

Distributed E-Business Architecture for SME Communities

Requirements and Solutions for Request Based Virtual
Organizations

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Agenda

- The Context and the Business Requirements
- The Conceptual Solution Model
- The Architectural Requirements
- The Solution Architecture
- A Reference Framework
- The further VO research - TrustCoM

The Context - the LAURA Project

“Adaptive Zones for Inter-regional Electronic Business

based on the concepts of

Request-Based Virtual Organizations and sector-specific Service Level Agreements”

An EU-sponsored FP5 project (IST-2001-33251)

www.lauraproject.org



The LAURA Project Goals

- To **raise level** of e-business adoption in Europe (particularly in so-called less-favourite regions) by introducing **interoperable e-business zones** and service
- To introduce an **SME-oriented e-business framework** based on modern standards and technologies, which can be reusable beyond the scope of the original project

The LAURA Project

- Builds on the concepts of:
 - „**Request Based VO**“ – dynamic formation of SME clusters
 - „**Adaptive zones**“ – flexibility related to regional and industry sector specific needs
 - **Service Level Agreements (SLA)** – templates, information gathering and monitoring
- Involves partners in the United Kingdom, Germany, Greece, Bulgaria

Key Features of Request Based VO

- **Short-lived ad-hoc** virtual formations of collaborating partners
- A possibility for an enterprise to discover potential business partners **upon demand** and **advertise itself** in standard ways
- Highly **dynamic** involvement of an enterprise in different e-business activities, serving **different roles** (those defined and advertised) at the same time, if needed

The Context - European SMEs

- Some characteristics:
 - Regional and industry sector related **differences** are quite considerable
 - Frequent **lack of awareness** of e-business benefits
 - Frequent **lack of specialised IT** skills
 - **Low level of resources** available for innovative investment strategies
 - Strong **need for support** and encouragement

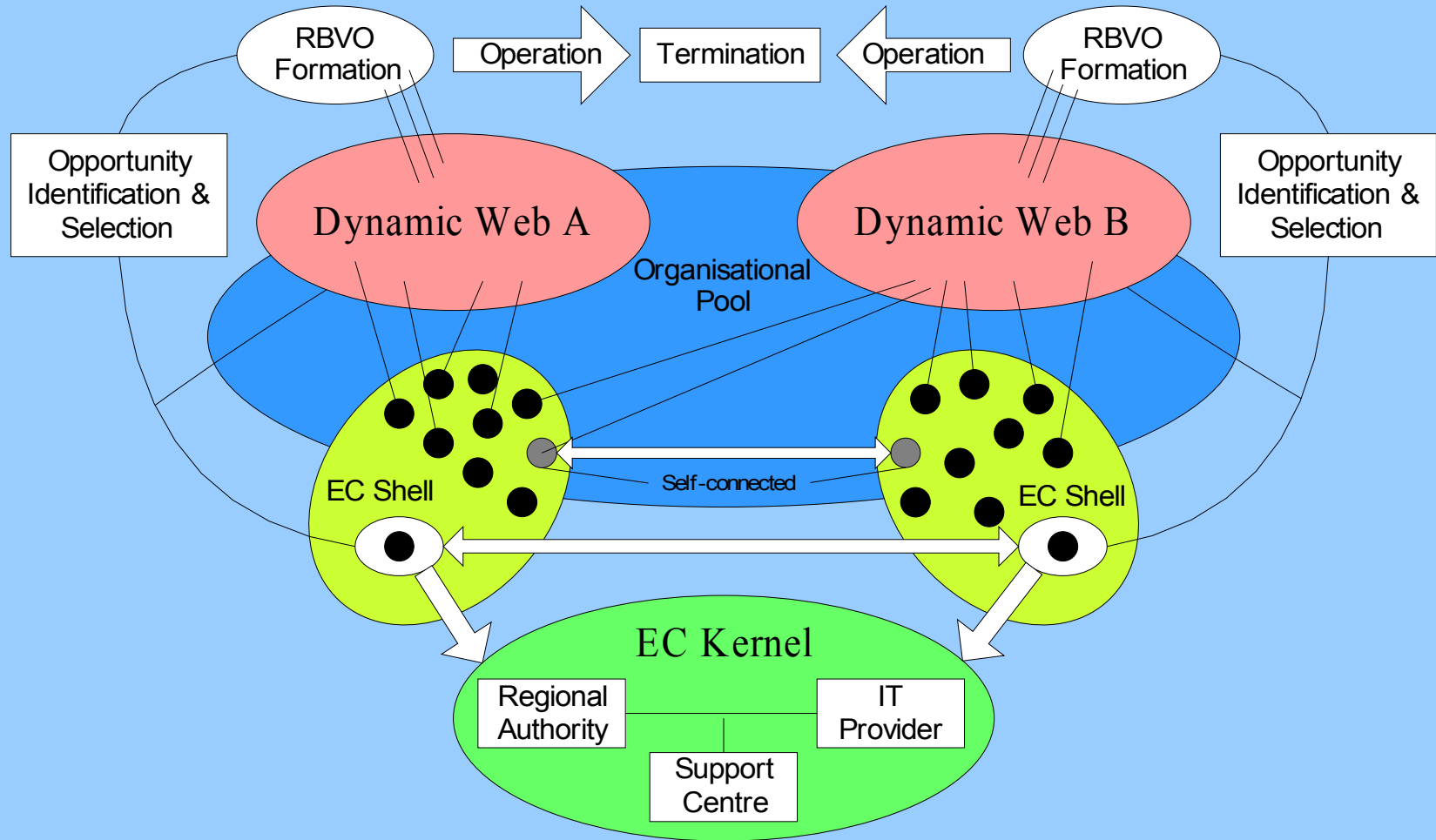
Business Requirements

- SMEs need to **advertise their own products** and services (catalogue management)
- Buyers want to **announce their purchasing needs** for potential sellers to find them
- For example:
 - “Who sells PC main boards, processors and coolers at a bargain price?”
 - “Who wants to buy PC main boards bundled with the CPUs, pre-tested and in volumes?”

Business Requirements

- Reaching **across the boundary** of the ‘home (region) domain’ when looking for a business partner
- Conducting **trusted, secure and traceable** business collaboration sessions with the chosen partners
- Being in touch with a **local structure**, which could encourage and help to use **the maximum potential** of e-business

The Conceptual Model



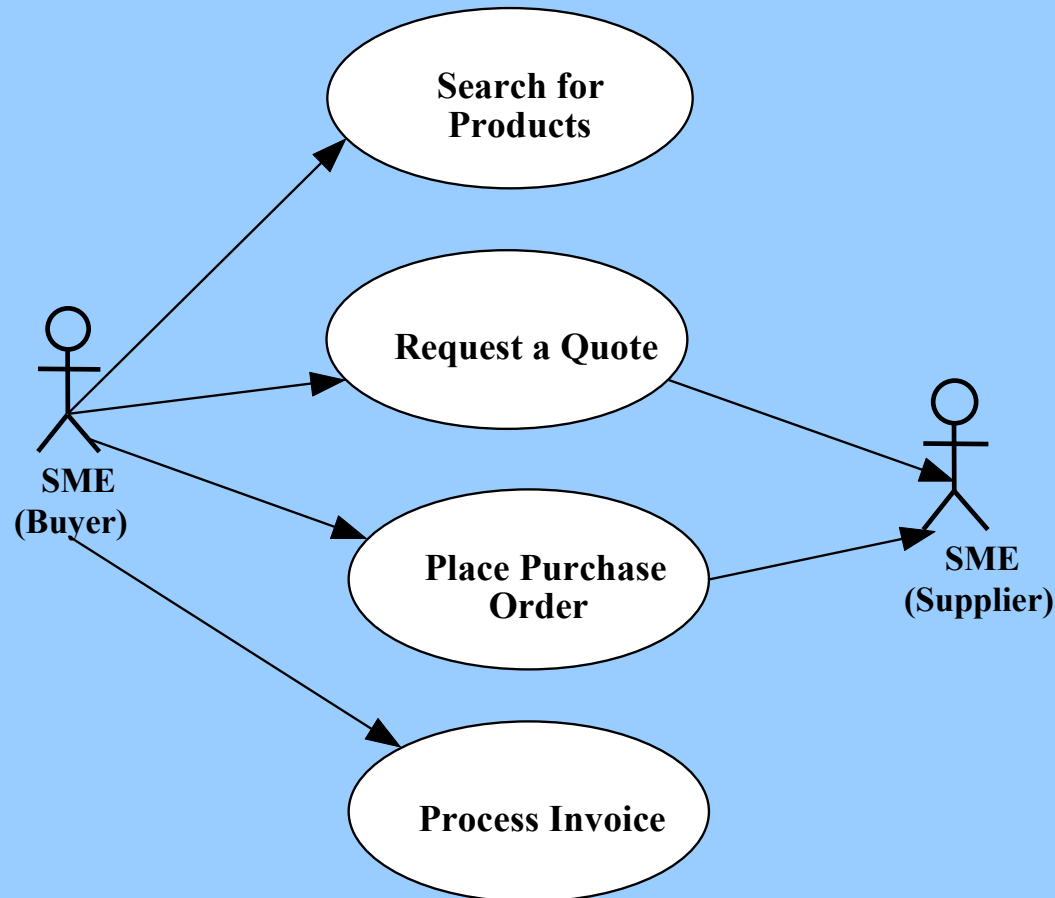
The Conceptual Model

- **LAURA E-Commerce (EC) Shell (domain)** - a set of SMEs belonging to a certain region and registered via LAURA EC Kernel/support centre
- **LAURA EC Kernel (domain hub)** - a LAURA support centre, responsible for provisioning of both commercial and IT services to the SMEs
- **LAURA Network** - an inter-domain collaboration infrastructure, which defines a set of rules and provides arrangements for inter-regional (inter-domain) business collaboration between the SMEs

