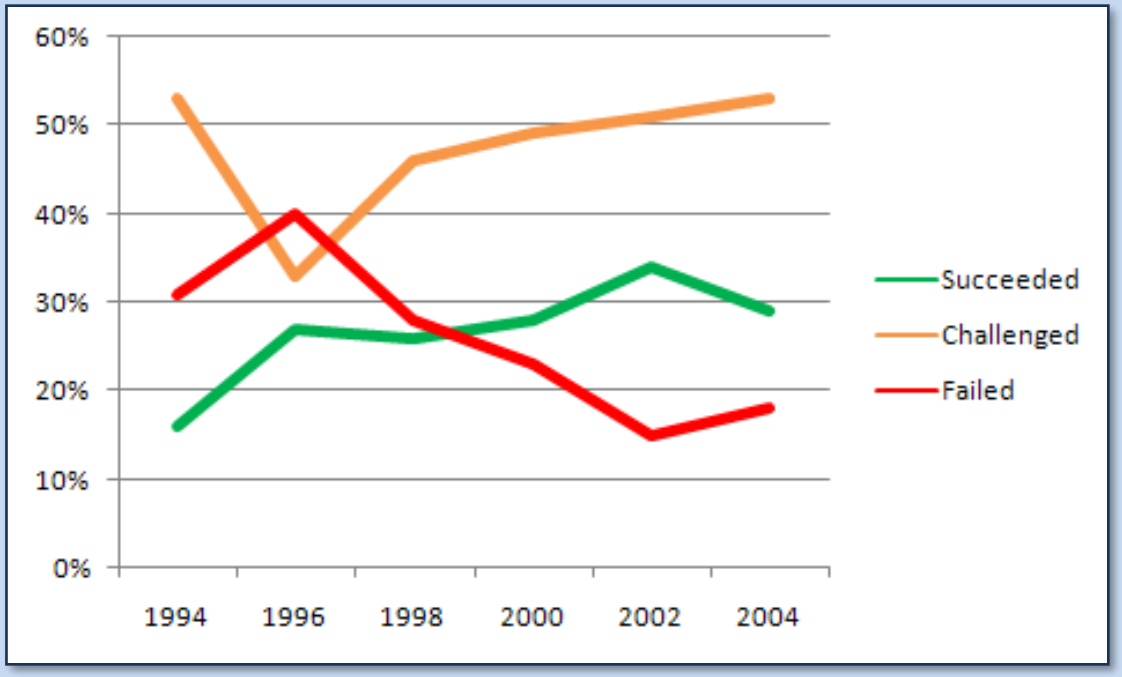
# Chapter 1: Introduction to Systems Analysis and Design

# Objectives

- Understand the fundamental systems development life cycle and its four phases.
- Understand the evolution of systems development methodologies.
- Be familiar with the Unified Process and its extensions.
- Be familiar with the different roles on the project team.

# Why Should We Care?




Would **you** buy a car that only had a 28% chance of driving off the lot with **no** problems?

