A light blue world map is centered in the background of the slide, showing the continents in a slightly darker shade of blue.

B2B E-Commerce System : Specification and Implementation Employing Use-Case Diagrams, Digital Signatures and XML

Case Study

Int'l Symp. on Multimedia SE, Dec 11th–13th, 2002
Newport Beach, California

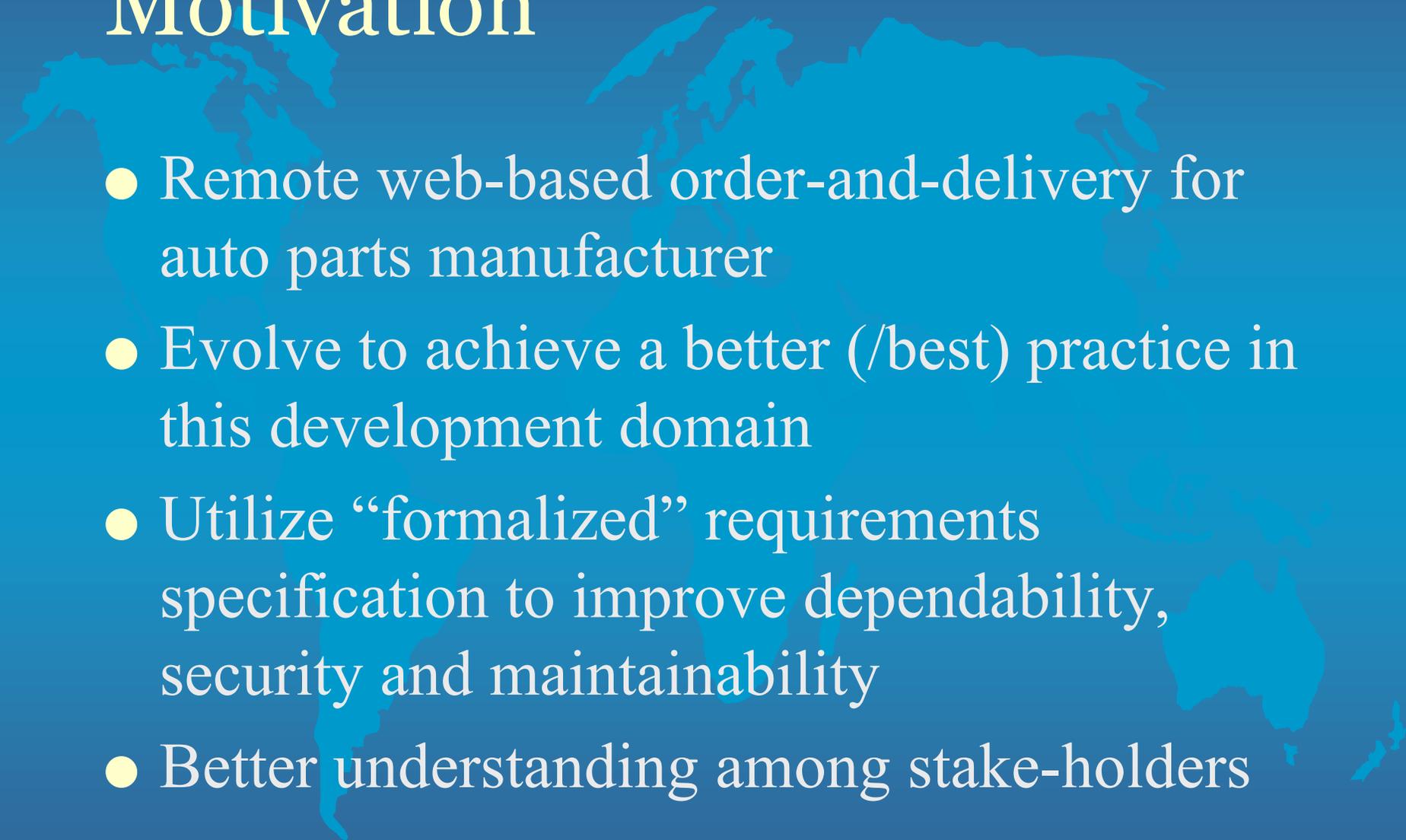
Frederick T. Sheldon, Kshamta Jerath, Orest Pilskalns, Young-Jik Kwon,
Woo-Hun Kim and Hong Chung

Software Engineering for Dependable Systems (SEDS) Laboratory
Sch of EECS Wash State U, Sch of Comp & Comm, Taegu U, Comp Engr, Keimyung U

Agenda

- Introduction and Technology Overview
- Background Information and Related Research
 - ❖ Related work on Use-Case Diagram
 - ❖ B2B Electronic Commerce and XML
 - ❖ Digital Signatures
 - ❖ Success factors for B2B e-commerce systems
- Empirical Study
 - ❖ Research Process and Methodology
 - ❖ User's Requirements and Use-Case Diagram
- Implementation and Tangible Benefits
- Conclusions

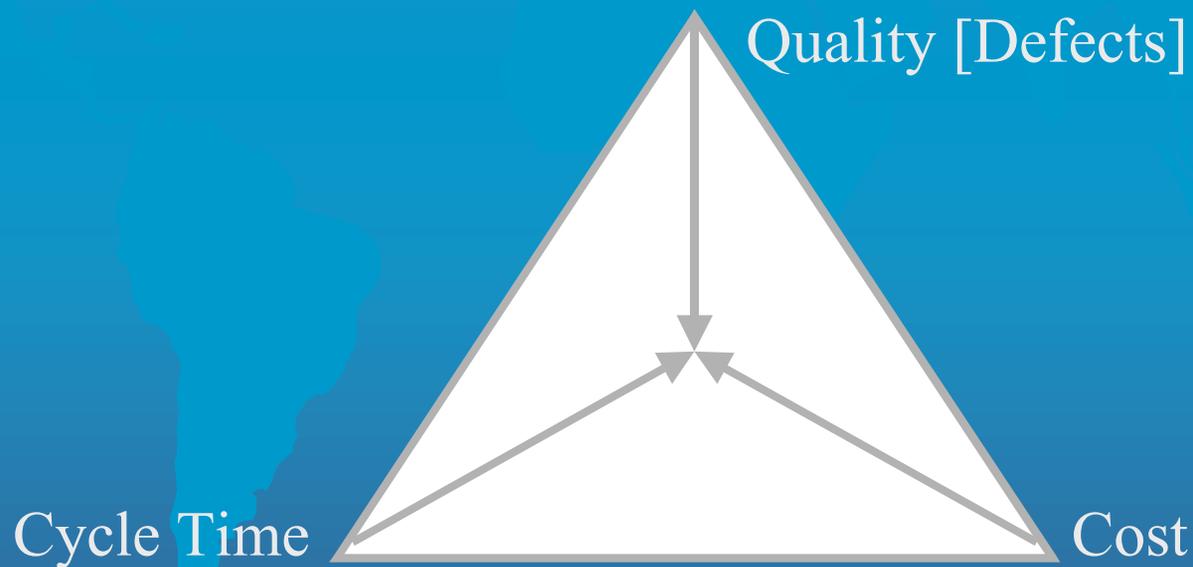
Motivation



- Remote web-based order-and-delivery for auto parts manufacturer
- Evolve to achieve a better (/best) practice in this development domain
- Utilize “formalized” requirements specification to improve dependability, security and maintainability
- Better understanding among stake-holders

