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USING ebXML FOR SUPPLY CHAIN TRACEABILITY

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Overview

- Introductory traceability scenario
- Interaction among participants
- Business Processes interoperability (ebXML)
- Overall architecture of a prototype
- Future work

Product recall scenario

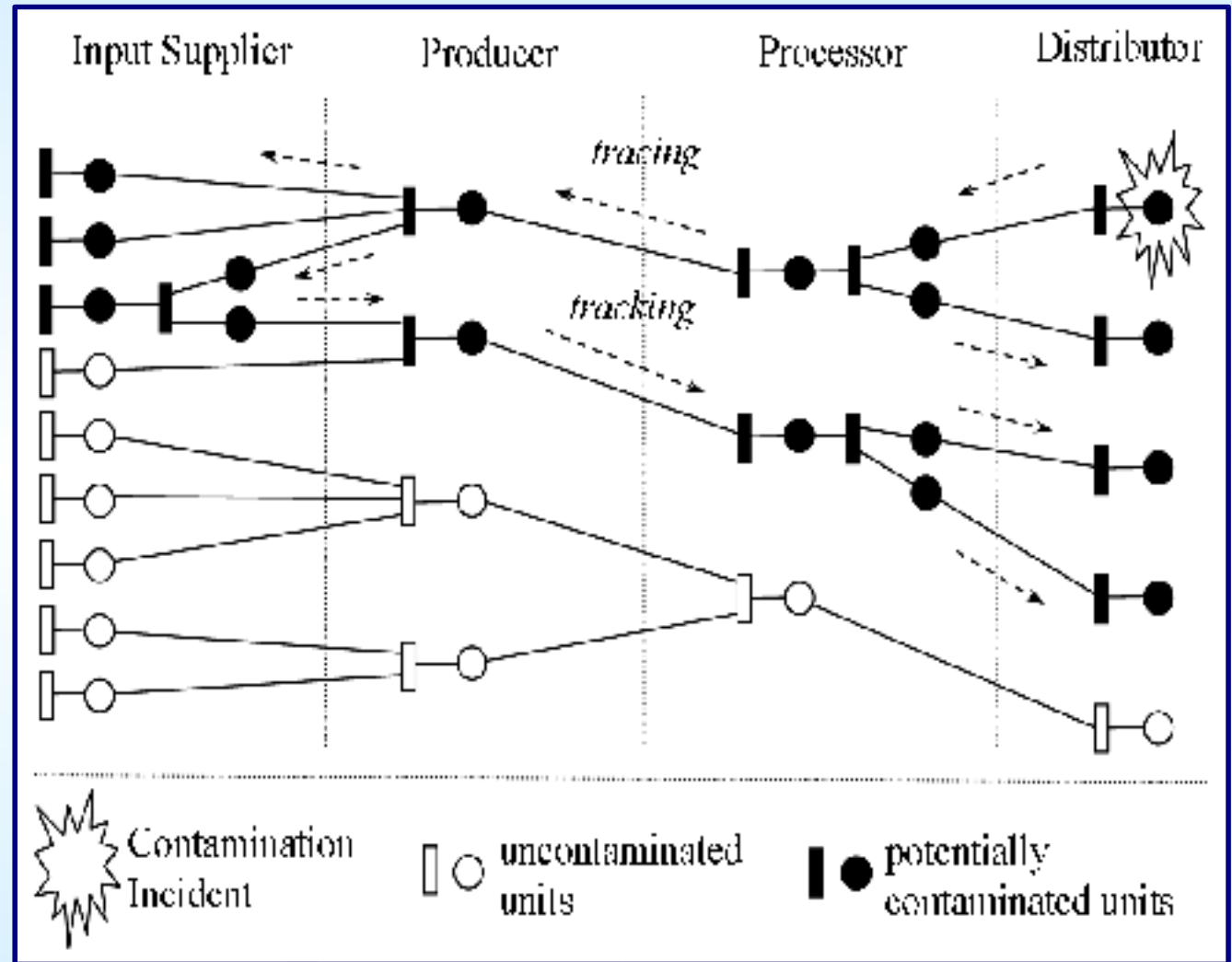
Goal:

- efficient recall

Terms:

- Traceability
- Tracking
- Tracing
- Lot
- Activity
- Relation

Quality

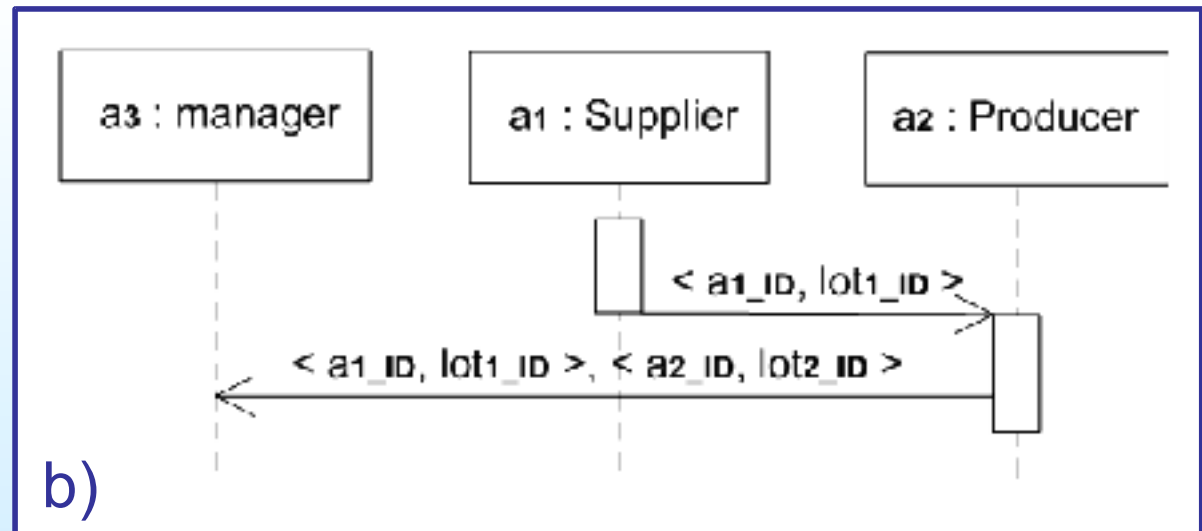
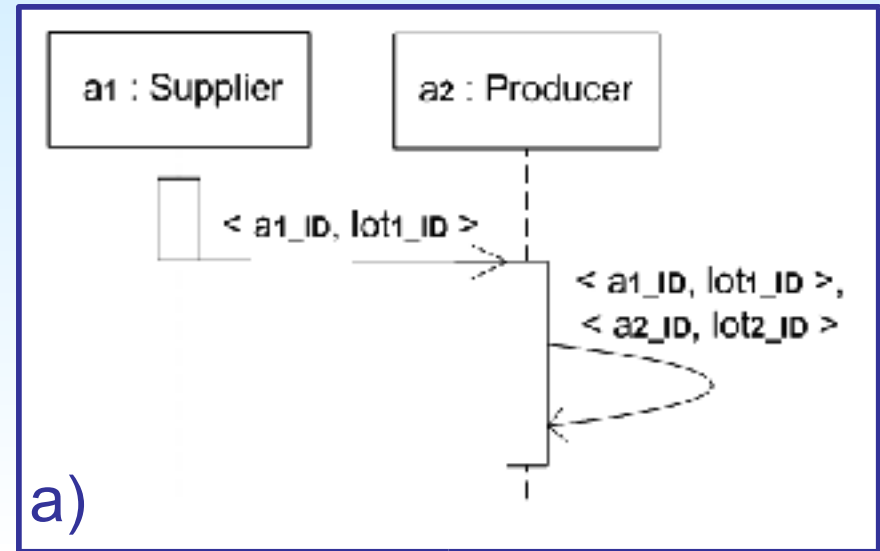


