MANAGEMENT INFORMATION SYSTEMS 8/E

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Chapter 7

System Life Cycle Methodologies

OBJECTIVES

- ✓ Realize that the development and use of a computer-based system progresses through a life cycle, and that users and information specialists play key roles in each phase
- ✓ Be aware of the MIS steering committee, the functions that it performs, and the advantages that accrue from its participation in the life cycle
- ✓ Know the benefits that can be expected from planning the system life cycle

The Systems Life Cycle (SLC)

- Methodology
  - Recommended way of doing something
- An application of the systems approach to the task of developing and using a computer-based system
- Often called waterfall approach

Phases in the SDLC

1) Planning
2) Analysis
3) Design
4) Implementation
5) Use

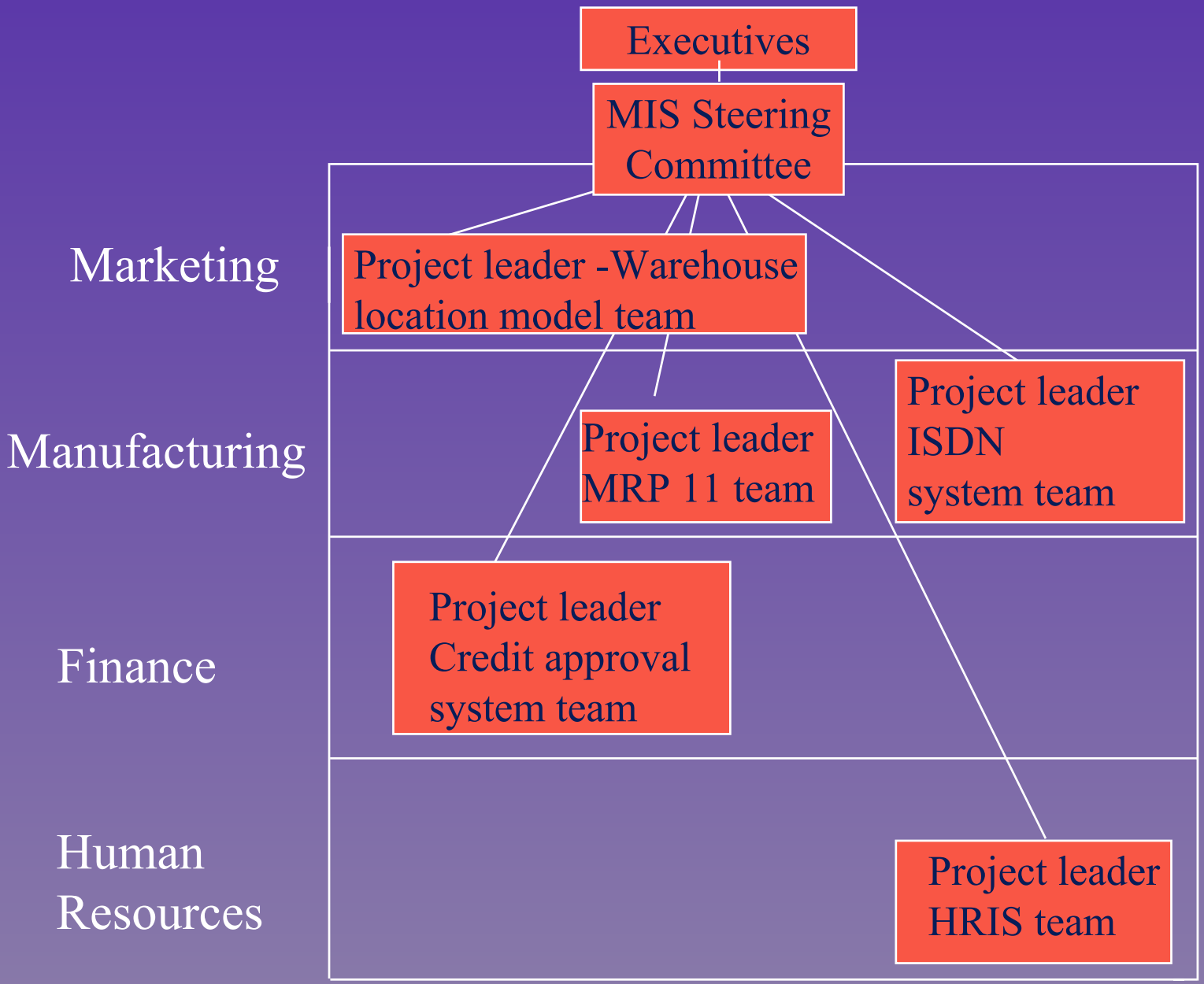
The System Development Life Cycle (SDLC)

- SDLC is the phrase that encompasses the planning, analysis, design, and implementation phases of the system life cycle
- Who participates
  - IS personnel
  - User
  - Information specialists can consult
- Traditional
  - Information specialists working with users.
  - A new strategy: Outsourcing

Life Cycle Management

- An upward migration
- Executive responsibility
- MIS steering committee
  - Functions
    - » Set policy
    - » Control the purse strings
    - » Resolve conflicts

Managers of Systems Life Cycles are Arranged in a Hierarchy



Main Advantages of the Steering Committee

- Total firm support
- Projects will be characterized by good planning and control
- Establishes policies, provides fiscal control, and resolves conflicts

Since the steering committee will probably not get involved with the details of the work, a project team is usually appointed.

Planning Phase

- Benefits
  - Define scope of the project
  - Spot potential problems
  - Arrange tasks in sequence
  - Provide basis for control

Steps

1. Recognize problem (the trigger)
2. Define problem
3. Set objectives
4. Identify constraints

Recall that objectives, standards, and constraints are problem-solving elements.

Steps (cont.)

5. Conduct feasibility study (TENLOS)
   - Technical
   - Economic return
   - Noneconomic return
   - Legal and ethical
   - Operational
   - Schedule

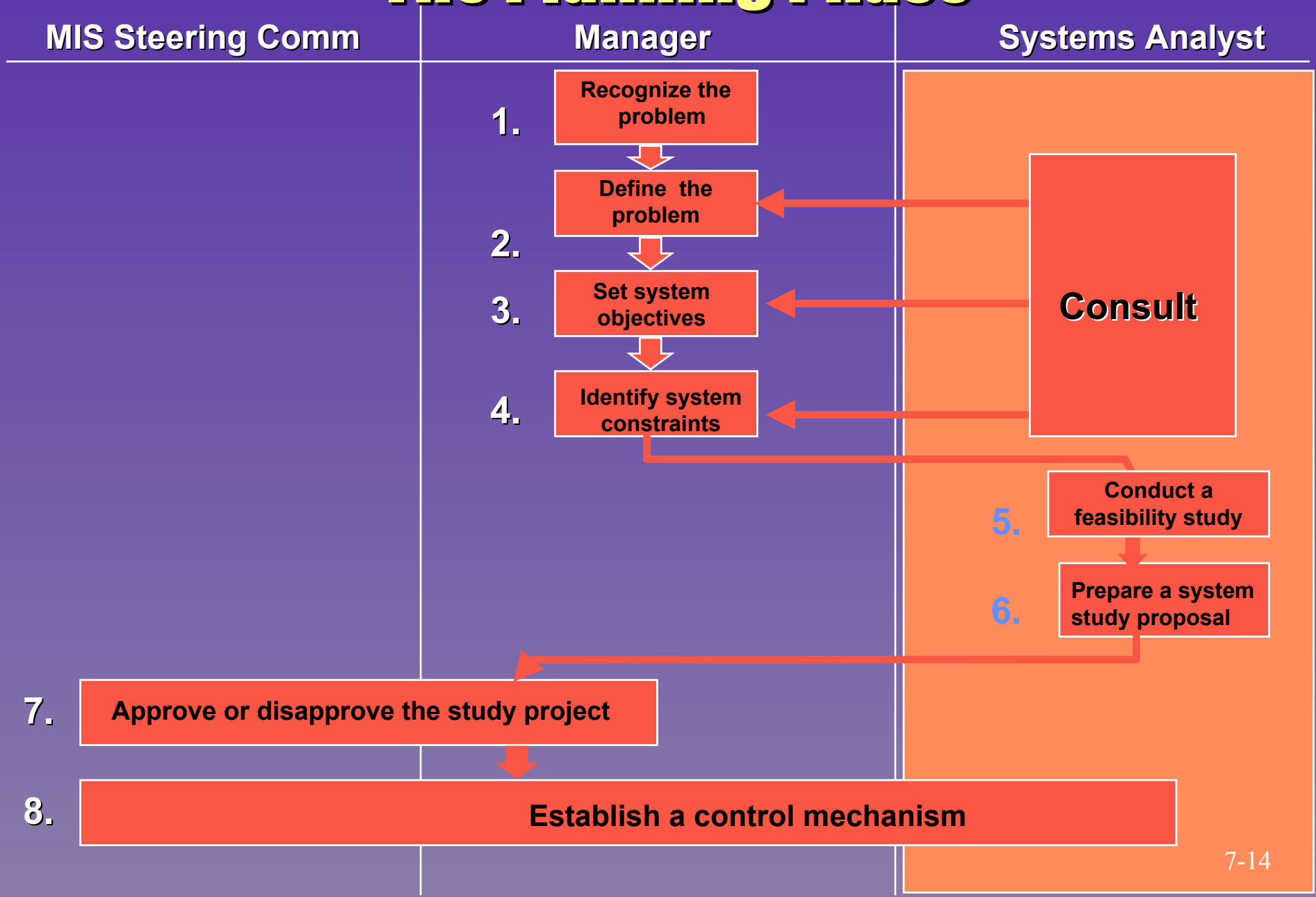
Steps (cont.)

