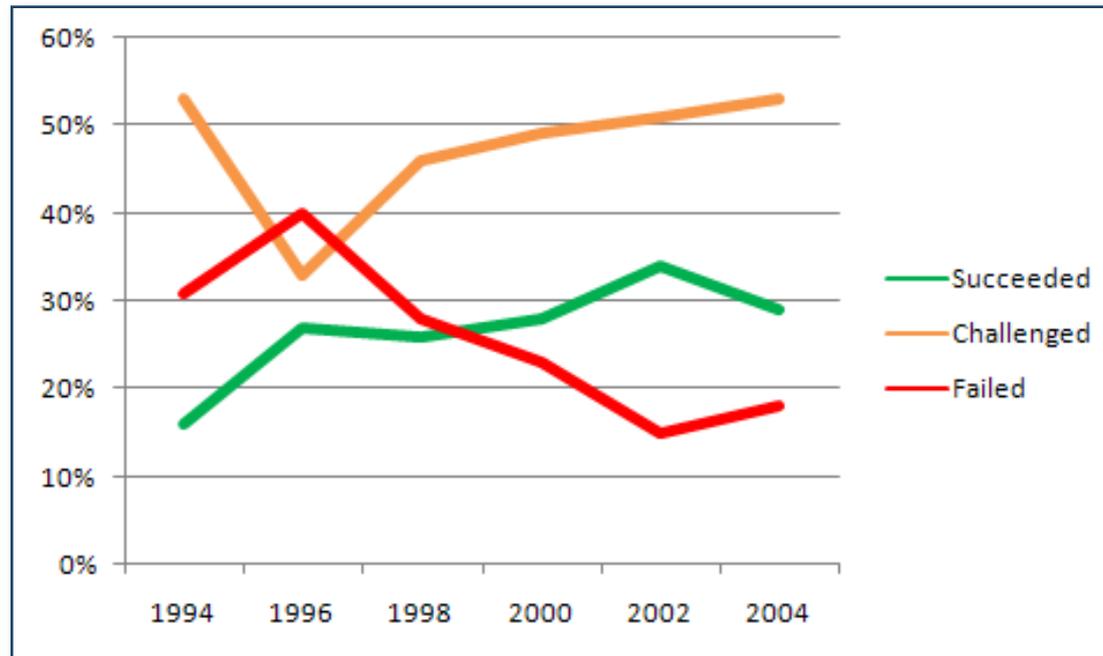


Introduction to Systems Analysis and Design

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?



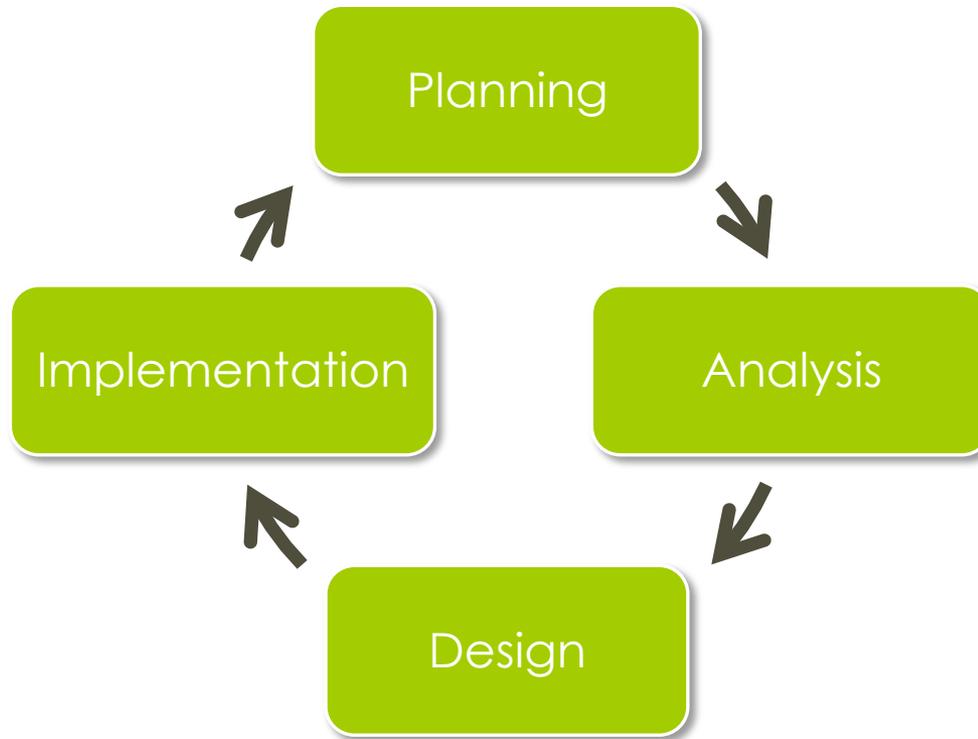
Would **you** buy a car that only had a 28% chance of driving off the lot with **no** problems?