The Conceptual Model

- **LAURA Business Collaboration Service**
 - is the software service in charge of communication between the SMEs
- **LAURA SME Connection Options**
 - **Directly** using the collaboration service (for SMEs with advanced IT resources)
 - **Via WWW portal** hosted by LAURA Kernel (for SMEs with only basic IT capabilities)

End-to-End Collaboration Example



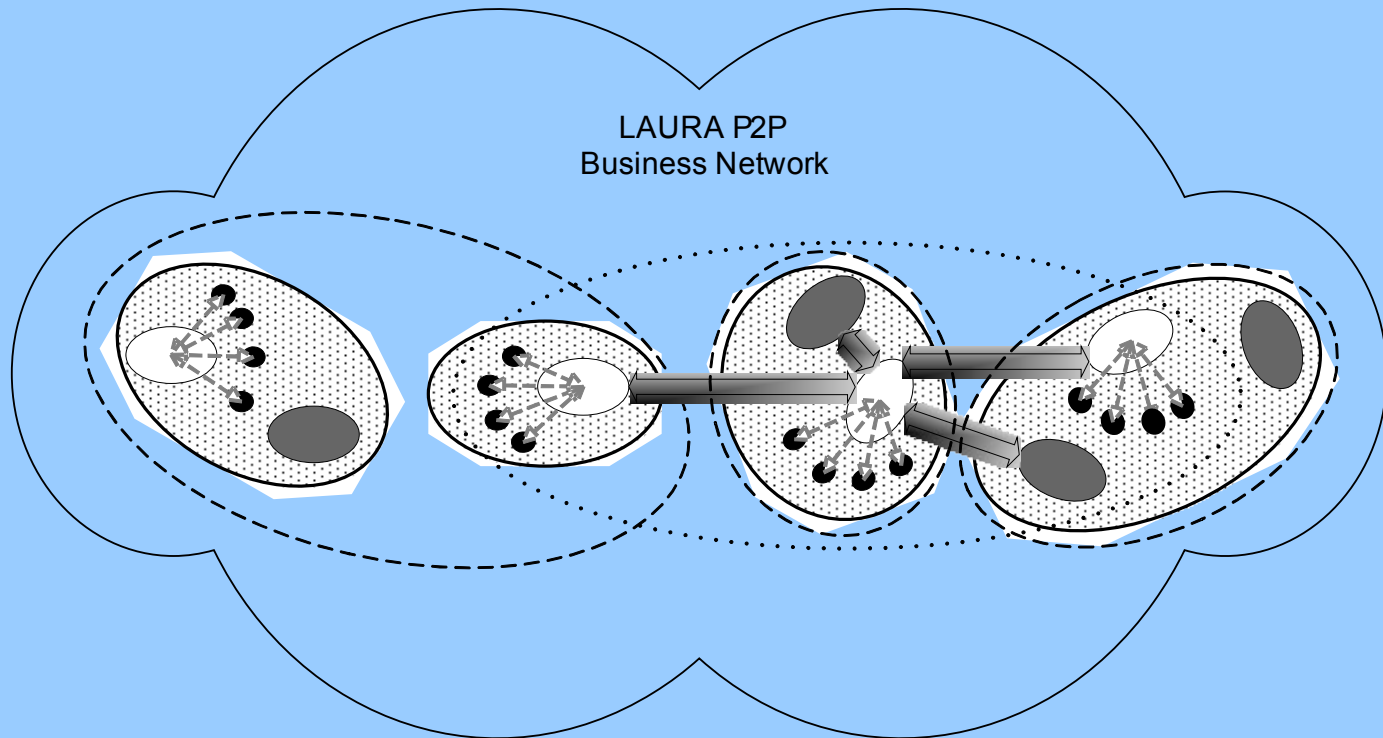
How Peer-to-Peer is Relevant?

- Is similar to B2B collaboration nature
 - People and SMEs seek for business partners rather than intermediaries
- Helps to solve issues, where possible, of
 - Content redundancy
 - Distrust in 3rd-parties having access to sensitive data
- Helps to cope with user base fragmentation
 - One central exchange would hardly handle all the needs and would be failure-prone
 - Region and industry specifics are significant

LAURA Peer-to-Peer Concept

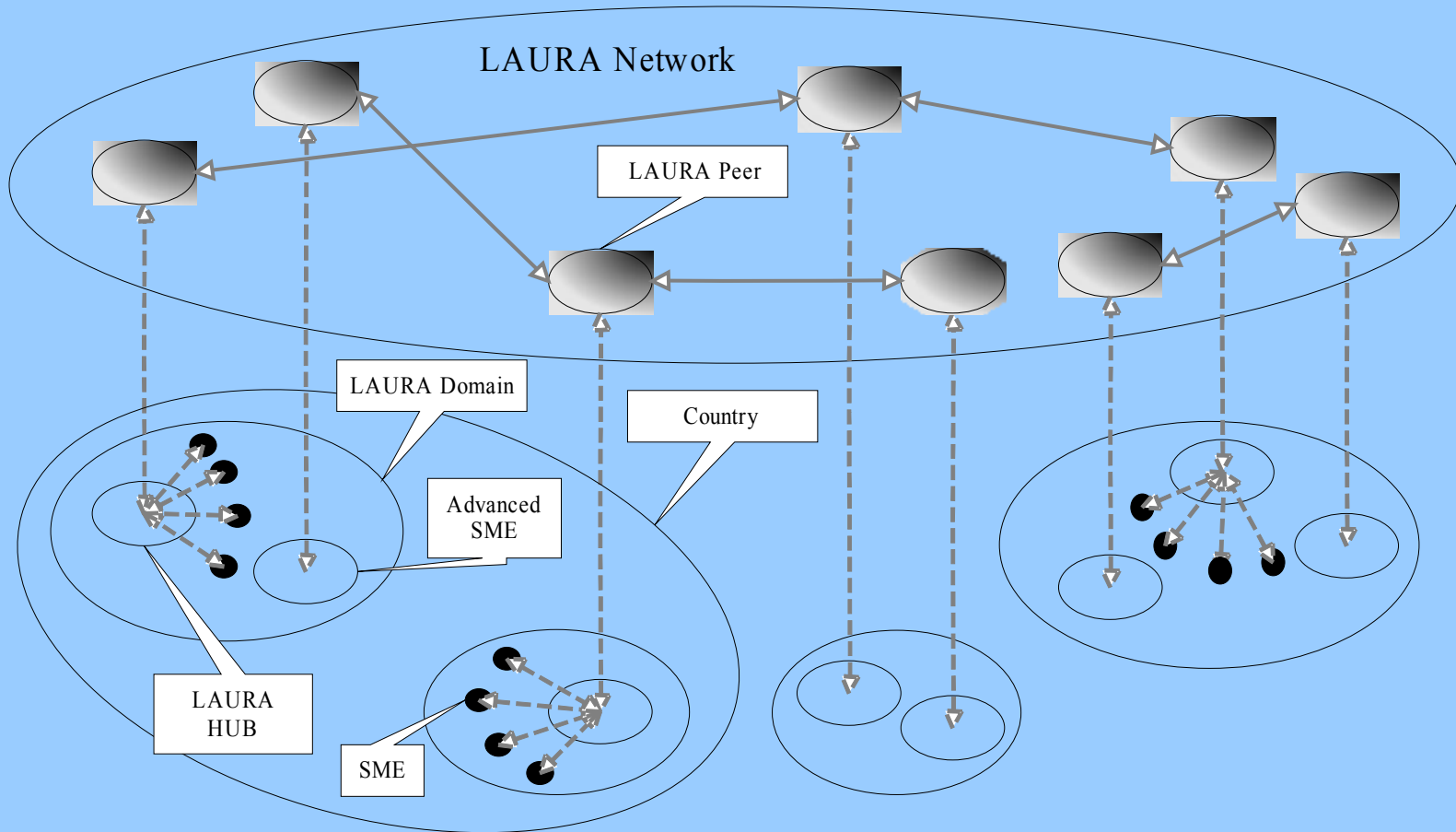
- Two types of peers in LAURA
 - **Advanced SMEs**, using the LAURA collaboration service connected to their back-office and/or ERP systems
 - **Domain Hubs**, acting on behalf of SMEs, which are not capable of using LAURA business collaboration service themselves

