

# Information as A Product

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Information Integrity/Integrity Information System/Management Information System

Course Lecture # 27

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# Lecture # 27: Information as A Product

# OVERVIEW-1

- Traditional Business Model
- Control Responses under Traditional Business Model – A Systems Representation
- Need for model change ...From **Fixed** to **Flexible**  
Information decision for Control
- Physical and Informational Work Systems
- Systems representation of a business process model emphasizing “information” showing interrelationship between informational and physical work systems

# OVERVIEW - 2

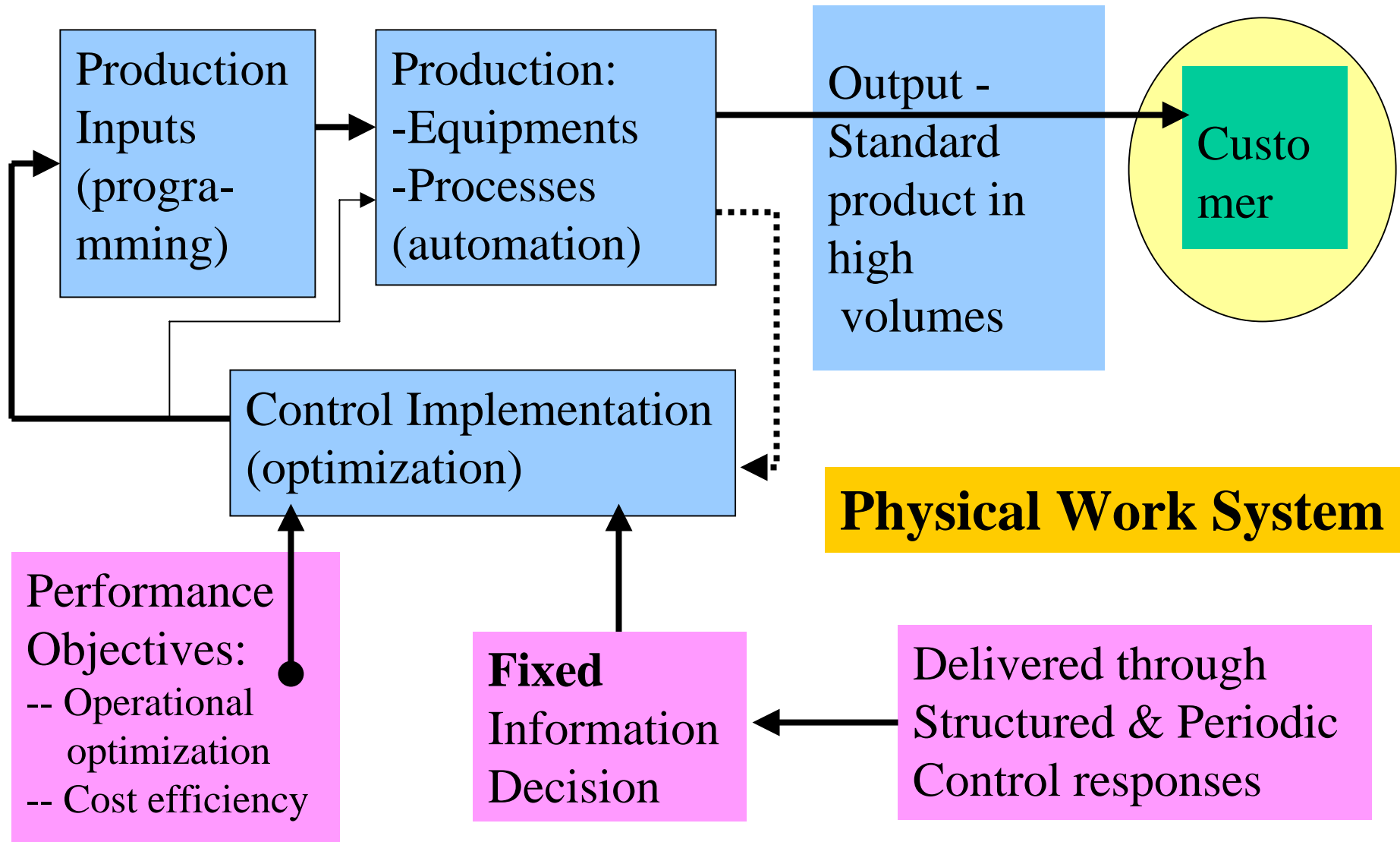
- Open System View of Business Process
- Business process *IS* View
- Business process *IS* View - A Multistage Decision Process delivering Flexible Information Decision
- Business Process *IS* view - An Information Origination situation under uncertainty
- And Elements of Each Decision Stage Are...
- *IS* errors, therefore, being...

