Enterprise COllaboration & INteroperability

COIN Winter School

COIN Services and Innovation

Ljubjana, Nov 29th 2011
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TXT e-solutions S.p.A.
COIN IP Lessons Learned

1. COIN EI Services
   - Richer, “unified-federated” EI services
   - Easy-to-use development environments (EI store)
   - EI does not matter, pervasive but invisible

2. COIN EC Services
Enterprise Interoperability Services

SP5 Innovative services in the SP5 Demo
• Interoperability Spaces Alignment (WP 5.2)
• UBL2GS1/exceptionCriteria (iSurf)
• GS12UBL/exceptionCriteria (iSurf)
• Interoperability Spaces (Federated) (WP 5.2)
• Semantic Mapping Discovery service (WP 5.2)
• Semantic Reconciliation Rules Generation service (WP 5.2)
• Semantic Interoperability Reconciliation Engine (WP 5.2)
• Social Ontology Building and Evolution (SOBE) service (WP 5.3)
• Enterprise Semantic Profiling service (WP 5.3)
• Enterprise Semantic Matchmaking service (WP 5.3)
• Business Interoperability Gap Finding Service (WP 5.4)
COIN Information Interoperability

- Interoperability Space
  - Publish/Subscribe
  - Federated Approach
  - Micro-services
  - UBL 1.0 – UBL 2.0
  - DK-TK invoices

- Payload Negotiation
  - 1:1, 1:n, n:m
  - ACS negotiation contract (buyer\supplier)

- Semantic Interoperability
  - A generic complete suite
  - Unified Approach
  - 21 Rules
  - AIDIMA order exchange (Furniture)
COIN Knowledge Interoperability

- Modeling CN competences asset
  - Social Ontology Building of CS
  - Automatic knowledge extraction from txt docs
  - Social participation of experts community (voting, discussing)
  - Example: IND ICT CS core ontology
  - Enterprise Semantic Profiling
  - Ontology-based filtering of enterprises related docs
  - Semantic profiles as ontology-based feature vectors (OFV)

- Assessing the current and evolving CS asset
  - Based on Information content-driven computation of semantic measures (coverage and similarity) between semantic profiles

CN = Collaborative Network
CS = Competences & Skills
COIN Process Interoperability

**Challenges**
- Define the scope of business process interoperability
- Categorize and classify interoperability gaps
- Develop innovative services to ensure business process interoperability
- Provide service primitives to purge the gaps during collaborative process model design-time

**Results**
- Solid concept of business process interoperability
  - Overall scenario
  - Gap categorization and classification
- Prototypical implementation of Business Interoperability Services:
  - Transformation Service (to transform private business processes into view processes applying SBVR rules)
  - CBPip Gap Detection Service (to identify CBPip gaps)
- EXAMPLE
  - Transformation of private processes to public views
  - Detection of interoperability gaps
COIN IP Lessons Learned

1. COIN VISION

2. COIN Generic Service Platform

3. COIN EI Services

4. COIN EC Services
   - Link between permanent & opportunistic alliances
   - Business opportunities internally generated
   - Collaborate to innovate, the innovation ecosystem
   - Service innovation in manufacturing ecosystems
## EC Innovative Services

<table>
<thead>
<tr>
<th>WP</th>
<th>Service</th>
<th>Acronym</th>
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<tr>
<td>4.2</td>
<td>c-PD Semantic Cluster Management Services</td>
<td>SCMS</td>
<td>ISOIN</td>
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<td>c-PD Document Management and Collaborative 3D Designer Service</td>
<td>DM&amp;C3D</td>
<td>ISOIN</td>
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<td>c-PD Advanced Semantic Cluster Management Service</td>
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<td>c-PP Collaborative Production Planning Platform</td>
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<td>4.3</td>
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<td>PPS</td>
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<td>PAB - CACMS</td>
<td>VTT</td>
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<td>4.4</td>
<td>c-PM Project alignment booster - Project alignment profile service</td>
<td>PAB - PAPS</td>
<td>VTT</td>
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<td>c-PM Project alignment booster - Partner alignment indicator service</td>
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<td>TUV</td>
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<td>c-HI Trusted Information Sharing</td>
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<td>4.5</td>
<td>c-HI Trusted Online Help and Support</td>
<td>TOHS</td>
<td>TUV</td>
</tr>
<tr>
<td></td>
<td>ECOSPACE Team Builder</td>
<td>TB</td>
<td>TXT</td>
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COIN c-Product Development

– Collaborative Knowledge-based Product model.
  – Semantic Cluster Management System (SCMS)

– 3D data and collaboration through visualization
  – Collaborative 3D Designer Service (C3DDS)
Collaborative - Product Development Services

• Semantic Cluster Management Services (SCMS)

Problems addressed:

– A new product is going to be developed. We need to find which companies (or group of companies, working in collaboration) have produced in the past a specific part of the product, or can provide the needed service.

