INFORMATION INTEGRITY TECHNOLOGY DEVELOPMENT

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And

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Information Integrity/Integrity Information System/Management Information System
Course Lecture (s) # 53-60

February 20, 2007

I*I Technology Development.

- Need for I*I Technology.
- What is it?
- I*I Technology A System's view.
- Steps to develop Information Integrity System.
  - Developing Environment/Information Topology.
  - Acquisition Cycle.
    - Demonstration with an example: Production-Distribution Process
  - Utilization Cycle.
  - Feedback.
- Conclusion

Need for I*I Technology

- Knowing What You Don't Know or Why Decision Makers Don't Act on What they Know.

- Most Decision-Makers Commit the Same Kind of Errors.
  - Next three slides give common information decision errors.
  - For systems, analytical view of information errors, please refer to Lecture on information envelope and uncertainties therein.

- Standard information decision errors (i.e., Design errors)
  - Ref.: J. Edward Russo and Paul J.H. Schoemaker, “Decision Traps”, A Fireside Book, Published by Simon and Schuster, New York, 1989.

a. **Plunging in**: Beginning to gather information and reach conclusions without first taking a few minutes to think about the crux of the issue one is facing or to think through how one believes decisions like this should be made.

b. **Frame Blindness**: Setting out to solve the wrong problem because one has created a mental framework for one’s decision, with little thought, that causes one to overlook the best options or loose sight of important objectives.

c. **Lack of Frame Control**: Failing to consciously define the problem in more ways than one or being unduly influenced by the frames of others.

d. **Overconfidence in One's Own Judgment**: Failing to collect key factual information because one is too sure of one's assumptions and opinions.

e. **Shortsighted Shortcuts**: Relying in appropriately on "rules of thumb" such as implicitly trusting the most readily available information or anchoring too much on convenient fact(s).

g. **Shooting from the hip**: Believing one can keep straight in one's head all the information one has discovered, and therefore "winging it" rather than following a systematic procedure when making the final choice.

h. **Group failure**: Assuming that with many smart people involved, good choices will follow automatically, and therefore failing to manage the group decision-making process.

i. **Fooling oneself about feedback**: Failing to interpret the evidence from past outcomes for what it really says, either because one is protecting one's ego or because one is tricked by hindsight.

j. **Not keeping tack**: Assuming that experience will make its lessons available automatically, and therefore failing to keep systematic records to track the results of your decisions and failing to analyze these results in ways that reveal their key lessons.

k. **Failure to audit one's own decision process**: Failing to create an organized approach to understanding one's own decision-making, so one remains constantly exposed to all above mistakes.

Emerging Insights

- Information *is* for use; e.g. for, improved decisions.
- Information is a composite of attributes, namely, usefulness, usability and integrity.
- All Business processes are Information Processing Situations.
- Information Processes are individual decision situations.
- Correct Decisions are only possible when requirements of customer (both external and internal) are originated, evaluated and selected with the help of I*I Rules.
- Need is to develop Integrity Business IS.

Traditional Business Process.

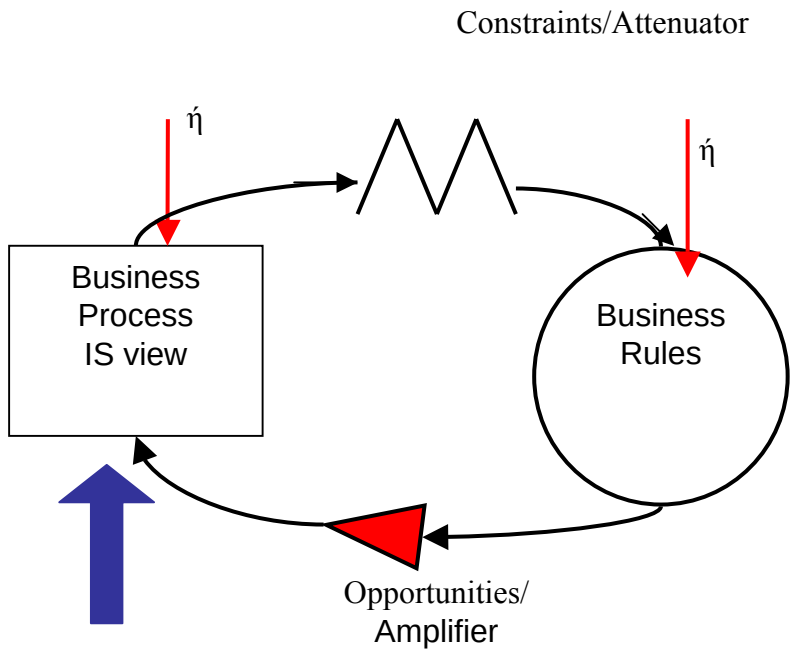


Fig 1, The Integrity Business IS view

The Integrity Business IS view

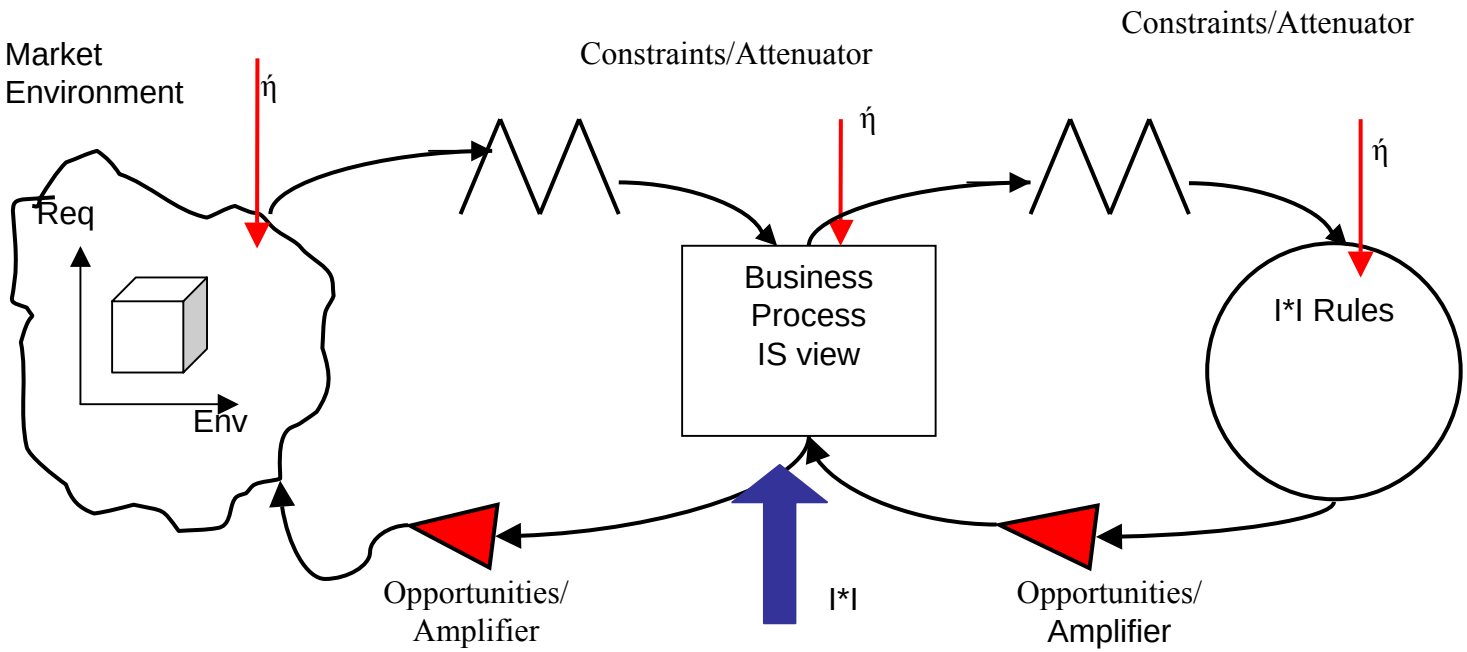
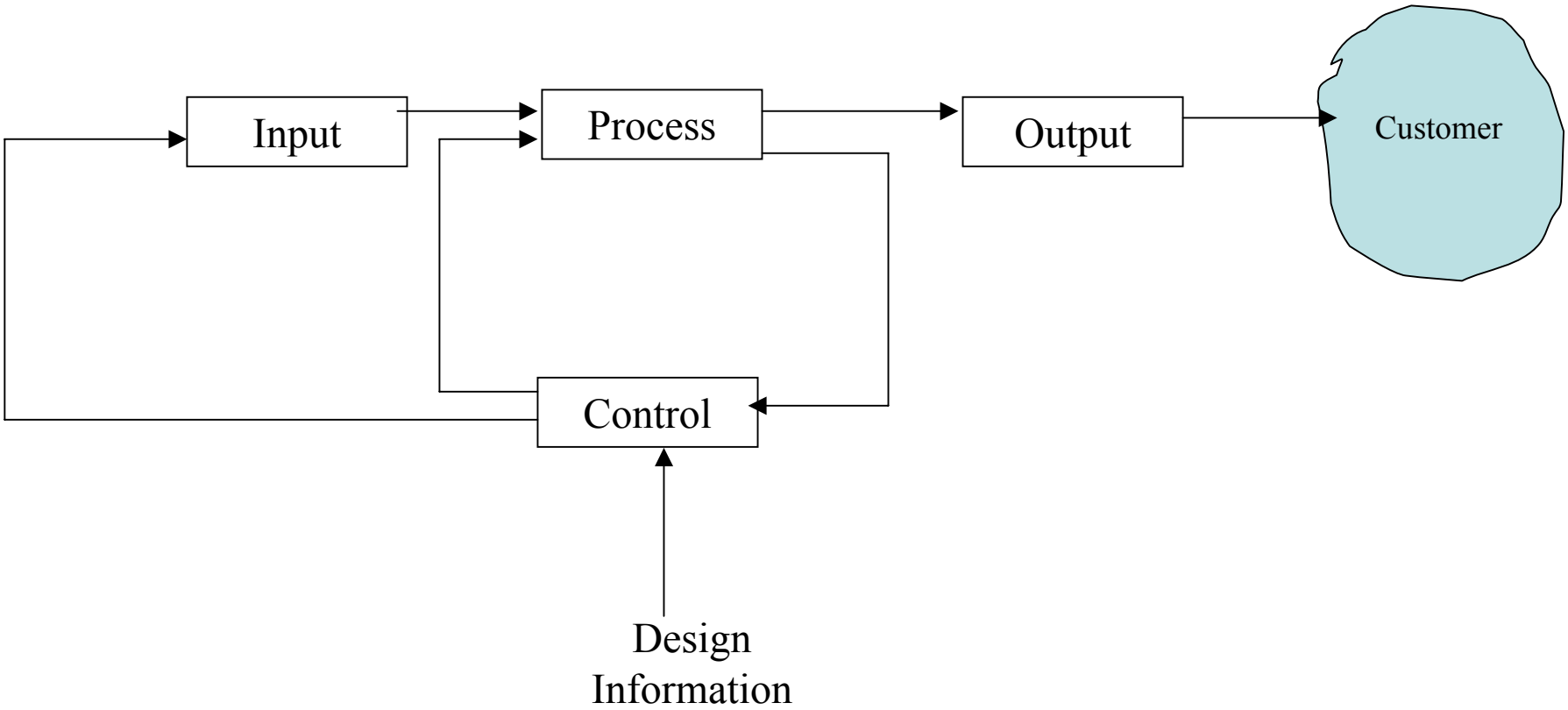


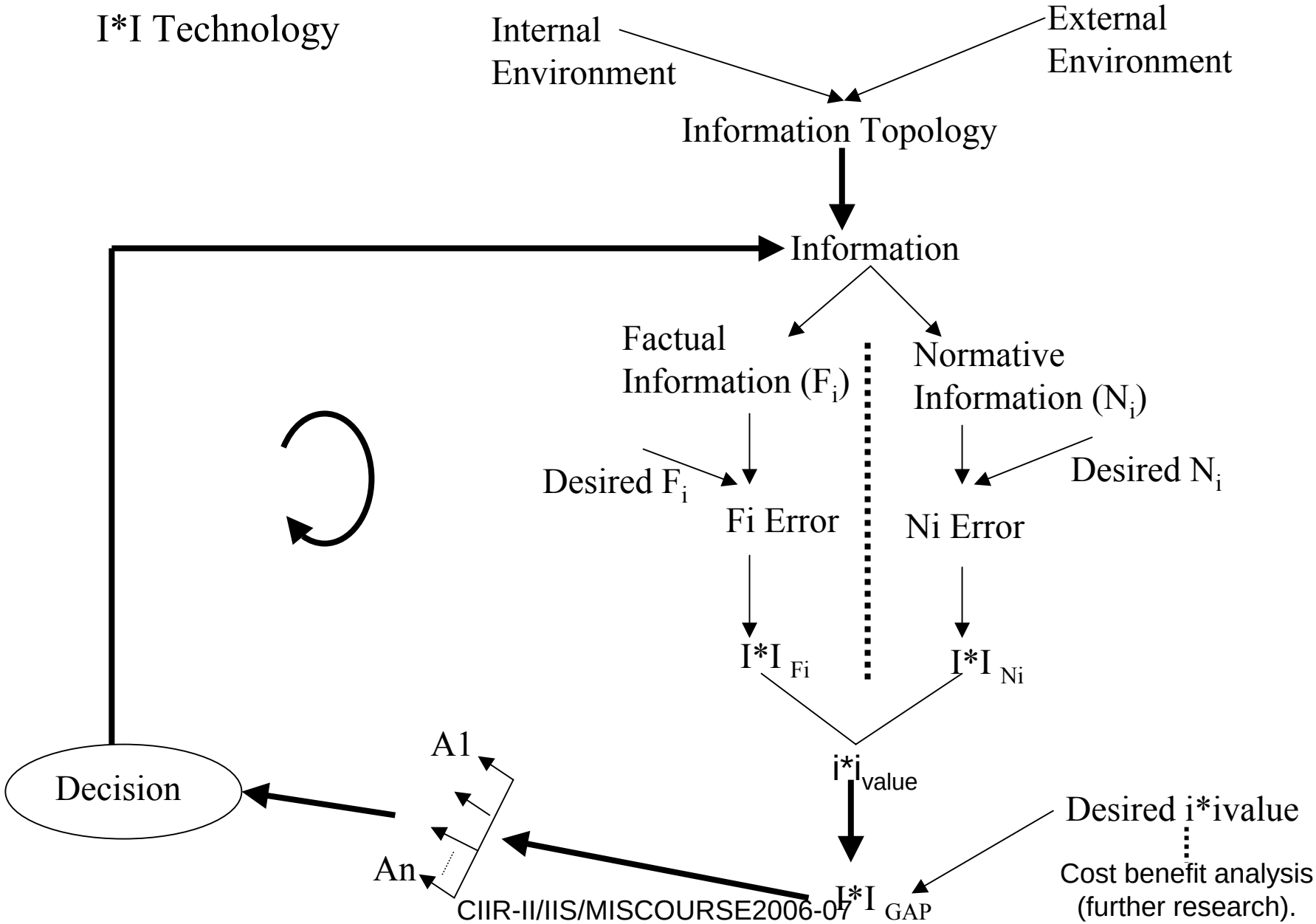
Fig 1, The Integrity Business IS view

- **I*I Technology aims at developing an Information System, which facilitates stakeholders (at a dynamic decision stage) with maximal information and minimum risk .**

