Enterprise COllaboration & INteroperability

- COIN Book -
COIN research results for enterprise innovation
Enterprise Collaboration Services

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Content of the presentation

- COIN A Side: Enterprise Collaboration & Main innovations

- Enterprise Collaboration Baseline technical analysis & business concept perspective

- Enterprise Collaboration Innovative services – exemplified

    - Collaborative Product Development (c-PD)
    - Collaborative Production Planning (c-PP)
    - Collaborative Project Management (c-PM)
    - Collaborative Human Interaction (c-HI)

- COIN A Side: Main innovations

- Back-up by interest

COIN A Side: Enterprise Collaboration

The COIN Project developed services for European SMEs enterprise aggregation, synchronization and co-operation in response to the more and more demanding and complex business opportunities coming from the global market.

- Existing solutions from previous EU FP6 project and other sources are used as starting point (**EC baseline services**).

- On top of a developed common baseline, the project has further developed **EC innovative services** for
  - Collaborative Product Development,
  - Production Planning,
  - Collaborative Project Management,
  - Collaborative Human Interaction.

- Such services are easily configurable to meet different collaboration requirements, from the most static supply chains where optimization and efficiency are of key importance, till to the most dynamic business ecosystems where evolutionary behaviour of the business system, including sudden disappearing and re-appearing of business entities, has to be modelled and supported.

Technical analysis: Existing EC tools and systems

Category	Software	Number of Tools	Tool Name
Web application	Tomcat	10	Virtual Breeding Environment Management (VMBS), Professional Virtual Community (PVC) Management and Governance, PVC Rewarding Tool, Requirement Identification Service (refQuest), E4 (Extended Enterprise Management in Enlarged Europe) Platform, Supported Indicator Definition (SID), Collaboration Opportunity Characterization (COC) Plan, Virtual Organization (VO) Model Repository, Partner Selection (PS), VO Formation
	Apache Web server	2	Collaboration Opportunity (CO) Finder, Customer Support Service (DISCO)
	Microsoft IIS	4	PVC Management and Governance, Planned, Mediated, and Ad-hoc Collaborations
Web service	Axis	2	Communication Service Set, Activity Management
Database	MySQL	9	PVC Management and Governance, PVC Rewarding Tool, Planned, Mediated, and Ad-hoc Collaborations, Communication Service Set, Activity Management, refQuest, DISCO
	PostgreSQL	5	VBMS, E4 Platform, CO Finder, COC-Plan, VO Formation
Programming Language	Java	10	VBMS, PVC Rewarding Tool, Communication Service Set, Activity Management, refQuest, SID, COC-Plan, VO Model Repository, PS, VO Formation
	C#	5	PVC Management and Governance, Planned, Mediated, and Ad-hoc Collaborations, E4 Platform
	PHP	2	CO Finder, DISCO

What‘s new in COIN EC Baselines?

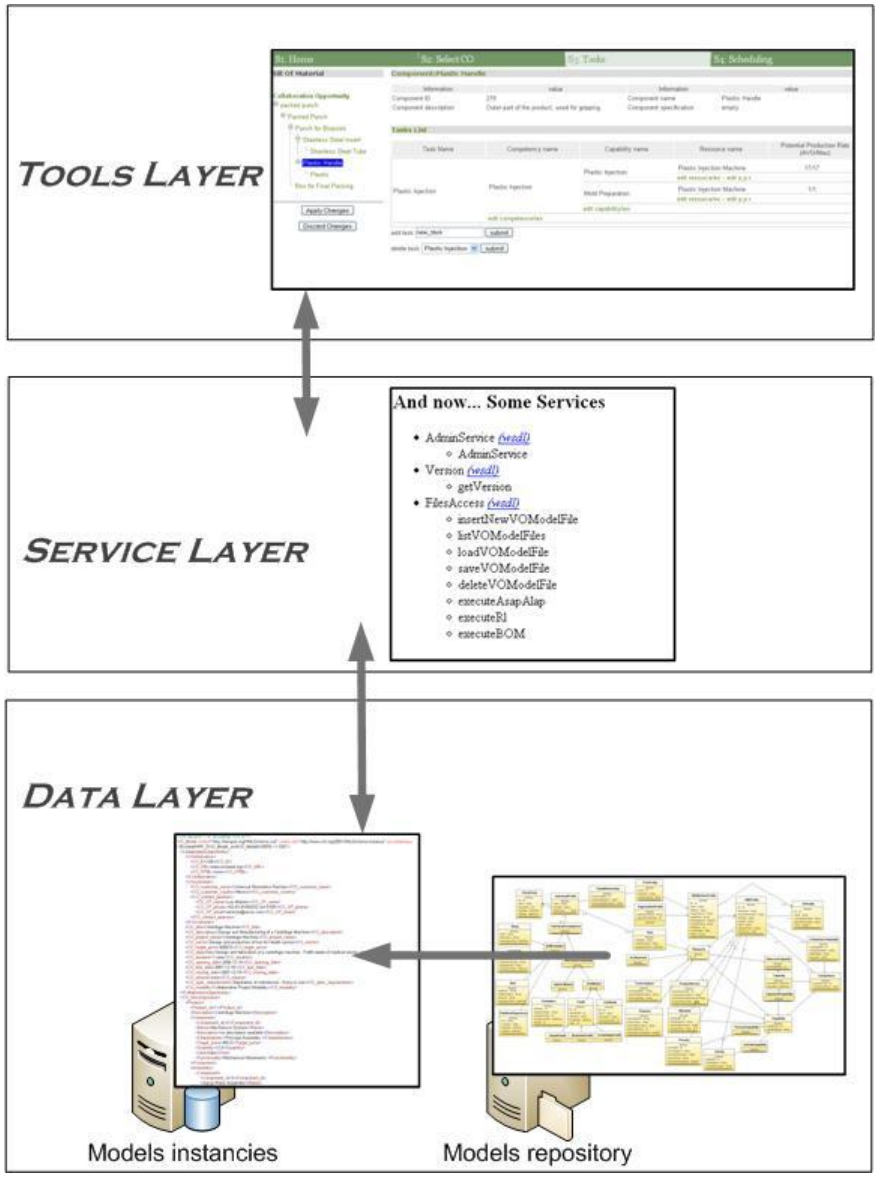
- Common Data and Models Base
with 59 implemented entities

-Former software has been decoupled in three levels, separating business logic, presentation layer and data

-Business logic has been encapsulated into reusable web-services

- Data exchanged by applications are now managed by a common database and private data of application stay on legacy databases

