Electronics and
Computer Science

UNIVERSITY OF
Southampton

The Project Management and Information Technology Context

COMP6204: Software Project Management and Secure Development

Dr A. Rezazadeh (Reza)
Email: ra3@ecs.soton.ac.uk or ar4k06@soton.ac.uk
October 21

Overview

- A Systems View of Project Management
- The Three-Sphere Model for Systems Management
- Organisational Structures
- Organisational Culture
- Focusing on Stakeholder Needs
- The Importance of Top Management Commitment
- Best Practice
- Organisational Commitment
- Project and Product Life Cycles
- Product Life Cycles
- The Nature of IT Projects

Learning Objectives

- Define the systems view of project management and how it applies to information technology (IT) projects
- Summarise organisations, including the four frames, organisational structures, and organisational culture
- Explain why stakeholder management and top management commitment are critical for a project's success

Learning Objectives

- Distinguish between project and product life cycles
- Discuss the unique attributes and diverse nature of IT projects
- Summarise recent trends affecting IT project management, including globalisation, outsourcing, virtual teams, and agile project management

A Systems View of Project Management

- 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 organization

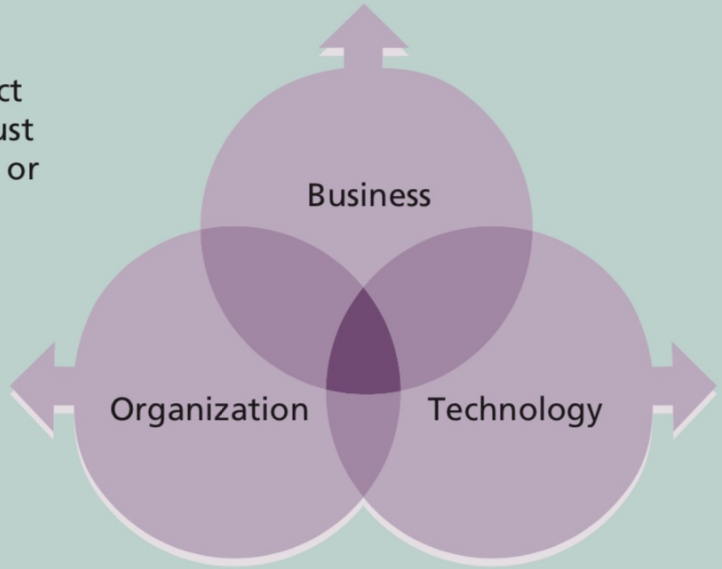
What Is a Systems Approach?

- A systems approach emerged in the 1950 s to describe a holistic and 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

The Three-Sphere Model for Systems Management

- What will the tablet project cost the college?
- What will it cost students?
- What will support costs be?
- What will the impact be on enrollments?

- Will the tablet project affect all students, just traditional students, or only certain majors?
- How will the project affect students who already have tablets or laptops?
- Who will develop special applications or books for the tablets?
- Who will train students, faculty, and staff?



- Should the tablets be based on Apple, Microsoft, Android, or another system?
- What applications will be required?
- What will the hardware specifications be?
- How will the tablets affect various networks and speed?
- Will more power cords be required in the classroom?

Advice for Young Professionals

- Don’t just focus on the technology, no matter how exciting it seems to you.
  - Even if you take just a few minutes each day learning about other aspects of the organization, that’s a start.
  - Ask important questions like how the company makes money, who key customers are, what the priorities are for the year, what meetings you can attend or documents you can read to gain more knowledge, etc.
  - Network, network! Find out which people inside or outside of your organization can help you in developing a systems approach.

Understanding Organisations

- Systems approach requires that project managers always view their projects in the context of the larger organisation
- Organisational issues are often the most difficult part of working on and managing projects
- Important for project managers to develop a better understanding of people as well as organizations
  - To improve the success rate of IT projects

The Four Frames of Organisations

Structural frame: Roles and responsibilities, coordination, and control. Organizational charts help describe this frame.	**Human resources frame:** Providing harmony between needs of the organization and needs of people.
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.

Source: Bolman and Deal.

An Example - What Went Wrong?

