MANAGEMENT INFORMATION SYSTEMS 8/E

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Chapter 6

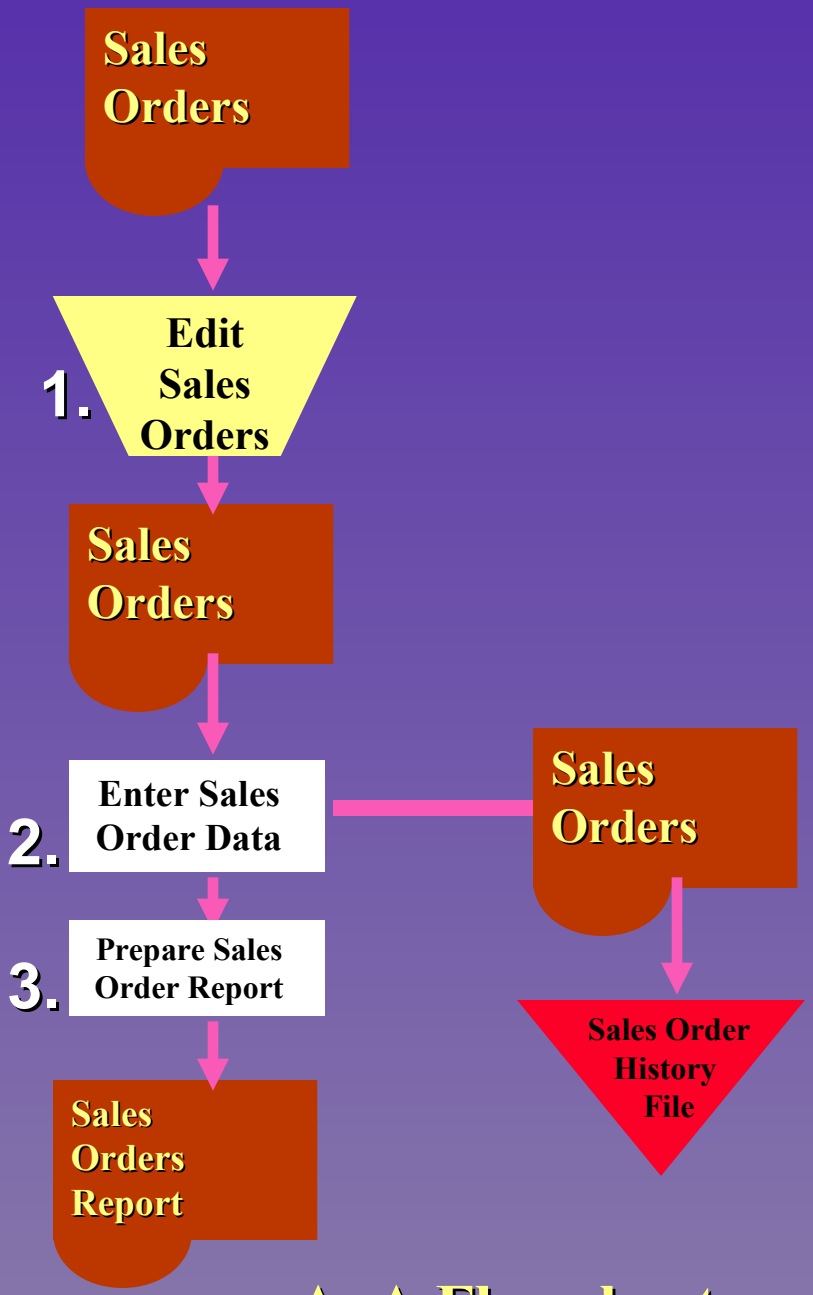
Systems Concepts

Four Model Types

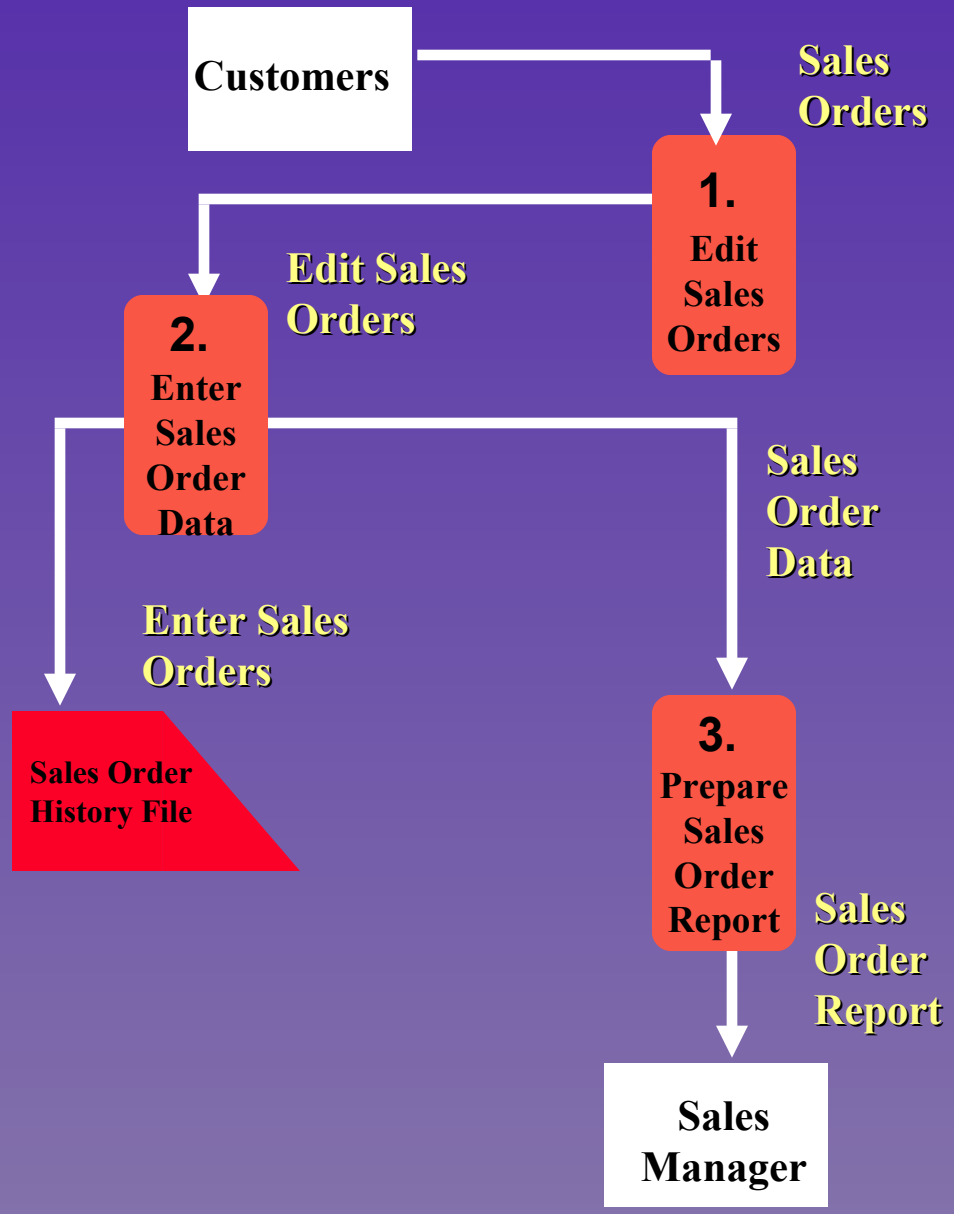
1) Physical models
   - Three dimensional representation such as a scale model
2) Narrative models
   - Spoken or written
3) Graphic models
   - Abstraction of lines, symbols, or shapes
4) Mathematical models
   - Equation(s)

