Enterprise COllaboration & INteroperability

COIN Platform Demonstration

COIN Summer School
Aachen, October 20th 2010

Michele Sesana
TXT e-solutions S.p.A.
Contents

- COIN Step II Integration Technical Overview
- Service registration in the GSP
- Step II Search & discovery & ranking & execution (CP – GSP Communication - pull)
- Step II GSP WatchDog (push)
- Step II GSP Execution Monitoring
- COIN Platform - Step III vision
Integration STEP 1

COIN Collaboration Platform

Knowledge Interaction

Social Interaction

COIN Collaboration Platform Service Bus

Service1  \( \rightarrow \)  EI Service2  \( \rightarrow \)  Service3  \( \rightarrow \)  EC Service4

Business Interaction

Start  \( \rightarrow \)  \( \cdots \)  \( \rightarrow \)  End
Integration STEP 2

COIN EI/EC Service Platform

Enterprise I/op / Collab. VAs

GSP Utility Services

EIServiceRequest2  ECServiceRequest4

EI Service2  EC Service4

COIN Collaboration Platform

Knowledge Interaction  Social Interaction
COIN Integrated Service Platform

CP

User

Legacy Systems

Web Portal, Single Point of Access

BPMN Engine GUI iFrame
Liferay Portlet & iFrame
COIN Portlet
COIN iFrame

GSP Communication Interface

Security Layer

Single Sign-on Layer

Presentation Layer

Liferay Basic Services
Baseline Integrated Services

WSDL Interface

Invocation/Coordination

Request
Profile

Access
Registration

Partner
Individual

Web

GSP Security Layer

Communication Manager
Discovery
Composition
Selection and Ranking
Data Mediation
Choreography
Invoker

Monitoring

Web

Services From Service Provider 1

Services From Service Provider N

Business Layer

Production Planning Service GUI (PPS)

PPS BPEL Services

Business Layer

Data Layer
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The COIN EC Ontology

- 35 Concepts
- 22 Relations
- 10 COIN EC Baseline Services
- 15 COIN EC Innovative Services
- 1 non-COIN EC Service (ECOSPACE CE)
The COIN EI Ontology

- 39 Concepts
- 14 Relations
- 7 COIN EI Baseline Services
- 9 COIN EI Innovative Services
- 2 non-COIN EI Services (iSURF)
Registration process

- Selecting namespace and SWS identifier
Registration process

- Importing ontologies
Registration process

- Building pre- and post-conditions
Registration process

- Building pre- and post-conditions
Registration process

- Defining annotations

![WSMX Registry UI](image-url)
Registration process

- Defining non-functional properties
Registration process

- Final shape of the service description
Registration process

- The service has been registered in WSMX
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Integration STEP 2

COIN EI/EC Service Platform

GSP Utility Services

Enterprise I/op / Collab. VAs

EI Service 2
EC Service 4

COIN Collaboration Platform

Business Interaction

Knowledge Interaction

Social Interaction

Start

End
a) COIN Guest CP - GSP
CP-GSP Integration

**CP**

- GSP Activity
- Business Process
- Human User
- Srv 1
- Srv M

**GSP Client Module**

- Goal Composition GUI
- Ontology Load Module
- Goal Mng Module
- Invocation Module
- Ranking Module
- Monitor Module
- Communication Module

**GSP**

- (Services registration and mapping on the ontology)
- GSP Ontology

**Srv**

- Service 1
- Service 2
- Service N

Flow:
- GoalRequest (pre,post)
- GoalResponse ()
ProcessMaker (BPM) in the CP

COIN Collaborative Platform

Sign In

Sign in with a regular account.
Login: vetran
Password: ********
Remember Me
Sign In

Sign in with an OpenID provider.
OpenID: 
Sign In

Flowchart:
1. Create Production Planning
2. Production Process
3. Send Goods
4. Inform FILAS
5. Inform COM
6. Translate invoice from F1 to F2
Business Process Definition

1) Business Process

GSP Client Module

Goal Composition GUI

- Ontology Load Module
- Goal Mng Module
- Invocation Module
- Ranking Module
- Monitor Module
- Communication Module

GSP

(Services registration and mapping on the ontology)

EC Ontology

EC NFP Ontology

Define

GoalRequest (pre,post)

GoalResponse ()

