



Sistemi ICT per il Business Networking

ebXML

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Introduction

- In order for enterprises to conduct electronic business with each other they **must**:
 - **Discover** each other and the products and services they have to offer
 - Determine which **shared business processes** and associated **document exchanges** to use for obtaining products or services from each other
 - Determine the **contact points** and **form of communication** for the exchange of information
 - Agree on the **contractual terms** on the above chosen processes and associated information
- and then they **can**:
 - **Exchange information and services in an automated fashion in accordance with these agreements**

More detailed ...

- An important step is **to define standards**. But standards **to define what?**
 - Define **Common Business Transactions** (e.g. Sending a Purchase Order)
 - Define **Common Data-Interchange Formats**, i.e. messages in the context of the above transactions
 - Define a mechanism for listing your **organization's capabilities** and the **business transactions** that your organization can perform in a **common Repository** accessible to all other organizations. In short, an ability to describe your **Company Profile**
 - Define a mechanism to allow organizations **to discover companies and lookup their profile**
 - Define a mechanism that allows two organizations **to negotiate on the business terms before they start transactions**
 - Define a **common transport mechanism** for exchanging messages between organizations
 - Define the **security and reliability framework**

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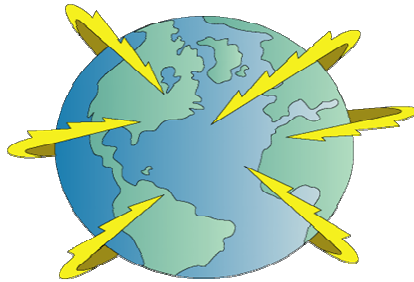
XML is not enough

- XML is for **marking up data**
- XML, by itself, does not solve **interoperability problems** yet it is an important tool for doing so
- XML **does not provide semantics**

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Thus the need for ebXML

Mission: ebXML enables **anyone**, **anywhere** to **do business with anyone else over the Internet**



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ebXML initiative

- **Vision of ebXML:** to create a single **global electronic marketplace** where enterprises of any size and in any geographical location can meet and conduct business with each other **through the exchange of XML based messages**
- ebXML is a **set of specifications** that together enable a modular, yet **complete electronic business framework**
- If the **Internet** is the information highway for electronic business, then **ebXML** can be thought of as providing the on ramps, off ramps, and the rules of the road

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ebXML

- The **ebXML architecture** provides:
 - A way to define **business processes** and their associated **messages** and **content**
 - A way to register and discover **business processes** with related **message exchanges**
 - A way to define **company profiles**
 - A way to define **trading partner agreements**
 - A **uniform** message transport layer

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ebXML

- The ebXML initiative is designed for **electronic interoperability**, allowing businesses **to find each other**, **agree** to become trading partners and **conduct business**
 - All of these operations can be performed **automatically**, **minimizing**, and in most cases completely **eliminating** the need for human intervention
 - **Low cost, open, standard** mechanism

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ebXML is global and evolutionary

- ebXML is **global** in **support**, **scope** and **implementation**
 - Joint initiative of the **United Nations (UN/CEFACT)** and **OASIS**, developed with global participation for global usage
 - **Membership** in ebXML is open to anyone
 - **Participants** represent major vendors and users in the IT industry and leading vertical and horizontal industry associations
- ebXML is **evolutionary**, not revolutionary
 - **Based on Internet technologies** using proven, public standards such as: HTTP, TCP/IP, mime, SMTP, FTP, UML, and XML
 - The use of public standards yields a **simple and inexpensive solution** that is **open and vendor-neutral**
 - ebXML can be implemented and deployed on just about **any computing platform** and **any programming language**

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ebXML and e-commerce

- **Electronic commerce** is not a new concept: for the past 25 years, companies have been exchanging information with each other electronically, based on **Electronic Data Interchange (EDI)**
 - Unfortunately, EDI currently requires significant technical expertise, and deploys **tightly coupled, inflexible architectures**. While it is possible to deploy EDI applications on public networks, they are most often deployed on **expensive dedicated networks** to conduct business with each other
 - As a result, **EDI adoption has been limited** to primarily large enterprises and selected trading partners, which represents a small fraction of the world's business entities
- Applying today's best practices, **ebXML aims to remove these obstacles**
 - **Low cost electronic business** to virtually anyone with a computer and an application that is capable of reading and writing ebXML messages

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ebXML: end-to-end modular solution

- ebXML is an **end-to-end solution**, but it is **modular** in nature
 - Businesses are **not required to implement the entire specification** all at once
 - Specification sets may be **implemented incrementally** as needed
 - The specification sets, each being stand-alone, but all of them being aligned with each other, can be **implemented individually or in a number of useful combinations**

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ebXML and business needs

- **Business needs**
 - **Discover** each other and the products and services they have to offer
 - Determine which **shared business processes**, and associated document exchanges, to use for obtaining products or services from each other
 - Determine the **contact points and form of communication** for the exchange of information
 - Agree on the **contractual terms** on the above chosen processes and associated information
- ebXML is designed **to meet these needs** and is built on three basic concepts:
 1. provide an infrastructure that ensures data **communication interoperability**
 2. provide a **semantics framework** that ensures commercial interoperability
 3. provide a mechanism that allows enterprises **to find** each other, **agree** to become trading partners and **conduct business** with each other

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ebXML high-level components

1. Infrastructure to ensure data **communication interoperability**:
 - a **standard message transport mechanism** with a well defined interface, packaging rules, and a predictable delivery and security model
 - a **'business service interface'** that handles incoming and outgoing messages at either end of the transport
2. **Semantic Framework** to ensure commercial interoperability:
 - **metamodel** for defining business process and information models
 - **set of re-useable business logic** based on core components that reflect common business processes and XML vocabularies
 - **process for defining actual message structures and definitions**
3. Mechanism that allows enterprises **to find** each other, **agree** to become trading partners and **conduct business** with each other:
 - **shared repository** where enterprises can register and discover each other's business services
 - company profiles
 - business process models
 - related message structures