– Usually, clusters are of considerable size, (supply chains, collaborative networks and business ecosystems should be taken into account), and the right information for product development (companies, products, services, materials, timing, etc) is hard to find.
Collaborative - Product Development Services

• Semantic Cluster Management Services (SCMS)

Objectives:

– **Semantic search for products or services** needed in the product development process, based on the product structure ontology.

– **Semantic search for companies** that provide the required product / service in a product development process, taking into account related competences.
Collaborative - Product Development Services

• Semantic Cluster Management Services (SCMS)

Semantic searches are based on a product and service ontology built for the cluster
Collaborative - Product Development Services

- Semantic Cluster Management Services (SCMS)

Architecture used in Semantic Cluster Management Services (SCMS).
Collaborative - Product Development Services

• Collaborative 3D Designer Service: C3DDS

Objectives:

– Web service to support **visualization, annotation and inspection of 3D design models** in multidisciplinary and distributed teams.
Collaborative - Product Development Services

• Collaborative 3D Designer Service: C3DDS

  – Dissemination of **3D product designs** and **online annotations of the 3D file**
COIN c-Production Planning

• Main challenges addressed
  - Strong Support to Collaboration among value-chain actors
  - Collaborative creation of Production Plans
  - Collaborative prediction and management of exception
  - Software design following SaaS paradigm
  - Enhance Process Quality

• Main results achieved
  ✓ PnP Collaborative Production Planning Portal (C3P)
  ✓ SaaS Production Planning Service (PPS)
  ✓ Collaborative Quality Management Service (cQMS)
  ✓ Supply Chain Intelligence Service (SCIS)
COIN c-Production Planning (WP4.3)

- **Main challenges addressed**
  - Strong Support to Collaboration among value-chain actors
  - Collaborative creation of Production Plans
  - Collaborative prediction and management of exception
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- **Main results achieved**
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  - Collaborative Quality Management Service (cQMS)
  - Supply Chain Intelligence Service (SCIS)
Collaborative Production Planning Platform (C3P)

- Creation of a Collaborative Production Plan
- Support collaboration among value-chain actors
- Give an user-centered approach to Production Planning by usage of Virtual Rooms
- Manage value-chain changes
- Point of access to other two services
- Next Steps
  - Provide privacy mechanism on information access
Supplier private process

Collaboration in Virtual rooms

Receiver private process
What is the cQMS Prototype?

- A program to identify missing inter-dependencies between partners in order to define needed communication channels to reduce quality problems in collaborative business.
- Therefore it analyses well-defined description texts of every material of a BOM (1\textsuperscript{st} step)
- Future work: Analyse full Competence Profiling of collaboration partners
Research need: Towards an Inter-organisational Perspective for Managing Quality in Business Networks

(1) Level of individual network actors in an organisation (intra-organisational viewpoint; relations between single persons in different departments)
→ Covered by existing QM initiatives

(2) Level of single organisations in a network (intra-organisational viewpoint; relations between departments within an organisation)
→ Covered by existing QM initiatives

(3) Level of inter-organisational relations (inter-organisational viewpoint; relations between networks member)

(4) Level of institutional contexts (inter-organisational viewpoint; relations between networks)

Source:
Level 3 following Gilbert 2003
Process quality in a networked business context

- Communication interfaces affect process quality and thus product quality
- Coordination to avoid incidents resulting from misunderstandings and lack of information

→ Identification of inter-organisational dependencies to support processes quality
Next Steps (1): Model Communication Structures by Competences

• **Product/Service**: core product/service of a company, which are attractive from the perspective of the customer and the market, and which could make a substantial contribution to the business network

• **Processes (Business Processes)**: All the core processes that are needed to offer the company’s product/service to the business network