Right process for the product to ensure ... and no *silver bullet!*

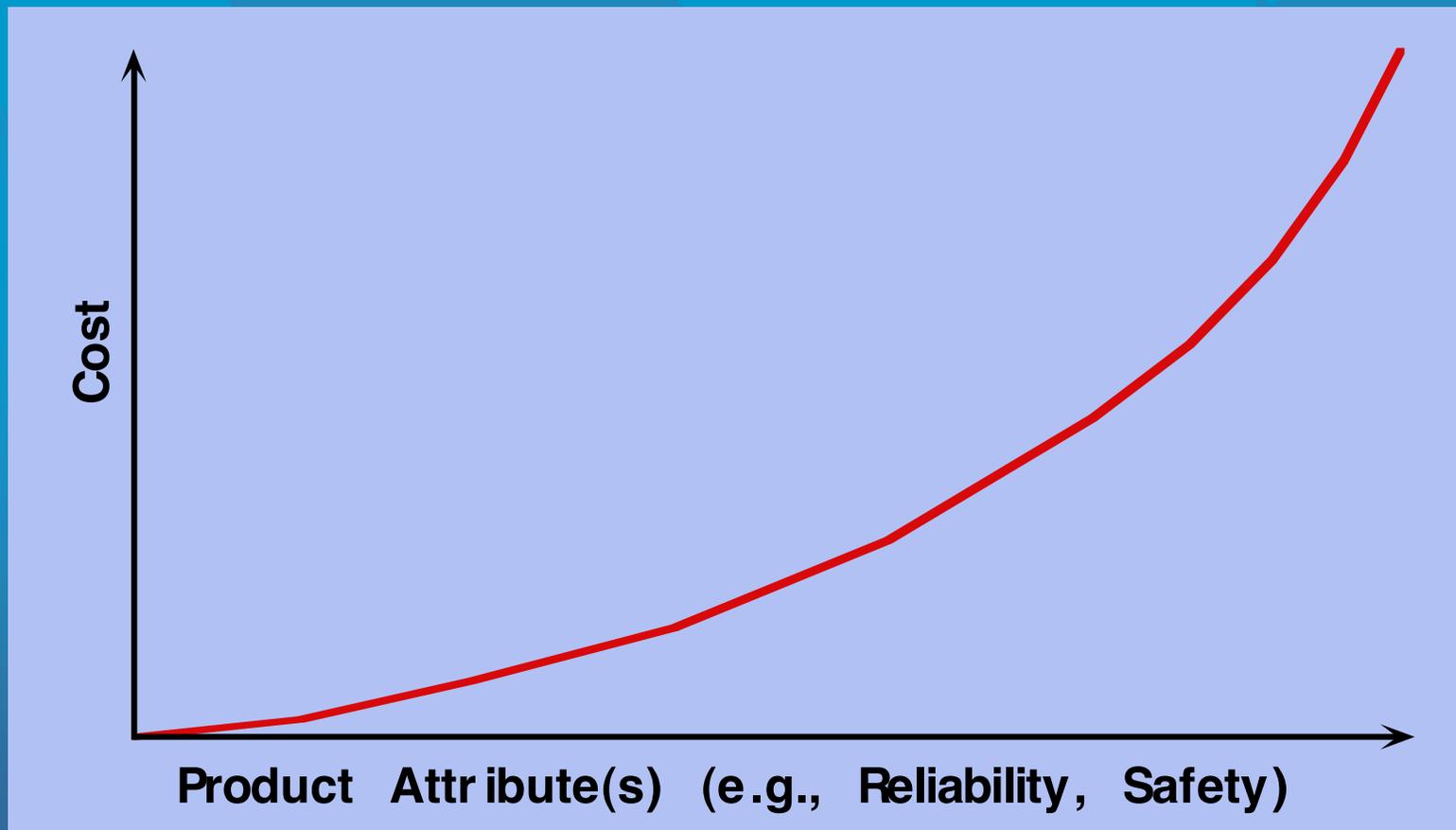
- High quality software with competitive cost and cycle time...



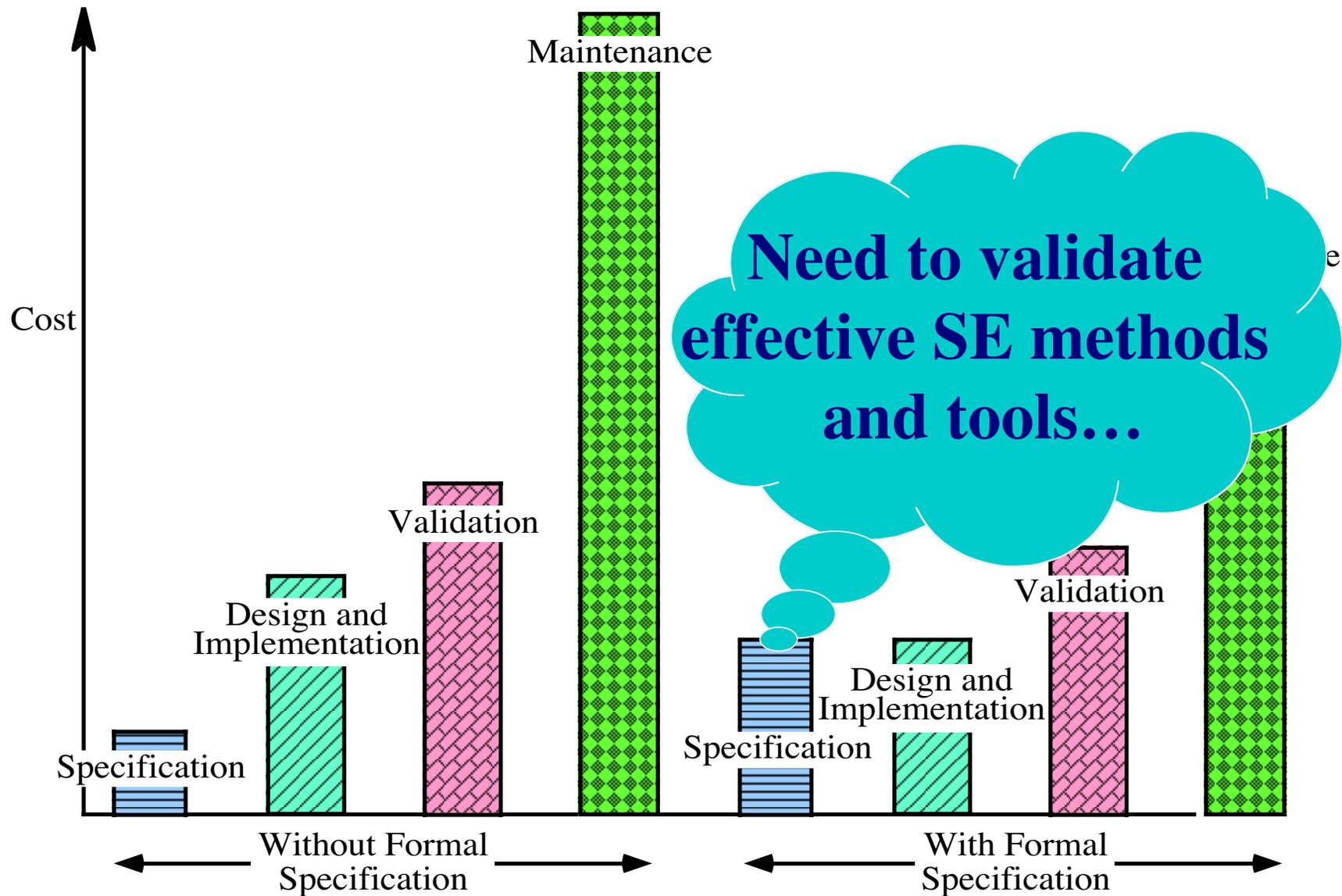
... we must shrink the triangle!

Quality Attribute(s) Versus Cost Relation

Moore's law of Software Engineering



SLC Expenditure Profile



Introduction / Technology Overview

- Today's systems are complex and user requirements are changing rapidly (reqs creep)
- Visually model the system's architecture to promote communication/understanding
- Güell et. al., present a method that utilizes
 - requirements gathering
 - conceptual and navigational design of Web applications
 - based on Scenarios, Use-Case and User Interaction Diagrams (UIDs)
- Document B2B e-commerce system development