# OVERVIEW-3

- Offering A Modeling Tool for Formalizing Environment as A Major Factor in Business Decisions
- Environmental Impact Factor – An Example from Healthcare
- Another Example of an Open System Modeling requirement as drawn from Healthcare Delivery System
- Business Process *IS* view as an integral to an information and control system
- Information As a Product
- Summary
- Exercises

# TRADITIONAL BUSINESS MODEL

- Emphasizes “material” and “energy” processing,
- Seeks to produce "standard" product in high volumes,
- Competitive advantage through
  - Operational Optimization, and
  - Cost efficiency
- Does not have a need to process information optimally.



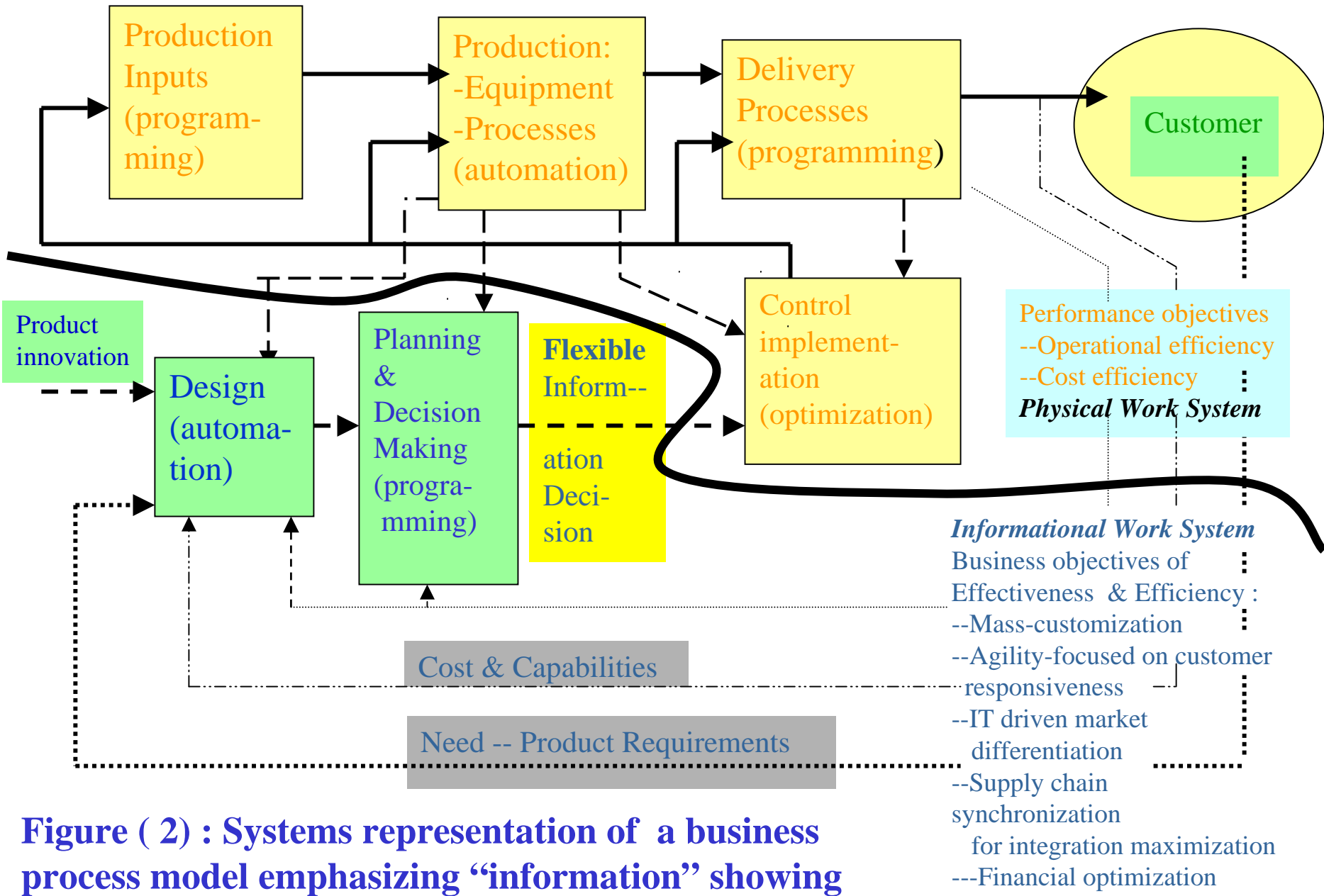
**Figure (1) : Control Responses under Traditional Business Model - A Systems Representation**