- **From the decision makers' point of view, this I*I risk is the decision makers expectation, *ex-ante* , that the outcome of the decision situation may, *ex-post* turn out as worse than the best possible *ex-ante* foreseeable.**

- **This IS helps in *ex-ante* analysis of the dynamic decision situation, which requires information origination, evaluation and selection at all time for continuous competitive advantage**


Input
Process
Output
Customer
Control
Design
Information


I*I Technology
Internal Environment
External Environment
Information Topology
Information
Factual Information (F_i)
Normative Information (N_i)
Desired F_i
Desired N_i
Fi Error
Ni Error
$I*I_{Fi}$
$I*I_{Ni}$
$i*i_{value}$
Desired i*ivalue
Cost benefit analysis (further research).
$I*I_{GAP}$
A1
An
Decision
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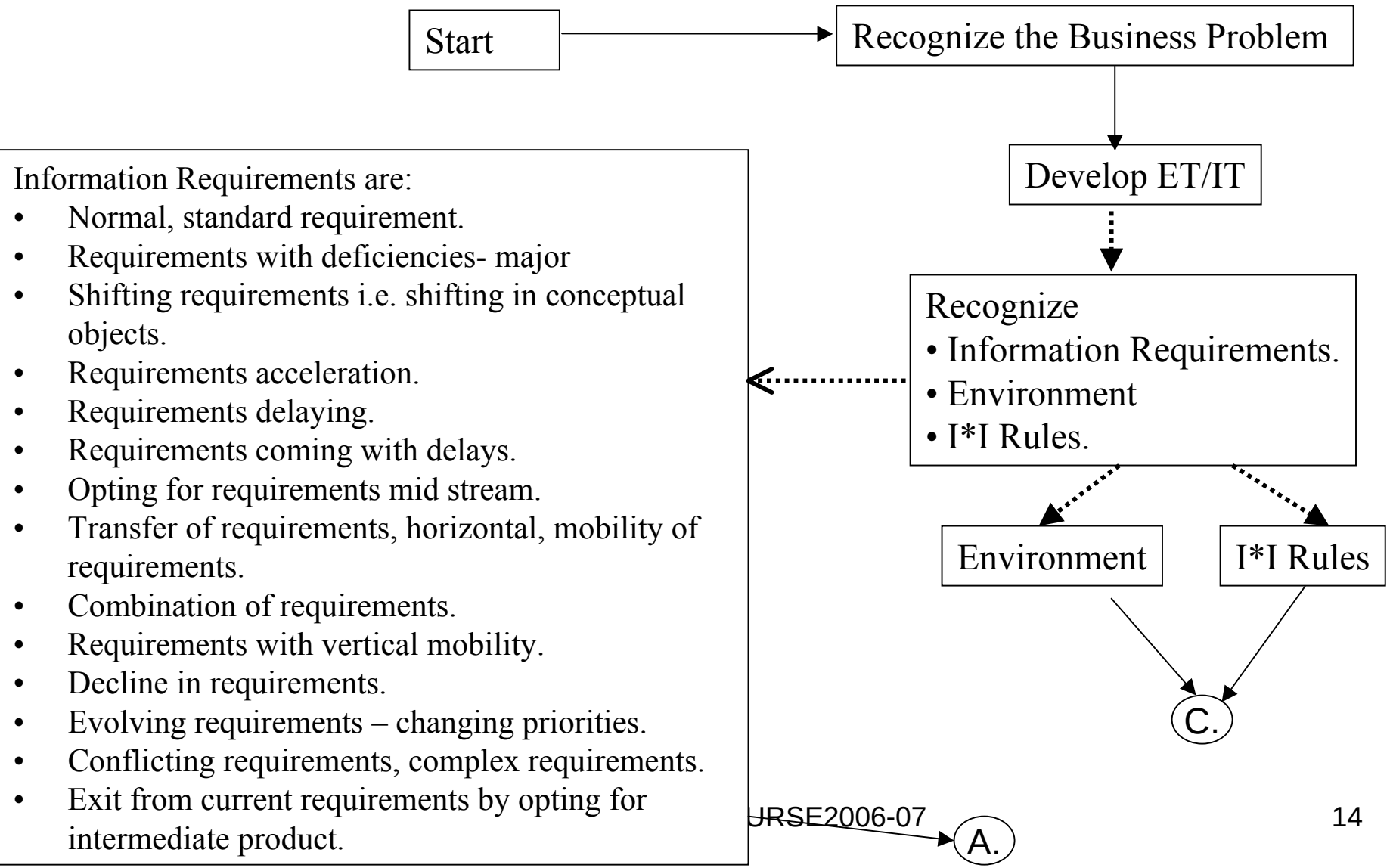
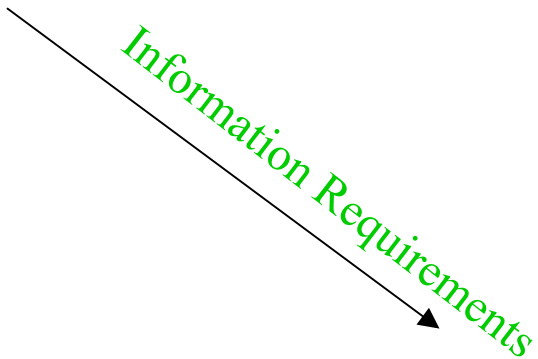
Steps to develop Information Integrity System



Information Requirements are:

- Normal, standard requirement.
- Requirements with deficiencies- major
- Shifting requirements i.e. shifting in conceptual objects.
- Requirements acceleration.
- Requirements delaying.
- Requirements coming with delays.
- Opting for requirements mid stream.
- Transfer of requirements, horizontal, mobility of requirements.
- Combination of requirements.
- Requirements with vertical mobility.
- Decline in requirements.
- Evolving requirements – changing priorities.
- Conflicting requirements, complex requirements.
- Exit from current requirements by opting for intermediate product.

Environment Topology Attribute



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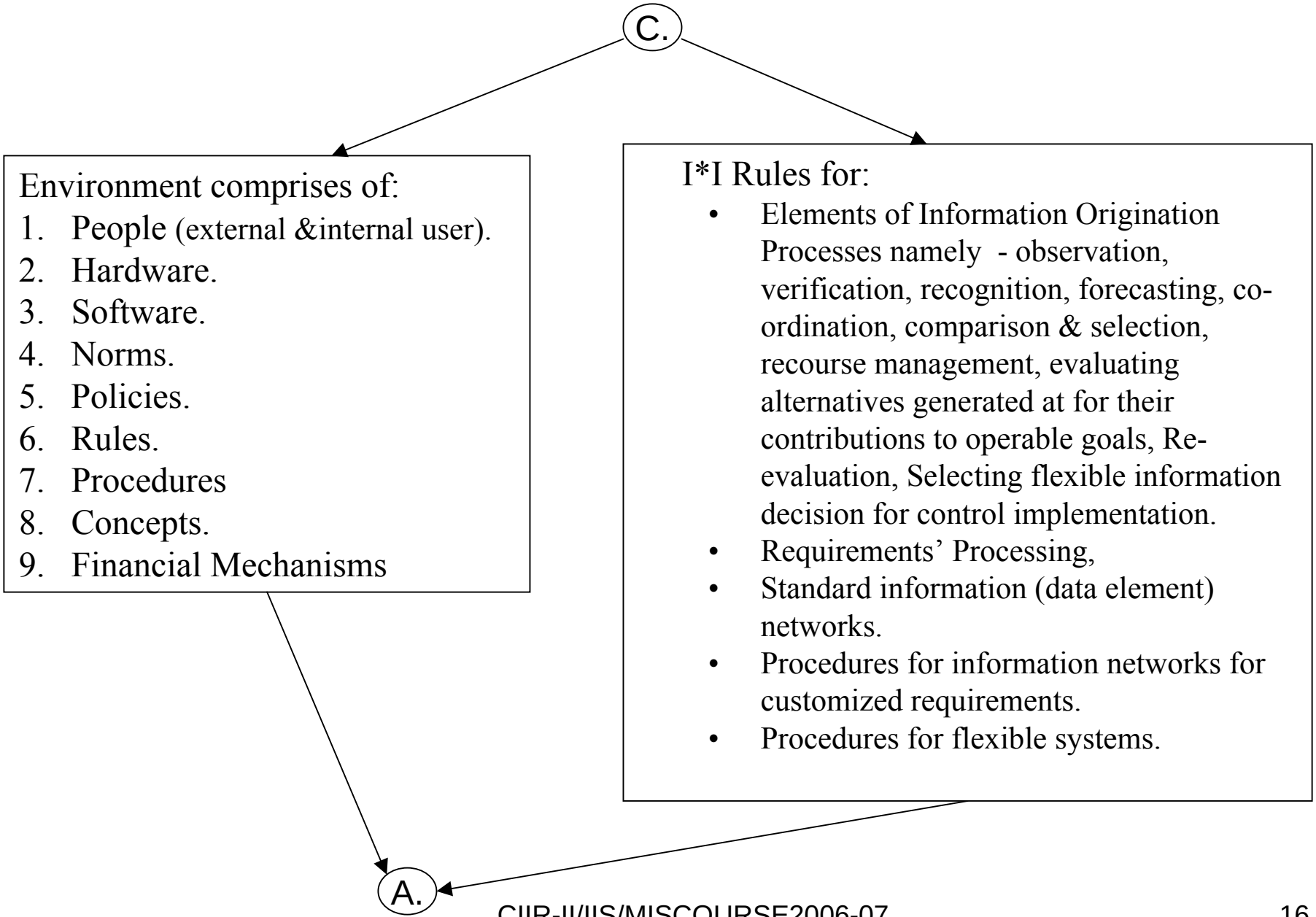
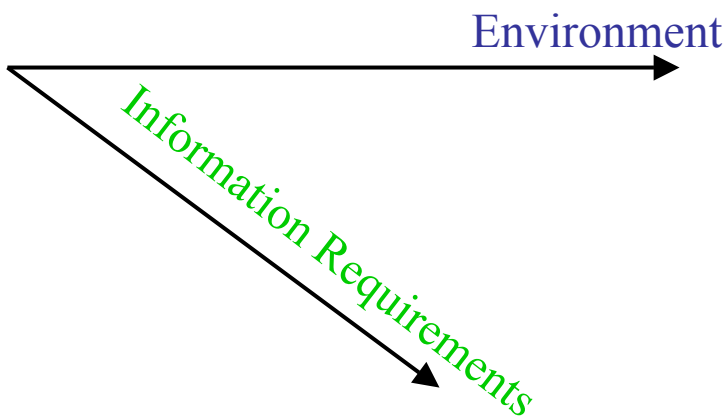

C.
Environment comprises of:
1. People (external &internal user).
2. Hardware.
3. Software.
4. Norms.
5. Policies.
6. Rules.
7. Procedures
8. Concepts.
9. Financial Mechanisms
I*I Rules for:
• Elements of Information Origination Processes namely - observation, verification, recognition, forecasting, co-ordination, comparison & selection, recourse management, evaluating alternatives generated at for their contributions to operable goals, Re-evaluation, Selecting flexible information decision for control implementation.
• Requirements' Processing,
• Standard information (data element) networks.
• Procedures for information networks for customized requirements.
• Procedures for flexible systems.
A.