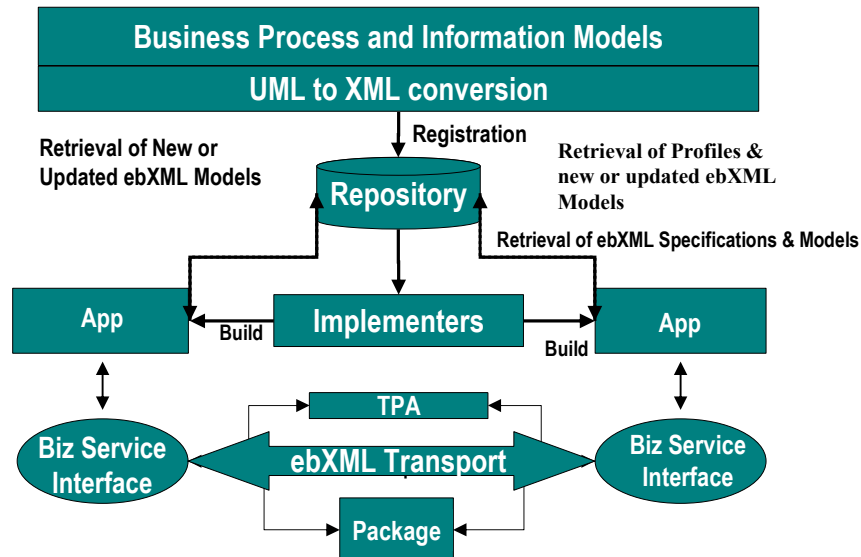
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ebXML Technical Architecture

- The technical architecture is composed of five main area of emphasis:
 - Business Process and Information Model
 - Company Profiles
 - Messaging Services
 - Registry & Repository
 - Collaborative Partner Agreements (CPA)

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ebXML Technical Architecture



ebXML Technical Architecture

Business Process models

- The Business Process models define **how business processes are described**
- Business Processes represent **the "verbs" of electronic business** and can be represented using **modelling tools**
- The specification for business process definition enables an organization to express its **business processes** so that they are **understandable by other organizations**
- This enables the **integration of business processes**
 - within a company
 - between companies

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ebXML Technical Architecture

Information models

- The Information models define **reusable components** that can be applied in a standard way within a business context
- These Core Components represent **the "nouns and adjectives"** of electronic business
- They are defined using **items that are common across all businesses**
 - This enables users to define **data that is meaningful** to their business while also maintaining interoperability with other business applications

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ebXML Technical Architecture

Messaging Service specification

- The ebXML Messaging Service specification defines the set of **services and protocols** that enables electronic business applications to exchange data
 - The specification allows **any application-level protocol** to be used
 - These can include **common protocols** such as SMTP, HTTP, and FTP
 - Well established **cryptographic techniques** can be used to implement strong security
 - For example, secure protocols such as [HTTPS](#) can be used to guarantee confidentiality
 - In addition, **digital signatures** can be applied to individual messages or a group of related messages to guarantee authenticity

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ebXML Technical Architecture

Registry and Repository

- The Registry and Repository provides a number of key **functions**
 - For the user (application) it stores **company profiles** and **Trading Partner specifications**
 - For the application developer it will store not only the final business process definitions, but also a **library of core components**

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Usage Example

Conducting electronic business with ebXML

is essentially a **four step process**

- 1. Design and register** business processes and information models
- 2. Implement** business service interfaces and **register** Collaborative Partner Profiles
- 3. Discover** Partner Information, **negotiate and define** a Collaborative Partner Agreement (CPA)
- 4. Exchanging** messages between business partners

Implementation
phase

Negotiation
phase

Transaction
phase

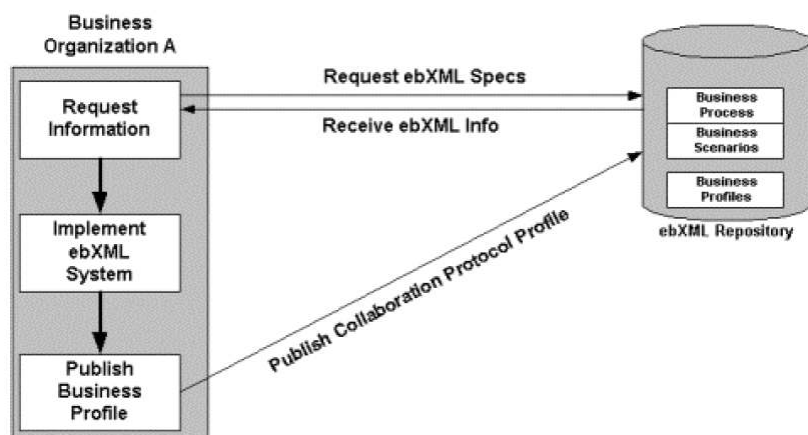
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Before starting ...