$$EOQ = \sqrt{\frac{2PS}{M}}$$

A Graphic Model of the Economic Order Quantity Concept



A. A Flowchart



B. A Data Flow Diagram

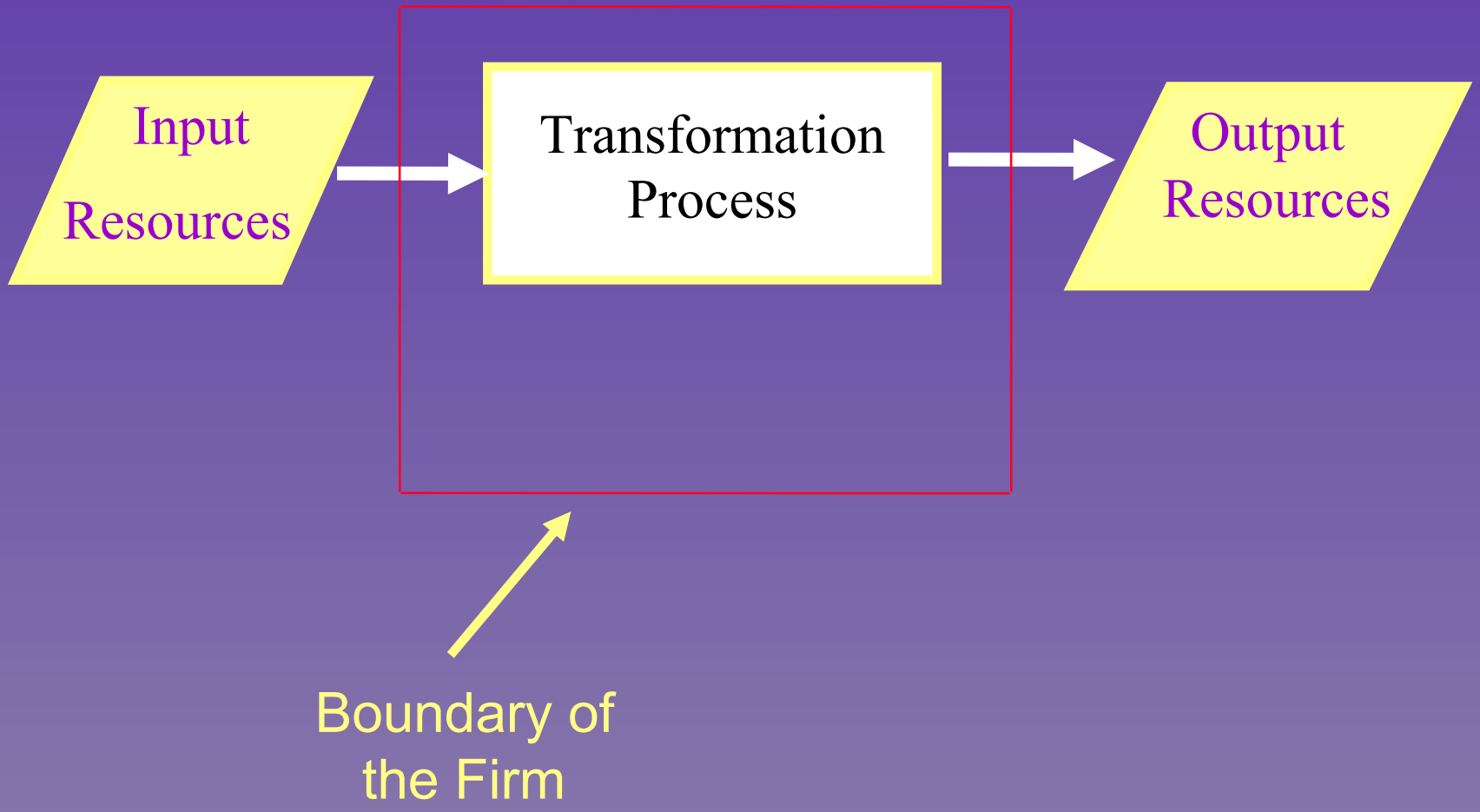
Uses of Models

- All four models facilitate understanding and communication.
- The mathematical model also helps predict the future.

The General Systems Model

- Graphic diagram with an accompanying narrative that depicts all organizations in a general way using a systems framework
- The Physical System
  - Material flow
  - Personnel flow
  - Machine flow
  - Money flow