6. Prepare study project proposal
   - Goes to MIS steering committee
7. Approve or disapprove (go/no go)
   - Key questions?
   1. Will the system accomplish its goals?
   2. Is this the best way to go about it?

Steps (cont.)

8. Establish a control mechanism
   - Think in terms of:
     - » 1. What
     - » 2. Who
     - » 3. When (Person-months versus calendar months)
   - PERT and CPM network diagrams

The Planning Phase



Outline of a System Study Proposal

1. Executive summary
2. Introduction
3. System objectives and constraints
4. Possible system alternatives
5. The recommended system study project
    - 5.1 Tasks to be performed
    - 5.2 Human resource requirements
    - 5.3 Schedule of work
    - 5.4 Estimated cost
6. Expected impact of the system
    - 6.1 Impact on the firm's organization structure
    - 6.2 Impact on the firm's operations
    - 6.3 Impact on the firms resources
7. General development plan (analysis, design, and implementation phase)
8. Summary

A Project Schedule

Functional System:	Marketing
Subsystem:	Product
Model:	Product Deletion

Subtask	Responsibility	Time Estimate *(Person Months)*
1. Identify deletion criteria	Systems analyst Product manager	0.75
2. Identify output information requirements	Systems analyst Network specialist Product manager	0.25

Project Schedule (cont.)

3.	Identify input data requirements	Systems analyst DBA	0.50
4.	Prepare new system documentation	Systems analyst	2.00
5.	Design network	Network specialist	1.50
6.	Design database	DBA	0.50
7.	Review design	Product manager Systems analyst	0.25
8.	Prepare program documentation	Programmer	1.00

Project Schedule (cont.)

9.	Code program	Programmer	1.25
10.	Test program	Programmer	0.75
		Operations staff	
11.	Approve program	Product manager	0.50
		VP of marketing	
12.	Prepare database	DBA	2.00
13.	Educate users	Systems analyst	0.50
14.	Cutover to model	Operations staff	0.75

Analysis Phase

- Steps
  1. Announce
     - » Reasons for project
     - » Purpose: inform and counteract fear
  2. Organize project team
     - » User(s)
     - » Specialists
     - » Define roles

Analysis Phase (cont.)

3. Define information needs
   - » Methods
     - Personal interview (the preferred method)
     - Observation
     - Record search (includes review of existing documentation)
     - Surveys

A *project directory* can be maintained as an encompassing set of documentation to describe the system

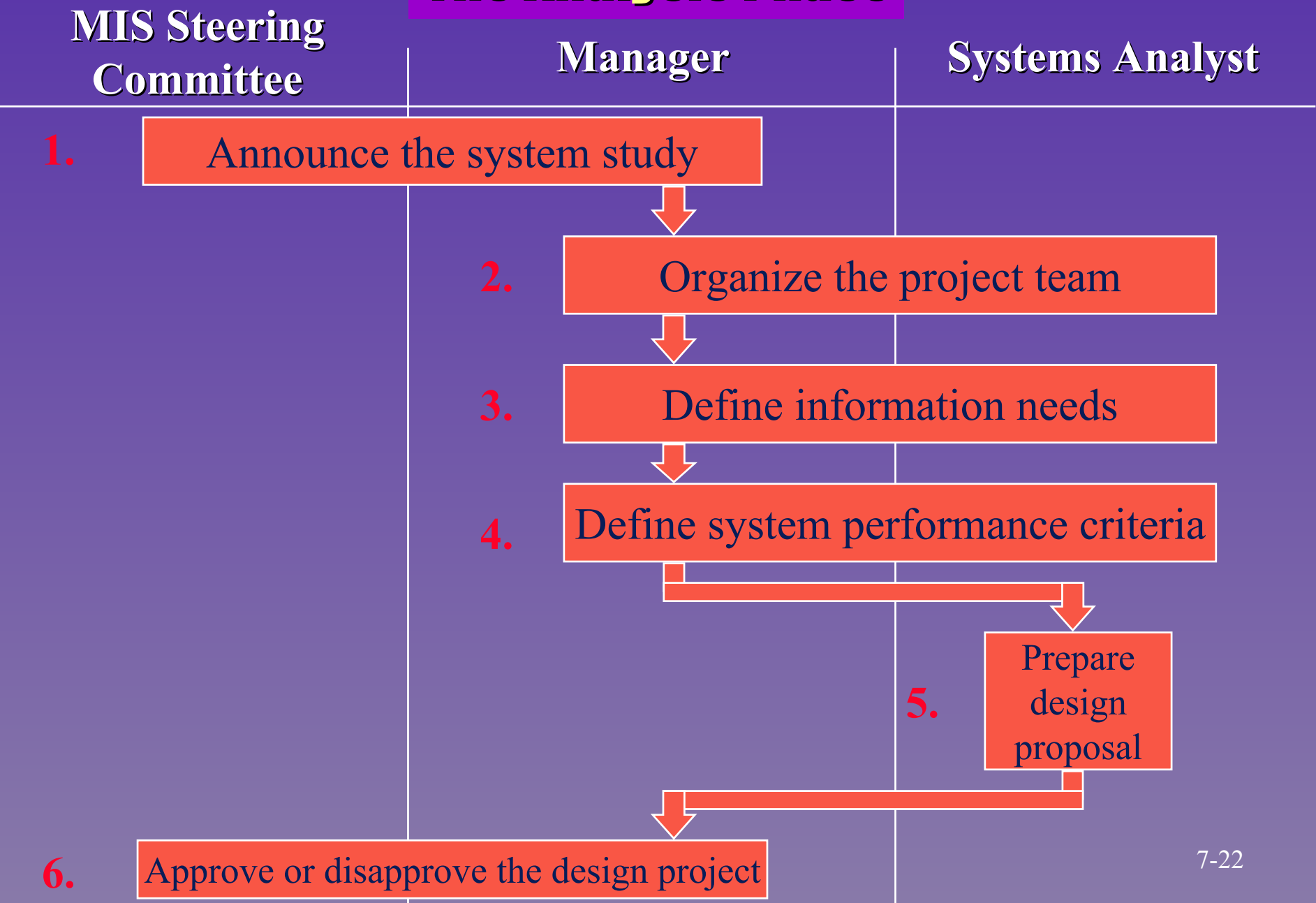
Analysis Phase (cont.)

4. Define system performance criteria
5. Prepare design proposal

(Compare to system study proposal)