- The exchange of information between two Parties **requires each Party to know**
 - the other Party's **supported Business Collaborations**
 - the other Party's **role in the Business Collaboration**
 - the **technology details** about how the other Party sends and receives Messages

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Implementation phase



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Implementation phase

- **ebXML Repository** contains industry defined **Business Processes and Scenarios** that are commonly applicable to most business transactions
 - Companies can choose **to extend these processes** and **add scenarios** of their own
 - The repository also contains **profiles for businesses that have already registered** themselves for performing ebXML transactions with other trading partners

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Implementation phase

1. Request Information

- **Request the ebXML Specs** (Business Processes, Business Scenarios) and understand them
- **Decide which business processes** to implement

2. Implement ebXML System

- **Implement a system in-house** based on those standards (either a new system or one on top of an existing system)
- The whole idea is **to expose a system that understands and talks ebXML**

3. Publish Business Profile

- Publish its profile known as a **Collaboration Protocol Profile (CPP)** to the ebXML Repository for other organizations to discover
 - **which business processes** it supports
 - **its roles** in that process
 - the **messages** exchanged
 - the **transport mechanism** for the messages

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Collaboration Protocol Profile (CPP)

- **Document** that allows a Trading Partner to express their **supported Business Processes and Business Service Interface requirements** in a manner where they can be universally understood by other ebXML compliant Trading Partners
 - **contact** information
 - industry **classification**
 - supported **Business Processes**
 - **interface** requirements
 - **messaging service** requirements
 - (Optional) **security** and **other implementation specific details**
- **Once the CPP is published to the ebXML Repository**, it will allow other organizations to access it and learn about the capabilities of Organization A

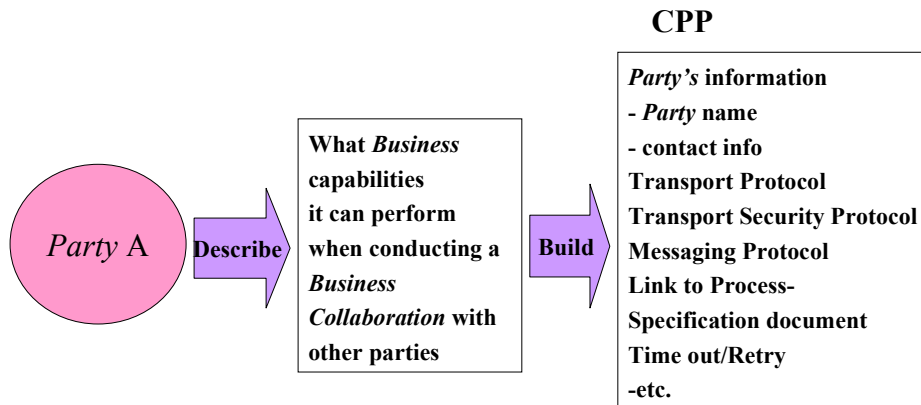
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Collaboration Protocol Profile (CPP)

- The way each Party can exchange information, in the context of a Business Collaboration, can be described by a **Collaboration-Protocol Profile (CPP)**
 - A Party MAY describe itself in a **single CPP**
 - A Party MAY create **multiple CPPs** that describe, for example, different Business Collaborations that it supports, its operations in different regions of the world, or different parts of its organization
- A CPP SHALL be capable of **referencing one or more Business Processes** supported by the Trading Partner
- The CPP SHALL reference **the Roles within a Business Process** that the user is capable of assuming (e.g. the notion of a "Seller" and "Buyer" within a "Purchasing" Business Process)

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Collaboration Protocol Profile (CPP)



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Collaboration Protocol Profile (CPP)

```
<CollaborationProtocolProfile
  xmlns=http://www.ebxml.org/namespaces/tradePartner
  xmlns:ds="http://www.w3.org/2000/09/xmldsig#"
  xmlns:xlink=http://www.w3.org/1999/xlink version="1.1">

  <PartyInfo> <!--one or more-->
    ...
  </PartyInfo>
  <Packaging id="ID"> <!--one or more-->
    ...
  <Packaging>
    <ds:Signature> <!--zero or one-->
      ...
    </ds:Signature>
    <Comment>text</Comment> <!--zero or more-->
  </CollaborationProtocolProfile>
```

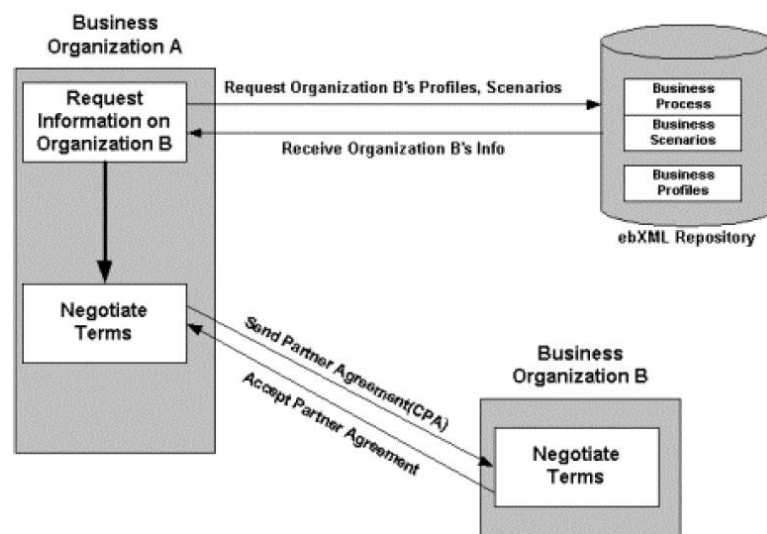
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CPP – Party Info

```
<PartyInfo>
  <PartyId type="..."> <!--one or more-->
    ...
  </PartyId>
  <PartyRef xlink:type="...", xlink:href="..."/>
  <CollaborationRole> <!--one or more--> ...
  </CollaborationRole>
  <Certificate> <!--one or more-->
    ...
  </Certificate>
  <DeliveryChannel> <!--one or more--> ...
  </DeliveryChannel>
  <Transport> <!--one or more--> ... </Transport>
  <DocExchange> <!--one or more--> ... </DocExchange>
</PartyInfo>
```

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Negotiation phase



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Negotiation phase

- We shall look at **how Organization A does electronic business** with a partner Organization B, which has published its profile
 1. **Retrieve Organization B's profile** information from the ebXML Repository
 2. As in the real world, businesses always **negotiate terms and implement business contracts** before conducting any business