**HOWEVER, THERE IS A NEED  
FOR MODEL CHANGE.....**

**...FROM **FIXED** TO **FLEXIBLE**  
INFORMATION DECISION FOR  
CONTROL IMPLEMENTATION**

# INFORMATIONAL AND PHYSICAL WORK SYSTEMS

- There is shift from Energy based to Data-driven Technologies
- Presenting New Market Requirement
- Need to *use* information decision ‘smarter’.
- This requires maximization of ‘informational work’.
- For delivering:
  - Flexible information decision
    - for control implementation.



**Figure ( 2 ) : Systems representation of a business process model emphasizing “information” showing interrelationship between informational and physical work systems**

# OPEN SYSTEM VIEW OF BUSINESS PROCESS

- This leads to *recognizing* business organizations to be “open systems” (*OS*).
- An open system is distinguished from a closed system in that it (open system) has following features.
- Purpose (objective),
- Possesses porous boundary with its environment,
- Is impacted by and impacts its environment, and
- **Whatever else it does, it necessarily processes information.**

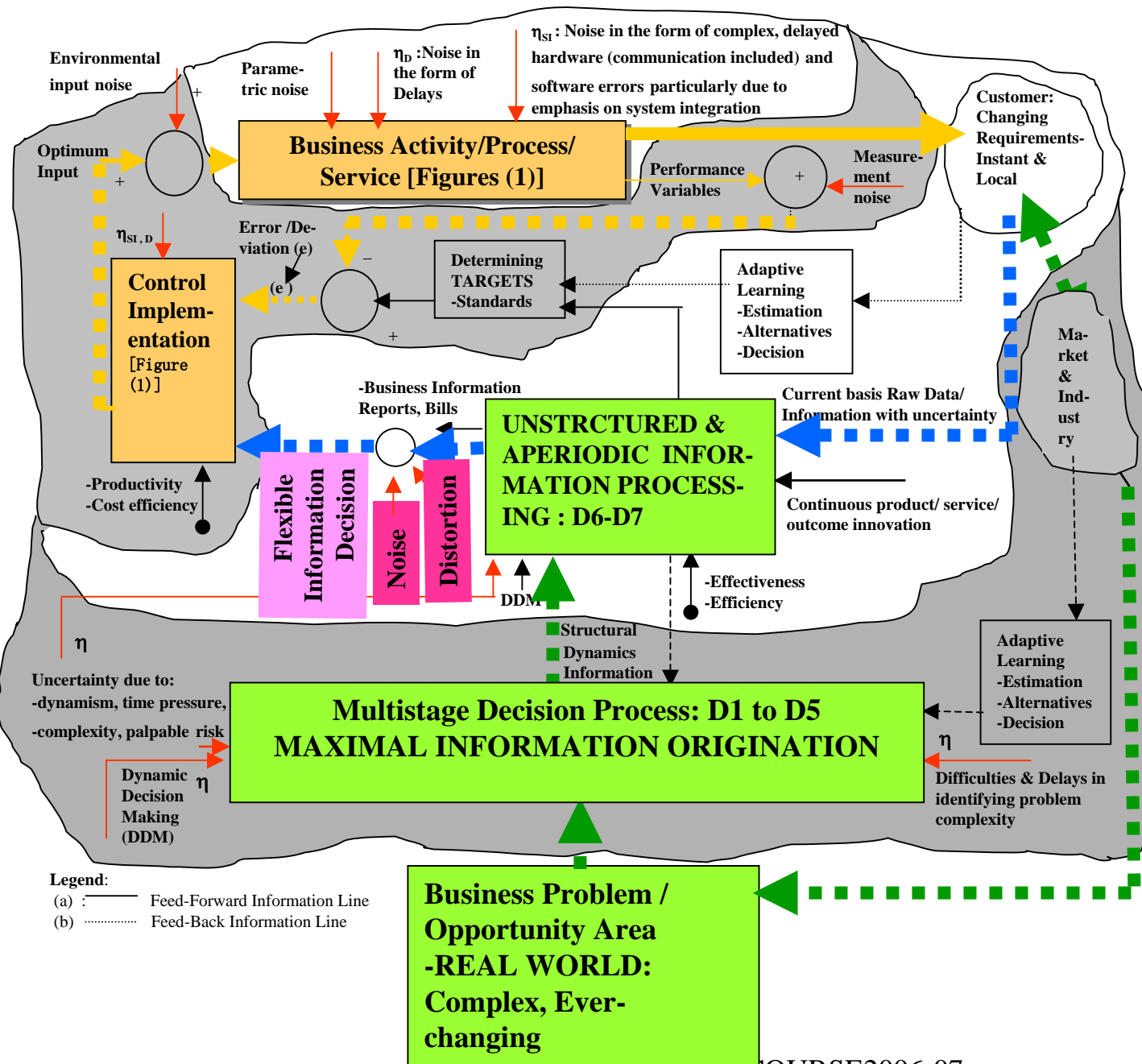
# BUSINESS PROCESS IS VIEW-1

- Information processing a decision process.
- Traditionally, decision process considered to have following three stages.
- Forecasting,
- Evaluation of *generated* alternatives, and
- Selection of a *fixed* information decision for control implementation

# BUSINESS PROCESS *IS* VIEW-2

## A MULTISTAGE DECISION PROCESS

- However, under the environmental impact, *OS* a multistage decision process having following stages.
  - Originating ‘many factors’ & ‘multiple criteria’ (Complexity factor) (D1),
  - Obtaining operable goal (D2),
  - Culling out relevant information variables (D3),
  - Originating interdependencies (D4),