Environment Topology Attributes



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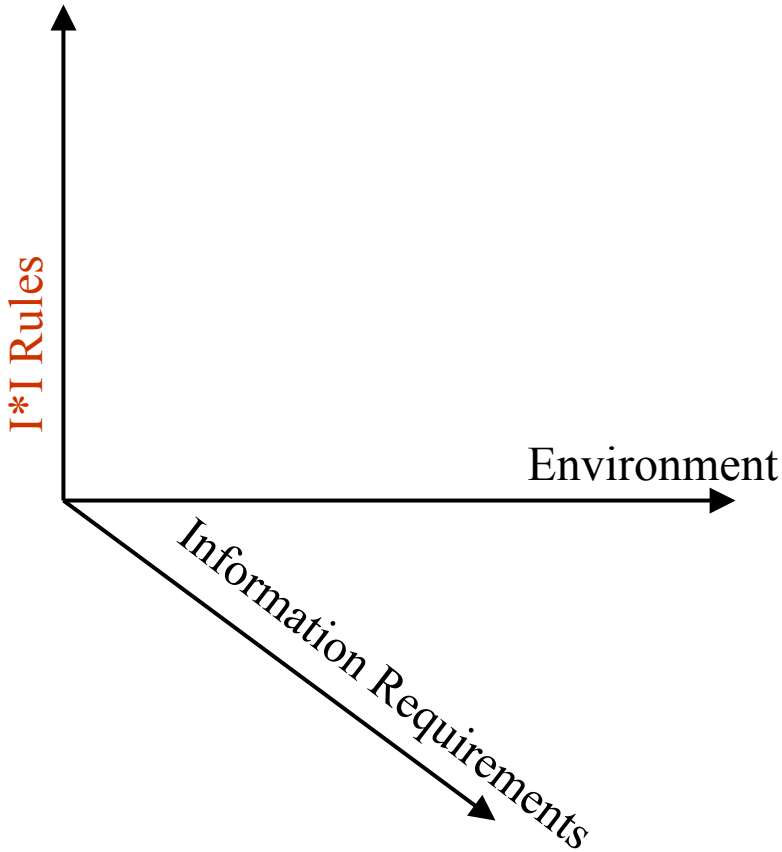
Environment Topology



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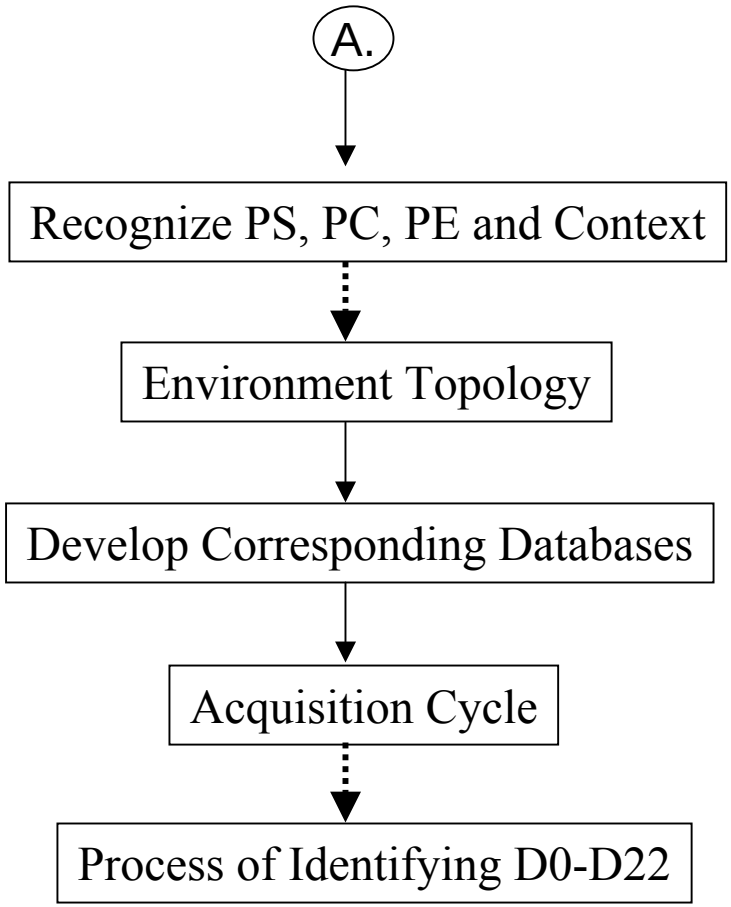
A.
Recognize PS, PC, PE and Context
Environment Topology
Develop Corresponding Databases
Acquisition Cycle
Process of Identifying D0-D22

People	Dynamic Decision Stages (Example Long-Term Goal)			
	Performance Standards	**Performance criteria**	**Performance evidences**	**Context**
Retailer	Ensure profitable inventory level at all time, by projecting changes for benefits and disadvantages.	Information on current and proposed services, product has integrity.		Information is gathered from agencies, seniors, customer and staff.

Hardware	Dynamic Decision Stages (Example Long-Term Goal)			
	Performance Standards	**Performance criteria**	**Performance evidences**	**Context**
Tools	Ensure proper working of tools at all times.	Information on current and proposed tools has integrity.		Information is gathered from agencies, vendors, customer and staff.

Software	Dynamic Decision Stages (Example Long-Term Goal)			
	Performance Standards	**Performance criteria**	**Performance evidences**	**Context**
Application Software	Ensure proper working of software at all times for effectiveness.	Software design should account for all the business rules of the retailer and of the production company.		Designer, Software vendor, retailer, production company.

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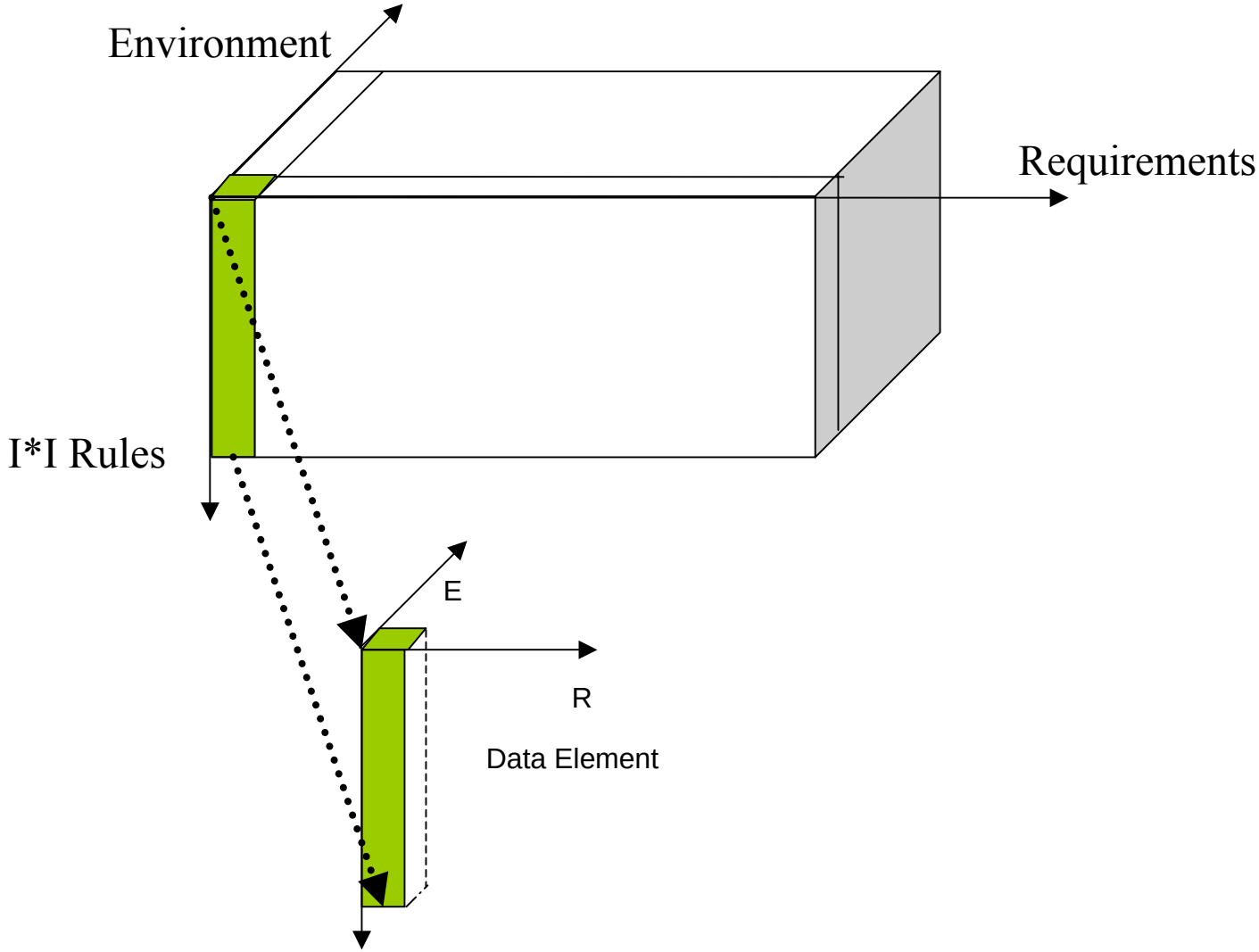

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Data Element

•Data element is the molecularized form of information encapsulating ideally all the I*I Rules. In other words, it represents a component(s) of the environment, with a requirement(s) encapsulating the I*I Rules.

•This is represented as data element attributes PS, PC, PE and context in the database. This data element forces the database to be distributed and decentralized. (further research)

click

People

Stakeholder,
Customers,
Vendors,

Hardware

Infrastructure,
Machines,
Tools,
Components,
Work Station Layout,

Software

Databases,
Tools,
Application software,

Norms

Security,
Modularity,
Flexibility,
Individual decision situations,
Perception of responsibility,
Political pressure,
Skills

Concepts

Requirements,
Budgets,
Sales,
Goal,
Demand,
Report,
Error reports

Policies

Factory production,
Retailer orders,
Desired production,
Delivery delay estimate,
Delivery delay forecast by retailer,
Desired pipeline orders,
Control policies,
Legal policies,
Training policies
Maintenance.

Rules

Work practice,
System Design,
Communication,
Modularity,
Flexibility,
Legal liability,
Display rules,
Ergonomics,
People,
Hardware,
Software

Financial Mechanism

Optimize methodology,
Optimum level of inventory,

Communication

Networking,
Information flow,

Standards

Procedures

Observation,
Verification,
Recognition,
Forecasting,
Co-ordination.
Comparison & Selection
Recourse Management
Re-evaluation
SDLC,
PDLC,
Maintenance,
Requirement gathering,
Analysis on Sale,

Distributed and Decentralize Databases

People	Dynamic Decision Stages			
	Performance Standards	**Performance criteria**	**Performance evidences**	**Context**
Retailer	Ensure profitable inventory level at all time, by projecting changes for benefits and disadvantages.	Information on current and proposed services, product has integrity.		Information is gathered from agencies, seniors, customer and staff.

Distributed and Decentralize Databases

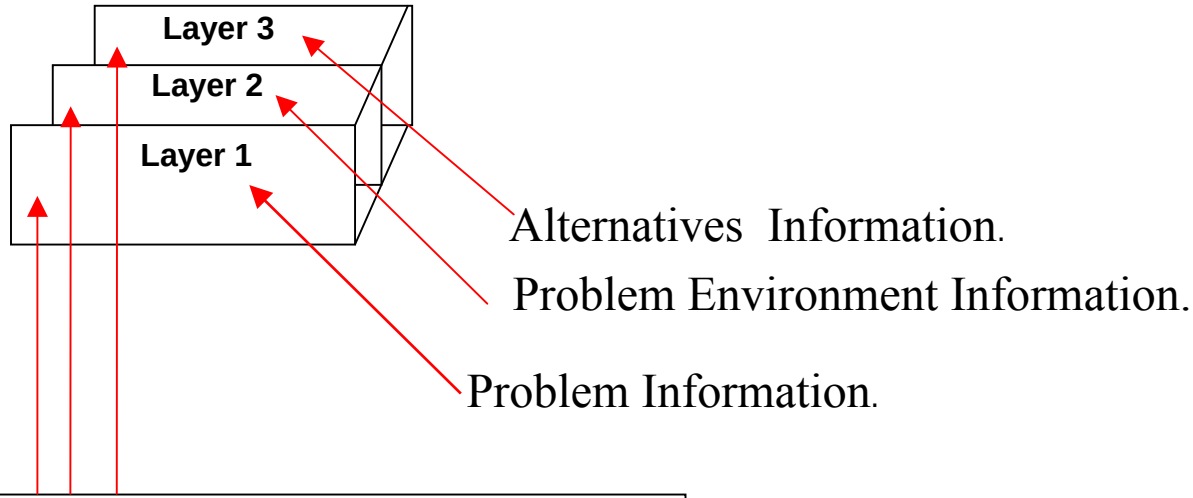
Software	Dynamic Decision Stages			
	Performance Standards	**Performance criteria**	**Performance evidences**	**Context**
Application Software	Ensure proper working of software at all times for effectiveness.	Software design should account for all the business rules of the retailer and of the production company.		Designer, Software vendor, retailer, production company.