Interaction among participants

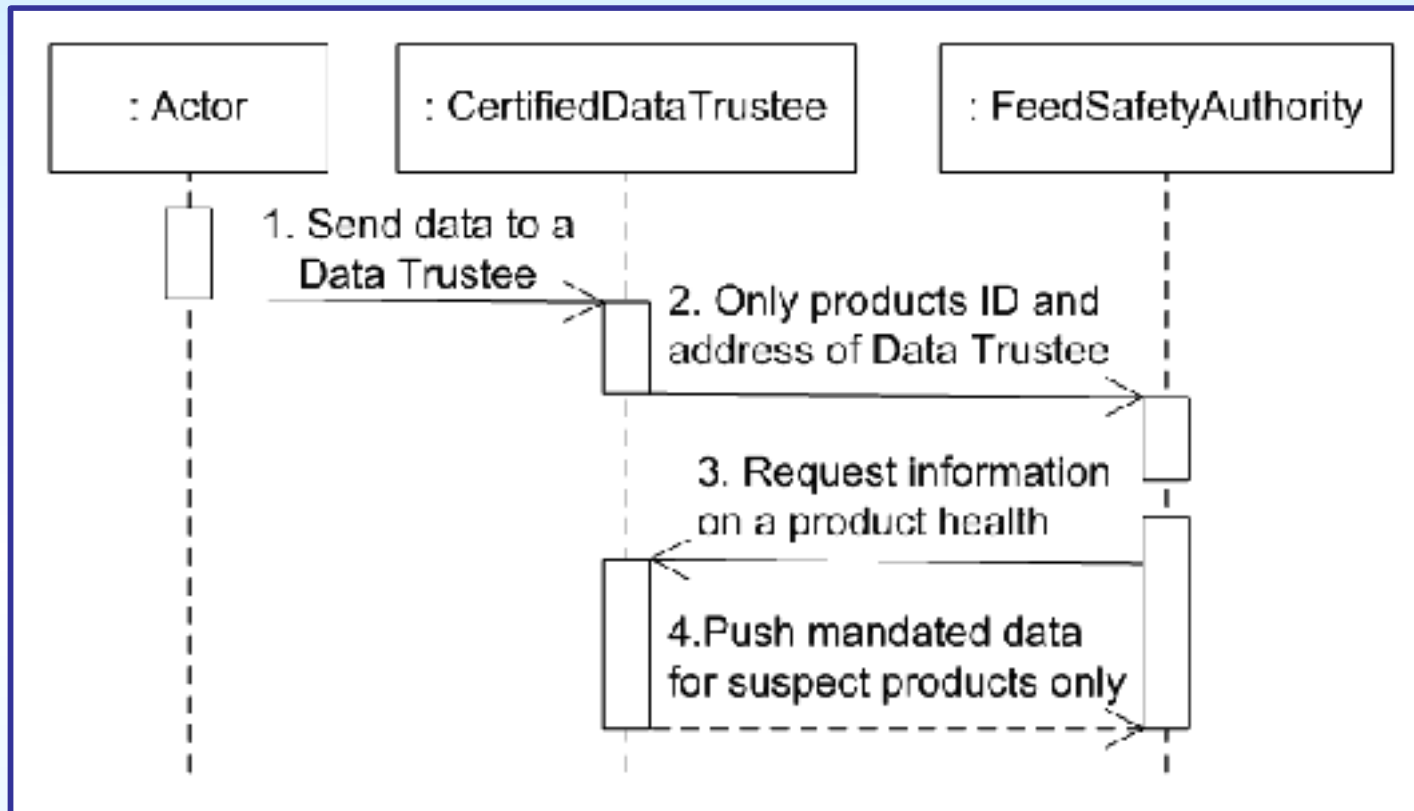
- Each responsible actor belongs to a different **company**
- **Information exchanges** among responsible actors
- Heterogeneous **structure** and **naming** of Data
- Tackling etherogeneous **semantics**
- **Confidentiality** and control of data. Intermediate data **trustees**
- **Large** and **Dynamic** community (depending on the market)
- Managing the Business status of **agreements**
- Facing **failure** scenarios

Interaction among participants

- (a) distributed and (b) central management
- Identifiers attached to the physical lot
- “Push” strategy



Interaction among participants



- Distributed management, intermediate data trustee
- “Pull” strategy

BP interoperability

Early technological needs:

- Highly distributed architecture
- Dealing with multiple software interfaces
- Tackling heterogeneity
- Loosely coupling communication

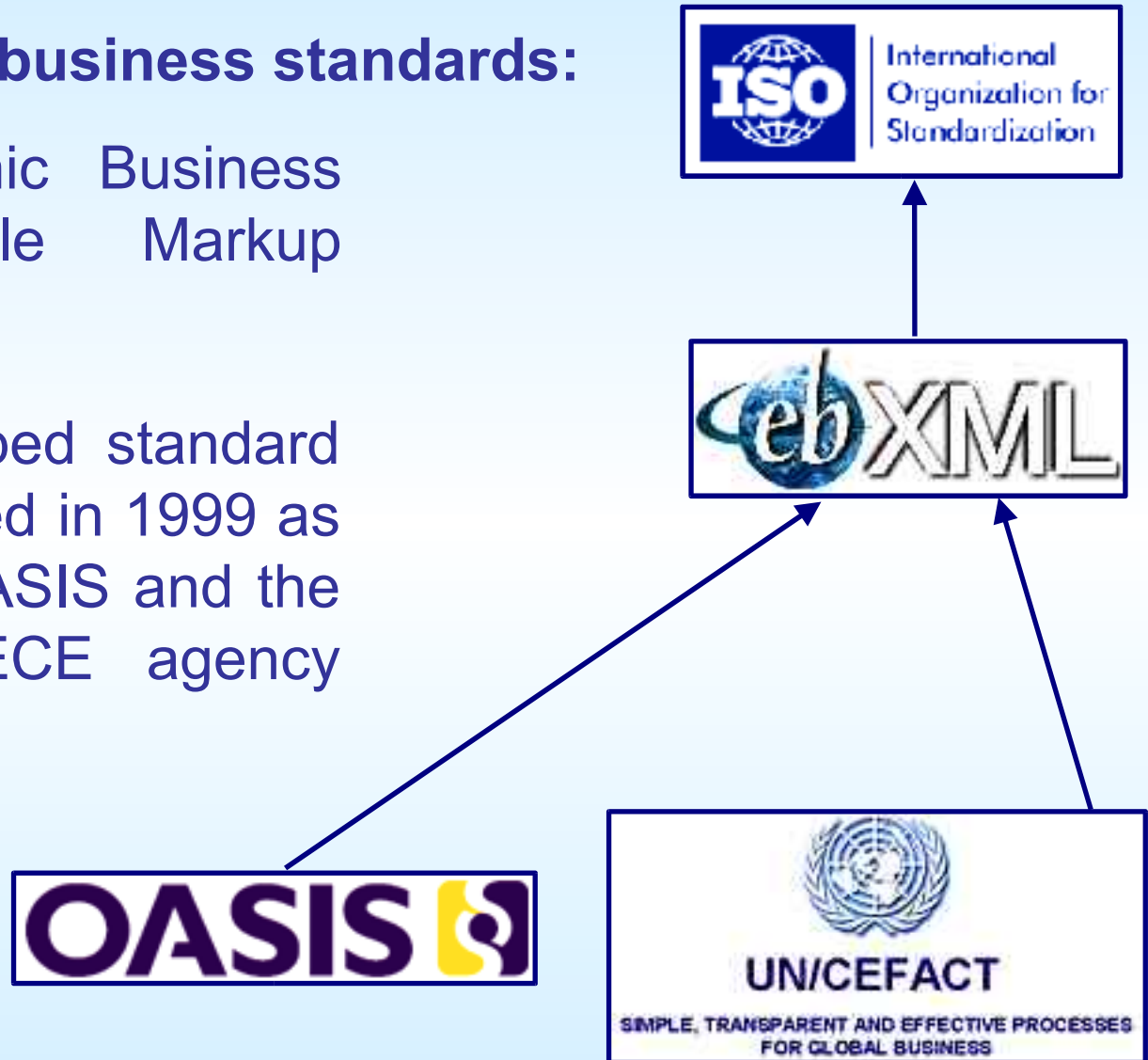
Early methodological needs:

- Relying on standard inter-organizations cooperation models and protocols
- Strongly separating the Business level from the technical one.

BP interoperability

Traceability and e-business standards:

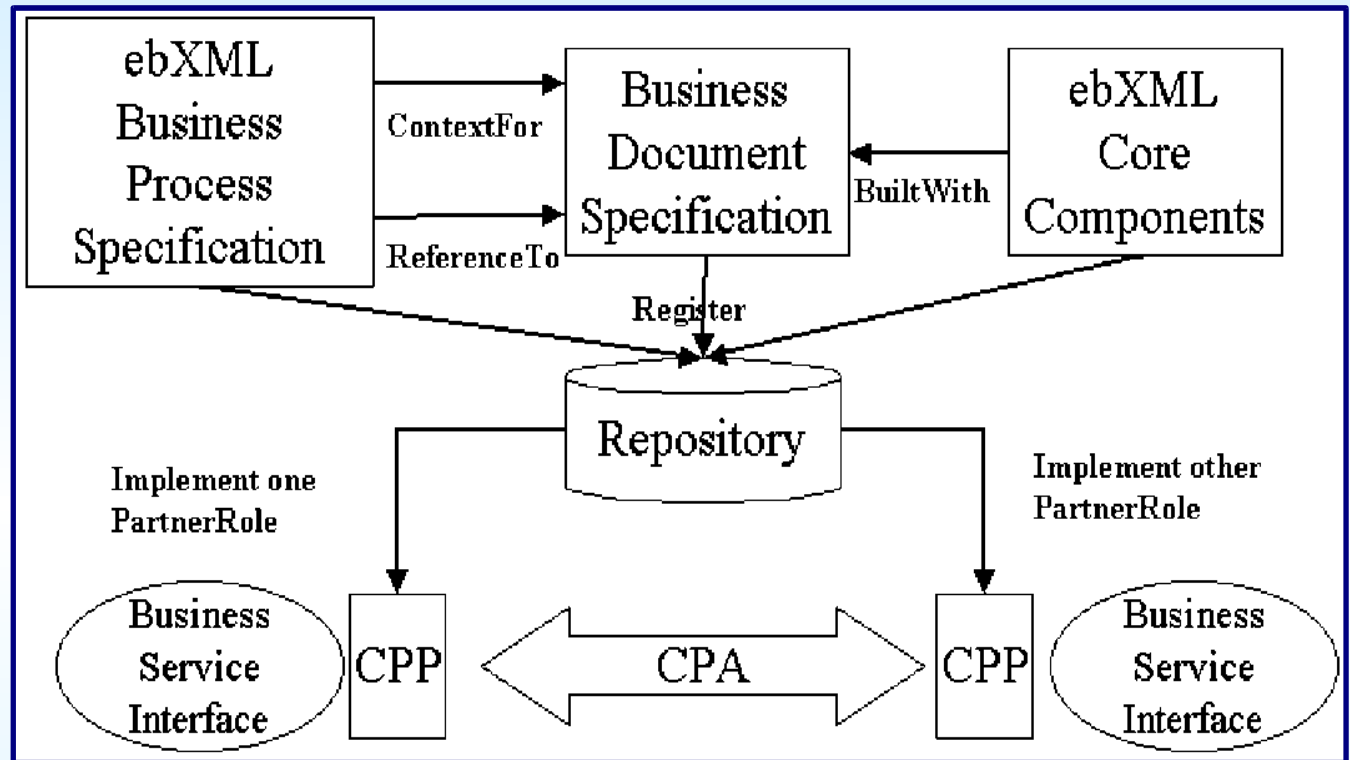
- ebXML (Electronic Business using eXtensible Markup Language)
- Globally developed standard (ISO15000) started in 1999 as an initiative of OASIS and the United Nations/ECE agency CEFAC.



BP interoperability

ebXML specifications:

- Technical Architecture (TA)
- Message Services (ebMS)



- Collaboration Protocol Agreements / Collaboration Protocol Profile (CPA / CPP)
- Business Process Specification Schema(BPSS)