LAURA P2P – Conceptual View

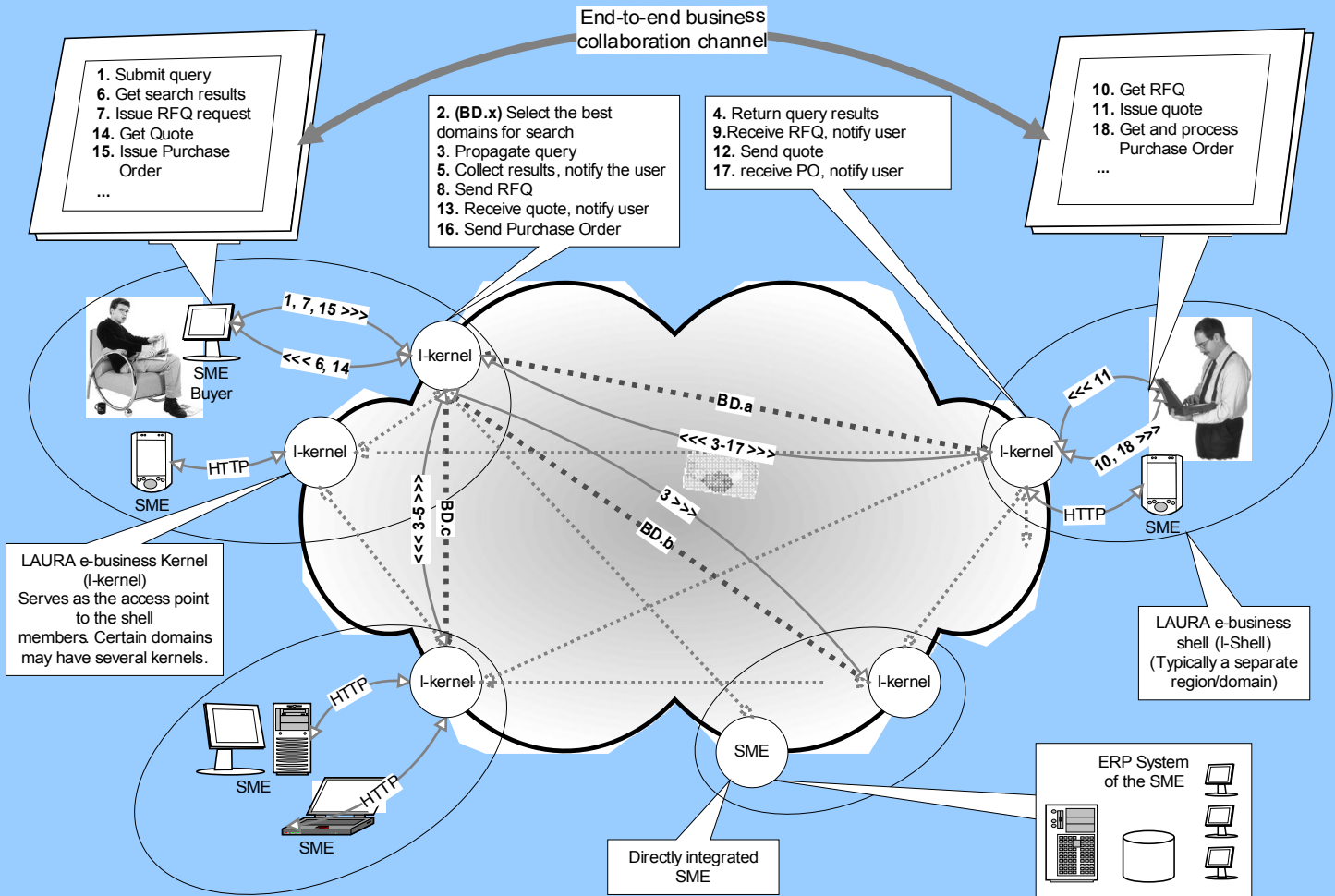


- SME with limited capabilities
- Advanced SME (peer type 1)
- LAURA Domain Hub (peer type 2)
- ⇄ Peer-to-Peer interaction
- ⋯ RBVO formed by the LAURA peers
- LAURA Domain
- ⌒ Country

LAURA P2P Topology



Realisation of end-to-end collaboration



The Key Requirements

- **Discovery** of other available domains a LAURA domain hub
- **Selection** of the best domains for partner search
- Efficient product and partner **search**
- **Brokerage** of business conversations on behalf of the business partners
- **Security** and identity management

The Solution Architecture

Layered e-Business Architecture

Business Process Modeling Layer

(BPML, BPEL4WS, WS-CDL, ebXML BPSS/ebBP)

Content Layer

(ebXML Core Components, UBL, OAGIS BOD)

Upper Integration Layer

(Basic Web Services, ebXML Messaging, WS-ReliableMessaging, WS-Reliability)

Lower Integration (Transport) Layer

(SOAP, HTTP)

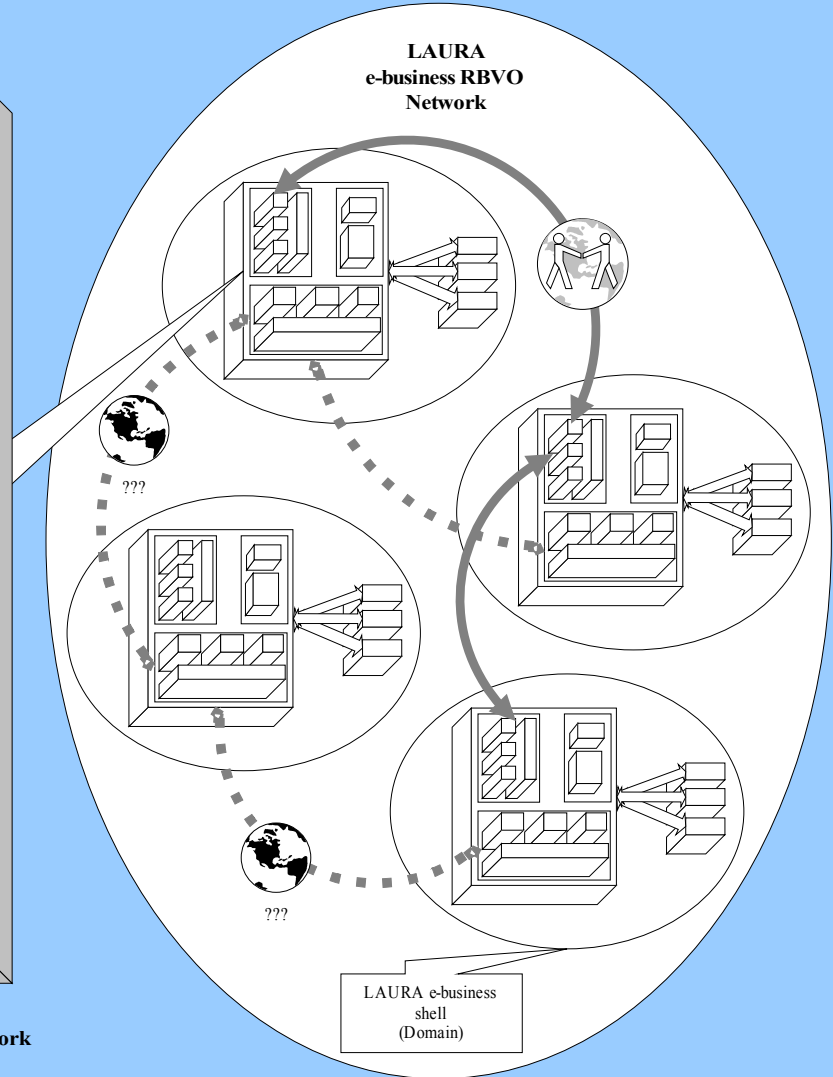
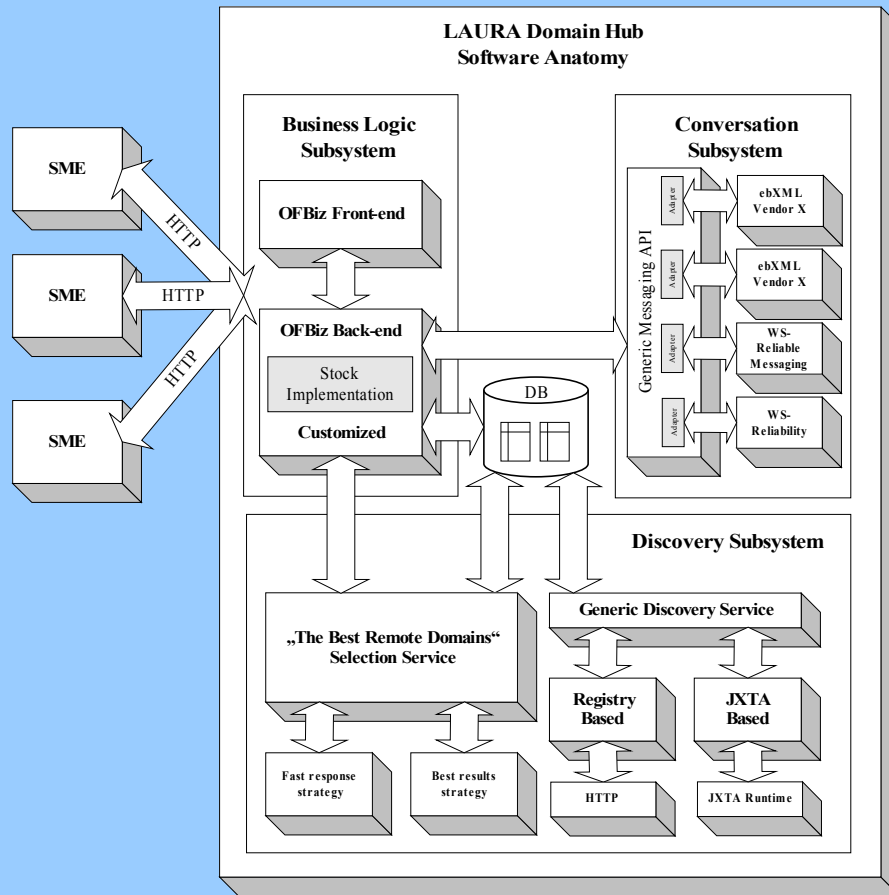
Infrastructure Layer