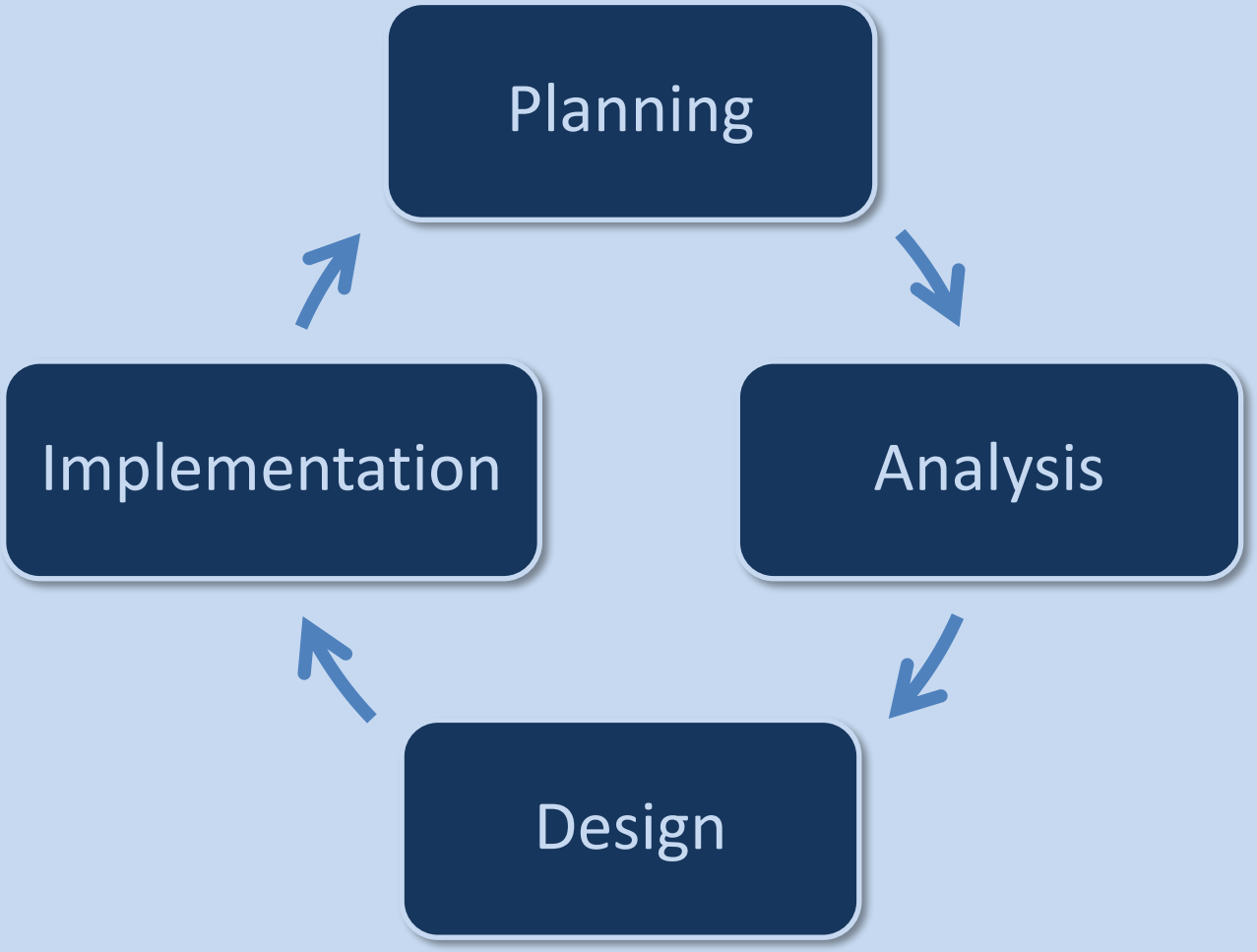
# Recent Significant IT Failures

| Company | Year | Outcome |
|---|---|---|
| Hudson Bay (Canada) | 2005 | Inventory system problems lead to $33.3 million loss. |
| UK Inland Revenue | 2004/5 | $3.45 billion tax-credit overpayment caused by software errors. |
| Avis Europe PLC (UK) | 2004 | Enterprise resource planning (ERP) system cancelled after $54.5 million spent. |
| Ford Motor Co. | 2004 | Purchasing system abandoned after deployment costing approximately $400 M |
| Hewlett-Packard Co. | 2004 | ERP system problems contribute to $160 million loss. |
| AT&T Wireless | 2004 | Customer relations management system upgrade problems lead to $100M loss |

# SYSTEMS DEVELOPMENT LIFE CYCLE


PowerPoint Presentation for Dennis, Wixom, & Tegarden *Systems Analysis and Design with UML, 3rd Edition*

# Systems Development Life Cycle



# SDLC: Planning

1. Project Initiation
   - Develop a system request
   - Conduct a feasibility analysis
2. Project Management
   - Develop work plan
   - Staff the project
   - Control and direct the project

***Why should we build this system?***

# SDLC: Analysis

1. Develop analysis strategy
2. Gather requirements
3. Develop a system proposal

***What should the system do for us?***
***Where and when will it be used?***

# SDLC: Design

1. Develop a design strategy
2. Design architecture and interfaces
3. Develop databases and file specifications
4. Develop the program design