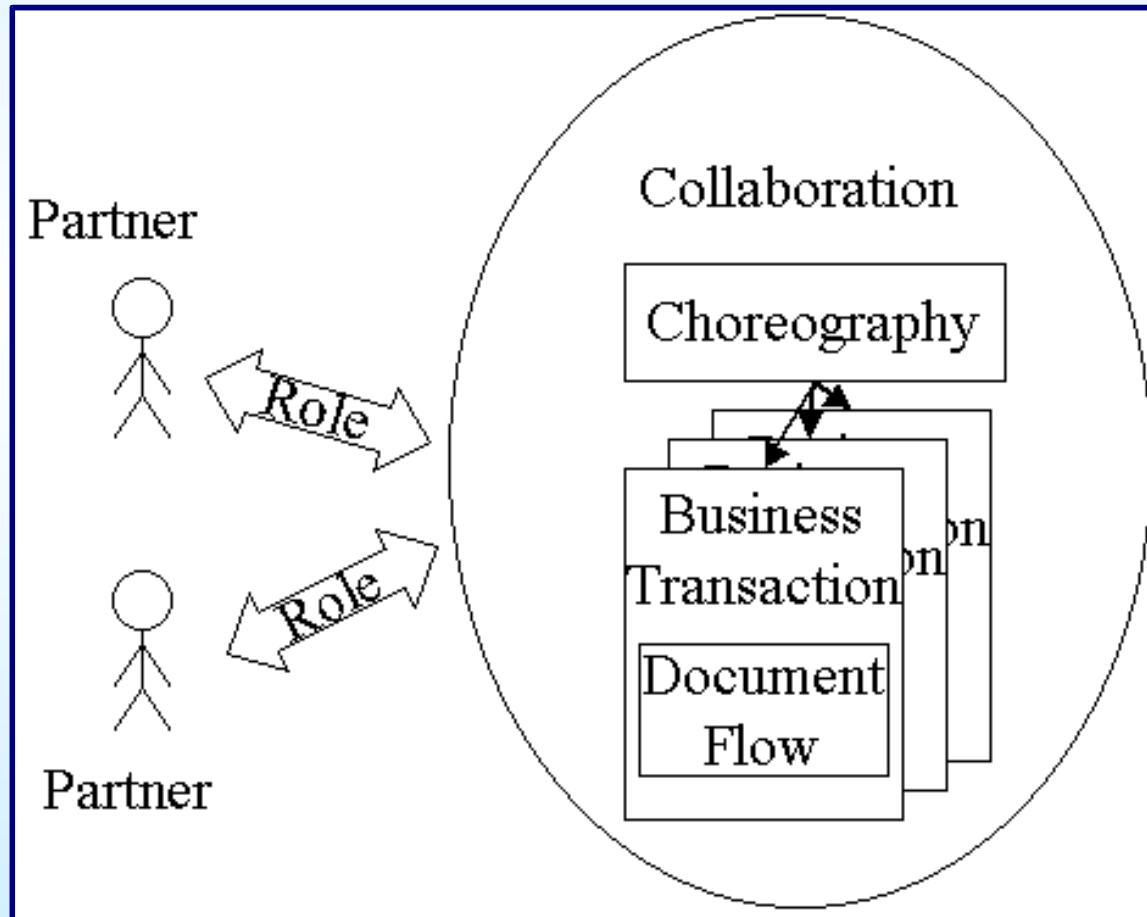
BP interoperability

ebXML outline:

- Many trading partners collaborate together to create working relationship
- Interchange defined as requestor / responder
- Business transactions exchanged control the state of the process
- Sharing of definitions and business understanding between partners within a community
- Support for Business Scalability (smaller companies can participate, not just large corporations)

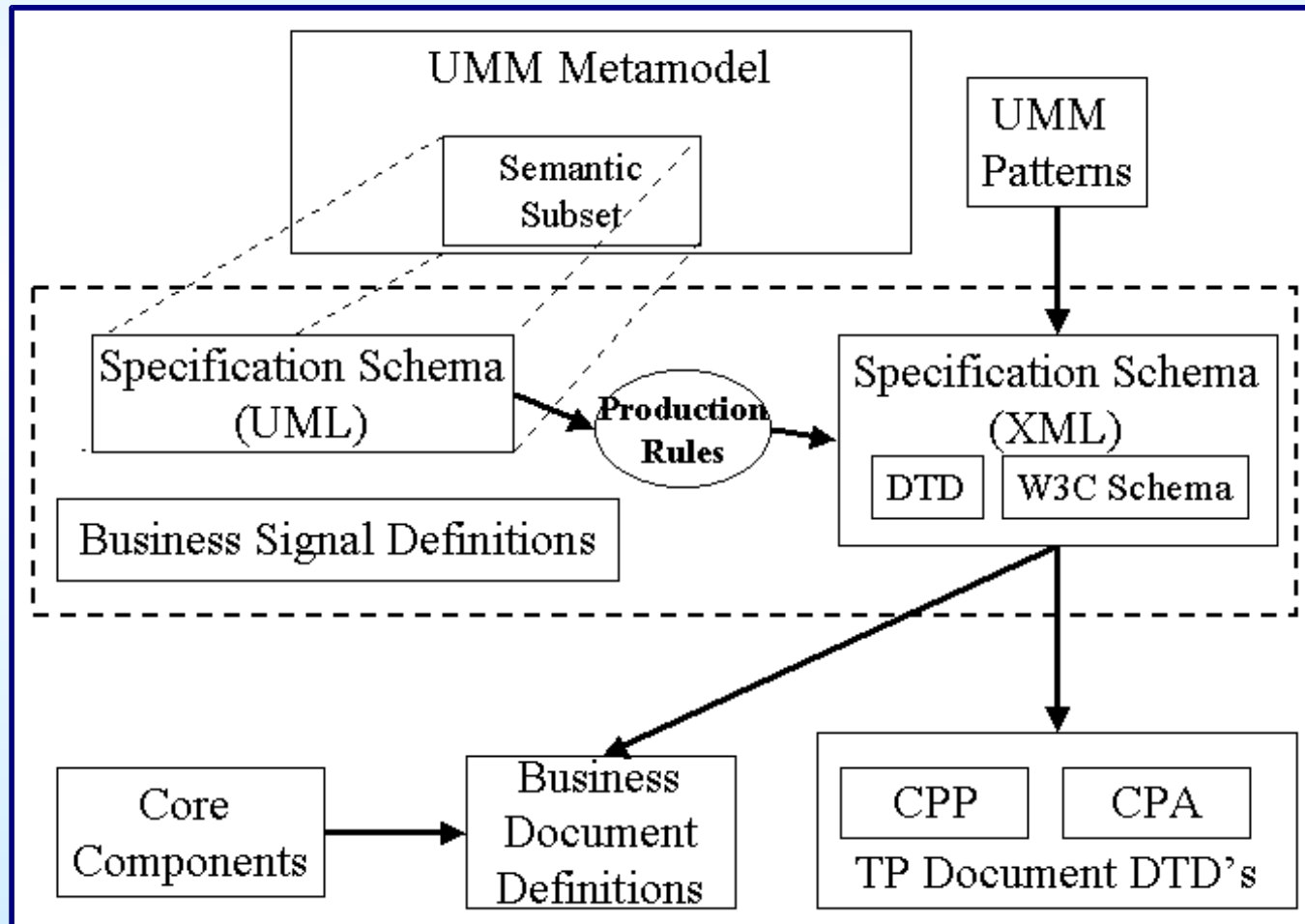
BP interoperability

ebXML overview: basic semantics of a business collaboration (BPSS)



