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Εισαγωγή στα Δίκτυα Υπηρεσιών

Διάλεξη 7η: Business Protocols (ebXML)

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Introduction to Service Networks
Business Protocols
UC-01/CS-592

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What kind of Business Protocols?

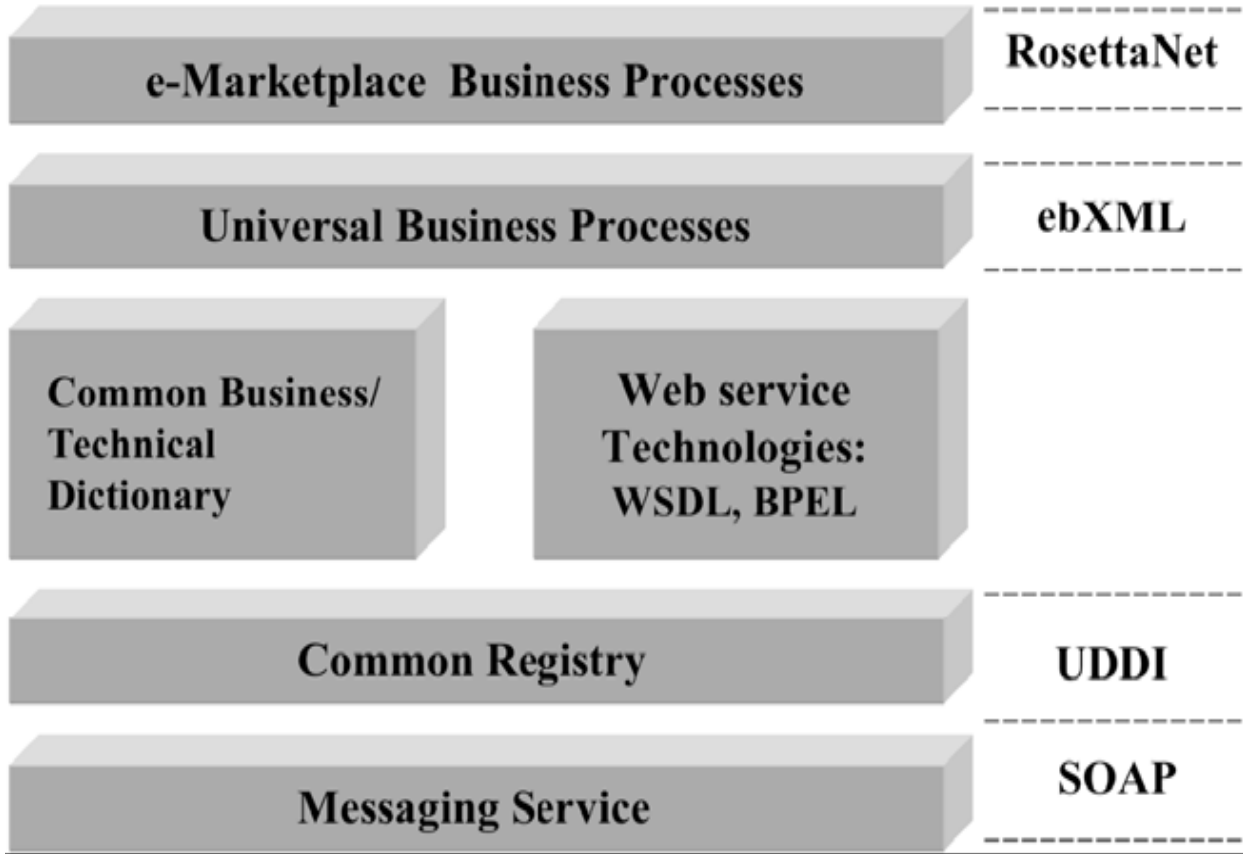
There is one family of protocols that describes how businesses pass goods and/or services between them, related information and related payments:

- Supply Chain Protocols
- EDI, eBXML, RosettaNet

There is another family of industry specific protocols that specify data formats for messages exchanged:

- OpenTravel, SWIFT/Banking, Insurance Industry - http://www.acord.org/standards/downloads/Pa