(J2EE, .NET, CORBA, MOM)

The Proposed Framework

- **Discovery and Selection phase:** P2P technology – Sun Microsystems' **JXTA** Project
- **Propagation/Delivery** of the search requests/results and business documents: **ebXML messaging**
- **Business Collaboration** (support of the main business functionality):
 - **Business documents (BD)** modeling and specification
 - **BD lifecycle** and presentation
 - **Business processes (BP)** modeling and run-time enactment

LAURA Reference Framework

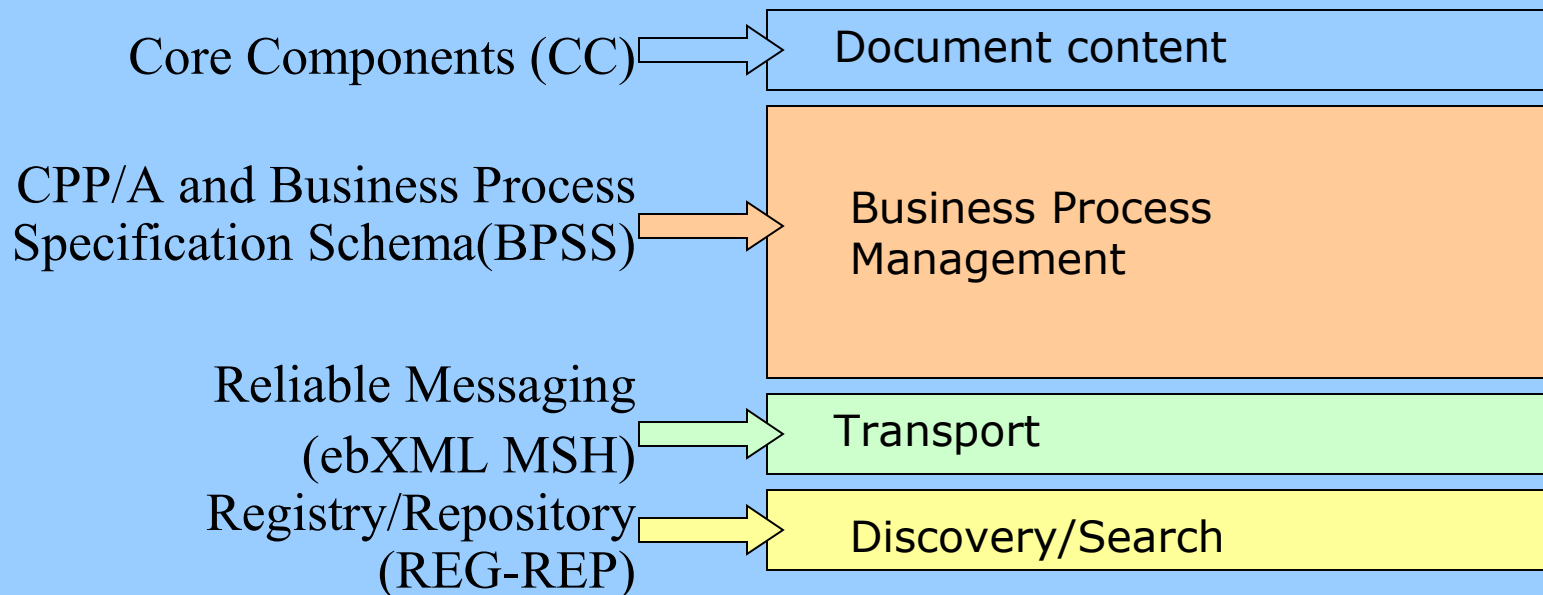


Discovery of Business partners via P2P network

Collaboration of the Business Partners via reliable transport (e.g. ebXML Messaging)

The ebXML Framework Relevance

- ebXML – “the new global standard” and the LAURA project – where do they meet?



Is ebXML suitable for SMEs?

- Is it suitable from architectural point of view?
- Is it supported by commercial and open source developments?
- Is it affordable?

The ebXML Framework

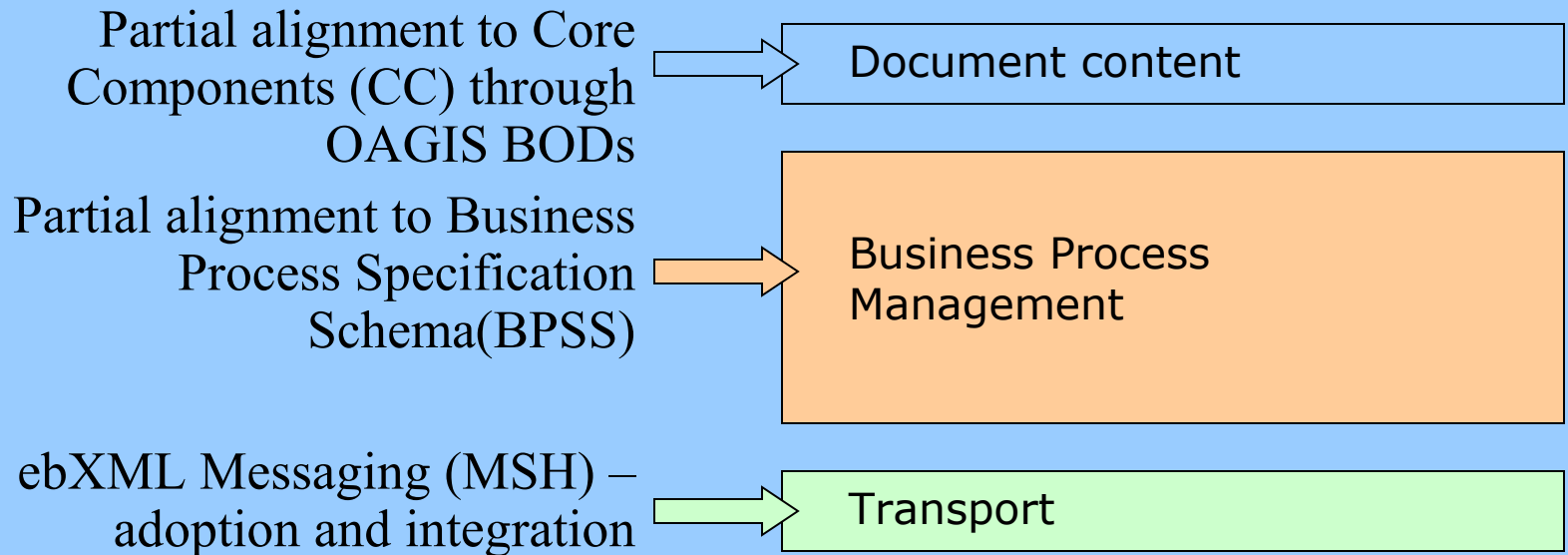
- Ambitious goals
 - Becoming the global standard
 - Technical excellence
- Promises to the SMEs
 - To enable worldwide collaboration possibilities
- However
 - Complex to implement
 - Expensive to maintain
- So where is the value?