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Negotiation phase

1. **Retrieve Organization B's profile** information from the ebXML Repository
 - **Understand Organization B's capabilities** i.e. whether it supports the business processes that it is interested in, the messages to be exchanged, transport mechanisms, security and reliability of the process, etc

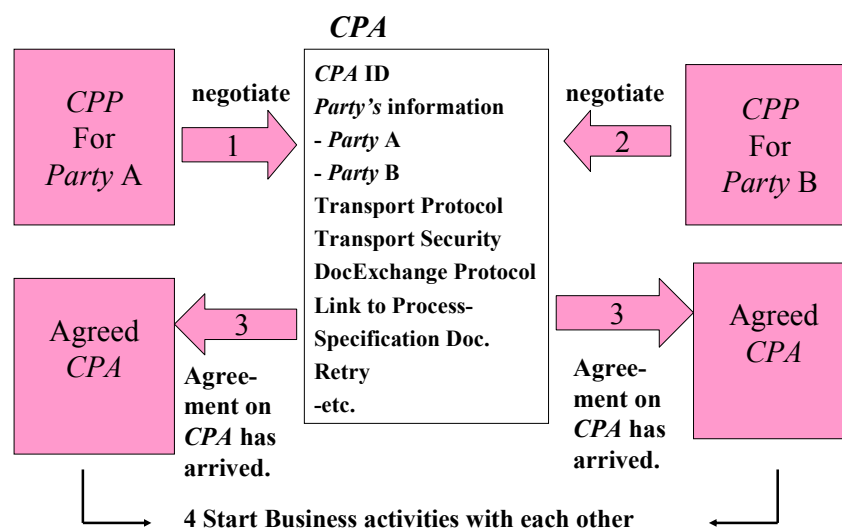
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Negotiation phase

2. As in the real world, businesses always **negotiate terms and implement business contracts** before conducting any business
 - Send over a business contract called a **Collaborative Partner Agreement (CPA)** to Organization B (the CPA will be a reflection of **the profile (CPP) of both the organizations**)
 - Both the organizations can now **collaborate on the CPA** and **refine it** to meet the business needs of both the organizations
 - Finally, **both parties accept the agreement**
 - During this phase, it is very likely that **key personnel** from both organizations will **meet** in person and make **assessments** before committing to an e-Business relationship

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Collaboration Protocol Agreement (CPA)



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Collaboration Protocol Agreement (CPA)

```
<CollaborationProtocolAgreement
  xmlns="http://www.ebxml.org/namespaces/tradePartner"
    xmlns:bpm="http://www.ebxml.org/namespaces/businessProcess"
    xmlns:ds = "http://www.w3.org/2000/09/xmldsig#"
    xmlns:xlink = http://www.w3.org/1999/xlink cpaid="YoursAndMyCPA"
    version="1.2">
  <Status value = "proposed"/>
  <Start>1988-04-07T18:39:09</Start>
  <End>1990-04-07T18:40:00</End>
  <ConversationConstraints invocationLimit="100" concurrentConversations="4"/>
  <PartyInfo> ... </PartyInfo>
  <PartyInfo> ... </PartyInfo>
  <Packaging id="N20"> <!--one or more--> ... </Packaging>
  <ds:Signature> any combination of text and elements </ds:Signature>
  <Comment xml:lang="en-gb">any text</Comment> <!--zero or more-->
</CollaborationProtocolAgreement>
```

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Collaboration Protocol Agreement (CPA)

- The **agreement between the Parties** can be expressed as a **Collaboration-Protocol Agreement (CPA)**
- **Document** that represents **the intersection of two CPP's** and is **mutually agreed** upon by both Trading Partners who wish to conduct e-Business using ebXML
- A CPA **describes**: (1) the Messaging Service and (2) the Business Process requirements that are agreed upon by two or more Trading Partners
- A CPA **contains**
 - the Messaging Service Interface requirements
 - the implementation details pertaining to the mutually agreed upon Business Processes that both Trading Partners agree to use to conduct eBusiness

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ebXML Scenario

1. Any *Party* may register its CPPs to an ebXML Registry.

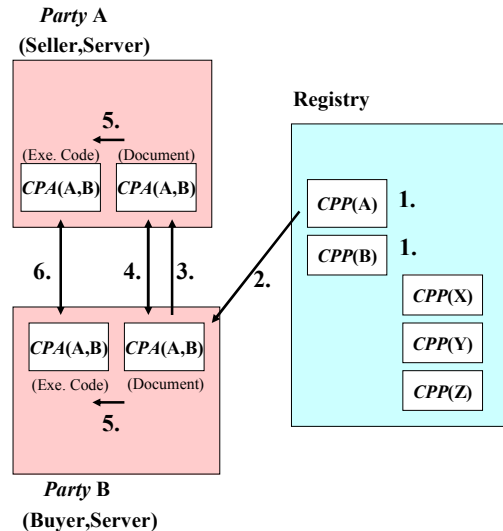
2. *Party B* discovers trading partner *A* (Seller) by searching in the Registry and downloads *CPP(A)* to *Party B*'s server.

3. *Party B* creates *CPA(A,B)* and sends *CPA(A,B)* to *Party A*.

4. *Parties A* and *B* negotiate and store identical copies of the completed *CPA* as a document in both servers. This process is done manually or automatically.

5. *Parties A* and *B* configure their run-time systems with the information in the *CPA*.

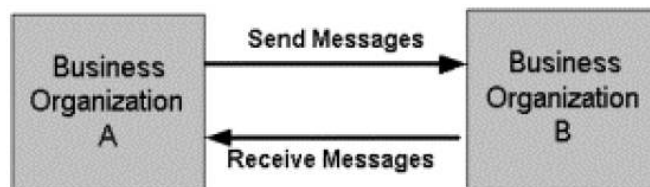
6. *Parties A* and *B* do business under the new *CPA*.