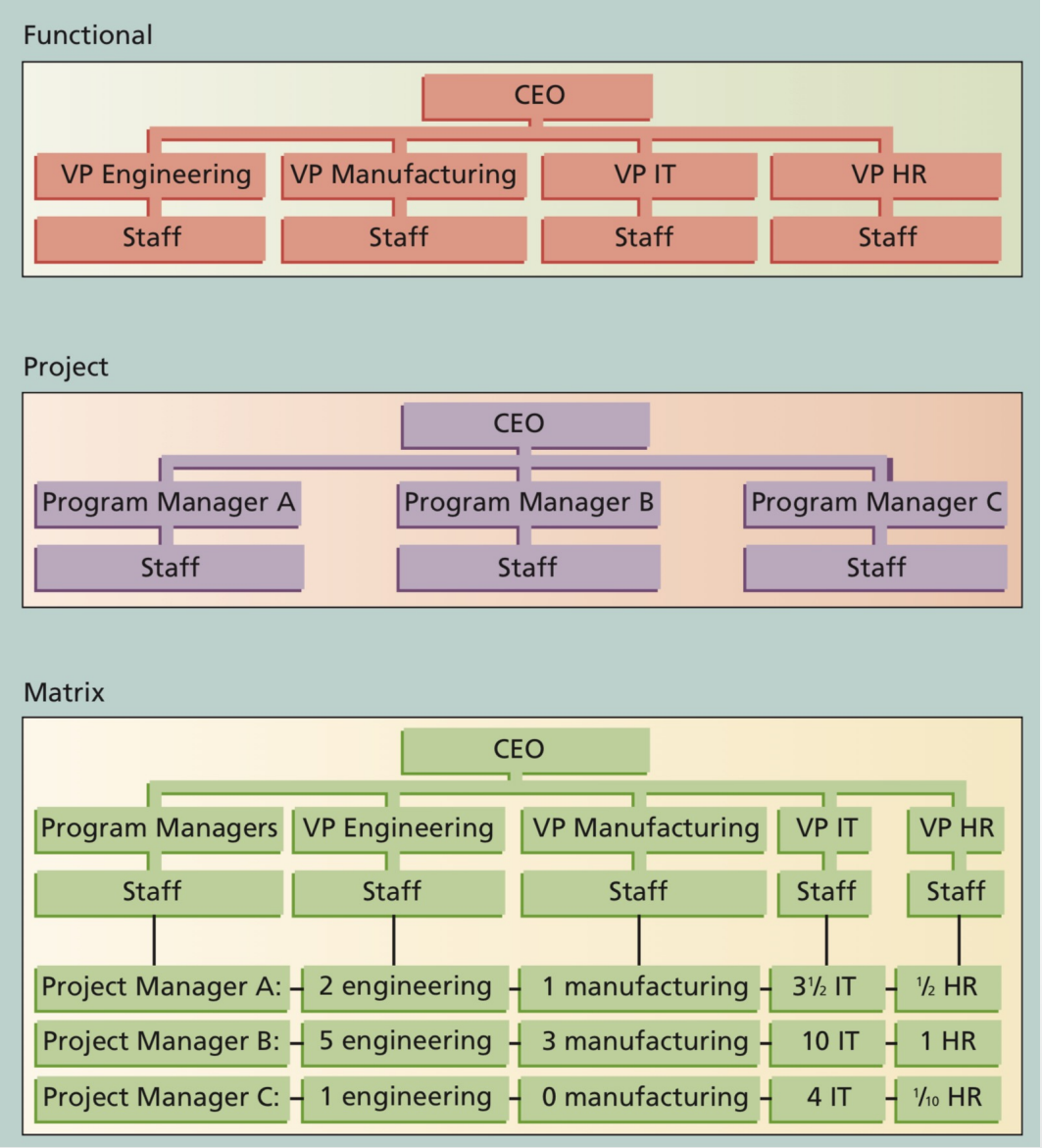
- In a paper titled “A Study in Project Failure, ” two researchers examined the success and failure of 214 IT projects over an eight-year period in several European countries
  - The researchers found that only one in eight (12. 5 percent) were considered successful in terms of meeting scope, time, and cost goals
  - The authors said that the culture within many organizations is often to blame
  - Among other things, people often do not discuss important leadership, stakeholder, and risk management issues

Organisational Structures

- Three basic organisational 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

Organisational Structures

Functional, project, and matrix organisational structures



Organisational Culture

- Organizational culture is a set of shared assumptions, values, and behaviours that characterise the functioning of an organization
- Many experts believe the underlying causes of many companies' problems are not the structure or staff, but the culture

Organisational Culture – Cont.