Business Standards and Web Services Technologies

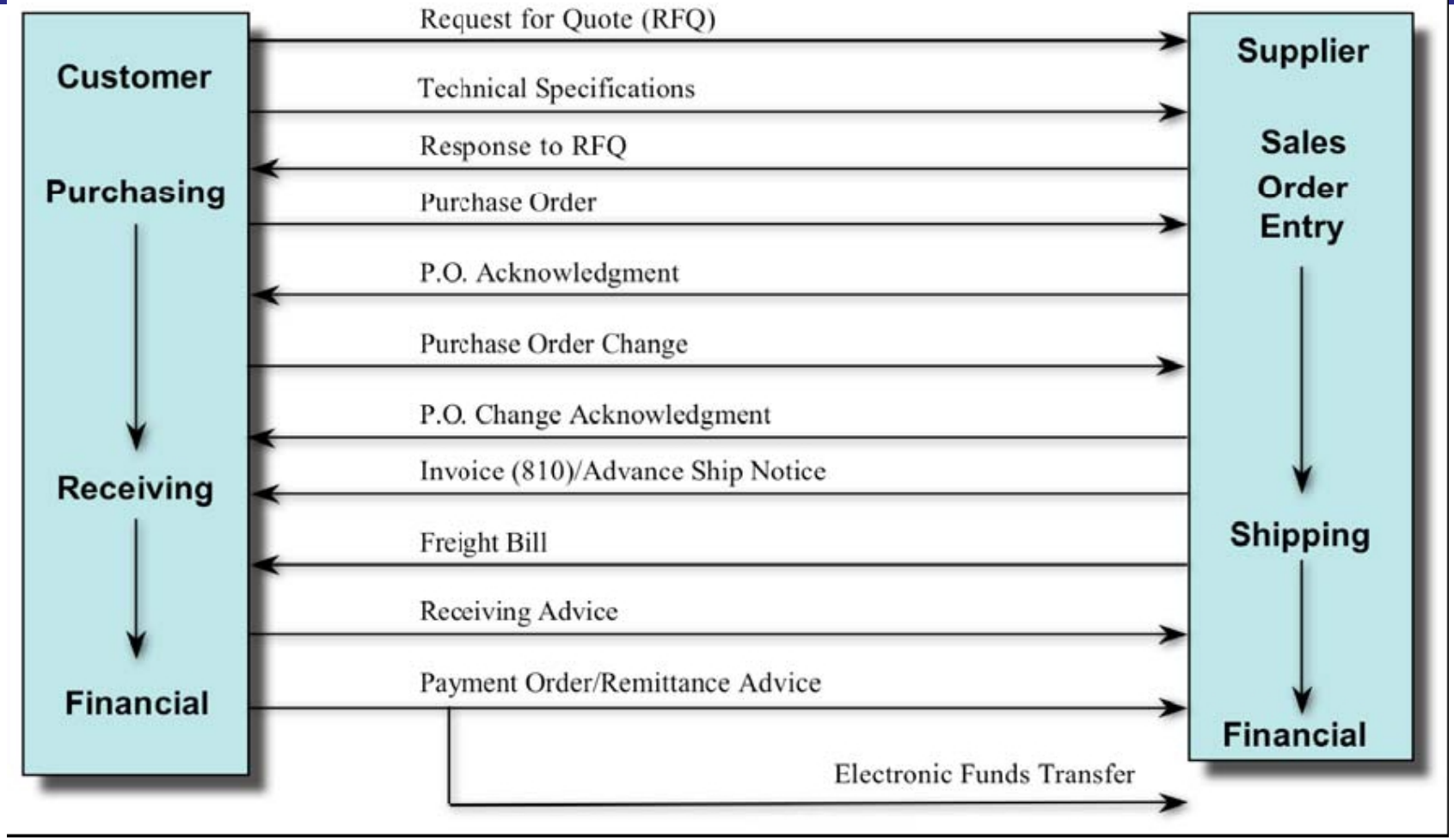


Electronic Data Interchange (EDI)