***How will we build the system?***

# SDLC: Implementation

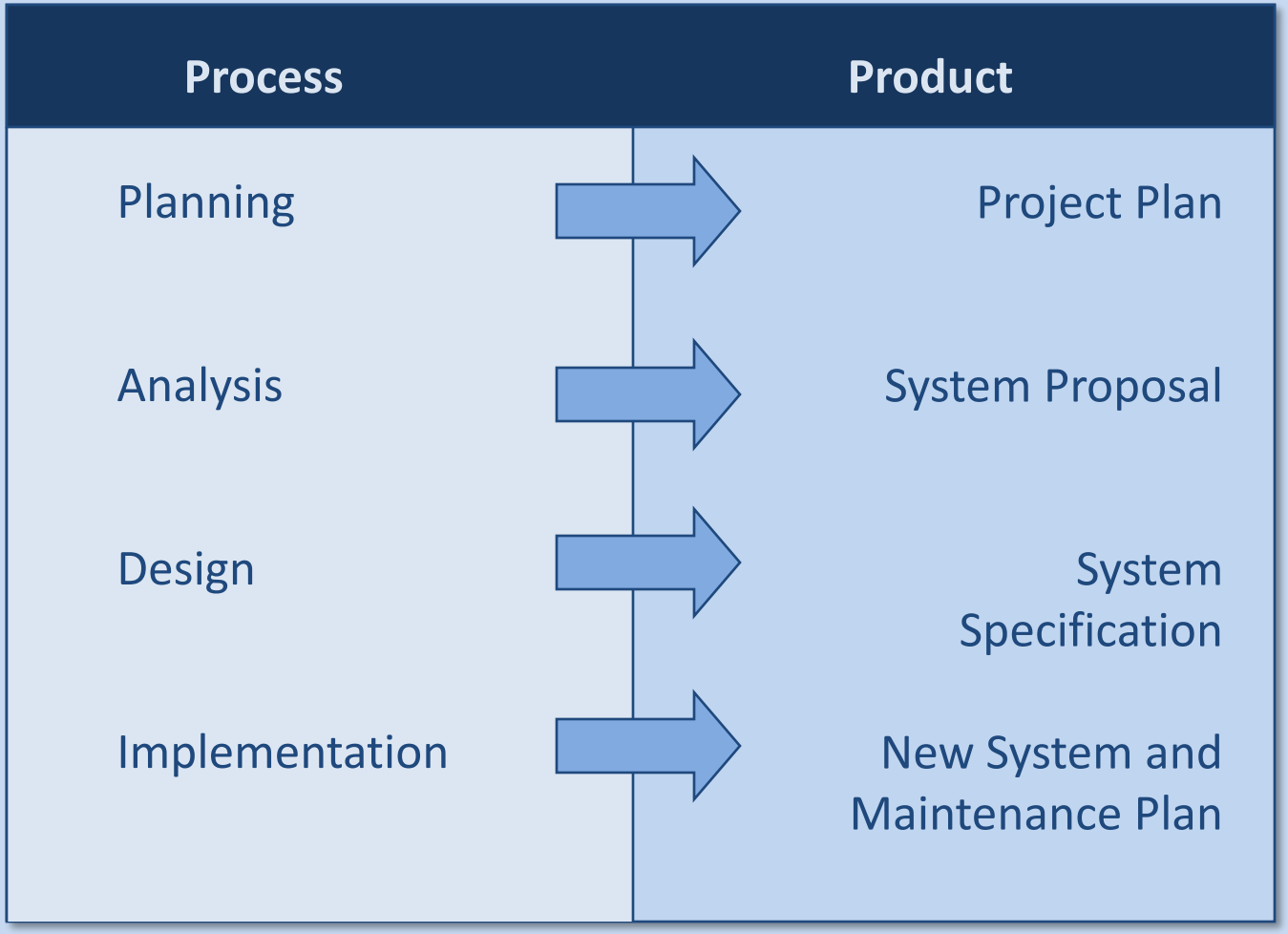
1. Construct system
2. Install system
   - Implement a training plan for the users
3. Establish a support plan

***Build* the system!**

# Putting the SDLC Together

- Each phase consists of steps that lead to specific deliverables
- The system evolves through gradual refinement
- Once the system is implemented, it may go back into a planning phase for its next revision, a follow-on system, or maintenance releases