BP interoperability

ebXML overview: Relationship of ebXML BPSS to UMM, CPP/CPA and Core Components



Overall architecture of a prototype

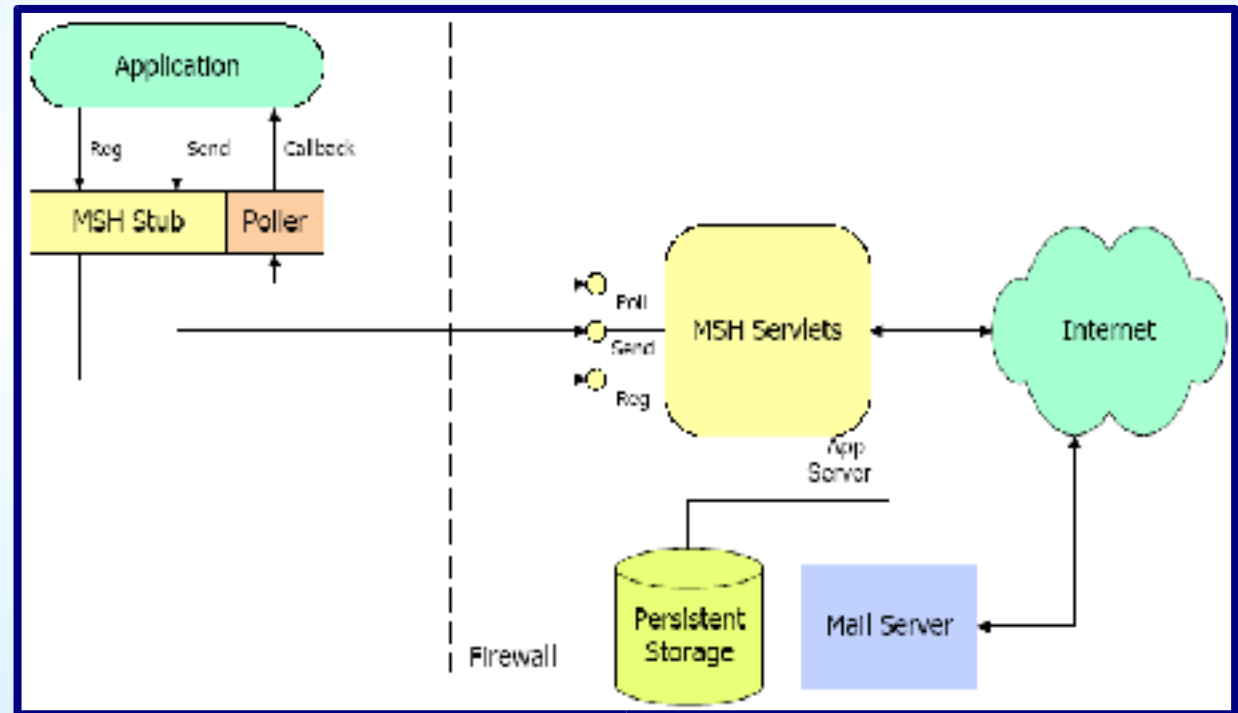
ebXML Messaging Service (ebMS) implementation



Center for E-Commerce Infrastructure Development. University of Hong Kong

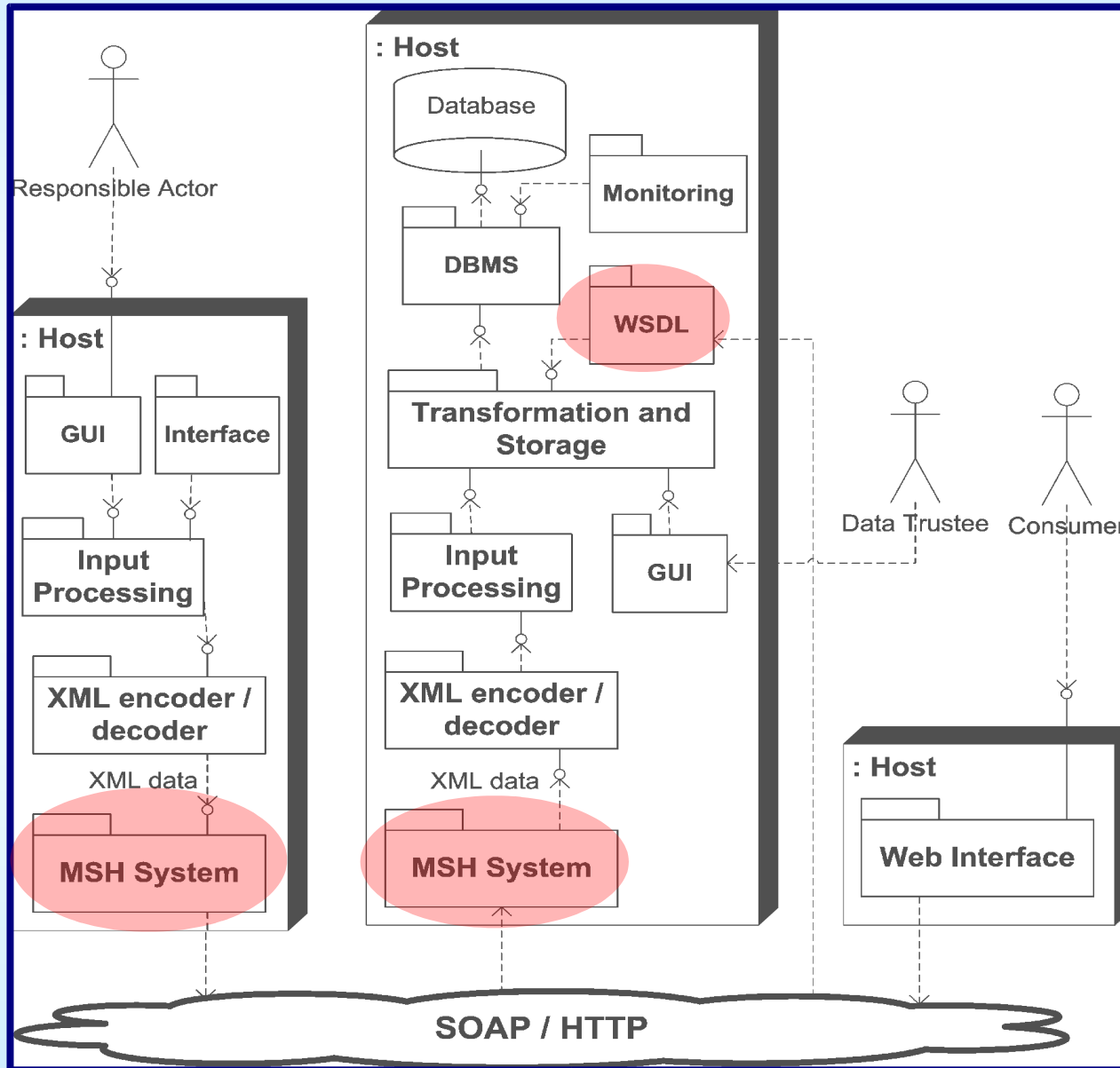
Main features:

- message packaging
- reliable messaging
- message ordering
- error handling
- security
- synchronous reply
- message status service
- persistent storage
- QoS support (CPA)