6. Approve or disapprove the design project

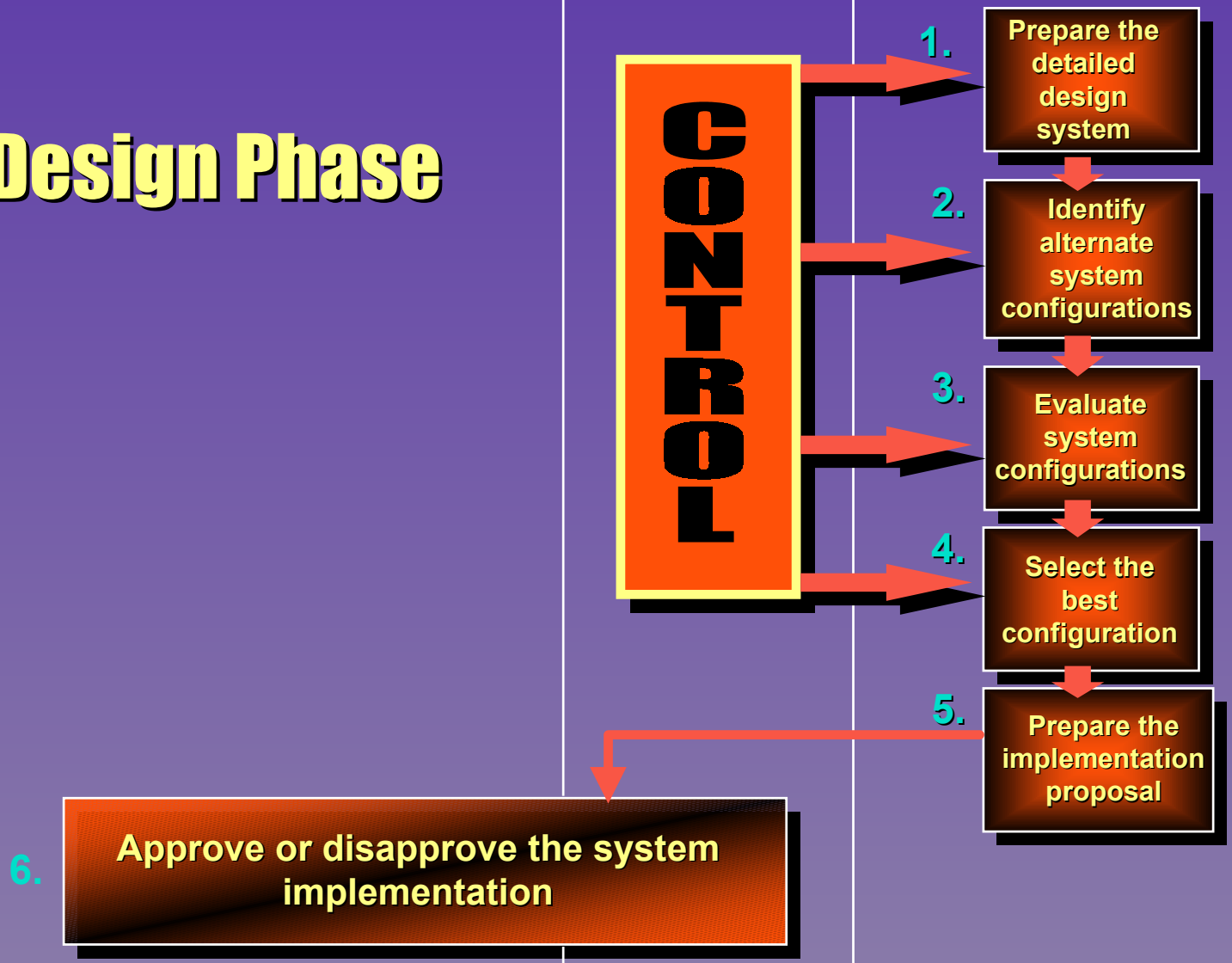
The Analysis Phase



Outline of a Design Proposal

1. Executive summary
2. Introduction
3. Problem definition
4. System objectives and constraints
5. Performance criteria
6. Possible system alternatives
7. The recommended design project
    - 7.1 Tasks to be performed
    - 7.2 Human resource requirements
    - 7.3 Schedule of work
    - 7.4 Estimated cost
8. Expected impact of the system
    - 8.1 Impact on the firm's organization structure
    - 8.2 Impact on the firm's operations
    - 8.3 Impact on the firms resources
9. General development plan (analysis, design, and implementation)
10. Summary

The Design Phase



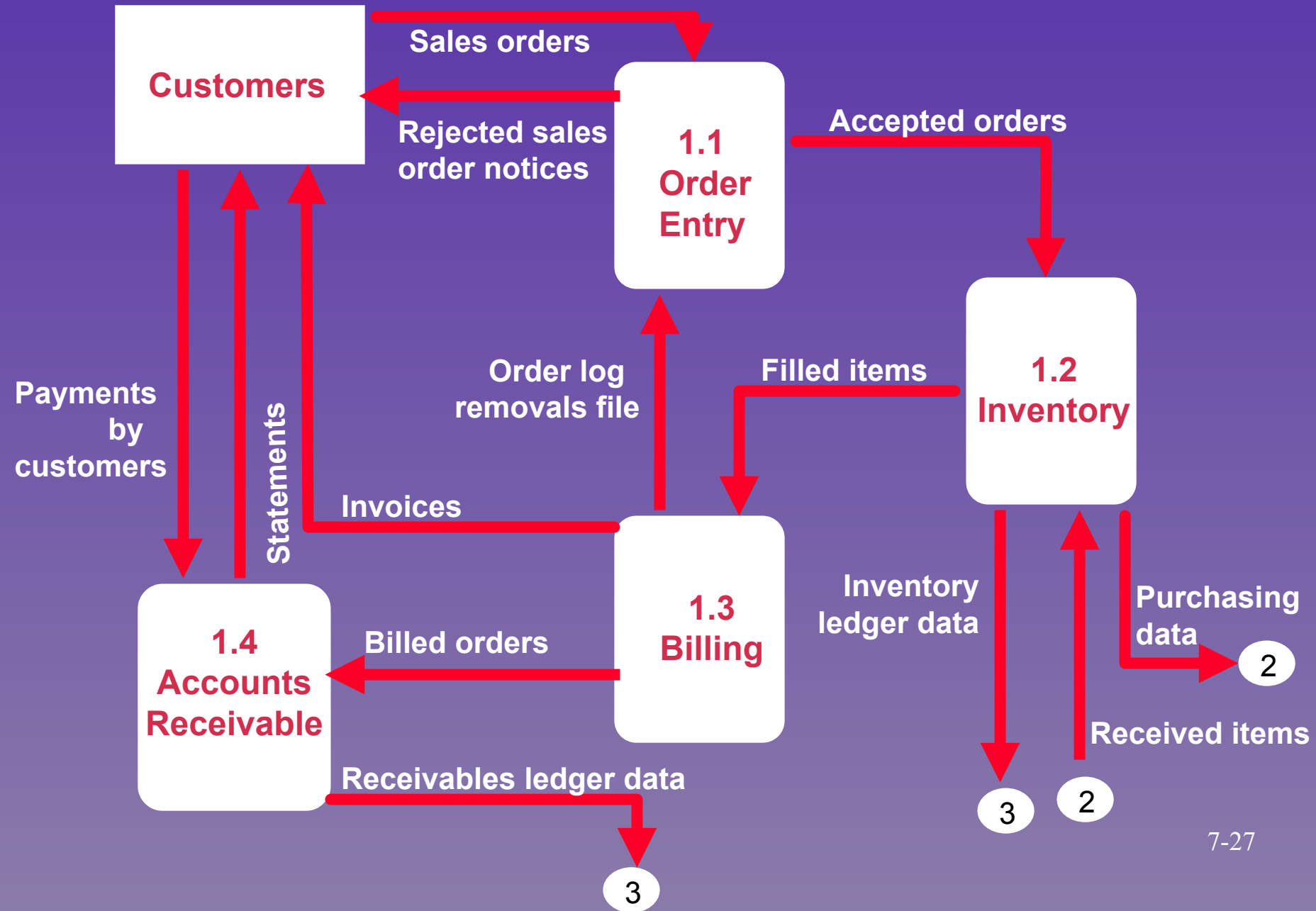
Design Phase

1. Prepare detailed design
   - Structured design (top down)
     - » System level
     - » Subsystem level
   - Documentation tools
2. Identify alternate system configurations
   - Refine to a manageable set

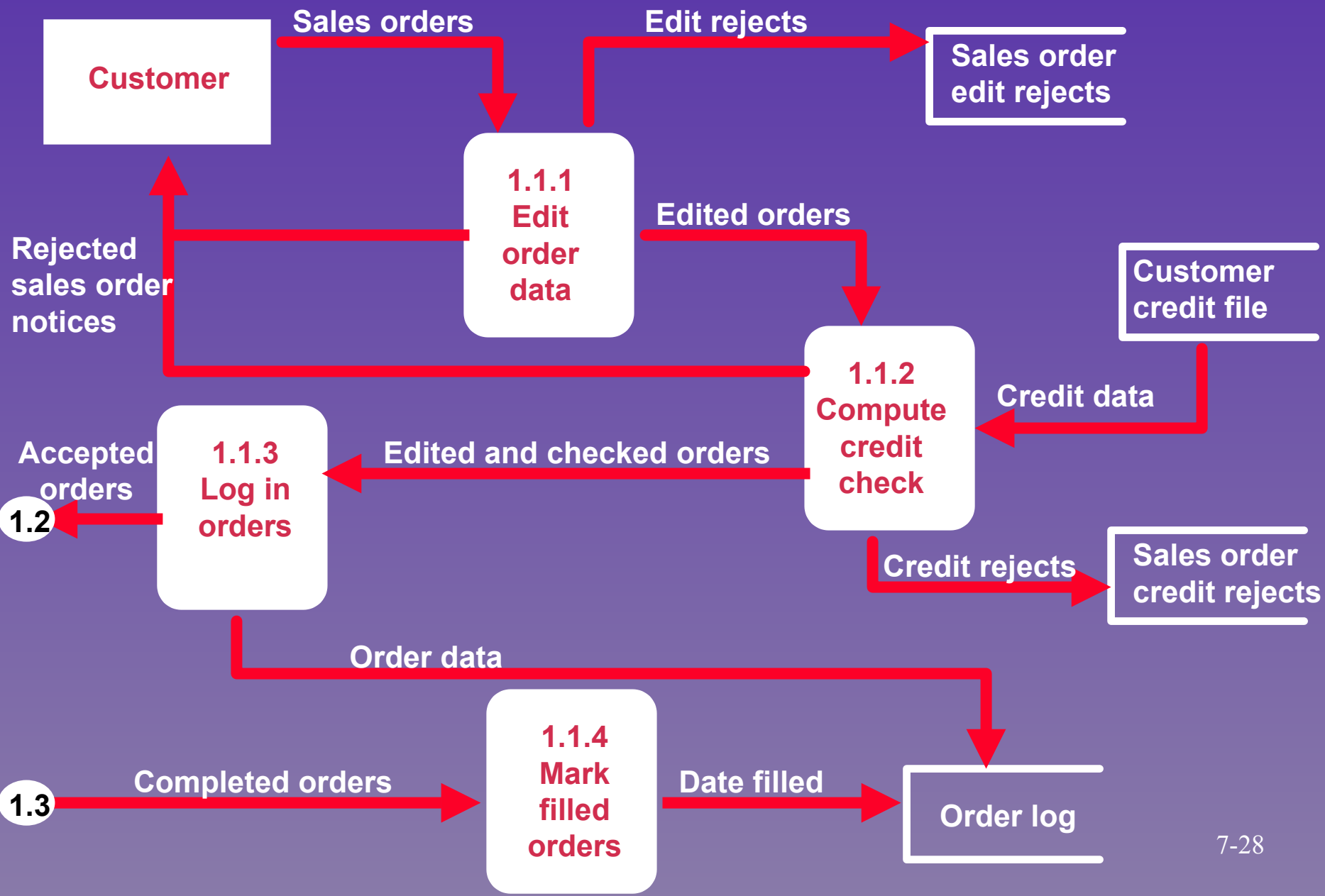
Popular Documentation Tools

Data Modeling	Entity-relationship diagram Data dictionary Screen/printer layout form
Process Modeling	System flowchart Program flowchart Data flow diagram Structured English
Object Modeling	Object relationship model Class specification