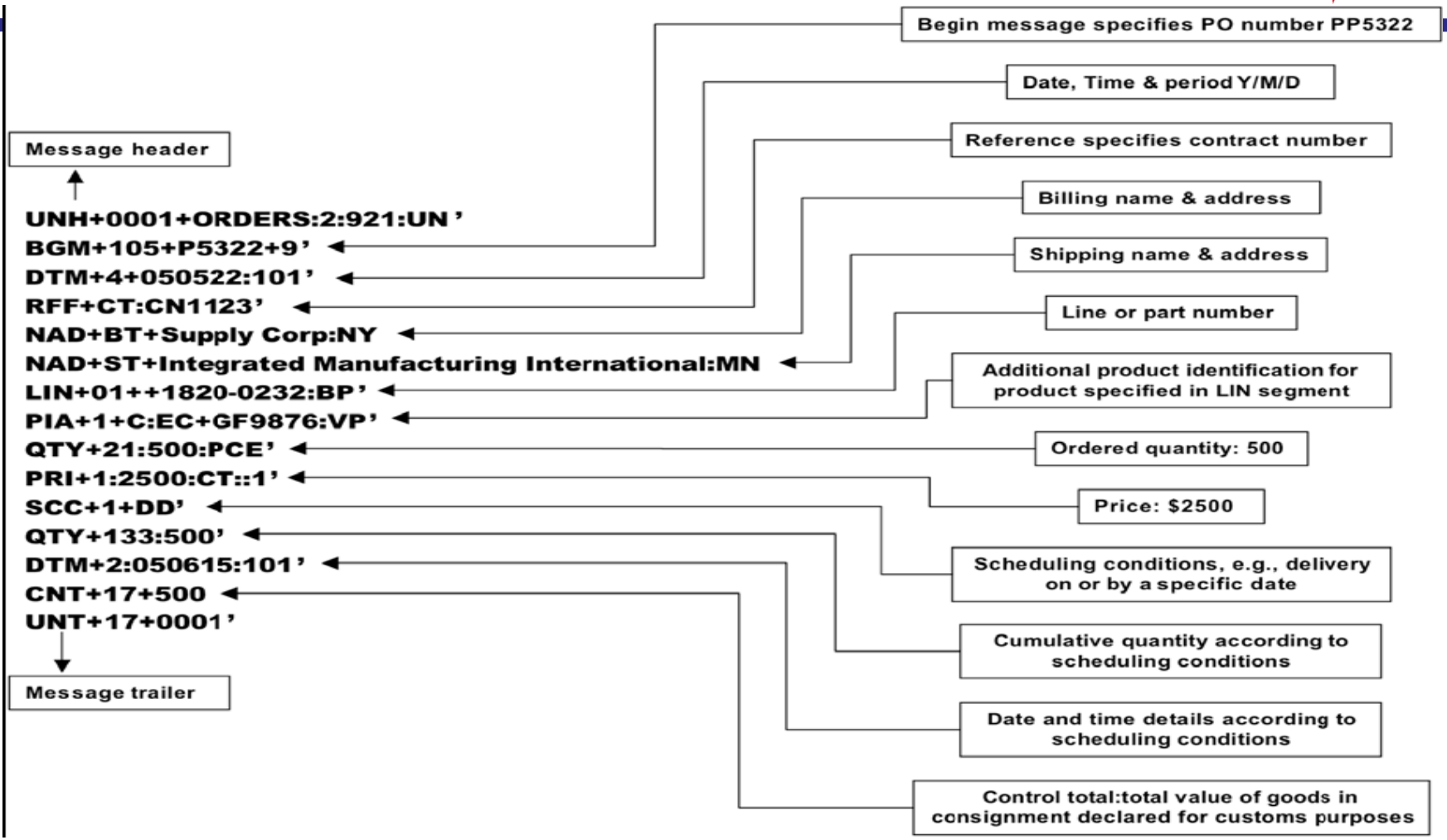
- Predates web technologies, was first developed in the early 80's.
- Motivated by cross-organization business processes – purchasing, shipment tracking, inventory queries
- Standards define syntax of exchanging data and business semantics.

http://en.wikipedia.org/wiki/Electronic_Data_Interchange

Typical EDI message exchange (Papazoglou…)



EDIFACT Sample Order



Stages of EDI

Initially EDI focused on document automation, point-to-point digital communication medium for document transmission (80s)

Many-to many digital communication medium, inventory replenishment, EDI used to eliminate purchase orders and replace them with production schedules, inventory balances (early 90s).

- Suppliers sent monthly statements of production requirements, precise scheduled delivery times, orders fulfilled continuously, inventory and payments adjusted at month end.

Mid 90s: suppliers given online access to parts of purchasing enterprise's production and delivery schedules, required to meet them by automated means.

Standards maintained by United Nation's UN/EDIFACT and USA ANSI X12.

EDI limitations

- Optimized for “heavy” data volume between large enterprises.
- Supports direct bilateral communications between small number of companies, does not permit multilateral dynamic relationships of a true marketplace.
- Involves complex and costly mapping and re-engineering procedures each time a new partner enters chain.
- High operational costs
- Does not allow multilateral negotiations

RosettaNet (M. Papazoglou…http://rosettanet.org/)

The RosettaNet business architecture identifies discrete clusters and within them segments of public business processes and standardizes the public business interaction processes involved within each of those segments.

Segments are broken into subprocesses until an event- or document-based interchange process is defined: a **Partner Interface Process (PIP)**.

PIPs define business processes between trading partners. PIPs fit into seven clusters of core business processes. PIPs apply to the following core industry processes:

- Partner,
- Product and Service Review;
- Product Information;
- Order Management;
- Inventory Management;
- Marketing Information Management;
- Service and Support;
- and Manufacturing.

Each cluster is broken down into segments -- cross-enterprise processes involving more than one type of trading partner.

PIPs are system-to-system XML-based dialogues. Each PIP specification includes a business document with the vocabulary, and a business process with the choreography of the message dialogue.