- Harmonisation of Networks of individuals (PVCs) and Enterprises

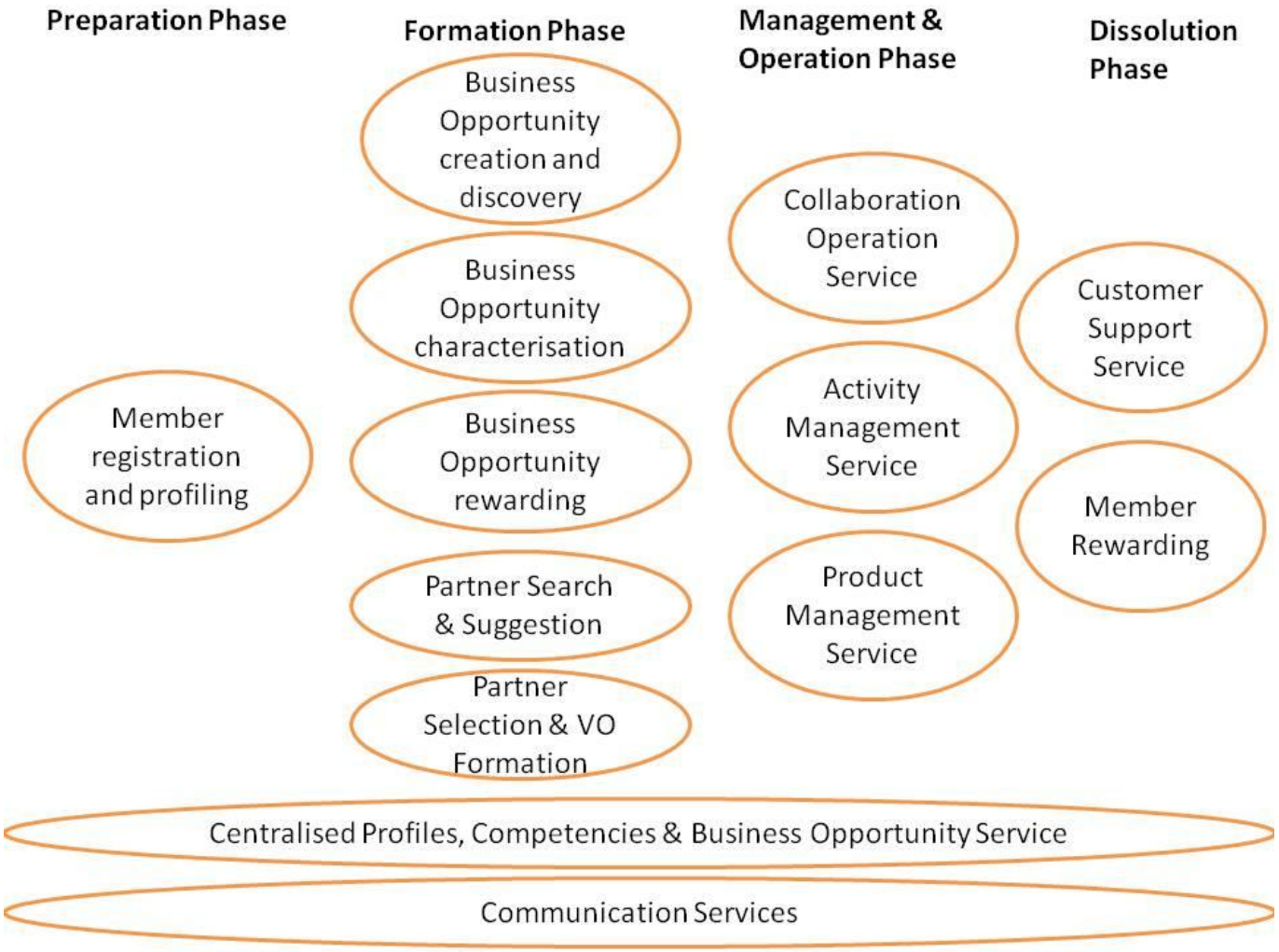


Enterprise Collaboration Baseline Concept – Business Perspective

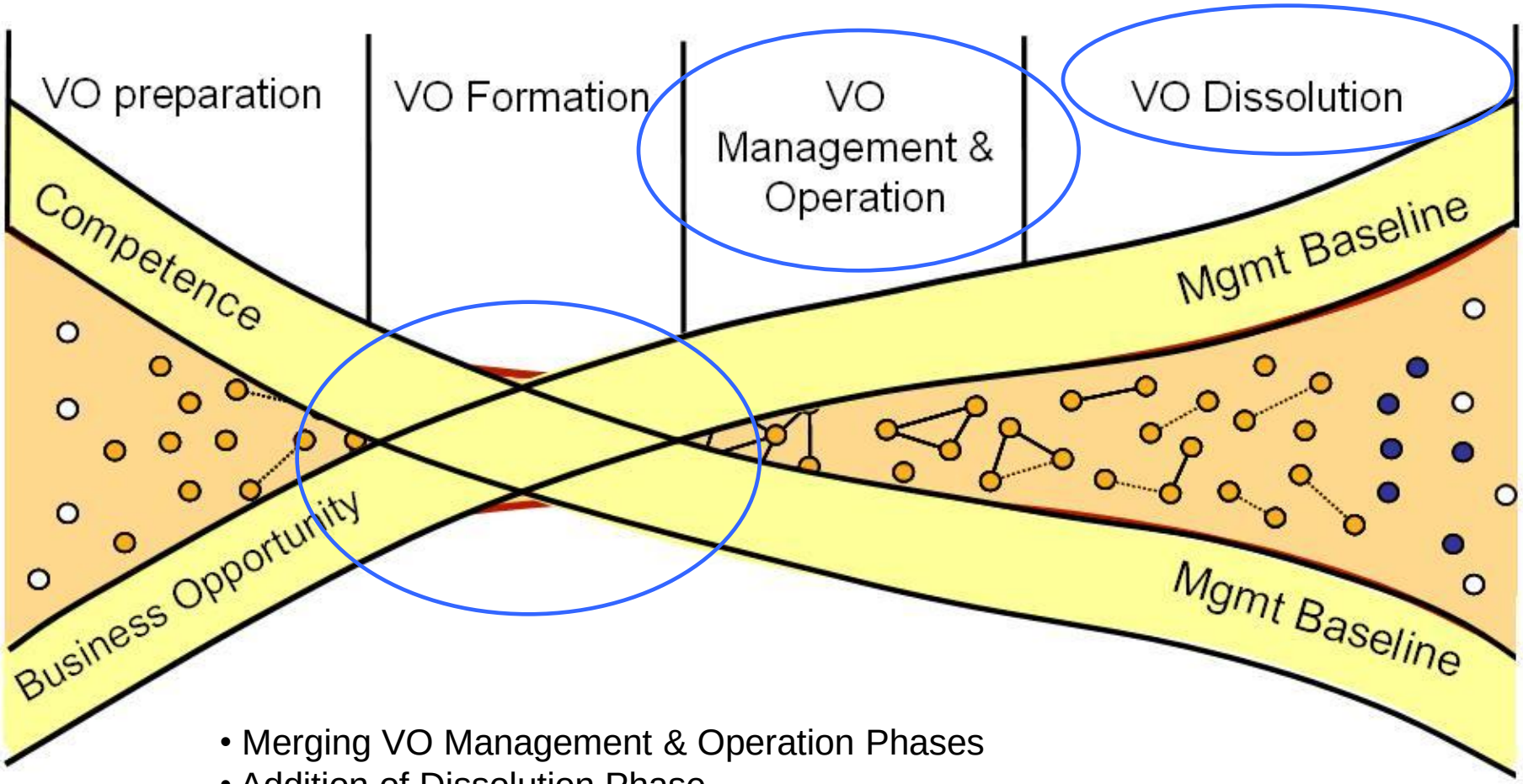
	Enterprise Collaboration Preparation	Enterprise Collaboration Formation	Enterprise Collaboration Management & Operation	Enterprise Collaboration Dissolution
Competencies Management Baseline Services	**Service for Maintaining Competencies**	**Service for matching Competencies with Business Opportunity**	**Service for Tracking Capacities**	**Service for Maintaining Knowledge and Training**
Business Opportunities Management Baseline Services	**Service for Identifying Business Opportunities**		**Service for Tracing Progress**	**Service for Customer Support**
	Basic Services for Human Interaction			

Enterprise Collaboration Baseline Services – Prototype Details

- core set of services and tools
- each ellipse represents a business service that is supported by a group of software tools and services



What‘s new in COIN EC Baselines?



- Merging VO Management & Operation Phases
- Addition of Dissolution Phase
- Cross-cutting Competence and Business Opportunity Mgmt Baseline Models

Innovative EC Services Overview

Based on industrial needs and identification of missing services on the market, COIN has further specified, developed and delivered services in the following domains.

- Collaborative Product Development (c-PD)
- Collaborative Production Planning (c-PP)
- Collaborative Project Management (c-PM)
- Collaborative Human Interaction (c-HI)

In the COIN context the developed services to support the above mentioned domains are called

Innovative Enterprise Collaboration Services.

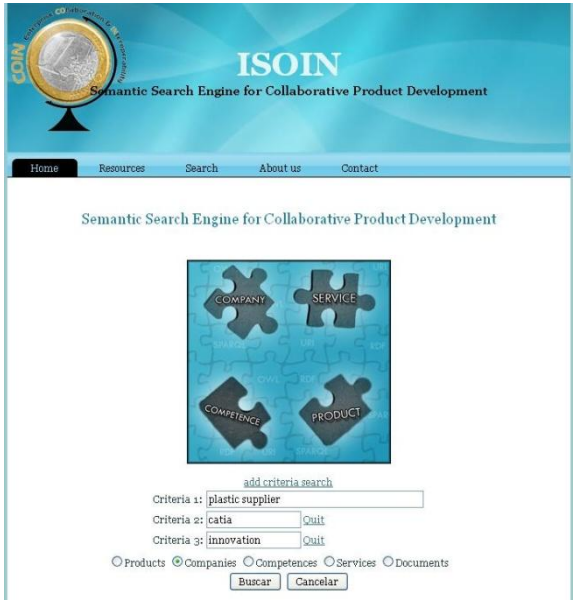
Collaborative Product Development (c-PD) Services

- Semantic Cluster Management Services (SCMS)
- Automatic and Intelligent Construction and Instantiation services (AICIS)
- Collaborative 3D Designer Service (C3DDS)

c-PD services

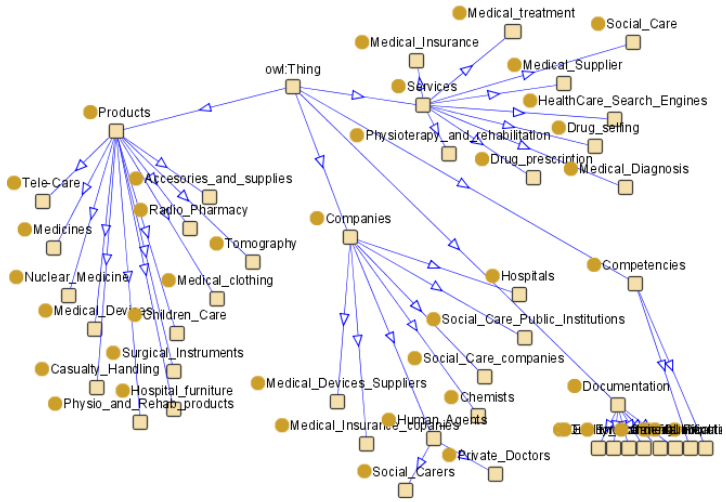
SCMS (Semantic Cluster Management Services)

Advanced semantic search functionalities for products or services needed in the product development process, finding related suppliers, services or stakeholders.



Horizontal, Software as a Service Utility (SaaS-U), useful for a wide variety of end users

Based on an innovative product structure ontology, based on products, services, documents, companies and competencies



Final improvements to be performed:
-categorization of searches, to better perform semantic searches.
-Testing of SCMS in different sectors: Healthcare (see figure)

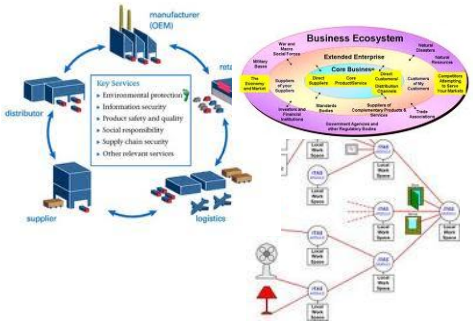
c-PD services

Collaborative 3D Designer Service (C3DDS)

- Online viewing of 3D files, including a wide variety of formats (Jvx, Bd, Byu, Dxf, Fe, Mgs, Mpl, Obj, Off, Stl and Wrl)
- Web service architecture, avoiding the need to install software and contributing to collaborative processes
- Online annotations, to enable “virtual meetings” to comment a 3D design.
- Historic of annotations and author of annotations, to enhance the product development process

Companies would not have to depend on legacy systems with expensive licenses and could **connect to collaborative work anytime, anywhere, with the use of web services, without the need to have installed the proprietary software** in the computer they are using.