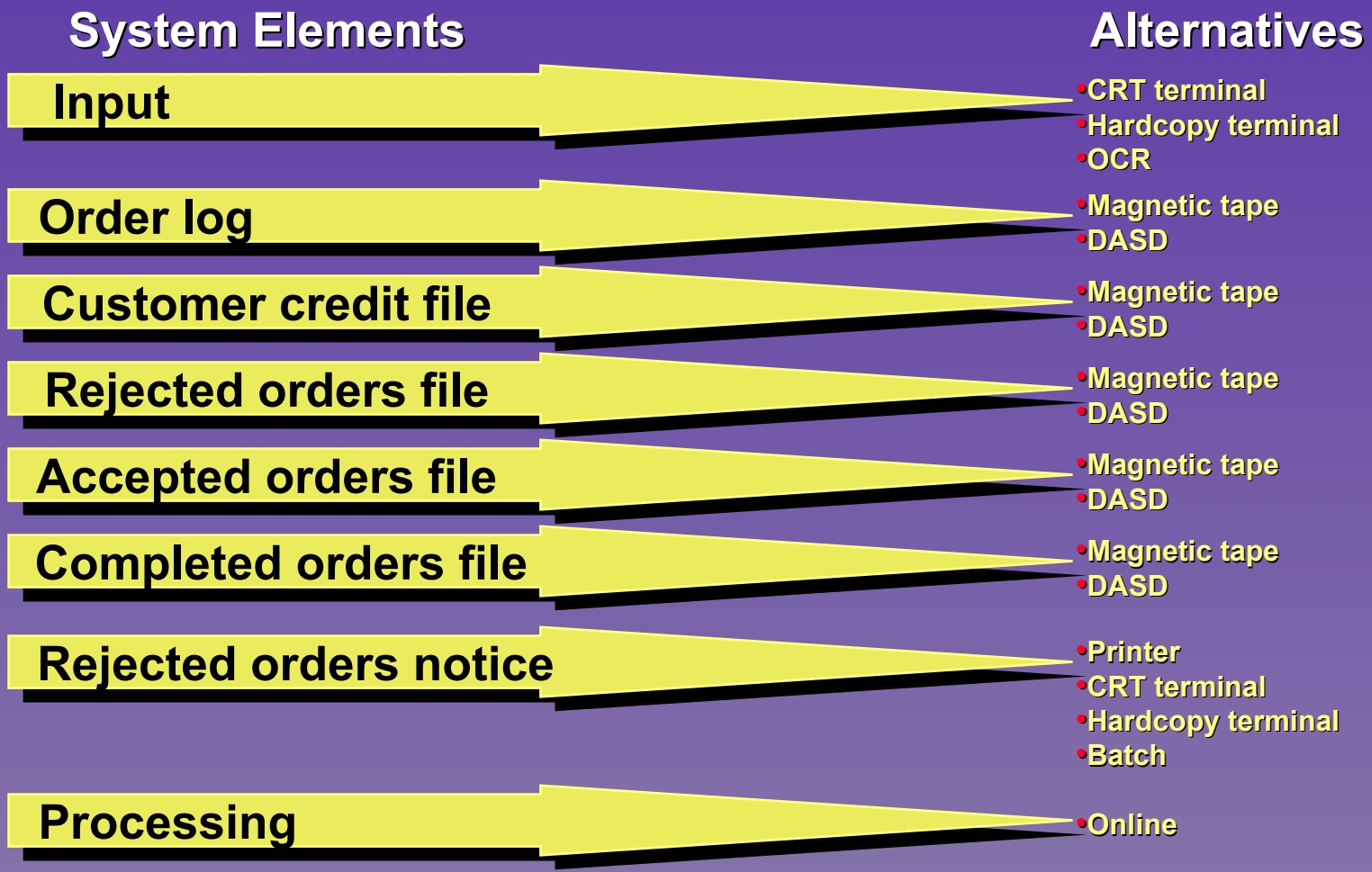
Data Flow Diagram of Four Data Processing Subsystems



Data Flow Diagram of Order Entry System



Hardware Choices Make Possible Multiple System Configurations



Alternatives Selected for Detailed Study

Alternative	Input	Order Log	Customer Credit File	Accepted & Rejected Orders File	Completed Orders File	Rejected Orders Notice
1.	Scanner	Magnetic tape	Magnetic tape	Magnetic tape	Magnetic tape	Printer
2.	Keyboard terminal	Magnetic tape	Magnetic tape	Magnetic tape	Magnetic tape	Printer
3.	Keyboard terminal	Magnetic tape	Magnetic tape	Magnetic tape	Magnetic tape	Hardcopy terminal

Design Phase (cont.)

3. Evaluate configurations
4. Select best configuration
5. Prepare implementation proposal
6. Approve or disapprove the system implementation

Outline of an Implementation Proposal

1. Executive summary
2. Introduction
3. Problem definition
4. System objectives and constraints
5. Performance criteria
6. System design
    - 6.1 Summary description
    - 6.2 Equipment configuration
7. The recommended implementation project
    - 7.1 Tasks to be performed
    - 7.2 Human resource requirements
    - 7.3 Schedule of work
    - 7.4 Estimated cost
8. Expected impact of the system
    - 8.1 Impact on the firm's organization structure
    - 8.2 Impact on the firm's operations
    - 8.3 Impact on the firms resources
9. General implementation plan
10. Summary

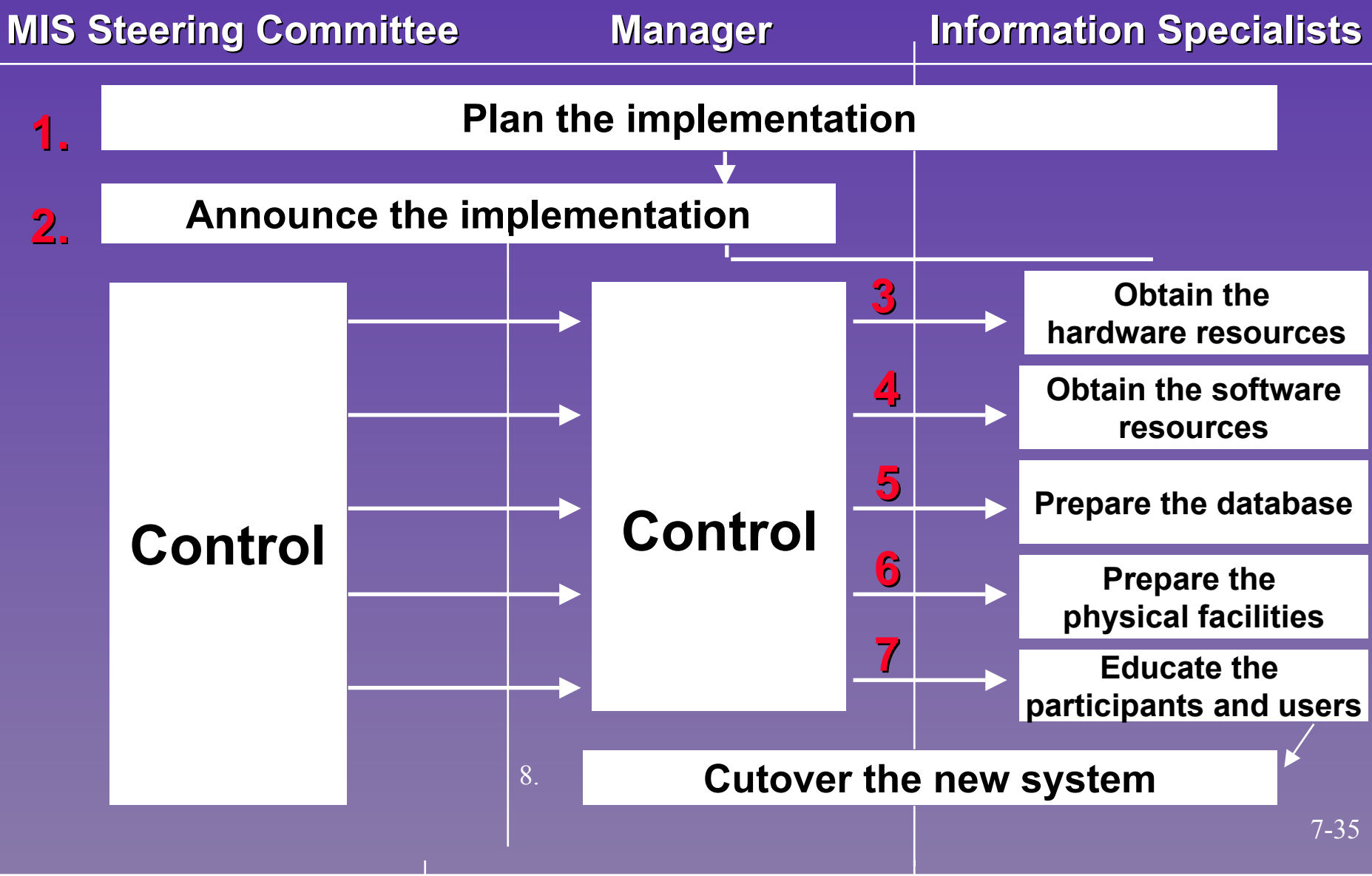
Implementation Phase

- Acquire and integrate the physical and conceptual resources to produce a working system