• **Skills (Technology)**: Theoretical and practical knowledge, skills and abilities that are used to develop the product/service

Each actor’s unique combination of products/services, resources and skills constitutes its identity as competence in the Value Network

Source: Information model to represent competence (according to Molina and Bremer, 1997)
Existing Communication / BOM Structure
Detected Possible Inter-dependencies
cQMS Prototype - Overview

Additional Communication Channels to be checked
Recommendations
Integration

The cQMS has to be smoothly integrated in the Collaborative Production Planning Platform (C3P).
COIN c-Project Management

Main challenges
WP4.4 Develops services for project partners and citizens to participate in and interact with the PM process.
• Develop services for “The Social and Collaborative internet based project management”
• Enable project stakeholders in PM to create and interact with content rather than just consume information
• To manage co-operational processes with differences in language & ontology, working culture, work ethics, legal systems and time zones & latitudes

Results achieved
• New type of services for industry in change
  Project Alignment Booster – Services
• Collaboration for Project Management (Coll^4P_M) – Services for Collaborative creation of a reference project WBS - Services
• Collaborative project meeting space. Management of project meeting processes over different time zones and latitudes (From agenda planning to minutes distribution) - Specification
→→→ Social aspect
• Collaborative proposal
• Collaborative acceptance of proposal
• Collaborative changes management
• Activities notification (new proposal, phone call request, etc)
• Context aware environment
• Individual communication services and Individual availability
• Shared log/documentation
COIN c-Human Interaction

• **Flexible Collaboration Support**
  – Ad-hoc activities underneath pre-planned project structures.

• **Human Interaction Support in SOA**
  – Guidance of interactions based on observed collaboration performance.

• **Trust-based c-HI Support**
  – Optimization of partner selection and group formation.

• **Active Participation of Humans in SOA**
  – Flexible context-aware discovery and ad-hoc involvement of experts in a service-oriented manner.

• **Adaptive Network-based Information Sharing**
  – Dynamically adapting document sharing behavior relying on social relations and collaborative success.
• Collaboration Visualization Tool (CVT)
  – Visualization of actors, relations, interaction metrics
  – Application: group formation, team evaluation

• Trusted Online Help and Support (TOHS)
  – Context-aware discovery and involvement of experts in ongoing collaborations

• Trusted Information Sharing (TIS)
  – Self-adaptive access rights management of documents based on collaboration strength
  – Suitable for highly dynamic collaboration networks
Collab. Visualization Tool (CVT)

- Visualization of Community Structures
  - Individuals
    - Registered profiles (central database)
    - Dynamic profile data
  - Relations described by metrics
- Application Scenario
  - Group Formation
  - Social Campaigns
  - Team Evaluation
- Innovative Concepts
  - Automatically managed/updated profiles and relations
  - Evidence-based structures through mining
CVT Architecture

**Collaboration Visualization Tool**
- Visualize Humans and Services
- Relations
- Collaboration metrics

**Tools**
- Interaction Logging
- Interaction Analysis
- Collaboration Network Provider
- Competencies WS
- ActivityWS

**Services**
- Interactions
- Collaboration Network
- Central Database
- Activity Data

**Data**

http://madrid.vitalab.tuwien.ac.at:8152/coin/cvt-demo-sw/
CVT Demo (1/5)
Basic User Interface
Dynamically expandable Collaboration Web
CVT Demo (3/5)
Customized Metric Visualization
CVT Demo (4/5)
Temporal Evolution
CVT Demo (5/5)
Direct Interactions with Users
Trusted Online Help/Sup. (TOHS)

• Flexible discovery and involvement of trustworthy experts
  – Dynamically changing skills
  – Contextual constraints to find best available expert
  – Personal preferences and social trust relations

• Application Scenarios
  – Expert Discovery
  – Team Assembly
  – Interest Group Formation

• Innovative Concepts
  – Personalized expert discovery
  – Flexible involvement of experts
TOHS Architecture

Trusted Online Help and Support

Request For Support (RFS), Delegation, and Trusted Selection

Tools

Collaboration Baseline Integration

Basic Expert Capabilities

Services

Data

http://copenhagen.vitalab.tuwien.ac.at/TOHS/
TOHS Demo (1/5)
Basic Search

Trusted Online Help and Support

[ Log On ]

Basic Search

Context parameters (optional)