Final improvements to be performed:
- Particularization for Supply chains, Collaborative Networks or Business ecosystems
- Different levels of privacy and security in 3D files depending the type of cluster
- Semantic Management of large number of annotations in Business ecosystems.



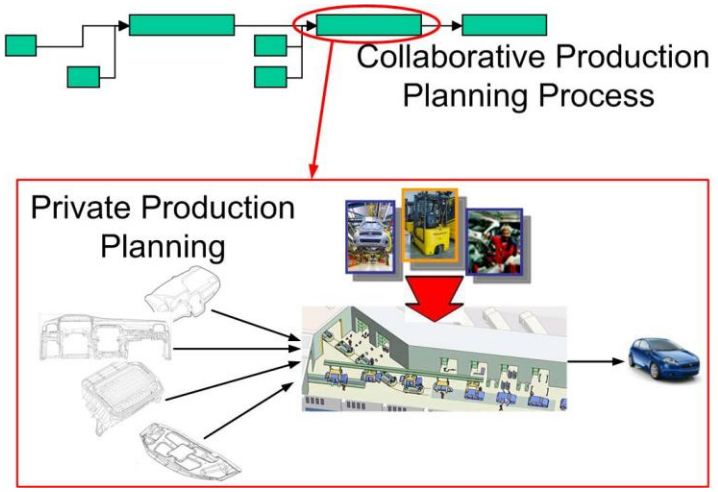
Collaborative Production Planning (c-PP) Services

- PnP Collaborative Production Planning Portal (C3P)
- SaaS Production Planning Service (PPS)
- Collaborative Quality Management Service (cQMS)
- Supply Chain Intelligence Service (SCIS)
- Service oriented text enrichment services (SOTES)

Collaborative Production Planning Platform (C3P)

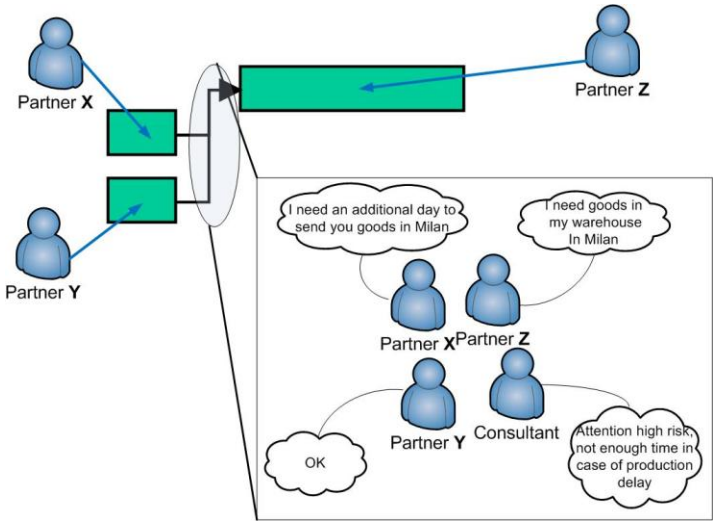
Implementation of the concept collaborative production planning process to support the dynamicity of the changes in the value chain. Process editable in a collaborative way by value-chain actors.

- Blocks representing the private production planning of an actor that has to manufacture something and, if PPS service is used, the user can directly edit its private plan
- Arrows representing the public collaboration space among actors; in these virtual rooms the plans are shared and discussed.



Innovative Concepts

- Agent negotiation implemented through services coming from COIN WP3.4.
- Possibility to start different negotiation at the same time with different competitors and selects the best one.
- Support to the communication among individuals through the inclusion of the virtual team concept on top of virtual rooms and the integration of human communication services
- Implementation of a collaborative BOM
- Shared changes at public (inter-organisations) or private level (intra-organisation)



Collaborative Quality Management Service (cQMS)

What is cQMS about?

An service to identify interdependencies between collaborative network partners in order to define needed communication channels to reduce quality problems.

What is the innovation?

- cQMS suggests an innovative approach beyond state of the art to identify interdependencies by analysing the partners' **competence profiles**. Using competence profiles is innovative compared to the State of the Art approach by analysing product structures for interdependencies purposes.

- Competence descriptions are used to identify interdependencies for inter-organisational information exchange.

Who are the main users?

FILAS

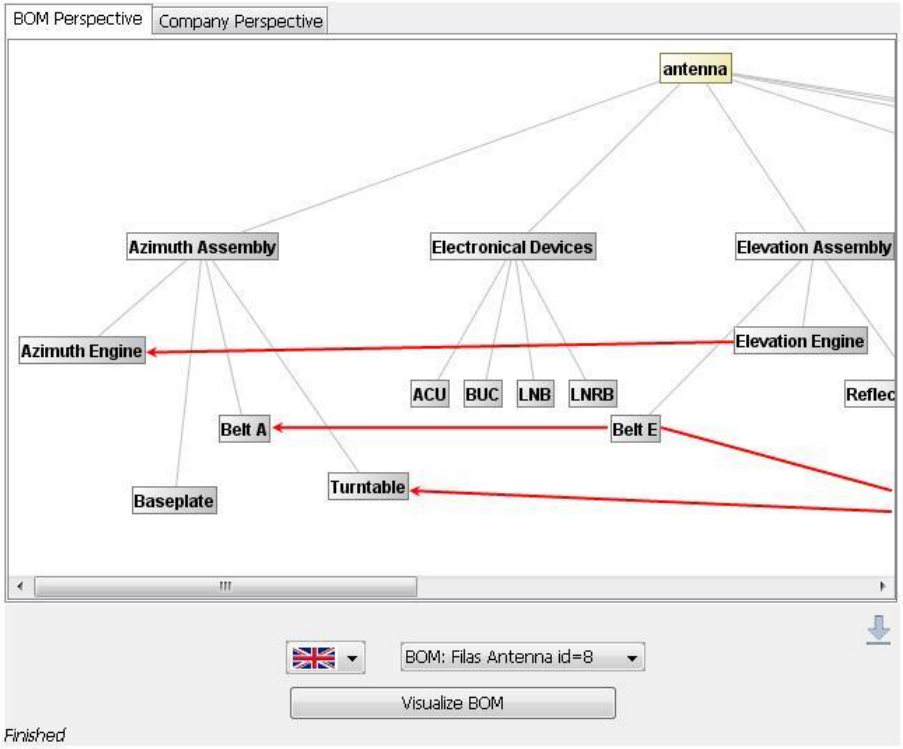


Figure: cQMS analysed FILAS antenna use case

Further reading

Invited for IJPD publication

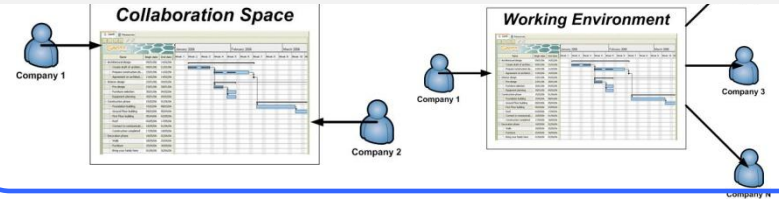
Collaborative Project Management (c-PM) Services

- Project Alignment Booster (PAB)
- Collaborative Project Meeting Process Management (PMPM)
- Collaboration for Project Management (Coll4PM)

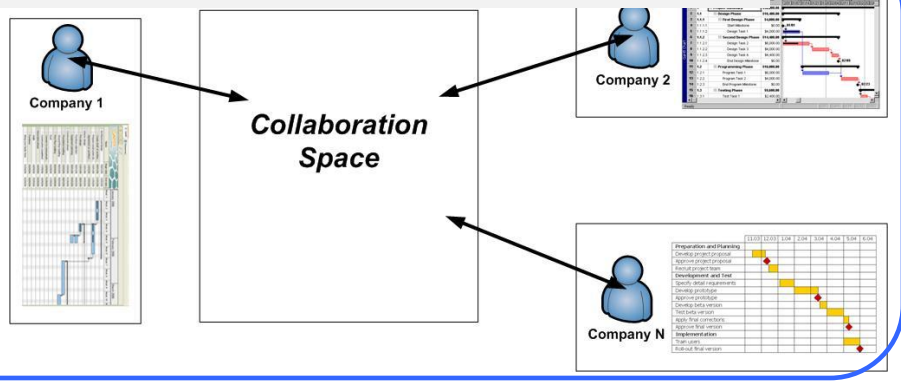
Collaboration for Project Management Service

Coll^{4}P$_M$

Collaboration forms well supported by Existing Tools



Collaborative Management of Collaborative Projects



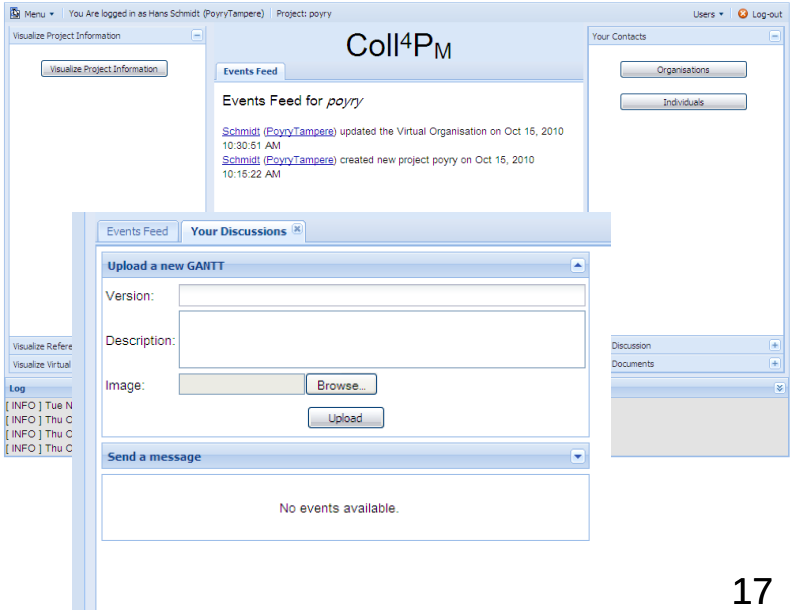
Goal: Provide a **Social Collaboration Space** to support inter-companies collaboration in project management