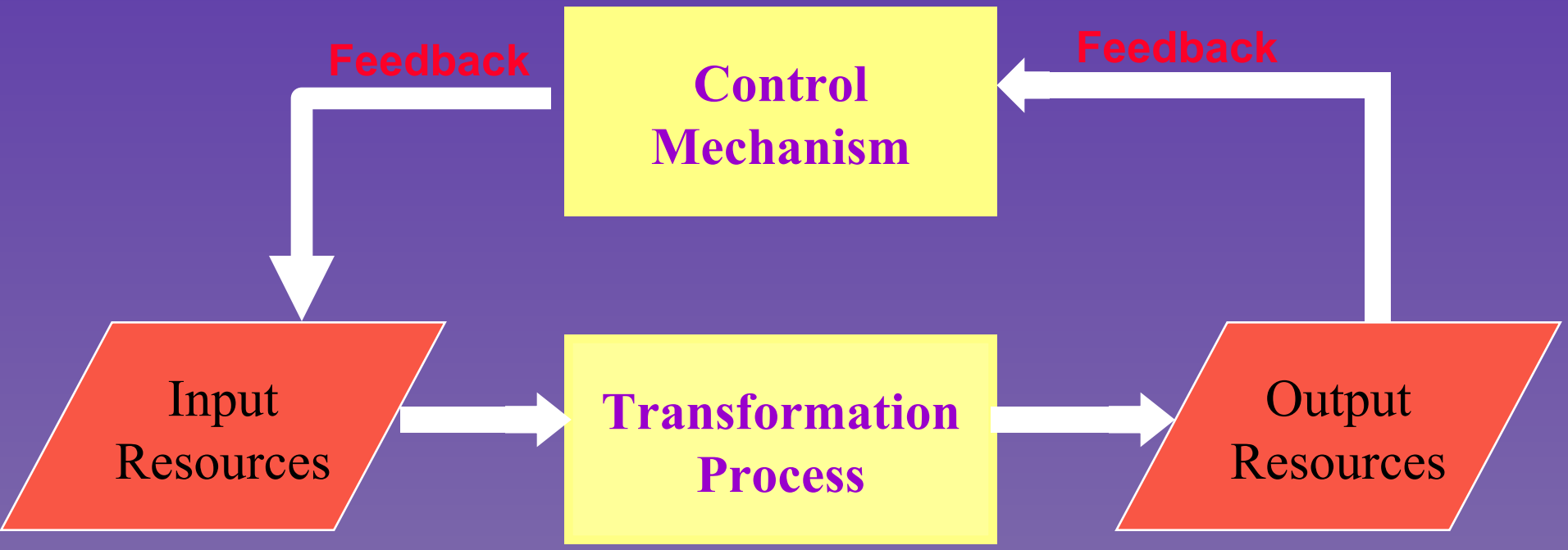
The Physical System of the Firm



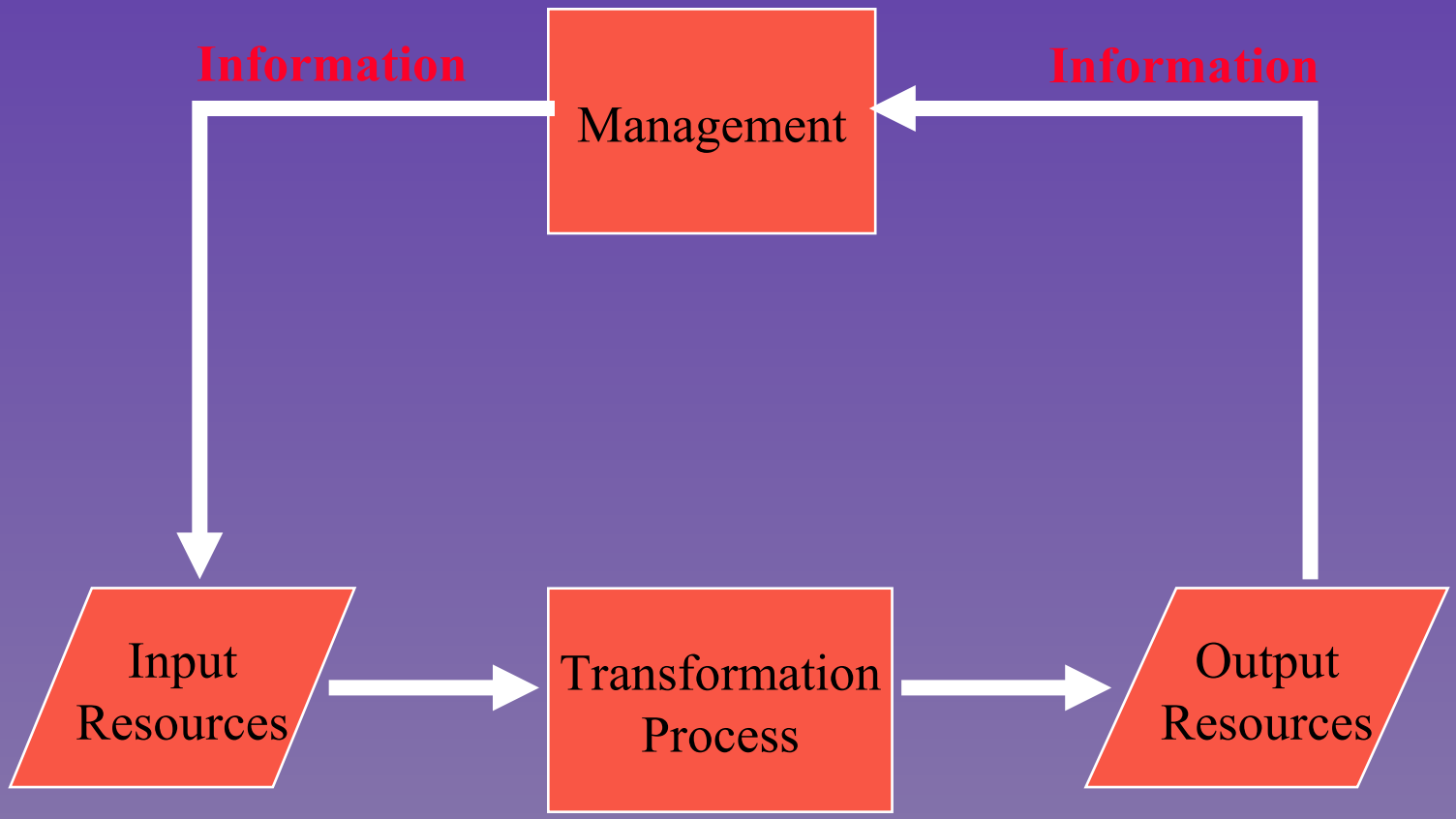
The Conceptual System

- Open-loop systems
- Closed-loop systems (feedback loop)
- Management control
- The information processor

A Closed-Loop System



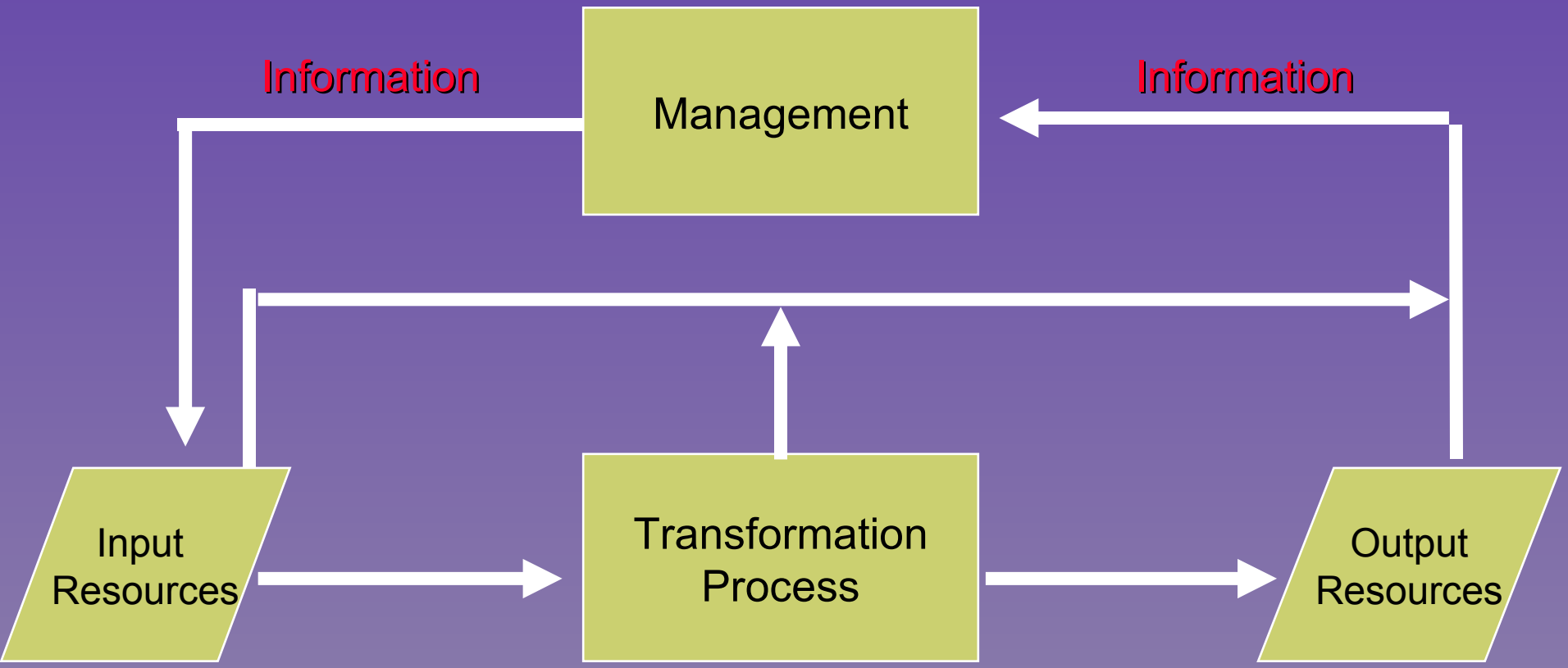
The Physical System of the Firm as a Controlled System



A Sales Report of Fast-Moving Products

Item Number	Item Description	Year-to-Date Sales Volume	% of Total Year-to-Date Sales
400293	BRAKE PIPE	$1,702.93	.068
319421	DOOR HANDLE GASKET	1,624.00	.065
786402	CLUTCH DRIVEN PLATE	1,403.97	.056
190796	CARPET SNAP	1,102.00	.044
001007	SPARK PLUG	1,010.79	.040
739792	HOSE CLIP	949.20	.038
722210	RUBBER PLUG	946.73	.038
410615	UPPER DOOR HINGE	938.40	.038
963214	REAR TUBE SHOCK	922.19	.037
000123	NEEDLE VALVE	919.26	.037
	Totals	$11,519.47	.461

Information is Gathered from All of the Physical System Elements



Supplier Analysis Report

Item Number: 410615
Item Description: Upper Door Hinge

SUPPLIER NUMBER	NAME	LAST DATE	P.O. #	QTY.	UNIT PRICE	DAYS TO RECEIPT	PCT. REJECTS
3062	CARTER & SONS	7/12	1048-10	360	$8.75	12	.00
4189	PACIFIC MACHINING	4/13	962-10	350	9.10	08	.02
0140	A.B. MERRIL	1/04	550-10	350	8.12	03	.00
2111	BAY AREA	8/19	1196-10	360	11.60	19	.04