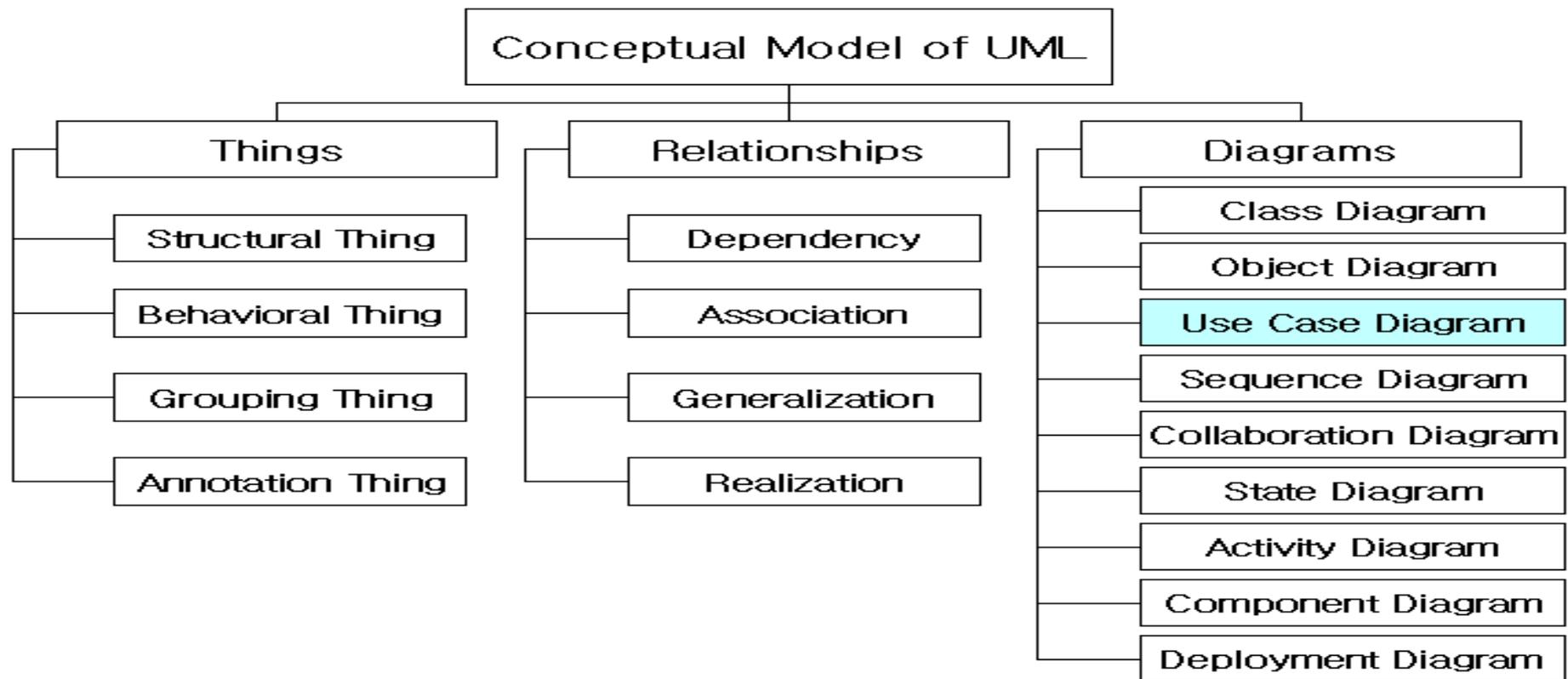
Introduction & Technology Overview II



- Critical success factors of concern
 - Effective communication
 - Processing time
 - Process cost
 - Reusability
 - Efficiency
 - Security etc.

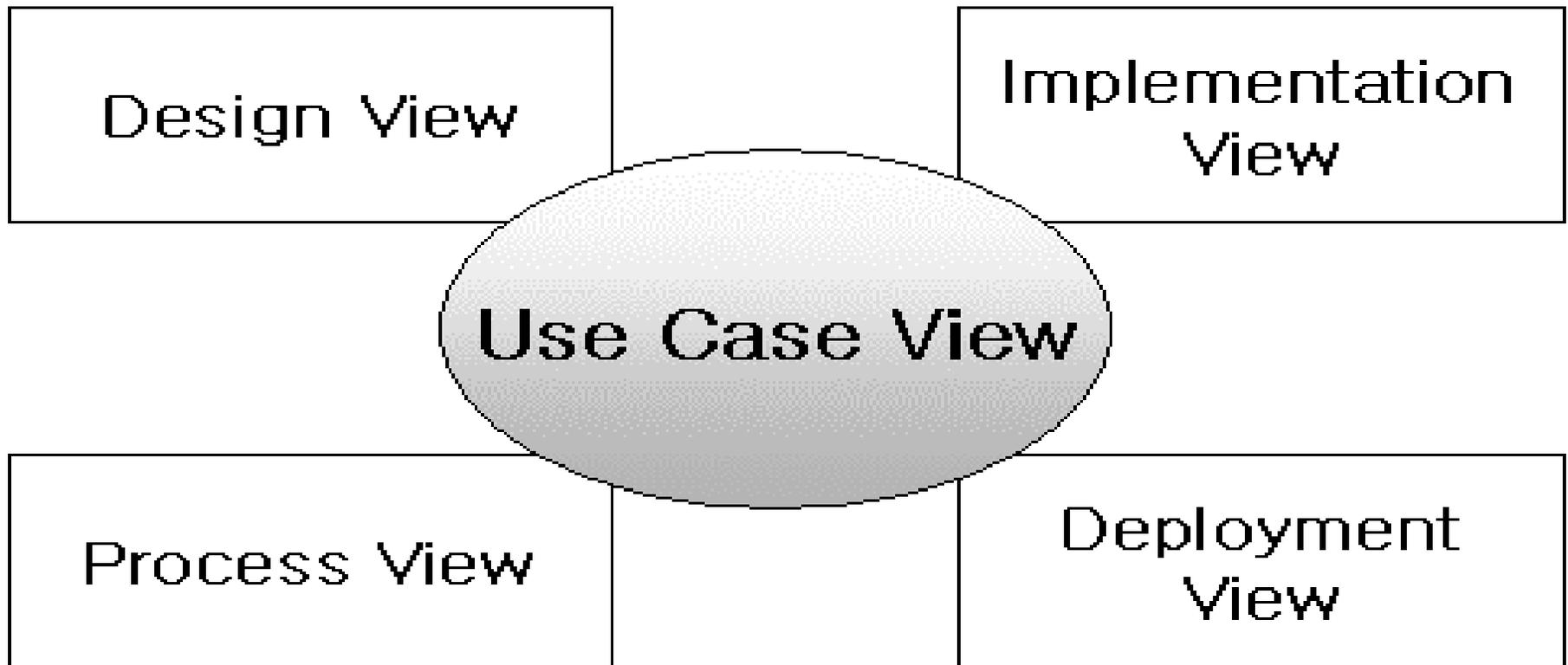
Background information and related research (Use-case diagram)

- Visual modeling is a way of thinking about problems using modeling

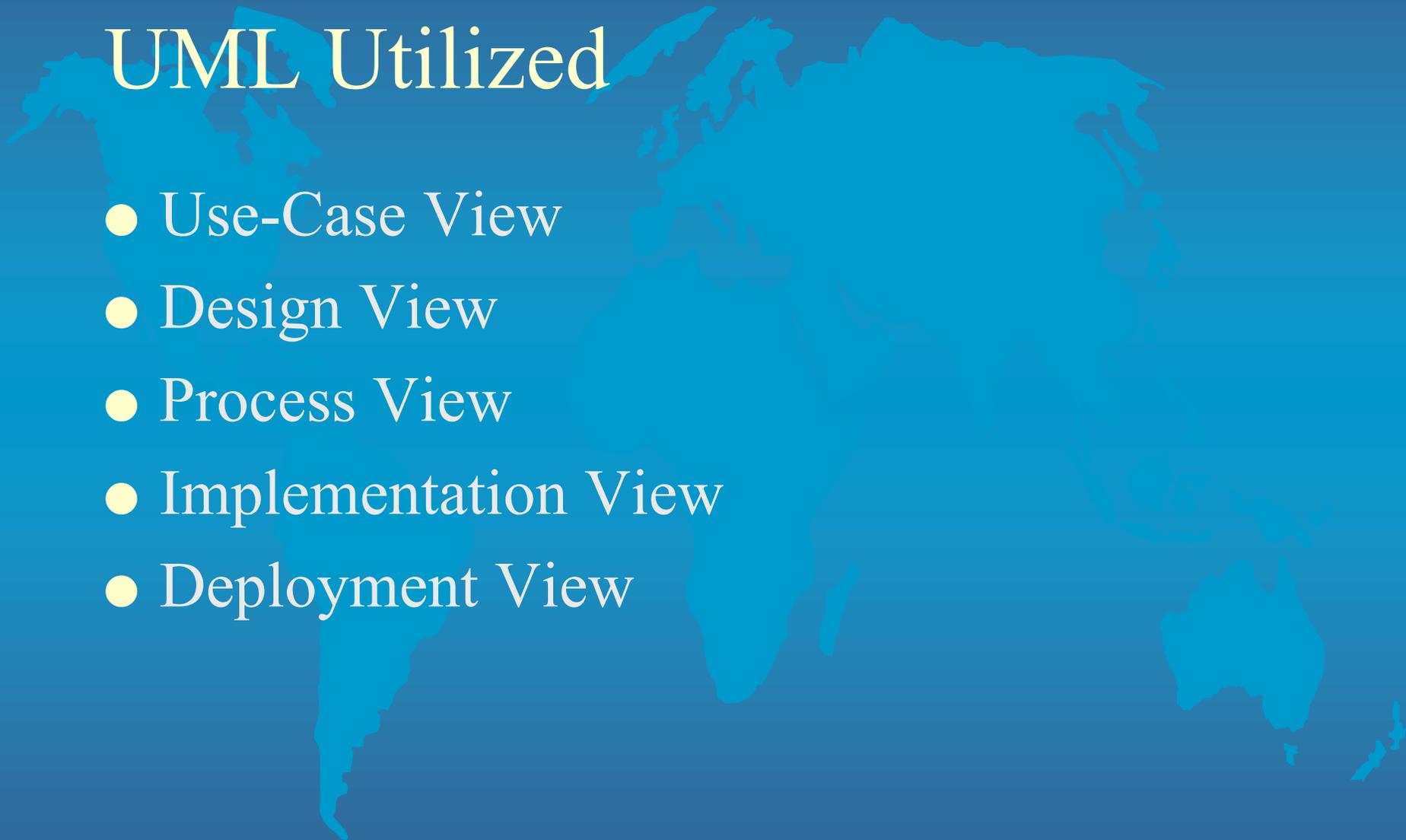


Use-case diagram support multiple views

- UML is a language used to specify, visualize, and document the artifacts of an object-oriented system under development