  - Developing state space model (D5),
  - *Generating* alternatives, and (D6)
  - Selection of a *flexible* information decision (D7).
- Each of these decision stages have their own **uncertainties**. We will study these **uncertainties** as the course progresses.



**Figure (-3-):  
 Business  
 Process IS  
 view An  
 Information  
 Origination  
 Situation  
 under  
 uncertainty**

# AND ELEMENTS OF EACH DECISION STAGE ARE...

- Each decision stage an Information Origination Situation, comprising of following individual elements.
  - Observation and Verification,
  - Problem recognition,
  - Prediction,
  - Selection of flexible information decision for control implementation,
  - Reevaluation,
  - Information Origination Resource Management.

# IS ERRORS THEREFORE BEING

An OS Model of a Business Process *IS* View

A Continuous Individual Information Origination Situation in the presence of **Uncertainty**

Multiple Decision Process Stages

A Decision Process Stage

A Continuous Individual Information Origination Situation in the presence of **Uncertainty**

Comprises of Individual Elements

**Uncertainty** in Each Element

Errors in Each Element

Resulting in Decision Stage *IS* Errors and Business *IS* Errors

**ELEMENT ERRORS AS CORE IS ERRORS**

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# OFFERING A MODELING TOOL

- Element errors are information origination errors.
- They result from dealing with environmental anomalies.
- This totality of the Business Process *IS* View, including the reality of element errors, thus offers a modeling tool
- To account for differing organization environments, and
- For dependency of organization on its internal and external environments.
- Formalizing Environment as A Major Factor in Business Decisions.