# Processes and Deliverables



# SYSTEMS DEVELOPMENT METHODOLOGIES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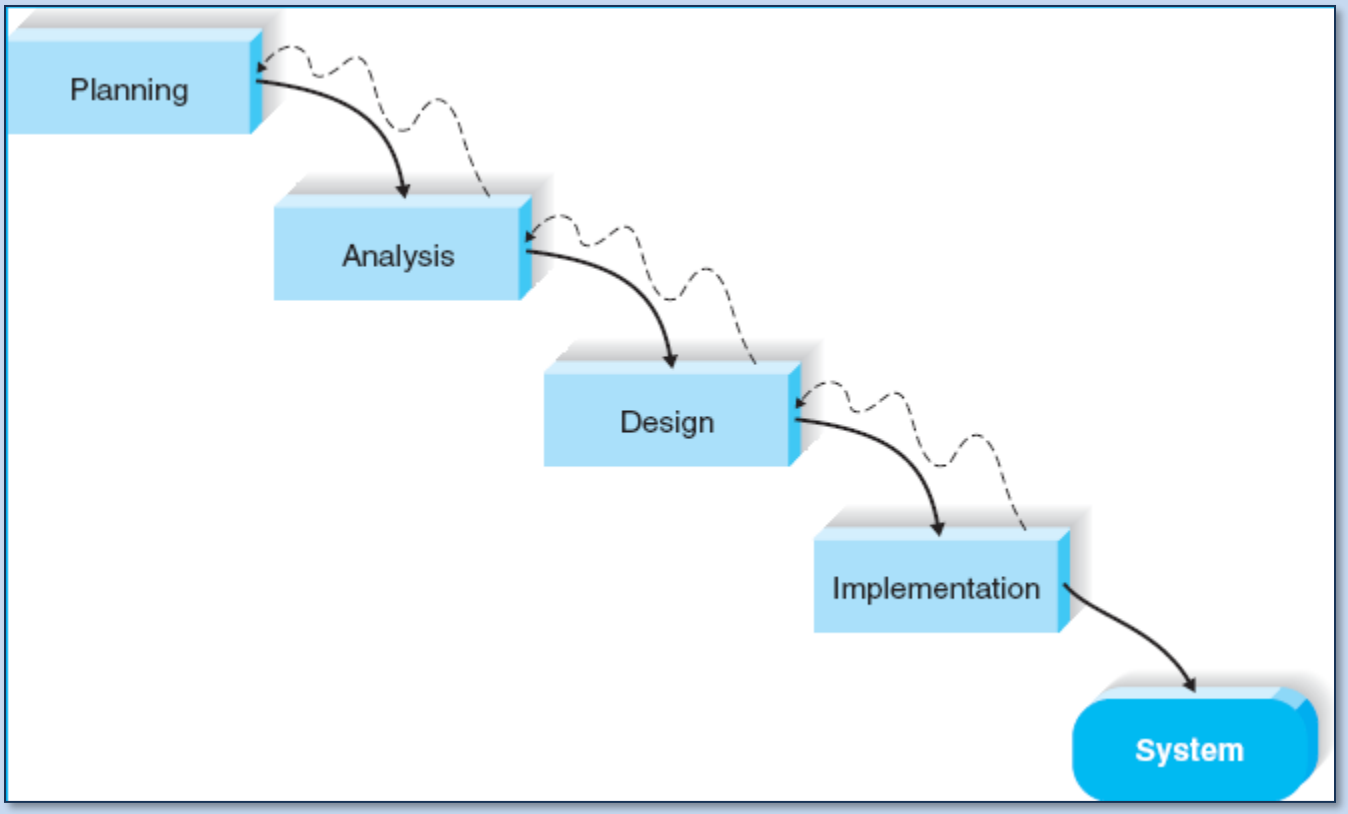
# Systems Development Methodologies

- A *methodology* is a formalized approach to implementing the SDLC
- Well-known methodologies include:
  - Waterfall development
  - Parallel development
  - V-model
  - Rapid application development
  - Agile development

# Categories of Methodologies

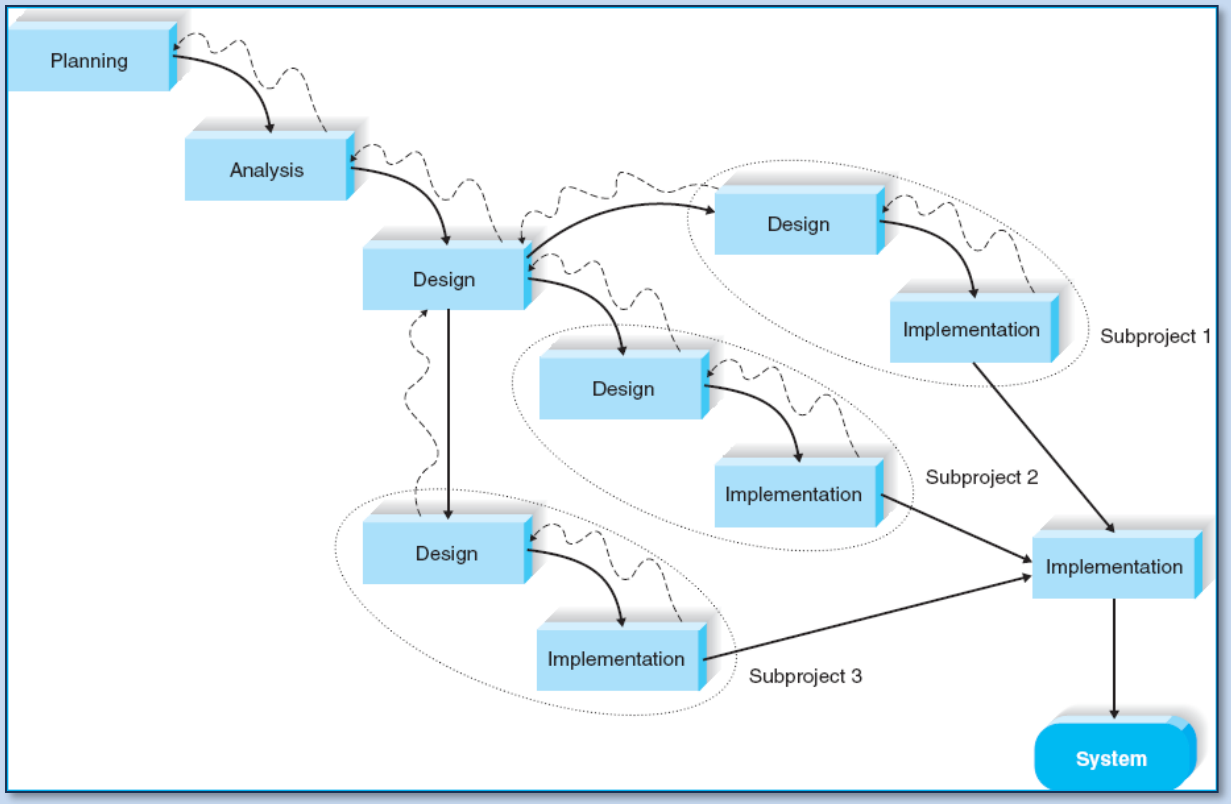
- Structured Design
  - Waterfall Development
  - Parallel Development
- Rapid Application Development
  - Phased
  - Prototyping
  - Throwaway Prototyping
- Agile Development
  - eXtreme Programming