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

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

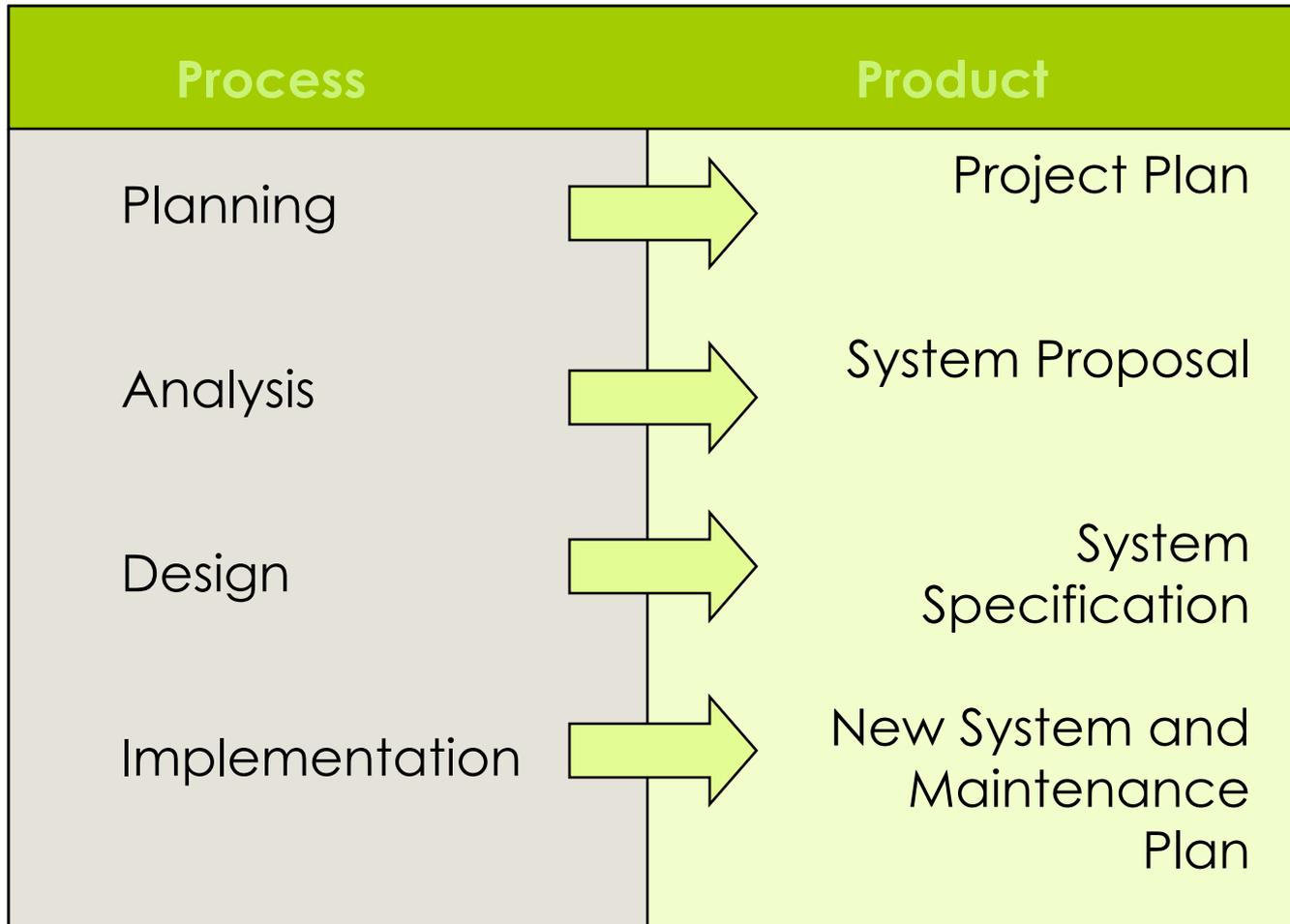
1. Construct system
2. Install system
 - Implement a training plan for the users
3. Establish a support plan