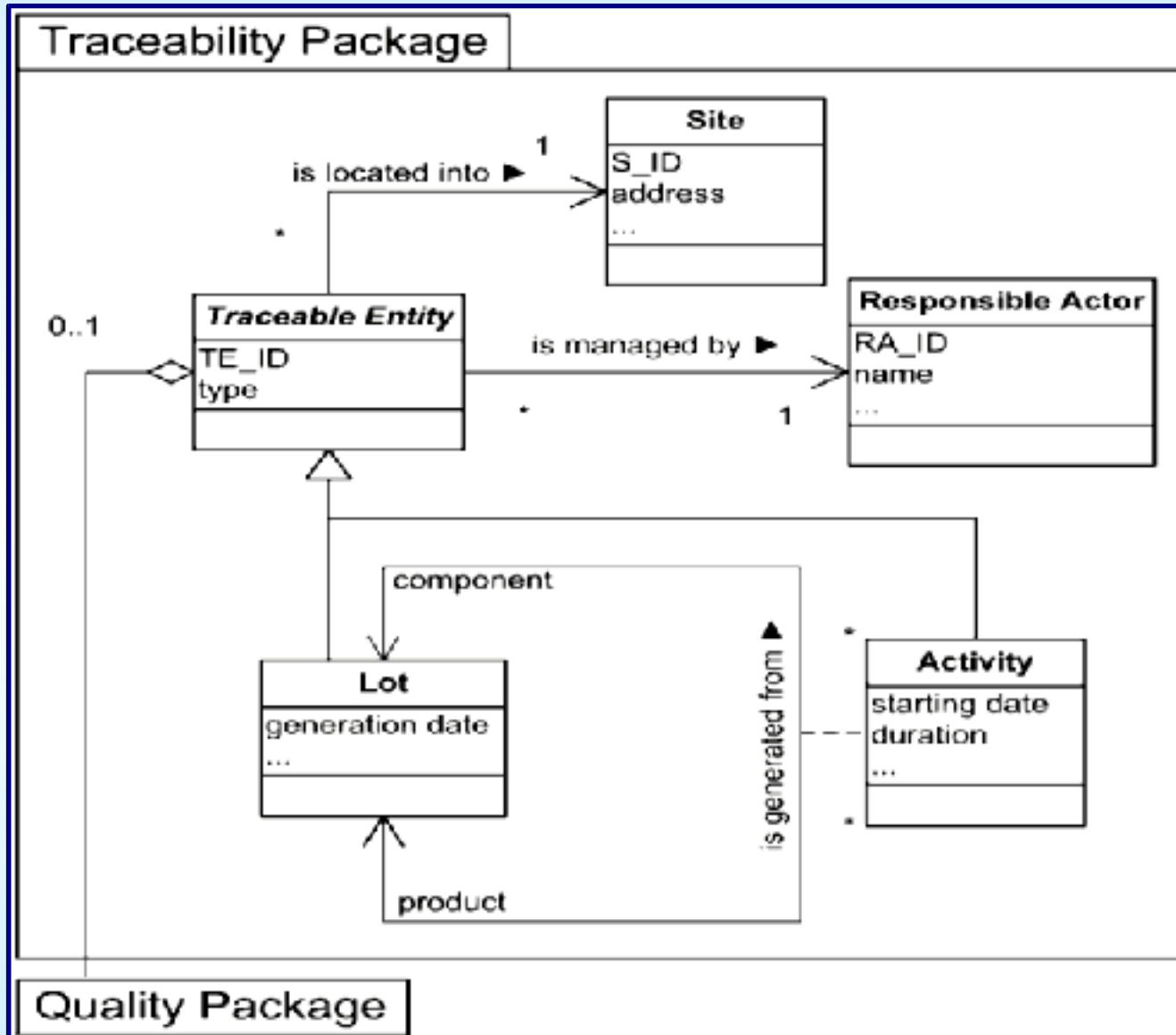
Basic Message Service Handler Architecture

Overall architecture of a prototype



outline of a traceability framework

Overall architecture of a prototype

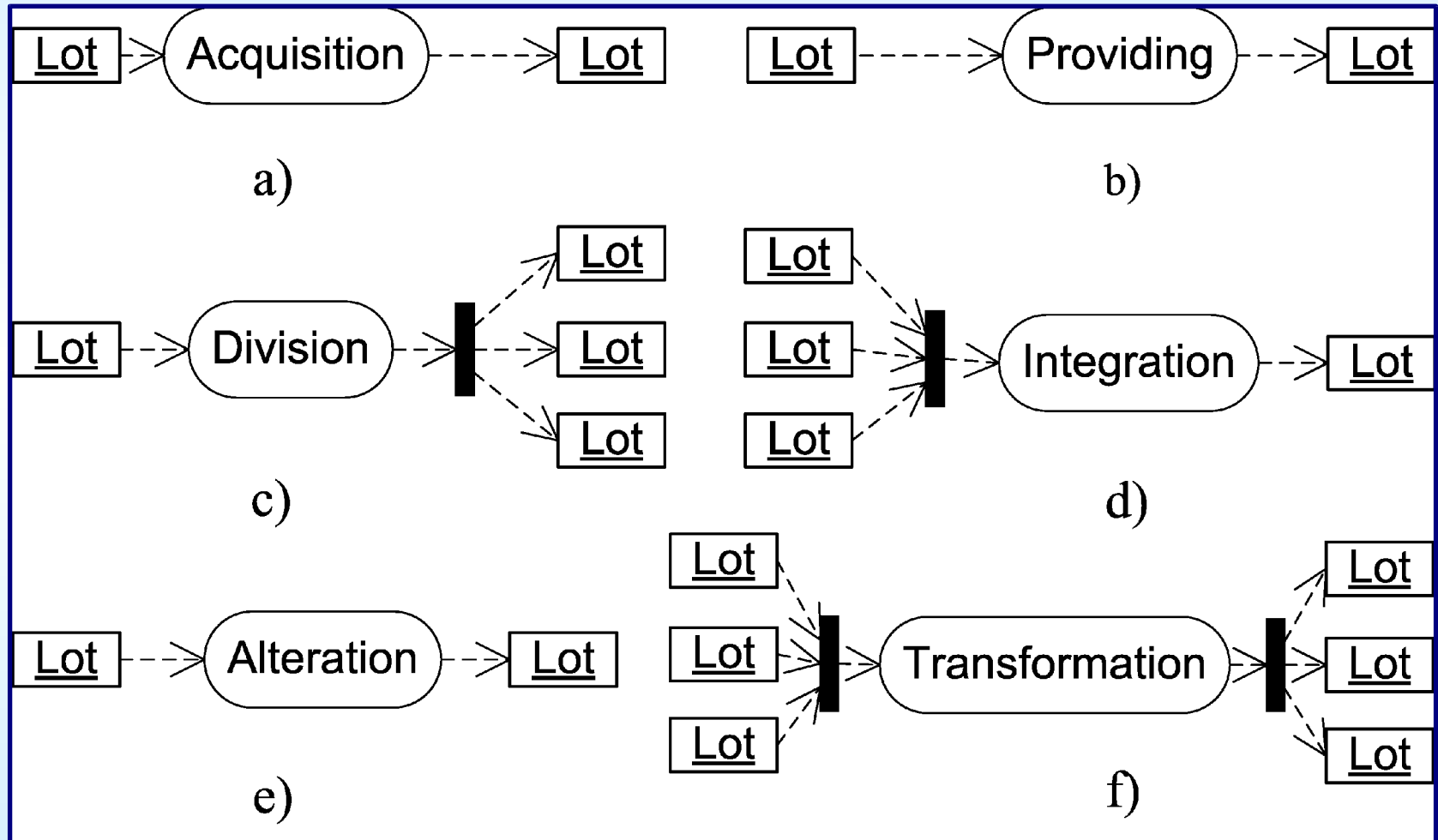


Generic traceability semantics

- two packages
- traceable entity
- traceable identifier: EAN/UCC (barcode), EPC (RFID)