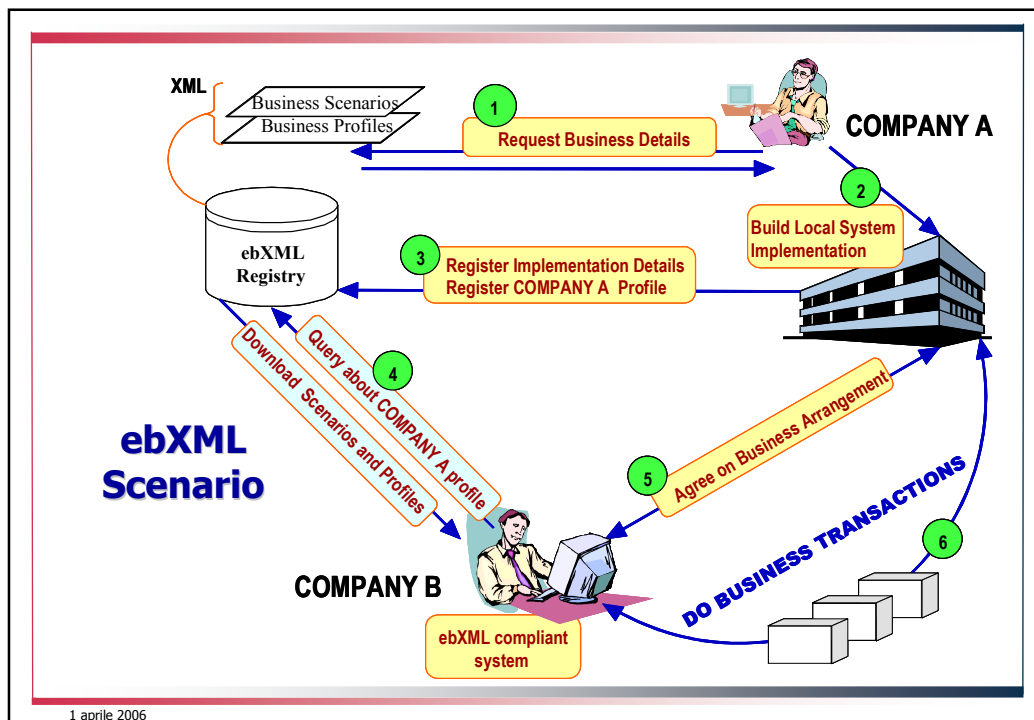
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Transaction phase

- Companies A and B are now **ready to conduct transactions**
- Each business organization plays a pre-determined role** in each transaction
- The **transactions** consist of ebXML messages, which are sent over the standard ebXML Messaging Service



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ebXML Scenario

- **Step 1:** Company A has become **aware of an ebXML Registry** that is accessible on the Internet
- **Step 2:** Company A, after reviewing the contents of the ebXML Registry, **decides to build and deploy** its own ebXML compliant application
- **Step 3:** Company A then **submits its own Business Profile information** (including implementation details) to the ebXML Registry
 - Company's ebXML **capabilities and constraints**
 - **Supported business scenarios:** XML versions of the Business Processes
 - An **acknowledgment** is sent to Company A

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ebXML Scenario

- **Step 4:** Company B **discovers the business scenarios** supported by Company A in the ebXML Registry
- **Step 5:** Company B **sends a request** to Company A stating that **they would like to engage in a business scenario** using ebXML
 - Company B submits a **proposed business arrangement** directly to Company A's ebXML compliant software Interface
 - The mutually agreed upon **business scenarios** and **specific agreements**
 - Information pertaining to the **messaging requirements** for transactions to take place and **security-related requirements**
 - Company A then **accepts** the business agreement
- **Company A and B are now ready** to engage in e-Business using ebXML

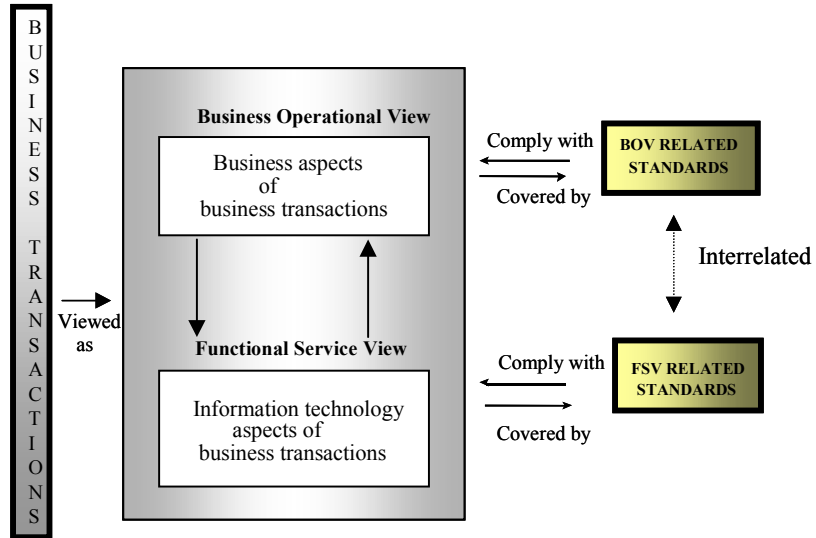
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ebXML Recommended Modelling Methodology

- Business Process and Information Modelling is **not mandatory**
- However, if implementers and users **select to model Business Processes and Information**, then they SHALL use the **UN/CEFACT Modeling Methodology (UMM)** that utilizes the **Unified Modelling Language (UML)**
- The UN/CEFACT Modeling Methodology (UMM) is broken down into
 - the **Business Operational View (BOV)**
 - the supporting **Functional Service View (FSV)**