- Ten characteristics of organisational culture:
  - Member identity*
  - Group emphasis*
  - People focus
  - Unit integration*
  - Control
  - Risk tolerance*
  - Reward criteria*
  - Conflict tolerance*
  - Means-ends orientation
  - Open-systems focus*
- *Project work is most successful in an organisational culture where these items are strong/high and other items are balanced.

Focusing on Stakeholder Needs

- Project managers must take time to identify, understand, and manage relationships with all project stakeholders
- Using the four frames of organisations can help meet stakeholder needs and expectations
- Senior executives/top management are very important stakeholders

- See Chapter 13, Project Stakeholder Management, for more information (Information Technology Project Management, Ninth Edition. 2019)

Media Snapshot

- Prior to the 2014 football season, Microsoft paid the NFL $400 million as part of a five-year deal to use their Surface as "the official tablet of the NFL"
- All 32 NFL teams were involved, and the deal was renewed for a sixth year in 2017
- Smooth transition?
  - During week one of the season at least two television announcers mistakenly referred to the tablets as iPads, giving Apple unexpected exposure
  - Microsoft also had to defend the use of tablets after the New England Patriots stopped using them

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.

The Importance of Top Management Commitment

- 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

Best Practice

- 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-publicised IT project failures in Australia
  - Sydney Water's customer relationship management system
  - The Royal Melbourne Institute of Technology's academic management system
  - One. Tel's billing system

The Need for Organisational Commitment to Information Technology

- If the organization 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 also encourage more commitment

The 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 centre of excellence

Project and Product Life Cycles

- It is good practice to divide projects into several phases
  - Because projects operate as part of a system and involve uncertainty
- The same can be said for developing products

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

Project Life Cycle

- 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

Product Life Cycles

- Products also have life cycles
  - The Systems Development Life Cycle (SDLC) is a framework for describing the phases of developing information systems
  - Systems development projects can follow
    - Predictive life cycle
    - Iterative life cycle
    - Incremental life cycle
    - Adaptive life cycle
    - Hybrid life cycle

Life Cycle Models

- *Predictive life cycle*: The scope, schedule, and cost are determined early, and changes to scope are carefully managed.
  - PMI also refers to predictive life cycles as waterfall.
- *Iterative life cycle*: The scope is determined early, but time and cost estimates are modified as the understanding of the product increases.
  - Iterations are used to develop the product through a series of repeated cycles to add to the functionality of the product.
  - This approach works best when there is a high degree of change and a low frequency of delivery.

Life Cycle Models – Cont.

- *Incremental life cycle*: Deliverables are produced through a series of iterations that add functionality within a set time frame.
  - The deliverable is not complete until after the final iteration.
  - This approach works best when there is a low degree of change and a high frequency of delivery.
- *Adaptive life cycle*: Stakeholders define and approve the detailed scope before the start of an iteration, producing a useable product at the end of each iteration.
  - PMI also refers to adaptive life cycles as agile or change-driven.
  - This approach works best when there is a high degree of change and a high frequency of delivery.