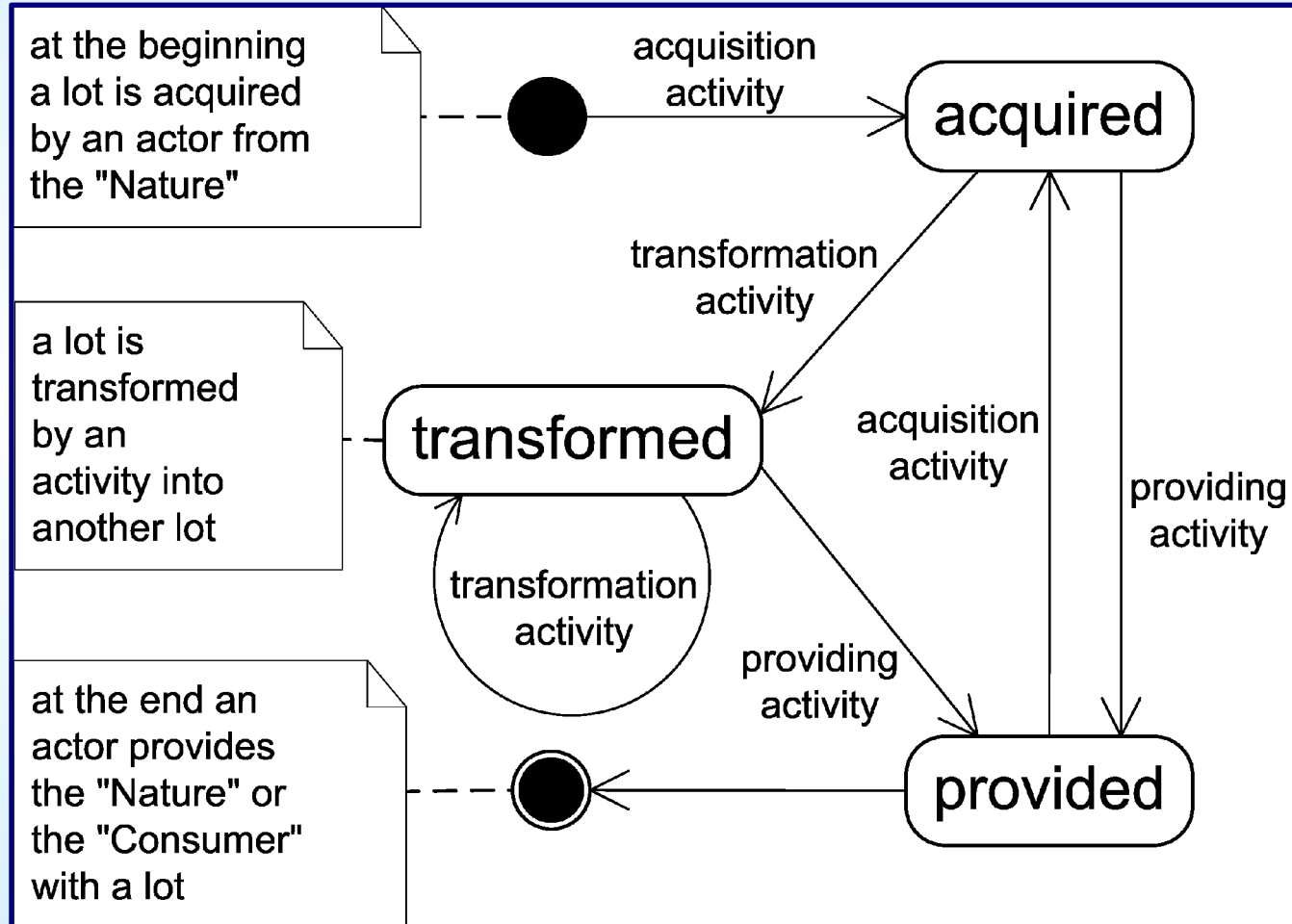
Overall architecture of a prototype

Generic traceability semantics



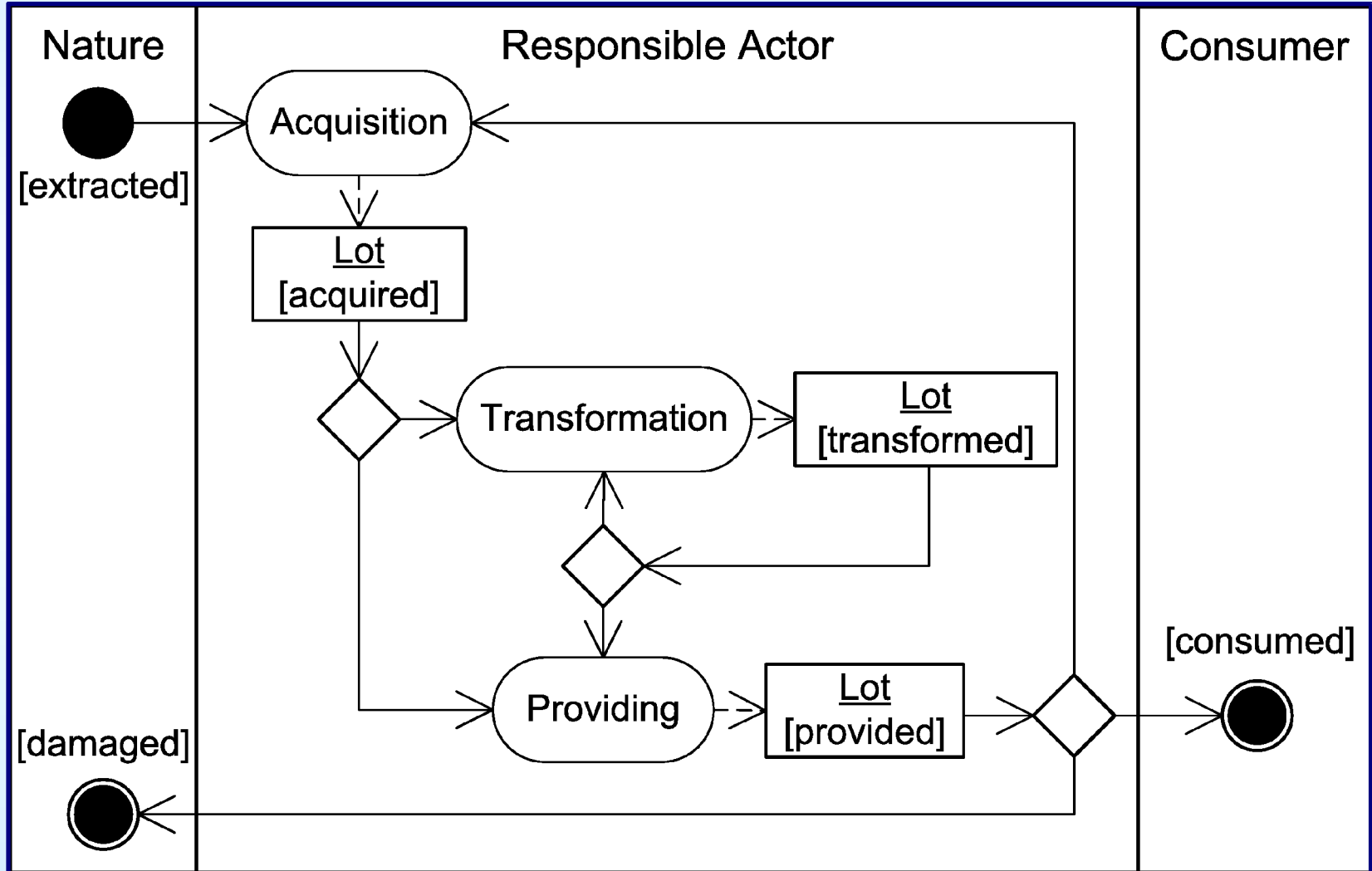
Overall architecture of a prototype

Lot state diagram (choreography)



