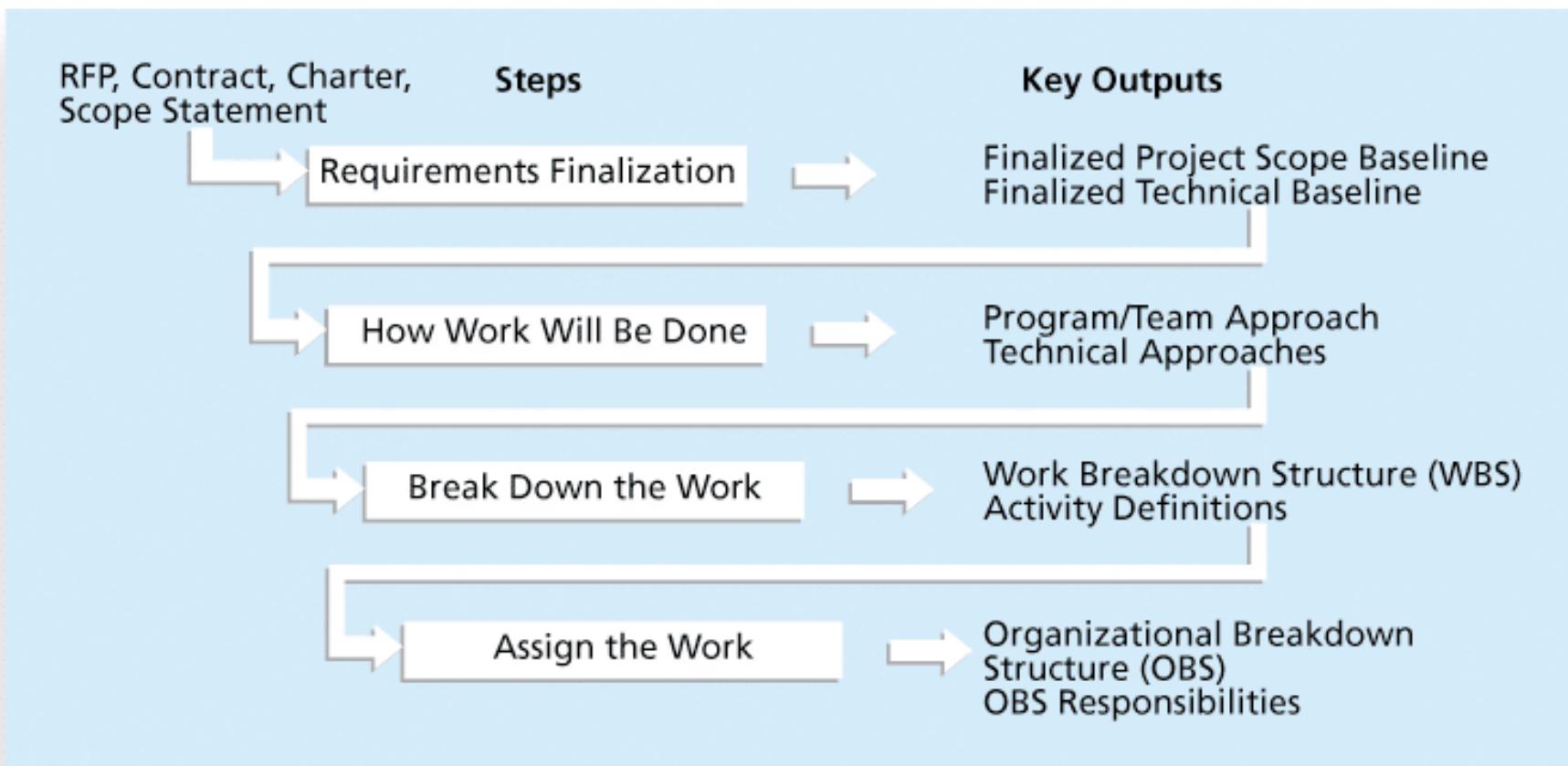
Developing the Human Resource Plan

- Involves identifying and documenting project roles, responsibilities, and reporting relationships
- Contents include
 - project organisational charts
 - staffing management plan
 - responsibility assignment matrixes
 - resource histograms

Sample Organisational Chart for a Large IT Project



Work Definition and Assignment Process



Responsibility Assignment Matrices

- A **responsibility assignment matrix (RAM)** is a matrix that maps the work of the project as described in the WBS to the people responsible for performing the work as described in the OBS (Organisational Breakdown Structure)
- Can be created in different ways to meet unique project needs
- Note: Organisational breakdown structure (OBS) is a specific type of organisational chart that shows which organisational units are responsible for which work items

Sample Responsibility Assignment Matrix (RAM)

WBS activities		1.1.1	1.1.2	1.1.3	1.1.4	1.1.5	1.1.6	1.1.7	1.1.8
OBS units		R	R P					R	
Systems Engineering									
Software Development					R P				
Hardware Development						R P			
Test Engineering		P							
Quality Assurance						R P			
Configuration Management							R P		
Integrated Logistics Support								P	
Training									R P

R = Responsible organizational unit

P = Performing organizational unit



Sample RACI Chart

	Group A	Group B	Group C	Group D	Group E
Test Plans	R	A	C	C	I
Unit Test	C	I	R	A	I
Integration Test	A	R	I	C	C
System Test	I	C	A	I	R
User Acceptance Test	R	I	C	R	A

R = responsibility

A = accountability, only one A per task

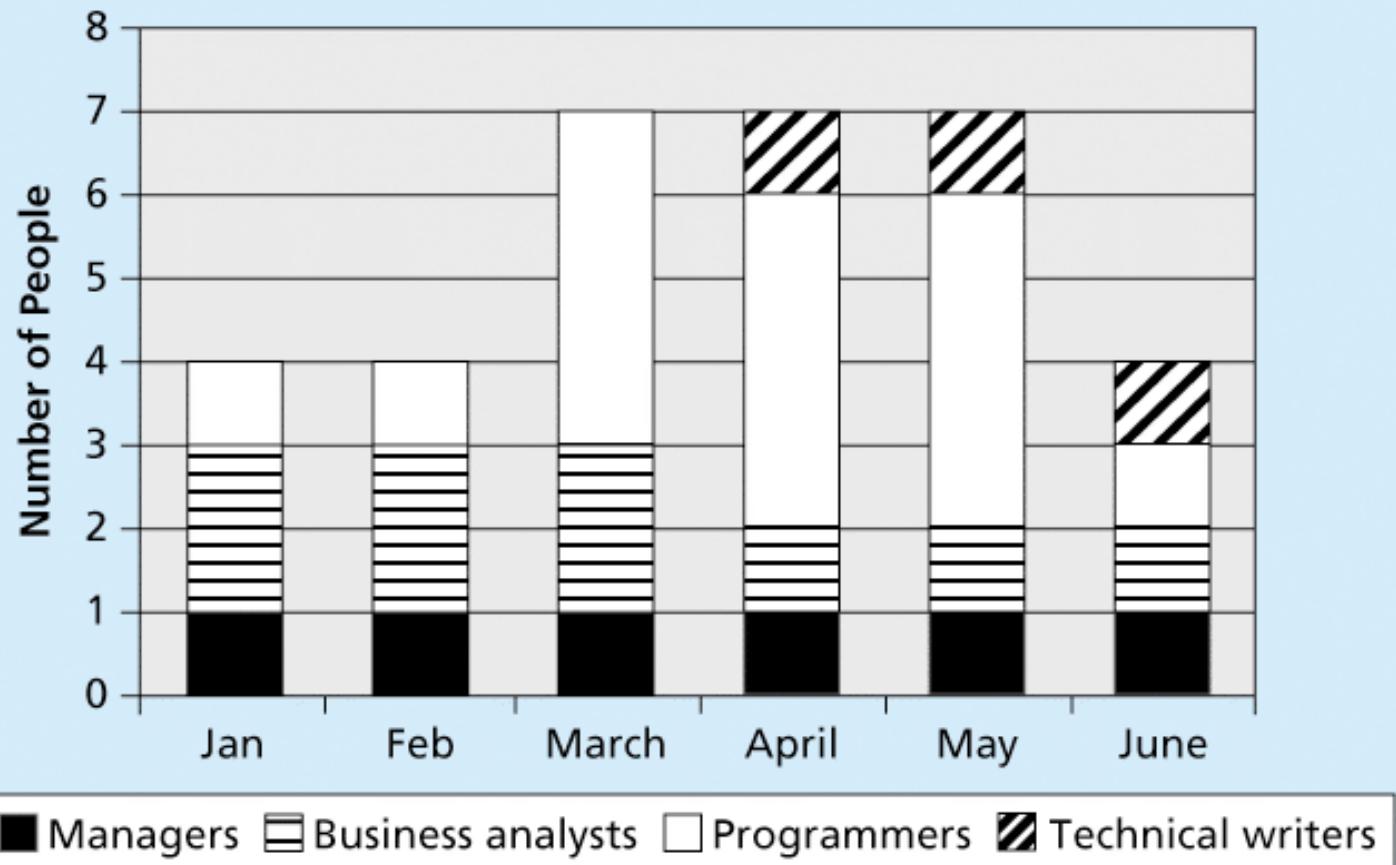
C = consultation

I = informed

Staffing Management Plans and Resource Histograms

- A **staffing management plan**
 - describes when and how people will be added to and taken off the project team
 - describe how these resources would be acquired, trained, rewarded, and reassigned
- A **resource histogram** is a column chart that shows the number of resources assigned to a project over time

Sample Resource Histogram



Video 3: Project Resource Management

Learning Objectives

- Understand important issues involved in project staff acquisition and explain the concepts of resource assignments, resource loading, and resource leveling

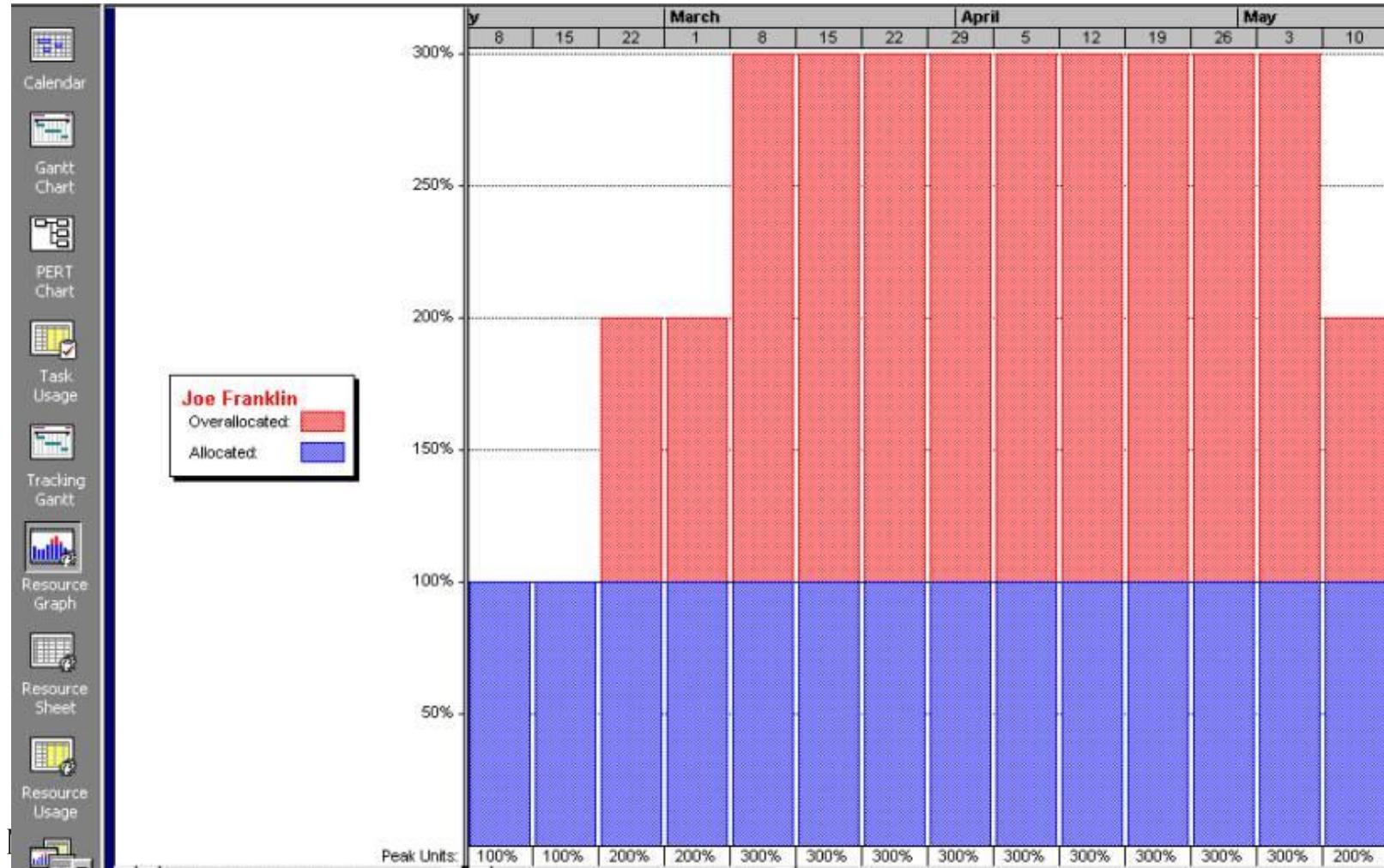
Acquiring the Project Team

- Acquiring qualified people for teams is crucial
- Are project managers doing a good job in recruiting?
- It's important to assign the appropriate type and number of people to work on projects at the appropriate times
- Staffing plans: Maintaining a complete and accurate inventory of employees' skills.