Steps for the Implementation Phase

1. Plan implementation
2. Announce
3. Obtain hardware resources
   RFP / Written Proposals
4. Obtain software resources
   "Make or buy"
5. Prepare database
6. Prepare physical facilities
7. Educate participants and users
8. Prepare cutover proposal
9. Approve or disapprove cutover to new systsem
10. Cutover to new system

The Implementation Phase



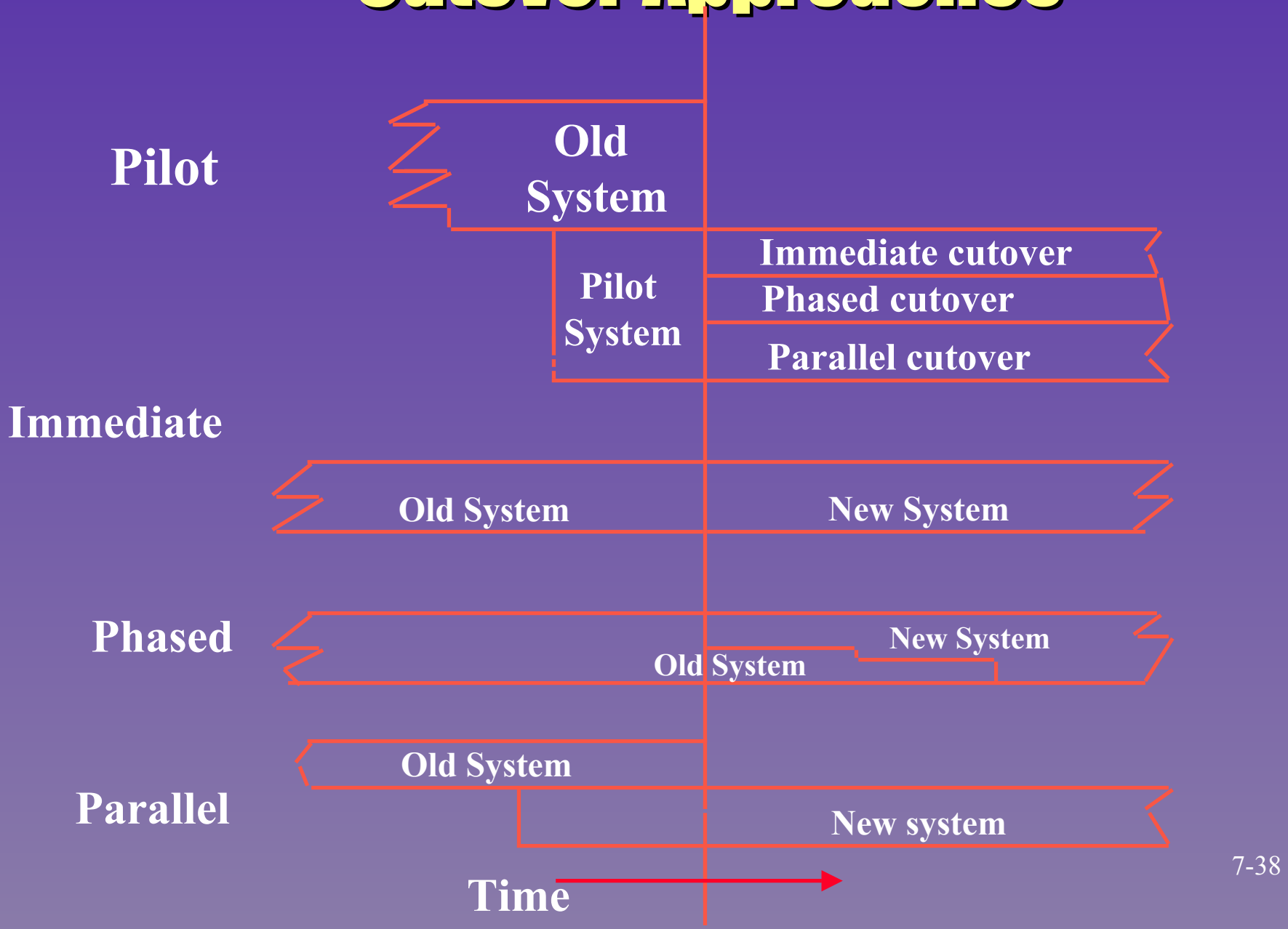
Outline of a Request for Proposal

1. Letter of transmittal
2. System objective and applicable constraints
3. System design
    - 3.1 Summary description
    - 3.2 Performance criteria
    - 3.3 Equipment configuration
    - 3.4 Summary system documentation
    - 3.5 Estimated transaction volume
    - 3.6 Estimated file size
4. Installation schedule

Outline of Supplier Proposal

1. Letter of transmittal
2. Summary of recommendations
3. Advantages
4. Equipment configuration
5. Equipment specifications
    - 5.1 Performance data
    - 5.2 Prices
6. Satisfaction and performance criteria
7. Delivery schedule

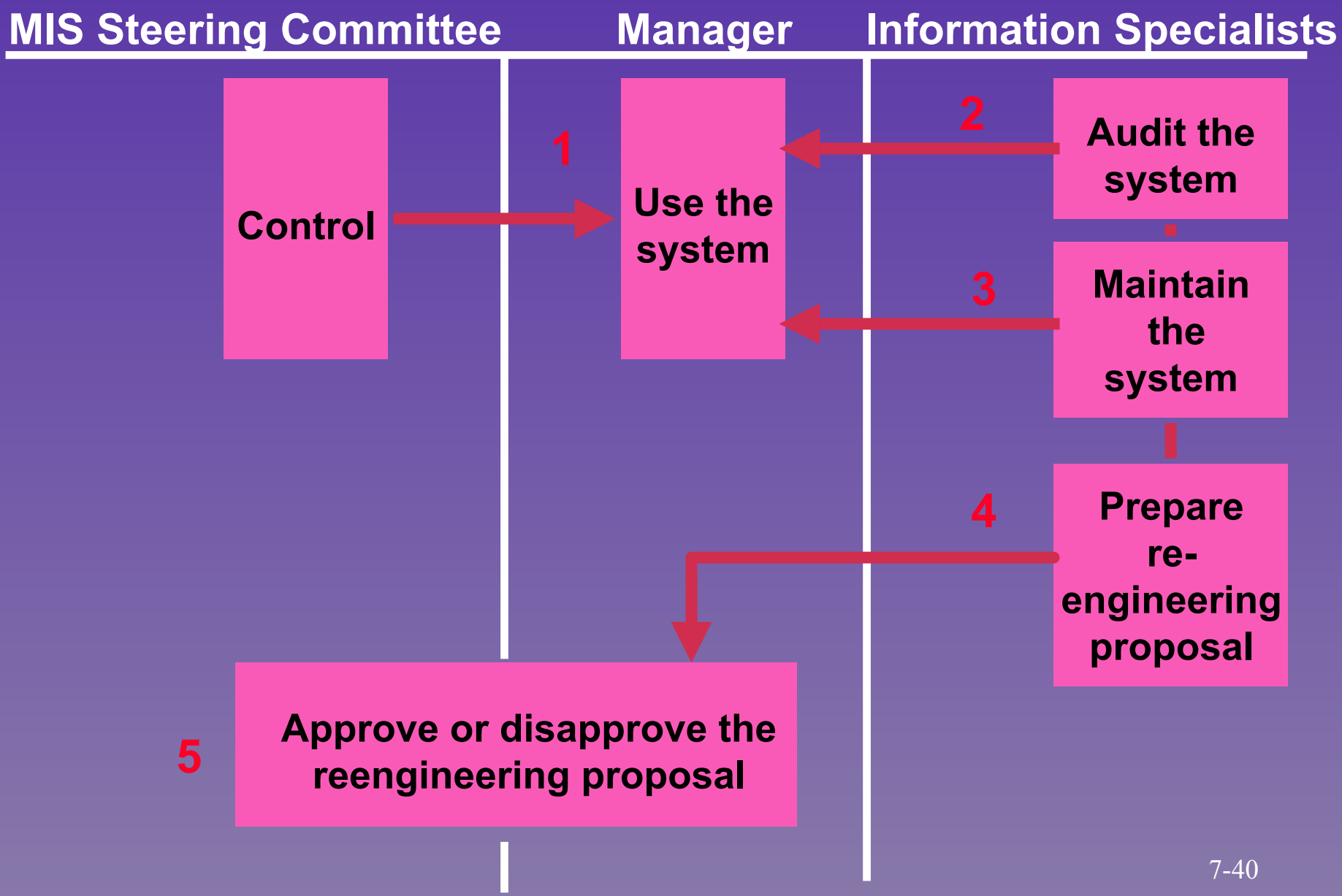
Cutover Approaches



Use Phase

1. Use
2. Audit (post implementation review)
   - » By information specialist(s)
   - » By internal auditor (a different one from the project team member)
3. Maintain the system
   - » Correct errors
   - » Keep current
   - » Improve
4. Prepare reengineering proposal
5. Approve or disapprove reengineering