Innovation:

✓Inclusion of social aspects in an integrated web environment to support Gantt creation

✓injection of trust based mechanism coming from COIN WP4.5 services in project management

- ✓a personalised notification system by news feeds of events occurred in different project/discussion rooms
- ✓a social collaborative management of changes based on web2.0
- ✓availability of humans/companies profiles and management of social (including trust) relationships among them by assessment of co-workers

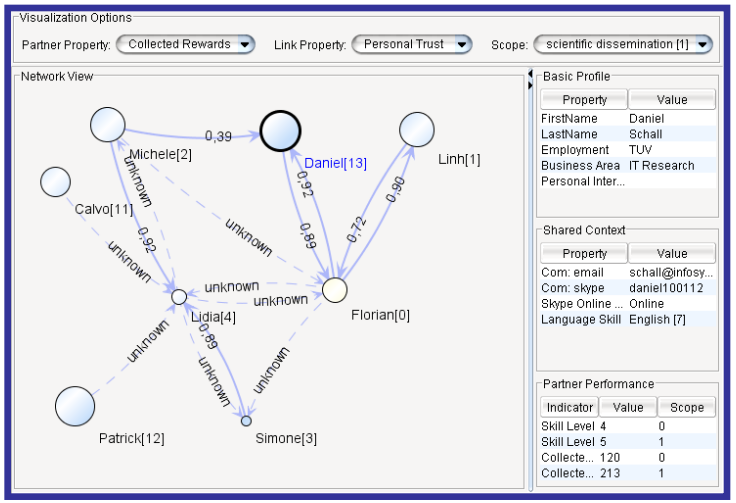


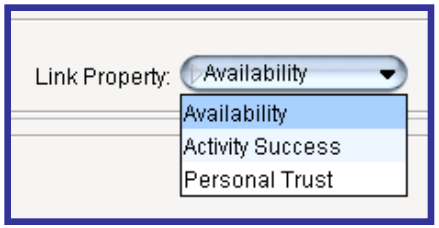
Tools for Human Interaction Support

- Collaboration Visualization Tool (CVT)
- Trusted Information Sharing (TIS)
- Trusted Online Help and Support (TOHS)

Collaboration Visualization Tool (CVT)

- Visualization of community structures and evolving social networks
  - Individuals
    - Registered profiles (name, organization, e-mail, Skype, …)
    - Dynamic profile data through interaction mining
  - Context-dependent social relations described by interaction metrics
- Application Scenarios
  - Group formation (emerged structures)
  - Social campaigns (interest clusters)
  - Team evaluation (collab. rewarding)
- Innovative Concepts
  - System-managed profiles and relations through analyzing interaction behavior
    - Keep track of network dynamics
    - Relieve users from managing their social networks manually
  - Evidence-based structures through mining
    - No unfair manual ratings
    - No rating quality variations over time
  - Embedding of baseline human interaction services





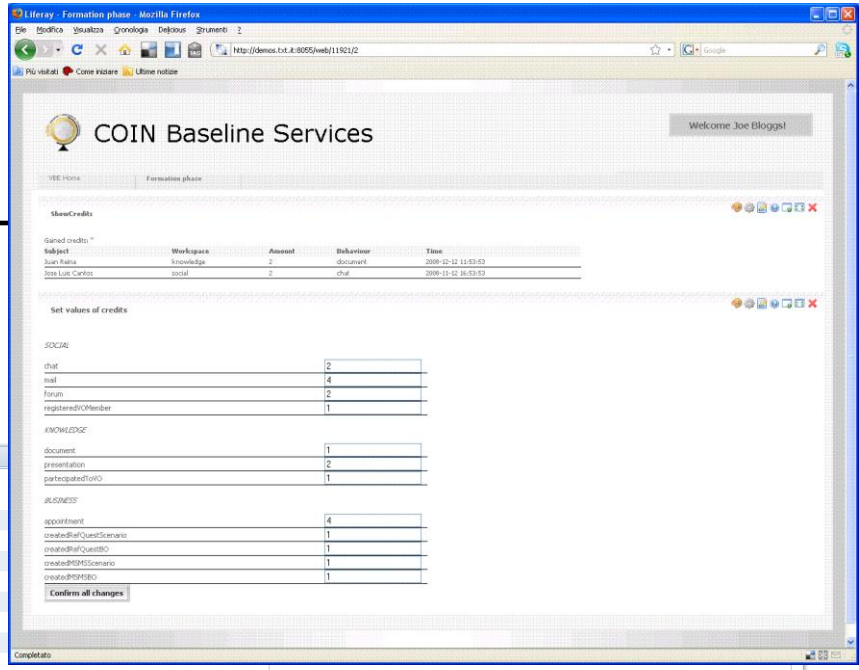
COIN A Side: main innovations

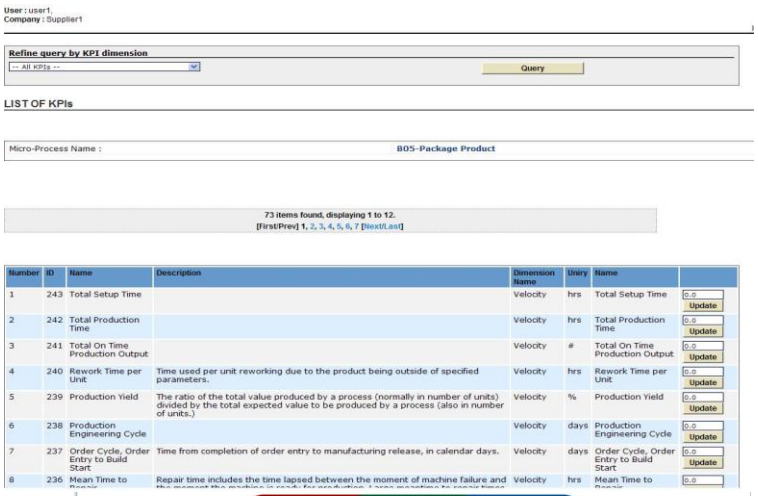
- **The COIN Collaboration Space**
  - To allow **Endogenous** generation of Business Opportunities (LivingLabs & Open Innovation)
  - To support **Product Design, Production Planning, Project Mgmt**
  - To enable **Co-operativity** of Enterprise Applications (groups as users)
  - To support **Web 2.0** and participative services (Enterprise 2.0)
  - To involve also the Customers in the whole life-cycle of **Enterprise Collaboration**:
    - ✓ **EC preparation** (get the enterprises prepared to form VOs)
    - ✓ **EC creation** (select partners and competencies)
    - ✓ **EC operations & mgmt** (performance indicators definition-governance)
    - ✓ **EC dissolution** (inheritance and knowledge transfer)

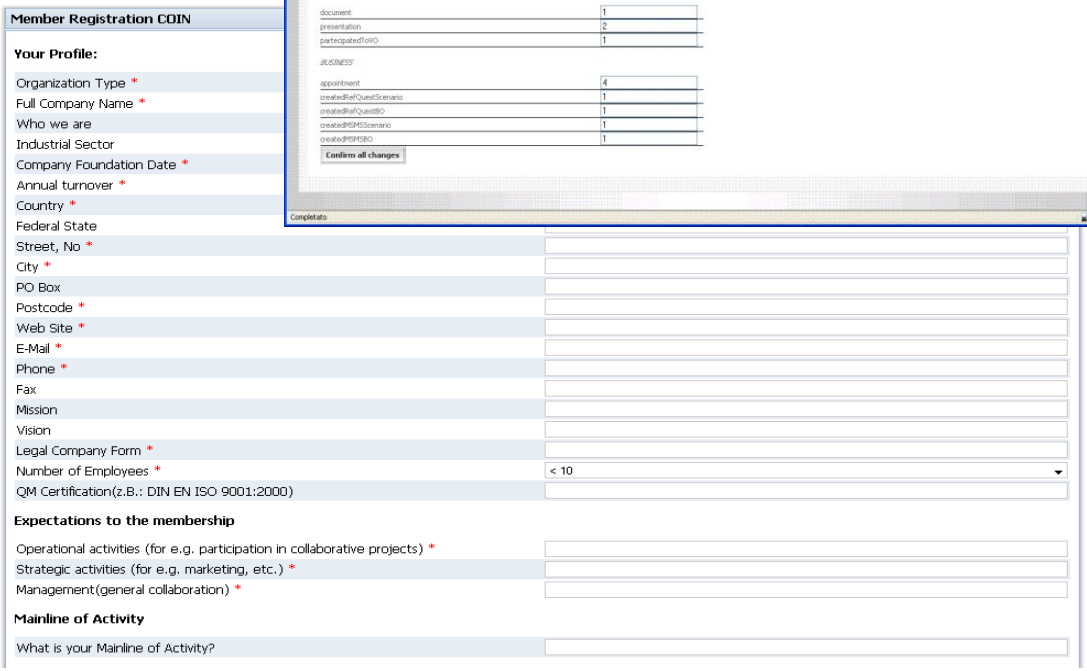
Back-up

Member registration and profiling

- Management of member information and member performance profiling (processes, VCOR KPIs)
- For both individuals and organizations.