Resource Loading

- Once people are assigned to projects, two techniques are available to project managers that help them use project staff most effectively: **resource loading** and **resource leveling**.
- **Resource loading** refers to the amount of individual resources an existing schedule requires during specific time periods
- Helps project managers develop a general understanding of the demands a project will make on the organisation's resources and individual people's schedules
- **Over-allocation** means more resources than are available are assigned to perform work at a given time

Sample Histogram Showing an Overallocated Individual



Resource Leveling

- **Resource leveling** is a technique for resolving resource conflicts by delaying tasks
- The main purpose of resource leveling is to create a smoother distribution of resource usage and reduce overallocation

Benefits of Resource Leveling

- When resources are used on a more constant basis, they require less management
- It may enable project managers to use a just-in-time inventory type of policy for using subcontractors or other expensive resources
- It results in fewer problems for project personnel and accounting department
- It often improves morale

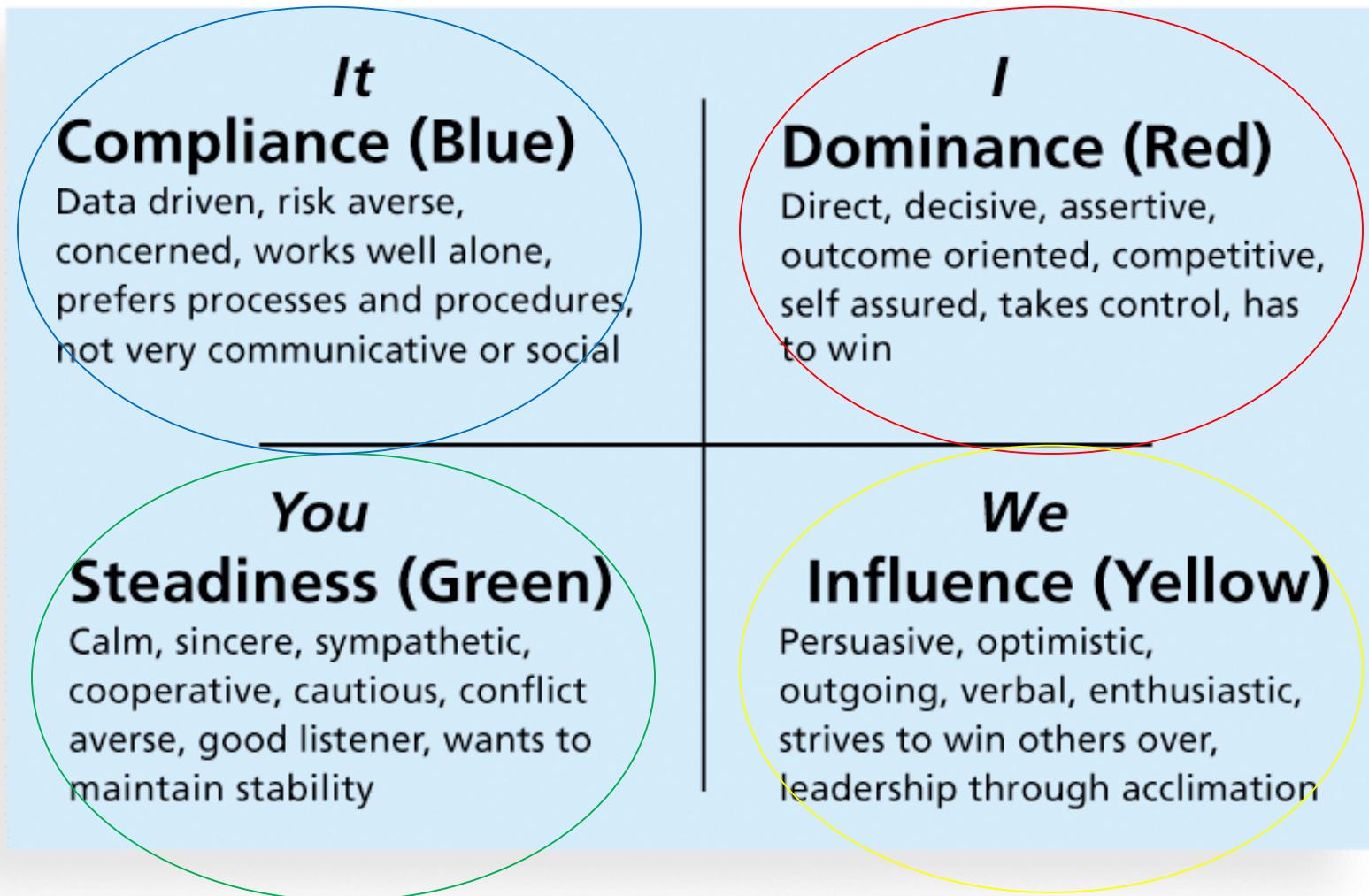
Developing the Project Team

- The main goal of **team development** is to help people work together **more effectively to improve project performance**
- It takes teamwork to successfully complete most projects
- Tuckman Model of Team Development:
 - Forming
 - Storming
 - Norming
 - Performing
 - Adjourning

Training and Team Building Activities

- Training can help people understand themselves, each other, and how to work better in teams
- Important to make sure that the timing and delivery method for the training is appropriate for specific situations and individuals
- Team building activities include
 - physical challenges
 - psychological preference indicator tools
 - Myers-Briggs Type Indicator
 - Social Styles Profile
 - DISC Profile

The DISC Profile



Reward and Recognition Systems

- Team-based reward and recognition systems can promote teamwork
- Focus on rewarding teams for achieving specific goals
- Allow time for team members to mentor and help each other to meet project goals and develop human resources

Video 4: *Project Resource Management*

Learning Objectives

- Explain and apply several tools and techniques to help manage a project team

Managing the Project Team

- Project managers must lead their teams in performing various project activities
- After assessing team performance and related information, the project manager must decide
 - if changes should be requested to the project
 - if corrective or preventive actions should be recommended
 - if updates are needed to the project management plan or organisational process assets.

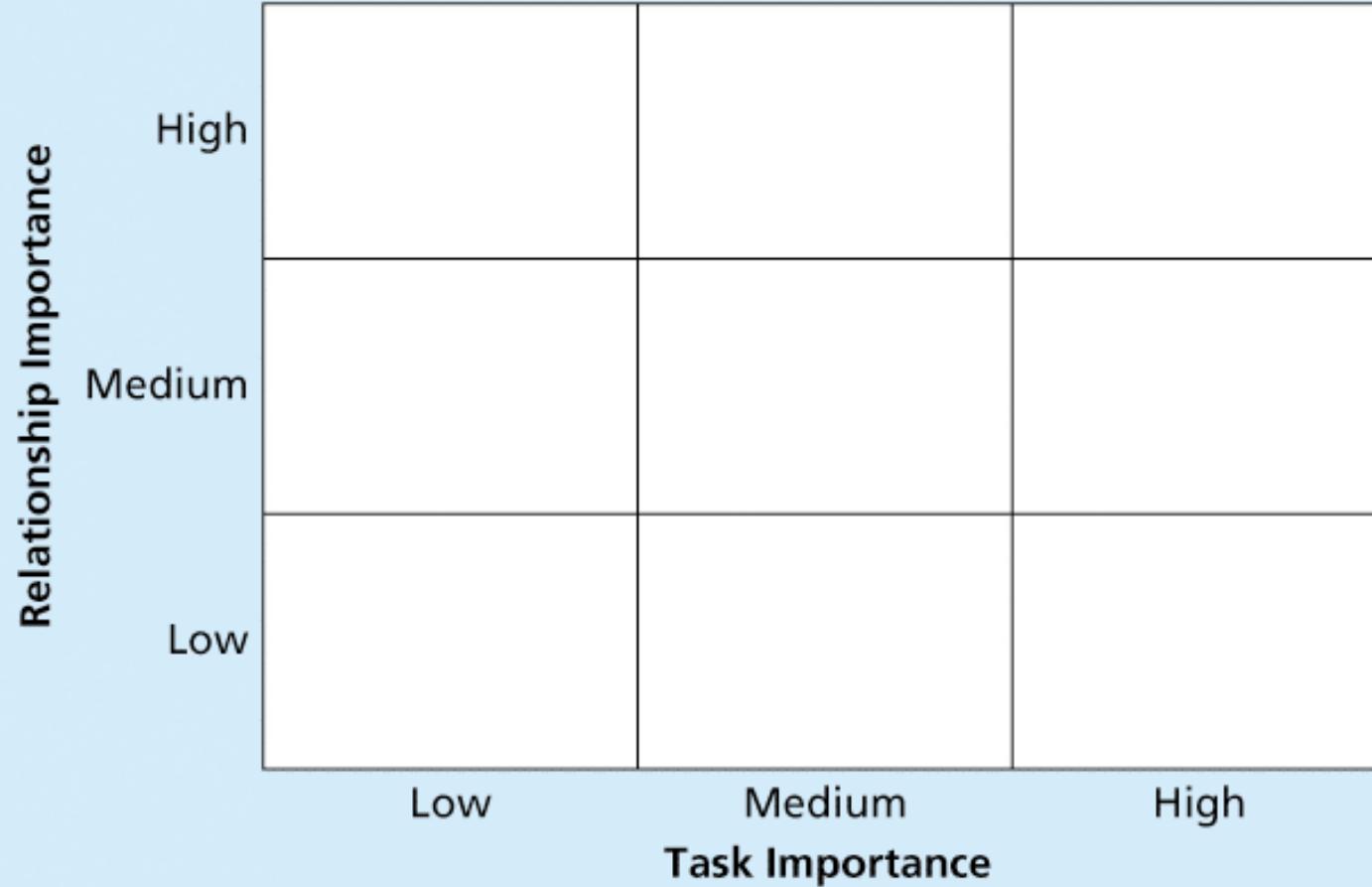
Tools and Techniques for Managing Project Teams

- Observation and conversation
- Project performance appraisals
- Interpersonal skills
- Conflict management

Conflict Handling Modes

1. **Confrontation:** Directly face a conflict using a problem-solving approach
2. **Compromise:** Use a give-and-take approach
3. **Smoothing:** De-emphasize areas of difference and emphasize areas of agreement – the accommodating approach
4. **Forcing:** The win-lose approach
5. **Withdrawal:** Retreat or withdraw from an actual or potential disagreement – avoiding approach
6. **Collaborating:** Decision makers incorporate different viewpoints and insights to develop consensus and commitment

Conflict Handling Modes



Conflict Can Be Good

- Conflict often produces important results, such as new ideas, better alternatives, and motivation to work harder and more collaboratively
- **Groupthink:** Conformance to the values or ethical standards of a group. Groupthink can develop if there are no conflicting viewpoints
- Research suggests that task-related conflict often improves team performance, but emotional conflict often depresses team performance

Human Resource Management Involves Much More Than Using Software

- Patrick Lencioni: The five dysfunctions of teams are:
 1. Absence of trust
 2. Fear of conflict
 3. Lack of commitment
 4. Avoidance of accountability
 5. Inattention to results
- Project managers must
 - Treat people with consideration and respect
 - Understand what motivates them
 - Communicate carefully with them
 - Focus on goal of enabling team members to deliver their best



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IT Project Management

Lecture 10 (Part 2)
Monitoring and Controlling

Learning Objectives

- Understand what is meant by monitoring and control
- Understand the integrated change control process
- Understand how to monitor and control schedule and cost issues
- A revisit of Earned Value Management (EVM)

Mapping Project Management Process Groups to Knowledge Areas

Knowledge Areas	Project Management Process Group				
	Initiating	Planning	Executing	Monitoring & Controlling	Closing
Project Integration Management	1. Develop Project Charter	2. Develop Project Management Plan	3. Direct & manage project work 4. Manage Project Knowledge	5. Monitor & control project work	6. Close Project or Phase
Project Scope Management		1. Plan Scope Management 2.. Collect requirements 3. Define Scope 4. Create WBS		5. Validate Scope; 6. Control Scope	
Project Schedule Management		1. Plan Schedule Management 2. Define Activities 3. Sequence Activities 4. Estimate Activity Durations 5. Develop Schedule		6. Control Schedule	
Project Cost Management		1. Plan Cost Management 2. Estimate Costs 3. Determine Budget		4. Control Costs	

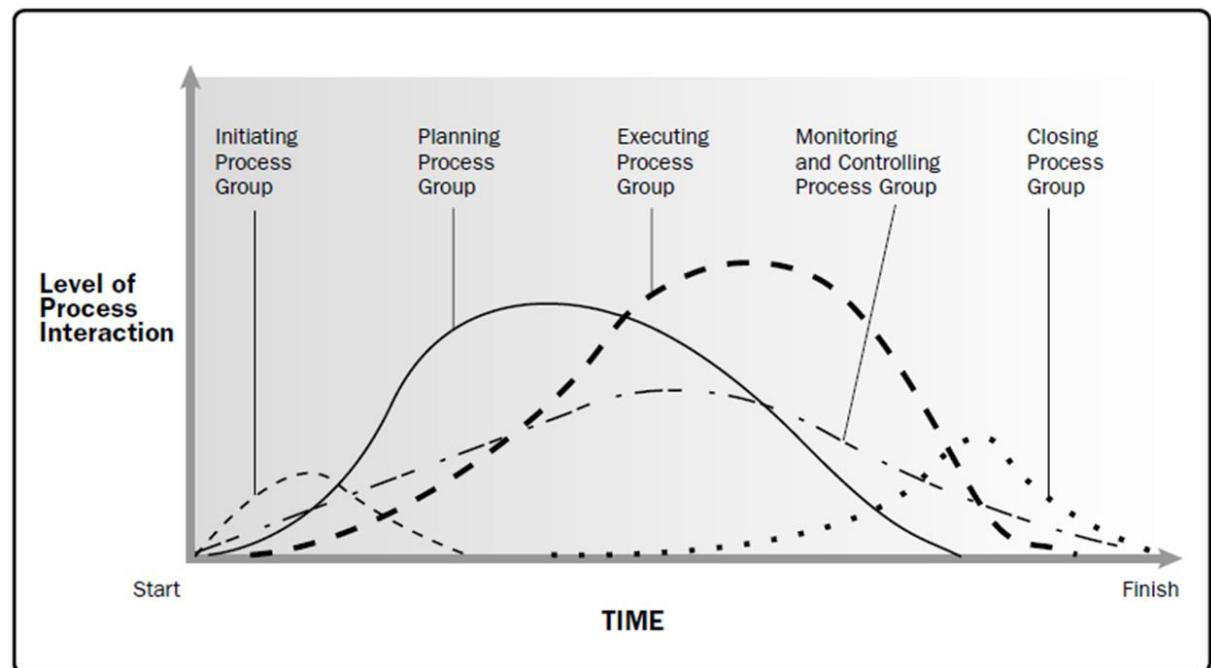
Continued...