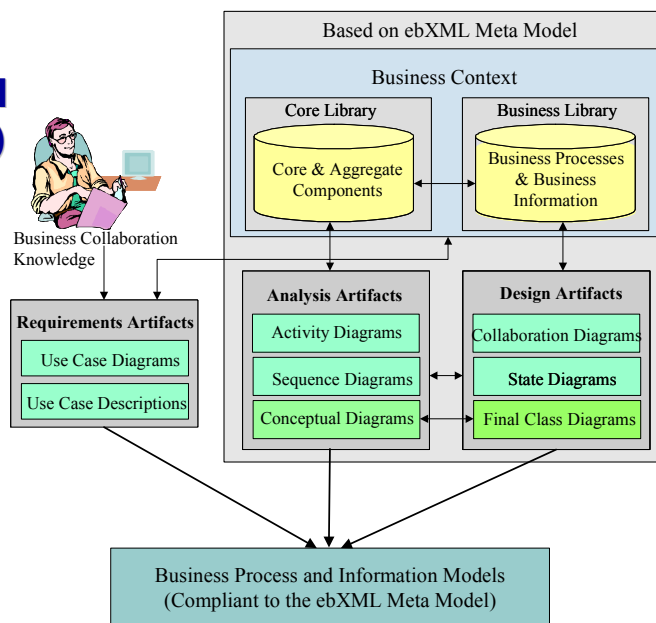
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ebXML Recommended Modelling Methodology



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Business Operational View (BOV)



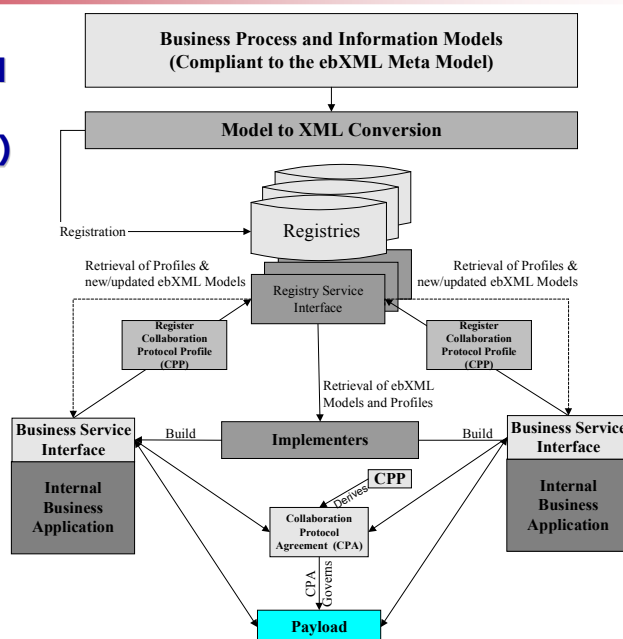
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Business Operational View (BOV)

- The **first phase** defines the **requirements artefacts** that describe the problem using **Use Case Diagrams** and Descriptions
 - If Core Library entries are **available from an ebXML compliant Registry** they will be utilized, otherwise **new Core Library entries** will be created and registered in an ebXML compliant Registry
- The **second phase** (analysis) will create **activity and sequence diagrams** describing the **Business Processes**
 - **Class Diagrams** will capture the associated information parcels (**business documents**)
- The **design phase** is the last step of standardization
 - In addition to generating **collaboration diagrams**, a **state diagram** MAY also be created

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Functional Service View (FSV)



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Functional Service View (FSV)

- The **ebXML Registry Service** serves as the **storage facility for the Business Process and Information Models**, the XML-based representations of those models, **Core Components**, and **Collaboration Protocol Profiles**
- The Business Process and Information Meta Models MAY be stored in **modelling syntax**, however they MAY be also stored as **XML syntax** in the Registry
 - This XML-based business information SHALL be expressed in a manner that allows discovery down to the atomic data level via a consistent methodology

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Business Process and Information Modelling

- A **Business Process** describes in detail **how Trading Partners take on roles, relationships and responsibilities** to facilitate interaction with other Trading Partners in shared collaborations
- The **interaction** between roles takes place as a **choreographed set of business transactions**
- Each business **transaction** is expressed as an exchange of electronic Business Documents
- Business Documents MAY be composed **from re-useable Business Information Objects**
- Business Processes can be composed of **re-useable Core Processes**
- Business Information Objects can be composed of **re-useable Core Components**

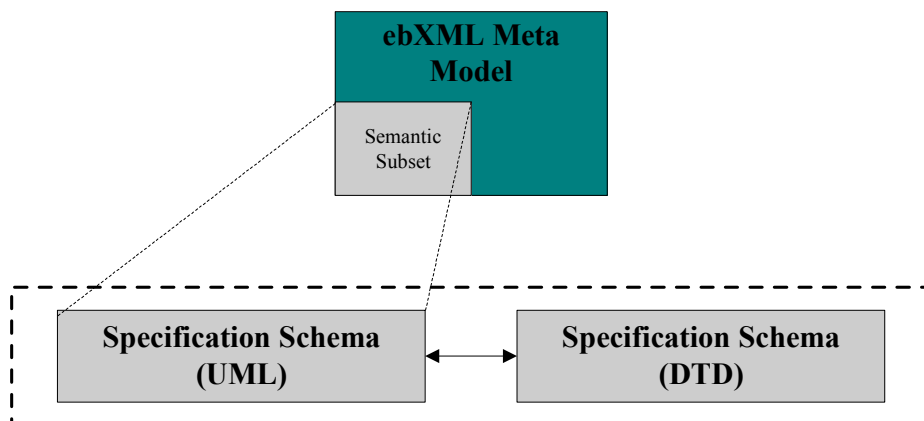
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Business Process and Information Modelling

- The ebXML **Business Process and Information Meta Model** provides a set of semantics (vocabulary) that forms the basis of specification of the artifacts that are required to facilitate Business Process and information integration and interoperability
- An additional view of the Meta Model, the **Specification Schema**, is also provided to support the direct specification of the set of elements required to configure a runtime system in order to execute a set of ebXML business transactions
 - The Specification Schema is available in two stand-alone representations, a UML profile, and a DTD.