# Environmental Factor Impact – Example

- Case of a “Myocardial infarction in a vascular surgery patient”.
- “**High**” increased intravascular volume is often present in patients with signs of congestive heart failure.
- However, presence of *these* signs along with otherwise non-critical but interdependent factors, namely:
  - previous diuretic treatment,
  - high serum glucose level,
  - high urinary output,
  - depleted intravascular volume, and
  - blood pressure falling much further than intended,

indicates a healthcare information decision *that* the patient’s intravascular volume is “**Low**”.

# Environmental Factor Impact – Example

- Change in information structure relationship
- Implication of environmental (i.e., local market (knowledge)) factors

## Existing Structural Integrity Standard

Patient with signs of congestive heart failure



is

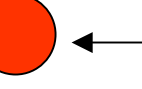
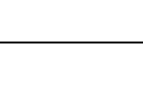
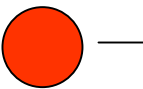
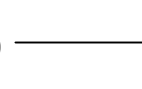
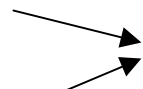


Patient with intravascular volume “high”.

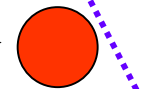
Information Flow when information originated

Information origination error

Patient with signs of congestive heart failure



All these factors indicate



Patient (having signs of congestive heart failure) with implication of environmental factor of:  
•High urinary output

Patient (having signs of congestive heart failure) with implication of environmental factor of:  
•Depleted intravascular volume

Patient (having signs of congestive heart failure) with implication of environmental factor of:  
•Blood pressure falling much further than intended

Patient (having signs of congestive heart failure) with intravascular volume “Low”

Environmental Factors of:  
•Previous diuretic  
•High serum glucose level

**Changed Structural Integrity Standard Required in Given Context and Specific Situation**

# Another Example of an Open System Modeling requirement as drawn from Healthcare Delivery System - 1

- **Expectation:**
  - An aseptic hospital environment - a closed environment for admitted patients.
- **A Situation:**
  - A burn victim (susceptible to infection and therefore an open system itself) in a totally aseptic hospital environment
- **A Result:**
  - The victim suffers nosocomical infection traced to bacteria present in the unremoved stalk remnants of vegetables served to the patient.
  - Unremoved stalk remnants (system environmental factor) rendered, for *that* patient (recipient), the hospital environment septic (that is an open, not closed system).

# Another Example of an Open System Modeling requirement as drawn from Healthcare Delivery System –2

- **What went wrong?**
  - Process of food preparation?
  - Skill or degree of accountability by those preparing it?
- **No, all such are post-event observations.**
- **In fact, what went wrong is:**
  - Information with respect to vegetables is assumed correct as validated earlier [for non-burn patients].
  - The information processing flaw here is not to anticipate information errors, i.e., loss of Information Integrity.

# Another Example of an Open System Modeling requirement as drawn from Healthcare Delivery System-3

- **Analytically speaking**, what in fact went wrong is:
  - Decision cycle time concerns decision process in respect of “food served to patients”.
  - For the decision cycle time under consideration:
    - First, the long term healthcare system goal as concretized through hospitalized patient care goal and implemented at the catering department based on operable goal in terms of “food to be served to patients” was *not set that day* with integrity.
    - For *the* burn victim, this led to the catering department in ballistic behavior deciding information on food to be served, that is without its (information) validation; that is without ensuing required Information Integrity.

## Another Example of an Open System Modeling requirement as drawn from Healthcare Delivery System - 4

- This resulted in infection to *the* burn victim (recipient). That is, in addition to the source and the process, **the information processed turning out to be function of the condition of recipient**.
- This is an **open system** statement.
- For satisfactory patient care, therefore, what was needed, was:
  - Given the situational factors of the burn victim and condition of vegetables, to **originate the information requirements (I)** in respect of: operable goal set, food serving requirements and the recipient patient condition, and
  - To **obtain (originate) and control (improve) integrity of information “I”**.

# Another Example of an Open System Modeling requirement as drawn from Healthcare Delivery System - 5

■ A burn victim susceptible to infection

- bacteria present in the unremoved stalk remnants of vegetables served to the patient



System  
Environmental  
factors

- 
- 

Hospital a  
**closed system:**  
Totally  
Aseptic  
Hospital  
Environment



Hospital rendered  
an **open system** for *the*  
burn patient ,  
resulting in  
victim  
suffering  
nosocomical  
infection

# Business Process IS view as an integral to an information and control system

- What this leads to is an information and control system based model of a business process *IS* view (see figure on next slide) of which business process is an integral part; thereby enhancing the open system characterization of business systems.