Knowledge Areas	Project Management Process Group				
	Initiating	Planning	Executing	Monitoring & Controlling	Closing
Project Quality Management		1. Plan Quality Management	2. Manage Quality	3. Control Quality	
Project Resource Management		1. Plan Resource Management 2. Estimate Activity Resources	3. Acquire Resources 4. Develop Team 5. Manage Team	6. Control Resources	
Project Communication Management		1. Plan Communications Management	2. Manage Communications	3. Monitor Communications	
Project Risk Management		1. Plan Risk Management 2. Identify Risks 3. Perform Qualitative Risk Analysis 4. Perform Quantitative Risk Analysis 5. Plan Risk Responses	6. Implement Risk Responses	7. Monitor Risks	
Project Procurement Management		1. Plan Procurement Management	2. Conduct Procurements	3. Control Procurements	
Project Stakeholder Management	1. Identify Stakeholders	2. Plan Stakeholder Management	3. Manage Stakeholder Engagement	4. Monitor Stakeholder Engagement	

Monitoring & Control

- Monitoring and Control processes are used to measure and report progress, handle changes to scope, time, cost, and quality, manage the project team, manage risk mitigation strategies, and monitor procurement contracts

Process overlap



Monitoring Vs. Control

- **Monitoring** is collecting and reporting information concerning previously defined project performance elements
- **Control** uses the information supplied by the monitoring techniques in order to bring project actual results in line with stated project performance standards

Keys to Effective Monitoring and Controlling

- The organisation and project manager must foster an environment that allows for the honest reporting of results
- To reduce the chances for biased reporting the process should be as automated as possible and there needs to be a separation of responsibilities
- Time must be allocated in the project schedule to perform the tasks of monitoring and control
- Lastly, all members of the project team, stakeholders, and other management resources should receive training on effective monitoring and control techniques

Integration Management Processes

- Develop the Project Charter
- Develop the project management plan
- Direct and manage project execution
- **Monitor and control the project work:** Oversee project work to meet the performance objectives of the project
- **Perform integrated change control:** Coordinate changes that affect the project's deliverables and organisational process assets

Integrated Change Control

(refer to lecture 3 video 4)

- A formal process used to approve and manage all necessary project document and deliverable changes
- Key activities
 - Identifying that a change needs to occur or has occurred
 - Establishing a governance structure for reviewing and approving requested changes
 - Managing the approved changes when and as they occur
 - Maintaining the integrity of project artifacts, as changes occur
 - Communication to all relevant stakeholders
 - Configuration management

Project Cost Management Processes

- Plan Cost Management
- Estimate costs
- Determine budget
- **Control Cost:** controlling changes to the project budget

Cost Control

- Is concerned with:
 - influencing the factors that create cost variances on the project and
 - controlling changes to the project's budget
- Like the other monitoring and control processes, cost control is a continual process of comparing the current actual project expenditures to the defined budget and determining when issues have arrived that need to be dealt with
- ***Almost every change made on an IT project will affect Cost in some manner***

Earned Value Management (EVM)

- A technique used to help determine and manage project progress and the magnitude of any variations from the planned values concerning cost, schedule, and performance
- The technique was created to help the project team and stakeholders gain a better understanding of just how the project is performing
- Many project managers fail to evaluate performance properly
 - How much work has actually been completed and how much work actually remains
 - Not necessarily how many hours have been worked

Percent Complete

- Often times IT projects can be difficult to estimate progress
 - 0-100 percent rule
 - 50-50 percent rule
 - Interval percent rule (0, 25, 50, 75, 100)

EVM Key Values

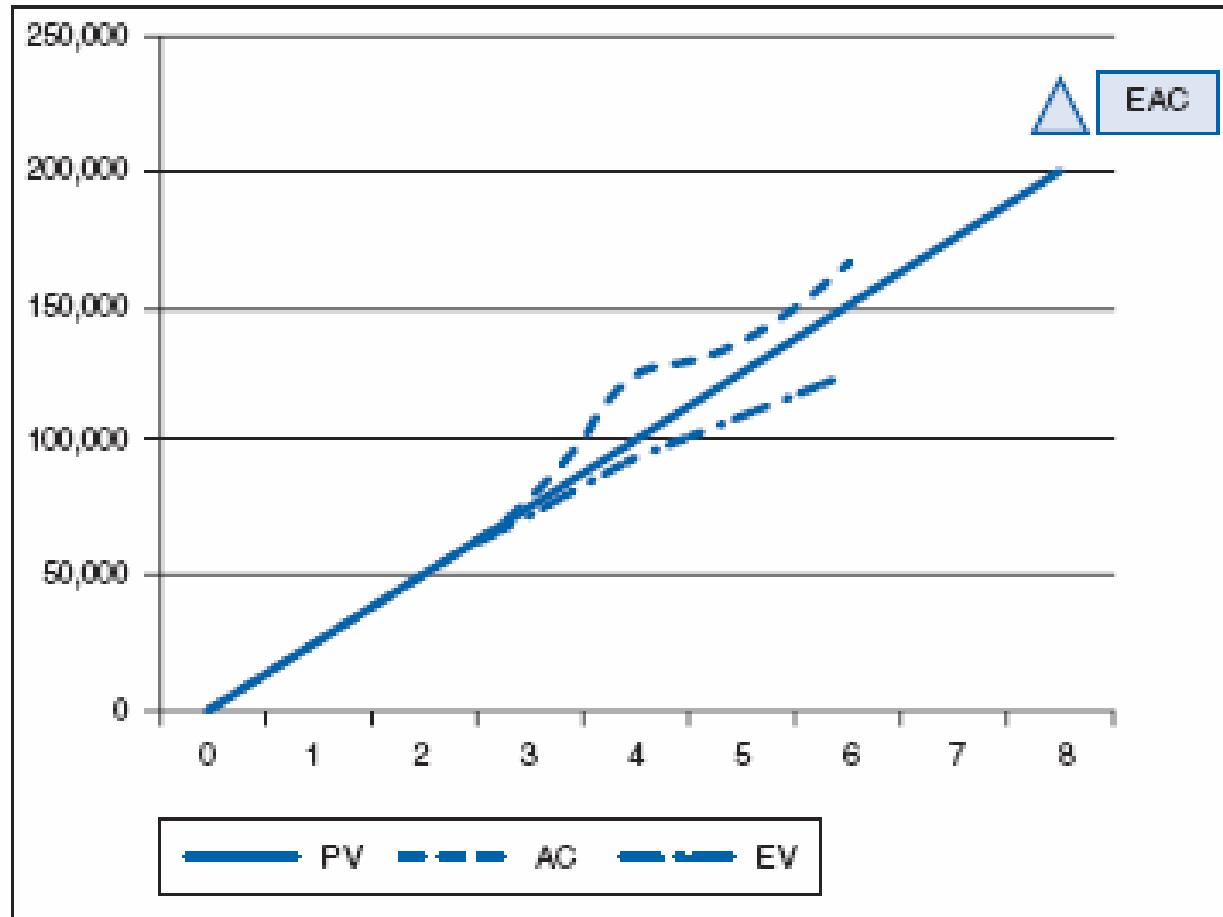
Recall from Lecture 6...

- **Planned Value (PV)** – is the budgeted cost for the work scheduled to be completed on a task, work package, or activity up to a given point in time (BCWS)
- **Actual Cost (AC)** – is the total cost incurred in accomplishing work on the task during a given time period (ACWP)
- **Earned Value (EV)** – is the budgeted amount for the work actually completed on the task during a given time period or $EV = (PV) * (\text{percent complete})$ (BCWP)

EVM Key Values

- **Cost Variance (CV)** – equals earned value (EV) minus actual cost (AC) or $CV = EV - AC$
- **Schedule Variance (SV)** - equals earned value (EV) minus planned value (PV) or $SV = EV - PV$
- **Cost Performance Index (CPI)** = equals the ratio of EV to the AC, or $CPI = EV/AC$
 - Equal to 100% then Actual = Planned
 - Less than 100% then project is over budget
- **Schedule Performance Index (SPI)** – equals the ratio of EV to the PV, or $SPI = EV/PV$
 - Equal to 100% then Actual = Planned
 - Less than 100% project is behind schedule

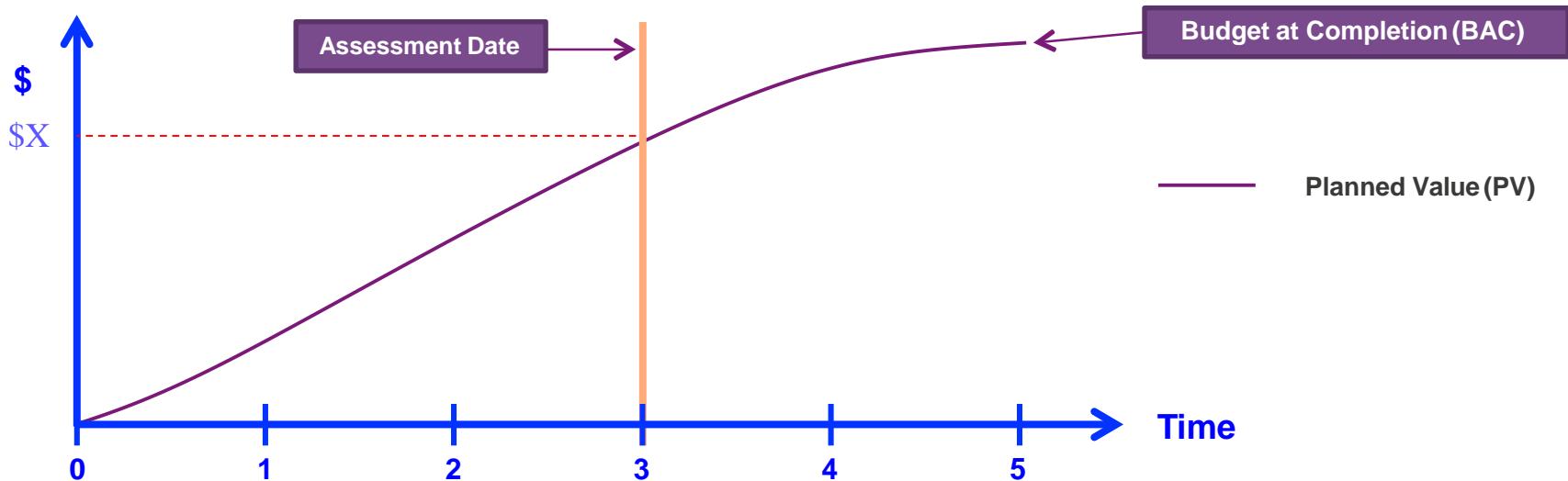
PV, AC and EV



Brewer (2013). Methods of Information Technology Management .p.365.

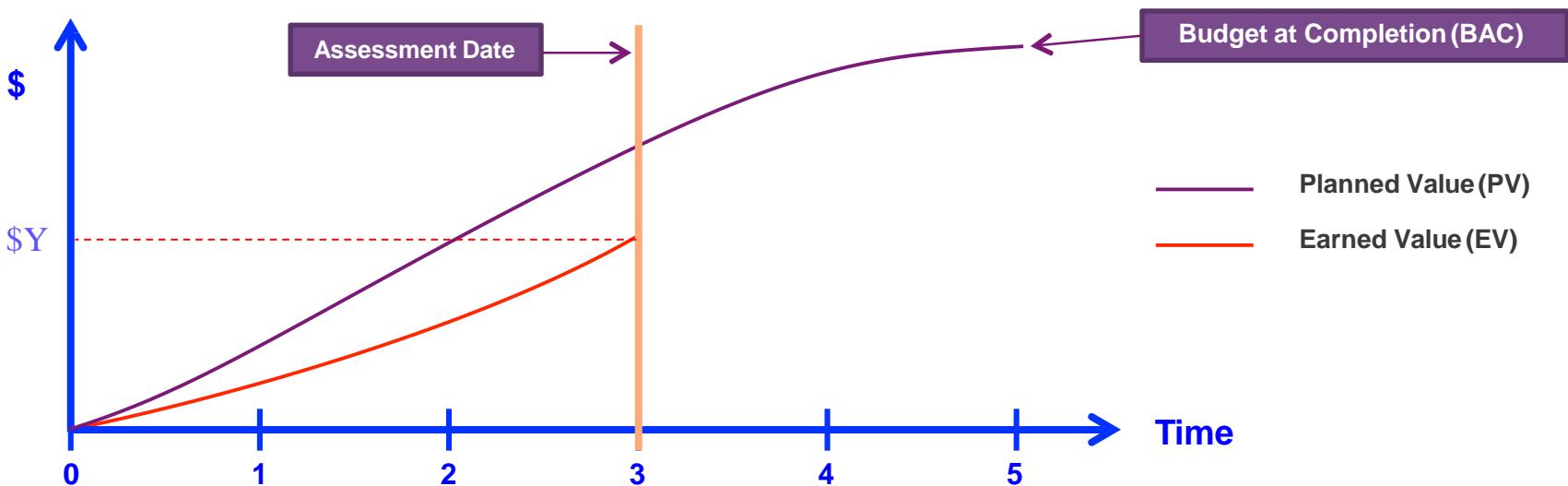
Planned value (PV)

- Planned Value (PV) – is the **budgeted cost for the work scheduled** to be completed on a task, work package, or activity up to a given point in time
- Also referred to as the budgeted cost of work scheduled (BCWS).
- The **final PV of a task is equal to the task's budget at completion (BAC)**, i.e. the total amount budgeted for the task.



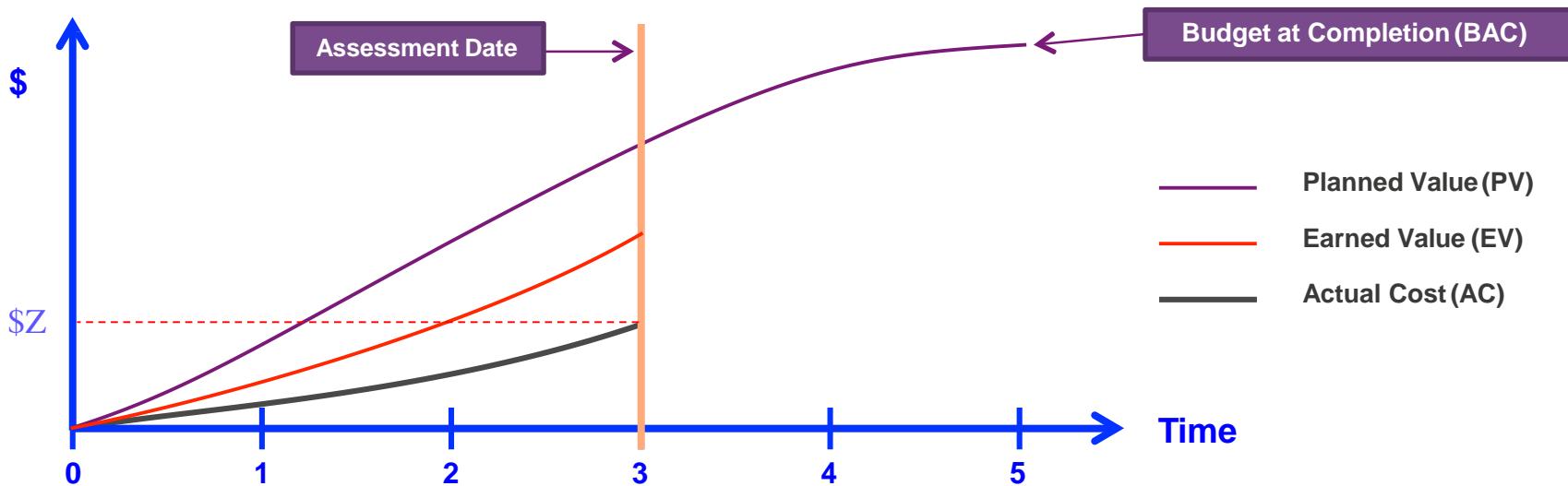
Earned value (EV)

- Earned Value (EV) – is the **budgeted amount for the work actually completed** on the task during a given time period (BCWP)
 - $EV = (\text{Project Budget}) * (\text{percent complete})$
- Also referred to as the **budgeted cost of work performed (BCWP)**.



Actual Cost (AC)

- **Actual Cost (AC)** – is the total cost incurred in accomplishing work on the task during a given time period
- Also referred to as the ***actual cost of work performed (ACWP)***.



Example

Q. A project has a budget of \$10M and schedule for 10 months. It is assumed that the total budget will be spent equally each month until the 10th month is reached. After 2 months the project manager finds that only 5% of the total work is finished and a total of \$1M spent.