A Job Status Report Provides Information about the Transformation Process

Job Number: 84-182
Customer: Wankel Automotive

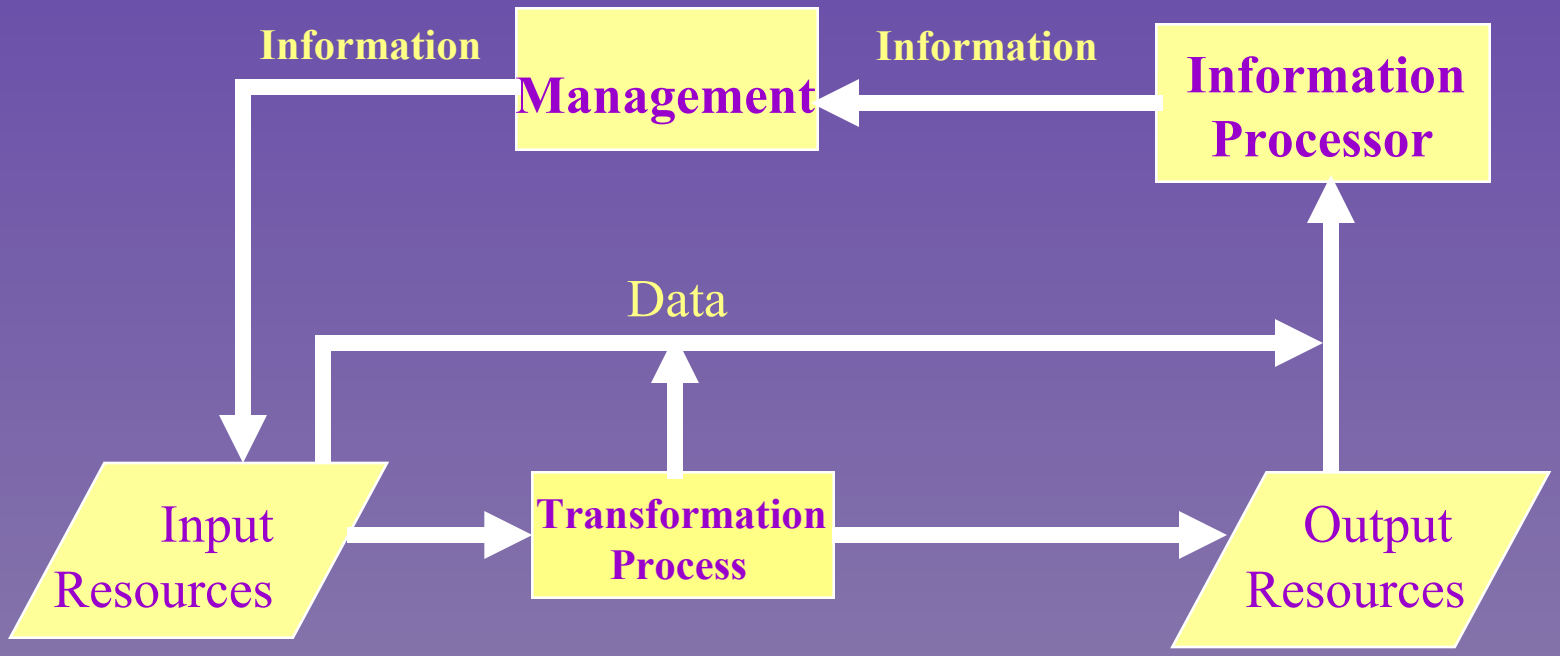
CURRENT STATUS

- Step 4-weld supports to frame
- Department 410-Welding
- Date and Time Begun-10/8; 10:15A
- Projected Job Completion-10/14; 9:30A

NEXT PROCESS

- Step 5-paint frame
- Department 632-Paint

The Information Processor Transforms Data into Information



Conceptual System (cont.)

- Dimensions of Information
  - Relevancy
  - Accuracy
  - Timeliness
  - Completeness

Too Much Information is called ‘Information Overload’

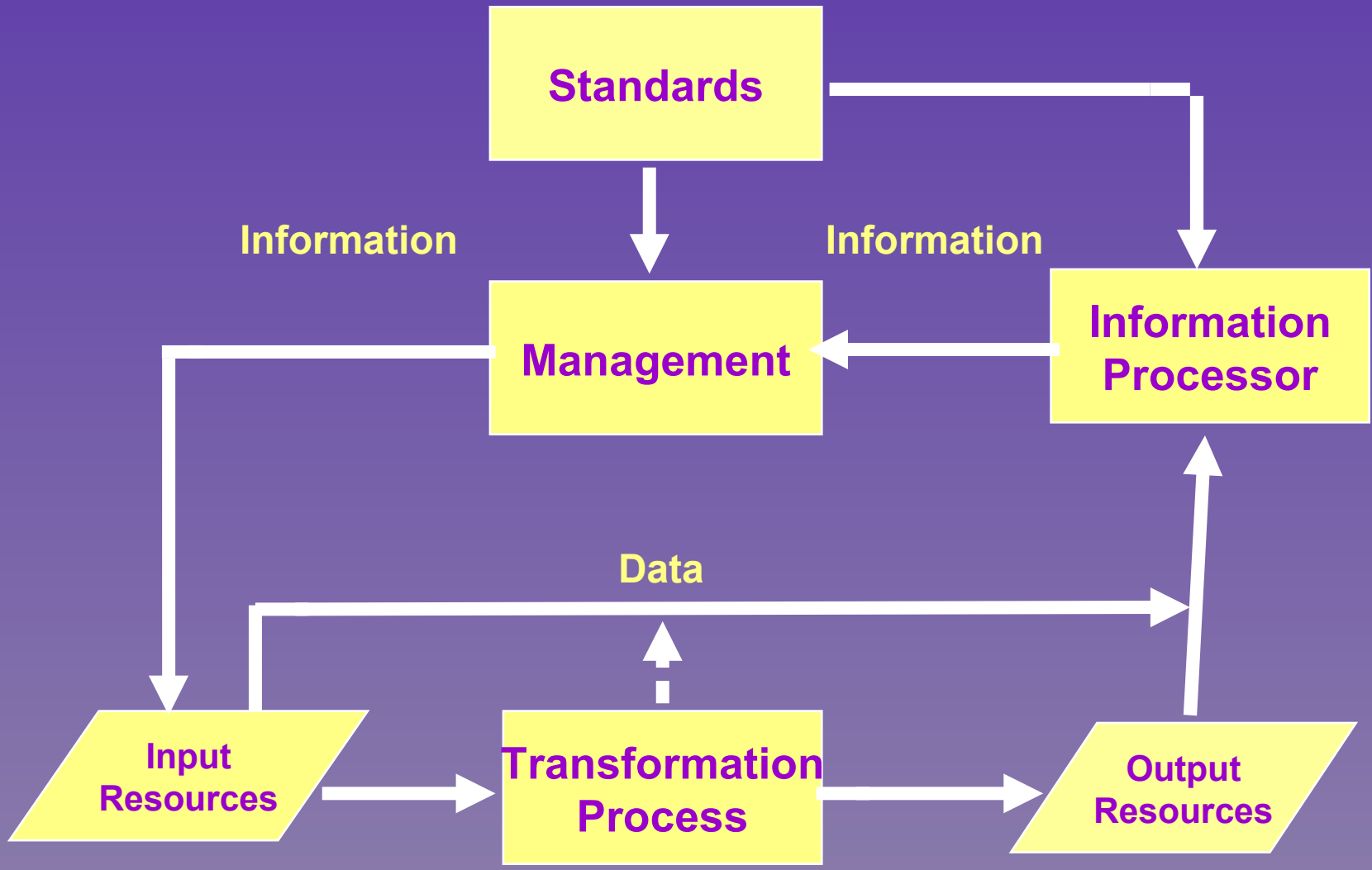
Conceptual System (cont.)