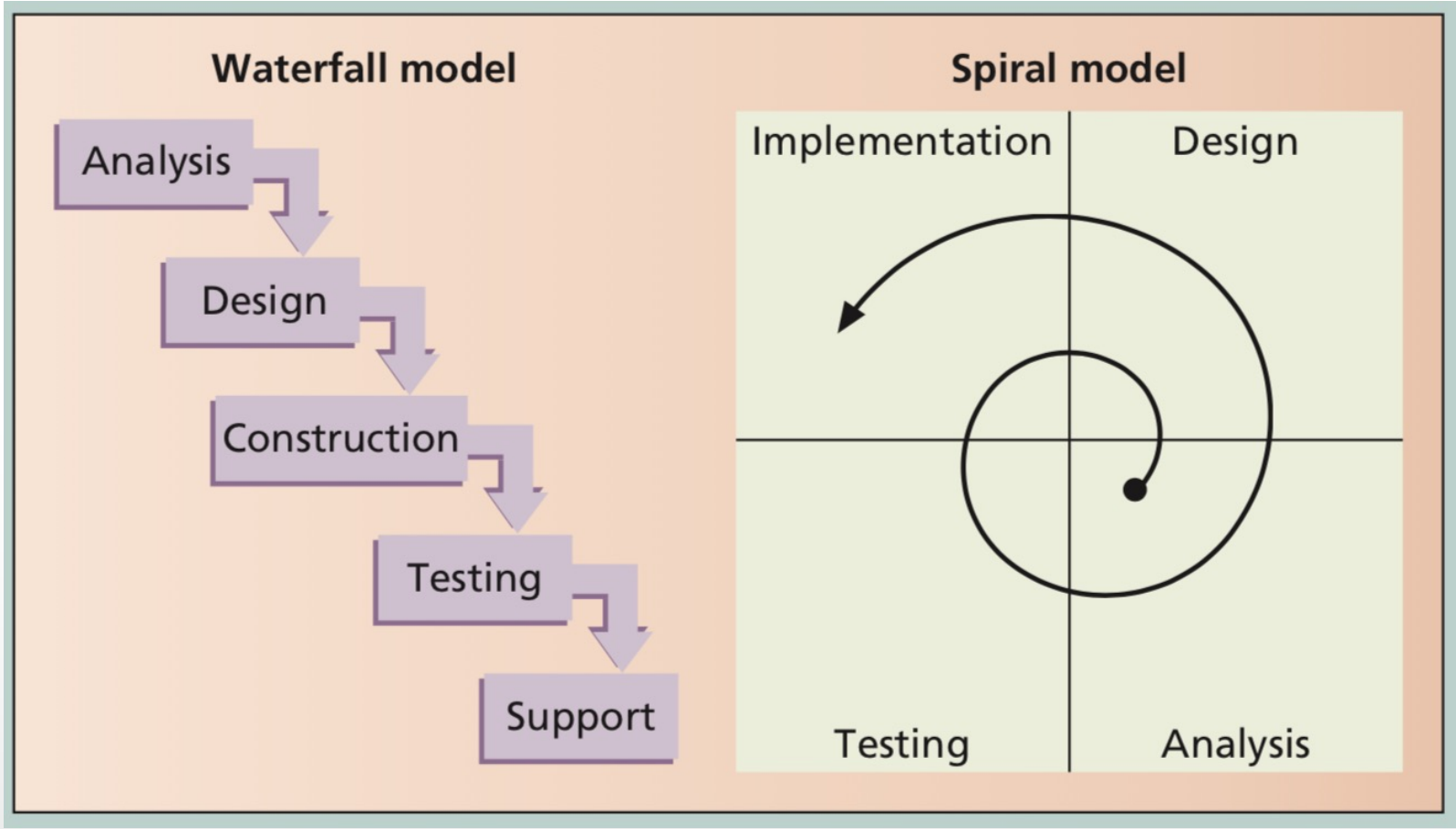
Life Cycle Models – Cont.

- *Hybrid life cycle*: A combination of approaches is used based on the nature of the work.
  - For example, some deliverables might have a low degree of change and low frequency of delivery such as monthly or quarterly progress reports.
  - On the other had a high degree of change and a high frequency of delivery such as certain software features, and so on.

Product Life Cycles

- 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
  - Prototyping model: used for developing prototypes to clarify user requirements - heavy user involvement
  - Rapid Application Development (RAD) model: uses an approach in which developers work with an evolving prototype.
    - This life cycle model also requires heavy user involvement and helps produce systems quickly without sacrificing quality.