Human User

Srv 1

Srv

M

Service 1

Service 2

Service N
## Scenario

### Business Process (adapted from FILAS)

<table>
<thead>
<tr>
<th>Step</th>
<th>Status</th>
</tr>
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<tbody>
<tr>
<td>TeS and COM needs to make a shared production plan</td>
<td>? – no service available</td>
</tr>
<tr>
<td>COM complete the production process</td>
<td>manual</td>
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Search EC Service (1)

**GSP Client Module**

- Goal Composition GUI
  - Ontology Load Module
  - Goal Mng Module
  - Invocation Module
  - Ranking Module
  - Monitor Module
  - Communication Module

**CP**
- GSP Activity
- Business Process
- Human User
- Srv 1
- Srv M

**GSP**
- (Services registration and mapping on the ontology)
  - EC Ontology
  - EC NFP Ontology

**Srv**
- Service 1
- Service 2
- Service N

**Video 1**
- Opening Goal Composition Form
- Selection of PRE/POST conditions
- Wide Search (PRE: document.....)
- Change PRE/POST conditions
- Strict Search (PRE: production plan.....)
- Find C3P service
Search EC Service (2)

5) Get Endpoint

6) Real Endpoint

7) Insertion in BP (WIP)

- Show details of the service
- Get Endpoint
- Button to insert GUI into BP
# Scenario

- **Business Process (adapted from FILAS)**

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Search & Rank & Invocation

2) Search

4) Result

3) Discover

5) Try It

Search for a message service
Find some services like (email and IM)
New Search for an email service with NFP
Find two email services (ranked)
See TXT email service details
Insert parameters into service form
Test Invocation
Click button to insert Web-service into BP
## Scenario

- **Business Process (adapted from FILAS)**

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Search & Rank

GSP Client Module

2) Search
3) Discover
4) Result
5) Try It

Video4
Search for an email service by NFP
• Find two email services (ranked)
• See TUV email service details
• Button to insert Web-service into BP

GSP
(Services registration and mapping on the ontology)

1) Define
2) Define
3) Discover
4) Result
5) Try It

GSP Activity

Human User

Business Process

EC Ontology

Domain Expert

NFP Ontology

Goal Composition GUI

Invocation Module

Onload Module

Goal Mng Module

Ranking Module

Monitor Module

Communication Module
Scenario

- Business Process (adapted from FILAS)

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<tr>
<td>Rossi from COM should be informed by email</td>
<td>TUV email service (EC WS)</td>
</tr>
<tr>
<td>COM looks for UBL invoice 1.0-2.0 Interoperability</td>
<td>? – no service available</td>
</tr>
</tbody>
</table>
Search

GSP Client Module

2) Search

3) Discover

4) Result

5) Insertion in BP (WIP)

EI Ontology

- Search for an invoice translation service
- Find two invoice services (ranked)
- Get Endpoint

Human User

GSP Activity

Goal Composition GUI

Ontology Load Module
Goal Mng Module
Invocation Module
Ranking Module
Monitor Module
Communication Module
# Scenario

- **Business Process (adapted from FILAS)**

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<td>COM send Invoice</td>
<td></td>
<td>Invoice service (EI GUI)</td>
</tr>
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</table>
Final Business Process

- Create Production Planning
- Production Process
- Send Goods
- Inform FILAS
- Inform COM
- Translate invoice from F1 to F2

C3P Service

Automatic steps

Federated Interoperability Service

- Run BP
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Motivation

• GSP has exhibited only **synchronous polling** discovery mechanism
  – Client sends a goal describing the required capabilities,
  – GSP discovers Web services capable of fulfilling the required functionality, and
  – Results are returned to the user in the form of wgMediators.

• Clients may want to subscribe their goals in order to…
  – … be notified about the events of interest (e.g. registration of a new Web service capable of fulfilling requirements).
  – … continue to operate until the situation of interest emerges.