- Standards
  - Measure of acceptable performance
  - Usually stated in specific terms
  - Used to control physical system
  - Consists of:
    - » Management
    - » Information processor
    - » Standards
- Objectives
  - Overall goal that a system is to obtain
  - Systems have one or more objectives

A Comparison of Objectives and Standards

Objectives	Standards of Performance
Satisfy Customer Needs	Achieve an annual sales volume of at least $25 million
	Maintain a 20% share of the market
	Maintain an annual growth rate of 15%
Produce a return on investment for the owners	Pay dividends to stockholders each quarter
	Maintain the price of the firm's common stock above $85 per share
Operate efficiently	Realize an after-tax profit of 15% of sales
	Maintain a record of accident-free days
	Keep employee turnover below 10%
Invest in the future	Invest in a minimum of 15% of sales revenue in research and development
Develop sources of supply	Achieve stockout on no more than 2% of the items in inventory during the year
	Keep the number of backorders to less than 5% of all orders processed
	Have no plant shutdowns due to unavailable materials
Operate ethically	Have no legal actions filed against the firm by customers, suppliers, and the government

Performance Standards are Made Available to Both Management and the Information Processor



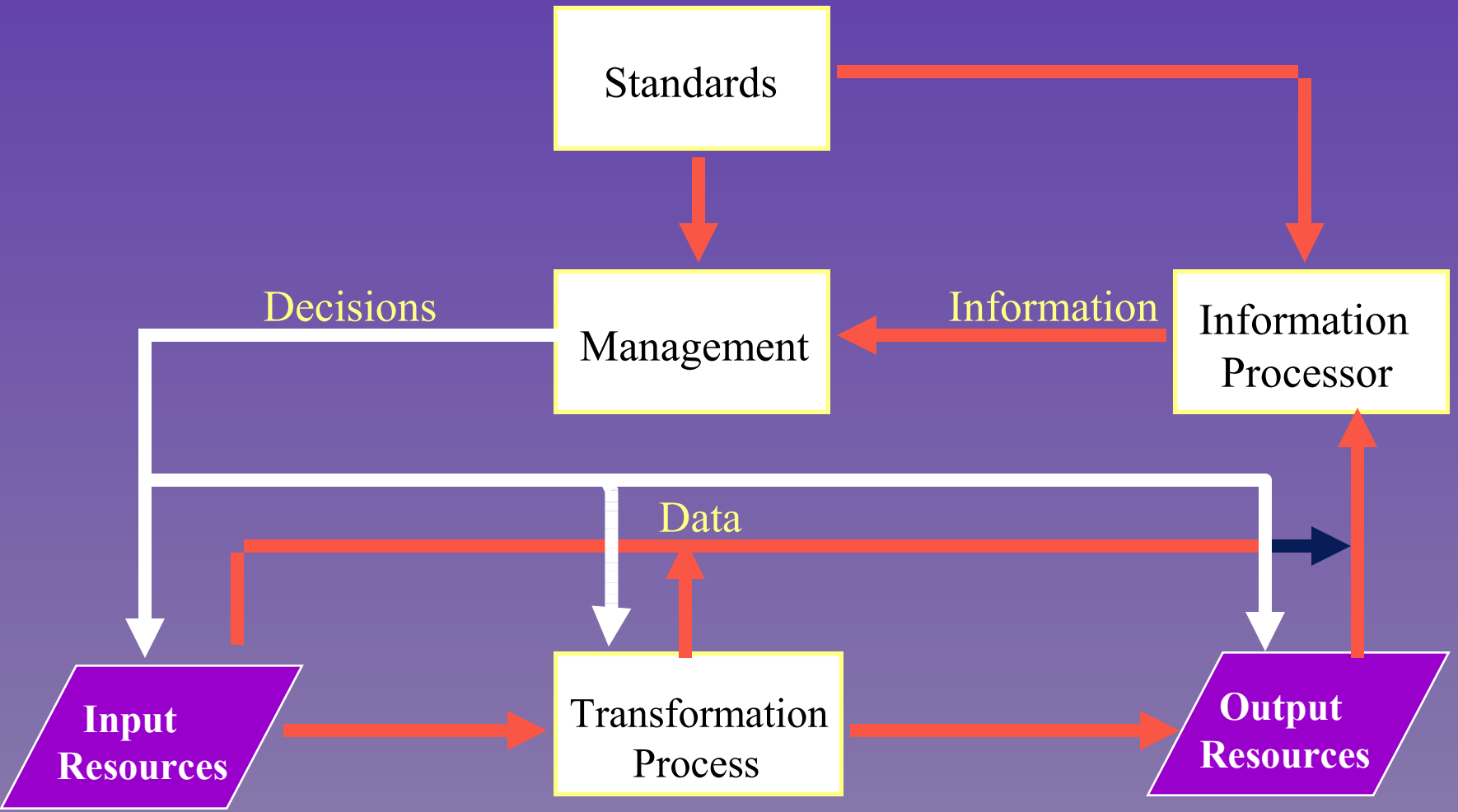
Conceptual System (cont.)

- Management by exception
  - Compares standards with information output of system
  - Manager becomes involved when system falls outside range of acceptable performance
  - Capability provided by CBIS

Conceptual System (cont.)

- Critical Success Factors (CSFs)
  - A CSF is one of the firm's activities that has a strong influence on the firm's ability to meet its objectives
  - Firms have multiple CSFs
  - CSFs focuses attention on a portion of a firm's activities

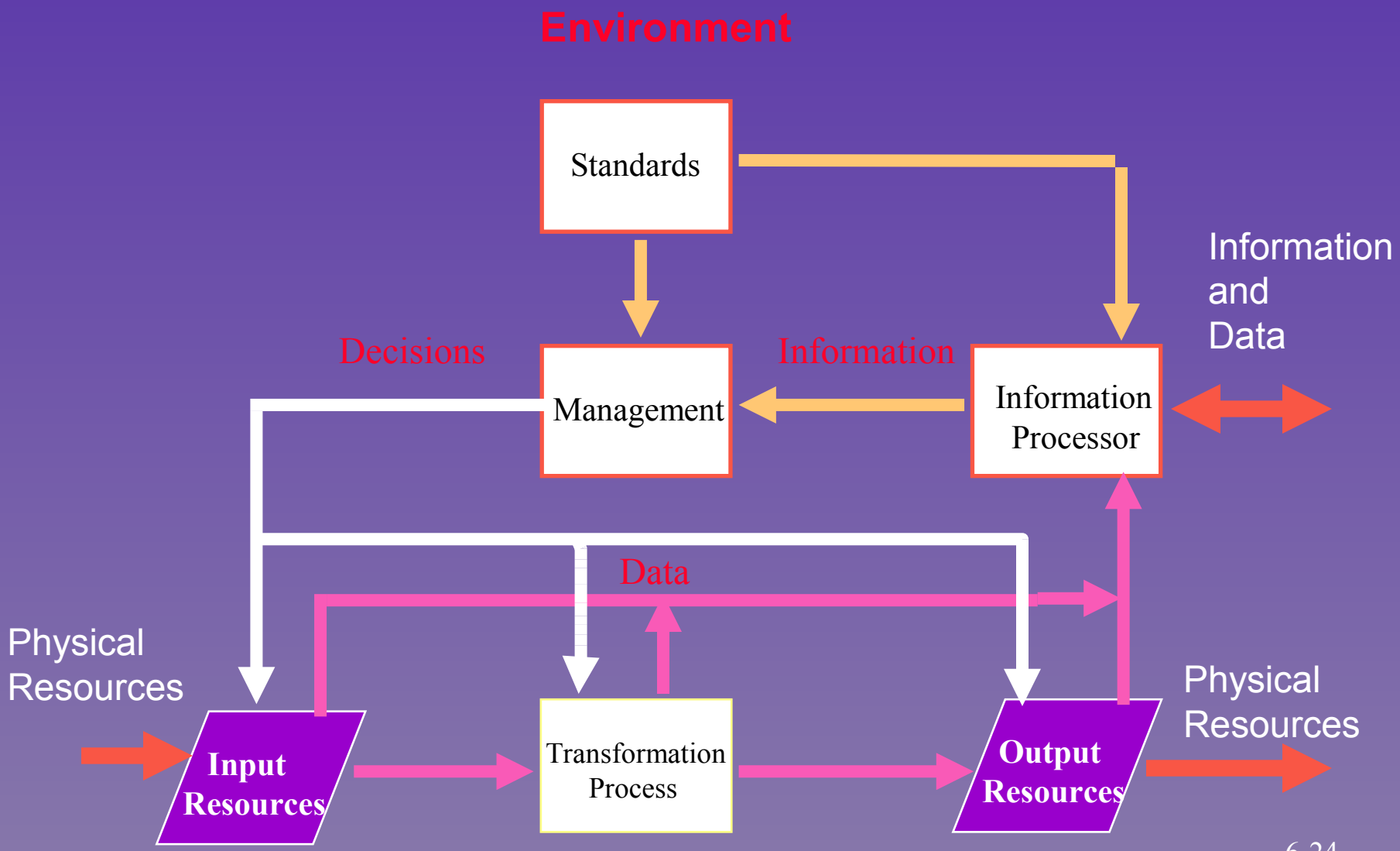
Changes are Made in the Physical System Through the Decision Flow



Conceptual System (cont.)