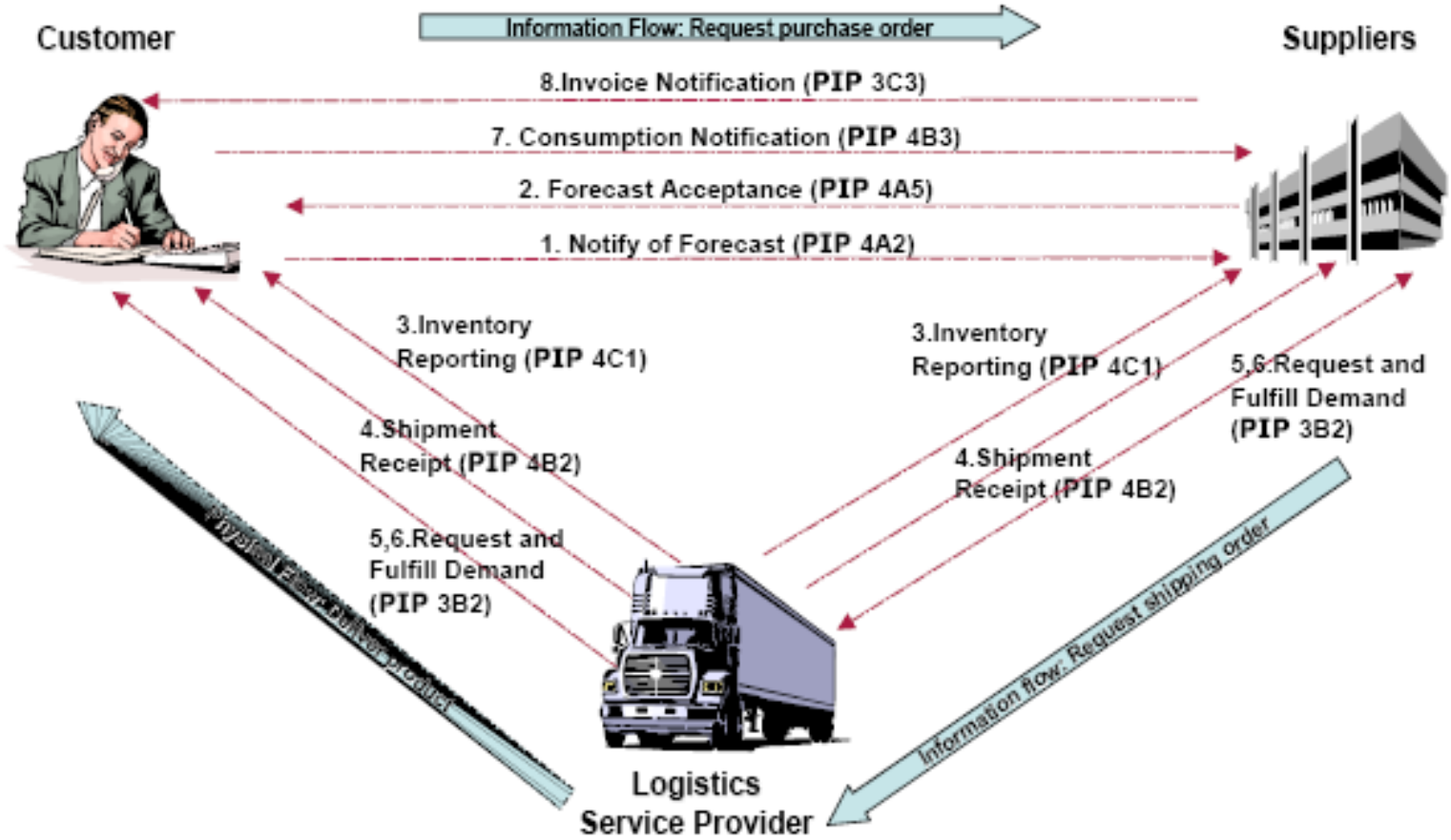
Example RosettaNet Process Manage Purchase Order (PIP 3A4)

```
<ProcessSpecification xmlns=http://www.ebxml.org/BusinessProcess name="PIP3A4RequestPurchaseOrder">
        <BusinessDocument name="Puchase Order Request"
                nameID="Pip3A4PurchaseOrderRequest" specificationLocation="PurchaseOrderRequest.xsd">
        </BusinessDocument>
        <BusinessDocument name="Puchase Order Confirmation"
                nameID="Pip3A4PurchaseOrderConfirmation"
                        specificationLocation="PurchaseOrderConfirmation.xsd">
        </BusinessDocument>
        <BusinessTransaction name="Request Purchase Order" nameID="RequestPurchaseOrder_BT">
                <RequestingBusinessActivity name="Purchase Order Request Action"
                        nameID="PurchaseOrderRequestAction"
                        isAuthorizationRequired="true" isNonRepudiationRequired="true"
                        timeToAcknowledgeReceipt="P0Y0M0DT2H0M0S">
                        <DocumentEnvelope businessDocument="Puchase OrderRequest"
                                businessDocumentIDRef="Pip3A4PurchaseOrderRequest" />
                </RequestingBusinessActivity>
                <RespondingBusinessActivity name="Purchase Order Confirmation Action"
                        nameID="PurchaseOrderConfirmationAction" isAuthorizationRequired="true"
                        isNonRepudiationRequired="true"
                        timeToAcknowledgeReceipt="P0Y0M0DT2H0M0S">
                        <DocumentEnvelope businessDocument="Purchase Order Confirmation"
                                businessDocumentIDRef="Pip3A4PurchaseOrderConfirmation" />
                </RespondingBusinessActivity>
        </BusinessTransaction>
```

Code continues in next page...

```
<BinaryCollaboration name="Request Purchase Order" nameID="RequestPurchaseOrder_BC">
        <InitiatingRole name="Buyer" nameID="BuyerId" />
        <RespondingRole name="Seller" nameID="SellerId" />
        <Start toBusinessState="Request Purchase Order" />
        <BusinessTransactionActivity name="Request Purchase Order"
nameID="RequestPurchaseOrder_BTA"
            businessTransaction="Request Purchase
            Order"businessTransactionIDRef="RequestPurchaseOrder_BT"
            fromAuthorizedRole="Buyer" fromAuthorizedRoleIDRef="BuyerId"
            toAuthorizedRole="Seller" toAuthorizedRoleIDRef="SellerId"
        •       timeToPerform="P0Y0M0DT24H0M0S"/>
    </BinaryCollaboration>
</ProcessSpecification>
```

RosettaNet Inventory and Logistics Model (M. Papazoglou…)



RosettaNet and Web Services

Fairly easy to model PIP processes and messages as WSDL operations (see Masud 2003).