# Structured Design 1



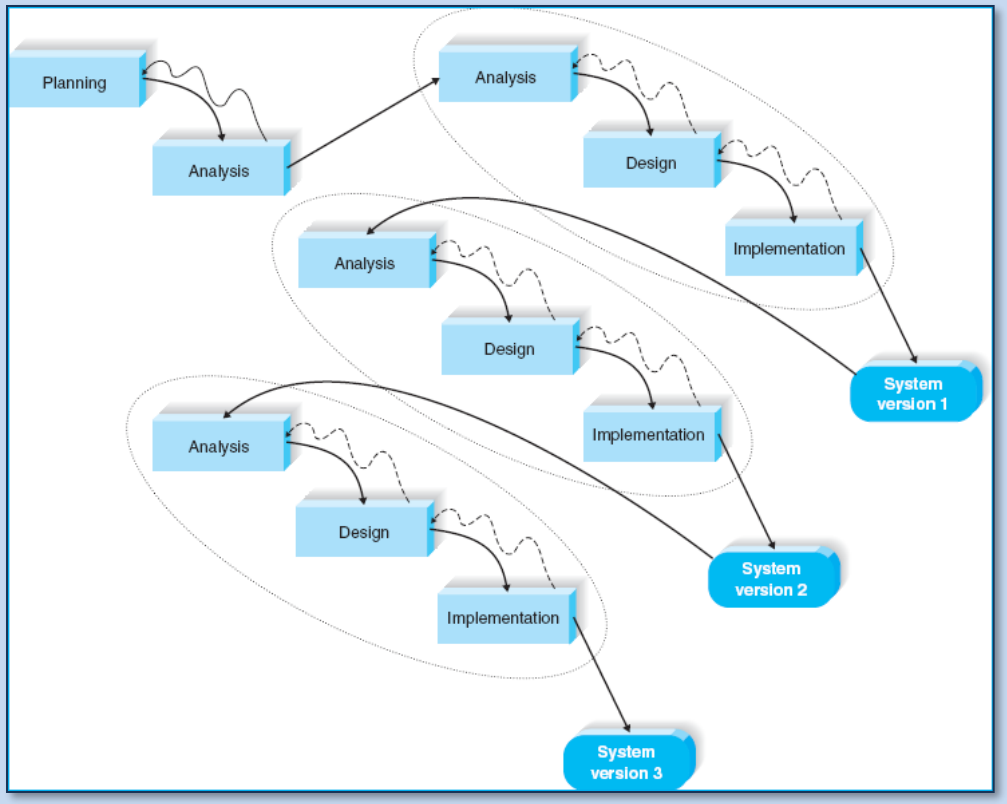

Waterfall Development

# Structured Design 2



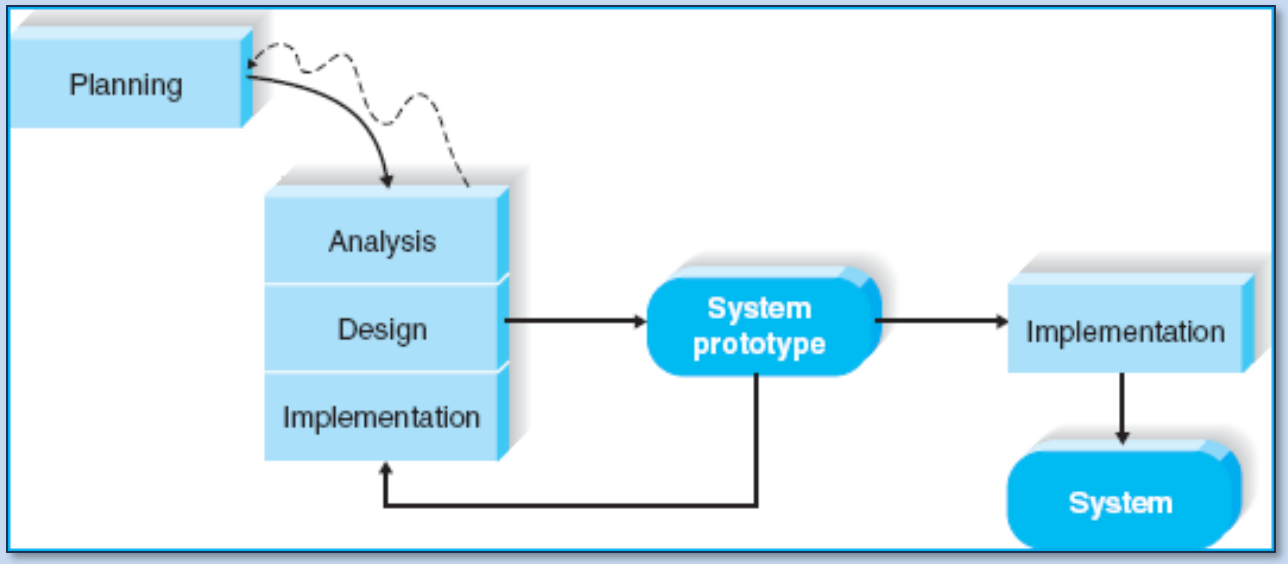

Parallel Development

# Rapid Application Development 1



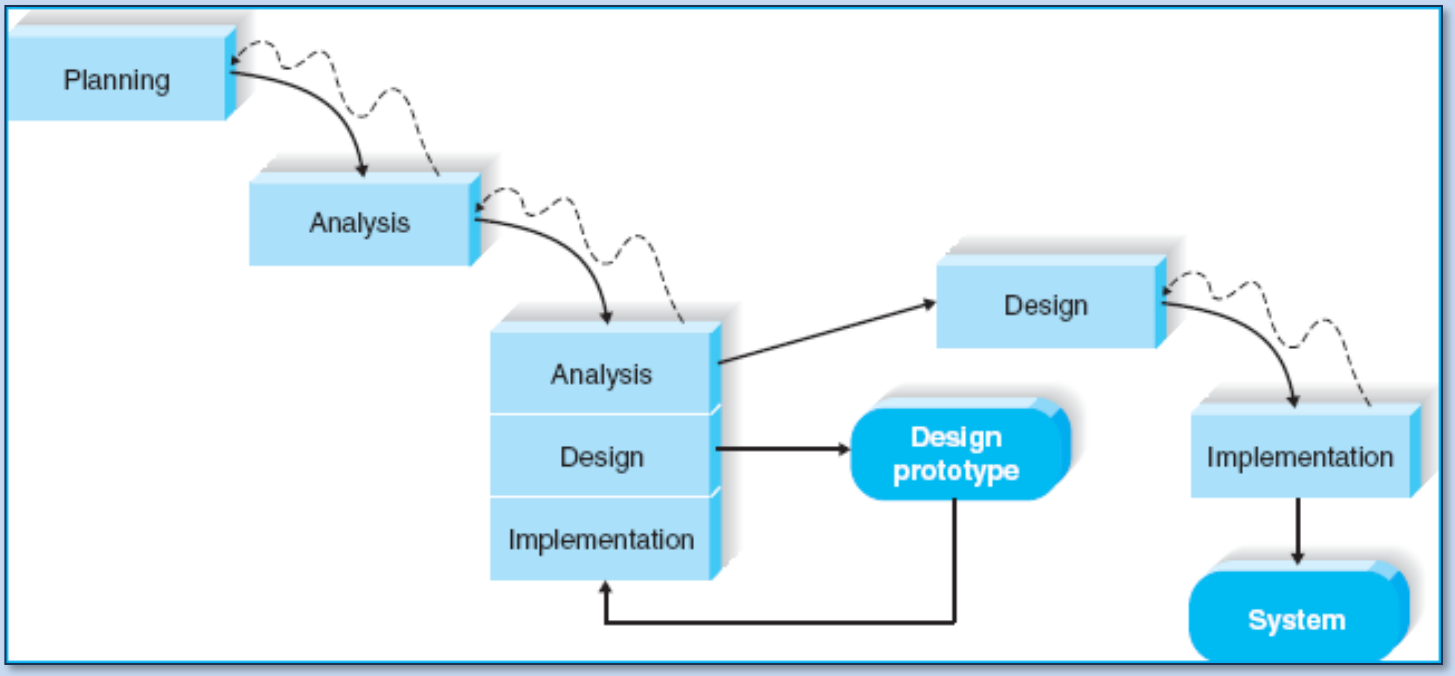

Phased Development

# Rapid Application Development 2



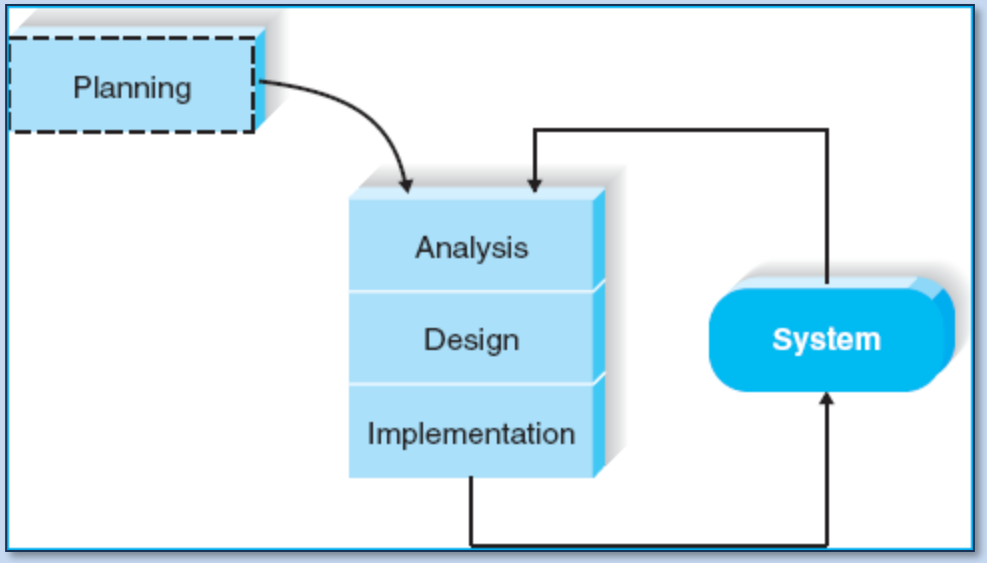

System Prototyping

# Rapid Application Development 3




Throwaway Prototyping