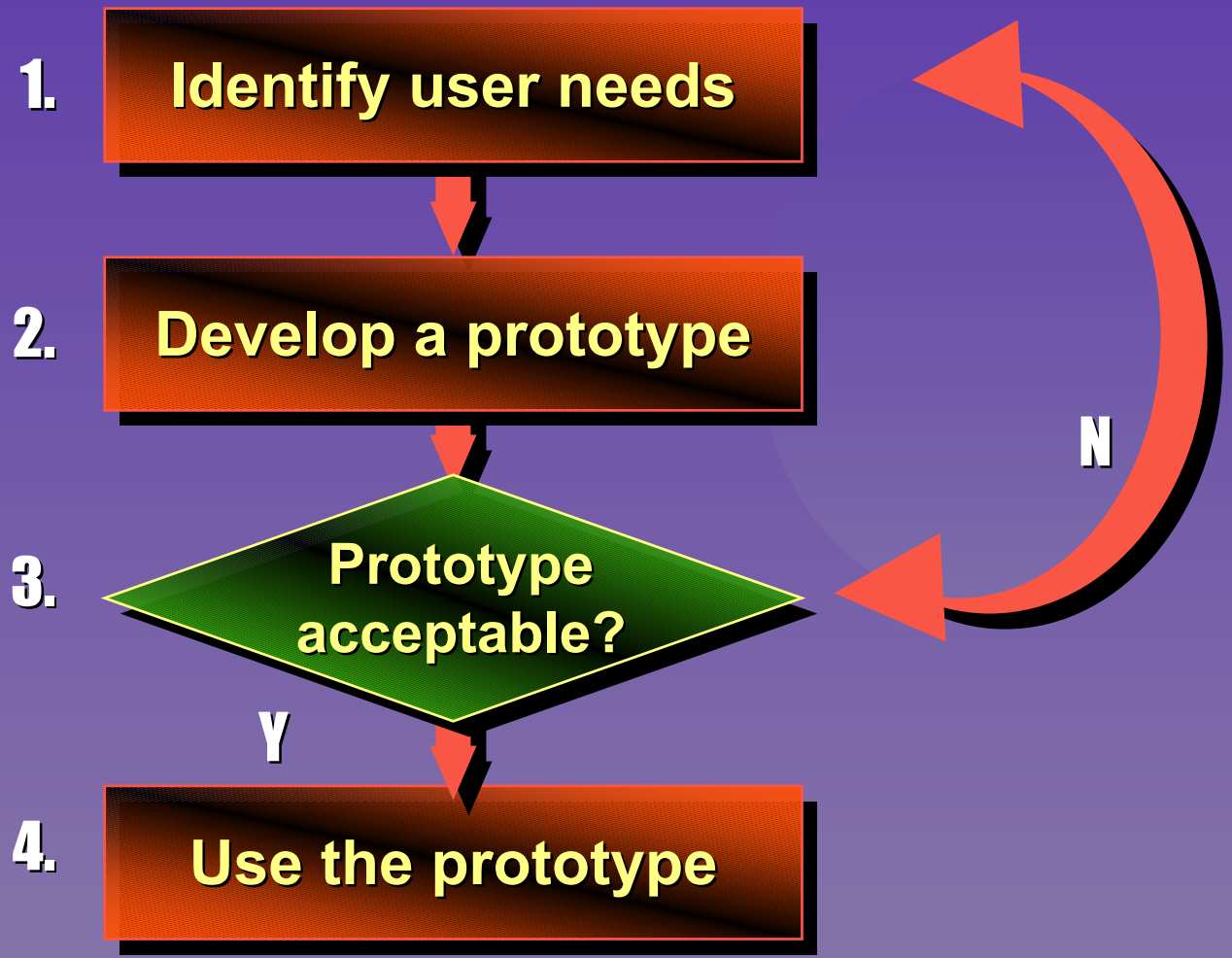
The Use Phase



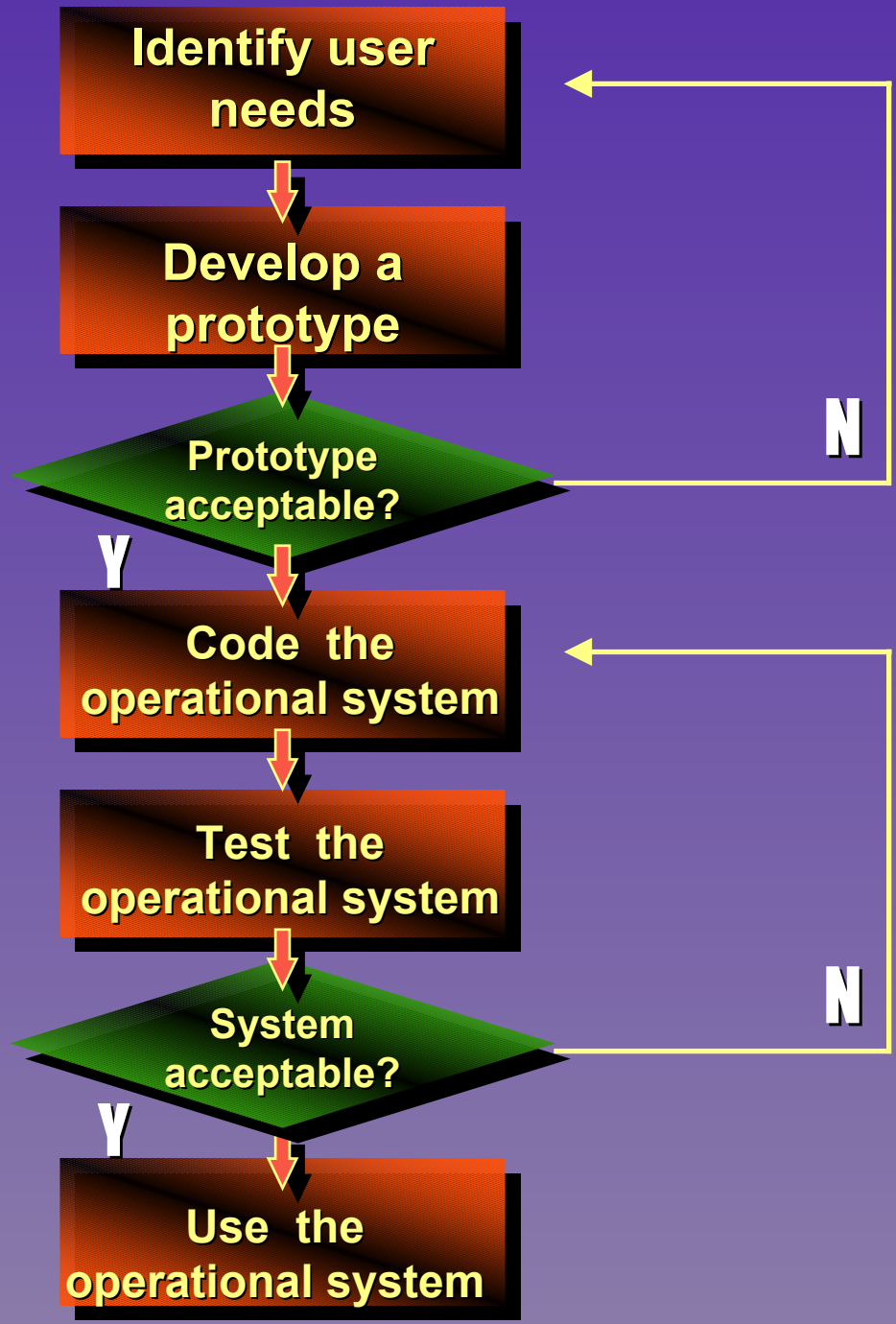
Prototyping

- Type I -- Becomes operational system
- Type II -- Serves as a blueprint

Development of a Type I Prototype



Development of a Type II Prototype



The Attraction of Prototyping

- Communications between the systems analyst and user are improved.
- The analyst can do a better job of determining the user's needs.
- The user plays a more active role in system development.
- The information specialists and the user spend less time and effort in developing the system.
- Implementation is much easier because the user knows what to expect.