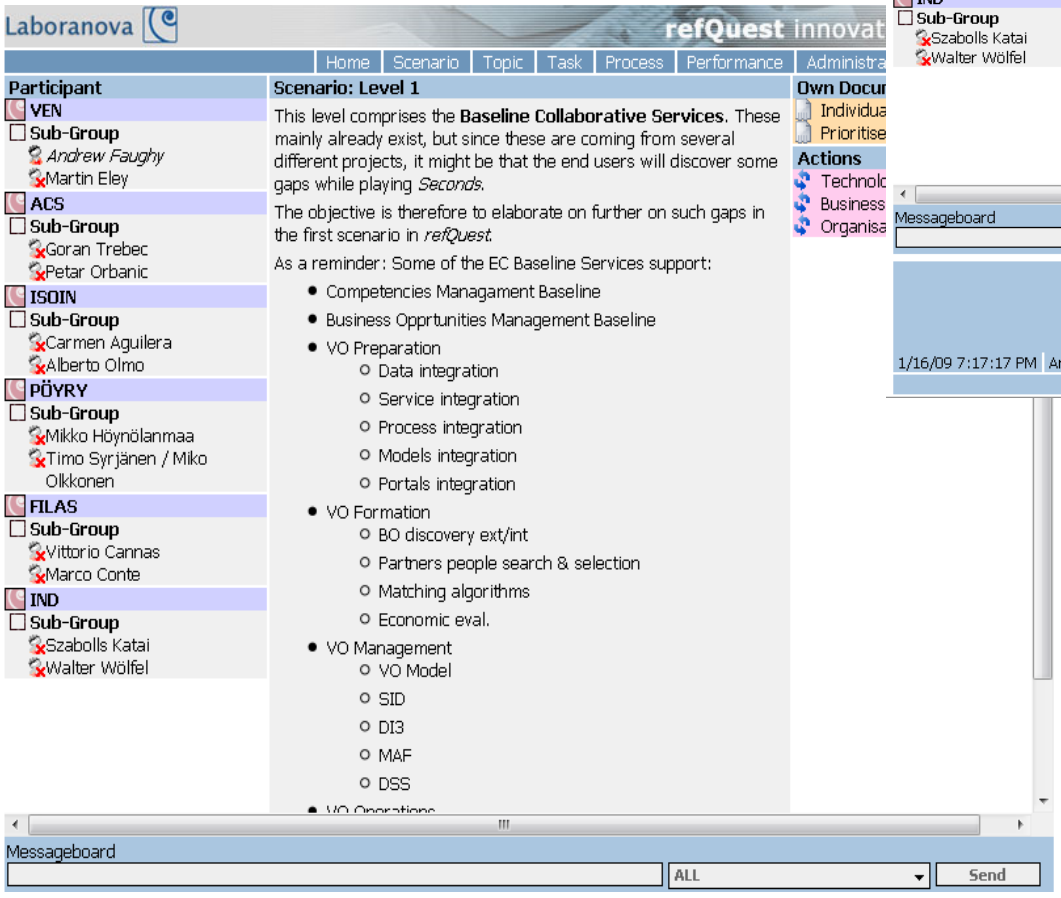


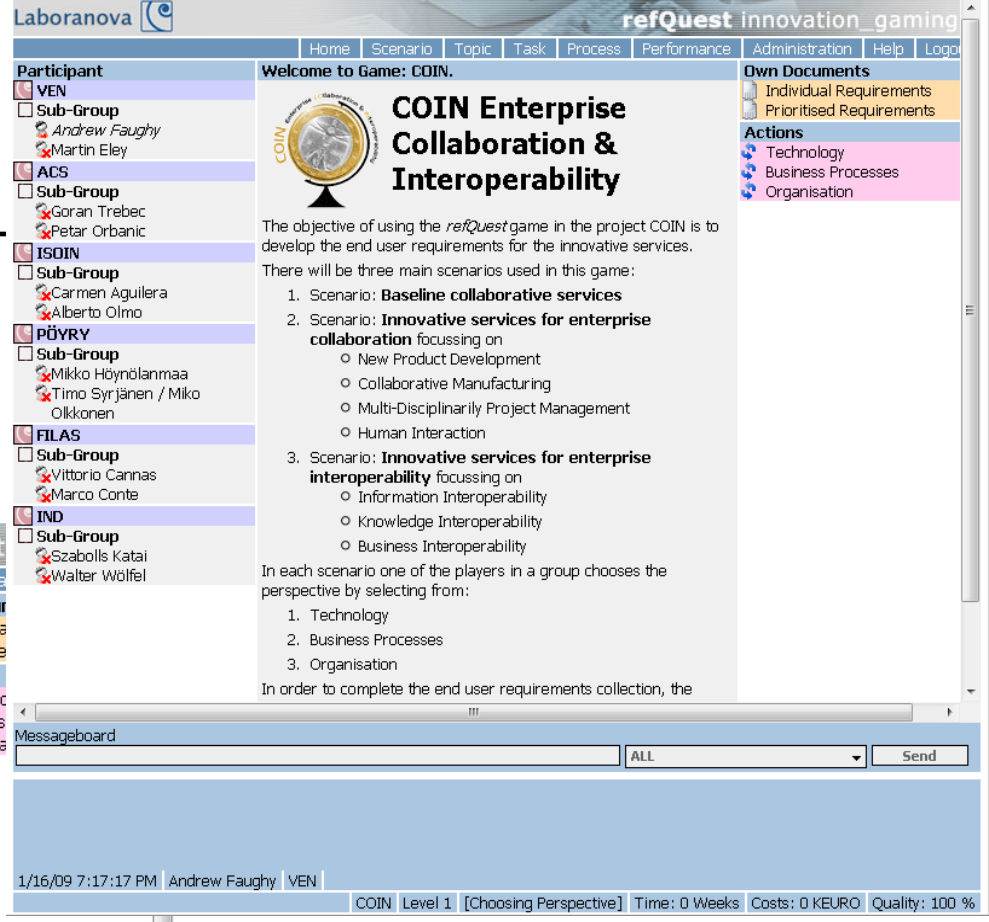




Business Opportunity creation and discovery

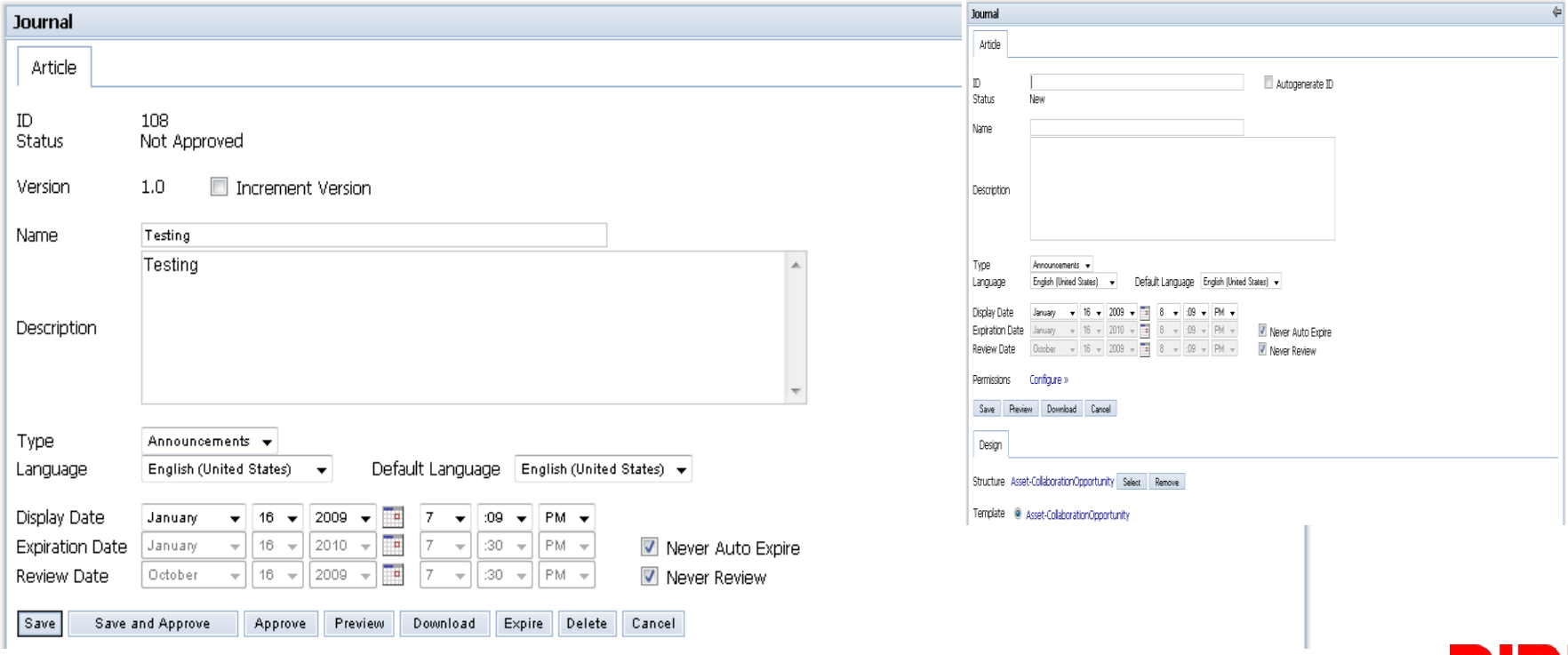
- Business Opportunity Discovery Service
- Business Opportunity Creation Tool





Business Opportunity rewarding

- Reward organisations creating new business opportunities for the cluster
- Score is defined and maintained for each member of the enterprise collaboration