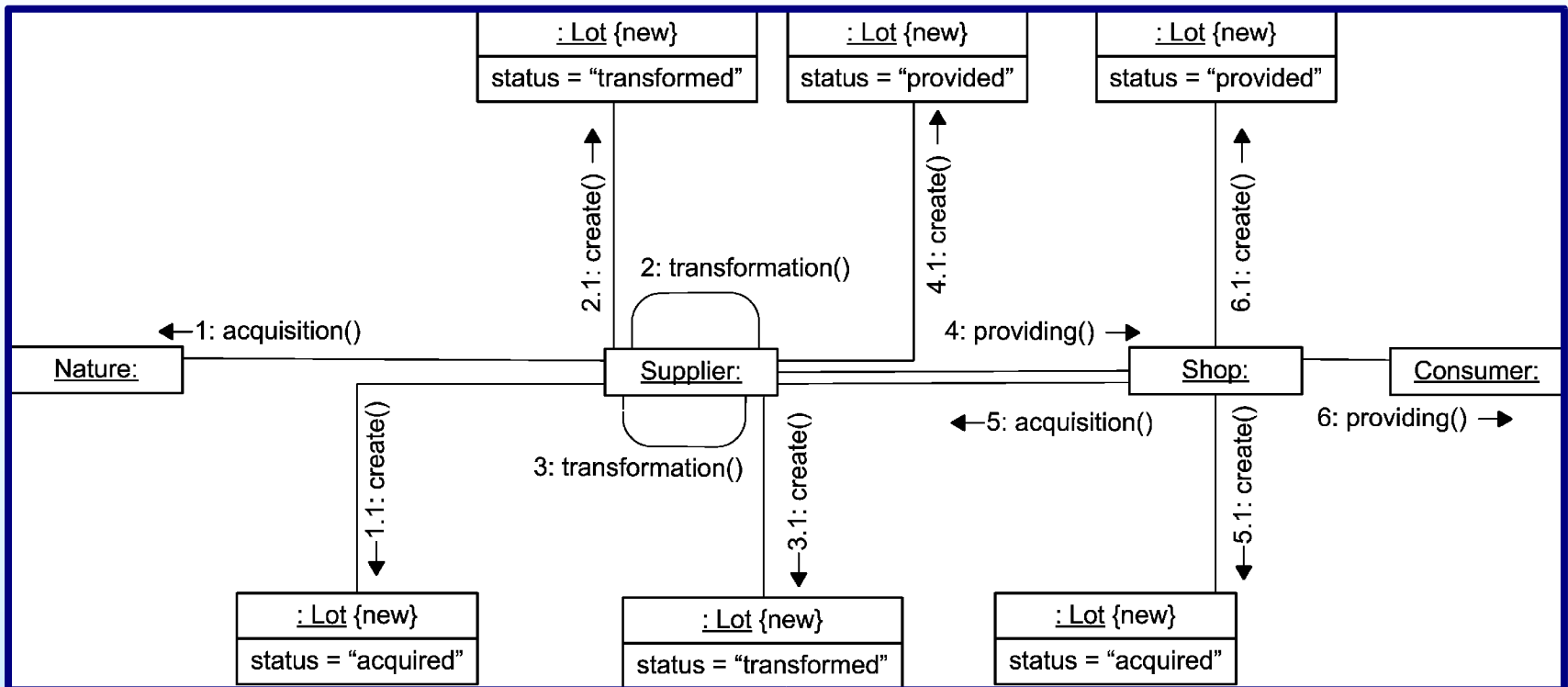
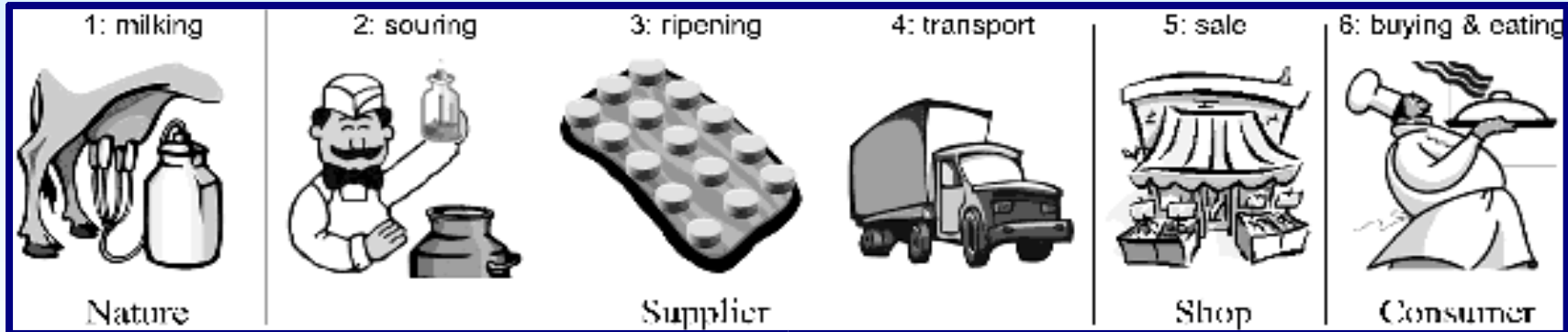
Overall architecture of a prototype

Involved activities (choreography)



Overall architecture of a prototype

Simplified cheese supply chain



Overall architecture of a prototype

XML translations (for a purchase activity)

```
<activity type = "purchase">
  <id>A055</id>
  <respActorId>A009</respActorId>
  <startingDate>
    2004-04-15 16:20:19
  </startingDate>
  <duration unit = "hour">1</duration>
  <siteId>S007</siteId>
  <qualityFeature>...</qualityFeature>
  <generatedLot>
    <id>T047</id>
  </generatedLot>
  <componentLots>
    <id>L033</id>
    <respActorId>A009</respActorId>
  </componentLots>
</activity>
```

a) activity

```
<lot type = "Wine Cask">
  <id>T047</id>
  <respActorId>A009</respActorId>
  <generationDate>
    2004-04-15 16:20:19
  </generationDate>
  <siteId>T038</siteId>
  <activityId>A005</activityId>
  <qualityFeature>...</qualityFeature>
</lot>
```

b) lot

Conclusions and Future Work

- Logical view (BPSS)
 - Message Orientation (ebMS)
 - Description Orientation (UML, XML)
 - Network Orientation (SOAP/HTTP)
 - Platform Neutral (XML)
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- We are currently experiencing the application of the prototype to a real vegetable supply chain.
 - The employment of Collaboration Protocol Agreements and Registries implementations should be taken in account.