- Expert is online (via Skype)
- HPS interaction (via Web services)
- Apply metric: Availability

Sign in as user

To learn more about COIN visit http://www.coin-ip.eu.
Trusted Online Help and Support

All skills:

AND

TOHS Search All Skills

One or more of specified skills:

Software/SE/Specifications/Languages

OR

TOHS Search One or More

Context parameters (optional):

- Expert is online (via Skype)
- HPS interaction (via Web services)
- Apply metric [Availability]

Sign in as user

To learn more about COIN visit http://www.coin-ip.eu.
TOHS Demo (3/5)
Advanced Search

Trusted Online Help and Support

One or more of specified skills:

Software/SE/Specifications/Languages OR Software/SE/Specifications/Analysis

TOHS Search One or More

Context parameters (optional)

- Expert is online (via Skype)
- HPS interaction (via Web services)
- Apply metric: Availability set value for minimum threshold (a number between 1 .. 100)

Signed in as:
Michele

To learn more about COIN visit http://www.coin-in.eu.

Personal Trust
**TOHS Demo (4/5)**

Search Result

**Trusted Online Help and Support**

Trusted Online Help and Support offered by:

- **Daniel Schall**
  - Skills:
    - Software/SE/Specifications/Analysis
    - Software/SE/Specifications/Languages

- **Florian Skopik**
  - Skills:
    - Software/SE/Specifications/Languages

Click user to contact.
TOHS Demo (5/5)
Contact Expert

Skype for Real-time Communication
Trusted Info. Sharing (TIS)

• Document-centric Information Sharing
  – Sharing based on dynamically adapting social and collaborative network structures
    • Altering Social relations
    • Flexible activity participation

• Application Scenario
  – Sharing of sensitive data in highly flexible collaboration scenarios
  – Sharing of information in social campaigns

• Innovative Concepts
  – Dynamically adapting access rights based on social relations and previous collaborations
  – Facilitate collaborations through active sharing
TIS - Fundamental Scenario

- Sharing of information depends on collaboration strength rather than static roles
- Collaboration attitude may change over time
  - Dynamically controlled access rights
  - No manual intervention required

Collaboration strength determined through:
- Availability on request
- Joint Activity Success
- Interest Similarities
TIS Architecture

Trusted Information Sharing Tool
- Sharing
- Configuration
- Transformation

Tools
- DocumentWS
- ActivityWS
- Collaboration Network Provider
- Information Sharing Backend

Services
- Resource Database
- Activity Data
- Collaboration Network
- Profile Sets Sharing Rules

Data

http://copenhagen.vitalab.tuwien.ac.at/InfoService/Default.aspx
TIS Demo (1/4)
Selecting Sharing Scope

1. CHOOSE ACTIVITY

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TIS Demo (3/4)  
Defining Rules

- Access to author section is slightly restricted
- Access to document body even more
COIN Collaborative Platform

• Support the collaboration among cluster partners, providing different assets:
  – Knowledge
  – Social
  – Business

• Main door to access to get beneficial of the whole COIN functionalities (integration step 2-3)

• Direct access to COIN services (integration step 1)

• Integrate a Business Process environment for cross-organisational collaboration
CP Environment

- Based on Liferay Portal Community Edition (CE)
  - LGPL license
- ALL liferay Functionalities still available
- COIN service as portlet
- COIN services in iFrames
- Integrates COIN Front-End APIs to access to the COIN GSP federated CLOUD with EI/EC services

¹http://www.liferay.com/downloads/liferay-portal/license
Collaborative Platform (CP) Architecture
Welcome on the Collaborative Platform of the COIN project!
Click on the images below to have more information on the COIN end users; use the left COIN to access the first 6 end-users of the project, click on the right COIN to access the Enlarged Europe end-users.

If you are a registered member of this cluster please use the log in function on the top-right corner to access to private pages of your cluster.
Communities

- 13 communities
  - 6 COIN end-users
  - 6 COIN-EEU end-users
  - 1 guest access
• Centralised Synchronized Database supporting cluster companies and individuals and their competencies
Service Layer (baseline adaptation)
Services access from the COIN CP (Integration Step 1)
Business Process
COIN Services (portlets/iframes)
Enterprise COllaboration & INteroperability

COIN Winter School

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Ljubjana, Nov 29th 2011
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