Architectural Framework of UML Utilized

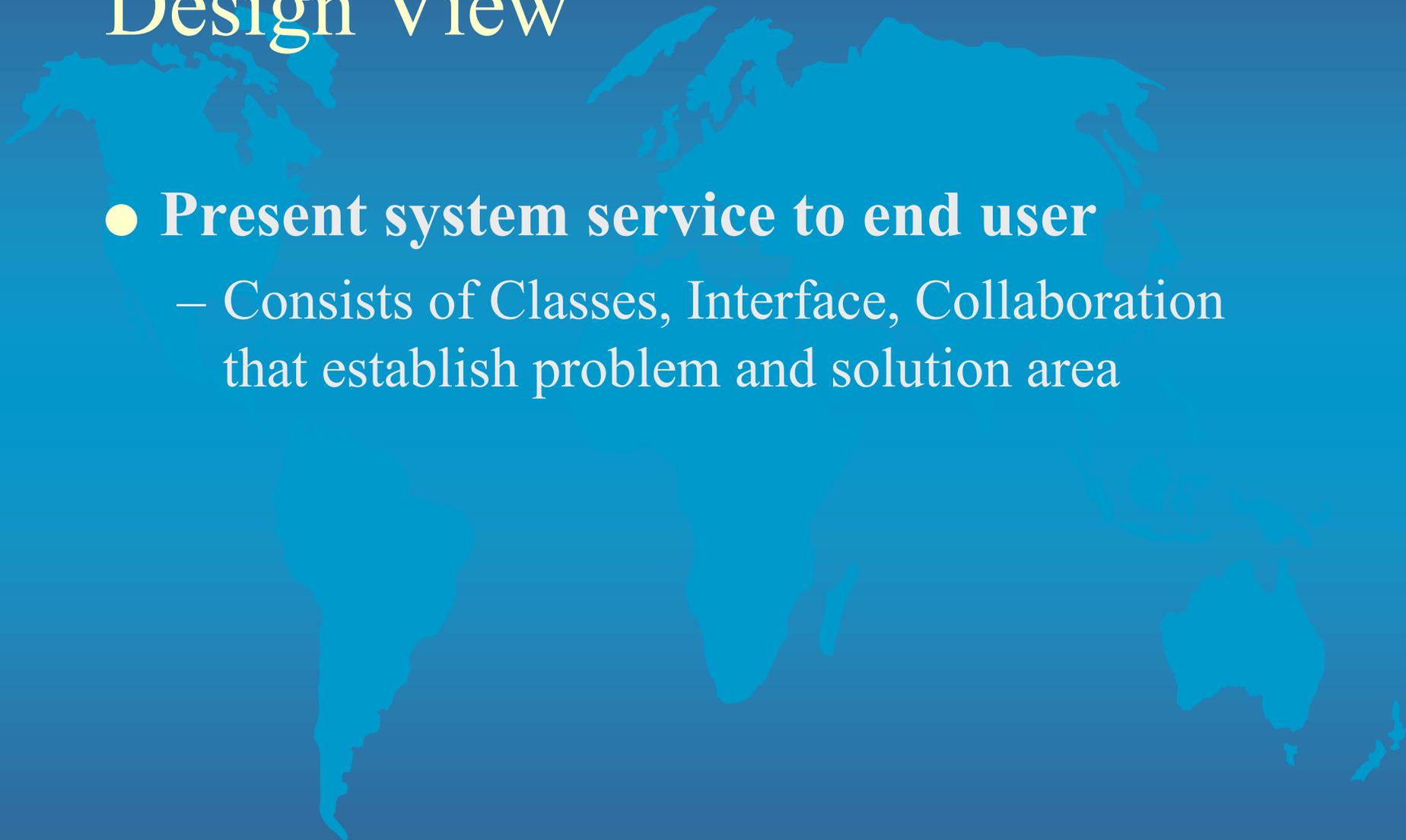


- Use-Case View
- Design View
- Process View
- Implementation View
- Deployment View

Use-Case View

- Explain system behavior/view for
 - End User,
 - Requirements engineer (analyst),
 - Designer, and
 - Tester.
- Specify factors of concrete system architecture

Design View



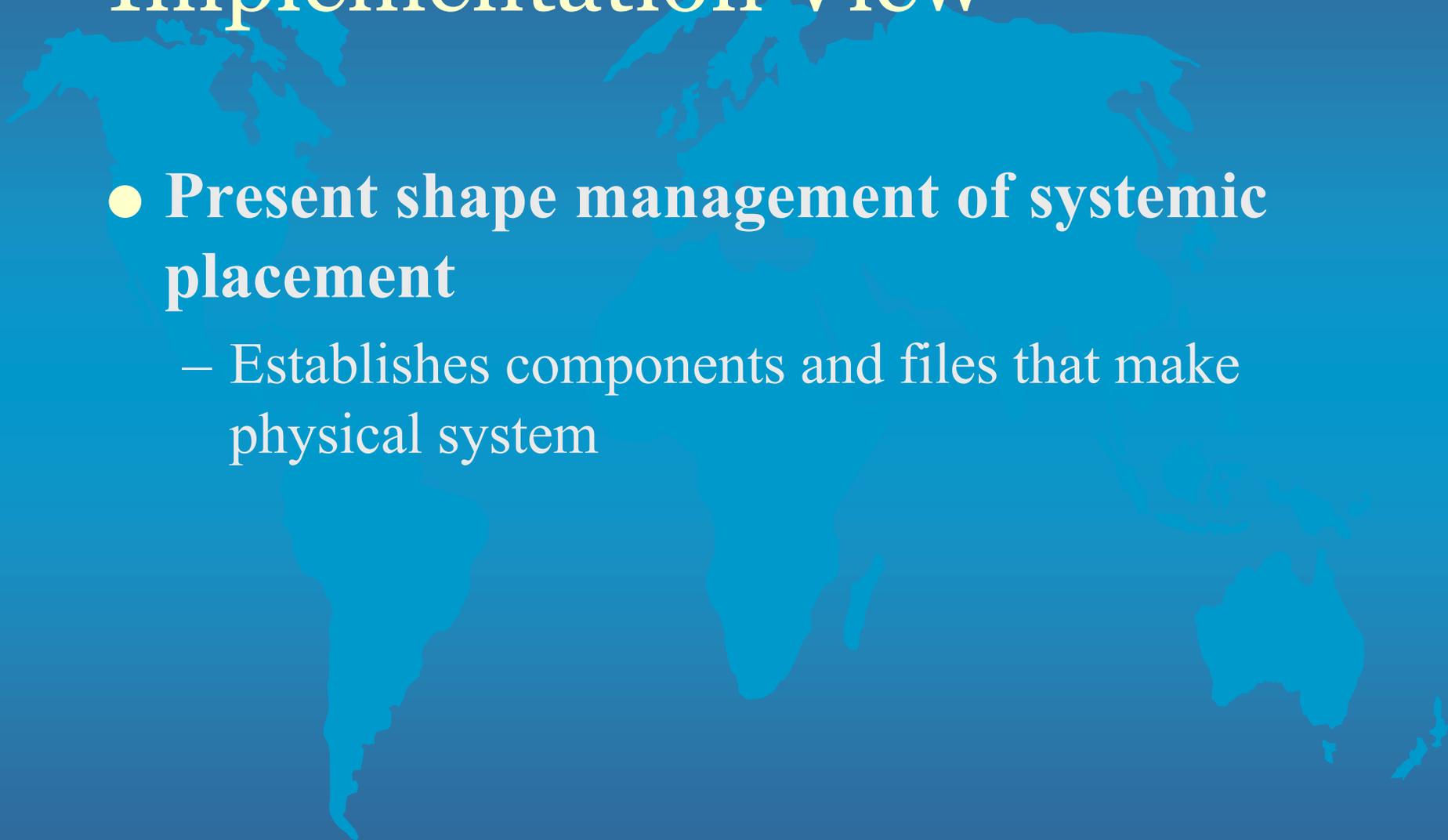
- **Present system service to end user**
 - Consists of Classes, Interface, Collaboration that establish problem and solution area