• Clients want to have **asynchronous** discovery mechanism which relies on the **push** paradigm.
Technical solution

GSP Goal Subscription Environment
Technical solution

WSMX Architecture
Technical solution

- NotificationBroker is responsible for the following tasks:
  - Accepting subscription requests,
  - Managing a list of subscriptions,
    - Subscriptions are persisted
  - Executing the discovery process when needed
    - New subscriptions, and
    - Service registrations.
  - Notifying subscribers over the designated channel:
    - Email
    - Web service invocation
  - Taking care of temporal subscription constrains
Technical solution

• New WSMX SOAP endpoint
  – http://localhost:8050/axis/services/WSMXSubscriptionService

• Provides following methods
  – retrieveSubscription
    • retrieves subscription details for specified subscriptionId,
  – retrieveSubscriptionIDs
    • retrieves all subscriptionIDs,
  – subscribe
    • subscribes a user,
  – unSubscribe
    • invalidates subscription for specified subscriptionID,
  – unSubscribeAll
    • invalidates all subscriptions.
Technical solution

• Notification Service endpoint
  – notify method (one-way method)
    • subscriptionID – id of the subscription which triggered notification
    • wsmlMessage – the payload in the form of wgMediators

```xml
<soap:Envelope xmlns:soap="http://www.w3.org/2003/05/soap-envelope"
               xmlns:axis="http://ws.apache.org/axis2">
  <soap:Header/>
  <soap:Body>
    <axis:Notify>
      <axis:subscriptionID>1</axis:subscriptionID>
      <axis:wsmlMessage>…</axis:wsmlMessage>
    </axis:Notify>
  </soap:Body>
</soap:Envelope>
```
Technical solution

Subscription request – email notification

<soapenv:Envelope
   xmlns:soapenv="http://schemas.xmlsoap.org/soap/envelope/"
   xmlns:web="http://webservices.deri.ie">
   <soapenv:Header/>
   <soapenv:Body>
      <web:subscribe>
         <web:userID>1</web:userID>
         <web:userEndPoint>mailto:srdjan.komazec@sti2.at</web:userEndPoint>
         <!-- <web:expireDate>??</web:expireDate> -->
      </web:subscribe>
   </soapenv:Body>
</soapenv:Envelope>
Technical solution

Subscription request – Web service notification

<soapenv:Envelope
   xmlns:soapenv="http://schemas.xmlsoap.org/soap/envelope/"
   xmlns:web="http://webservices.deri.ie">
   <soapenv:Header/>
   <soapenv:Body>
      <web:subscribe>
         <web:userID>1</web:userID>
         <web:userEndPoint>
            http://localhost:8088/axis2/services/NotificationReceiver
         </web:userEndPoint>
         <web:wsmlMessageGoal>
            http://www.coin-ip.eu/goals/ec#MessageServiceGoal
         </web:wsmlMessageGoal>
         <!-- <web:expireDate>? </web:expireDate> -->
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Motivation

• COIN mission statement

The COIN project will develop an original business model based on the SaaS-U (Software as a Service-Utility) paradigm where the open-source COIN service platform will be able to integrate both free-of-charge and chargeable, open and proprietary services depending on the case and business policies.
Technical solution

GSP Monitoring Environment
GSP Monitoring Ontology
Technical solution

• Monitoring Manager is responsible for the following tasks:
  – Extracting data of monitoring interest,
  – Transforming data into the appropriate format according to the monitoring ontology,
    • Monitoring Ontology API
  – Storing the observed data in the Monitoring RDF Storage
  – Notifying interested parties about occurrences of observed data

• Monitoring Manager relies on a synchronized buffer in communicating with the Monitoring RDF Storage
  – Decoupling primary and supporting GSP functionalities
  – Fostering scalability
Technical solution

Monitoring Web Service invocation price

- **Context-based price definition**
  - Negotiated price value
- **Axiom-based calculation of price**
  - Evaluation of the price axiom on top of the NFP ontology and Web Service input ontology

```xml
wsmlVariant _"http://www.wsmo.org/wsml/wsml-syntax/wsml-rule"
namespace {
  _"http://www.coin-ip.eu/services/ec#",
  ec _"http://www.coin-ip.eu/ontologies/ec#",
  ecp _"http://www.coin-ip.eu/ontologies/ecp#",
  dc _"http://purl.org/dc/elements/1.1/",
  ecs _"http://www.coin-ip.eu/services/ec#",
  pref _"http://www.wsmo.org/ontologies/nfp/preferenceOntology#"}

webService EmailCommunicationService
  nonFunctionalProperties
    pref#Price hasValue ecs#price
    pref#Reputation hasValue ecs#reputation
    pref#InvocationTime hasValue mo#AverageTimeConfiguration
  endNonFunctionalProperties

importsOntology {
  ...
  EmailCommunicationServiceNFP
}

capability EmailService_Cap
  ...

ontology EmailCommunicationServiceNFP
  nfp
    pref#isNFPOntology hasValue "true"
  endnfp

axiom EmailCommunicationServicePriceAxiom
  definedBy
    price(1.0).

axiom EmailCommunicationServiceReputationAxiom
  definedBy
    reputation(0.5).
```
Technical solution