Distributed and Decentralize Databases

Hardware	**Dynamic Decision Stages**			
	Performance Standards	**Performance criteria**	**Performance evidences**	**Context**
Tools	Ensure proper working of tools at all times.	Information on current and proposed tools has integrity.		Information is gathered from agencies, vendors, customer and staff.

click

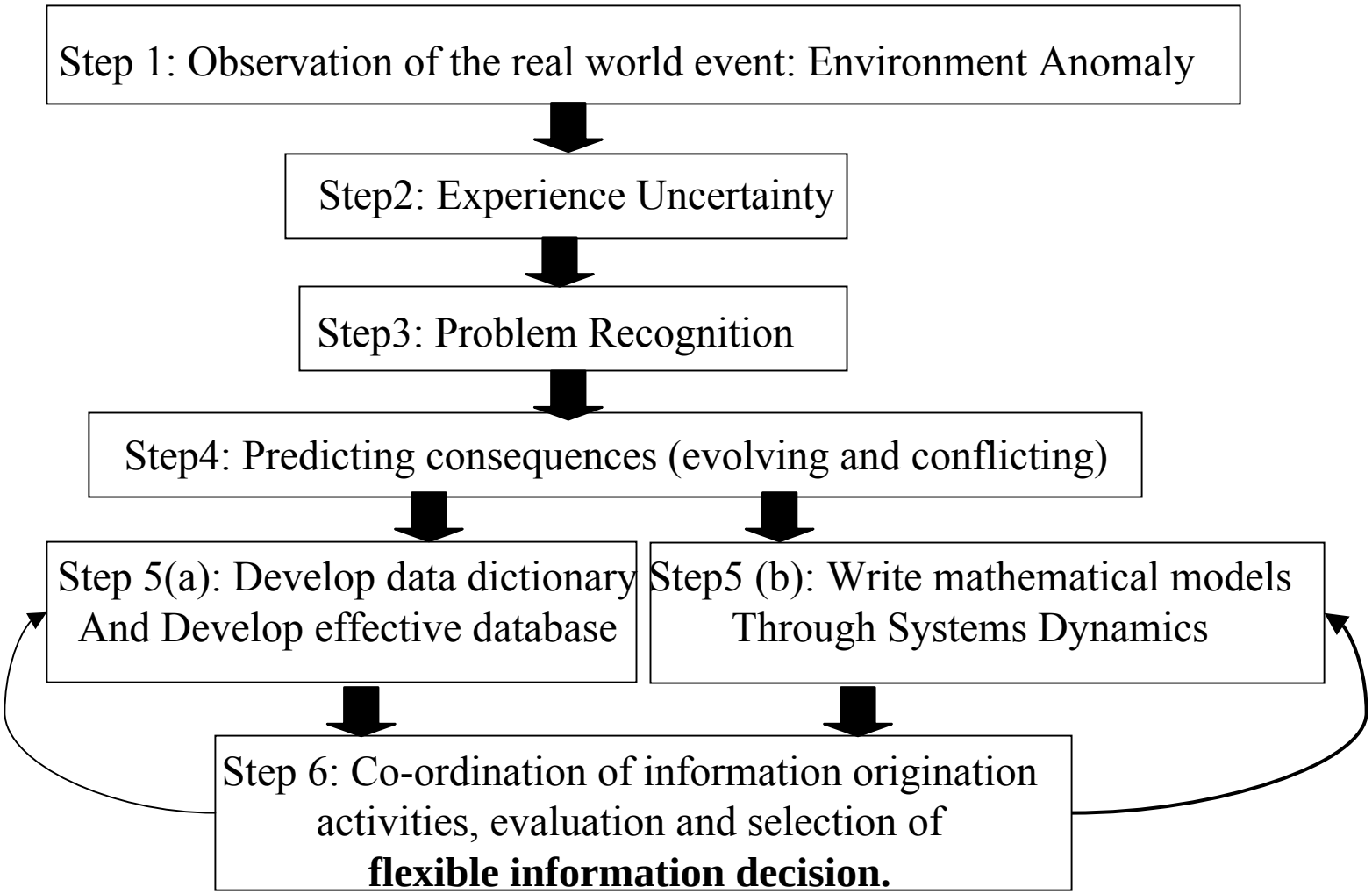
Acquisition Cycle



Identify Decision Mile-post

D0 – D15,Problem Information
D16 – D18, Problem Environment Information.
D19 - D22, Alternatives Information.

Flow Chart of Acquisition Cycle



Illustration

Quality Assurance

- Identify Following Decision Mile-post
  - **D23:** Processing of information decision by process controls and physical variable controls at physical control system.
  - **D24:** As per the input from D23, processing business inputs through business process to deliver product/system/service (inclusive information product) to the recipient as per requirements.
  - **D25:** Obtaining and processing feedback and reevaluation of information.

Example: The Production-Distribution Process.

- A simple example, how a retailer should analyze his inventory so that he can order just enough (correct) of the quantity from the manufacturer to meet customers' requirements.
- What policy he should acquire?
- How would the database be modeled to account for this situation?
- How does the retailer forecast?

People

Stakeholder,
Customers,
Vendors,

Hardware

Infrastructure,
Machines,
Tools,
Components,
Work Station Layout,

Software

Databases,
Tools,
Application software,

Norms

Security,
Modularity,
Flexibility,
Individual decision situations,
Perception of responsibility,
Political pressure,
Skills

Concepts

Requirements,
Budgets,
Sales,
Goal,
Demand,
Report,
Error reports

Policies

Factory production,
Retailer orders,
Desired production,
Delivery delay estimate,
Delivery delay forecast by retailer,
Desired pipeline orders,
Control policies,
Legal policies,
Training policies
Maintenance.

Rules

Work practice,
System Design,
Communication,
Modularity,
Flexibility,
Legal liability,
Display rules,
Ergonomics,
People,
Hardware,
Software

Financial Mechanism

Optimize methodology,
Optimum level of inventory,

Communication

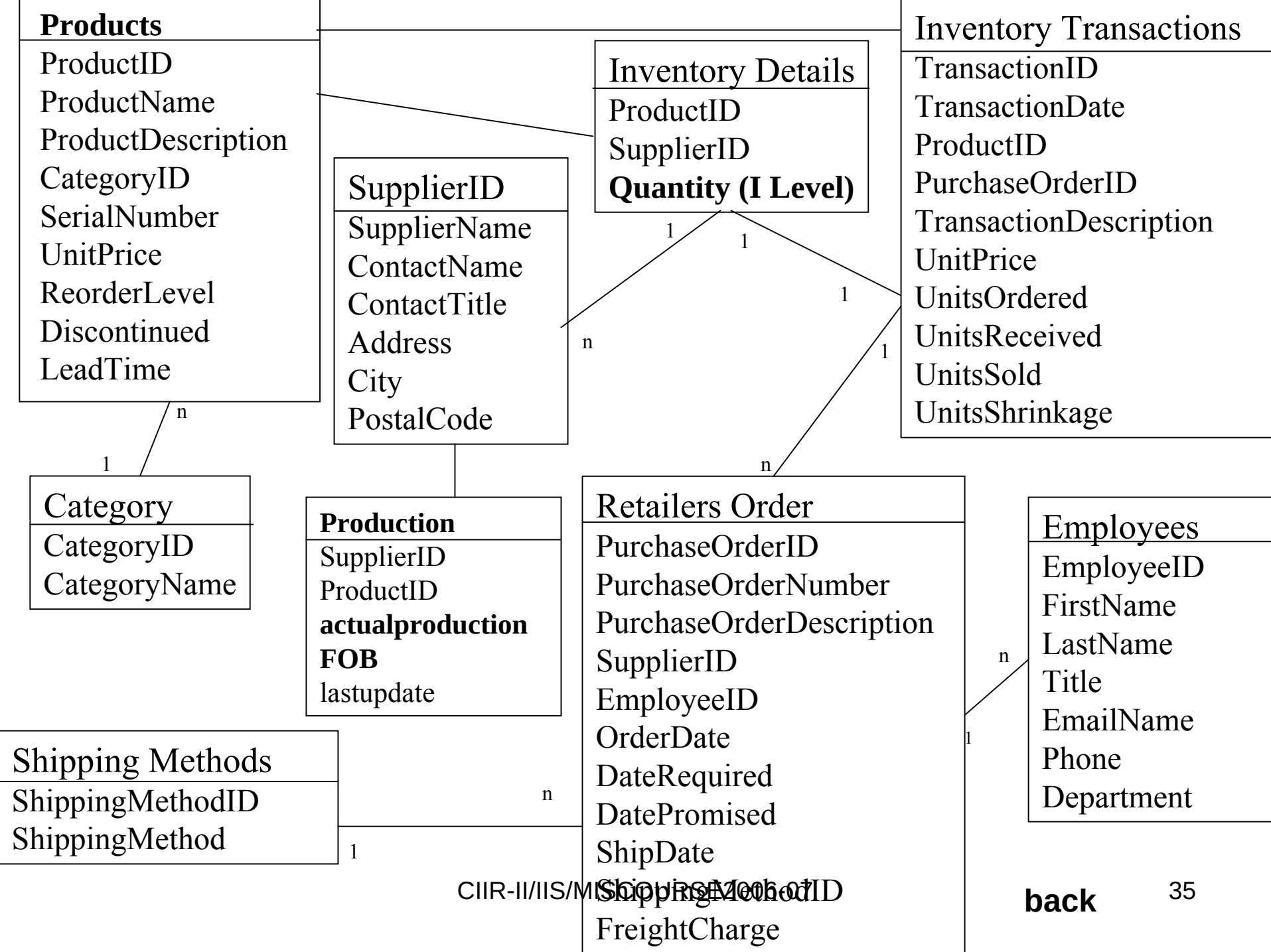
Networking,
Information flow,

Standards

Procedures

Observation,
Verification,
Recognition,
Forecasting,
Co-ordination.
Comparison & Selection
Recourse Management
Re-evaluation
SDLC,
PDLC,
Maintenance,
Requirement gathering,
Analysis on Sale,

- Policy 1: *What ever is sold is ordered into the inventory*.
  - Data Model.
  - I*Ivalue for corresponding data model and I*I Risk.
  - Systems Dynamic Model.
  - I*Ivalue for corresponding SD model and I*I Risk.
  - I*Ivalue of the Policy 1 & I*I Risk of the Policy 1.


Products
ProductID
ProductName
ProductDescription
CategoryID
SerialNumber
UnitPrice
ReorderLevel
Discontinued
LeadTime
Inventory Details
ProductID
SupplierID
Quantity (I Level)
Inventory Transactions
TransactionID
TransactionDate
ProductID
PurchaseOrderID
TransactionDescription
UnitPrice
UnitsOrdered
UnitsReceived
UnitsSold
UnitsShrinkage
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SupplierName
ContactName
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CategoryName
Production
SupplierID
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lastupdate
Retailers Order
PurchaseOrderID
PurchaseOrderNumber
PurchaseOrderDescription
SupplierID
EmployeeID
OrderDate
DateRequired
DatePromised
ShipDate
ShippingMethodID
FreightCharge
Employees
EmployeeID
FirstName
LastName
Title
EmailName
Phone
Department
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Shipping Methods
ShippingMethodID
ShippingMethod
n
1

I*Ivalue for corresponding data model.

- **I*Ivalue = 0.32,**
- **I*I Risk = 0.68.**

The Method and formula

- Assume the factual accuracy FA = 0.7. The weight associated is WF = 8.
- NA1 = 0, WA1 = 9
- $$I*Ivalue = \frac{FA* WF + NA1 * WNA1}{WF + WNA1}$$

$$= (0.7*8 + 0)/ (8+9)$$

$$=0.32.$$

back

I*Ivalue for corresponding SD model

- I*Ivalue = 0.22.
- I*I Risk = 0.78.

Method and Formula

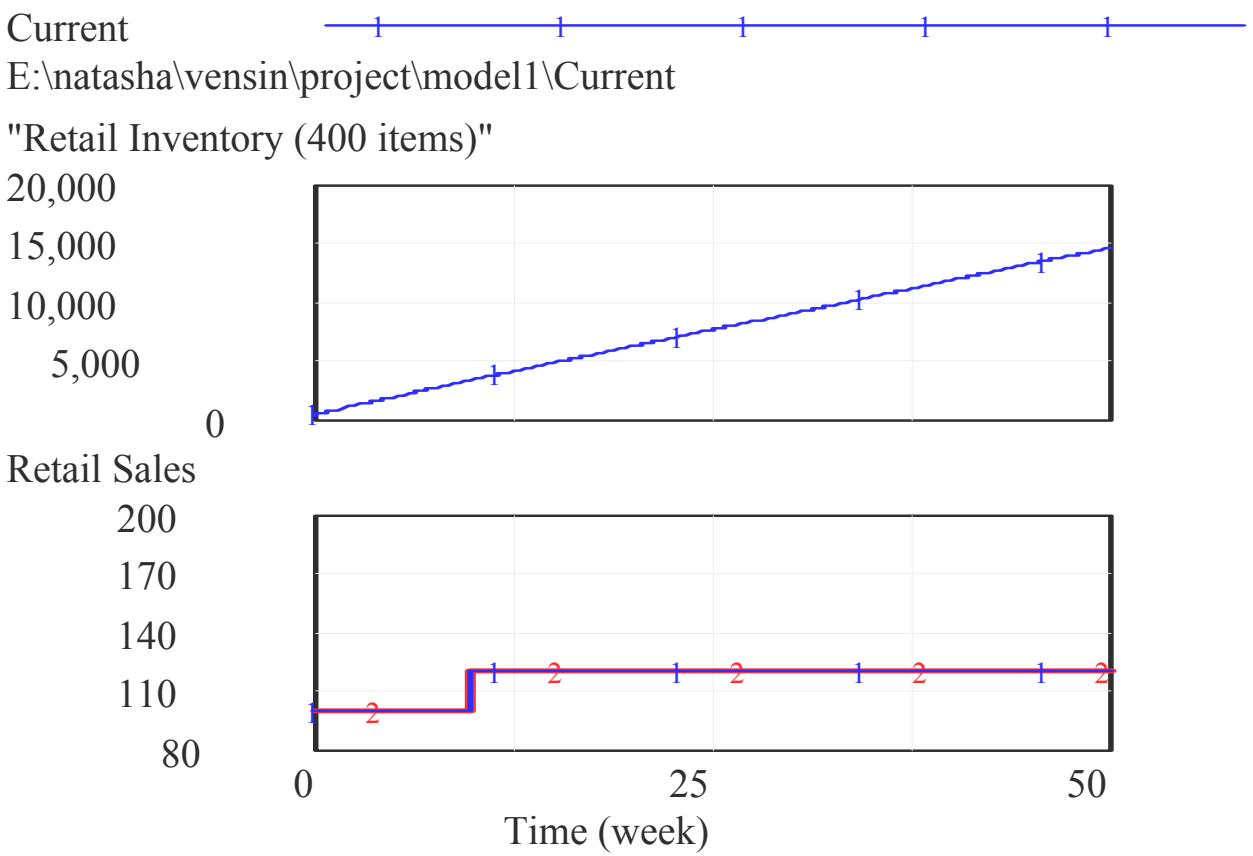
- Factual Accuracy FA =0.7, WF = 8.
- NA1 = $\frac{\text{no. of information flows}}{\text{Total information flows}}$ = 2/21 = 0.095, WNA1 = 9
- NA2 = $\frac{\text{no. of information variable}}{\text{Total information variable}}$ = 1/7=0.14, WNA2 = 9.
- NA3 = $\frac{\text{no. of closed loop}}{\text{Total closed loop}}$ = 0/4=0, WNA2 = 9.
- I*Ivalue = $\frac{FA* WF + NA1 * WNA1 + NA2 * WNA2 + NA3 *WNA3}{WF + WNA1 + WNA2 + WNA3}$