Process View



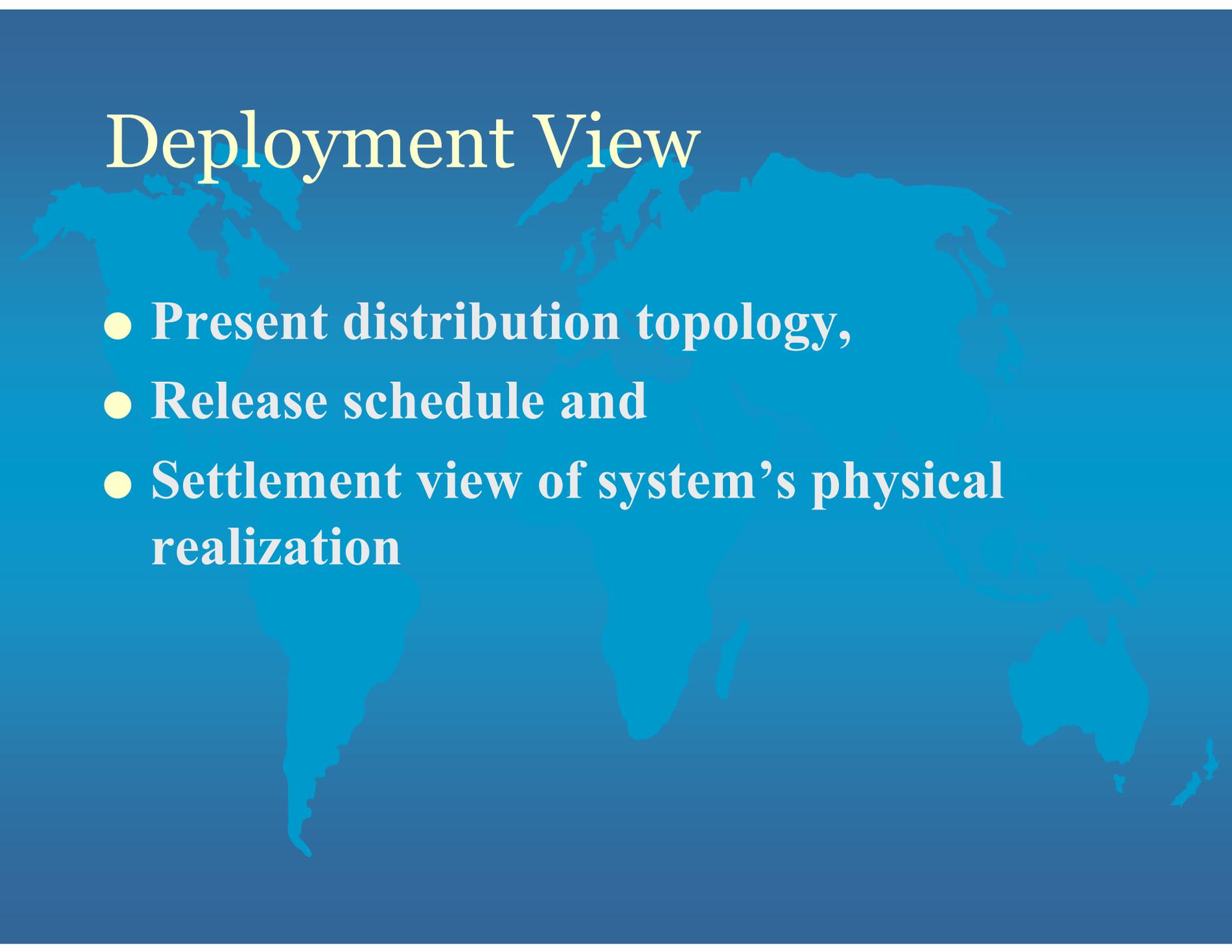
- **Enables system functionality, flexibility, and capacity**
 - Consists of *threads* and *process* which establishes system consistency and synchronization mechanism.

Implementation View



- **Present shape management of systemic placement**
 - Establishes components and files that make physical system

Deployment View

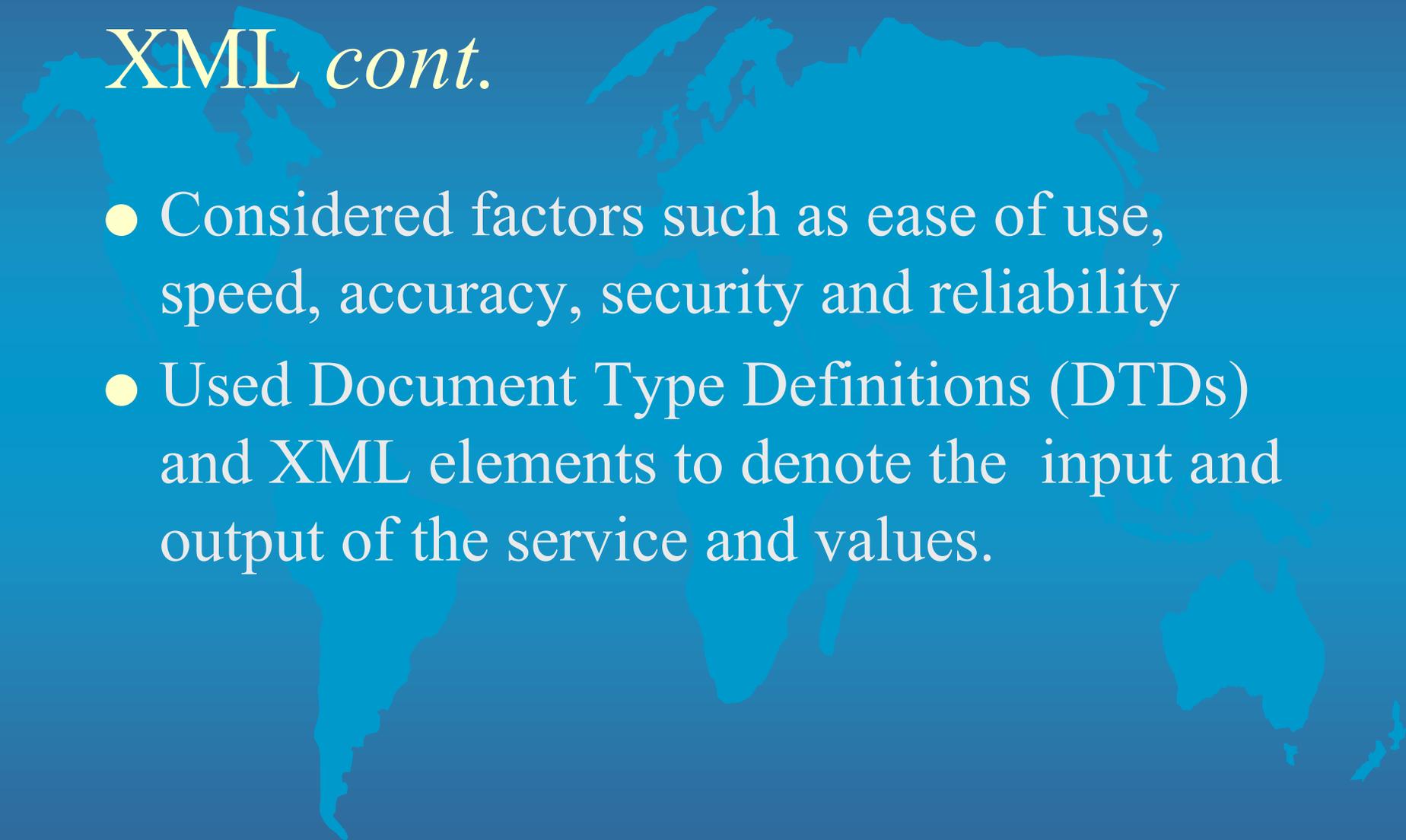


- Present distribution topology,
- Release schedule and
- Settlement view of system's physical realization

B2B Electronic Commerce and XML

- Exchange technologies are basically Web sites that use a standard languages, XML, to facilitate application-to-application data exchange.
- XML allows
 - Information regarding orders to interoperate
 - Purchase orders and invoicing standardization
 - To be easily understood by other computers
 - Accessible to organizations of all sizes