Find out how the project is progressing in terms of schedule and budget.

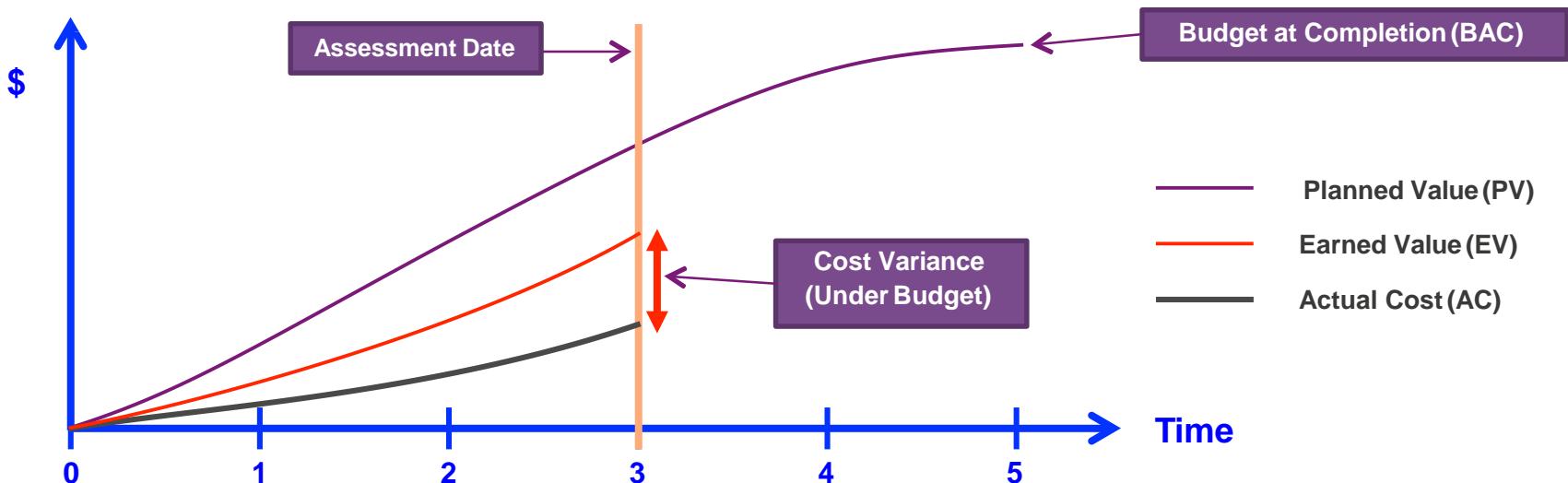
- Budgeted Cost scheduled for each month is = $\$10M/10\text{ months} = \$1M$
- **Planned Value (BCWS)** = \$2M
- **Earned Value (BCWP)** = $\$10M * 5\% = \$0.5M$
- **Actual Cost (ACWP)** = \$1M

Cost Variance (CV)

- Shows whether and by how much the project is under or over the approved budget.

$$CV = EV - AC$$

- Negative CV means the project is over the budget (cost overrun).
- Positive CV means the project is below the budget.
- This is the actual dollar value by which a project is either overrunning or under running its estimated cost.

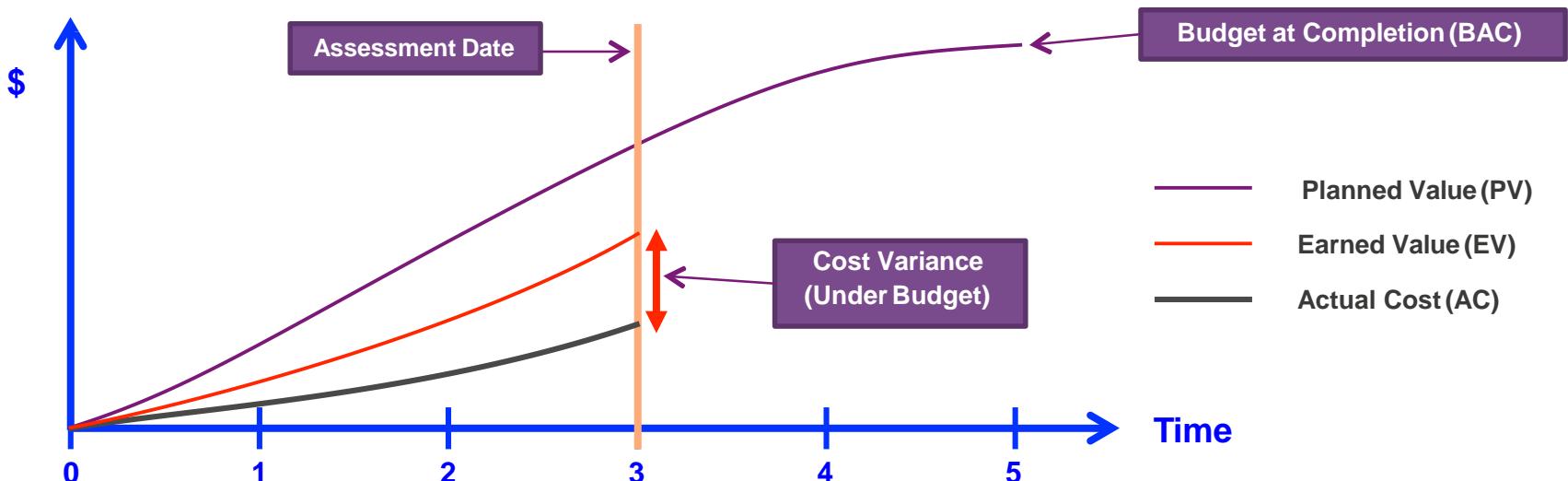


Cost Performance Indicator (CPI)

- CPI showing the project's **cost efficiency** or the **utilisation of the resources** on the project.

$$\text{CPI} = \text{EV} / \text{AC}$$

- Equal to 100% then Actual = Planned
- Less than 100% then project is over the budget
- More than 100% then project is below the budget

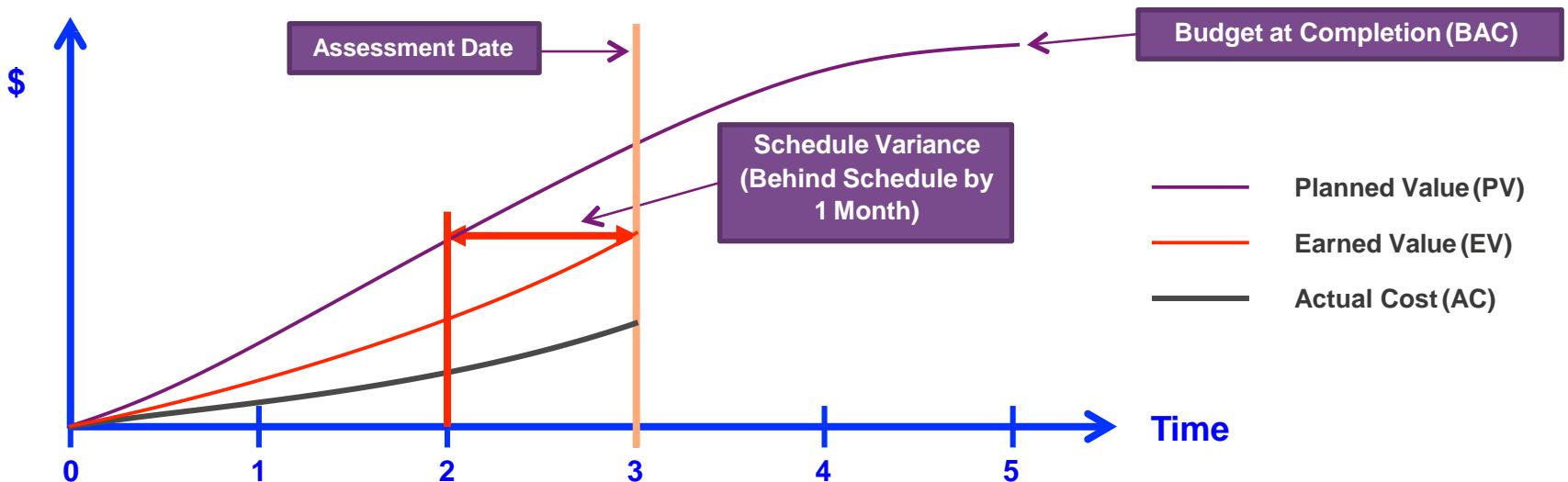


Schedule Variance (SV)

- SPI shows whether your work is ahead of or behind your approved schedule.

$$SV = EV - PV$$

- Negative SV means the project is behind schedule
- Positive SV means the project is ahead of schedule
- SV is calculated in terms of the difference in dollar value between the amount of work that should have been completed in a given time period and the work actually completed.

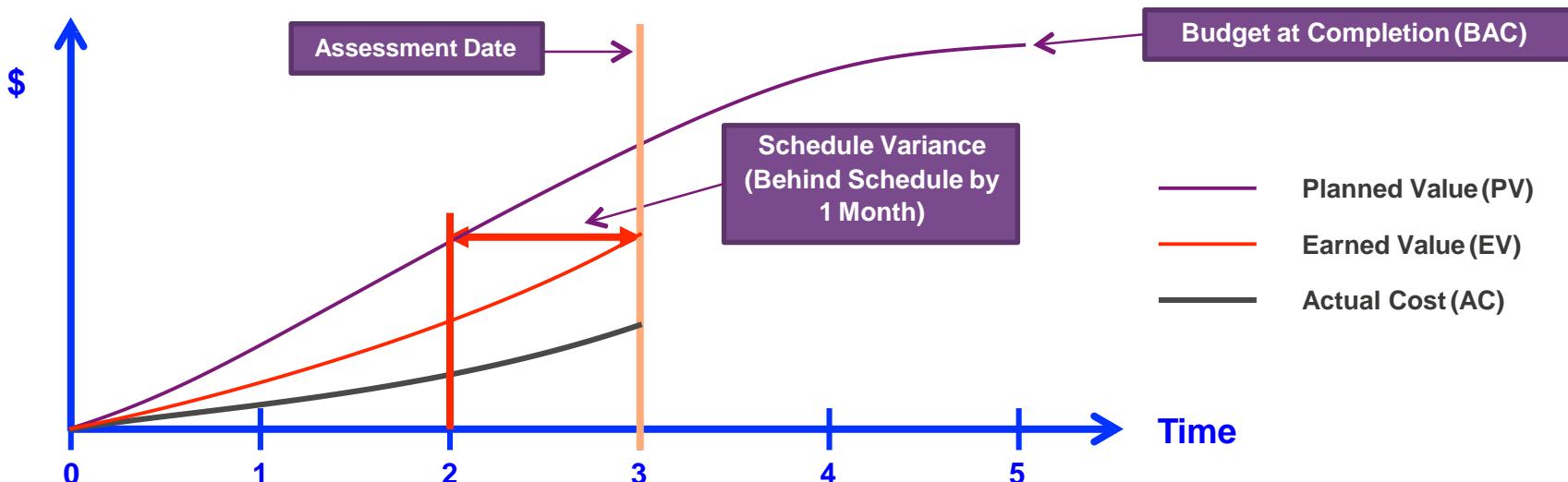


Schedule Performance Indicator (SPI)

- SPI indicates the **rate** at which the **project is progressing** (ahead of or behind schedule), and is sometimes referred to as the **project's schedule efficiency**.

$$\text{SPI} = \text{EV} / \text{PV}$$

- Equal to 100% then Actual = Planned
- Less than 100% project is behind schedule
- More than 100% project is ahead of schedule



EXAMPLE– Cost/Budget

Q. A project has a budget of \$10M and schedule for 10 months. It is assumed that the total budget will be spent equally each month until the 10th month is reached. After 2 months the project manager finds that only 5% of the total work is finished and a total of \$1M spent.

Find out how the project is progressing in terms of schedule and budget.

$$\text{PV} = \$2\text{M} \quad \text{EV} = \$0.5\text{M} \quad \text{AC} = \$1\text{M}$$

- $\text{CV} = \text{EV} - \text{AC}$
= $0.5 - 1$
= -0.5M (Cost overrun)
- $\text{CPI} = \text{EV} / \text{AC}$
= $0.5 / 1$
= 0.5 (Cost overrun)

Example – Schedule

Q. A project has a budget of \$10M and schedule for 10 months. It is assumed that the total budget will be spent equally each month until the 10th month is reached. After 2 months the project manager finds that only 5% of the total work is finished and a total of \$1M spent.

Find out how the project is progressing in terms of schedule and budget.

$$\text{PV} = \$2\text{M} \quad \text{EV} = \$0.5\text{M} \quad \text{AC} = \$1\text{M}$$

- $\text{SV} = \text{EV} - \text{PV}$
= $0.5 - 2$
= $-\$1.5\text{M}$ (Behind schedule)

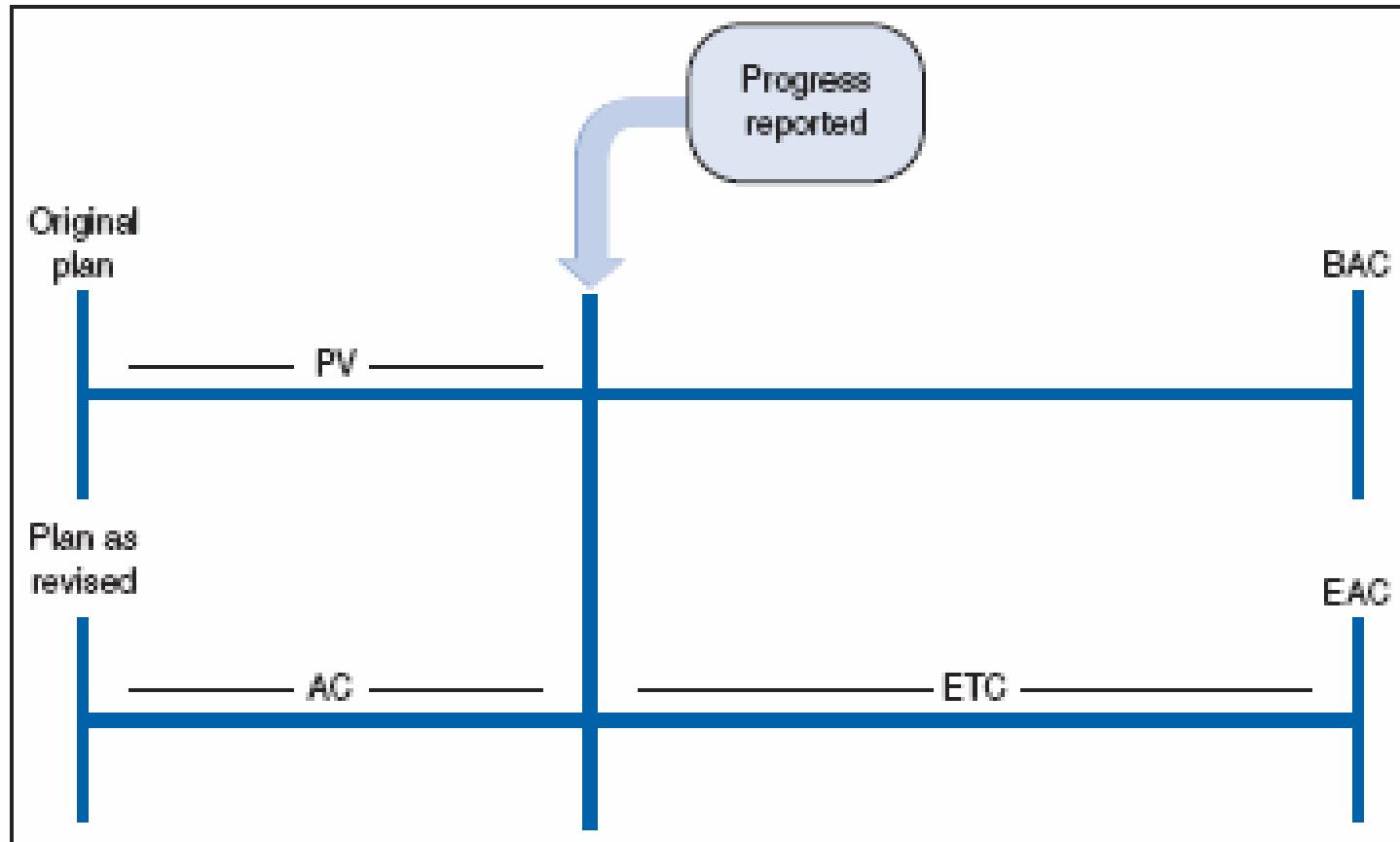
- $\text{SPI} = \text{EV} / \text{PV}$
= $0.5 / 2$
= 0.25 (Behind schedule)

- Currently we are 75% behind schedule i.e. $(1 - \text{SPI}) * 100\%$, since we have only achieved 25% of the schedule.