The ebXML Framework

- The value is in:
 - Conceptual integrity
 - **Modularity** of the framework – the parts of it can be applied upon demand and readiness
 - **Interoperability** of the implementations from different vendors
 - **Standardisation**

ebXML Usage

- What ebXML parts do we need?



Domain Hub Anatomy

- Discovery Subsystem:
 - A Generic API
 - Generic discovery – JXTA, ebXML RR
 - Selection – fast response, best response
- Conversation Subsystem:
 - A Generic API (masks ebMS specifics)
- Business Logic subsystem:
 - OFBiz – customized
 - Business collaborations

Discovery Subsystem

- Generic Interface to support various discovery mechanisms (P2P, registry)
- Main features
 - XML-based peer profiles
 - Pluggable best-option selection strategies
 - Usage of peer ranking for discovery
 - Dynamic support of “neighbour list”

Conversation Subsystem

- Generic Interface to support various messaging options
- ebXML Messaging
 - A candidate solution has been chosen – CECID Hermes MSH (<http://www.cecid.hku.hk>)
 - Partnership with Ponton Consulting for usage of Ponton X/P

Business Logic Subsystem

- Account Management
 - Registration and Approval
 - Parties, Roles, Permissions
- Catalogue Management
 - UNSPSC classification
 - Product Management
 - Export/Import
- “Trade Corner”
 - Business scenarios
 - Business processes
 - Business documents

E-business Component Frameworks

- Buy/acquire vs. build
- Rapid assembly of services from pre-built components
- Reusability of well-understood functionality
- Focus on **specific added value**
- Fast time to market

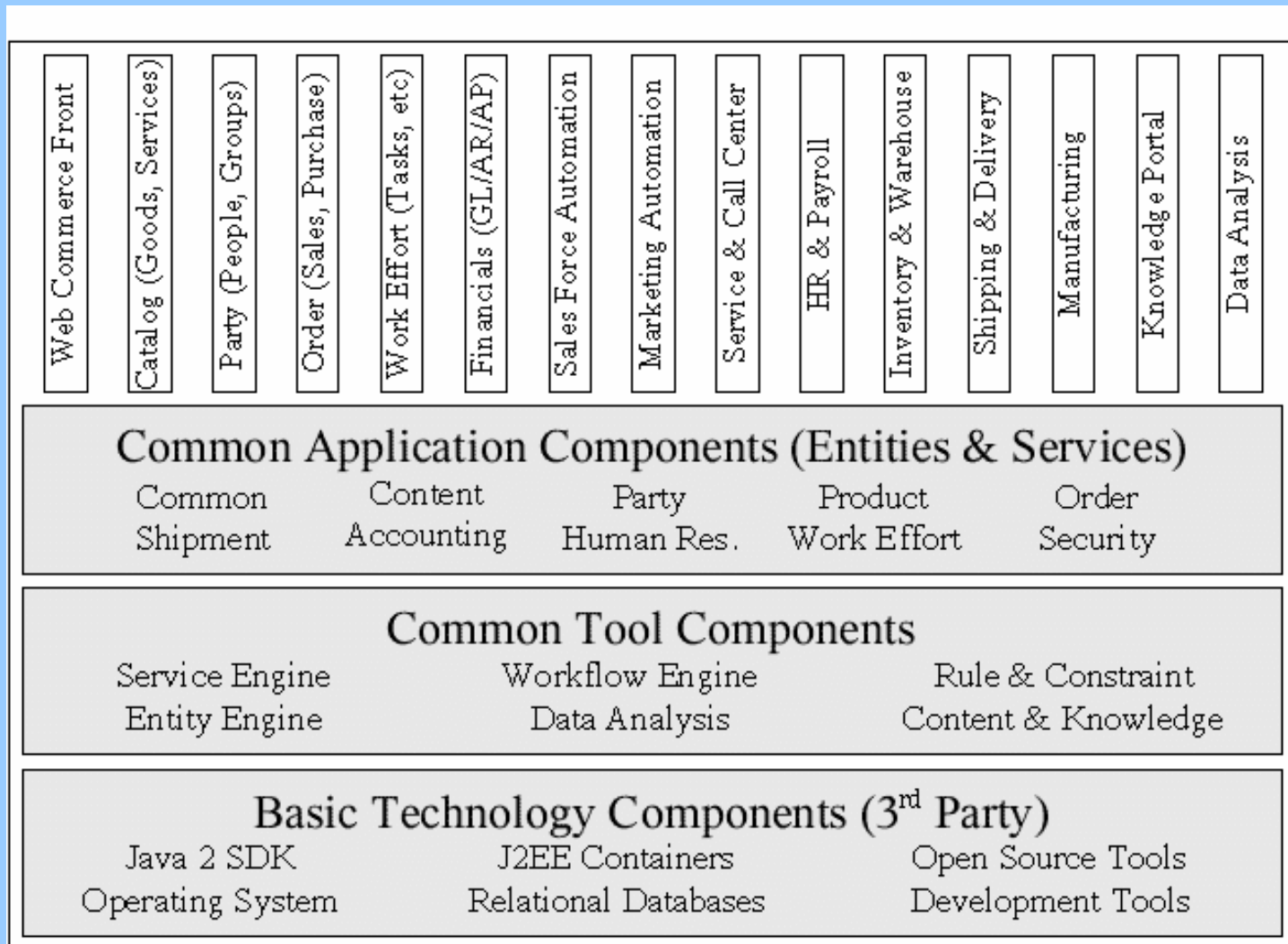
E-business Component Frameworks

- Commercial
 - IBM WebSphere Business Components
 - BEA Systems Weblogic Platform
 - Oracle Commerce
- Open Source
 - **OFBiz**
 - Compiere
 - GNU Enterprise Small Business

OFBiz E-business Framework

- The Open for Business Project - www.ofbiz.org
- The benefits:
 - An extensible development framework
 - Data entity management
 - Service management
 - Rule-based logic
 - Basic e-business functionality already implemented
 - Catalogue management
 - User/Party management
 - Order management
 - Basic marketing management
 - Workflow management

OFBiz Architecture



Business Scenarios

- Often defined by industry groups
- Standard business scenarios free trading partners from the need to reinvent them
- Business process model:
 - Interactions between parties
 - Sequencing of interactions
 - Documents exchanged in each interaction