  = 0.22.

back

SD Equations

(01) "Factory Order Backlog (200 items)"= INTEG (+retailer orders-factory production,200)
Units: units.
(2) factory production=400
Units: **undefined**
(03) FINAL TIME = 50
Units: week
The final time for the simulation.
(04) INITIAL TIME = 0
Units: week
The initial time for the simulation.
(05) "Retail Inventory (400 items)"= INTEG (factory production-Retail Sales,400)
Units: units
(06) Retail Sales=TESt input
Units: units/week
(07) retailer orders=200+STEP(20,10)
Units: units/week
(8) SAVEPER = 0.25
Units: week [0,?]
The frequency with which output is stored.
(9) TESt input= 100+STEP(20, 10)
Units: **undefined**
(10) TIME STEP = 0.25
Units: week [0,?]
The time step for the simulation.



factory production

Current: 400 E:\natasha\vensin\project\model1\(

I*Ivalue for the Policy 1

$$= \frac{\text{IIvalue1* W1 + IIvalue2 * W2}}{\text{W1 + W2}} = (\ 0.32*9+0.22*9)/18 = 0.27$$

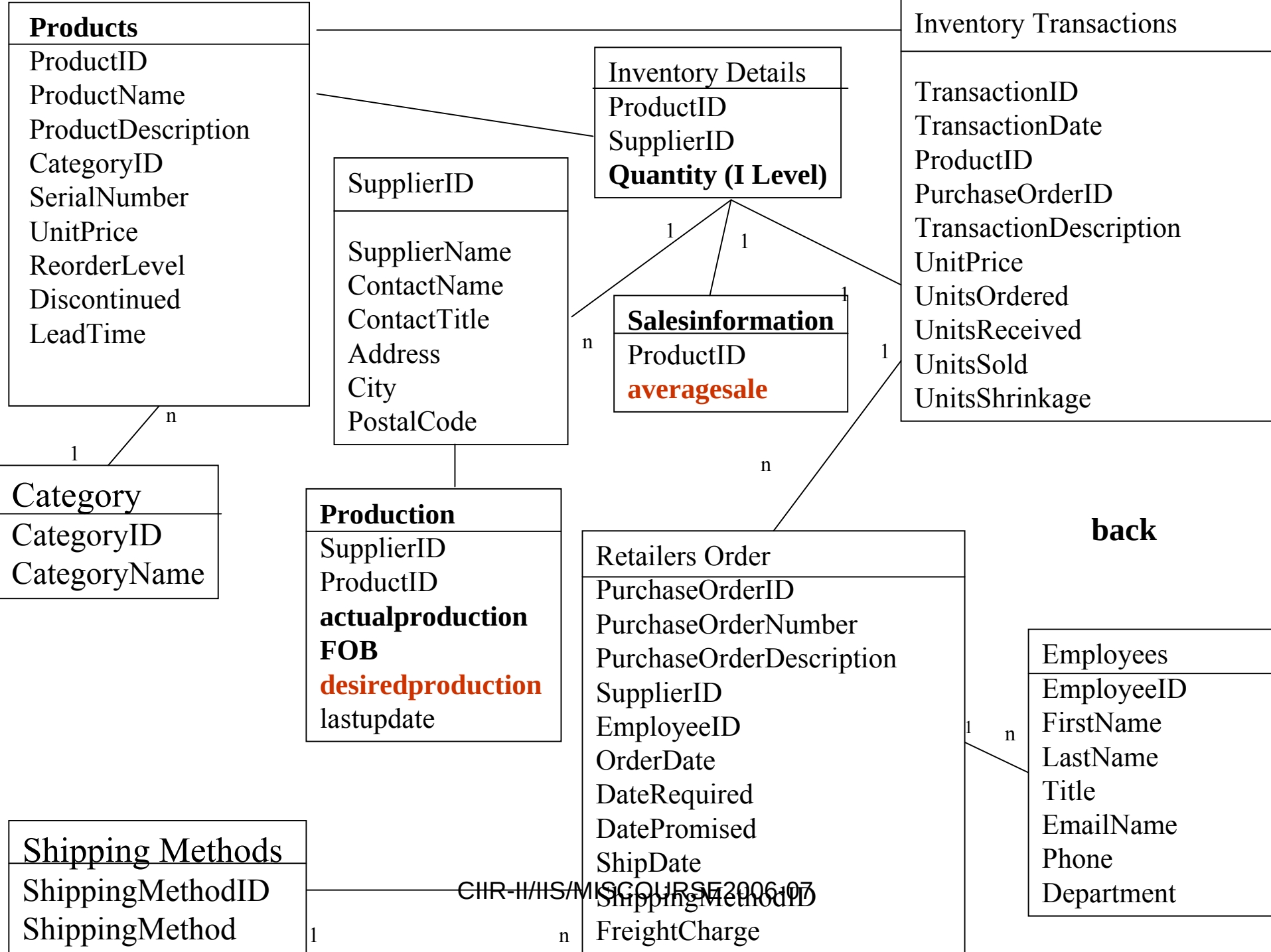
I*I Risk for the Policy 1

= 1 – 0.27 = 0.73.

W1 = 9, W2 = 9.

Analysis: I*Ivalue is 0.27 which is poor and means information (design) is incomplete and imperfect

- Policy 2: Retailer orders' policy based on average over a time period.
  - Data Model.
  - I*Ivalue for corresponding data model and I*I Risk.
  - Systems Dynamic Model.
  - I*Ivalue for corresponding SD model and I*I Risk.
  - I*Ivalue of the Policy 2 & I*I Risk of the Policy 2.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Discontinued
LeadTime
Inventory Transactions
TransactionID
TransactionDate
ProductID
PurchaseOrderID
TransactionDescription
UnitPrice
UnitsOrdered
UnitsReceived
UnitsSold
UnitsShrinkage
Inventory Details
ProductID
SupplierID
Quantity (I Level)
SupplierID
SupplierName
ContactName
ContactTitle
Address
City
PostalCode
Salesinformation
ProductID
averagesale
Category
CategoryID
CategoryName
Production
SupplierID
ProductID
actualproduction
FOB
desiredproduction
lastupdate
Retailers Order
PurchaseOrderID
PurchaseOrderNumber
PurchaseOrderDescription
SupplierID
EmployeeID
OrderDate
DateRequired
DatePromised
ShipDate
ShippingMethodID
FreightCharge
Employees
EmployeeID
FirstName
LastName
Title
EmailName
Phone
Department
Shipping Methods
ShippingMethodID
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1
n
back

I*Ivalue for corresponding data model.

- **I*Ivalue = 0.38.**
- **I*I Risk = 0.62.**

The Method and formula

- Assume the factual accuracy FA = 0.7. The weight associated is WF = 8.
- NA1 = 0.1, WA1 = 9
- $$\text{I*Ivalue} = \frac{\text{FA* WF} + \text{NA1 * WNA1}}{\text{WF} + \text{WNA1}}$$

$$= (0.7*8 + 0.1*9)/ (8+9)$$

$$= 0.38.$$

back

I*Ivalue for corresponding SD model

- I*Ivalue = 0.38
- I*I Risk = 0.62

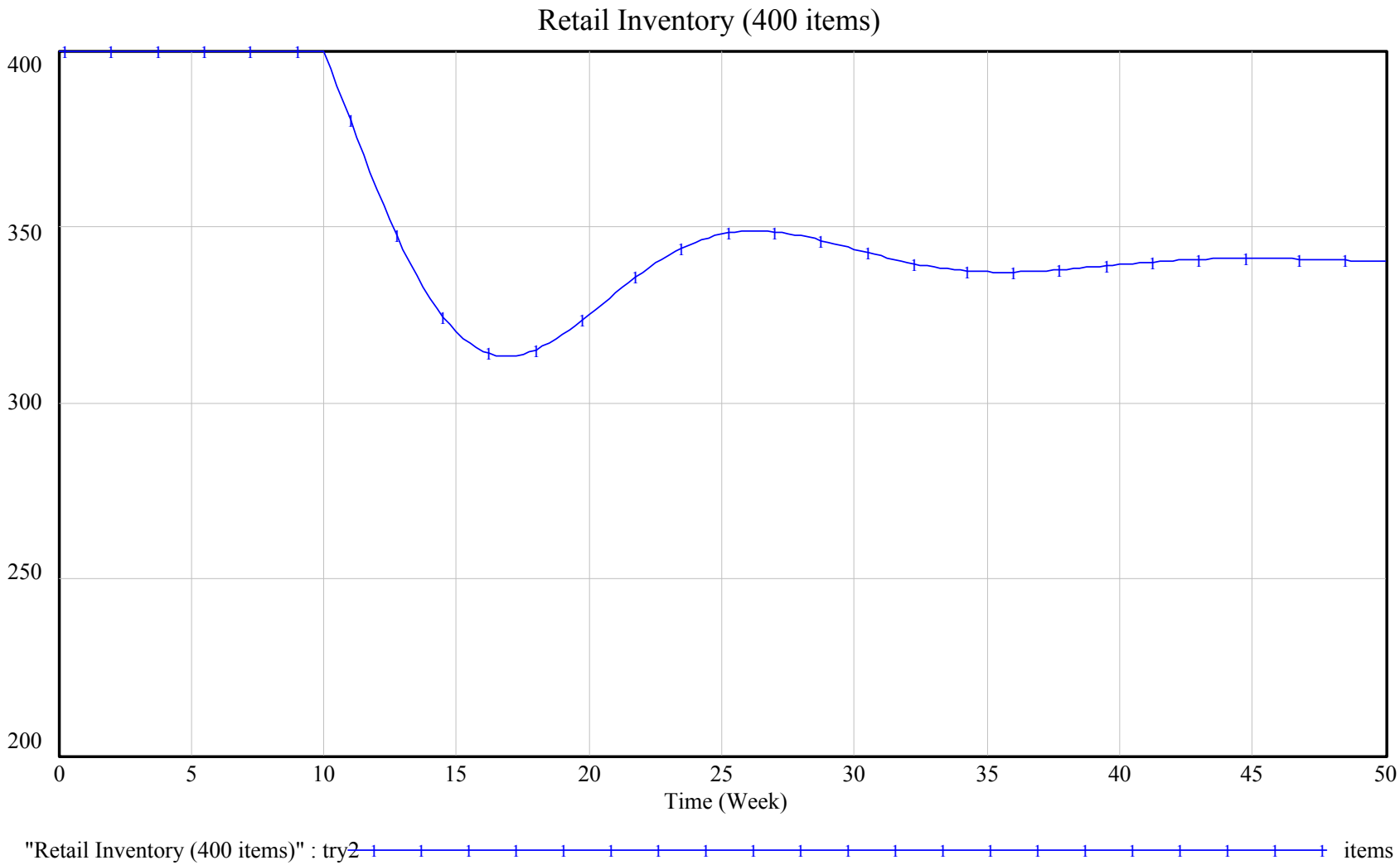
Method and Formula

- Factual Accuracy FA =0.7, WF = 8.
- NA1 = $\frac{\text{no. of information flows}}{\text{Total information flows}}$ = 10/21 = 0.47, WNA1 = 9
- NA2 = $\frac{\text{no. of information variable}}{\text{Total information variable}}$ = 3/7=0.14, WNA2 = 9.
- NA3 = $\frac{\text{no. of closed loop}}{\text{Total closed loop}}$ = 1/4=0.25, WNA2 = 9.
- I*Ivalue = $\frac{FA* WF + NA1 * WNA1 + NA2 * WNA2 + NA3 *WNA3}{WF + WNA1 + WNA2 + WNA3}$

  = 0.38.

back

(01) average retail sales= ACTIVE INITIAL (SMOOTH(retail sales, TIME TO AVERAGE SALES),retail sales)
Units: items/Week
(02) desired production="Factory Order Backlog (200 items)"/TARGET PRODUCTION DELAY
Units: items/Week
(03) "Factory Order Backlog (200 items)"= INTEG (+retailer orders-factory production,200)
Units: items
(04) factory production= SMOOTH(desired production, TIME TO ADJUST PRODUCTION)
Units: items/Week
(05) FINAL TIME = 50
Units: Week
(06) INITIAL TIME = 0
Units: Week
(07) "Retail Inventory (400 items)"= INTEG (-retail sales+factory production,400)
Units: items
(08) retail sales= test input
Units: items/Week
(09) retailer orders=average retail sales
Units: items/Week


Retail Inventory (400 items)
400
350
300
250
200
0
5
10
15
20
25
30
35
40
45
50
Time (Week)
"Retail Inventory (400 items)" : try2
items

I*Ivalue for the Policy 2

$$= \frac{\text{IIvalue1* W1 + IIvalue2 * W2}}{\text{W1 + W2}} = (\ 0.38*9+0.38*9)/18 = 0.38$$