More EVM Key Values

- **BAC** Budget at Completion
 - *How much did you **BUDGET** for the Total Job?*
- **ETC** Estimate to Complete
 - *From this point on, how much MORE do we expect it to cost to finish the job?*
 - ETC = (BAC - EV)/CPI
- **EAC** Estimate at Completion
 - *What do we currently expect the TOTAL project to cost?*
 - EAC = AC + ETC or EAC = BAC/CPI

EVM Terms Visually



Brewer (2018). Methods of Information Technology Management .p.364.

Example – Schedule part 2

Q. A project has a budget of \$10M and schedule for 10 months. It is assumed that the total budget will be spent equally each month until the 10th month is reached. After 2 months the project manager finds that only 5% of the total work is finished and a total of \$1M spent.

Find out how the project is progressing in terms of schedule and budget.

PV = \$2M

EV = \$0.5M

AC = \$1M

CPI = 0.5

Budget at completion (BAC) = \$10m

Estimate to complete (ETC) = (BAC – EV) / CPI = (10 - 0.5) / 0.5 = \$19m

Estimate at Completion (EAC) = ETC + AC = 19 + 1 = \$20m

→ or **EAC = BAC/CPI = 10 / 0.5 = \$20m**

Report Performance

- **Report Performance** - collecting and disseminating performance information
- Performance reporting involves the collection of all project and product related data and the distribution of performance information to stakeholders
- Project related data includes information from all areas of the project including: schedule, costs, quality, risks, human resources, and if needed procurement
- The **frequency of the reports** (daily, weekly, monthly) is determined by the type of report, size of the project and the importance of the project as stated in the communication plan

Performance Report Categories

- **Progress reports** – physical progress to date, Actual data vs. planned data
- **Status reports** – identify where the project is today (the date the report is prepared) and the information from collected performance data to calculate Schedule Variance and Cost Variance
- **Projection reports** – calculate the following
 - Earned Value numbers – Estimate at Completion (EAC), Estimate to Complete (ETC), Schedule Performance Index (SPI), and Cost Performance Index (CPI).
 - The report is forward looking giving projections/forecasts of the project finish
- **Exception reports** – exceptions, problems, risks

Final Thoughts on EVM

- The results are only as good as the data accuracy
- If numbers generated in a timely fashion, allows the project manager to act in a proactive manner instead of a reactive mode
- Make sure to establish rules for progress reporting (percent complete) early in the project then communicate and educate all project team members for consistency across all tasks



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Lecture 11
Project Management Process Group:
A Case Study

Part 1: A Review of Traditional PM Approach

Topics covered:



Describe the five project management process groups, the typical level of activity for each, and the interactions among them



Review a case study of an organisation applying the project management process groups to manage an IT project



Describe outputs of each process group, and how effective initiating, planning, executing, monitoring and controlling, and closing contributes to project success

Video 1:

Learning Objectives

- Describe the five project management process groups, the typical level of activity for each, and the interactions among them
- Understand how the project management process groups relate to the project management knowledge areas
- Discuss how organisations develop information technology (IT) project management methodologies to meet their needs

Project Management Process Groups

- Project management can be viewed as a number of interlinked processes
- A **process** is a series of actions directed toward a particular result
- The project management process groups include
 - initiating processes
 - planning processes
 - executing processes
 - monitoring and controlling processes
 - closing processes

Project Management Process Group

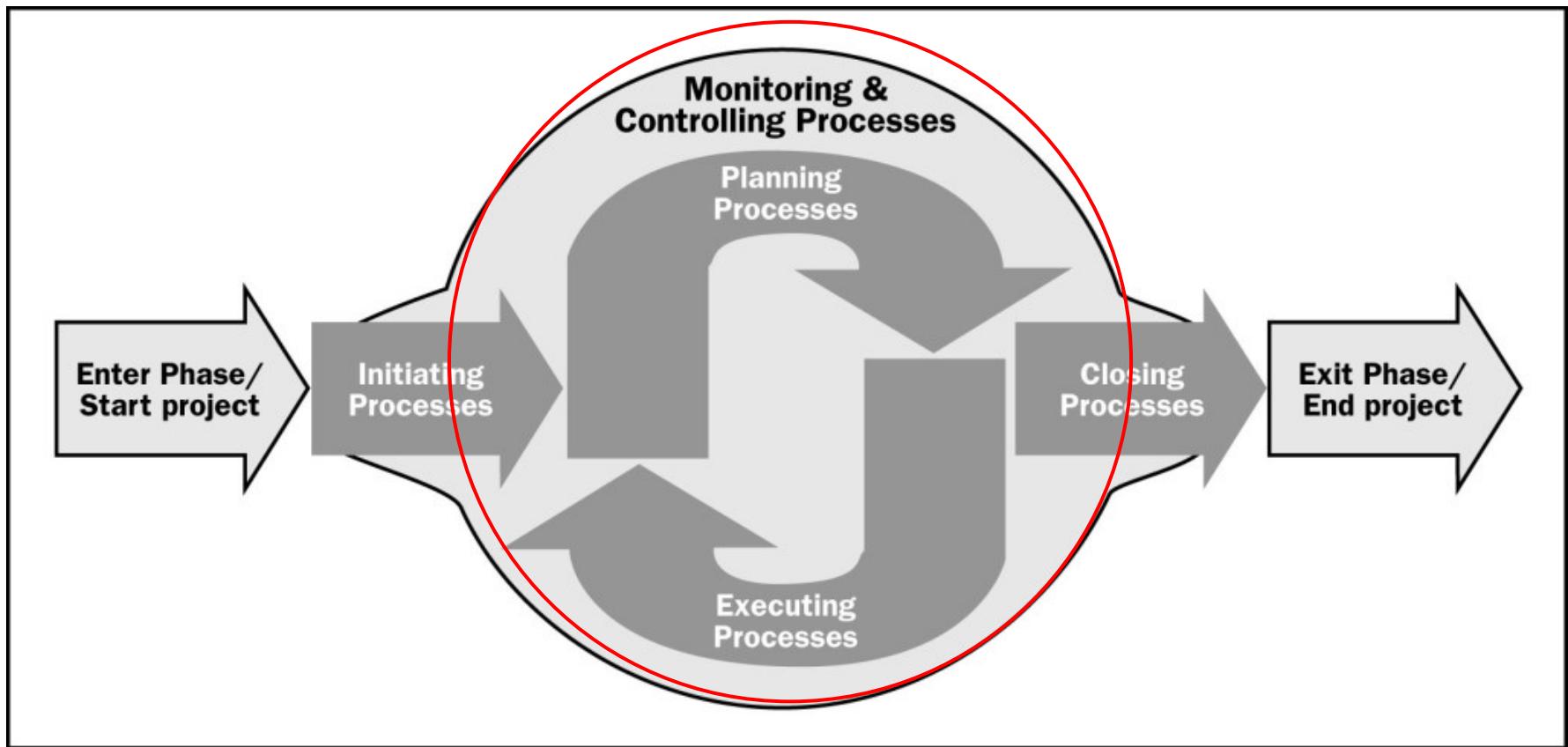


Figure 3-1. Project Management Process Groups

*Source: PMBOK® Guide, Fifth Edition, 2013.

Process Group Interact in a Phase

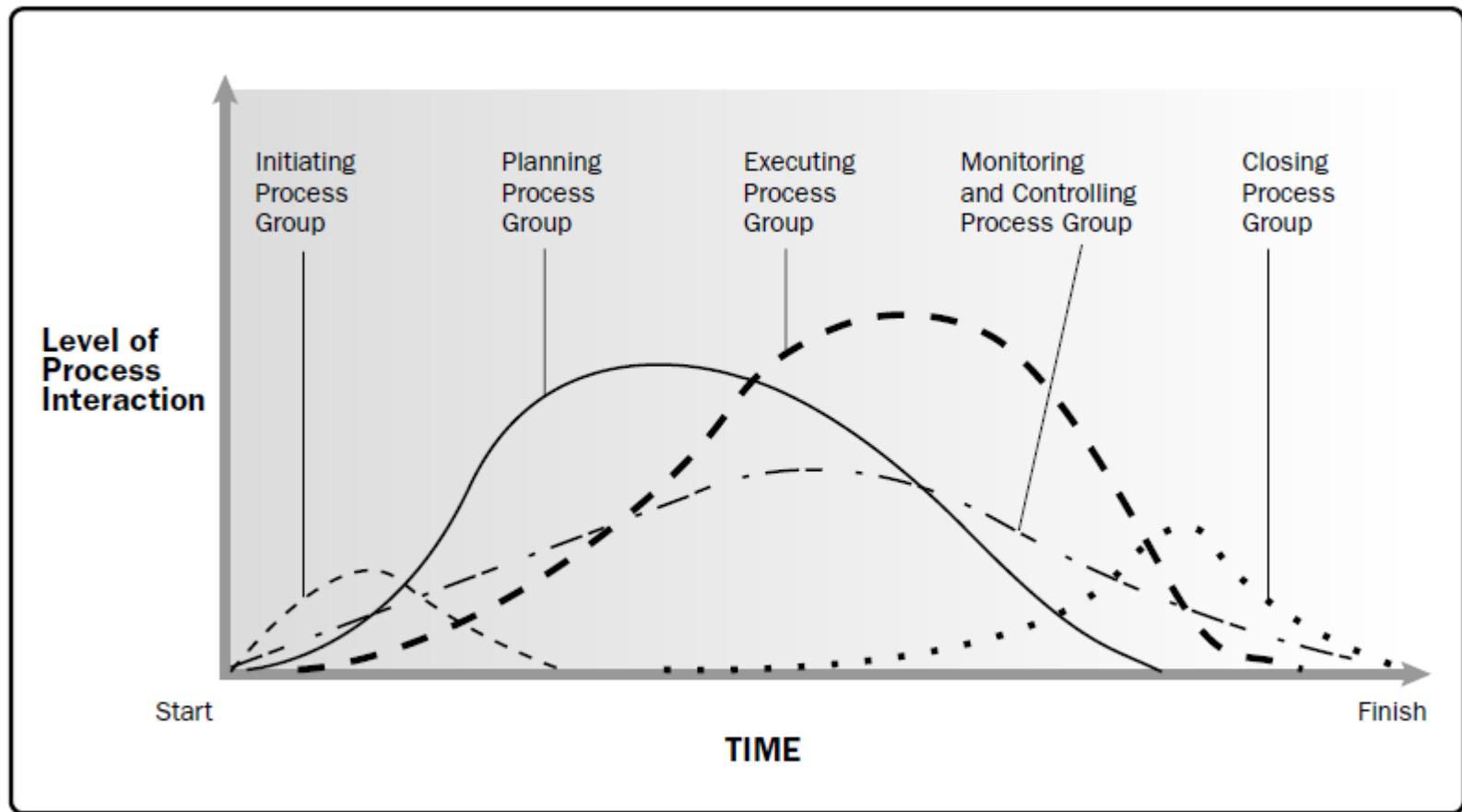
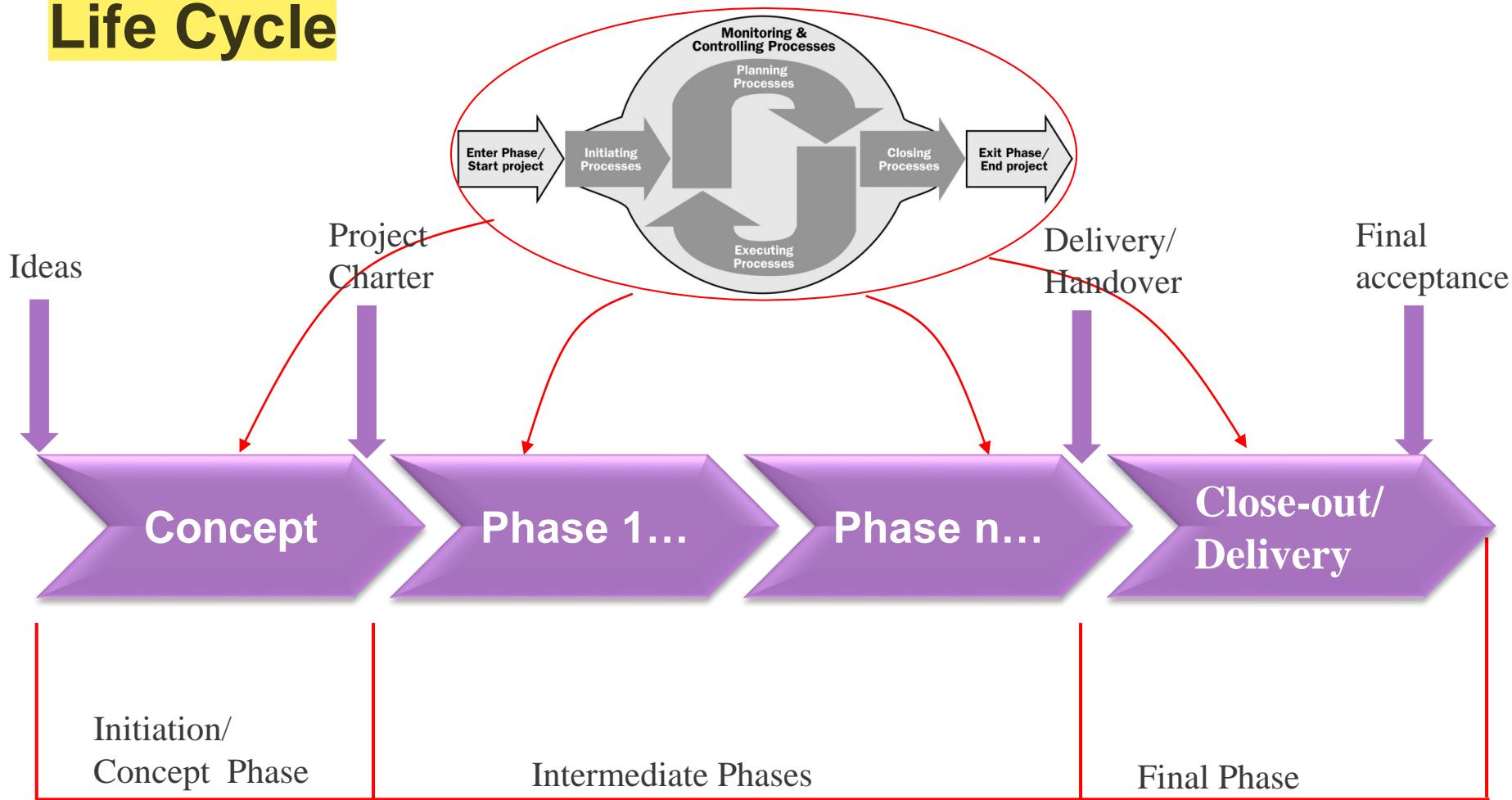
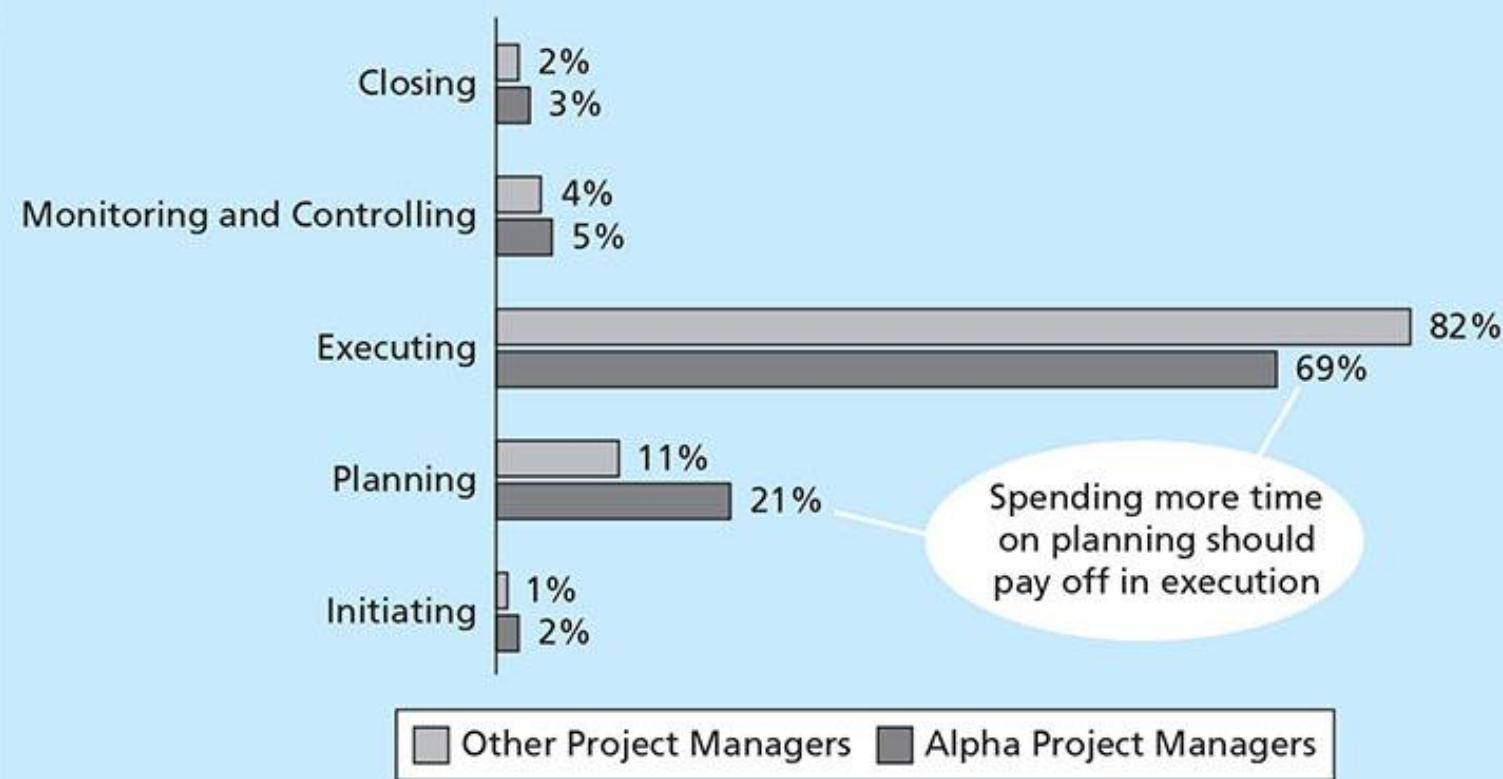