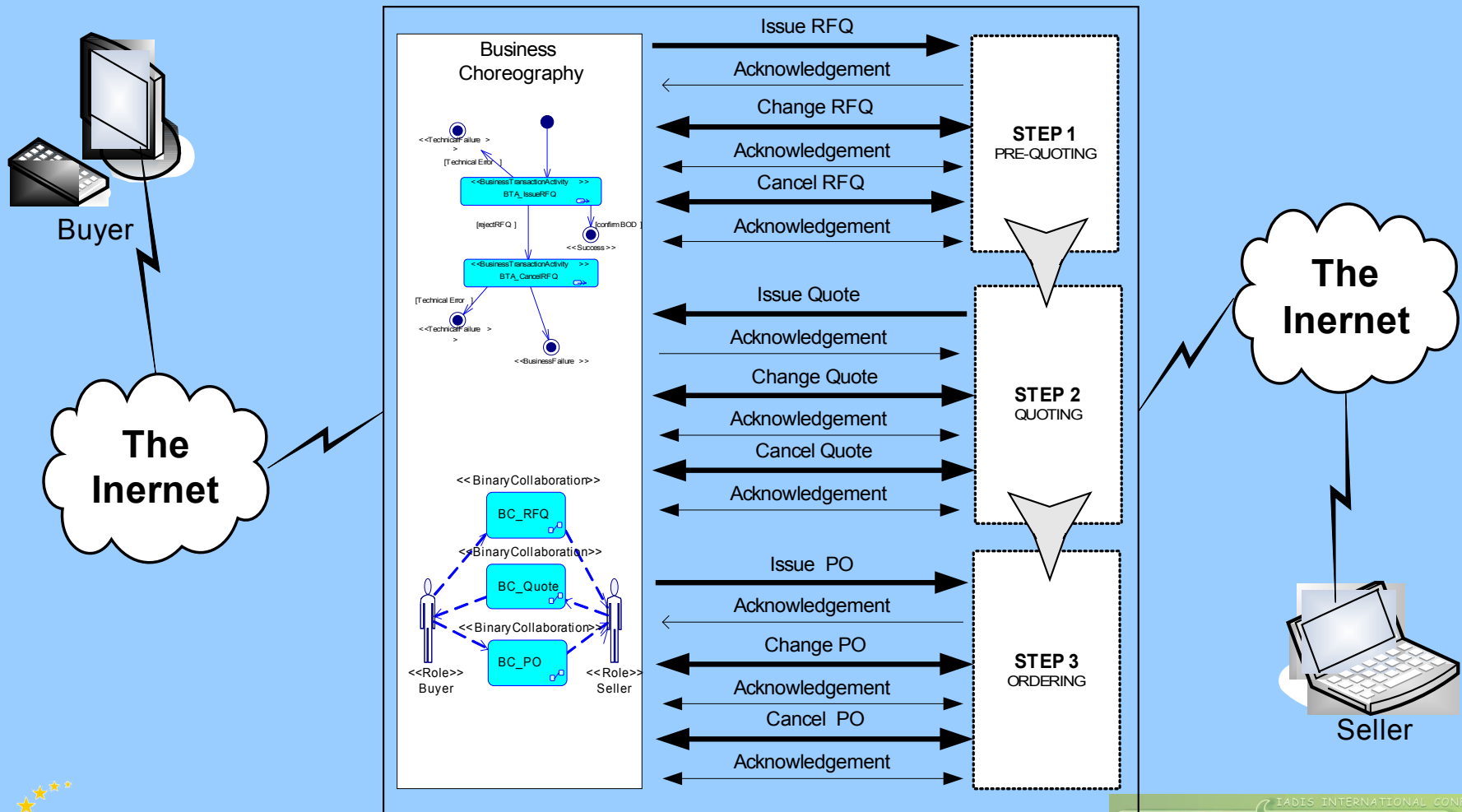
Business Processes

- Process execution (process brokering) involves the execution of **discrete steps** (tasks) within a business process.
- **Design Phase**
 - Business Process and Information Model
- **Specification Phase**
 - ebXML BPSS
 - ebXML CPP/CPA
- **Run-time Phase**
 - ebXML Business Service Interface Configuration

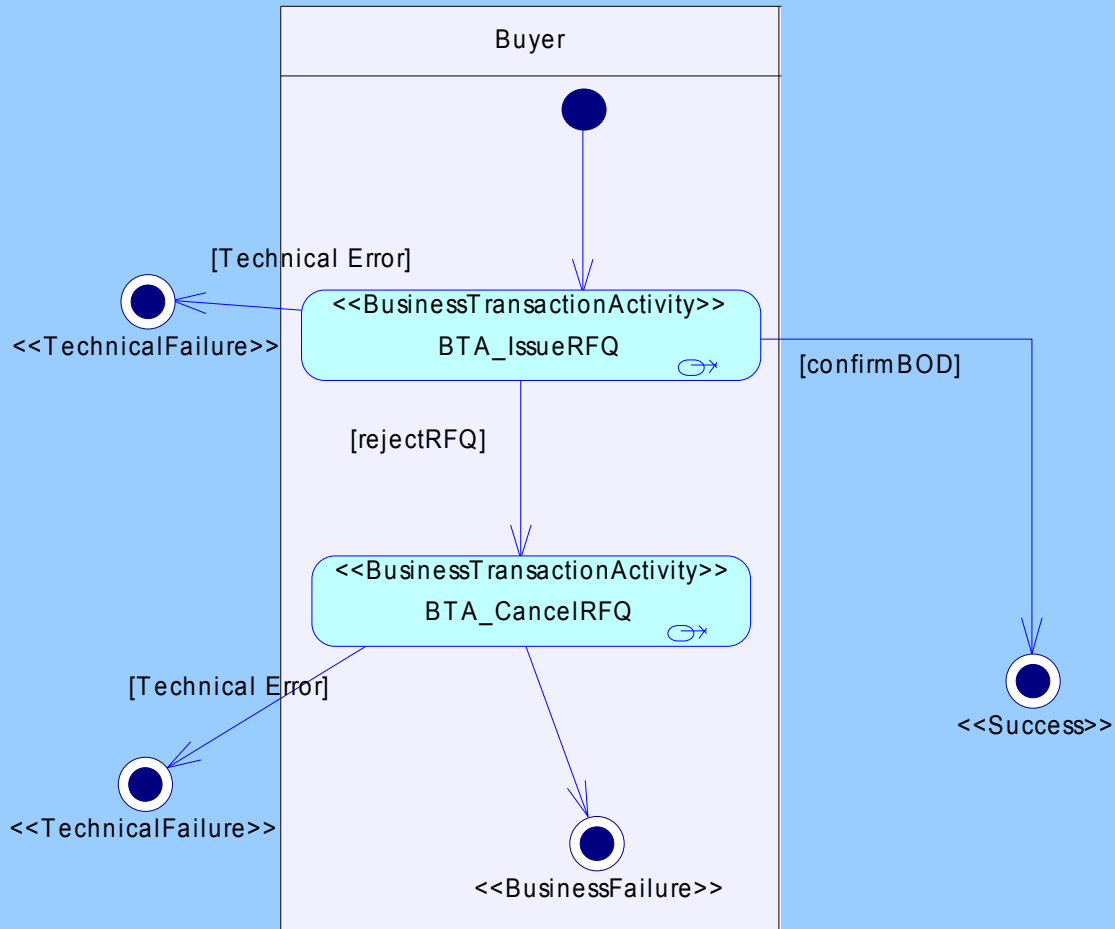
Business Documents

- A candidate framework has been chosen for business documents as standard – OAGIS (www.openapplications.org)
- Support for ebXML Core Components since version 8.1
- Over 200 documents in the library
- Large user base

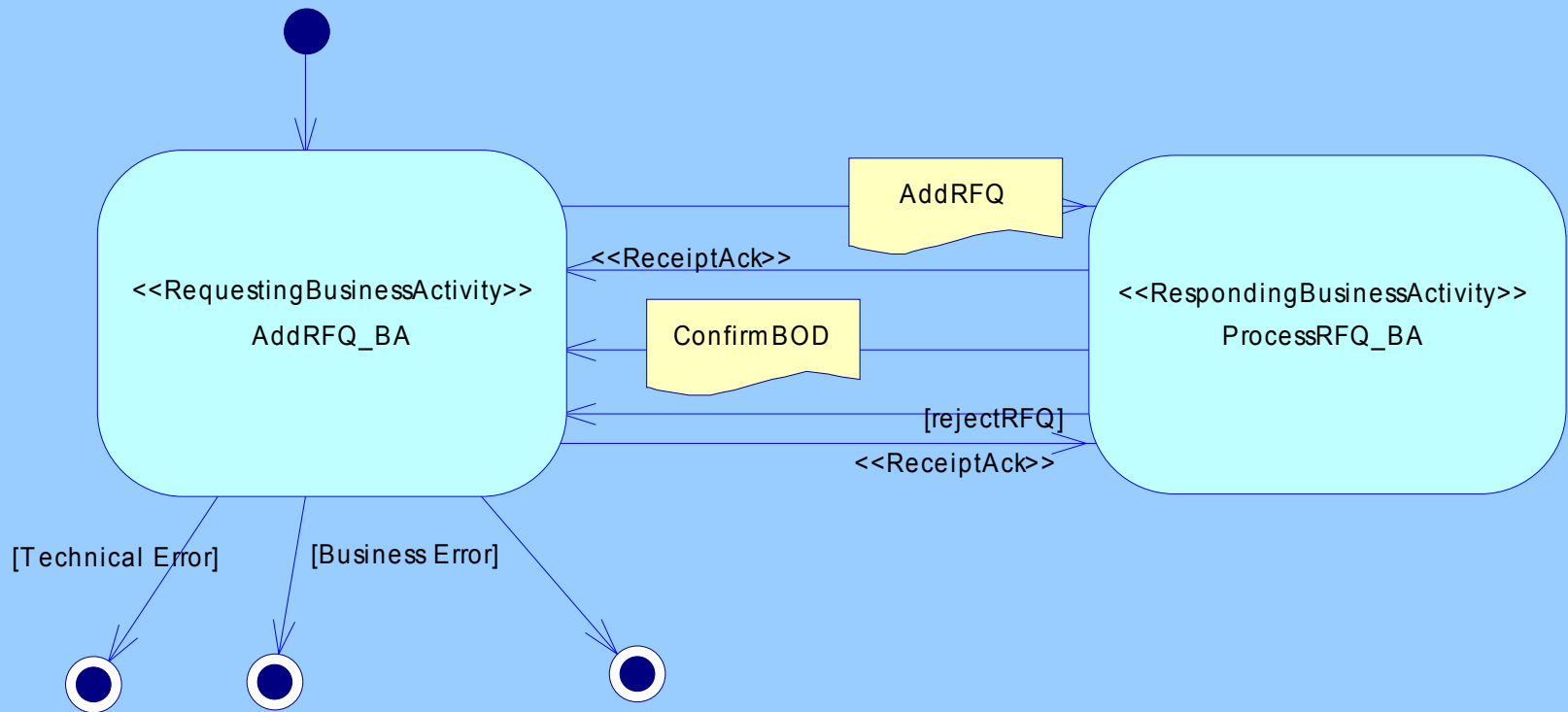
Business Process "Quoting"