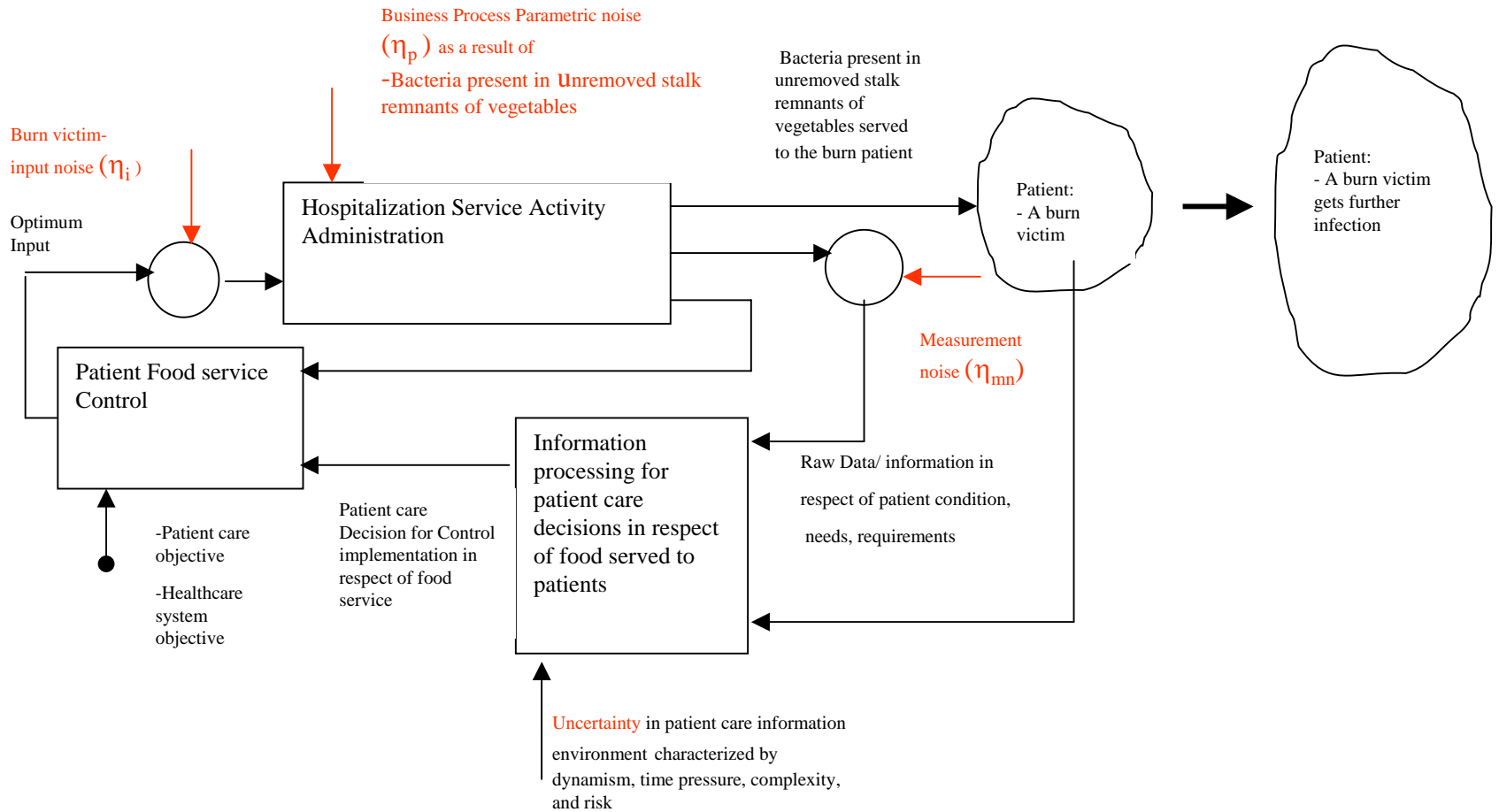


Figure: In the wake of system environmental factor, transformation of the totally aseptic and hence closed hospital environment into an open system for *the* burn victim – an *IS* representation