Choreography from the RosettaNet PIP can be implemented in BPEL (Masud 2003).

The Electronic Business XML Initiative (ebXML)

ebXML consists of a set of XML document type definitions that are common for business to business (ANSI X12 EDI) transactions across most industries.

Its purpose is to preserve and extend the EDI infrastructure, by leveraging semantics and structure of EDI standards such as X12 and EDIFACT.

Several business concepts and constructs apply to all business domains and are expressed in a common way across vendors to enable ebXML-based e-Business. These constructs include

- descriptions of businesses,
- products and individuals,
- measurements, date, time, location, currencies,
- business classification codes, etc.

Translation services can handle the mapping from one company's XML documents onto formats used by its trading partner and into data formats required by its own legacy systems.

A complete business integration solution along the lines of ebXML requires:

- standardized tags (meta-data), for each industry sector;
- a means for mapping between different meta-data descriptions;
- and means for processing XML documents
- and invoking business applications and services provided by business processes and workflows.

ebXML Reference Architecture

(http://ebxml.org./specs/index.htm#reference_materials)

At a high level, ebXML identified common cross-industry business processes that characterised business transactions, and defined a structure of those processes that enabled development of a Business Process Specification Schema (BPSS). Business processes

- identify the parties conducting business,
- their specific roles,
- the interactions among the parties,
- the flow of messages in those interactions,
- and major pieces of data carried in those messages.

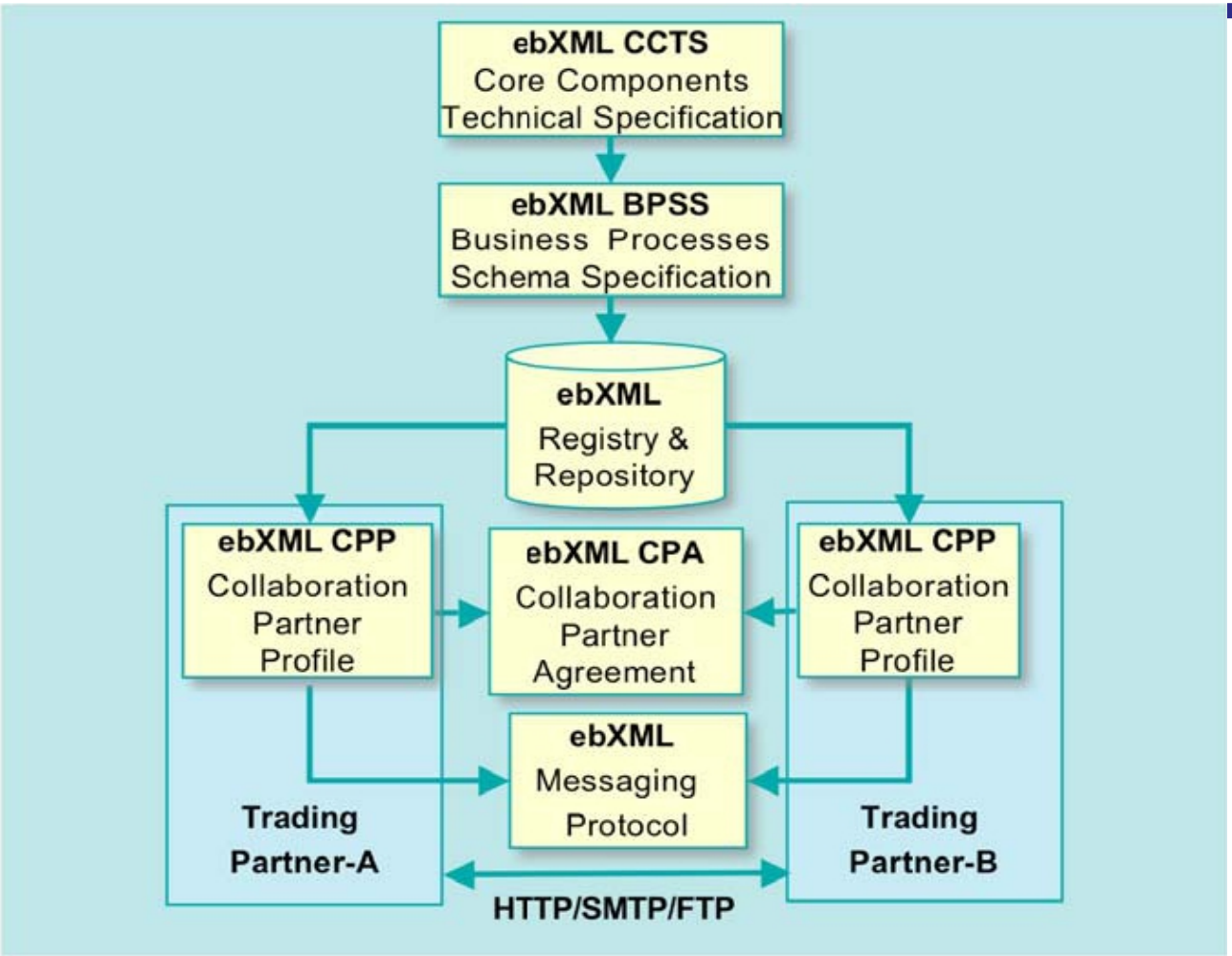
At a more detailed level, ebXML defined core components that address semantic interoperability at the level of individual data items, seeking a way to bridge the individual industry terminologies, much as ebXML business processes work at a high level.