Potential Pitfalls of Prototyping

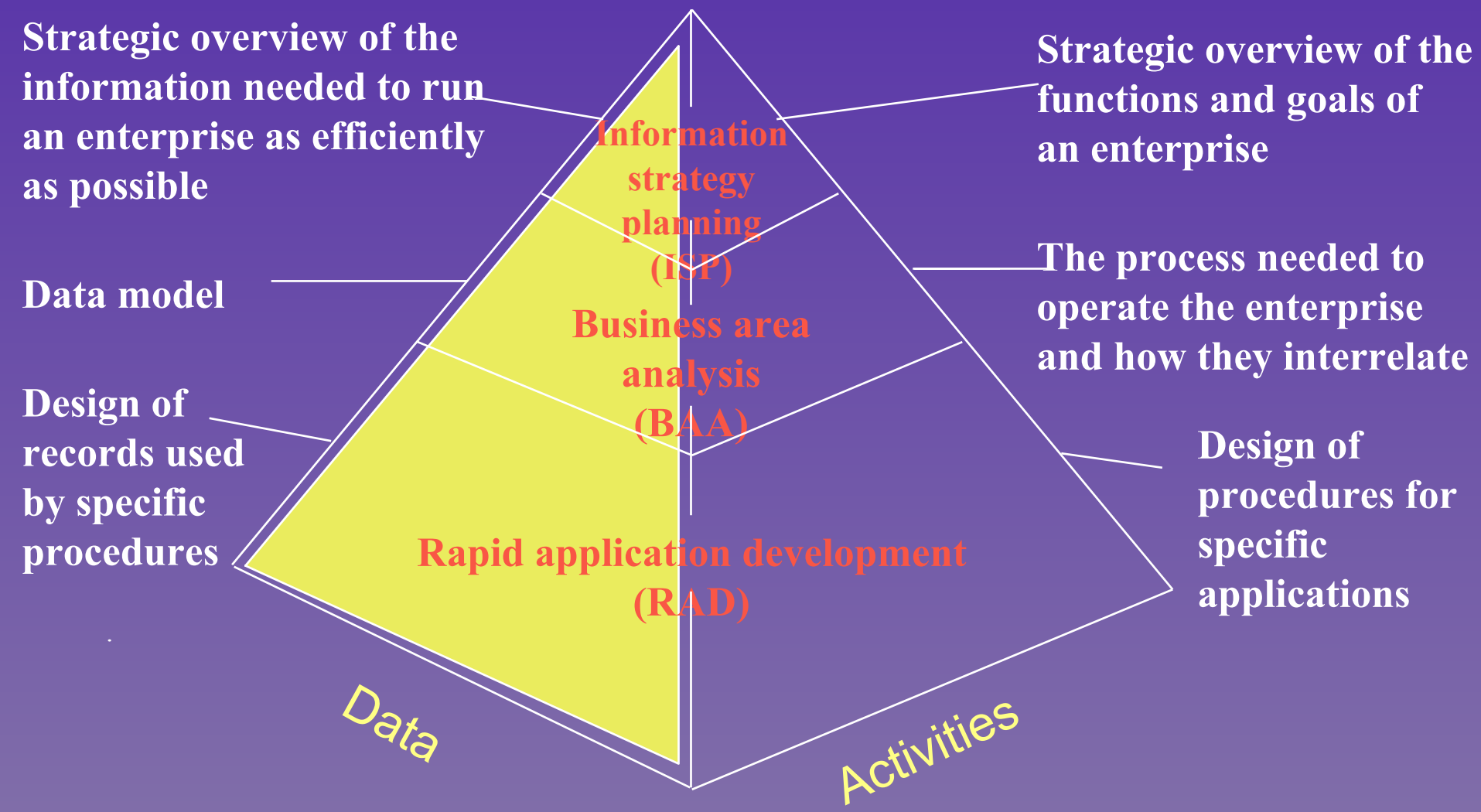
- The haste to deliver the prototype may produce shortcuts in problem definition, alternative evaluation, and documentation.
- The users may get so exited about the prototype that they have unrealistic expectations of the operational system.
- Type I prototypes might not be as efficient as systems coded in a programming language.
- The computer-human interface provided by certain prototyping tools may not reflect good design techniques.

Applications That Are Good Prospects for Prototyping

- High risk
- Considerable user interaction
- Large number of users
- A need for quick delivery
- An expected short use phase of the system
- An innovative system
- Unpredictable user behavior

Rapid Application Development (RAD)

- Information engineering (IE)
- Key ingredients
  - Management should be experimenters or early adapters
  - Specialized teams
  - Methodologies (RAD life cycle)
  - Tools (I-CASE, 4GLs)
- RAD and the SLC are applications of the systems approach
- Tools are mainly 4th generation languages and CASE tools



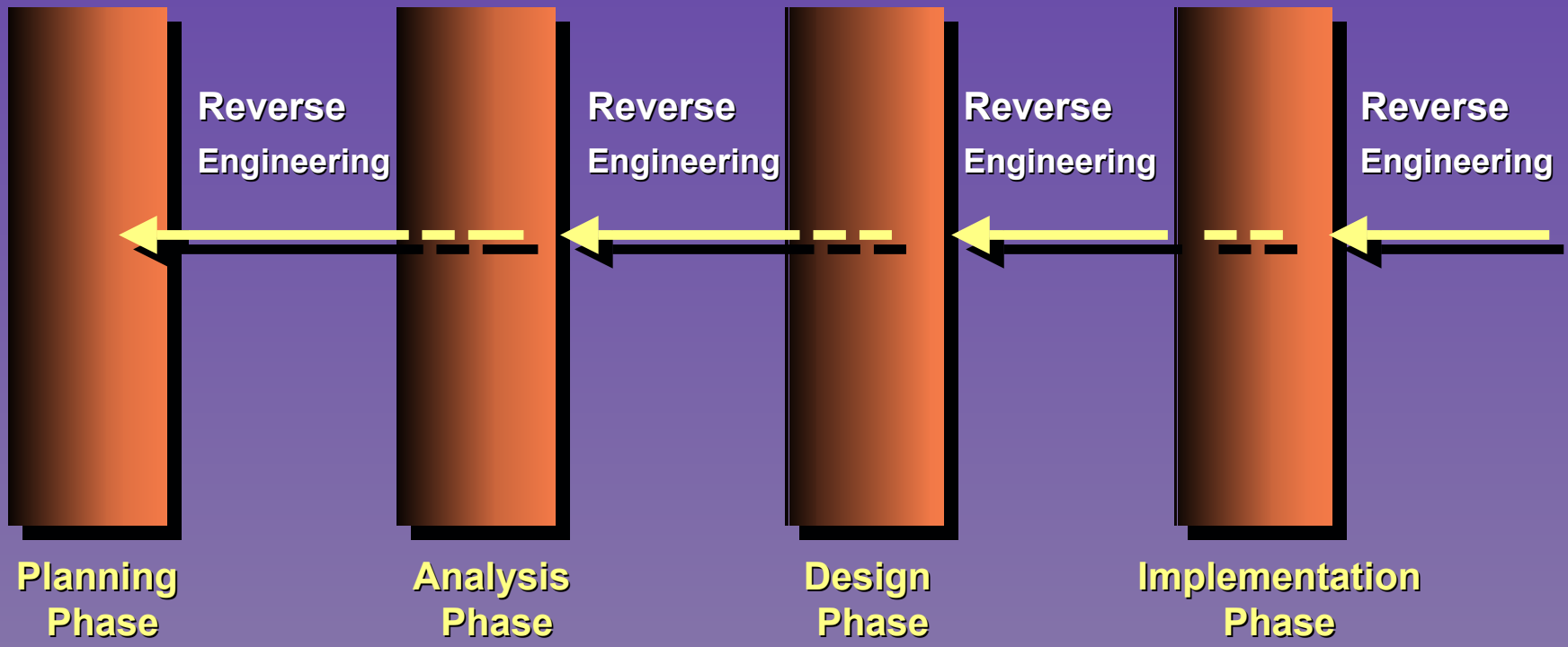
Rapid Application Development is an Integral Part of Information Engineering

Business Process Redesign (BPR)

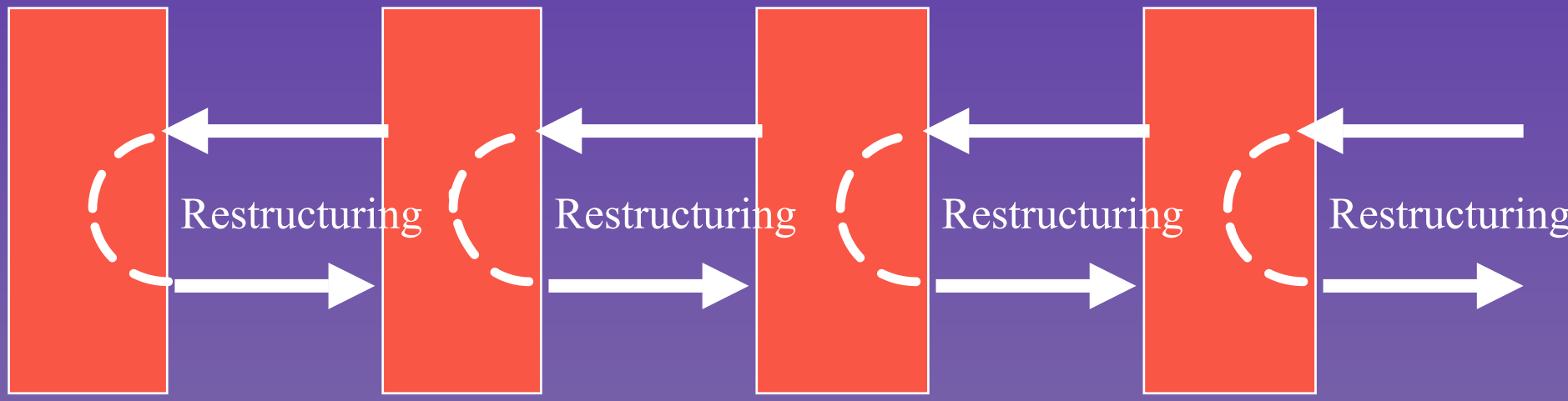
- Often used to react to systems that can no longer function adequately in the current business environment of the firm (legacy systems fall into this category)
- Three techniques for business process redesign are
  1) reverse engineering
  2) restructuring
  3) reengineering