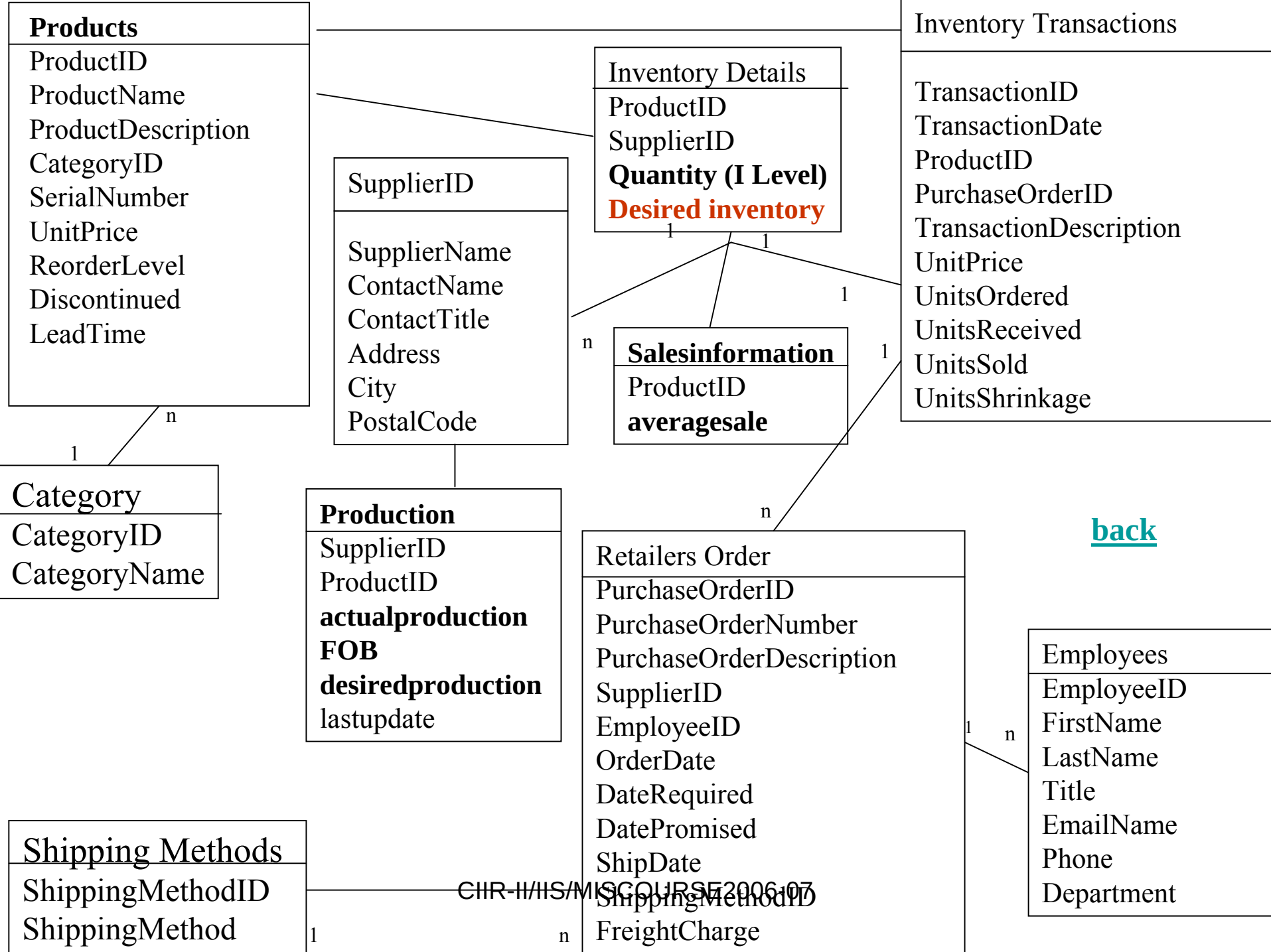
I*I Risk for the Policy 2

= 1 – 0.38 = 0.62.

W1 = 9, W2 = 9.

Analysis: I*Ivalue is 0.38 which is still poor and means information (design) is incomplete and imperfect

- Policy 3:Includes the inventory adjustment i.e. difference in desired and actual inventory over time to adjust it, along with average sales
  - Data Model.
  - I*Ivalue for corresponding data model and I*I Risk.
  - Systems Dynamic Model.
  - I*Ivalue for corresponding SD model and I*I Risk.
  - I*Ivalue of the Policy 3 & I*I Risk of the Policy 3.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Discontinued
LeadTime
Inventory Transactions
TransactionID
TransactionDate
ProductID
PurchaseOrderID
TransactionDescription
UnitPrice
UnitsOrdered
UnitsReceived
UnitsSold
UnitsShrinkage
Inventory Details
ProductID
SupplierID
Quantity (I Level)
Desired inventory
SupplierID
SupplierName
ContactName
ContactTitle
Address
City
PostalCode
Salesinformation
ProductID
averagesale
Category
CategoryID
CategoryName
Production
SupplierID
ProductID
actualproduction
FOB
desiredproduction
lastupdate
Retailers Order
PurchaseOrderID
PurchaseOrderNumber
PurchaseOrderDescription
SupplierID
EmployeeID
OrderDate
DateRequired
DatePromised
ShipDate
ShippingMethodID
FreightCharge
Employees
EmployeeID
FirstName
LastName
Title
EmailName
Phone
Department
Shipping Methods
ShippingMethodID
ShippingMethod
1
n
1
n
1
n
1
1
1
n
1
n
1
n

back

I*Ivalue for corresponding data model.

- **I*Ivalue =0.48,**
- **I*I Risk = 0.52.**

The Method and formula

- Assume the factual accuracy FA = 0.7. The weight associated is WF = 8.
- NA1 = 0.3, WA1 = 9
- $$\text{I*Ivalue} = \frac{\text{FA* WF} + \text{NA1 * WNA1}}{\text{WF} + \text{WNA1}}$$

$$= (0.7*8 + 0.3*9)/ (8+9)$$

$$= 0.48.$$

back

I*Ivalue for corresponding SD model

- I*Ivalue = 0.57
- I*I Risk = 0.43

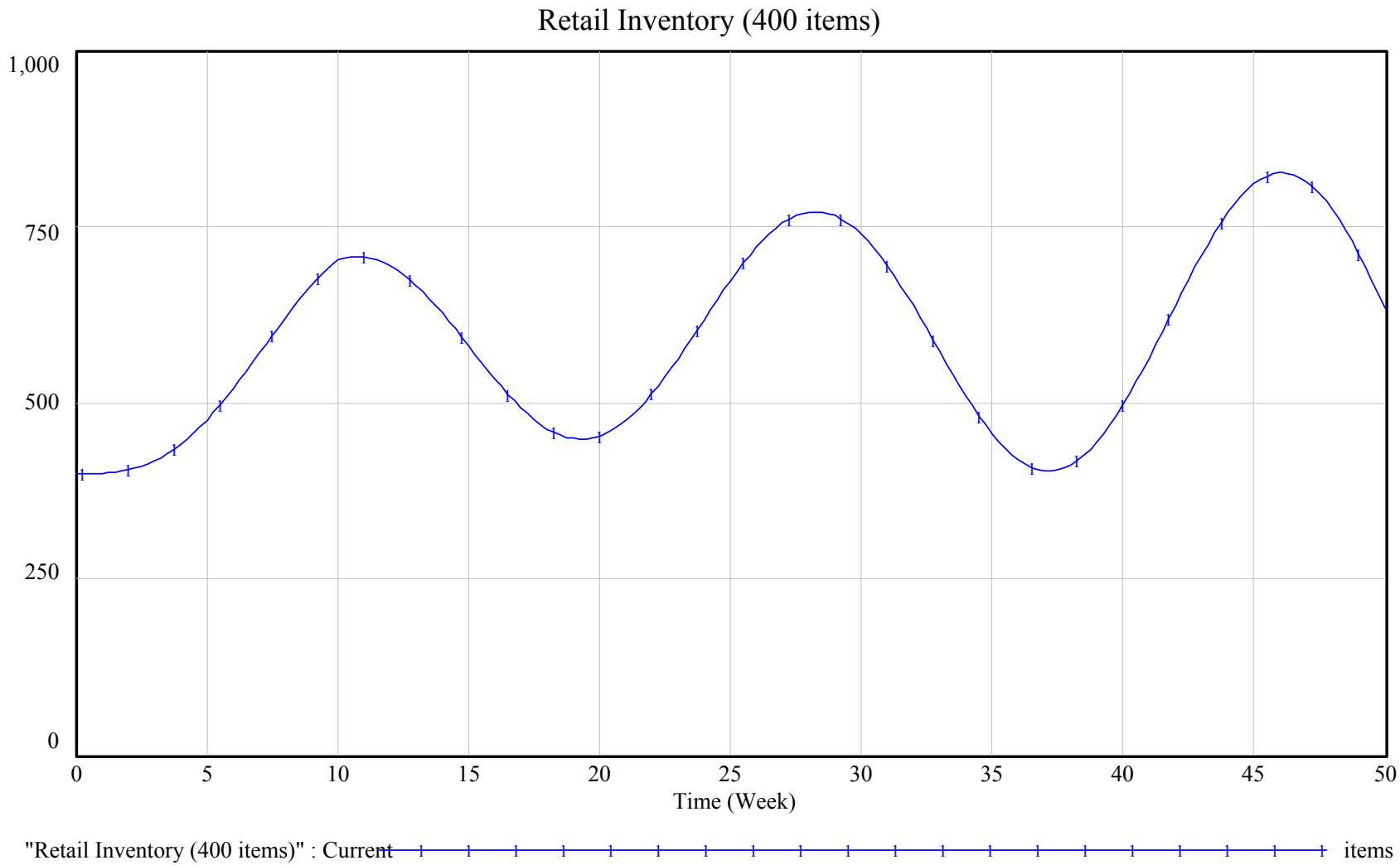
Method and Formula

- Factual Accuracy FA =0.7, WF = 8.
- NA1 = $\frac{\text{no. of information flows}}{\text{Total information flows}}$ = 12/21 = 0.57, WNA1 = 9
- NA2 = $\frac{\text{no. of information variable}}{\text{Total information variable}}$ = 4/7=0.57, WNA2 = 9.
- NA3 = $\frac{\text{no. of closed loop}}{\text{Total closed loop}}$ = 2/4 =0.5, WNA2 = 9.
- I*Ivalue = $\frac{FA* WF + NA1 * WNA1 + NA2 * WNA2 + NA3 *WNA3}{WF + WNA1 + WNA2 + WNA3}$

  = 0.57.

back

(01) average retail sales= ACTIVE INITIAL (SMOOTH(retail sales, TIME TO AVERAGE SALES),retail sales)
Units: items/Week
(02) "DESIRED INVENTORY (600 items)"=600
Units: items
(03) desired production="Factory Order Backlog (200 items)"/TARGET PRODUCTION DELAY
Units: items/Week
(04) "Factory Order Backlog (200 items)"= INTEG (+retailer orders-factory production,200)
Units: items
(05) factory production=SMOOTH(desired production, TIME TO ADJUST PRODUCTION)
Units: items/Week
(06) FINAL TIME = 50
Units: Week
(07) INITIAL TIME = 0
Units: Week
(08) "Retail Inventory (400 items)"= INTEG (-retail sales+factory production,400)
Units: items
(09) retail sales=test input
Units: items/Week
(10) retailer orders=average retail sales+ ("DESIRED INVENTORY (600 items)" - "Retail Inventory (400 items)") / TIME TO ADJUST INVENTORY
Units: items/Week


Retail Inventory (400 items)
1,000
750
500
250
0
0
5
10
15
20
25
30
35
40
45
50
Time (Week)
"Retail Inventory (400 items)" : Current
items

I*Ivalue for the Policy 3

$$= \frac{\text{IIvalue1} * W1 + \text{IIvalue2} * W2}{W1 + W2} = (0.48*9+0.57*9)/18 = 0.52$$

I*I Risk for the Policy 3

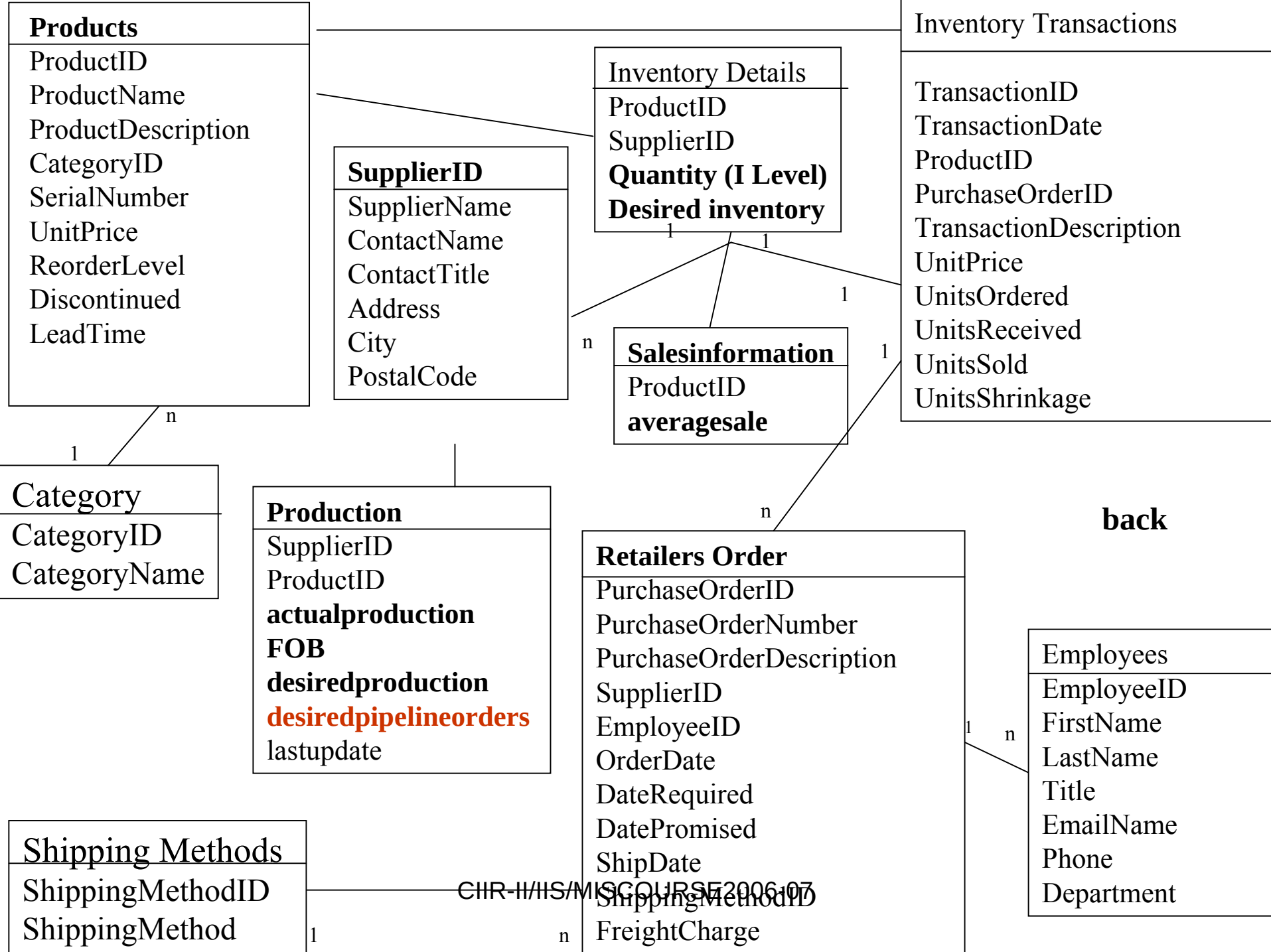
= 1 – 0.52 = 0.48.