# Agile Development




## Extreme Programming

# Selecting the Right Methodology

| Usefulness for | Waterfall | Parallel | Phased | Prototyping | Throwaway Prototyping | Extreme Programming |
|---|---|---|---|---|---|---|
| Unclear user requirements | Poor | Poor | Good | Excellent | Excellent | Excellent |
| Unfamiliar technology | Poor | Poor | Good | Poor | Excellent | Poor |
| Complex systems | Good | Good | Good | Poor | Excellent | Poor |
| Reliable systems | Good | Good | Good | Poor | Excellent | Good |
| Short time schedule | Poor | Good | Excellent | Excellent | Good | Excellent |
| Schedule visibility | Poor | Poor | Excellent | Excellent | Good | Good |

# Object-Oriented Analysis & Design

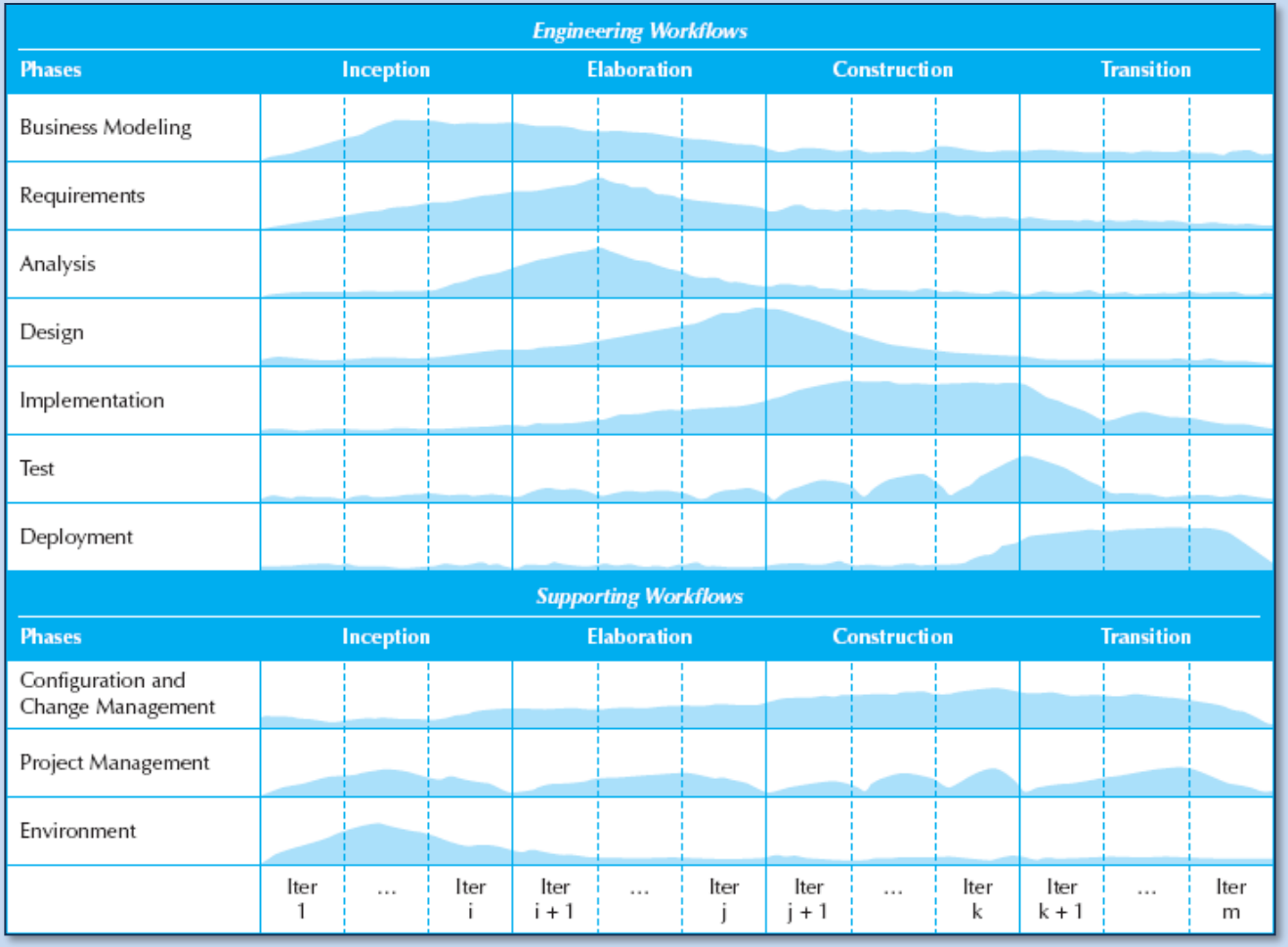
- Attempt to balance emphasis on data and process
- Uses Unified Modeling Language (UML)
- Characteristics of OOAD:
  - Use-case Driven
  - Architecture Centric
  - Iterative and Incremental