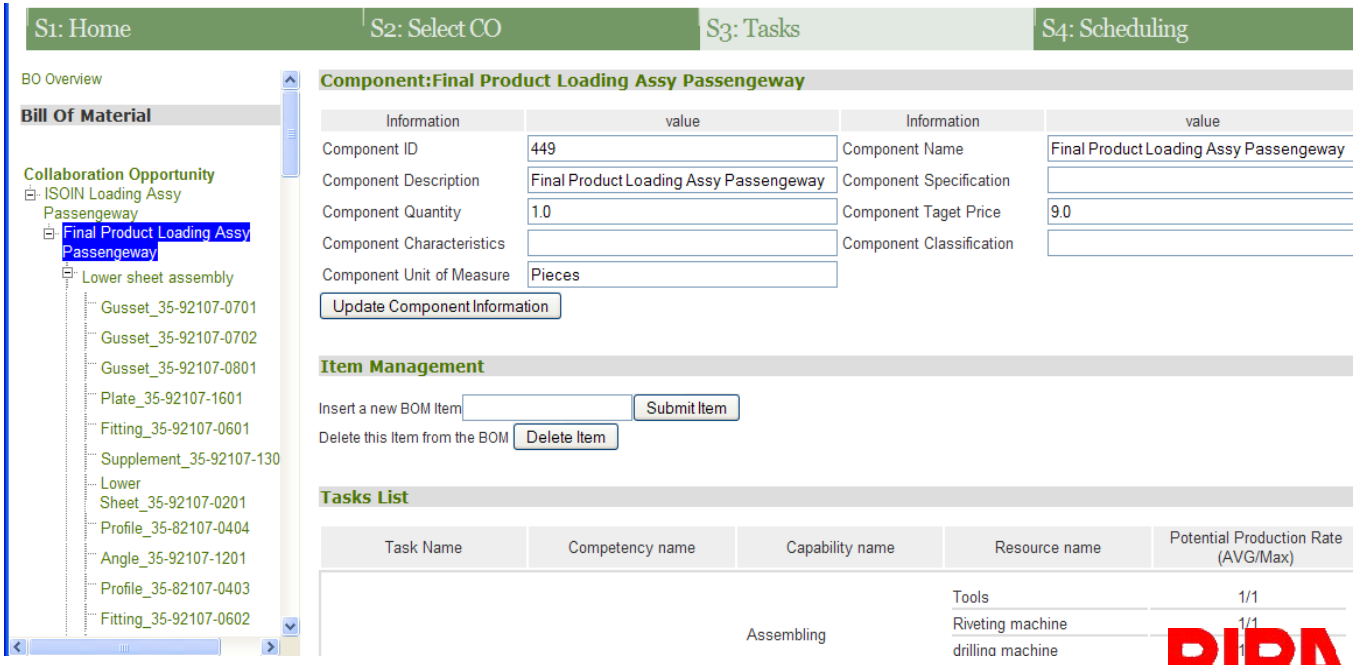


Business Opportunity characterisation

-Characterization of a Business Opportunity in terms of BOM (Bill Of Material) definition, BOM item information tasks and required competencies to perform them. BO formalization in a structure (WBS).

Edit Business Opportunity

Business Opportunity	
Name	ISOIN Loading Assy-Passegeway
Description	Loading Assy-Passegeway
Title	Loading Assy-Passegeway
URL	www.isoin.es
HTML	www.isoin.es
Business Opportunity Details	
Collaboration Opportunity Language	Spanish
Reference Sector	Aeronautics
Reference Document	Open document
Contract Type	normal contract
Target Price	250000
Objectives	To manufacture and assembly the parts of the component. Design and manufacturing of the necessary toc
Duration	1 year
Start Date	2009-06-01
End Date	2009-06-18
Product Specification	Loading Assy-Passegeway
Reference Product Volume	1



S1: Home | S2: Select CO | S3: Tasks | S4: Scheduling

BO Overview

Bill Of Material

Collaboration Opportunity
- ISOIN Loading Assy Passengeway
  - Final Product Loading Assy Passengeway
    - Lower sheet assembly
      - Gusset_35-92107-0701
      - Gusset_35-92107-0702
      - Gusset_35-92107-0801
      - Plate_35-92107-1601
      - Fitting_35-92107-0601
      - Supplement_35-92107-130
      - Lower Sheet_35-92107-0201
      - Profile_35-82107-0404
      - Angle_35-92107-1201
      - Profile_35-82107-0403
      - Fitting_35-92107-0602

Component:Final Product Loading Assy Passengeway

Information	value	Information	value
Component ID	449	Component Name	Final Product Loading Assy Passengeway
Component Description	Final Product Loading Assy Passengeway	Component Specification	
Component Quantity	1.0	Component Taget Price	9.0
Component Characteristics		Component Classification	
Component Unit of Measure	Pieces		

Update Component Information

Item Management

Insert a new BOM Item | Submit Item

Delete this Item from the BOM | Delete Item

Tasks List

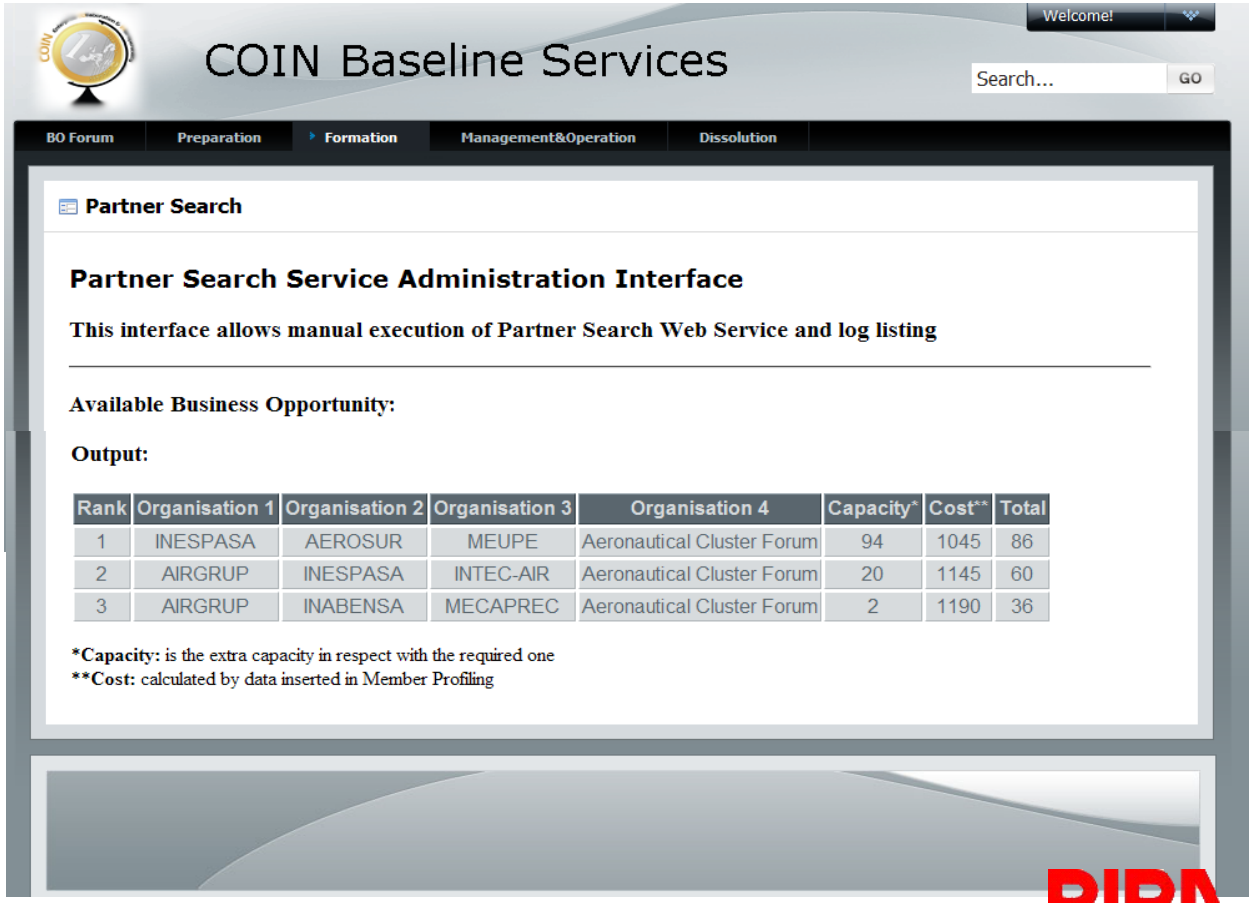
Task Name	Competency name	Capability name	Resource name	Potential Production Rate (AVG/Max)
Assembling			Tools	1/1
			Riveting machine	1/1
			drilling machine	1

Partner Search & Suggestion

- Search for relevant partners (from the cluster member pool)