The ebXML reference architecture is composed of the following five major architectural components [Clark 2001]:

- messaging service,
- registry and repository,
- trading partner information,
- business process specification schema
- and core components.

The lower-level layers in this stack support lower-level functionality, e.g., computer processing and message transport details or registry functions, required for the implementation of the higher-level components.

ebXML infrastructure elements



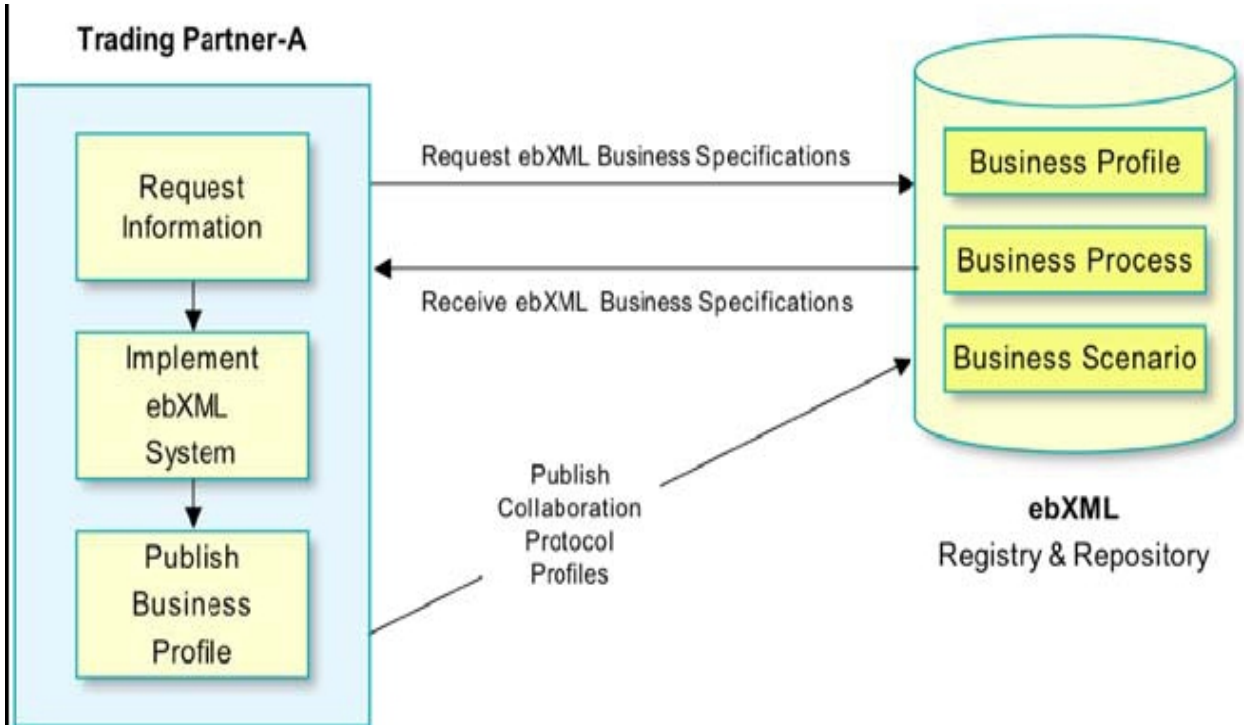
Sample ebXML transaction

```
<BusinessTransaction name="Create Order">
    <RequestingBusinessActivity name="SendOrder"
        isNonRepudiationRequired="true"
        timeToAcknowledgeReceipt="P2D"
        timeToAcknowledgeAcceptance="P3D">
    <DocumentEnvelope businessDocument="Purchase Order"/>
    </RequestingBusinessActivity>
    <RespondingBusinessActivity name="SendPOAcknowledgement"
        isNonRepudiationRequired="true"
        timeToAcknowledgeReceipt="P5D">
        <DocumentEnvelope isPositiveResponse="true"
            businessDocument="PO Acknowledgement"/>
    </RespondingBusinessActivity>
</BusinessTransaction>
```