• RDF Complex Event Processing Engine
  – Implements Event-Condition-Action (ECA) rules paradigm

• Event
  – SPARQL query over the stream of RDF triples

• Condition
  – SPARQL query over the Monitoring RDF Storage and variables bonded in the Event step

• Action
  – Arbitrary activity which may rely on the variables bound in the previous two steps,
  – Activity can be CRUD operation over Monitoring RDF Storage, Web Service invocation, E-mail, execution of Java code.
Technical solution

• Currently implemented ECA rules
  – Update Average Invocation Time
    • Calculates the average invocation time for a third-party Web Service and stores it in the Monitoring RDF Storage
  – Update Average Invocation Time Per User
    • Calculates the average invocation time per user for a third-party Web Service and stores it in the Monitoring RDF Storage
    • Useful for SLA evaluation
  – Notifying Reputation Manager
    • Invokes Reputation Manager endpoint in order to notify it regarding the monitored data.
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Collaboration example

### People to be Connected

**Context:**
- project (WBS, task allocation)
- role (internal / external person)
- location (office / travel / home)
- agenda (free / busy / available)
- context (alone / with s.body)
- job (idle / priority / ordinary)
- device (PC, PDA, phone)

### Collaboration Business Process

- Invite to a Meeting
- Discuss/Send Agenda
- Remind Meeting
- Run a Meeting
- Send Minutes

### Collaboration Services

**Services:**
- File transfer (Skype)
- Instant messaging (COIN)
- Phone call (Skype)
- Phone ring (Skype out)
- SMS / MMS (Skype out)
- e-mail (COIN)
- Audio-videoconf. (Skype)
- Desktop sharing (Skype)
Collaboration example

<table>
<thead>
<tr>
<th>People to be Connected</th>
<th>Collaboration Business Process</th>
<th>Collaboration Services</th>
</tr>
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<tbody>
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<td><strong>Context:</strong></td>
<td></td>
<td><strong>Services:</strong></td>
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- Instant messaging (COIN)
- Phone call (Skype)
- Phone ring (Skype out)
- SMS / MMS (Skype out)
- e-mail (COIN)
- Audio-videoconf. (Skype)
- Desktop sharing (Skype)
The **Problem**: ProjectX - WPY Leader has to send invitations to all

The **Context** is stored in a DB of the CP (e.g. the WBS of the project, the names of the participants with the context info).

**Step 0** The ProjectX-WPY Leader has to look at the people involved in the WP and their contextual information. He will use different separated ad-hoc tools to choose ad-hoc the most suitable communication services for invitations, discuss agenda and send documents.

**Step 1** The ProjectX-WPY Leader accesses the **COIN EC Web Site** via his workspace and selects the most suitable communication services for each person
Step 2  The ProjectX-WPY Leader accesses the **COIN EC Service Platform** which is able to search-discover-compose-rank-execute the “best” communication services. He needs to write a Service Specification (i.e. a Service Request or a Goal for the Platform).
Step 3  The ProjectX-WPY Leader accesses the COIN Intelligent EC Service Platform, which is able to interpret the context and choose the best communication services.
EC Step 3 overview
EC Step 3 overview

Communication with “Sergio”
“see you on Monday”

EC Concepts:
Synchronous/Asynchronous
Invasive/Discreet

Done it

Reasoning Middleware

GSP Client Module
Expert System (JESS)
(Rules...)

Human User

IF ... AND

Step Without Service

Business Process

Knowledge base

Service 1

Service 2

Service N

Agenda = “free”
Email = “xx@yy.com”
Skype = “zzzzz”
Acknowledgment

• UIBK Team (Srdjan, Federico, Davide)
Enterprise COllaboration & INteroperability

COIN Platform Demonstration

COIN Summer School
Aachen, October 20th 2010

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