Figure 3-2. Process Groups Interact in a Phase or Project

Process Groups Repeating Along the Project Life Cycle



Percentage of Time Spent on Each Process Group



Source: Andy Crowe

Mapping the Process Groups to the Knowledge Areas

- You can map the main activities of each PM process group into the ten knowledge areas using the PMBOK® Guide, Fifth Edition, 2013
- Note that there are activities from each knowledge area under the planning process groups

Mapping Project Management Process Groups to Knowledge Areas*

Knowledge Areas	Project Management Process Group				
	Initiating	Planning	Executing	Monitoring & Controlling	Closing
Project Integration Management	1. Develop Project Charter	2. Develop Project Management Plan	3. Direct & manage project work 4. Manage Project Knowledge	5. Monitor & control project work	6. Close Project or Phase
Project Scope Management		1. Plan Scope Management 2.. Collect requirements 3. Define Scope 4. Create WBS		5. Validate Scope; 6. Control Scope	
Project Schedule Management		1. Plan Schedule Management 2. Define Activities 3. Sequence Activities 4. Estimate Activity Durations 5. Develop Schedule		6. Control Schedule	
Project Cost Management		1. Plan Cost Management 2. Estimate Costs 3. Determine Budget		4. Control Costs	

Source: PMBOK® Guide, Sixth Edition, 2017.

Continued...

Knowledge Areas	Project Management Process Group				
	Initiating	Planning	Executing	Monitoring & Controlling	Closing
Project Quality Management		1. Plan Quality Management	2. Manage Quality	3. Control Quality	
Project Resource Management		1. Plan Resource Management 2. Estimate Activity Resources	3. Acquire Resources 4. Develop Team 5. Manage Team	6. Control Resources	
Project Communication Management		1. Plan Communications Management	2. Manage Communications	3. Monitor Communications	
Project Risk Management		1. Plan Risk Management 2. Identify Risks 3. Perform Qualitative Risk Analysis 4. Perform Quantitative Risk Analysis 5. Plan Risk Responses	6. Implement Risk Responses	7. Monitor Risks	
Project Procurement Management		1. Plan Procurement Management	2. Conduct Procurements	3. Control Procurements	
Project Stakeholder Management	1. Identify Stakeholders	2. Plan Stakeholder Management	3. Manage Stakeholder Engagement	4. Monitor Stakeholder Engagement	



Developing an IT Project Management Methodology

- Just as projects are unique, so are approaches to project management
- Many organisations develop their own project management methodologies, especially for IT projects
- A **methodology** describes *how* things should be done; a **standard** describes *what* should be done
- PRINCE2, Agile, RUP, and Six Sigma provide different project management methodologies

Global Issues

- A 2011 study of organisations across India included the following findings:
 - Two-thirds of organisations in some stage of Agile adoption are realizing key software and business benefits in terms of faster delivery of products to the customer, an improved ability to manage changing requirements, and higher quality and productivity in IT.
 - Organisations struggle with the magnitude of the cultural shift required for Agile, opposition to change, a lack of coaching and help in the Agile adoption process, and a lack of qualified people.
 - The daily stand-up, iteration planning, and release planning are the most commonly used practices, while paired programming and open workspaces are not popular

Video 2: Learning Objectives

- Review a case study of an organisation applying the project management process groups to manage an IT project; and
- Describe outputs of each process group, and understand the contribution that effective initiating, planning, executing, monitoring and controlling, and closing make to project success

Case Study:

JWD Consulting's Project Management Intranet Site (Predictive Approach)

- This case study provides an example of what's involved in initiating, planning, executing, controlling, and closing an IT project
- This case study provides a big picture view of managing a project and understand how each knowledge area fits into the project management process group.
- Note: we will revisit some of the things we've covered in the past 10 weeks.

Project Pre-initiation

- It is good practice to lay the groundwork for a project before it officially starts
- Senior managers often perform several pre-initiation tasks, including the following:
 - Determine the scope, time, and cost constraints for the project
 - Identify the project sponsor
 - Select the project manager
 - Develop a business case for a project (see JWD business case)
 - Meet with the project manager to review the process and expectations for managing the project
 - Determine if the project should be divided into two or more smaller projects

Project Initiation

- Initiating a project includes recognizing and starting a new project or project phase
- The main goal is to formally select and start off projects
- The following table shows the project initiation knowledge areas, processes, and outputs

Knowledge Area	Initiating Process	Outputs
<i>Project Integration Management</i>	Develop project charter	Project charter
<i>Project Stakeholder Management</i>	Identify stakeholders	Stakeholder register

Stakeholder Register

Name	Position	Internal/ External	Project Role	Contact Information
Joe Fleming	CEO	Internal	Sponsor	joe_fleming@jwdeconsulting.com
Erica Bell	PMO Director	Internal	Project manager	erica_bell@jwdeconsulting.com
Michael Chen	Team member	Internal	Team member	michael_chen@jwdconsulting.com
Kim Phuong	Business analyst	External	Advisor	kim_phuong@client1.com
Louise Mills	PR Director	Internal	Advisor	louise_mills@jwdeconsulting.com

Stakeholder Management Strategy

Name	Level of Interest	Level of Influence	Potential Management Strategies
Joe Fleming	High	High	Joe likes to stay on top of key projects and make money. Have a lot of short, face-to-face meetings and focus on achieving the financial benefits of the project.
Louise Mills	Low	High	Louise has a lot of things on her plate, and she does not seem excited about this project. She may be looking at other job opportunities. Show her how this project will help the company and her resume.

Contents are often sensitive, so do not publish this document.

Project Charters and Kick-off Meetings

- We've covered project charters in Lecture 3.
- Charters are normally short and include key project information and stakeholder signatures
- It's good practice to hold a **kick-off meeting** at the beginning of a project so that stakeholders can meet each other, review the goals of the project, and discuss future plans

Kick-off Meeting Agenda

Kick-Off Meeting [Date of Meeting]

Project Name: Project Management Intranet Site Project

Meeting Objective: Get the project off to an effective start by introducing key stakeholders, reviewing project goals, and discussing future plans

Agenda:

- Introductions of attendees
- Review of the project background
- Review of project-related documents (i.e., business case, project charter)
- Discussion of project organizational structure
- Discussion of project scope, time, and cost goals
- Discussion of other important topics
- List of action items from meeting

Action Item	Assigned To	Due Date

Date and time of next meeting:

Project Planning

- The main purpose of project planning is to *guide execution*
- Every knowledge area includes planning information (see Slide 7 and 8)
- Key outputs included in the JWD project include:
 - A team contract
 - A project scope statement
 - A work breakdown structure (WBS)
 - A project schedule, in the form of a Gantt chart with all dependencies and resources entered
 - A list of prioritized risks (part of a risk register)

Planning processes and outputs

Knowledge Area	Planning Process	Outputs
<i>Project Integration Management</i>	Develop project management plan	Project management plan
<i>Project Scope Management</i>	Plan scope management	Scope management plan Requirements management plan
	Collect requirements	Requirements documentation Requirements traceability matrix
	Define scope	Project scope statement Project documents updates
	Create WBS	Scope baseline Project documents updates
<i>Project Time Management</i>	Plan schedule management	Schedule management plan
	Define activities	Activity list Activity attributes Milestone list Project management plan updates
	Sequence activities	Project schedule network diagrams Project documents updates
	Estimate activity resources	Activity resource requirements Resource breakdown structure Project documents updates
	Estimate activity durations	Activity duration estimates Project documents updates
	Develop schedule	Schedule baseline Project schedule Schedule data Project calendars Project management plan updates Project documents updates

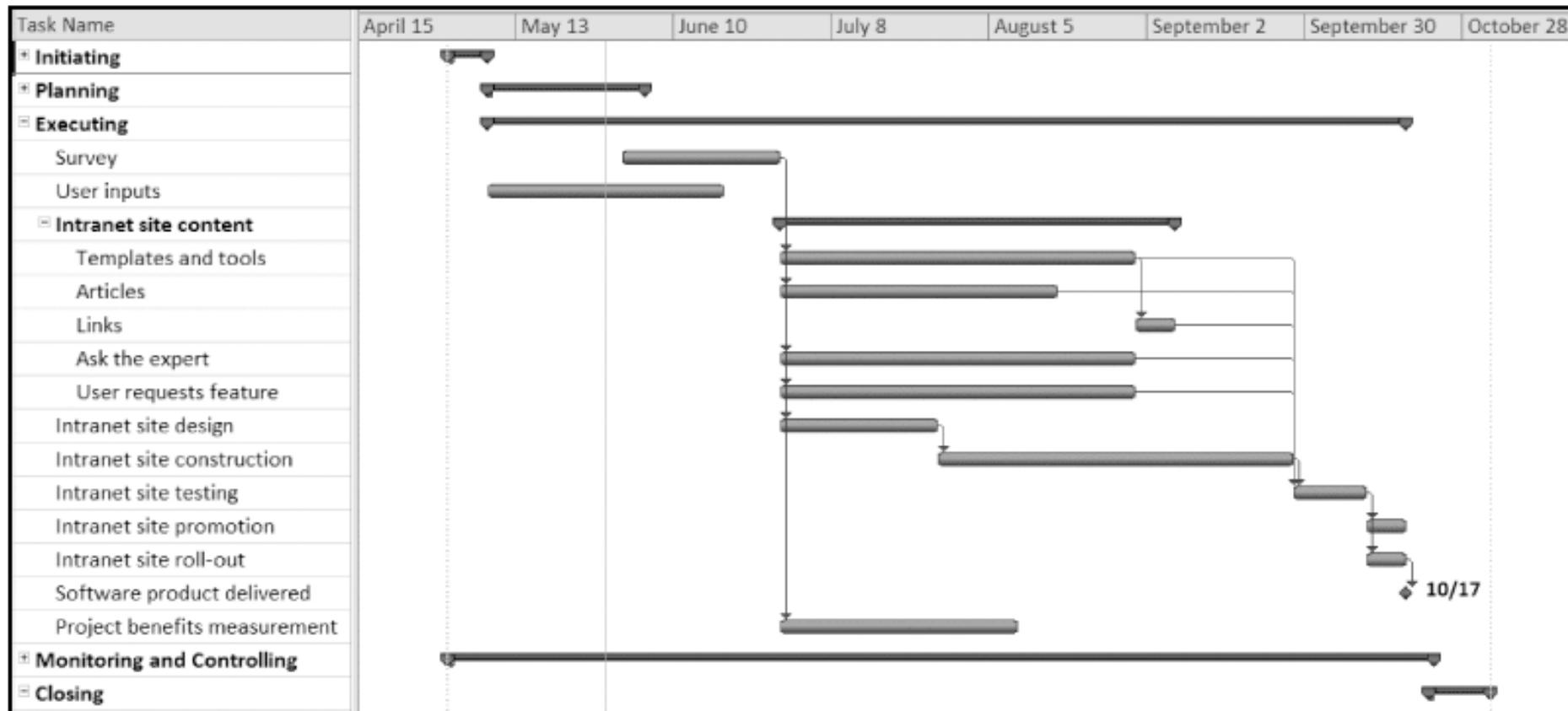


Planning processes and outputs (cont...)