# INFORMATION AS A PRODUCT

- In the example incorrect origination/production of information leads to incorrect Healthcare Service.
- Requirement, therefore, is for correct origination/production of information.
- **That is by treating Information As A Product.**
- **And Modeling of the healthcare case in the example as an open system makes it possible.**
- **Further, it is important to note that controlling of Correctness of Information, i.e., of Information Integrity (I\*I) ensures competitive advantage as information is treated as product.**

# SUMMARY

- Traditional Business Model assumes Static Environment, Linear Processes, and Complete Knowledge of Information Decision.
- This renders the business model treating information as a by-product.
- However, businesses operating in the real world function in Complex and Dynamic Environments, which are characterized by the presence of Non-linear Processes, and Inaccurate Knowledge of Information Decisions.
- For competitive advantage this calls for treating Information as a product by taking open system view of the business process.

# EXERCISES-1

- (E9.1) What is a traditional business model? Why does it not have a requirement for processing information optimally?
- (E9.2) Why does a technological shift from energy based to data driven technologies create a new market need to use information decision ‘smarter’?
- (E9.3) What do you understand by the term “informational work system”? Develop a system’s view of interrelationship between physical work system and informational work system.
- (E9.4) What is the implication of maximizing informational work?
- (E9.5) Why is a business process in a complex and changing environment an open system?
  - (Hint: It comprises physical work system and informational work system, and for competitive advantage it requires maximizing informational work, i.e., using information decision ‘smarter’, i.e., maximizing (benefit from) information *use*. This renders the business process as an integral to the closed loop information and control system, which is a business process *IS* view.)

# EXERCISES-2

- (E9.6) “Information processing is a decision process”. Explain briefly.
- (E9.7) What are the decision stages in the information processing under the traditional business model?
- (E9.8) “Business process *IS* view is a multistage decision process”. What are these multiple decision stages?
- (E9.9) “While *IS* under traditional business process processes minimal information, business process *IS* view processes *maximal* information.” Explain.

# EXERCISES-3

- (E9.10) “Business process *IS* view is a continuous information origination situation in the presence of uncertainty”. Explain briefly.
- (E9.11) Each decision stage of the business process *IS* view is an information origination situation. What are the elements of the information origination situation?
- (E9.12) Show that element errors are business *IS* errors.
- (E9.13) “Given that element errors are information errors, within the framework of Exercise (E9.13), the business errors then become information errors in business setting”. Explain.

# EXERCISES-4

- (E9.14) “Reduced elements’ errors would result in reduced information origination errors and lead to improved dealing with environmental anomalies. This will have effect of reduced business process *IS* view errors and offer a modeling tool to account for differing organization environments, and for dependency of organization on its internal and external environments”. Explain this using any of the two healthcare delivery examples discussed in Lecture # 9.
- (E9.15) What do you understand by formalizing environment as a major factor in business decisions?

# EXERCISES-5

- (E9.16) With the help of example of your choice (example from healthcare delivery discussed in Lecture # 9 will do), show that business process modeled as integral to a closed loop information and control system that the business process *IS* view is facilitates treating information as a product.
- (E9.17) “Traditional Business Model assumes Static Environment, Linear Processes, and Complete Knowledge of Information Decision”. Explain briefly.
- (E9.18) “Assumptions in Exercise (E9.18) render the business model treating information as a by-product”. Explain, if possible with the help of example (healthcare delivery example discussed in Lecture # 9 will do).

# EXERCISES - 6

- (E9.19) “Businesses operating in the real world function in complex and dynamic environments, which are characterized by the presence of non-linear processes, and inaccurate knowledge of information Decisions”. Explain, if possible with the help of example (healthcare delivery example discussed in Lecture # 9 will do).
- (E9.20) “For competitive advantage this calls for treating information as a product by taking open system view of the business process”. Explain, if possible with the help of example (healthcare delivery example discussed in Lecture # 9 will do).

**THANK YOU**