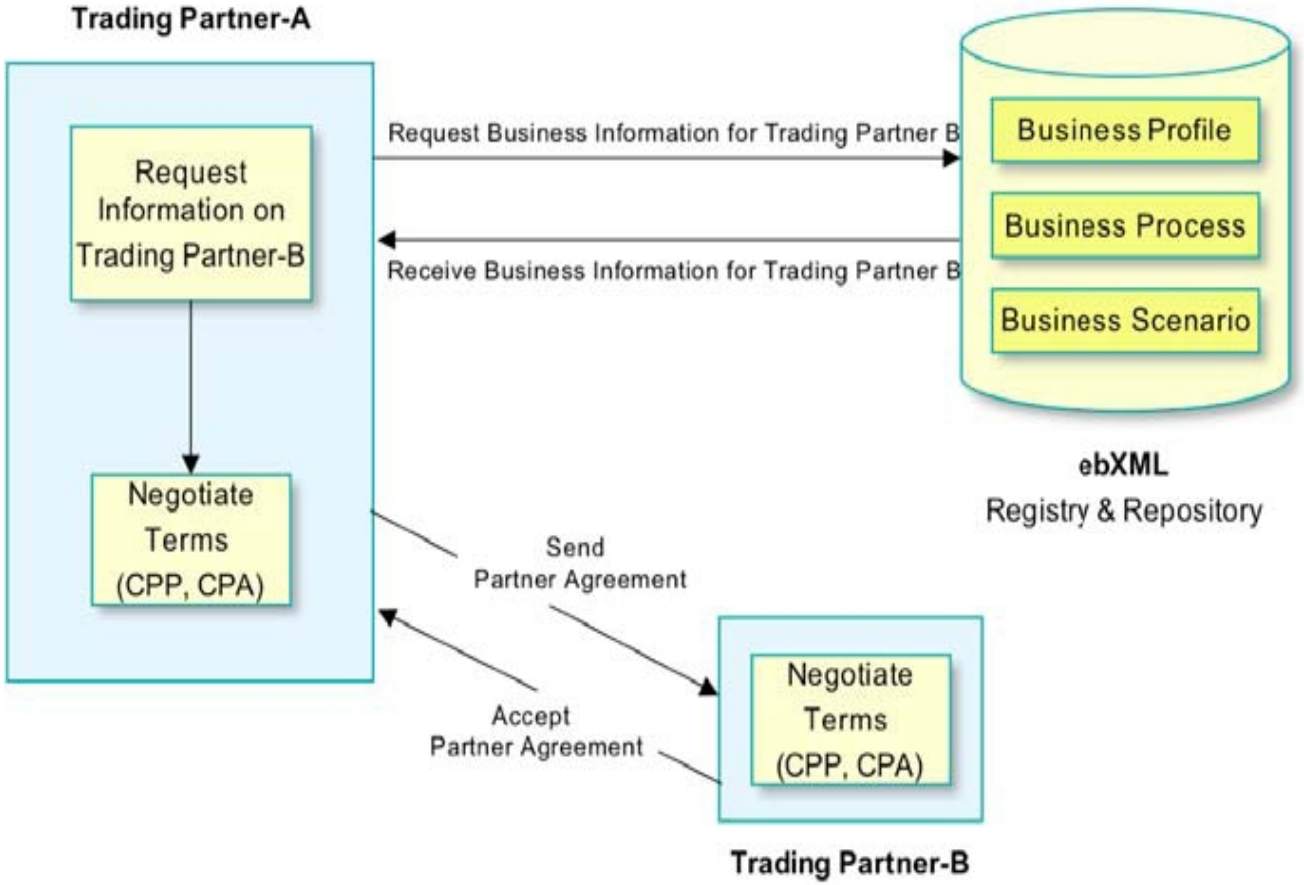
Sample ebXML business collaboration

```
<BinaryCollaboration name="Product Fulfillment" timeToPerform="P5D">
      <Documentation>
            timeToPerform = Period: 5 days from start of transaction
      </Documentation>
      <InitiatingRole name="buyer"/>
      <RespondingRole name="seller"/>
      <!-- Transaction: buyer to create an order with seller -->
      <BusinessTransactionActivity name="Create Order"
            businessTransaction="Create Order"
            fromAuthorizedRole="buyer"
            toAuthorizedRole="seller"
            isLegallyBinding=”true” />
      <!-- Transaction: buyer to notify seller in case of advance shipment -->
      <BusinessTransactionActivity name="Notify Shipment"
            businessTransaction="Notify of advance shipment"
            fromAuthorizedRole="buyer" toAuthorizedRole="seller"/>
</BinaryCollaboration>
```