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Specification Schema



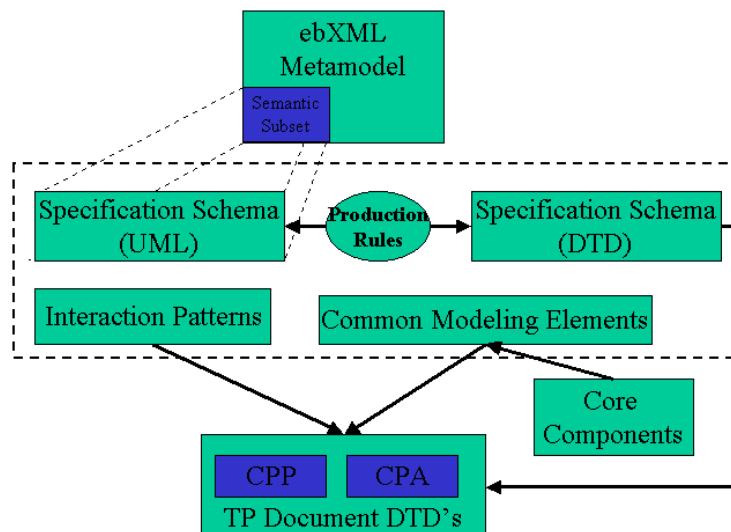
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Business Process and Information Modelling

- Each Business Transaction can be implemented using one of many **available standard patterns**
- To help specify the patterns, the Specification Schema is accompanied by
 - a set of standard patterns
 - a set of modelling elements common to those patterns
- This information serves as the primary input for the formation of Collaboration Protocol Profiles (CPP's) and CPA's

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ebXML Meta Model



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Business Processes

- The **representation of a Business Process** document instance SHALL be **in a form that will allow both humans and applications to read** the information
- A Business Process SHALL be expressible in **XML syntax**
- Business Processes are capable of expressing the following types of information:
 - **Choreography for the exchange of document** instances
 - References to Business Process and Information Meta Model or Business Documents (possibly DTD's or Schemas) that add structure to business data
 - Definition of the roles for each participant in a Business Process

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Core components and core library functionality

- A **Core Component** captures information about a real world business concept, and the relationships between that concept, other Business Information Objects, and a contextual description that describes how a Core or Aggregate Information Entity may be used in a particular ebXML eBusiness scenario
- A Core Component can be either an **individual piece of business information**, or a natural "go-together" **family of Business Information Objects** that may be assembled into Aggregate Information Entities
- ebXML users may **adopt and/or extend** components from the ebXML Core Library

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Core components and core library functionality

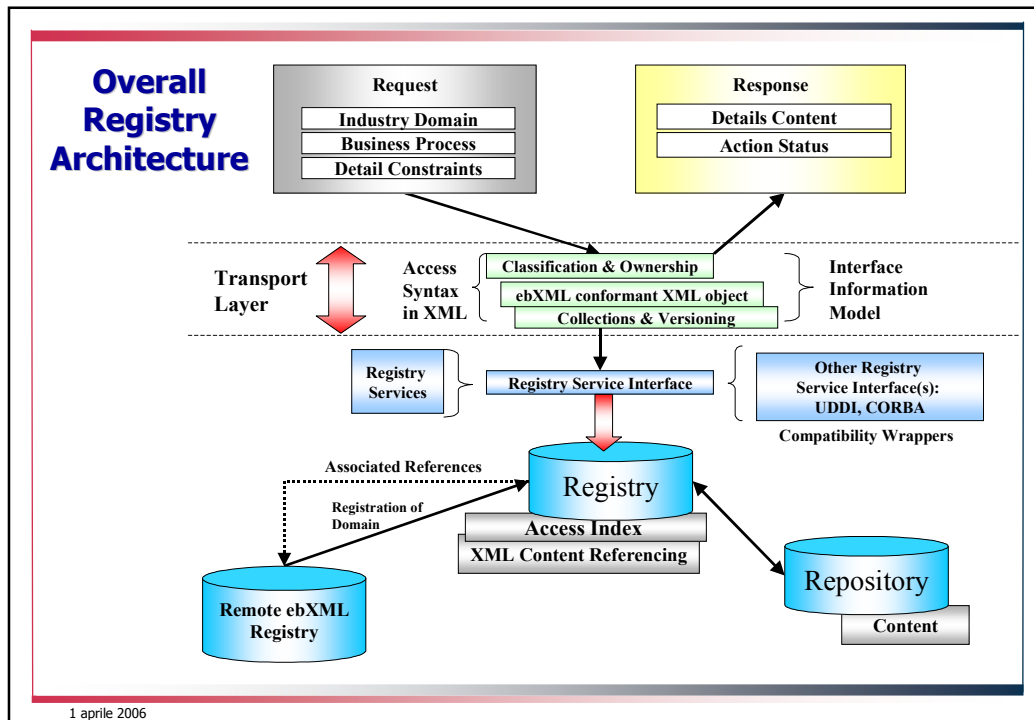
- As a minimum set of **requirements**, Core Components SHALL facilitate the following functionality:
 - Core Components SHALL be storable and retrievable using an ebXML Registry Mechanism
 - Core Components SHALL capture and hold a minimal set of information to satisfy e-Business needs
 - Core Components SHALL be capable of being expressed in XML syntax
 - A Core Component SHALL be capable of containing:
 - Another Core Component in combination with one or more individual pieces of Business Information Objects
 - Other Core Components in combination with zero or more individual pieces of Business Information Objects
 - A Core Component SHALL be able to be uniquely identified