- Decision Flow
  - Data is transformed into information by the information processor
  - Manager transforms information into decisions

The General Systems Model of the Firm



General Systems Model in Context

- Helps adjust firm
- Provides a sense of stability
- Provides mental picture of what to expect

Problems -- Good and Bad

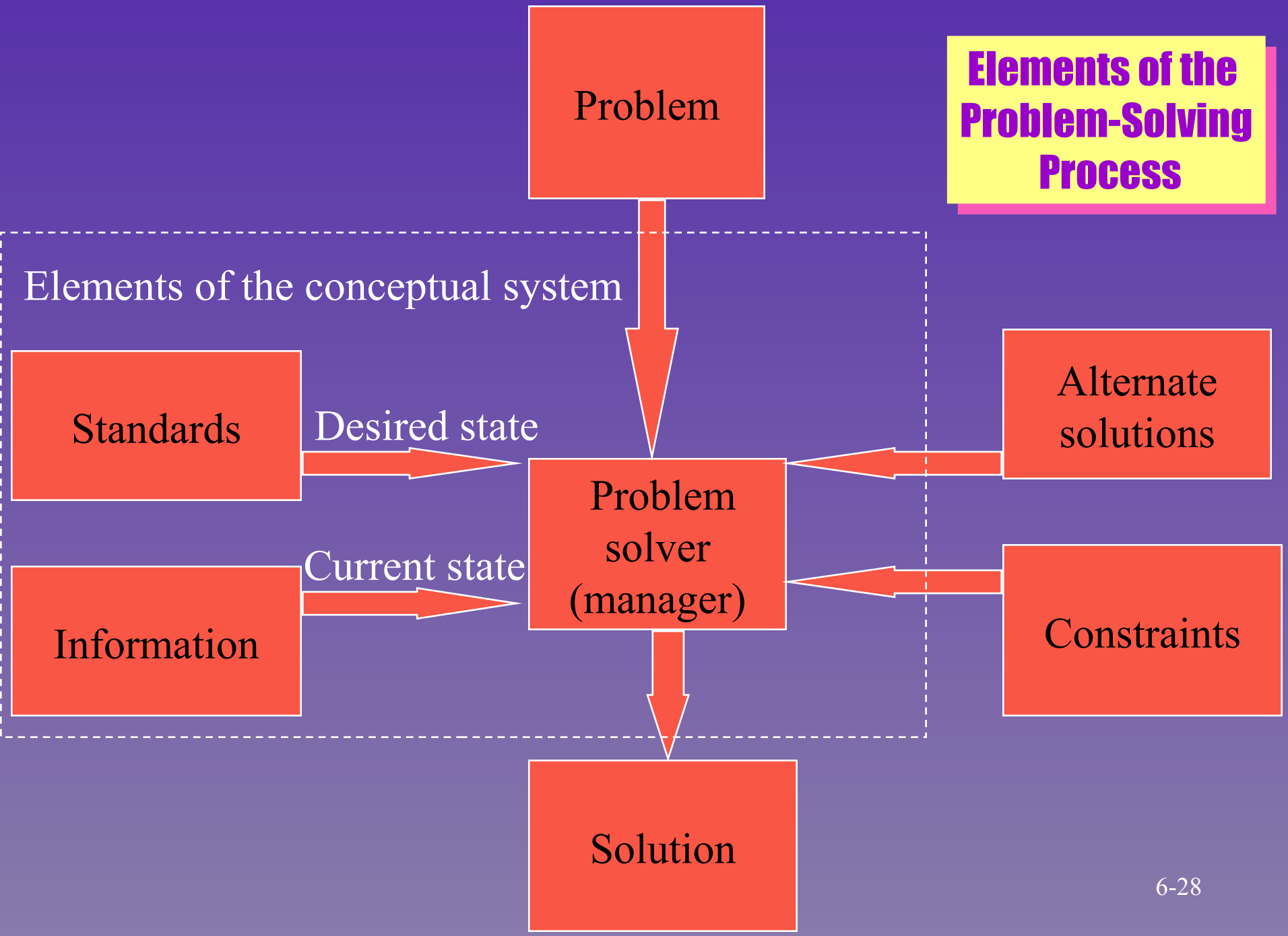
- Problem solving
  - Suppress harmful effects
  - Capitalize on opportunity for benefit
- Decision
  - The act of selecting a strategy or action

Elements of Problem Solving

- Desired state
- Current state
- Constraints
  - Internal -- limited resources
  - Environmental -- pressures to restrict resource flows

} Difference = Solution Criterion

Elements of the Problem-Solving Process



Problems versus Symptoms

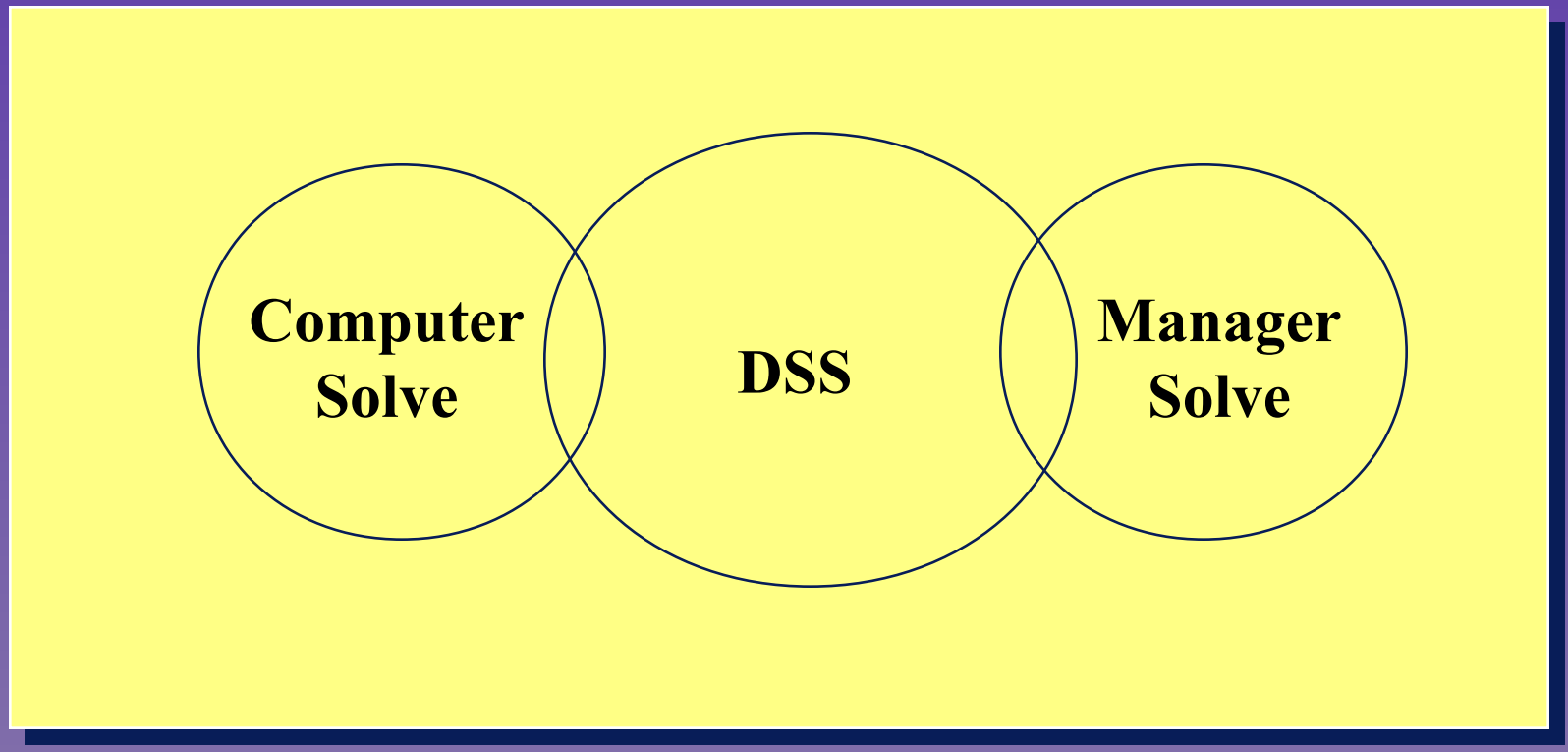
Know the difference

- Symptoms are produced by the problem
- The problem causes the symptoms
- When the problem is corrected the symptoms will cease, but not vice versa