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

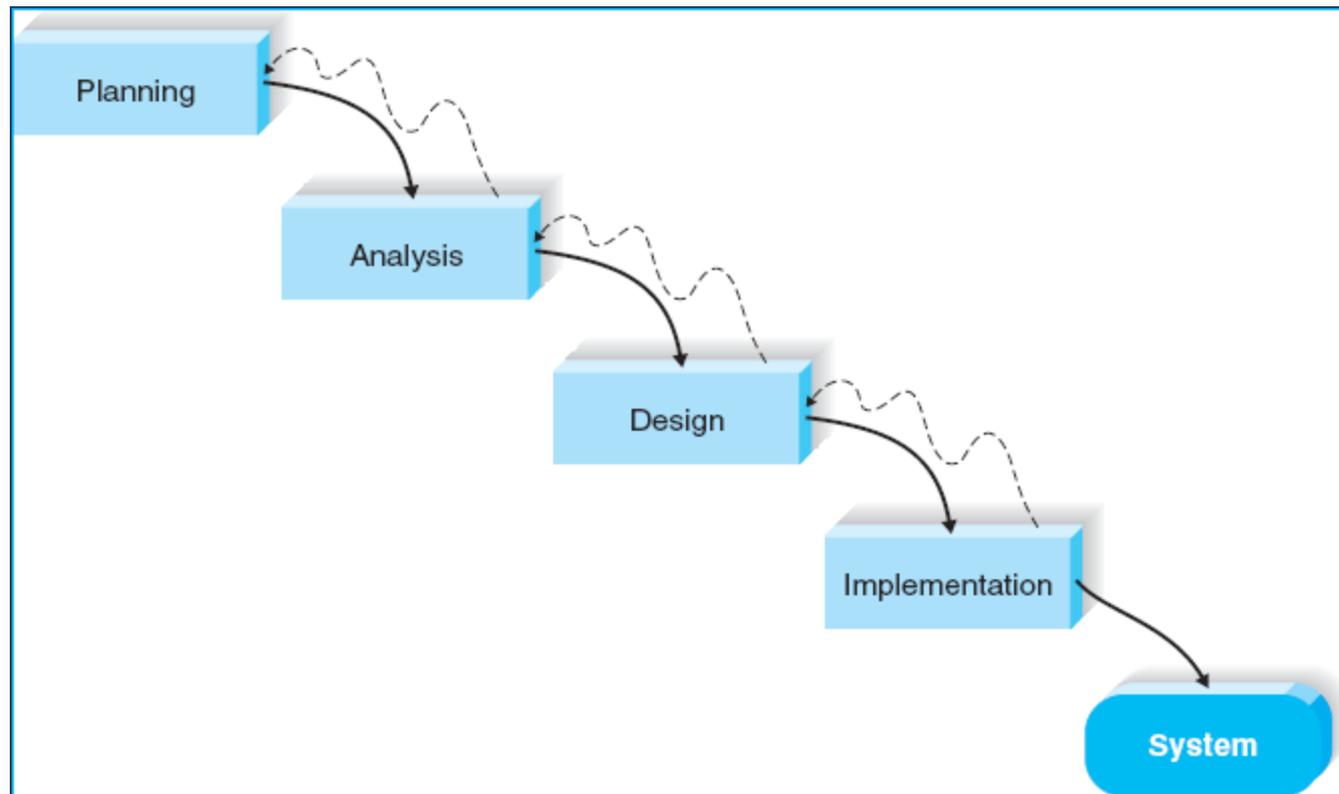
Systems Development Methodologies

- 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

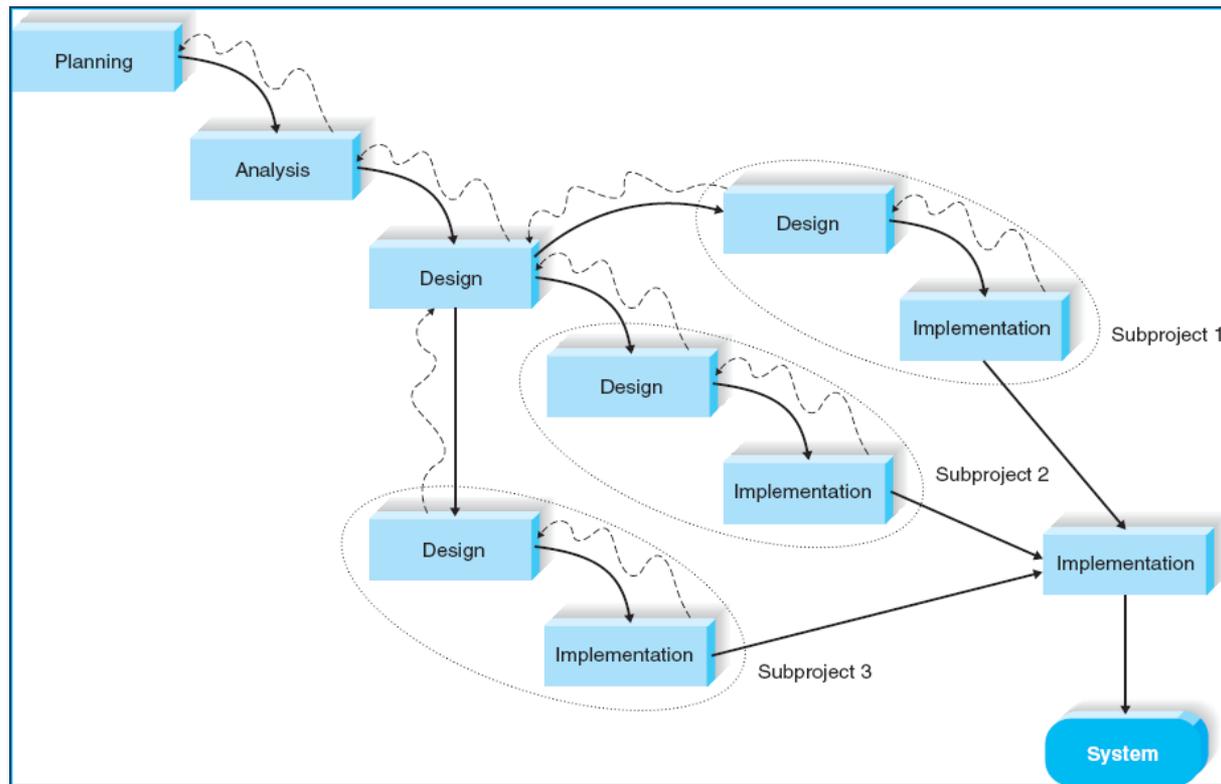
- Structured Design
 - Waterfall Development
 - Parallel Development
- Rapid Application Development
 - Phased
 - Prototyping
 - Throwaway Prototyping
- Agile Development
 - eXtreme Programming