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ebXML Registry

- An ebXML Registry provides a set of services that enable the sharing of information between Trading Partners
- A Registry is a component that maintains an interface to metadata for a registered item
- Access to an ebXML Registry is provided through Interfaces (APIs) exposed by Registry Services

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Scenario 1: Two trading partners set-up an agreement and run the associated exchange

- **Each Trading Partner** defines its own **Profile (CPP)**
- **Each Profile** references:
 - One or more existing **Business Process found** in the ebXML Registry
 - One of more **Message Definitions**. Each Message definition is built from reusable components (Core Components) found in the ebXML Registry
- **Each Profile (CPP)** defines:
 - The **business transactions** that the Trading Partner is able to engage into
 - The **Technical protocol (like HTTP, SMTP etc)** and the **technical properties** (such as special encryption, validation, authentication) that the Trading Partner supports in the engagement

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Scenario 1: Two trading partners set-up an agreement and run the associated exchange

- **The Trading Partners implement** the respective part of the Profile. This is done either
 - by **creating/configuring a Business Service Interface** or
 - properly **upgrading the legacy software** running at their side
- **The Trading Partners acknowledge** each other profile and create a **CPA**
- The Trading Partners **start exchanging Messages** and **performing the agreed transactions**

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Scenario 2: Three or more parties set-up a business process implementing a supply-chain and run the associated exchanges

- Here we are dealing with situations where **more Trading Partners** are involved
- We consider a supply chain of the following type:



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Scenario 2: Three or more parties set-up a business process implementing a supply-chain and run the associated exchanges

- What fundamentally differs from Scenario 1 is that **"Trading Partner 2"** is engaged **at the same time with two different Trading Partners**
- **Assumption:** the "state" of the local portion of the Business Process is managed by each Trading Partner
 - i.e. that **each Trading Partner is fully responsible of the Business Transaction involving it**
 - **"Trading Partner 3" only knows about "Trading Partner 2", "Trading Partner 2" knows about "Trading Partner 3" and "Trading Partner 1", "Trading Partner 1" knows about "Trading Partner 2")**

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Scenario 2: Three or more parties set-up a business process implementing a supply-chain and run the associated exchanges

1. Each Trading Partner defines its own Profile (CPP)

- which references:
 - One or more existing Business Process found in the ebXML Registry
 - One or more Message Definitions
- and defines:
 - The Commercial Transactions that the Trading Partner is able to engage into e.g. "Trading Partner 2" must be able to support at least 2 Commercial Transactions)
 - The Technical protocol (like HTTP, SMTP etc) and the technical properties (such as special encryption, validation, authentication) that the Trading Partner supports in the engagement
 - The Trading Partners acknowledge each other profile and create the relevant CPA
 - "Trading Partner 2" is engaged in 2 CPA's

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Scenario 2: Three or more parties set-up a business process implementing a supply-chain and run the associated exchanges

2. The Trading Partners implement the respective part of the Profile

- This is done:
 - Either by creating/configuring a Business Service Interface
 - Or properly upgrading the legacy software running at their side
- In both cases, this step is about:
 - Plugging the Legacy into the ebXML technical infrastructure as specified by the Messaging Service
 - Granting that the software is able to properly engage the stated conversations
 - Granting that the exchanges semantically conform to the agreed upon ebXML Message definitions
 - Granting that the exchanges technically conform with the underlying ebXML Messaging Service
 - "Trading Partner 2" may need to implement a complex Business Service Interface in order to be able to engage with different Trading Partners

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Scenario 2: Three or more parties set-up a business process implementing a supply-chain and run the associated exchanges

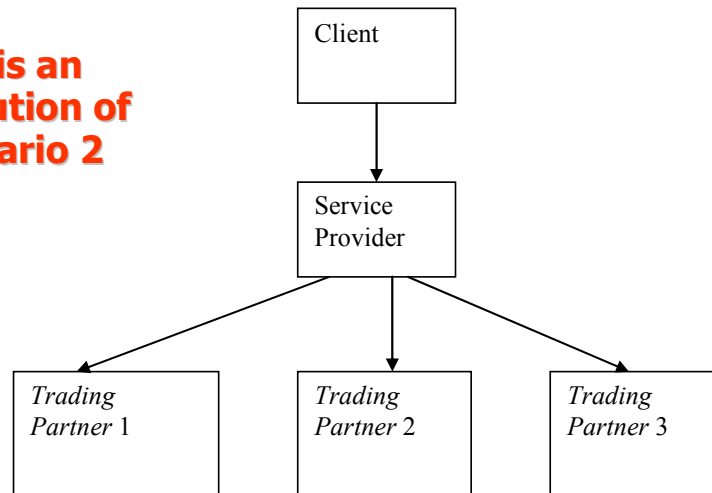
3. The Trading Partners start **exchanging Messages and performing the agreed transactions**

- "Trading Partner 3" places an order at "Trading Partner 2"
- "Trading Partner 2" (eventually) places an order with "Trading Partner 1"
- "Trading Partner 1" fulfills the order
- "Trading Partner 2" fulfill the order

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Scenario 3: A company sets up a portal which defines a business process involving the use of external business services

This is an evolution of Scenario 2



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Materiale didattico

- Introduction to ebXML
- An Introduction to ebXML - Collaborative Electronic Business is here to stay
- Enabling Electronic Business with ebXML
- Conducting Business with ebXML

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Ulteriori Informazioni

- Dove reperire ulteriori informazioni su ebXML
 - www.ebxml.org

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