- Web service implementing and executing search algorithms

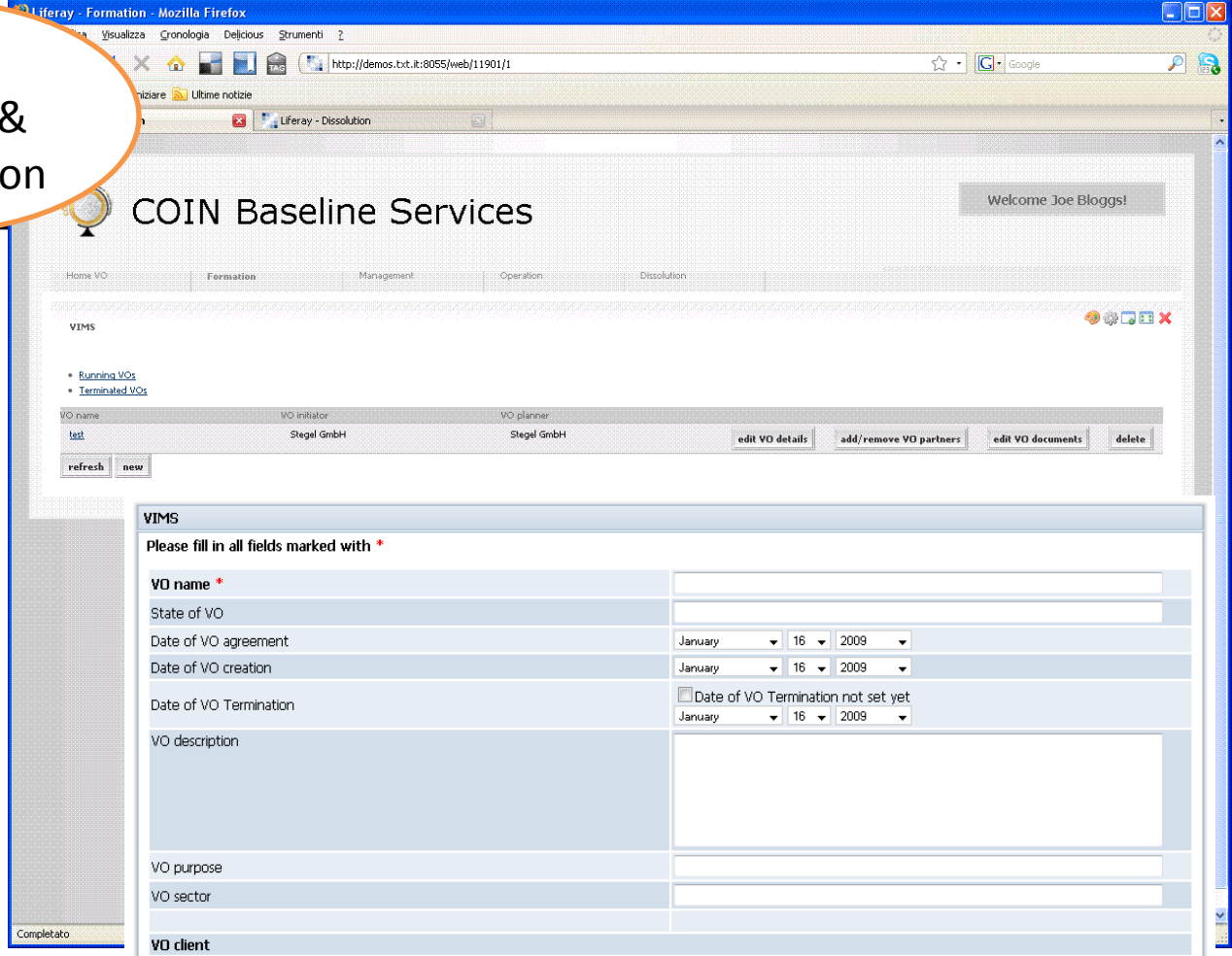
- The service suggests the most suitable members for an Enterprise Collaboration regarding the requirements of a given business opportunity (BO)

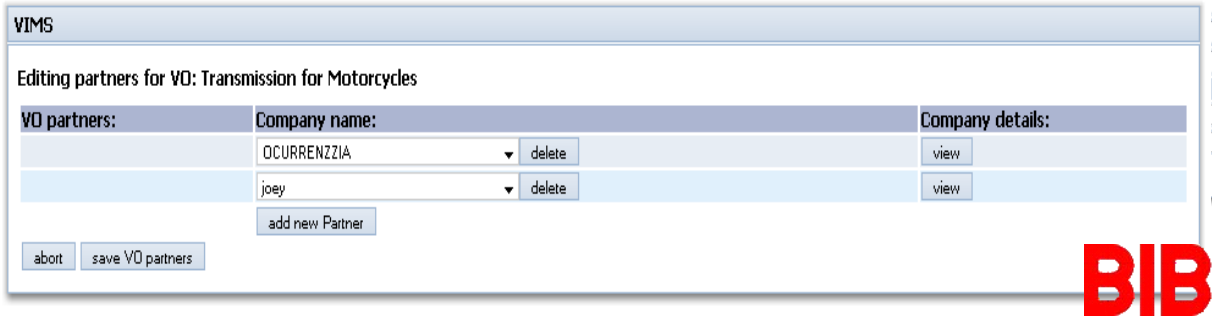


Partner Selection & EC Formation

- Mechanisms for storing information on created ECs

- Structuring, storing and providing inheritance information to the EC formation process.





Activity Management Service

- Creation and management of activities of people within an EC
- Information about responsible and involved users, time constraints, and applicable resources
- Records any changes to activity structures during runtime
- Allows to analyze deviations from planned collaborations

Activities

Name	Description	Progress	Start	Status	
Adapter__adapter_drilling	BO: Centrifuge Machine, Component: Adapter, Task: adapter-drilling	0	15/01/2007 0.00.00	pending	Edit activity properties
Adapter__adapter_milling	Milling	0	28/01/2009 8.00.00	pending	Edit activity properties
MechanicalSystem__assembly	BO: Centrifuge Machine, Component: Mechanical System, Task: assembly	1	26/12/2006 0.00.00	running	Edit activity properties
Positioner__assembly	BO: Centrifuge Machine, Component: Positioner, Task: assembly	1	13/01/2009 6.00.00	running	Edit activity properties
Revolute__revolute_lathing		0	01/01/0002 0.00.00	pending	Edit activity properties
RotorAssembly__assembly	BO: Centrifuge Machine, Component: Rotor Assembly, Task: assembly	0	17/01/2007 0.00.00	pending	Edit activity properties
Rotor__rotorfabrication_lathing	BO: Centrifuge Machine, Component: Rotor, Task: rotor fabrication - lathing	0	15/01/2007 0.00.00	pending	Edit activity properties

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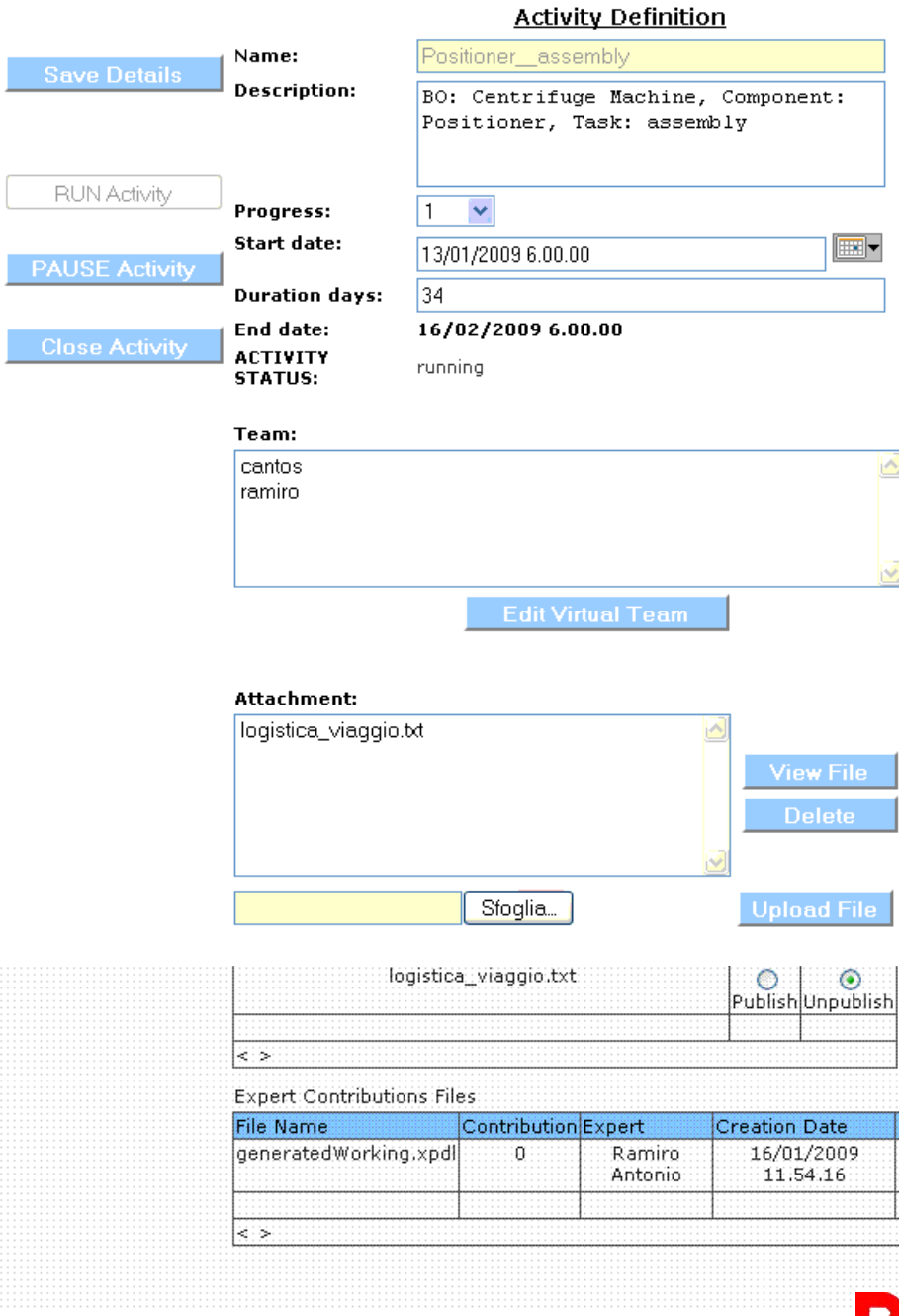
Collaboration Operation Service

-Problem-solving service

- Collecting and evaluating contributions from activity management service

- Compile solution forms, taking into account the experts suggestions, deciding which contributions shall be included in the solution