Structured Design 1



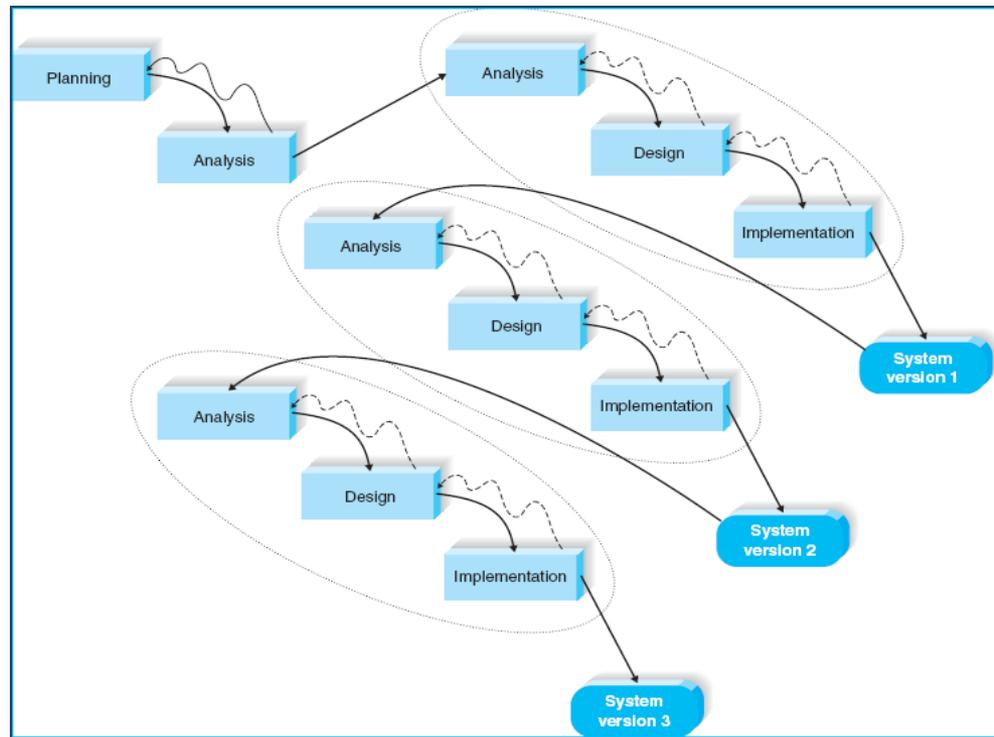
Waterfall Development

Structured Design 2



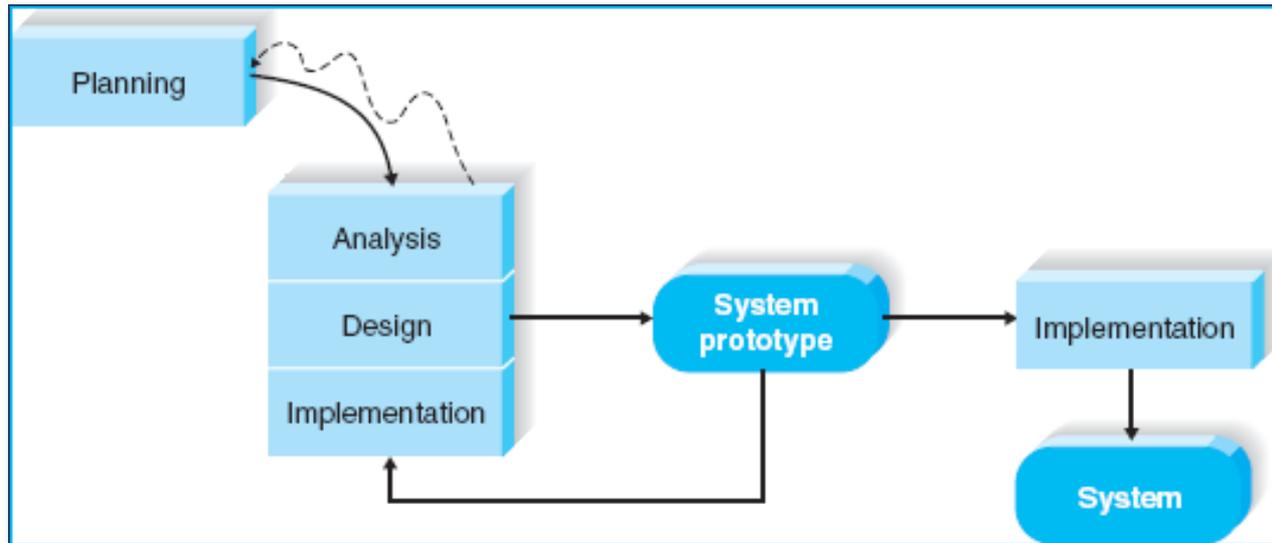
Parallel Development

Rapid Application Development 1



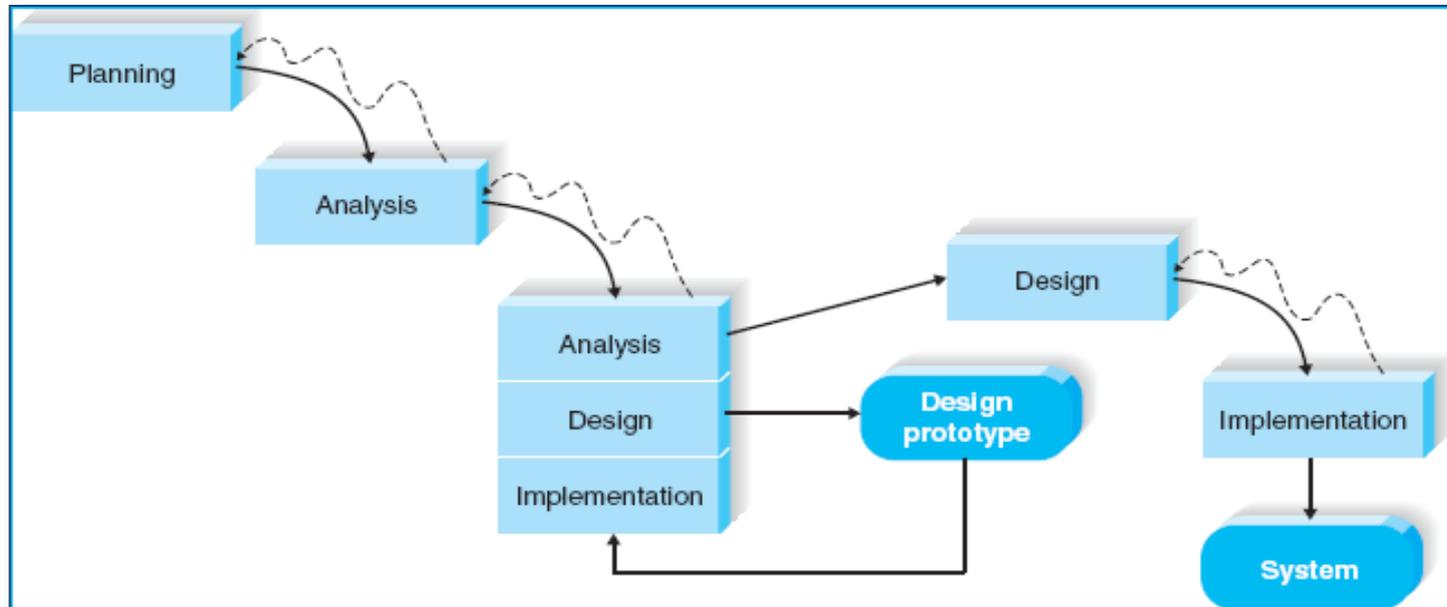
Phased Development

Rapid Application Development 2



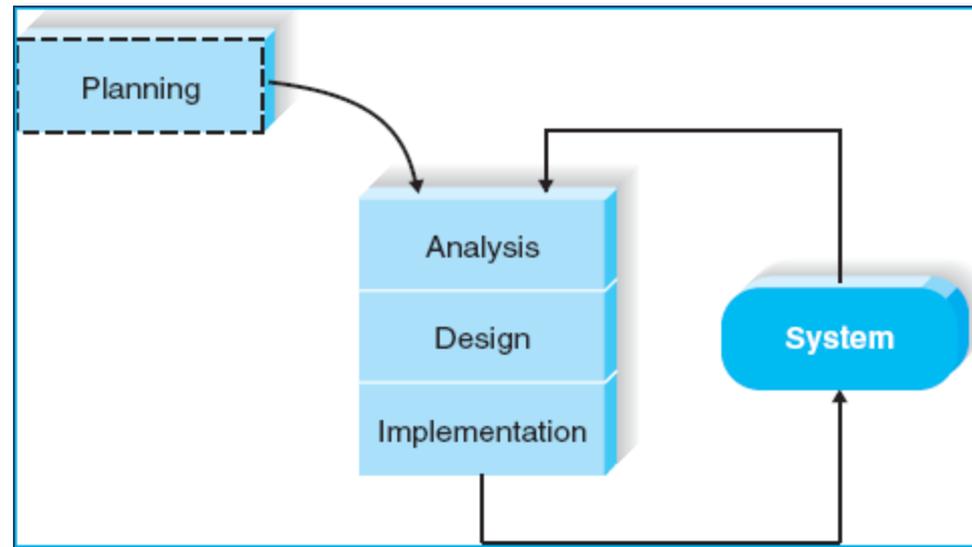
System Prototyping

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

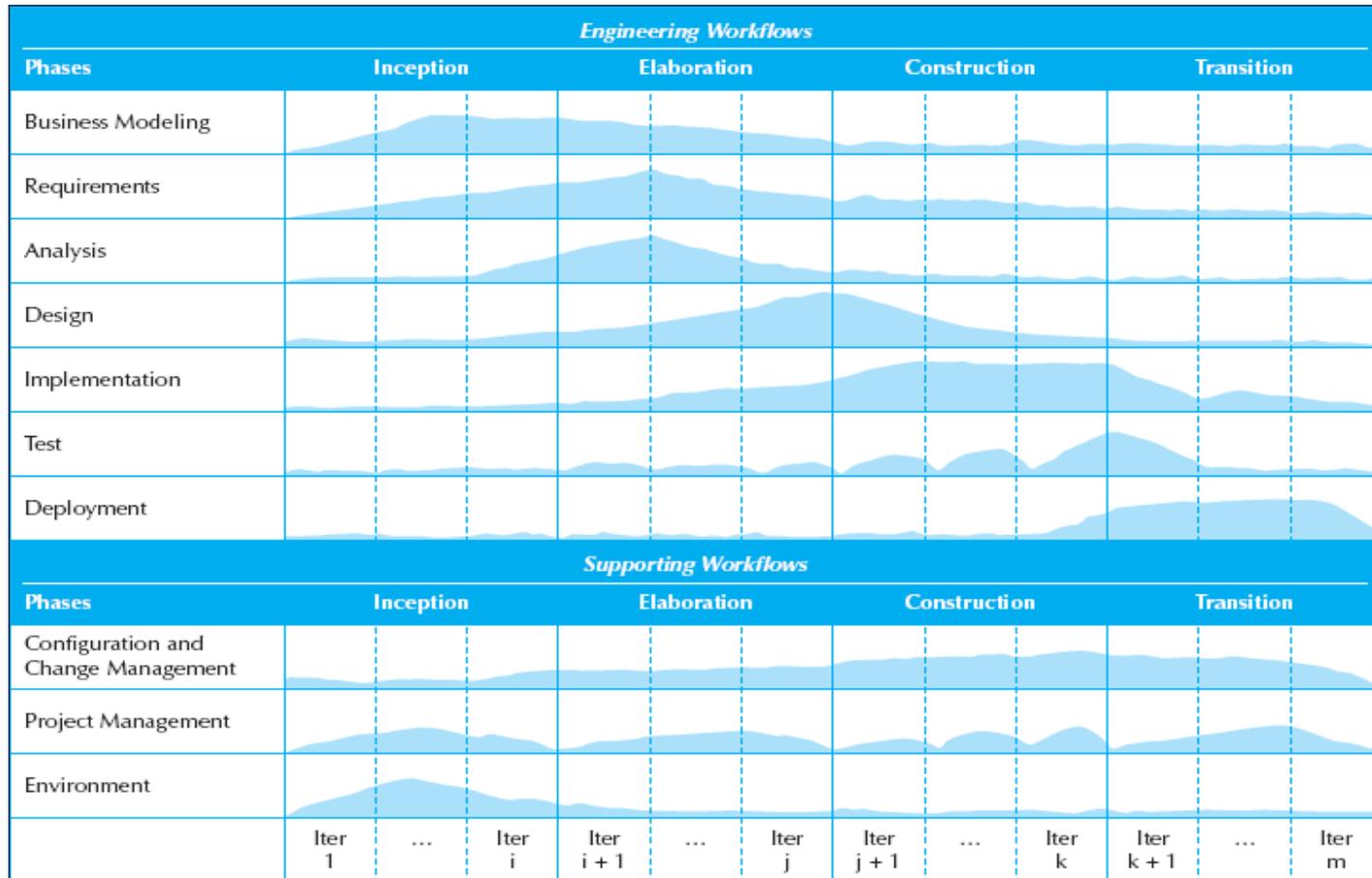