Binary Collaboration “RFQ”



Business Transaction “Issue RFQ”



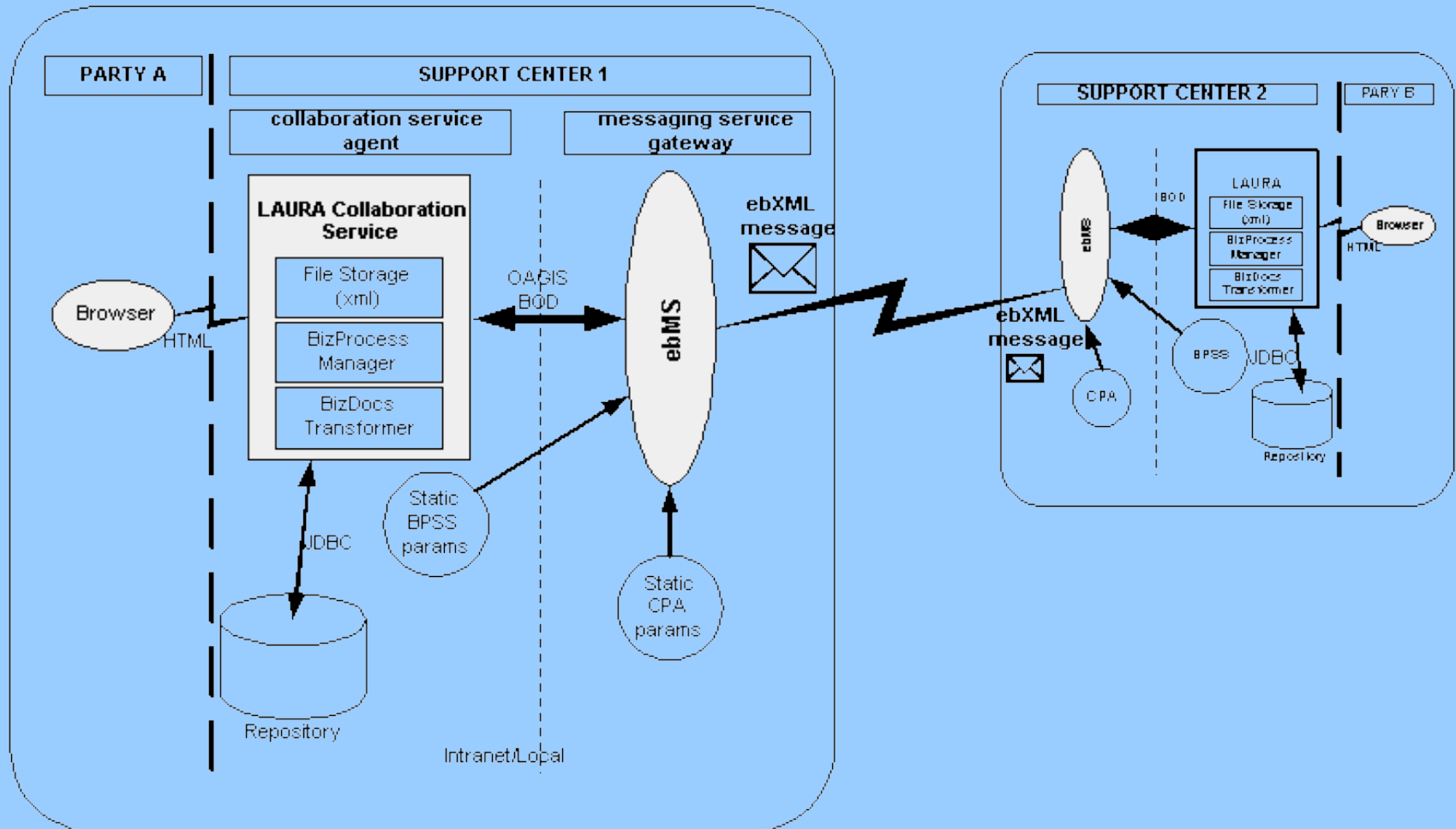
Business Process “Quoting”: BPSS instance

```

<ProcessSpecification name="QuotingProcess"
  version="0.1" uuid="3C921B20-D5F6-49B1-96EB-B1048DB41EDD">
  <BusinessDocument name="AddRFQ" nameID="AddRFQ_BD_1" specificationLocation="AddRequestForQuote.xsd"/>
  .....
  <BusinessTransaction name="BT_Issue_RFQ" nameID="BT_Issue_RFQ_BT_1" isSecureTransportRequired="yes">
    <RequestingBusinessActivity name="AddRFQ_BA" nameID="AddRFQ_BA_RQBA_1" timeToAcknowledgeReceipt="PT2H".....>
      <DocumentEnvelope businessDocument="AddRFQ" businessDocumentIDRef="AddRFQ_BD_1" ></DocumentEnvelope>
    </RequestingBusinessActivity>
    <RespondingBusinessActivity name="ProcessRFQ_BA" nameID="ProcessRFQ_BA_RPBA_1">
      ...
    </RespondingBusinessActivity>
  </BusinessTransaction>
  .....
  <BinaryCollaboration name="BC_RFQ" nameID="BC_RFQ_BC_1" endsWhen="P30D" initiatingRole="Buyer_OU_1">
    <Role name="Buyer" nameID="Buyer_OU_1"></Role> <Role name="Seller" nameID="Seller_OU_2"></Role>
    <BusinessTransactionActivity name="BTA_IssueRFQ" nameID="BTA_IssueRFQ_BTA_1"
      businessTransaction="BT_Issue_RFQ" businessTransactionIDRef="BT_Issue_RFQ_BT_1"
      fromRole="Buyer" fromRoleIDRef="Buyer_OU_1" toRole="Seller" toRoleIDRef="Seller_OU_2"></BusinessTransactionActivity>
    .....
    <Start toBusinessState="BTA_IssueRFQ" toBusinessStateIDRef="BTA_IssueRFQ_BTA_1"/>
    <Failure fromBusinessState="BTA_IssueRFQ"
      fromBusinessStateIDRef="BTA_IssueRFQ_BTA_1" conditionGuard="AnyProtocolFailure"></Failure>
    <Success fromBusinessState="BTA_IssueRFQ" fromBusinessStateIDRef="BTA_IssueRFQ_BTA_1" conditionGuard="Success"> </Success>
    <Transition fromBusinessState="BTA_IssueRFQ" fromBusinessStateIDRef="BTA_IssueRFQ_BTA_1".....></Transition>
    .....
  </BinaryCollaboration>
</ProcessSpecification>

```

BP Implementation View



The Conclusions

- SME-oriented e-business solutions are quite specific due to differences in partners' capabilities
- A combination of e-business standards such as ebXML and OAGIS BOD with an innovative Peer-to-Peer approach seems to have a potential
- Business Process support is the “big hill” and is the focus of the future work

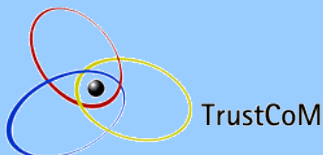
The TrustCoM Project

A Trust and Contract Management framework enabling

- **Secure collaborative** business processing in
- **On-demand created**, self-managed, scalable, and highly dynamic **Virtual Organizations**



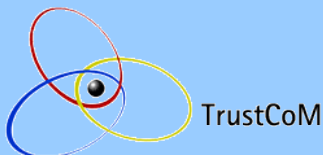
Project funded under the action line
Networked Business and Government



The TrustCoM Project

TrustCom aims to develop a coherent framework (architecture, services descriptions, interaction protocols) that provides means of achieving:

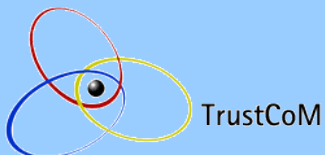
- establishment of **trust relationships** by means of digital identities, certification, reputation, and inspection
- **autonomic security** including confidentiality/privacy, integrity, availability and accountability, driven by executable policies
- formation, verification, negotiation and amendment of **electronic contracts**, including partner agreements, collaboration agreements and service level agreements
- **performance assessment** in the execution of electronic contracts, and **enforcement of trust and security management policies**



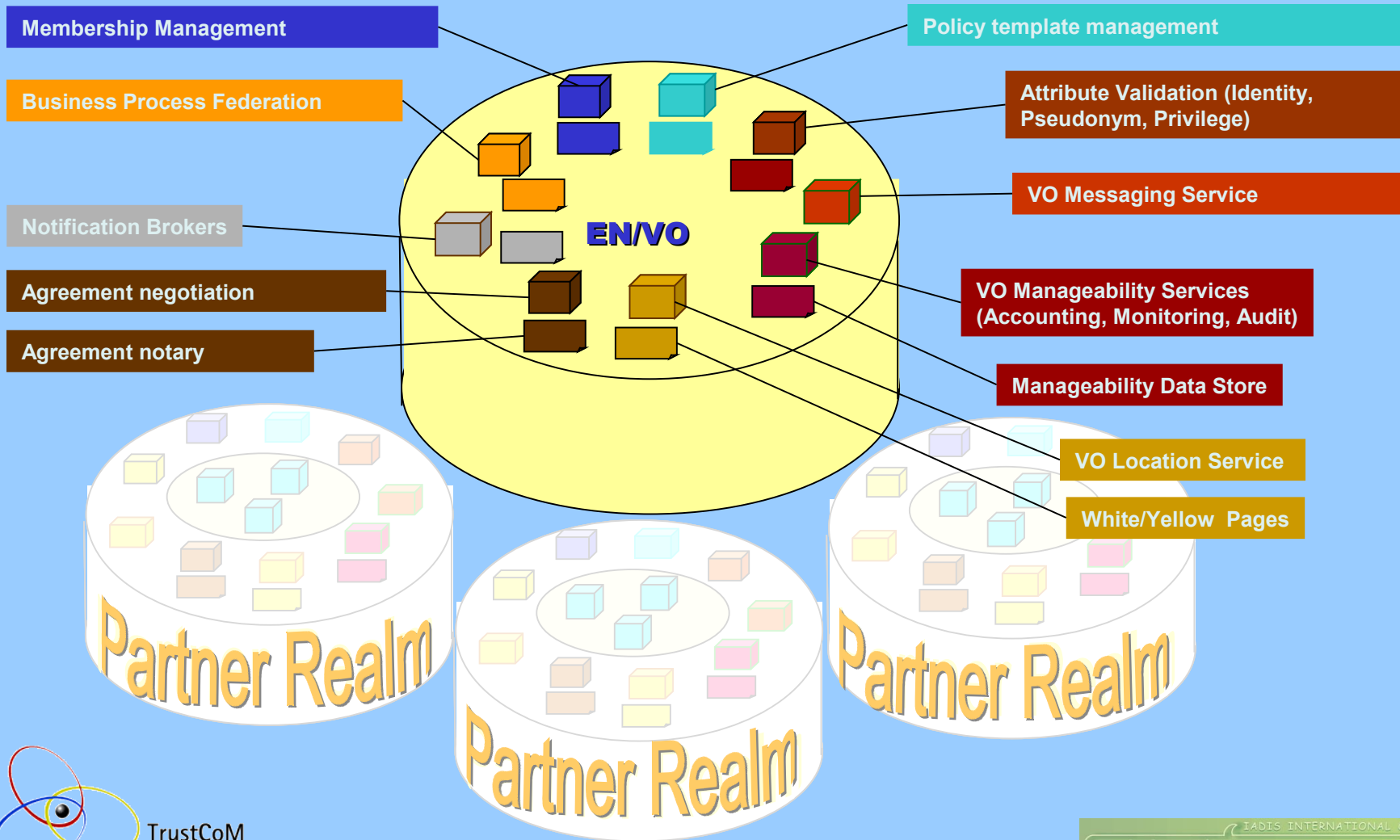
The TrustCoM Project

The TrustCoM framework is being

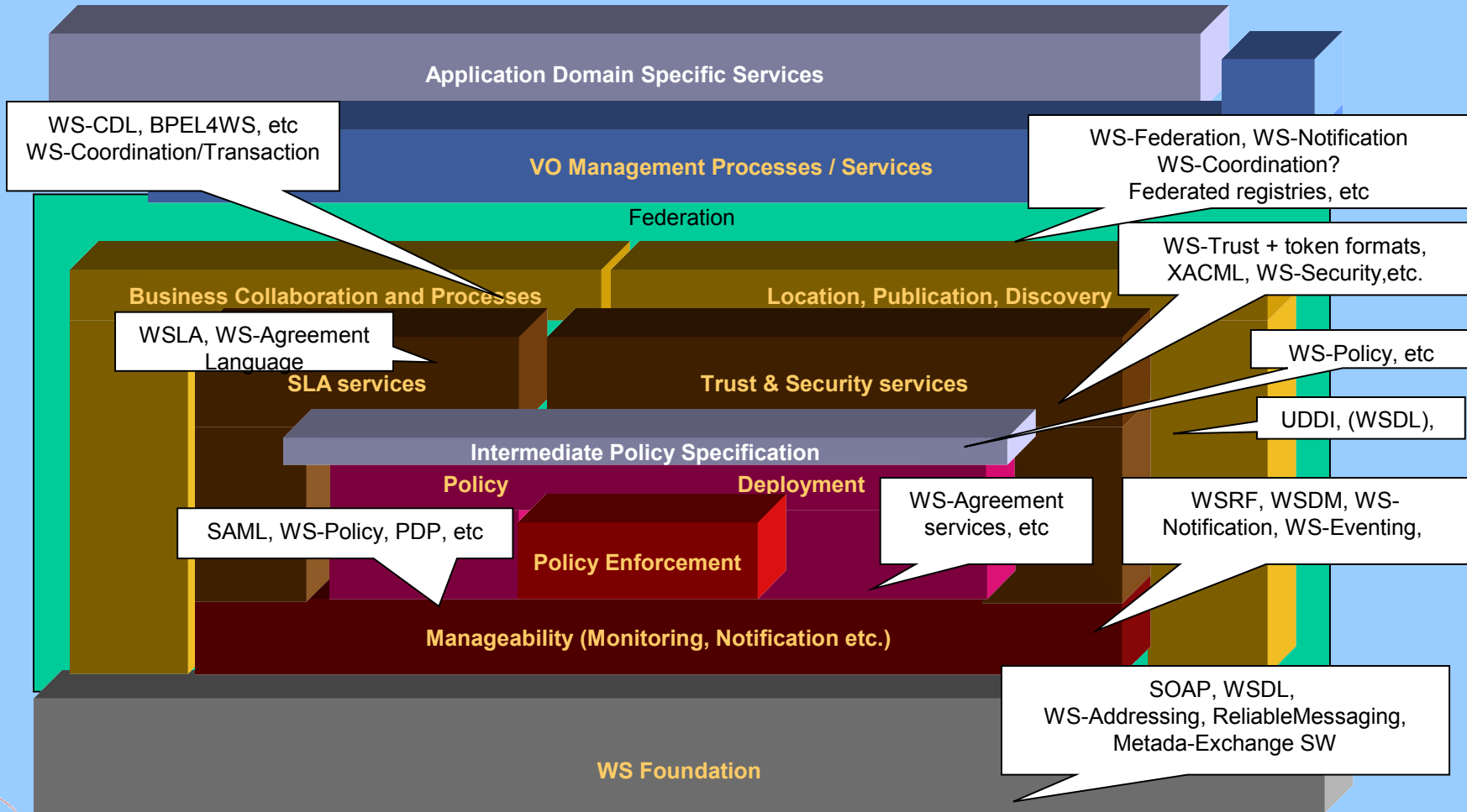
- **Realised** by means of a set of information models, reusable designs, Web Services standards profiles (aka WS-i) and open source reference implementation components
- **Validated** in two testbeds in complementary business areas:
 - **collaborative engineering** (long-term high-performance VOs) and
 - ad-hoc aggregated services (**temporary coalitions of SMEs** that rent resources and operational infrastructure).



TrustCoM Conceptual Model



TrustCoM Architecture



Thank you!

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Q&A

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