# THE UNIFIED PROCESS

# The Unified Process

- A specific methodology that maps out when and how to use the various UML techniques for object-oriented analysis and design
- A two-dimensional process consisting of phases and flows
  - Phases describe how the system evolves over time
  - Workflows are collections of tasks that occur throughout the lifecycle, but vary in intensity

# The Unified Process



# Unified Process Phases

- Inception
- Elaboration
- Construction
- Transition

# Engineering Workflows

- Business modeling
- Requirements
- Analysis
- Design
- Implementation
- Testing
- Deployment

# Supporting Workflows

- Project management
- Configuration and change management
- Environment
- Operations and support*
- Infrastructure management*

* Part of the *enhanced* unified process

# THE UNIFIED MODELING LANGUAGE

# Unified Modeling Language

- Provides a common vocabulary of object-oriented terms and diagramming techniques rich enough to model any systems development project from analysis through implementation
- Version 2.0 has 14 diagrams in 2major groups:
  - Structure diagrams
  - Behavior diagrams

# UML Structure Diagrams

- Represent the data and static relationships in an information system
  - Class
  - Object
  - Package
  - Deployment
  - Component
  - Composite structure

# UML Behavior Diagrams

- Depict the dynamic relationships among the instances or objects that represent the business information system
  - Activity
  - Sequence
  - Communication
  - Interaction overview
  - Timing
  - Behavior state machine
  - Protocol state machine,
  - Use-case diagrams

# PROJECT TEAM ROLES AND SKILLS

# Project Team Skills

- Project team members are change agents who find ways to improve their organization
- A broad range of skills is required, including
  - Technical
  - Business
  - Analytical
  - Interpersonal
  - Management
  - ethical

# Project Team Roles

| Role | Responsibilities |
|---|---|
| **Business Analyst** | Analyzing the key business aspects of the system<br>Identifying how the system will provide business value<br>Designing the new business processes and policies |
| **Systems Analyst** | Identifying how technology can improve business processes<br>Designing the new business processes<br>Designing the information system<br>Ensuring the system conforms to IS standards |
| **Infrastructure Analyst** | Ensuring the system conforms to infrastructure standards<br>Identifying infrastructure changes required by the system |
| **Change Management Analyst** | Developing and executing a change management plan<br>Developing and executing a user training plan |
| **Project Manager** | Managing the team<br>Developing and monitoring the project plan<br>Assigning resources<br>Serving as the primary point of contact for the project |

# Summary

- All systems development projects follow essentially the same process, called the system development life cycle (SDLC)
- System development methodologies are formalized approaches to implementing SDLCs
- Object-Oriented Systems Analysis and Design (OOSAD) uses a use-case-driven, architecture-centric, iterative, and incremental information systems development approach

# Summary

- The Unified Process is a two-dimensional systems development process described with a set of phases and workflows
- The Unified Modeling Language, or UML, is a standard set of diagramming techniques
- The project team needs a variety of skills