- Attempt to balance emphasis on data and process
- Uses Unified Modeling Language (UML)
- Characteristics of OOAD:
 - Use-case Driven
 - Architecture Centric
 - Iterative and Incremental

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

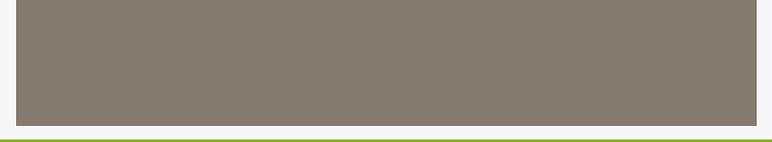
Engineering Workflows

- 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

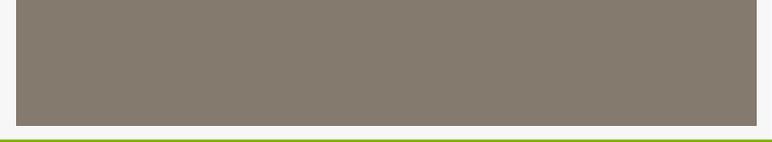
- Provides a common vocabulary of object-oriented terms and diagramming techniques rich enough to model any systems development project from analysis through implementation
- Version 2.0 has 14 diagrams in 2 major groups:
 - Structure diagrams
 - Behavior diagrams

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 Identifying how the system will provide business value Designing the new business processes and policies
Systems Analyst	Identifying how technology can improve business processes Designing the new business processes Designing the information system Ensuring the system conforms to IS standards
Infrastructure Analyst	Ensuring the system conforms to infrastructure standards Identifying infrastructure changes required by the system
Change Management Analyst	Developing and executing a change management plan Developing and executing a user training plan
Project Manager	Managing the team Developing and monitoring the project plan Assigning resources 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