Reverse Engineering

Reverse Engineering Produces Documentation on Successively Higher Levels but Leaves the System Unchanged



Restructuring



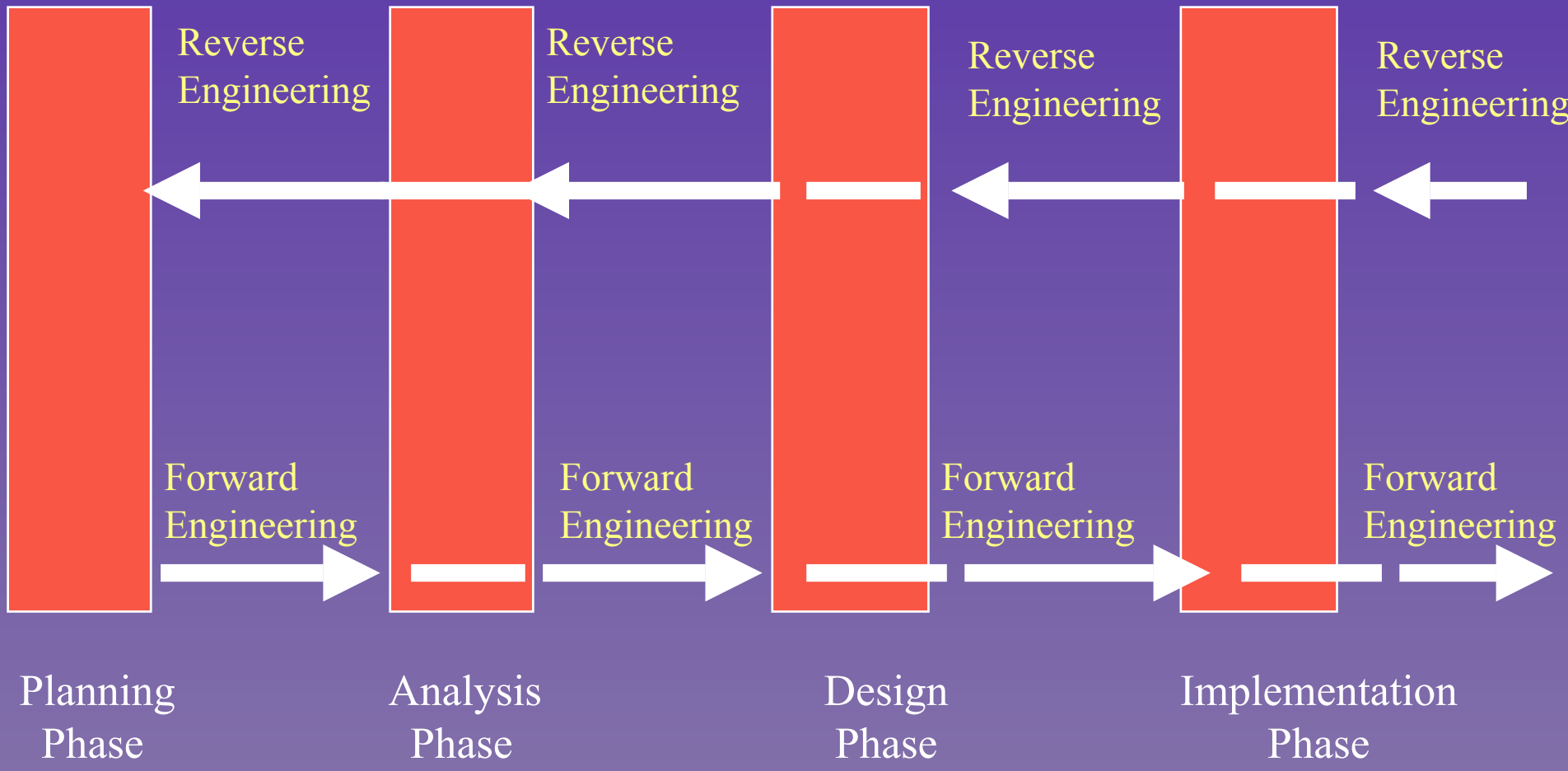
Planning Phase

Analysis Phase

Design Phase

Implementation Phase

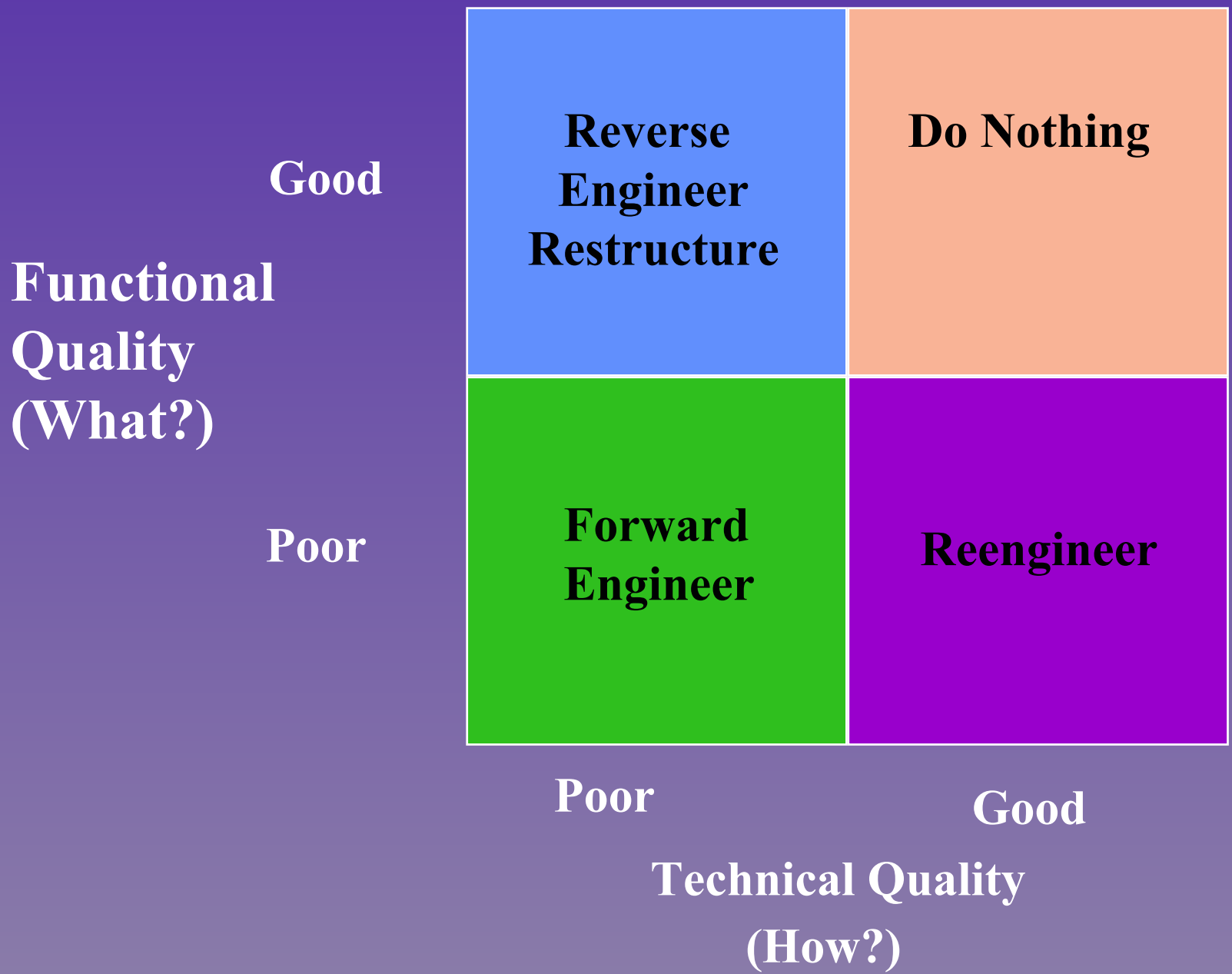
Reengineering



Selection of BPR Components

- Based upon functional quality
  - What the system does
- Based upon technical quality
  - How the system does its job
- The relationship between these two characteristics suggest which BPR technique would be appropriate

Selection of BPR Components



SLC, Prototyping, RAD, and BPR in Perspective

- SLC, prototyping, and RAD are all methodologies
  - Recommended ways of implementing a computer-based system
- BPR revamps systems that were implemented with computer technology that has become obsolete

Summary

- System Life Cycle
  - Planning
  - Analysis
  - Design
  - Implementation
  - Use
- Cycle management responsibility
- Other methodologies