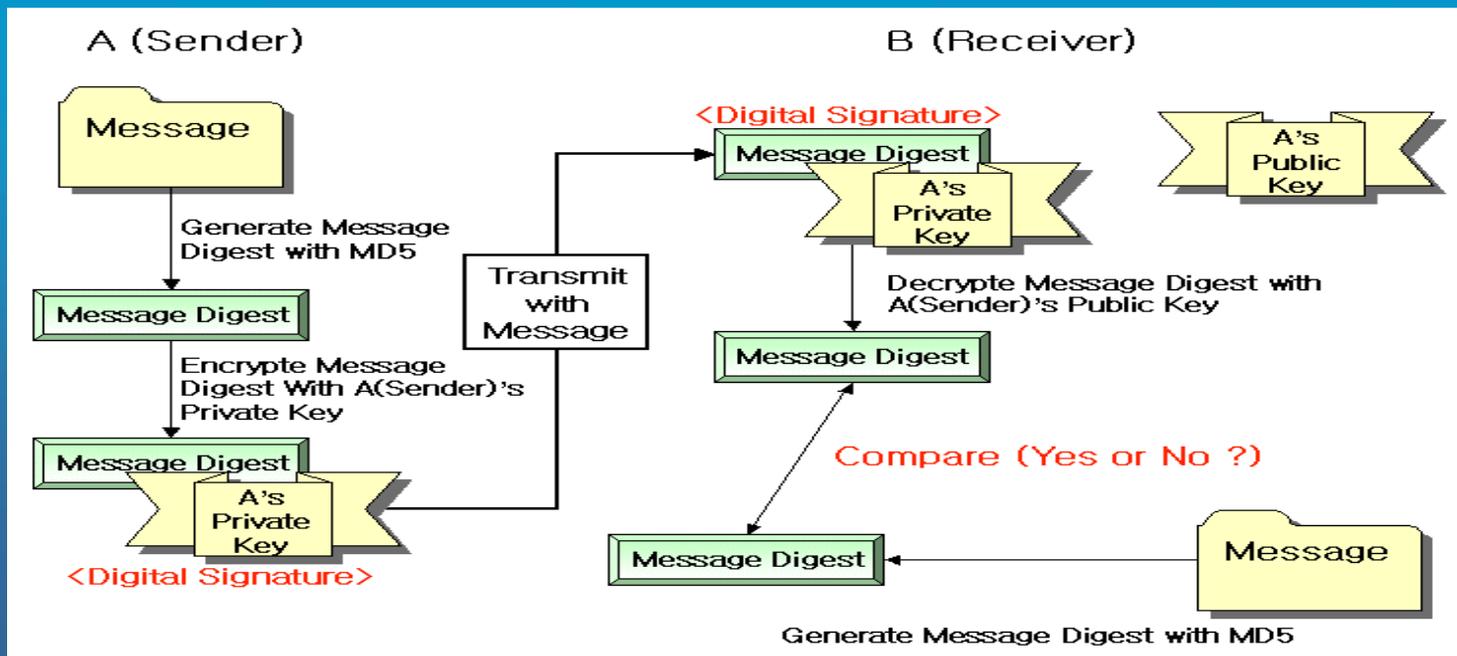
B2B Electronic Commerce and XML *cont.*



- Considered factors such as ease of use, speed, accuracy, security and reliability
- Used Document Type Definitions (DTDs) and XML elements to denote the input and output of the service and values.

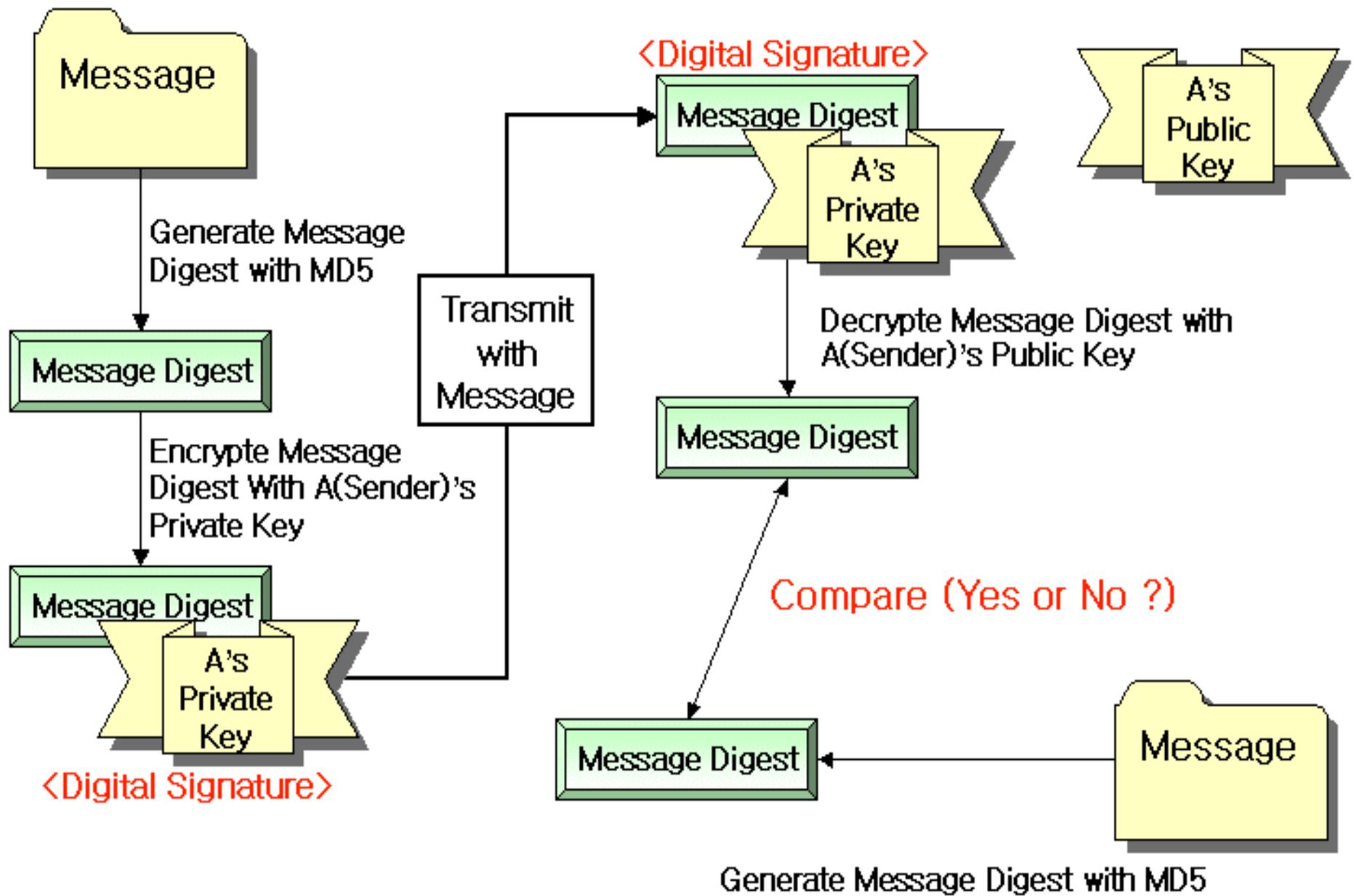
Digital Signatures

- Use of a message digest offers the following advantage
 - The run time is reduced and the integrity of the message can be confirmed
 - Forgery and/or falsification of messages can be prevented



A (Sender)

B (Receiver)