Problem Structure

- Structured
  - Elements and relationships understood
- Unstructured
  - No elements or relationships understood
- Semistructured
  - Some elements understood
- DSS concept of managers and the computer working jointly towards a solution

Problem Structure



Structured Semi-structured Unstructured

The Systems Approach

John Dewey, 1910

Columbia philosophy professor

- 1. Recognize the controversy ⟵ Problem
- 2. Weigh alternative claims
- 3. Form a judgment ⟵ Solution

Phases and Steps of the Systems Approach

Phase I: Preparation Effort

Step 1. View the firm as a system
Step 2. Recognize the environmental system
Step 3. Identify the firm's subsystems

Phase II: Definition Effort

Step 4. Proceed from a system to a subsystem level
Step 5. Analyze system parts in a certain sequence

Phase III: Solution Effort

Step 6. Identify the alternative solutions
Step 7. Evaluate the alternative solutions
Step 8. Select the best solution
Step 9. Implement the solution
Step 10. Follow up to ensure that the solution is effective

Decisions are made at each step of the definition and solution phases

Preparation Effort

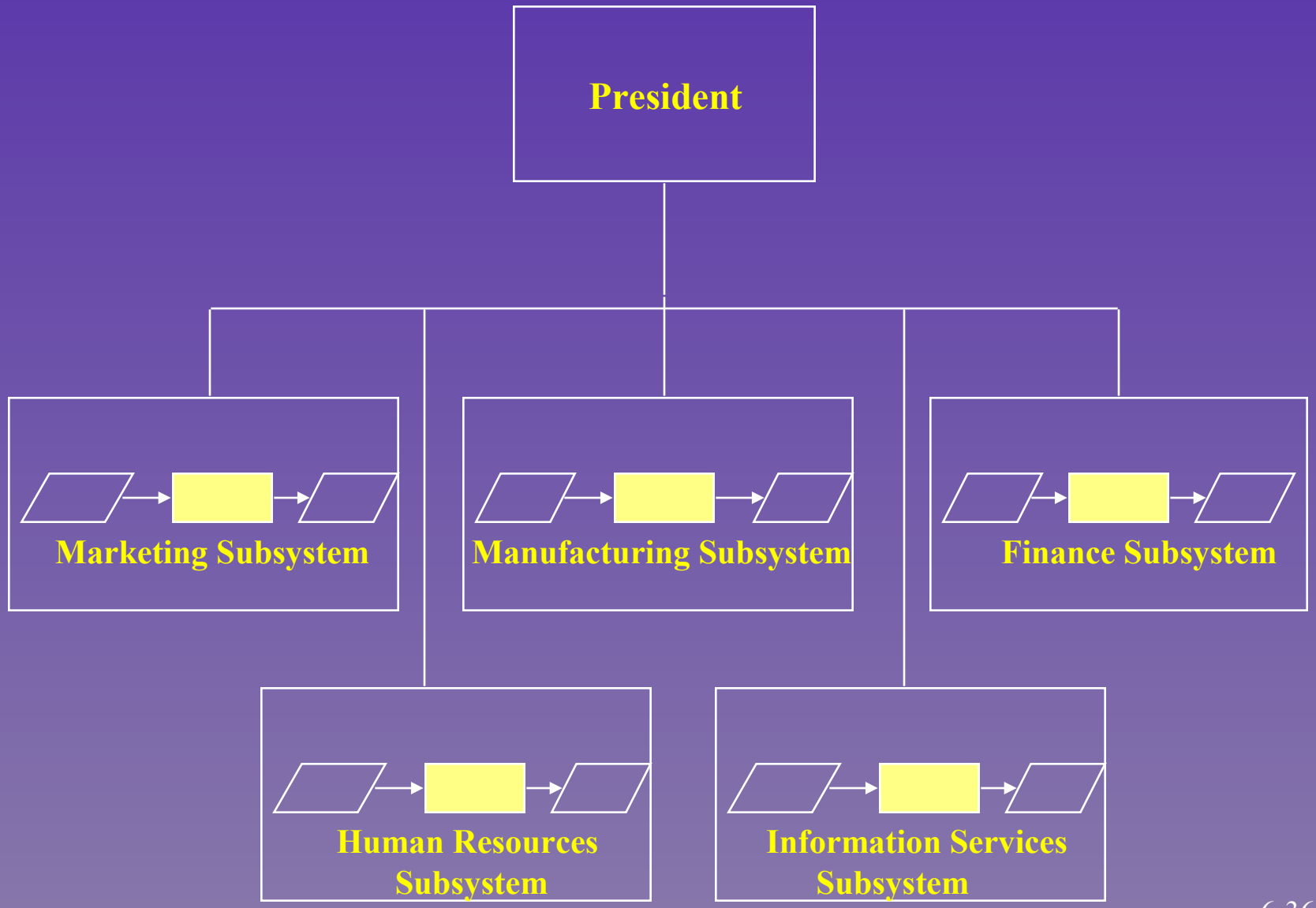
- Step 1 View the firm as a system
- Step 2 Recognize environmental system
- Step 3 Identify the firm's subsystems
  - Business areas
  - Levels of management
  - Resource flows

Steps taken in any order or at the same time

The Systems Approach Requires Decision Making

PHASE	STEP	DECISION
Definition Effort	4. Proceed from a system to a subsystem level.	Where is the problem?
	5. Analyze system parts in a certain sequence.	Do new data need to be gathered, or do data already exist? How will data be gathered? What is causing the problem?
Solution Effort	6. Identify alternative solutions.	How many alternatives should be identified? Are these alternatives feasible?
	7. Evaluate the alternative solutions.	Which criteria should be used? How does each alternative measure up to each criterion?
	8. Select the best solution.	Do all criterion have equal weight? Is there enough information to make a selection? Which alternative measures up best to the criteria?
	9. Implement the solution.	When should this solution be implemented? How should the solution be implemented?
	10. Follow up to ensure that the solution is effective.	Who should perform the evaluation? How well is the solution meeting the objectives?

Each Functional Area is a Subsystem



Something Triggers the Definition Effort

The trigger can be:

1. An action
2. The passage of time
3. From within the firm or the environment

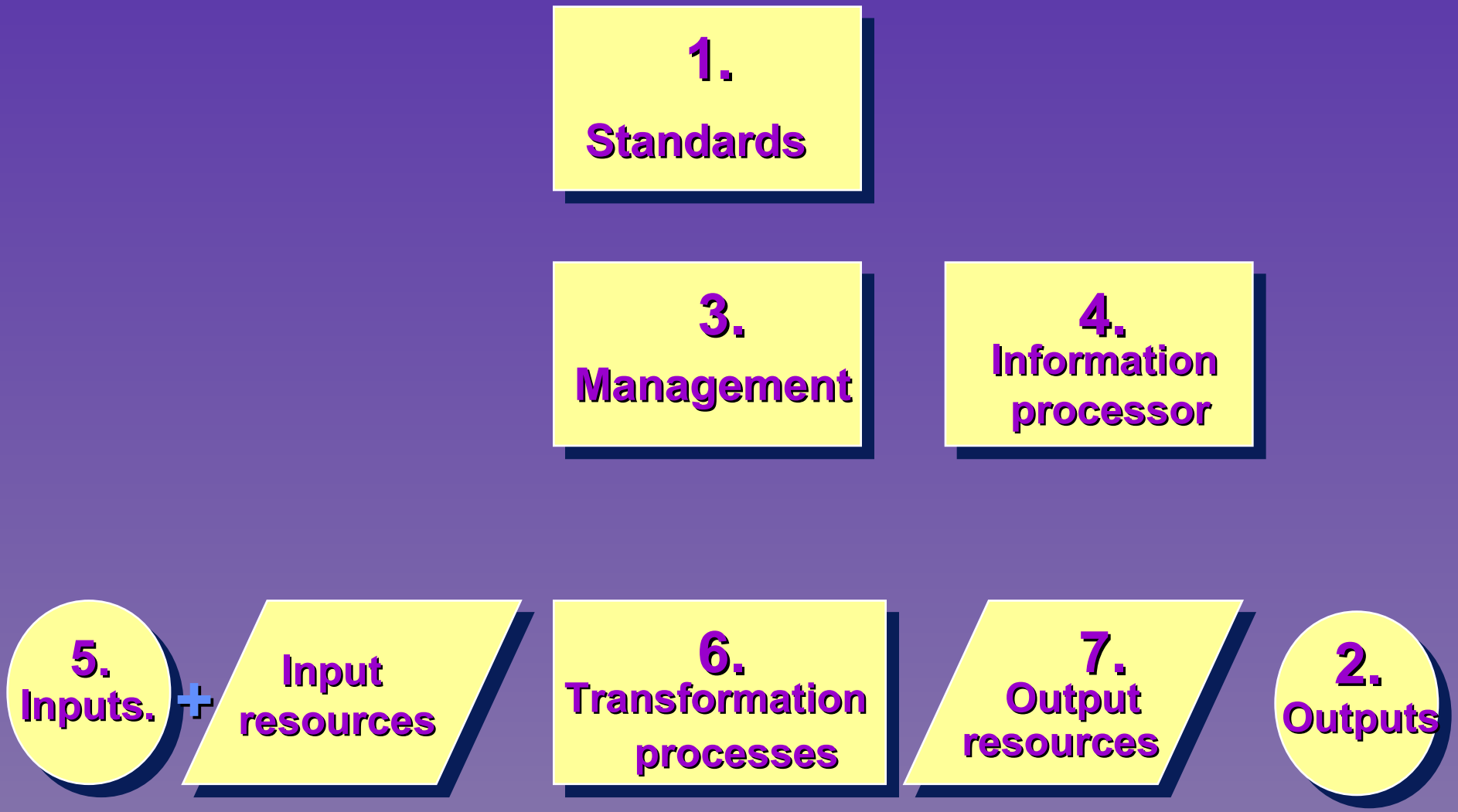
Definition Effort

- Step 4: Proceed from System to Subsystem Level
  - Each level is a system
  - Are subsystems integrated into a smoothly functioning unit?
  - Does the subsystem need to be broken down further?

Definition Effort [cont.]

- Step 5: Analyze System Parts in a Certain Sequence
  1. Evaluation standards. They must be valid, realistic, understandable, measurable
  2. Compare system outputs with standards
  3. Evaluate management
  4. Evaluate the information processor
  5. Evaluate the inputs and input resources

Each Part of the System Is Analyzed in Sequence



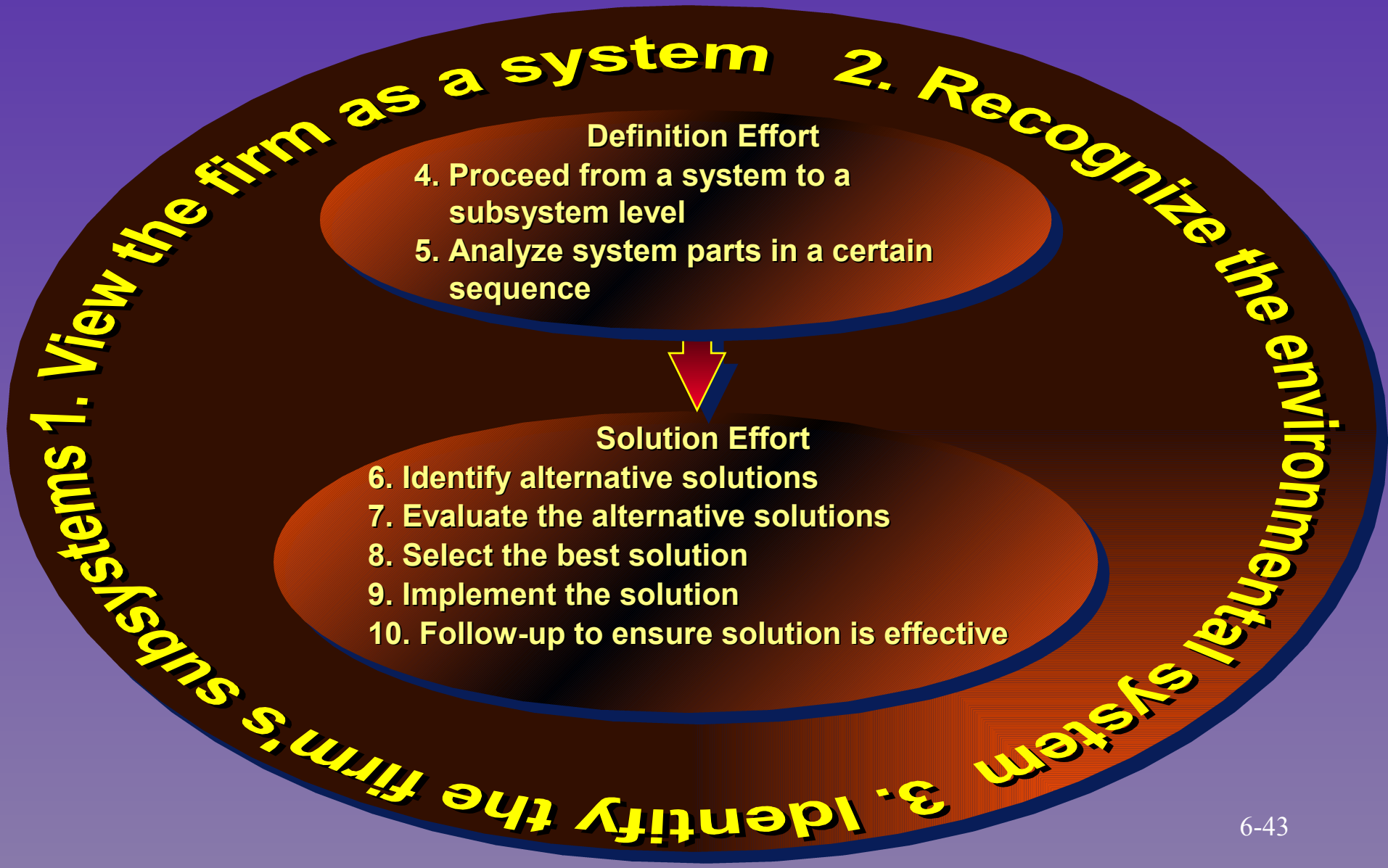
Solution Effort

- Step 6: Identify alternatives
  - Find *different* ways to solve the *same* problem
    - » Brainstorming
    - » Joint Application Design (JAD) session
- Step 7: Evaluate alternative solutions
- Step 8: Select the best solution
    - » Analysis
    - » Judgment
    - » Bargaining

Final Steps of the Solution Effort

- Step 9: Implement the solution
- Step 10: Follow-up to ensure that the solution is effective

An Integrative Model of the Systems Approach



Review of Systems Approach

- Integrating each step of the systems approach is a managerial challenge
- Managerial preparation effort is a good starting point
- Next, manager engages in functional decomposition
  - Definition effort
- Finally, manager solves problem
  - Solution effort

Summary

- Models are abstractions of reality
  - Four types of models
  - General systems model
- Physical system
- Conceptual system
- Information Processor
  - Computer
  - Noncomputer

Summary [cont.]

- Management by exception
- Managerial problem solving
- Classification of problems
  - Structured
  - Unstructured
- Use of the systems approach