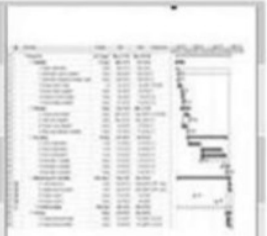
Waterfall & Spiral Life Cycle Models

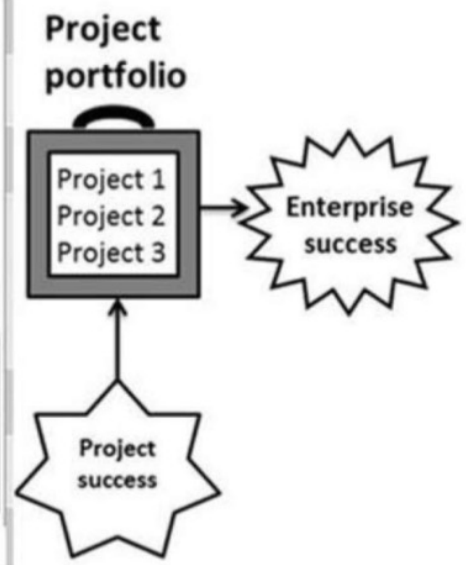


Project Management Framework

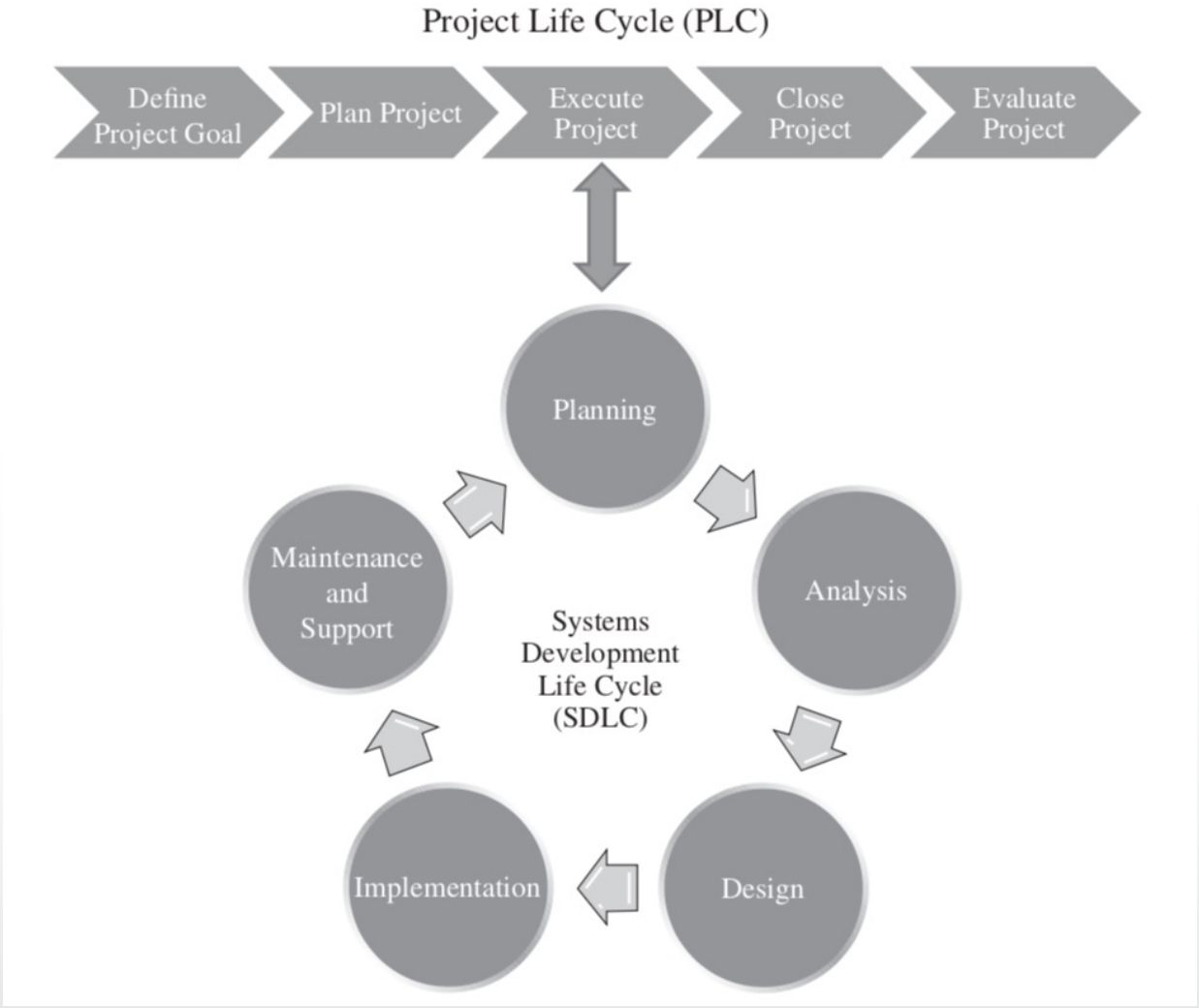
Process groups	Knowledge areas	Tools and techniques
1. Initiating	1. Integration	
2. Planning	2. Scope	
3. Executing	3. Schedule	
4. Monitoring and controlling	4. Cost	
5. Closing	5. Quality	
	6. Resource	
	7. Communication	
	8. Risk	
	9. Procurement	
	10. Stakeholder	