W1 = 9, W2 = 9.

Analysis: The policy has desired inventory as benchmark to check inventory level against it. It aims at bringing the actual inventory close to desired inventory.

This policy is better.

- Policy 4: Policy includes the inventory adjustment i.e. difference in desired and actual inventory over time to adjust it, average sales and also the desired pipeline orders
  - Data Model.
  - I*Ivalue for corresponding data model and I*I Risk.
  - Systems Dynamic Model.
  - I*Ivalue for corresponding SD model and I*I Risk.
  - I*Ivalue of the Policy 4 & I*I Risk of the Policy 4.


Products
ProductID
ProductName
ProductDescription
CategoryID
SerialNumber
UnitPrice
ReorderLevel
Discontinued
LeadTime
Inventory Transactions
TransactionID
TransactionDate
ProductID
PurchaseOrderID
TransactionDescription
UnitPrice
UnitsOrdered
UnitsReceived
UnitsSold
UnitsShrinkage
Inventory Details
ProductID
SupplierID
Quantity (I Level)
Desired inventory
SupplierID
SupplierName
ContactName
ContactTitle
Address
City
PostalCode
Salesinformation
ProductID
averagesale
Category
CategoryID
CategoryName
Production
SupplierID
ProductID
actualproduction
FOB
desiredproduction
desiredpipelineorders
lastupdate
Retailers Order
PurchaseOrderID
PurchaseOrderNumber
PurchaseOrderDescription
SupplierID
EmployeeID
OrderDate
DateRequired
DatePromised
ShipDate
ShippingMethodID
FreightCharge
Employees
EmployeeID
FirstName
LastName
Title
EmailName
Phone
Department
Shipping Methods
ShippingMethodID
ShippingMethod
1
n
back

I*Ivalue for corresponding data model.

- **I*Ivalue =0.7,**
- **I*I Risk = 0.3.**

The Method and formula

- Assume the factual accuracy FA = 0.7. The weight associated is WF = 8.
- NA1 = 0.7, WA1 = 9
- $$\text{I*Ivalue} = \frac{\text{FA* WF} + \text{NA1 * WNA1}}{\text{WF} + \text{WNA1}}$$

$$= (0.7*8 + 0.7*9)/ (8+9)$$

$$= 0.7.$$

back

I*Ivalue for corresponding SD model

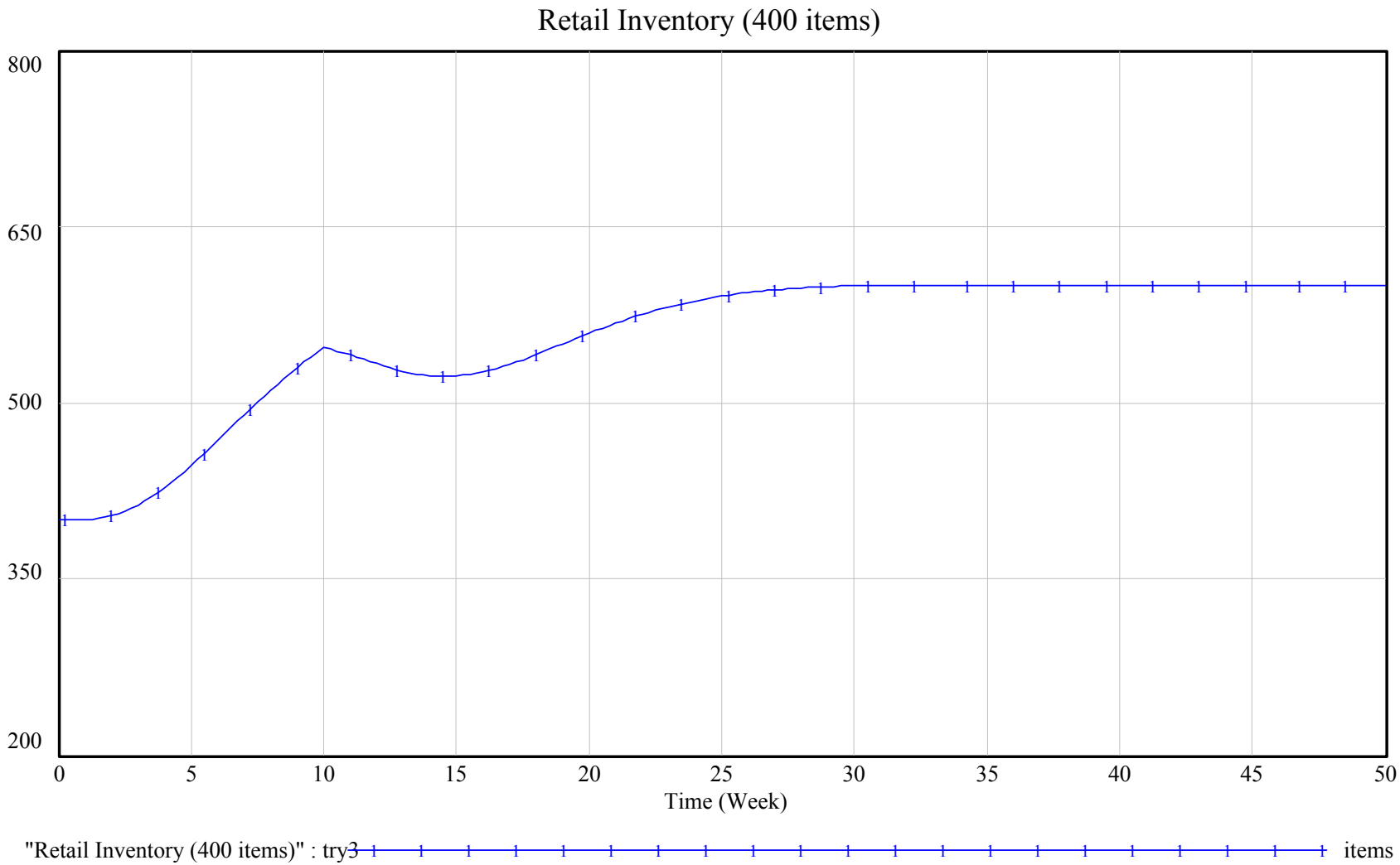
- I*Ivalue = 0.75
- I*I Risk = 0.25

Method and Formula

- Factual Accuracy FA =0.7, WF = 8.
- NA1 = $\frac{\text{no. of information flows}}{\text{Total information flows}}$ = 16/21 = 0.76, WNA1 = 9
- NA2 = $\frac{\text{no. of information variable}}{\text{Total information variable}}$ = 6/7=0.8, WNA2 = 9.
- NA3 = $\frac{\text{no. of closed loop}}{\text{Total closed loop}}$ = 3/4 =0.75, WNA2 = 9.
- I*Ivalue = $\frac{FA* WF + NA1 * WNA1 + NA2 * WNA2 + NA3 *WNA3}{WF + WNA1 + WNA2 + WNA3}$

  = 0.75.

(01)average retail sales= ACTIVE INITIAL (SMOOTH(retail sales, TIME TO AVERAGE SALES),retail sales)
Units: items/Week
(02)DELAY IN RECEIVING ORDERS=2
Units: Week
(03)"DESIRED INVENTORY (600 items)"=600
Units: items
(04)desired pipeline orders=
DELAY IN RECEIVING ORDERS*average retail sales
Units: Week
(05)desired production="Factory Order Backlog (200 items)"/TARGET PRODUCTION DELAY
Units: items/Week
(06)"Factory Order Backlog (200 items)"= INTEG (+retailer orders-factory production,200)
Units: items
(07)factory production=SMOOTH(desired production, TIME TO ADJUST PRODUCTION)
Units: items/Week
(08)FINAL TIME = 50
Units: Week
(09)INITIAL TIME = 0
Units: Week
(10)"Retail Inventory (400 items)"= INTEG (-retail sales+factory production,400)
Units: items
(11)retail sales=TESt input
Units: items/Week
(12)retailer orders=average retail sales+ ("DESIRED INVENTORY (600 items)" - "Retail Inventory (400 items)"
) / TIME TO ADJUST INVENTORY + (desired pipeline orders - "Factory Order Backlog (200 items)"
)/ TIME TO ADJUST PIPELINE
units: items/Week


Retail Inventory (400 items)
800
650
500
350
200
0
5
10
15
20
25
30
35
40
45
50
Time (Week)
"Retail Inventory (400 items)" : try3
items

I*Ivalue for the Policy 4

$$= \frac{IIvalue1 * W1 + IIvalue2 * W2}{W1 + W2} = (0.7*9+0.75*9)/18 = 0.72.$$

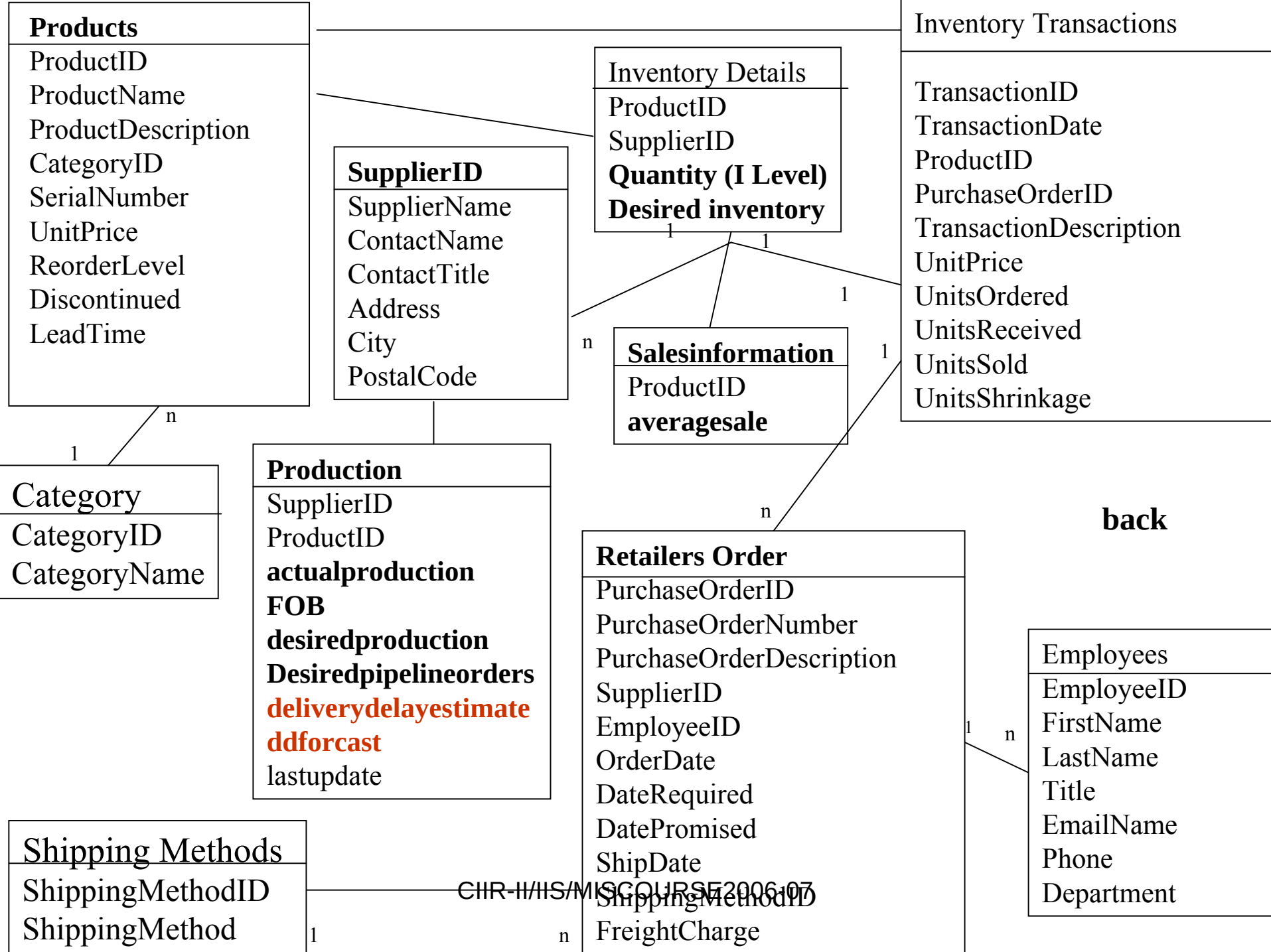
I*I Risk for the Policy 4

$= 1 - 0.72 = 0.28.$

W1 = 9, W2 = 9.