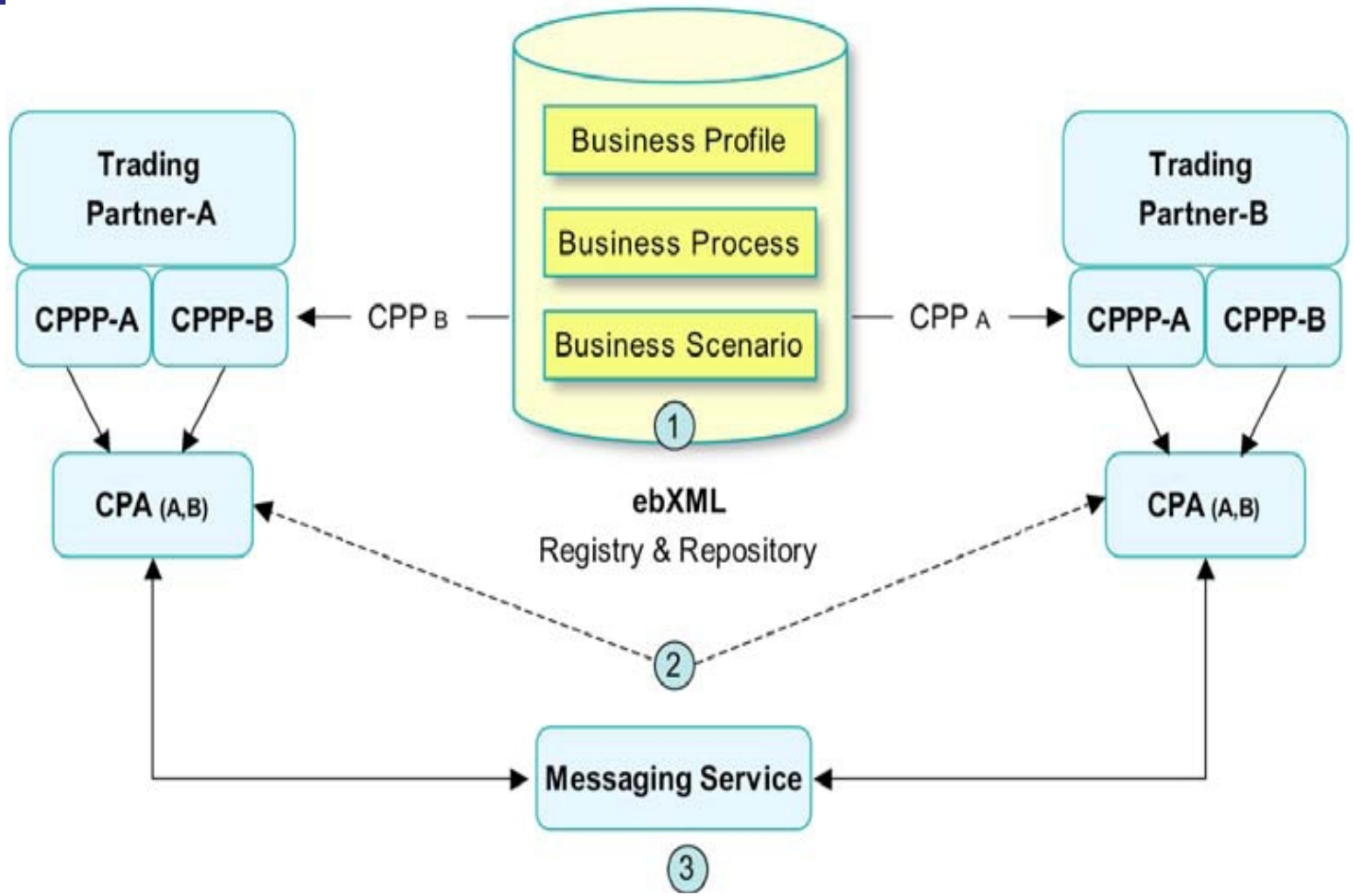
ebXML Functional Phases: Implementation



ebXML discovery and retrieval phase



ebXML Runtime Phase



ebXML and Web Services

ebXML provides a complete solution in the e-Business integration domain; Web services are an e-Business enabling infrastructure, broader in scope and include application and e-Business integration as well as traditional Web interactions.

ebXML addresses several of the layers in the Web services technology stack

- the ebXML messaging specification provides secure, reliable communication on any transport, uses SOAP for packaging, and defines a rich set of meta-data for carrying out e-Business transactions between trading partners [Patil 2003].
- the ebXML Collaboration Protocol describes the trading partner's business services, the concrete binding where the service can be addressed.
- BPSS also defines the collaboration aspects between processes and, thereby, how services are orchestrated.
- The Collaboration Protocol covers the business and service-level agreements.
- the ebXML registry allows publication, sharing and discovery of different business artifacts such as trading-partner information, business process definitions, and business document types.

Web services as an implementation platform for ebXML:

- use WSDL to describe Collaboration Protocol Profiles.
- BPEL can be used to implement BPSS.
- BPPScan be used to describe the overall business processes and then BPEL can be used to define components in the BPSS.
- Predefined BPEL components can be included into BPSS diagrams as nodes.

XML in Vertical Organizations

- Aviation and Automotive (http://www.sae.org/)
- Retail (http://www.nrf-arts.org/)
- Travel
- Insurance

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ΕΣΠΑ 2007-2013
πρόγραμμα για την ανάπτυξη
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Με τη συγχρηματοδότηση της Ελλάδας και της Ευρωπαϊκής Ένωσης

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