Stakeholder needs and expectations





The Project Life Cycle (PLC) and the Systems Development Life Cycle (SDLC)



The Project Life Cycle (PLC) and the Systems Development Life Cycle (SDLC)

- The project life cycle (PLC) focuses on the phases, processes, tools, knowledge, and skills for managing a project, while the systems development life cycle (SDLC) focuses on creating and implementing the project's product—the information system.
- The integration of project management and systems development activities is one important component that distinguishes IT projects from other types of projects.

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, phase gate reviews, or kill points, should occur after each phase to evaluate the project's progress, likely success, and continued compatibility with organisational goals
- It is unwise to wait until the end of project or product phases to have management inputs
  - Many projects are reviewed by management on a regular basis

The Context of Information Technology Projects

- Project context
  - It has a critical impact on which product development life cycle will be most effective for a particular software development project
  - Several issues unique to the IT industry have a critical impact on managing IT projects

The Nature of IT Projects

- IT projects can be very diverse in terms of size, complexity, products produced, application area, and resource requirements
- The nature of software development projects is even more diverse than hardware-oriented projects
- IT projects also support every possible industry and business function

Characteristics of IT Project Team Members

- IT project team members often have diverse backgrounds and skill sets
  - Many companies purposely hire graduates with degrees in other fields such as business, mathematics, or the liberal arts to provide different perspectives on IT projects
  - Some IT projects require the skills of people in just a few job functions
  - But some require inputs from many or all of them

Diverse Technologies

- IT projects use diverse technologies that change rapidly
- Differences in technical knowledge can make communication between professionals challenging
- New technologies have also shortened the time frame many businesses have to develop, produce, and distribute new products and services

Recent Trends Affecting Information Technology Project Management

- Globalisation
- 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

Globalisation

- Issues
  - Communications
  - Trust
  - Common work practices
  - Tools
- Suggestions
  - Employ greater project discipline
  - Think globally but act locally
  - 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
- Practice can be *unpopular* in some countries
- Project managers should become more familiar with many global and procurement issues

Virtual Teams - Advantages

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

Virtual Teams - 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
- Factors that help virtual teams succeed, including team processes, trust/relationships, leadership style, and team member selection

Agile

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

Agile – Cont.