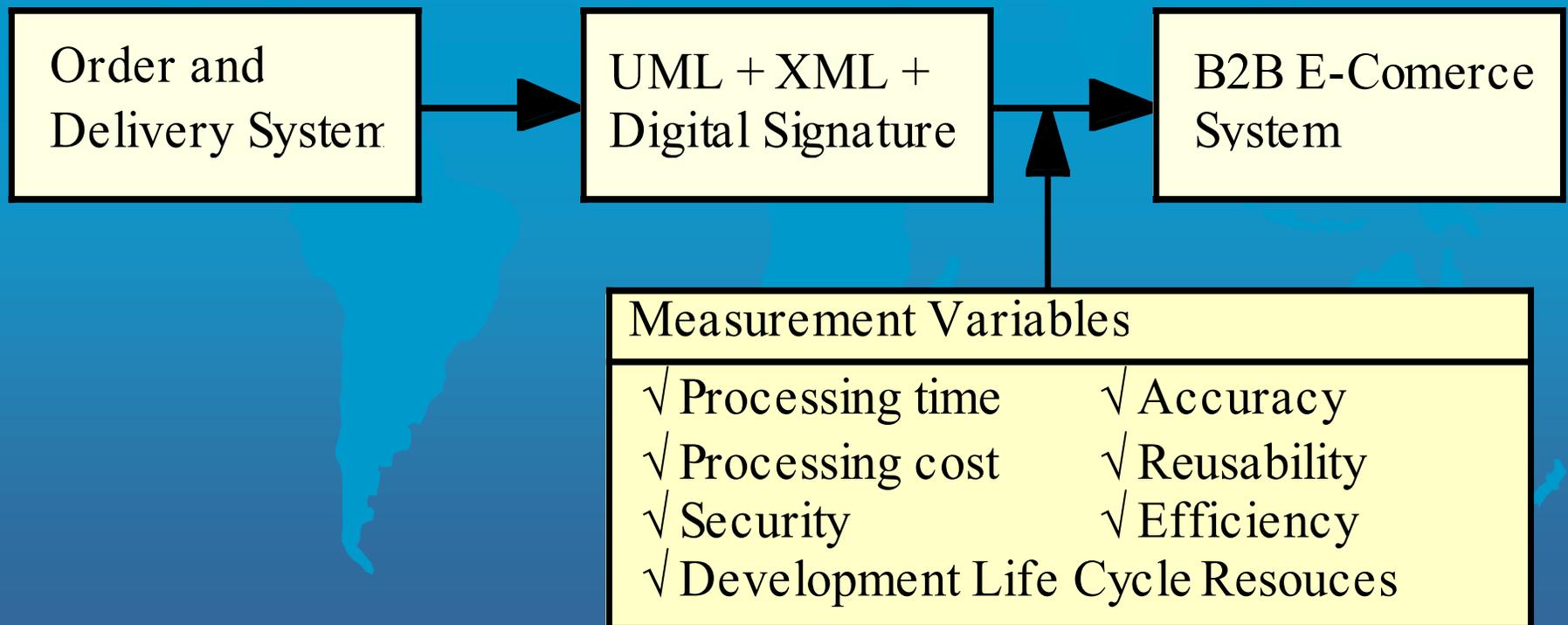


Critical Success Factors for Building B2B e-commerce systems

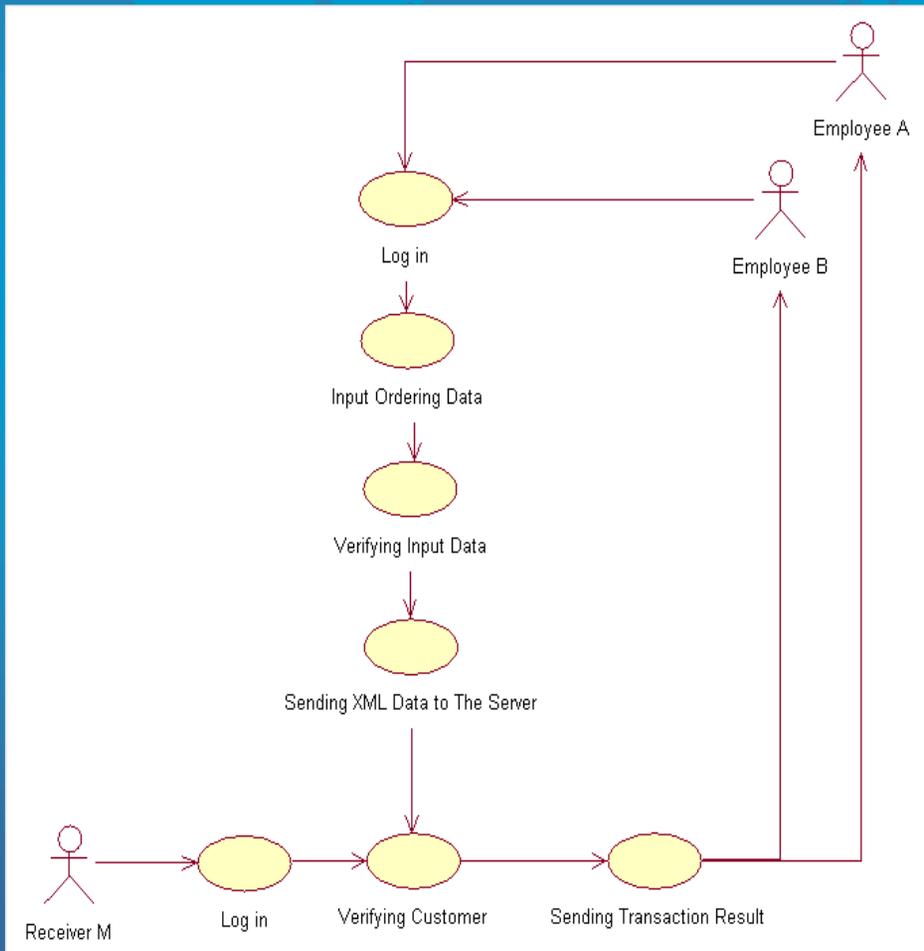
- Harmonious user/developer communication
- Reduced processing cost/time of transactions
- Accuracy of business and transactions data
- Efficiency of the TBD systems
- Shortened systems development life cycle
- Reliability of transactions data
- Security of transmitted data