Analysis: This policy is better.

- Policy 5: Policy include the inventory adjustment i.e. difference in desired and actual inventory over time to adjust it, average sales and also the desired pipeline orders.
  - Data Model.
  - I*Ivalue for corresponding data model and I*I Risk.
  - Systems Dynamic Model.
  - I*Ivalue for corresponding SD model and I*I Risk.
  - I*Ivalue of the Policy 5 & I*I Risk of the Policy 5.


Products
ProductID
ProductName
ProductDescription
CategoryID
SerialNumber
UnitPrice
ReorderLevel
Discontinued
LeadTime
Inventory Transactions
TransactionID
TransactionDate
ProductID
PurchaseOrderID
TransactionDescription
UnitPrice
UnitsOrdered
UnitsReceived
UnitsSold
UnitsShrinkage
Inventory Details
ProductID
SupplierID
Quantity (I Level)
Desired inventory
SupplierID
SupplierName
ContactName
ContactTitle
Address
City
PostalCode
Salesinformation
ProductID
averagesale
Category
CategoryID
CategoryName
Production
SupplierID
ProductID
actualproduction
FOB
desiredproduction
Desiredpipelineorders
deliverydelayestimate
ddforcast
lastupdate
Retailers Order
PurchaseOrderID
PurchaseOrderNumber
PurchaseOrderDescription
SupplierID
EmployeeID
OrderDate
DateRequired
DatePromised
ShipDate
ShippingMethodID
FreightCharge
Employees
EmployeeID
FirstName
LastName
Title
EmailName
Phone
Department
Shipping Methods
ShippingMethodID
ShippingMethod
1
n
back

I*Ivalue for corresponding data model.

- **I*Ivalue =0.85,**
- **I*I Risk = 0.15.**

The Method and formula

- Assume the factual accuracy FA = 0.7. The weight associated is WF = 8.
- NA1 = 0.7, WA1 = 9
- $$I*Ivalue = \frac{FA* WF + NA1 * WNA1}{WF + WNA1}$$

$$= (0.7*8 + 1*9)/ (8+9).$$

$$= 0.85.$$

back

I*Ivalue for corresponding SD model

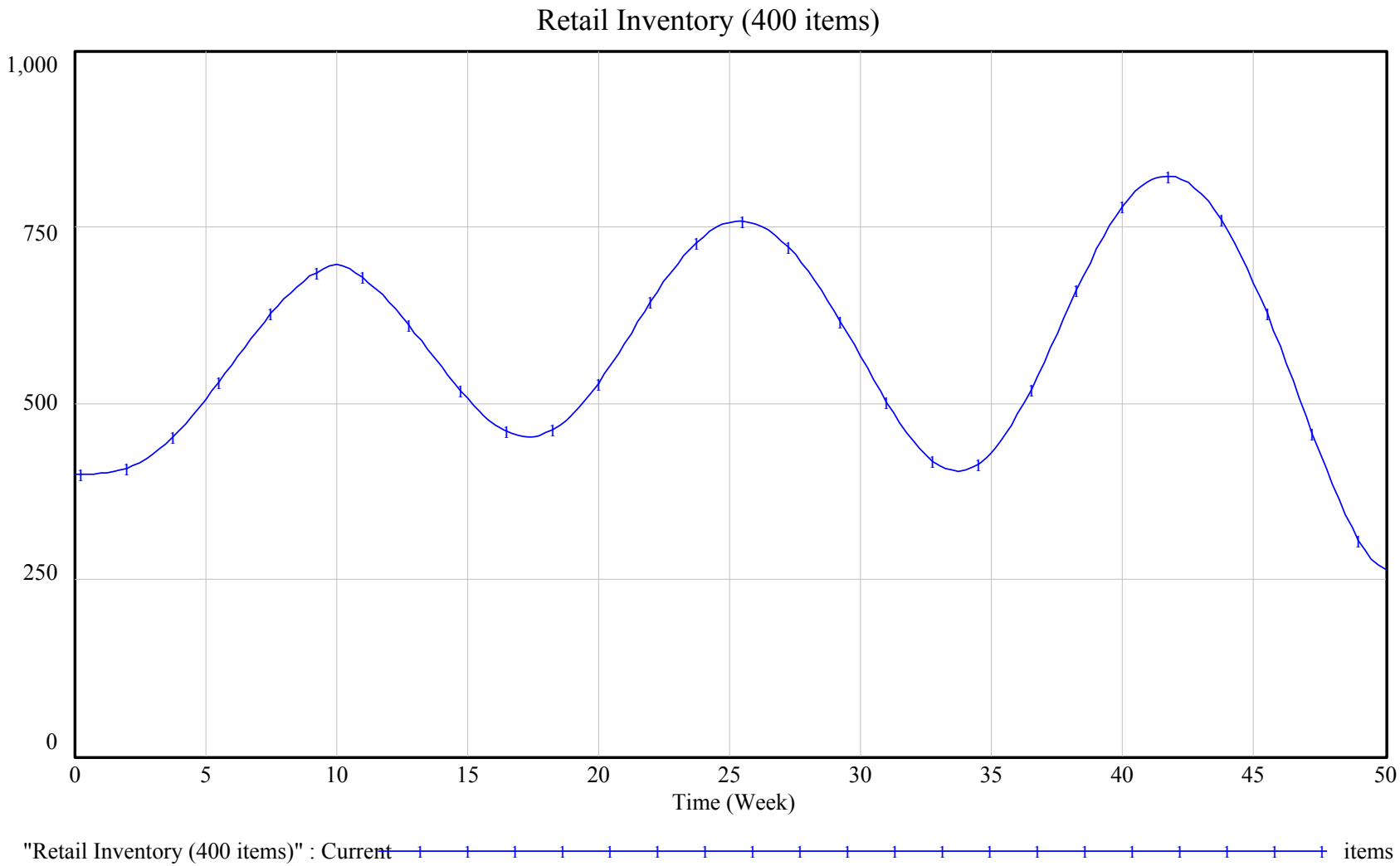
- I*Ivalue = 0.95
- I*I Risk = 0.05

Method and Formula

- Factual Accuracy FA =0.7, WF = 8.
- NA1 = $\frac{\text{no. of information flows}}{\text{Total information flows}}$ = 21/21 = 1, WNA1 = 9
- NA2 = $\frac{\text{no. of information variable}}{\text{Total information variable}}$ = 7/7=1, WNA2 = 9.
- NA3 = $\frac{\text{no. of closed loop}}{\text{Total closed loop}}$ = 4/4 =1, WNA2 = 9.
- I*Ivalue = $\frac{FA^* WF + NA1 * WNA1 + NA2 * WNA2 + NA3 * WNA3}{WF + WNA1 + WNA2 + WNA3}$

  = 0.95.

(01)average retail sales= ACTIVE INITIAL (SMOOTH(retail sales, TIME TO AVERAGE SALES),retail sales)
Units: items/Week
(02)delivery delay estimate="Factory Order Backlog (200 items)" / factory production
Units: Week
(03)delivery delay forecast by retailer=SMOOTH(delivery delay estimate, TIME TO DETECT DELIVERY DELAY)
units: Week
(04)"DESIRED INVENTORY (600 items)"=600
Units: items
(05)desired pipeline orders=delivery delay forecast by retailer * average retail sales
Units: Week
(06)desired production="Factory Order Backlog (200 items)"/TARGET PRODUCTION DELAY
Units: items/Week
(07)"Factory Order Backlog (200 items)"= INTEG (+retailer orders-factory production,200)
Units: items
(08)factory production=SMOOTH(desired production, TIME TO ADJUST PRODUCTION)
Units: items/Week
(11)"Retail Inventory (400 items)"= INTEG (-retail sales+factory production,400)
Units: items
(12)retail sales=TESt input
Units: items/Week
(13)retailer orders=average retail sales+ ("DESIRED INVENTORY (600 items)" - "Retail Inventory (400 items)"
) / TIME TO ADJUST INVENTORY + (desired pipeline orders - "Factory Order Backlog (200 items)"
)/ TIME TO ADJUST PIPELINE
Units: items/Week


Retail Inventory (400 items)
1,000
750
500
250
0
0
5
10
15
20
25
30
35
40
45
50
Time (Week)
"Retail Inventory (400 items)" : Current
items

I*Ivalue for the Policy 5

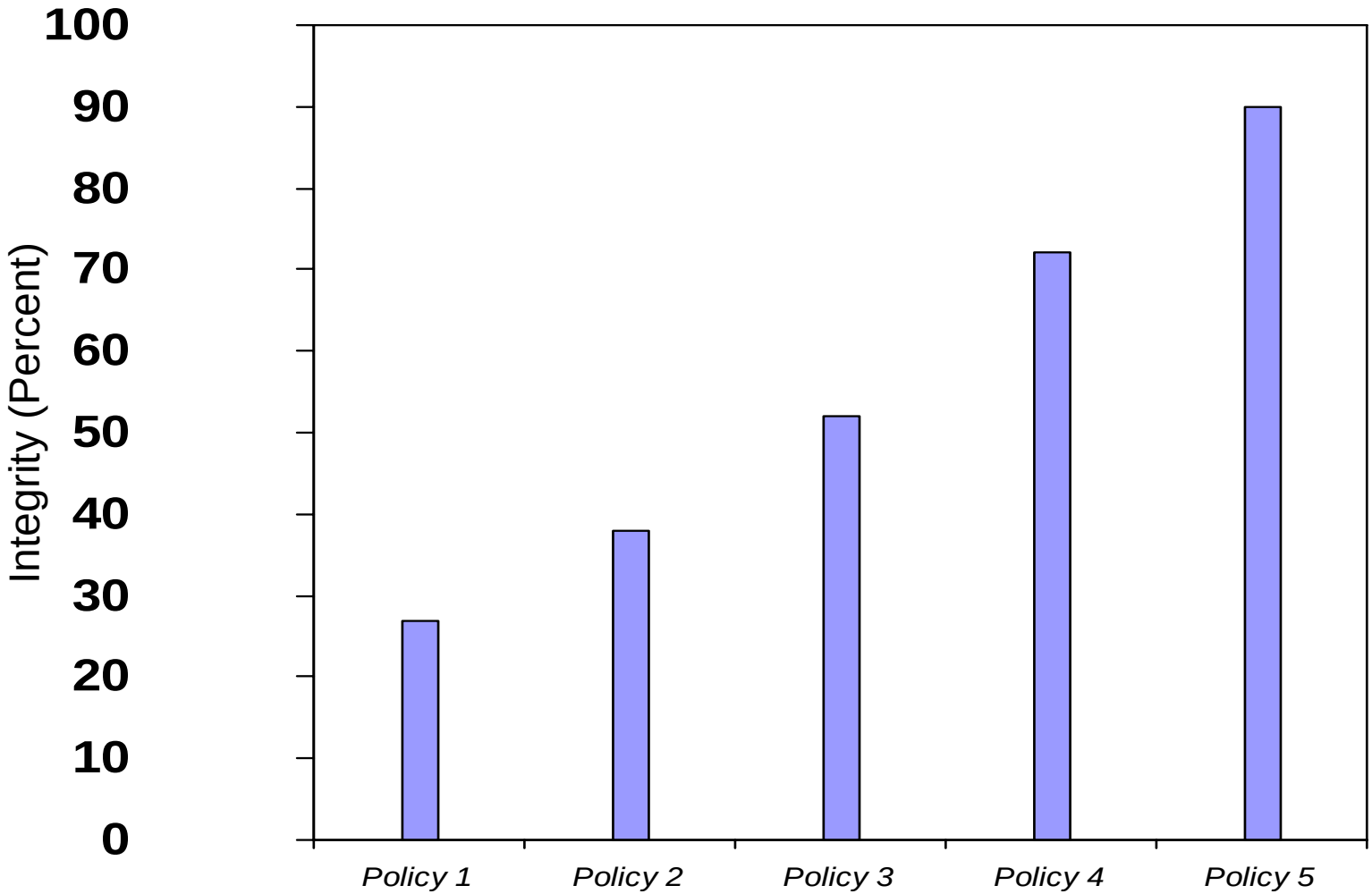
$$= \frac{IIvalue1 * W1 + IIvalue2 * W2}{W1 + W2} = (0.85*9+0.95*9)/18 = 0.9$$

I*I Risk for the Policy 5

= 1 – 0.95 = 0.05.

W1 = 9, W2 = 9.

Analysis: The Policy 4 and 5 both have high integrity values, but the issue is which of the one would be best suited for the retailer? To answer this, the I*I researchers would take support of the cost benefit analysis


100
90
80
70
60
50
40
30
20
10
0
Integrity (Percent)
Policy 1
Policy 2
Policy 3
Policy 4
Policy 5

Utilization Cycle.

- Utilization Cycle recognizes that the customer has its own information processing and would use the product as per his convenience.
- Keeping this in mind the UC contains all the decision mile post from D0-D25, giving flexibility to the customer to operate within the confines of the designer boundary.
- Integrity of this UC must also be ensured.

Feedback

Conclusion.