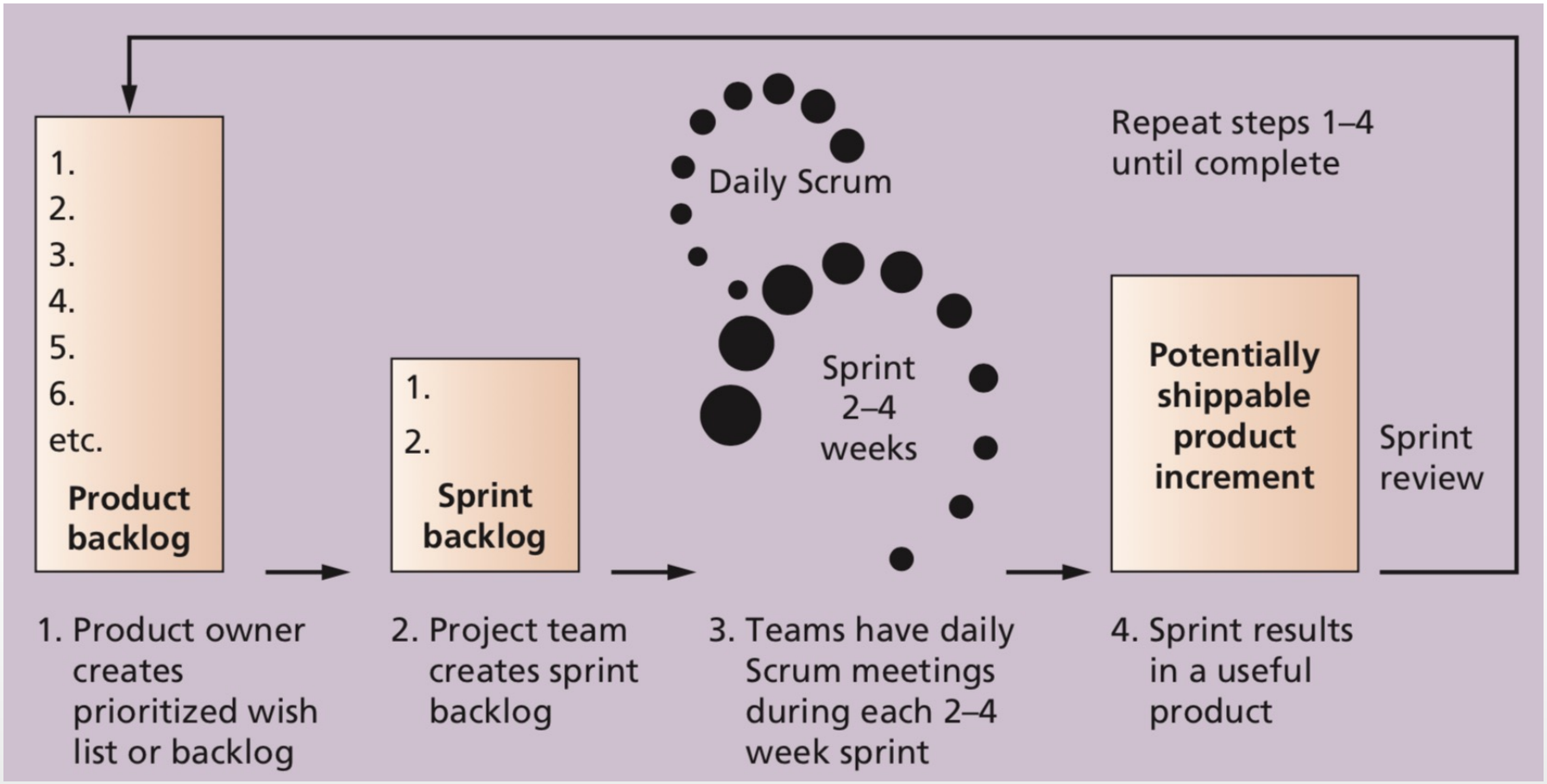
- Manifesto for Agile Software Development
  - In February 2001, a group of 17 people that called itself the Agile Alliance developed and agreed on the Manifesto for Agile Software Development, as follows:
  - "We are uncovering better ways of developing software by doing it and helping others do it.
  - 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

Scrum

- According to the Scrum Alliance, Scrum is 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 that compared high-performing, cross-functional teams to the scrum formation used by rugby teams.

Scrum Framework



Scrum

- 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

Agile Certified Practitioner (ACP)

- The PMBOK® Guide describes best practices for what should be done to manage projects.
  - Agile is a methodology that describes how to manage projects.
- The Project Management Institute (PMI) recognised the increased interest in Agile, and introduced a new certification in 2011 called *Agile Certified Practitioner (ACP)*.
  - Seasoned project managers understand that they have always had the option of customising how they run projects, but that project management is not easy, even when using Agile.

Chapter Summary

- Project managers need to take a systems approach when working on projects
- Organisations have four different frames: structural, human resources, political, and symbolic
- The structure and culture of an organisation have strong implications for project managers
- Projects should successfully pass through each phase of the project life cycle
- Project managers need to consider several factors due to the unique context of information technology projects
- Recent trends affecting IT project management include globalisation, outsourcing, virtual teams, and agile project management

Discussion Questions

- What does it mean to take a systems view of a project? How does taking this view apply to project management?
- Explain the four frames of organizations. How can they help project managers understand the organizational context for their projects?
- Briefly explain the differences between functional, matrix, and project organizations. Describe how each structure affects the management of a project.
- Describe how organizational culture is related to project management. What type of culture promotes a strong project environment?

Discussion Questions

- Discuss the importance of top management commitment and the development of standards for successful project management. Provide examples to illustrate the importance of these items based on your experience on any type of project.
- What are the phases in a traditional project life cycle? How does a project life cycle differ from a product life cycle? Why does a project manager need to understand both?
- What makes IT projects different from other types of projects? How should project managers adjust to these differences?
- Define globalization, outsourcing, virtual teams, and agile project management, and describe how these trends are changing IT project management.

Reference

- Information Technology Project Management, Ninth Edition. By **Kathy Schwalbe – Chapter 2**