Knowledge Area	Planning Process	Outputs
<i>Project Cost Management</i>	Plan cost management	Cost management plan
	Estimate costs	Activity cost estimates Basis of estimates Project documents updates
	Determine budget	Cost baseline Project funding requirements Project documents updates
<i>Project Quality Management</i>	Plan quality management	Quality management plan Process improvement plan Quality metrics Quality checklists Project documents updates
<i>Project Resource Management</i>	Plan resource management	Resource management plan, Team charter
<i>Project Communications Management</i>	Plan communications management	Communications management plan Project documents updates
	Identify risks	Risk register
<i>Project Risk Management</i>	Perform qualitative risk analysis	Project documents updates
	Perform quantitative risk analysis	Project documents updates
	Plan risk responses	Project management plan updates Project documents updates
<i>Project Procurement Management</i>	Plan procurement management	Procurement management plan Procurement statement of work Procurement documents Source selection criteria Make-or-buy decisions Change requests
	Identify stakeholders	Stakeholder management plan Project documents updates
	Plan stakeholder engagement	Stakeholder management plan Project documents updates
	Manage stakeholder interactions	Stakeholder management plan Project documents updates
	Monitor and control stakeholder interactions	Stakeholder management plan Project documents updates
	Close out stakeholder interactions	Stakeholder management plan Project documents updates
<i>Project Stakeholder Management</i>	Plan stakeholder management	Stakeholder management plan Project documents updates



JWD Consulting Intranet Site Project Baseline Gantt Chart



List of Prioritized Risks

RANKING	POTENTIAL RISK
1	Lack of inputs from internal consultants
2	Lack of inputs from client representatives
3	Security of new system
4	Outsourcing/purchasing for the article retrieval and “Ask the Expert” features
5	Outsourcing/purchasing for processing online payment transactions
6	Organizing the templates and examples in a useful fashion
7	Providing an efficient search feature
8	Getting good feedback from Michael Chen and other senior consultants
9	Effectively promoting the new system
10	Realizing the benefits of the new system within one year

Project Executing

- Usually takes the most time and resources to perform project execution
- Project managers must use their leadership skills to handle the many challenges that occur during project execution
- The next slide shows a list of the executing processes and outputs. Many project sponsors and customers focus on deliverables related to providing the products, services, or results desired from the project
- A milestone report can help focus on completing major milestones

Executing processes and outputs

Knowledge Area	Executing Process	Outputs
<i>Project Integration Management</i>	Direct and manage project work	Deliverables Work performance data Change requests Project management plan updates Project documents updates
<i>Project Quality Management</i>	Perform quality assurance	Change requests Project management plan updates Project documents updates Organizational process assets updates
<i>Project Resource Management</i>	Acquire resources	Project staff assignments Resource calendars Project management plan updates
	Develop project team	Team performance assessments Enterprise environmental factor updates
	Manage project team	Change requests Project management plan updates Project documents updates Enterprise environmental factors updates Organizational process assets updates
<i>Project Communications Management</i>	Manage communications	Project communications Project documents updates Project management plan updates Organizational process assets updates
<i>Project Procurement Management</i>	Conduct procurements	Selected sellers Agreements Resource calendars Change requests Project management plan updates Project documents updates
<i>Project Stakeholder Management</i>	Manage stakeholder engagement	Issue log Change requests Project management plan updates Project documents updates Organizational process assets updates

*Source: PMBOK® Guide, Fifth Edition, 2013.

Part of Milestone Report (partial)

Milestone	Date	Status	Responsible	Issues/ Comments
<i>Initiating</i> Stakeholders identified	May 2	Completed	Erica and Joe	
Project charter signed	May 10	Completed	Erica	
Project kick-off meeting held	May 13	Completed	Erica	Went very well
<i>Planning</i>				
Team contract signed	May 13	Completed	Erica	
Scope statement completed	May 27	Completed	Erica	
WBS completed	May 31	Completed	Erica	
List of prioritized risks completed	June 3	Completed	Erica	Reviewed with sponsor and team
Schedule and cost baseline completed	June 13	Completed	Erica	
<i>Executing</i>				
Survey completed	June 28		Erica	Poor response so far!

Project Monitoring and Controlling

- Involves measuring progress toward project objectives, monitoring deviation from the plan, and taking correction actions
- Affects all other process groups and occurs during all phases of the project life cycle
- Outputs include performance reports, change requests, and updates to various plans
- See next slide



Monitoring & Controlling processes and outputs

Knowledge Area	Monitoring and Controlling Process	Outputs
<i>Project Integration Management</i>	Monitor and control project work	Change requests Work performance reports Project management plan updates Project documents updates
	Perform integrated change control	Approved change requests Change log Project management plan updates Project documents updates
<i>Project Scope Management</i>	Validate scope	Accepted deliverables Change requests Work performance information Project documents updates
	Control scope	Work performance information Change requests Project management plan updates Project documents updates Organizational process assets updates
<i>Project Time Management</i>	Control schedule	Work performance information Schedule forecasts Change requests Project management plan updates Project documents updates Organizational process assets updates
	Control cost	Work performance information Cost forecasts Change requests Project management plan updates Project documents updates Organizational process assets updates
<i>Project Cost Management</i>	Control cost	Work performance information Cost forecasts Change requests Project management plan updates Project documents updates Organizational process assets updates
	Control scope	Work performance information Change requests Project management plan updates Project documents updates Organizational process assets updates

Monitoring & Controlling processes and outputs (cont...)

Knowledge Area	Monitoring and Controlling Process	Outputs
<i>Project Quality Management</i>	Control quality	Quality control measurements Validated changes Validated deliverables Work performance information Change requests Project management plan updates Project documents updates Organizational process assets updates
<i>Project Communications Management</i>	Control communications	Work performance information Change requests Project documents updates Organizational process assets updates
<i>Project Risk Management</i>	Control risks	Work performance information Change requests Project management plan updates Project documents updates Organizational process assets updates
<i>Project Procurement Management</i>	Control procurements	Work performance information Change requests Project management plan updates Project documents updates Organizational process assets updates
<i>Project Stakeholder Management</i>	Control stakeholder engagement	Work performance information Change requests Project documents updates Organizational process assets updates



Project Closing

- Involves gaining stakeholder and customer acceptance of the final products and services
- Most projects also include a final report and presentation to the sponsor/senior management
- Even if projects are not completed, they should be closed out to learn from the past
- Outputs include project files and lessons-learned reports, updates to organisational process assets

Part 2: Predictive vs Agile Approach

Topics covered:



Discuss the different project lifecycle and identify which approach to use



Discuss the Agile Methodology in managing projects



Review the same case study (from Part 1) of a project managed with an agile focus to illustrate the key differences in approaches

Video 3: Learning Objectives

- Discuss the different project lifecycle and identify which approach to use
- Discuss the Agile Methodology in managing projects

Types of Life cycle

- **Predictive life cycle:** A more traditional approach, with the bulk of planning occurring upfront, then executing in a single pass; a sequential process
- **Iterative life cycle:** An approach that allows feedback for unfinished work to improve and modify that work.
- **Incremental life cycle:** An approach that provides finished deliverables that the customer may be able to use immediately
- **Agile life cycle:** An approach that is both iterative and incremental to refine work items and deliver frequently.

Life Cycles Characteristics

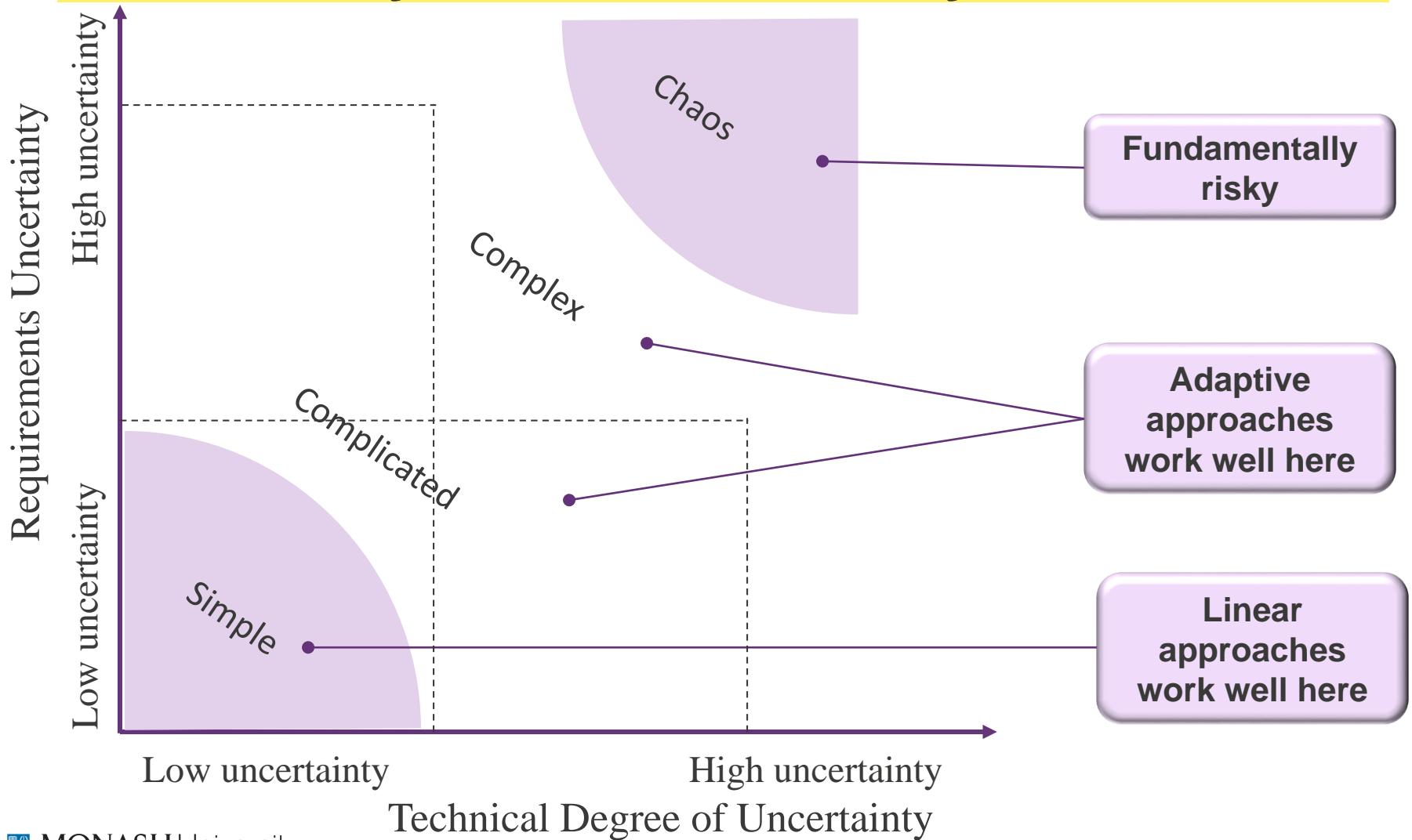
Table 3-1. Characteristics of Four Categories of Life Cycles

Characteristics				
Approach	Requirements	Activities	Delivery	Goal
Predictive	Fixed	Performed once for the entire project	Single delivery	Manage cost
Iterative	Dynamic	Repeated until correct	Single delivery	Correctness of solution
Incremental	Dynamic	Performed once for a given increment	Frequent smaller deliveries	Speed
Agile	Dynamic	Repeated until correct	Frequent small deliveries	Customer value via frequent deliveries and feedback

Definable Work vs High Uncertainty Work

- Definable work projects:
 - characterised by clear procedures that have been proven successful on similar projects in the past
 - Low levels of execution uncertainty and risk
- High uncertainty projects:
 - New design, problem solving and not-done-before work is exploratory
 - High rates of change, complexity and risk
 - May pose a problem for traditional predictive approaches

Uncertainty, Risk and Life Cycle Selection



The Agile Manifesto

- Thought leaders in the software industry formalised the agile movement in 2001 with the publication of the Manifesto for Agile Software Development:

The 4 values of the Agile Manifesto

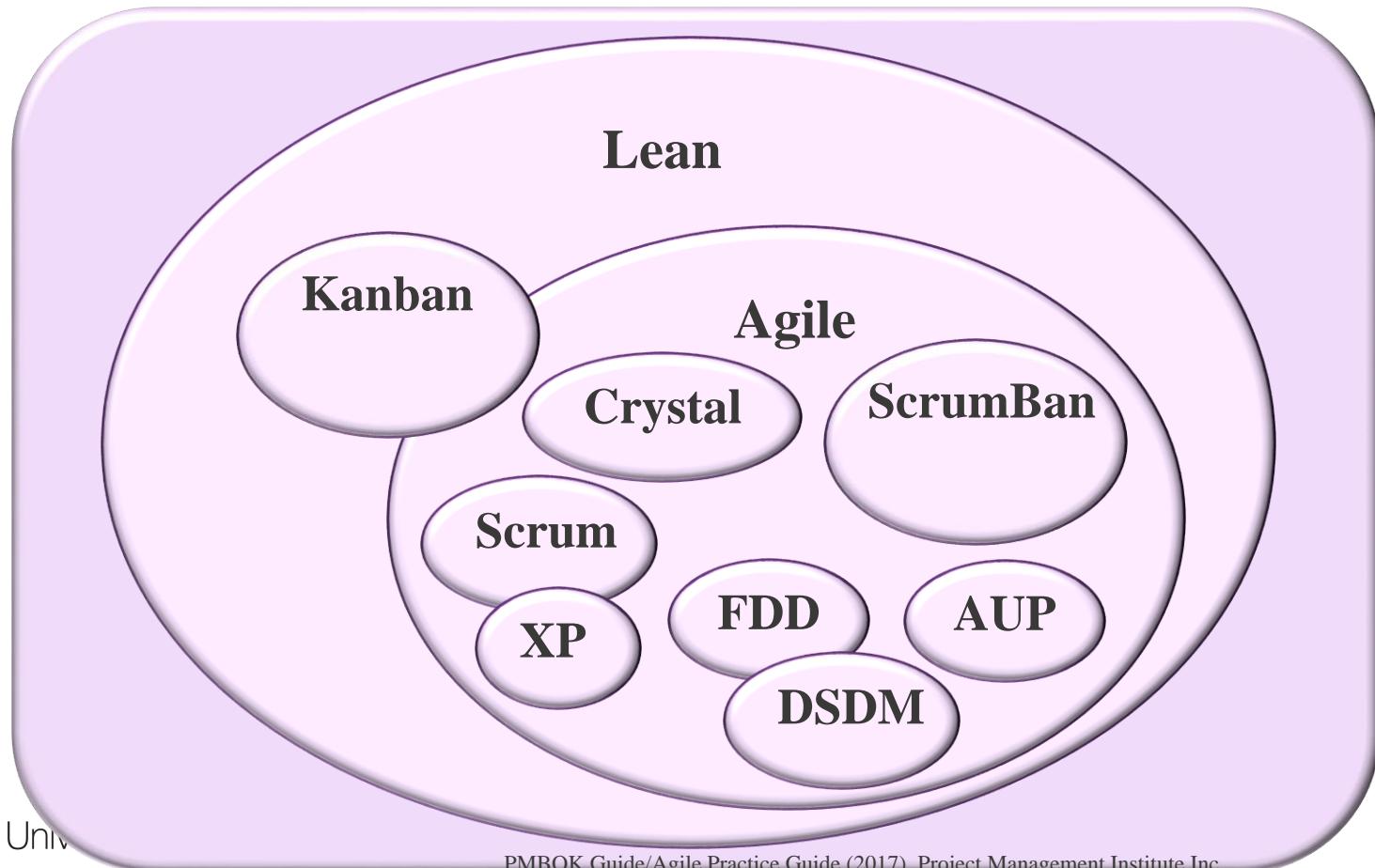
We are covering better ways of developing software by doing it and helping others do it. Through this work we have come to value:

1. **Individuals and interactions** over processes and tools
2. **Working software** over comprehensive documentation
3. **Customer collaboration** over contract negotiation
4. **Responding to change** over following a plan

That is, while there is value in the items on the right, we value the items on the left more.

Agile is a Blanket Term for Many Approaches

- Agile approaches and agile methods are umbrella terms that cover a variety of frameworks and methods



An Informed Decision

- It is not a snap decision whether to use an agile approach or not, just like flying or driving somewhere on a trip
- Projects with heavy constraints, inexperienced and dispersed teams, large risks, generally clear up-front requirements, and a fairly rigid completion date are best done using a predictive approach.
- Projects with less rigid constraints, experienced and preferably co-located teams, smaller risks, unclear requirements, and more flexible scheduling would be more compatible with an agile approach
- The following example uses Scrum roles, artefacts, and ceremonies

Video 4: Learning Objectives

- Review the same case study (from video 2) of a project managed with an agile focus to illustrate the key differences in approaches

Case Study 2: JWD Consulting's Project Management Intranet Site (Agile Approach)

- This section demonstrates a more agile approach to managing the same project
- Differences in using an agile approach are highlighted
- An agile project team typically uses several iterations or deliveries of software instead of waiting until the end of the project to provide one product.

Scrum Roles

- **Product owner:** The person responsible for the business value of the project and for deciding what work to do and in what order, as documented in the product backlog.
- **ScrumMaster:** The person who ensures that the team is productive, facilitates the daily Scrum, enables close cooperation across all roles and functions, and removes barriers that prevent the team from being effective.
- **Scrum team or development team:** A cross-functional team of five to nine people who organize themselves and the work to produce the desired results for each sprint, which normally lasts 2-4 weeks.

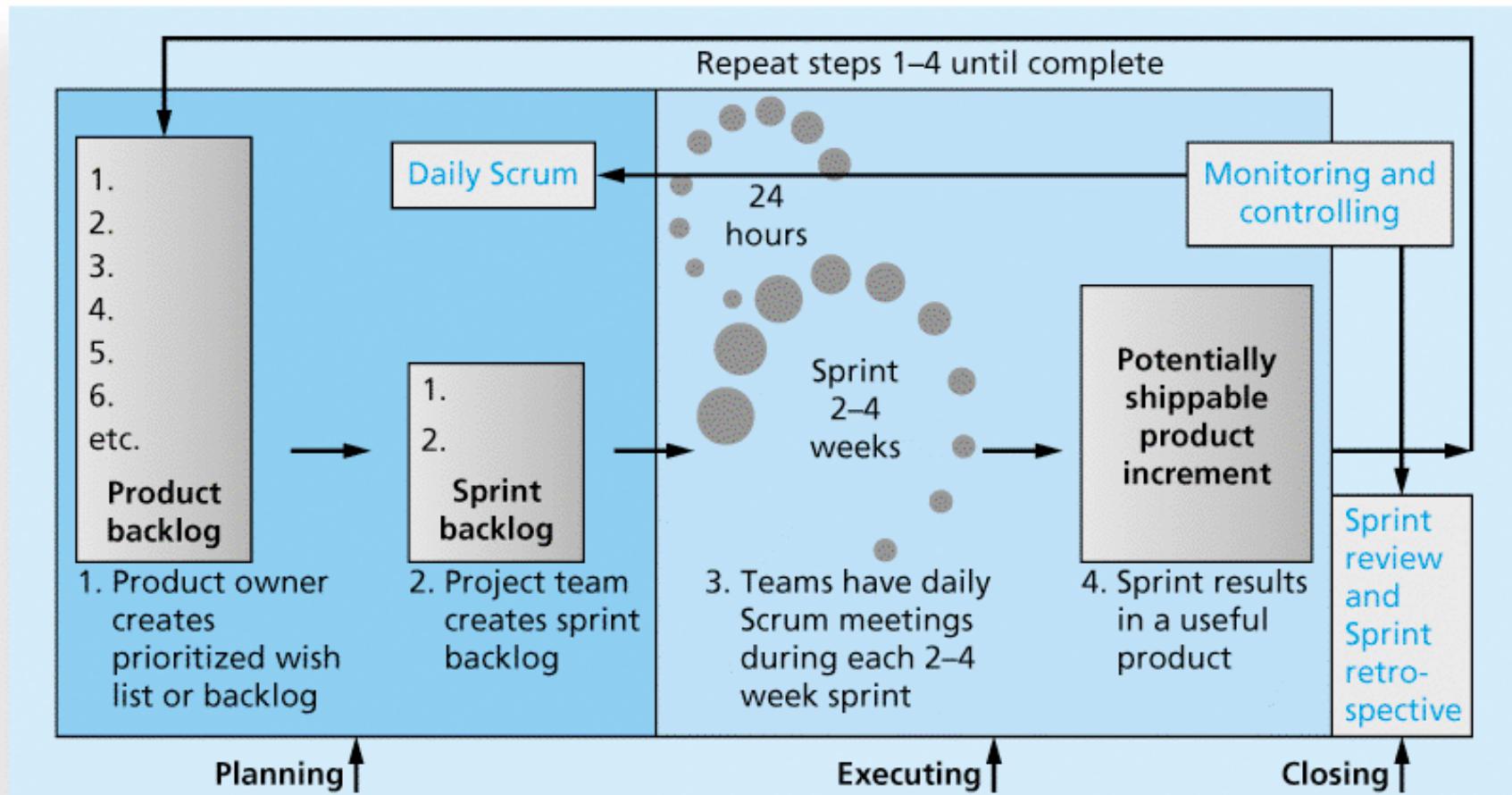
Scrum artefacts

- An artefact is a useful object created by people
- Scrum artefacts include:
 - **Product backlog**: A list of features prioritized by business value
 - **Sprint backlog**: The highest-priority items from the product backlog to be completed within a sprint
 - **Burndown chart**: Shows the cumulative work remaining in a sprint on a day-by-day basis

Scrum Ceremonies

- **Sprint planning session:** A meeting with the team to select a set of work from the product backlog to deliver during a sprint.
- **Daily Scrum:** A short meeting for the development team to share progress and challenges and plan work for the day.
- **Sprint reviews:** A meeting in which the team demonstrates to the product owner what it has completed during the sprint.
- **Sprint retrospectives:** A meeting in which the team looks for ways to improve the product and the process based on a review of the actual performance of the development team.

Scrum Framework and the Process Groups



Unique Scrum Activities by Process Group

Initiating:

- Determine roles
- Decide how many sprints will compose each release and the scope of software to deliver

Planning:

- Create product backlog
- Create sprint backlog
- Create release backlog
- Plan work each day in the daily Scrum
- Document stumbling blocks in a list

Executing:

- Complete tasks each day during sprints
- Produce a shippable product at the end of each sprint

Monitoring and Controlling:

- Resolve issues and blockers
- Create and update burndown chart
- Demonstrate the completed product during the sprint review meeting

Closing:

- Reflect on how to improve the product and process during the sprint reflection meeting



Planning

- Not different from PMBOK® Guide
 - Still create a scope statement and can use a Gantt chart for the entire project schedule; other planning similar (risk, etc.)
- Different:
 - Descriptions of work are identified in the product and sprint backlogs, more detailed work documented in technical stories, estimate a velocity or capacity for each sprint; release roadmap often used for schedule

Intranet Site Project Baseline Gantt Chart Using Scrum Approach



Product and Sprint Backlogs

Product Backlog

1. User story templates, samples, and point person
2. WBS templates, samples, and point person
3. Project schedule templates, samples, and point person
4. Ability to charge customers for some intranet products and services
5. Ability to collect user suggestions
6. Business case templates, samples, and point person
7. Ask the Expert feature
8. Stakeholder management strategy templates, samples, and point person
9. Risk register templates, samples, and point person
10. Etc.

Sprint Backlog

1. User story templates, samples, and point person
2. WBS templates, samples, and point person
3. Project schedule templates, samples, and point person
4. Ability to charge customers for some intranet products and services
5. Ability to collect user suggestions

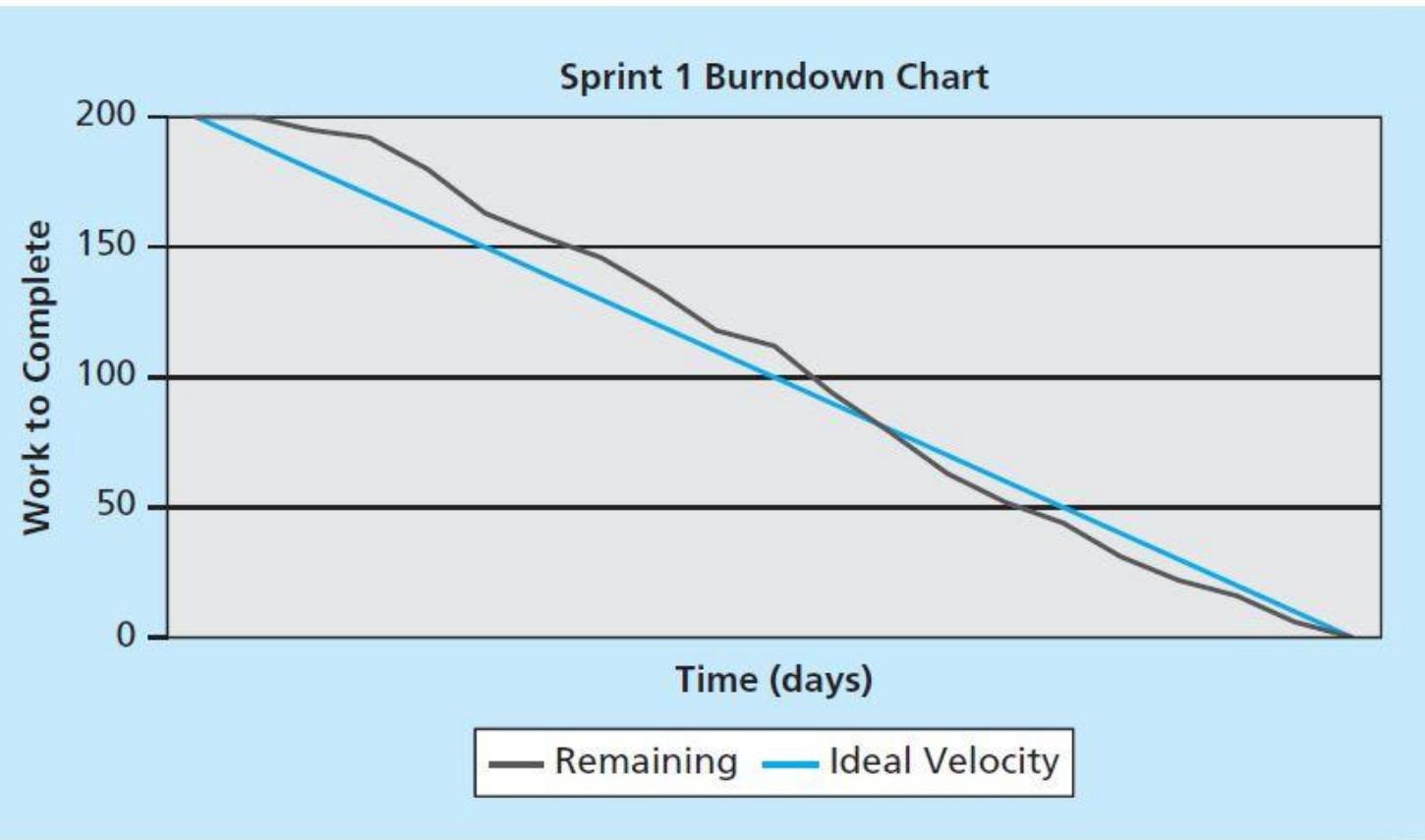
Executing

- Not different from PMBOK® Guide
 - Still produce products, lead people, etc.
- Different:
 - Produce several releases of software - users of the new software might be confused by getting several iterations of the product instead of just one
 - Communications different because the project team meets every morning, physically or virtually

Monitoring and Controlling

- Not different from PMBOK® Guide
 - Still check actual work vs. planned work
- Different
 - Names of key reviews are the daily Scrum and the sprint review
 - A sprint board is used instead of a tracking Gantt chart or other tools
 - Use a burndown chart vs. earned value chart

Figure 3-7. Burndown Chart



Closing

- Not different from PMBOK® Guide
 - Focus is still on acceptance of deliverables and reflection
- Different:
 - The retrospective is similar to a lessons-learned report, but it focuses on a shorter period of time. It is intended to answer two fundamental questions:
 - What went well during the last sprint that we should continue doing?
 - What could we do differently to improve the product or process?