Empirical Study : Research Process and Methodology

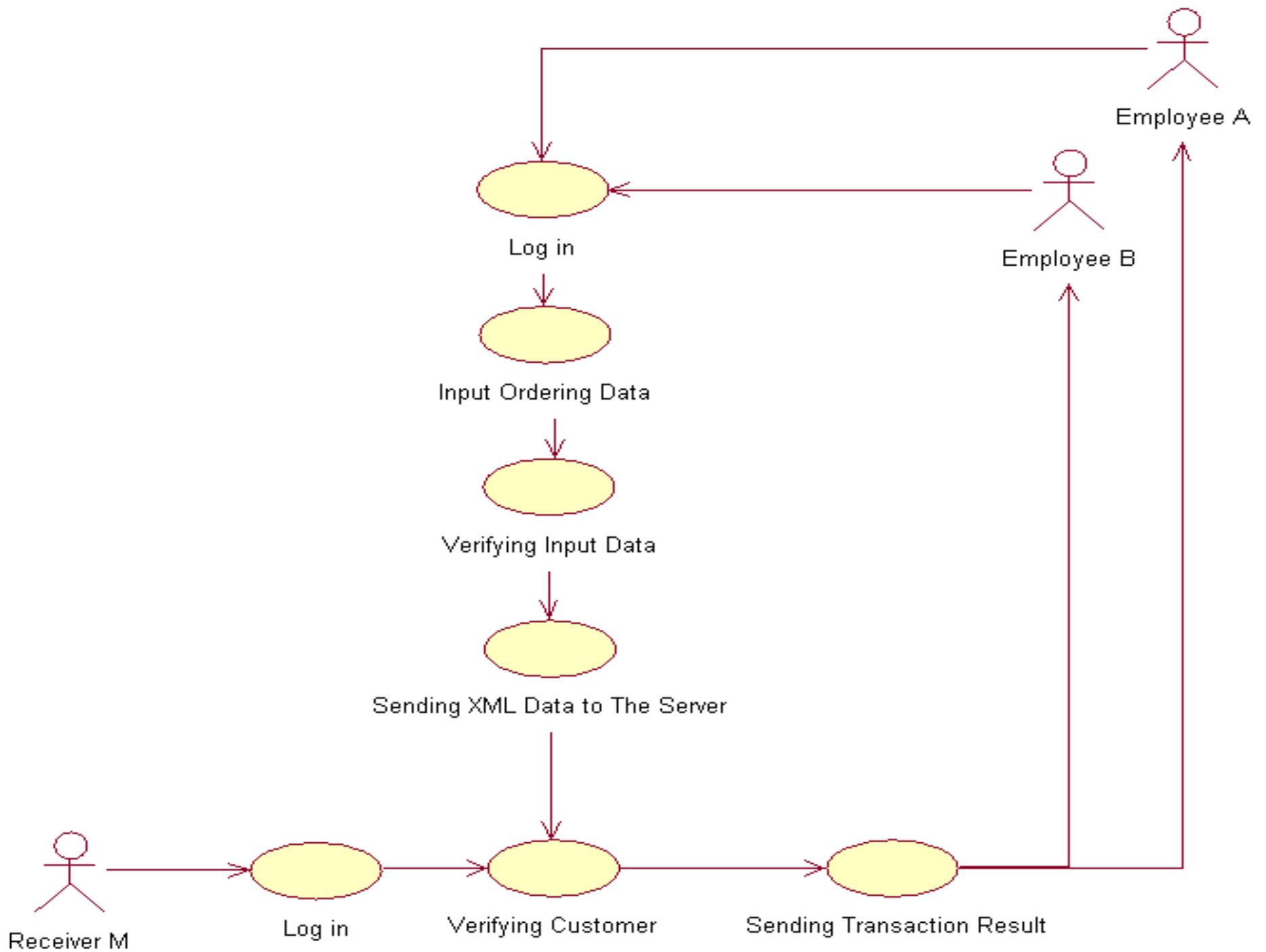
- Research Model



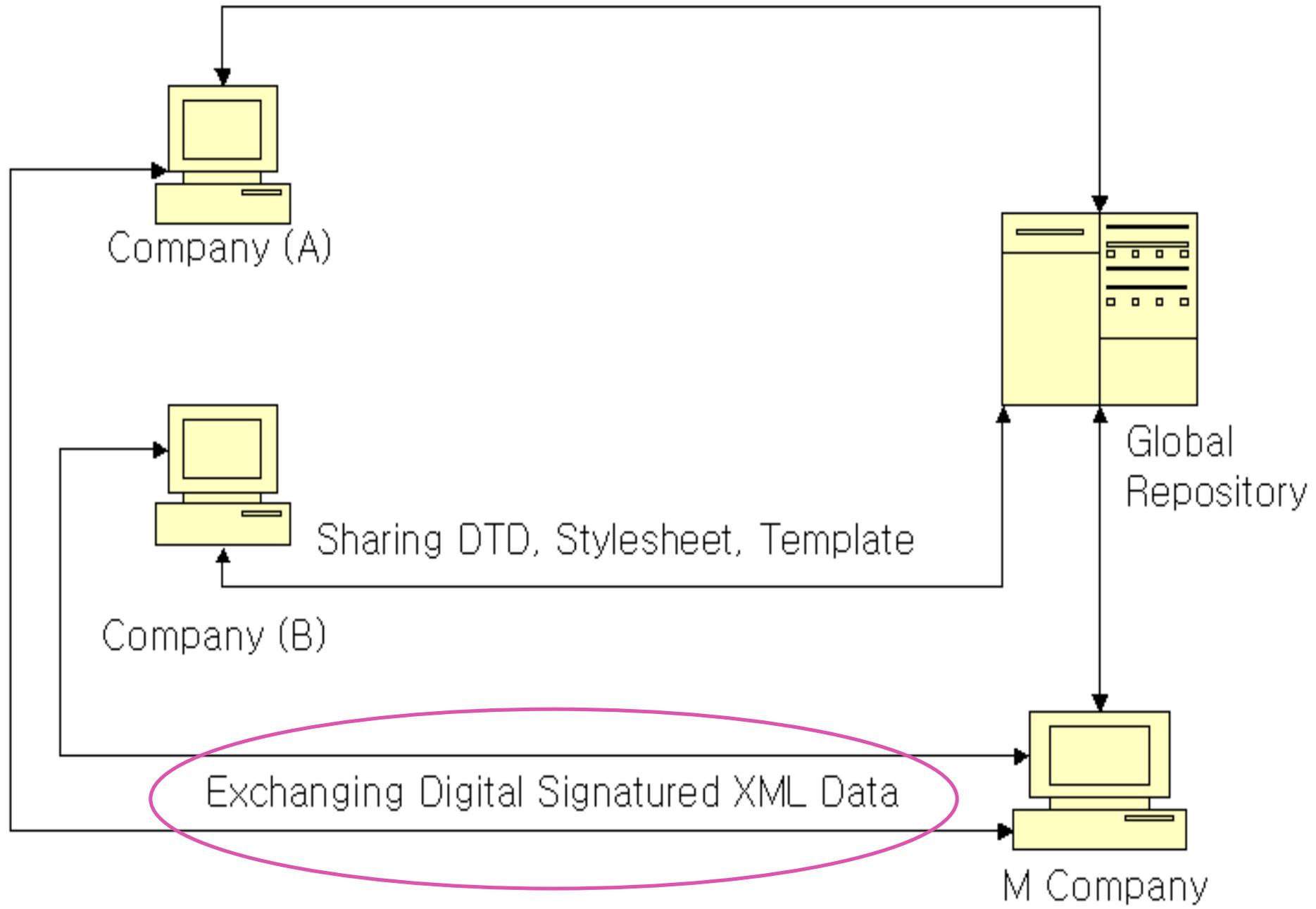
Empirical Study : User's Requirements and Use-Case Diagram



- Main and alternate flow of events
- Special requirements
- Pre-conditions
- Post-conditions



Sharing DTD, Stylesheet, Template



Company (A)

Company (B)

Global Repository

M Company

Exchanging Digital Signed XML Data

Implementation and Tangible Benefits

cont.

Verifying XML data

```

<?xml version="1.0" encoding="euc-kr" ?>
<!DOCTYPE clients (View Source for full doctype...)>
- <clients>
  <cNum>9283-1100</cNum>
  <cName>Yjkwon</cName>
  <cComName>Myung shin Co.Ltd</cComName>
  <cAdd>Taegu, Republic of Korea, Nam-gu Bongduck</cAdd>
  <cKubun>K2-3611</cKubun>
  <cStockNum>F-DF234</cStockNum>
  <cStockName>Oil Filter</cStockName>
  <cStockSize>S-12</cStockSize>
  <cStockQuan>100,000EA</cStockQuan>
  <cStockPrice>1,000,000</cStockPrice>
  <cDeadLine>07/09/2001</cDeadLine>
  <cPay>CASH</cPay>
  <cCharge>Yjkwon</cCharge>
  <cEtc>Handle with Care</cEtc>
</clients>
  
```

Verifying XML Data

Sign Send_Quit

Verifying Received XML Data

	B-Number	9283-1100	CEO Name	Yjkwon	
Ordering Company	Company	Myung shin Co.Ltd			
	Address	Taegu, Republic of Korea, Nam-gu Bongduck			
Division	Ordering Information				
	Stock Code	Object Name	Regulations	Quantity	Price
K2-3611	F-DF234	Oil Filter	S-12	100,000EA	1,000,000
			A Limit of Time	07/09/2001	
Payment	CASH			Responsibility	Yjkwon
Etc	Handle with Care				

XML Digital Signature Algorithm With RSAAEuro V1.0

Exit Program

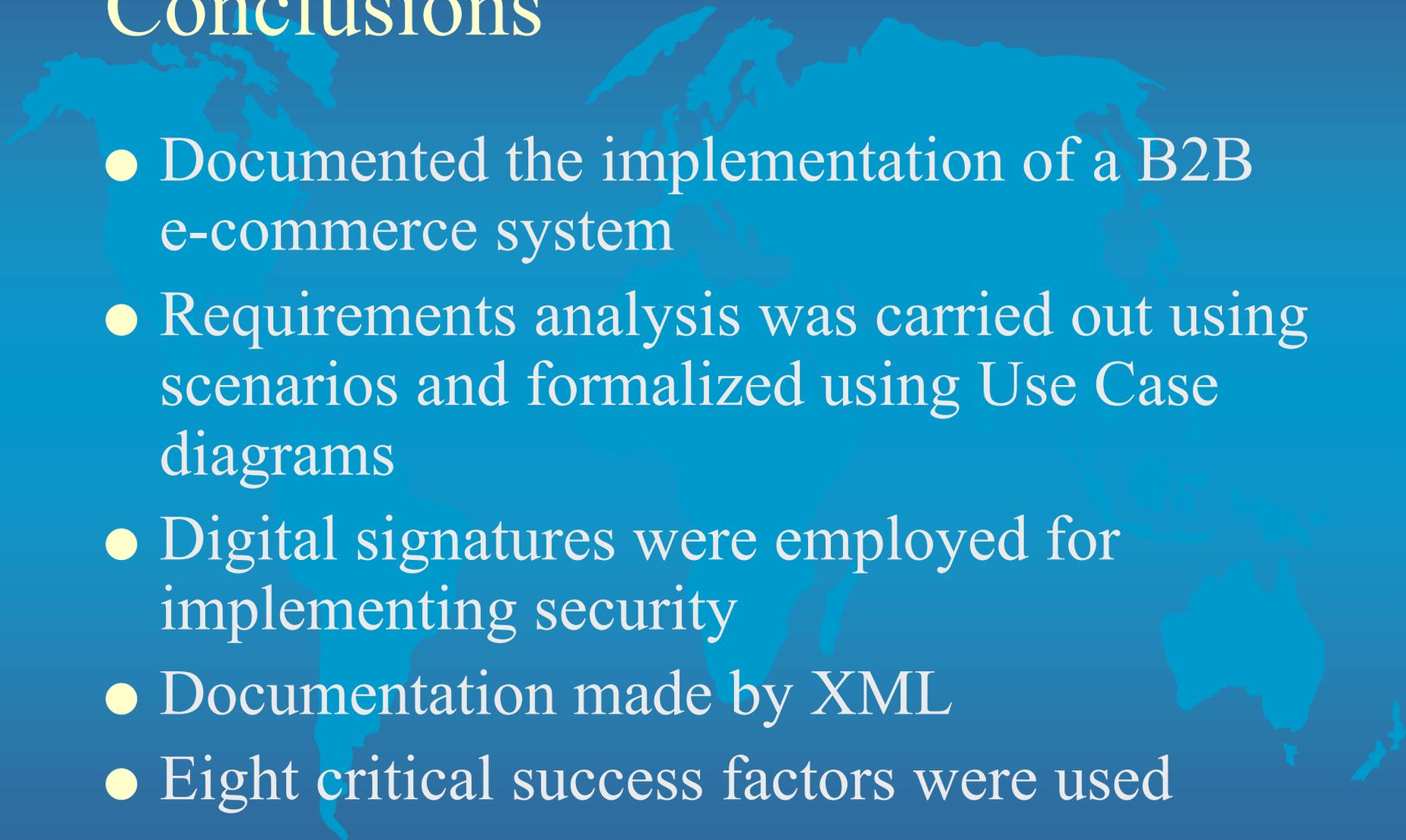
Benefits

- Using Use Case Diagrams (and XML) improved the communications among development stakeholders
- System onto the Internet reduced the time needed to process transaction data
- There was a cost savings of roughly \$12,000 USD per month

Benefits

- The accuracy of transaction data input to the system was significantly improved
- More usable and ultimately more efficient system
- Combination of SDLC and PDLC shorten development life-cycle
- The reliability of the system was improved
- Authentication of identity and repudiation of forgery/falsification

Conclusions



- Documented the implementation of a B2B e-commerce system
- Requirements analysis was carried out using scenarios and formalized using Use Case diagrams
- Digital signatures were employed for implementing security
- Documentation made by XML
- Eight critical success factors were used

Conclusions *cont.*

- Harmonious communication between the users and developers
- Reduction in the processing time of transactions
- Reduced processing cost
- Improved efficiency and accuracy
- Security of transmitted data
- Shortened the system development life cycle

Contact Information



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