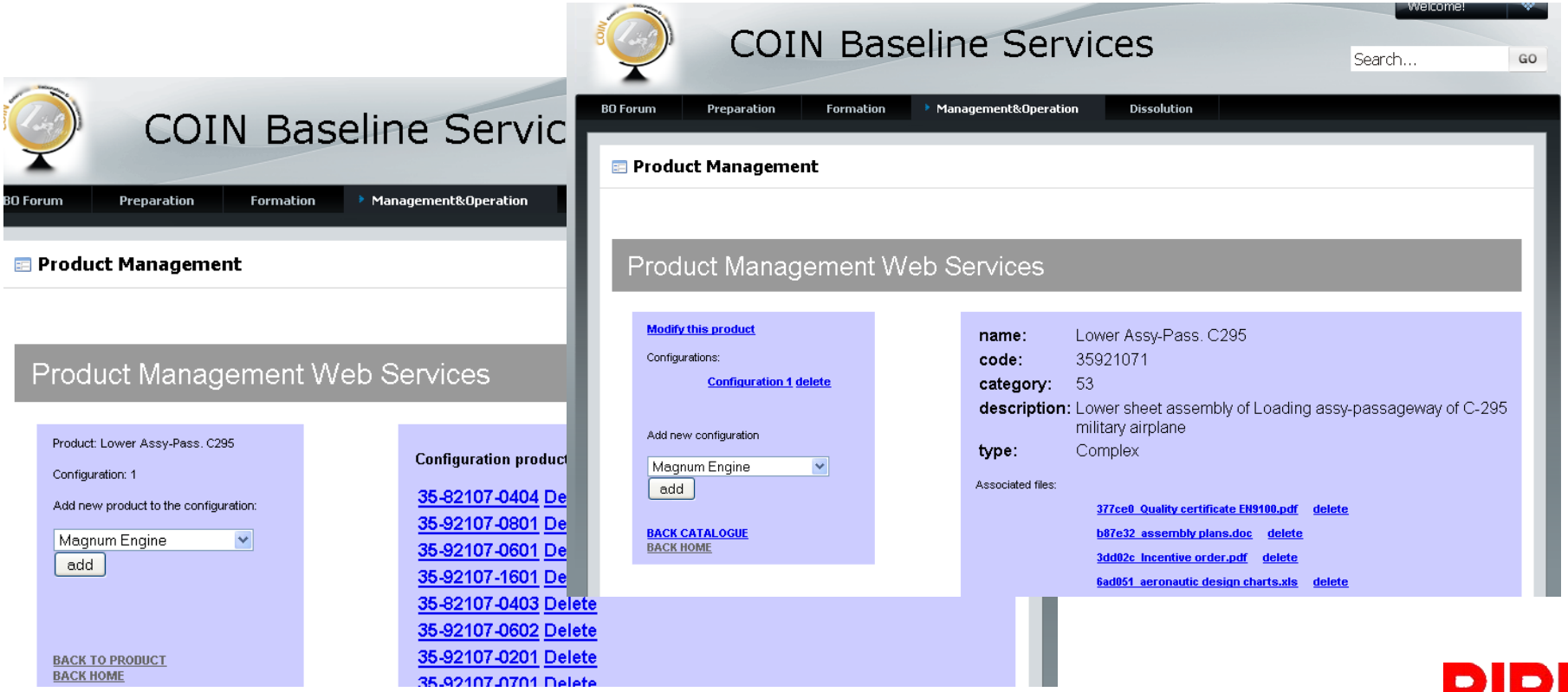
- Sent information to responsible people



Product Management Service

- Share documentation of products and assemblies

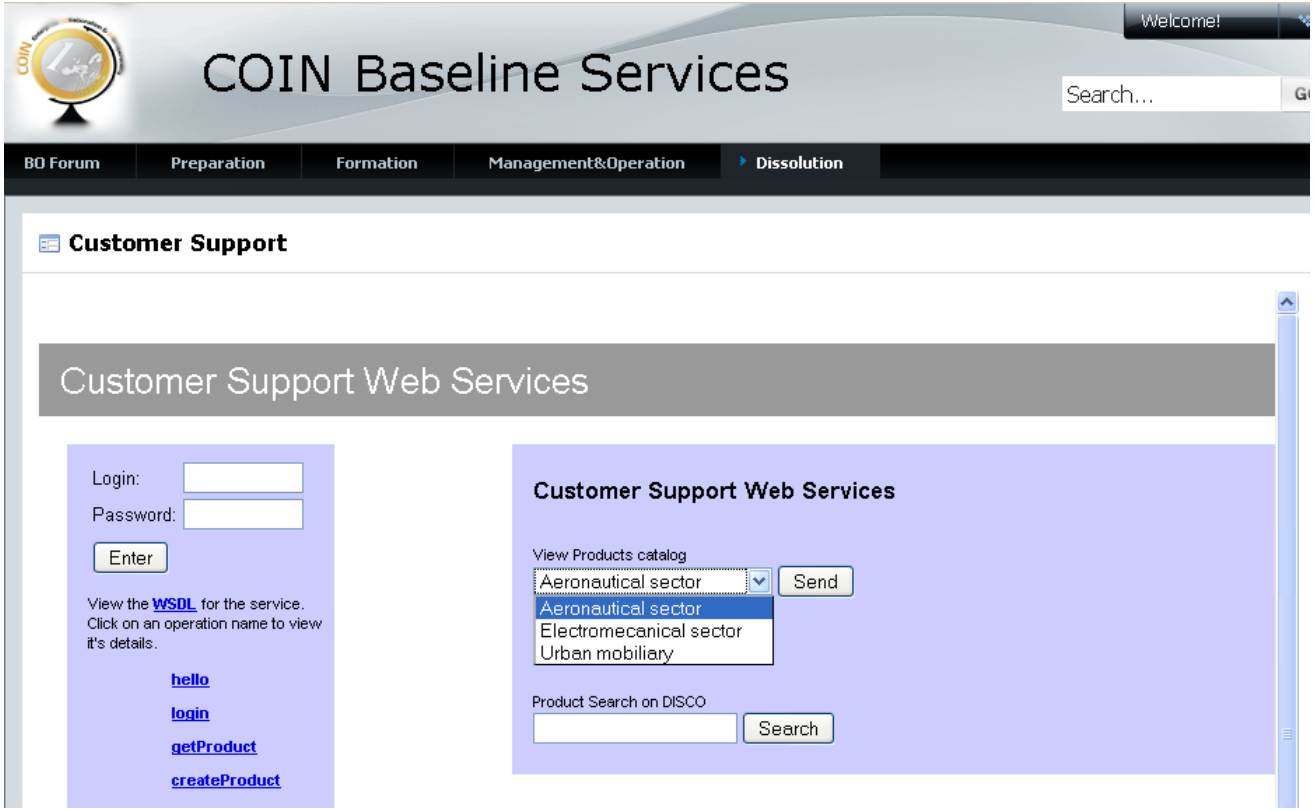
- Structure complex products in catalogues, categories and different configurations



Customer Support Service

-Access information of products and assets resultant from the EC project

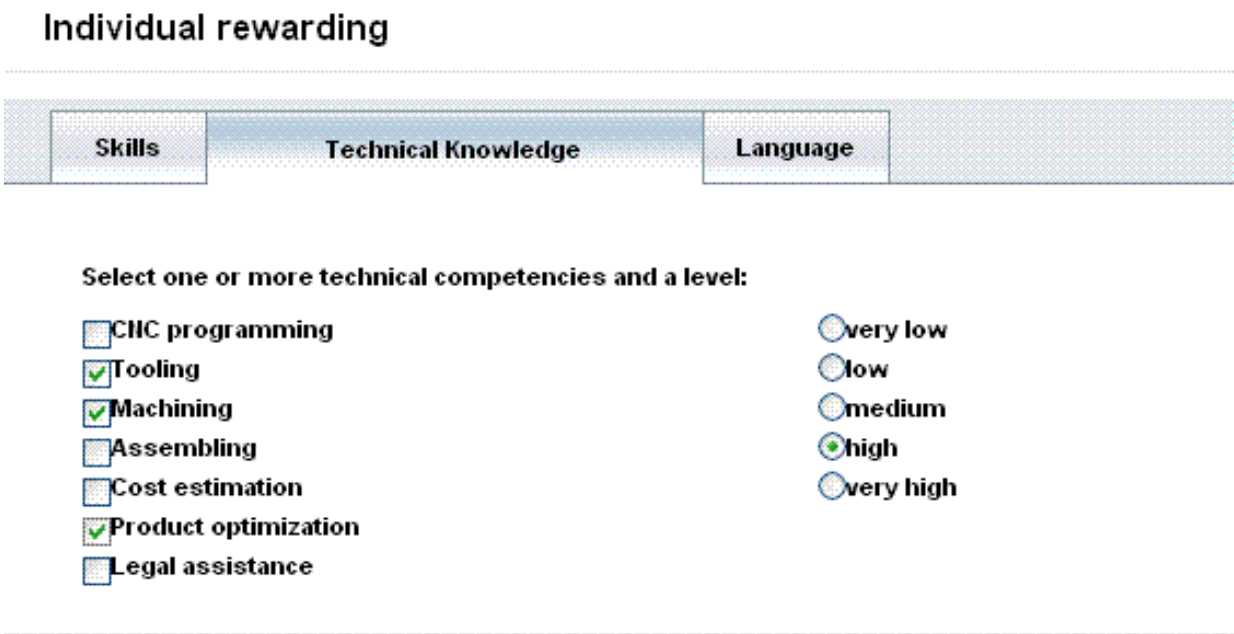
- Structured classification in catalogues, categories and different configurations of the complex product

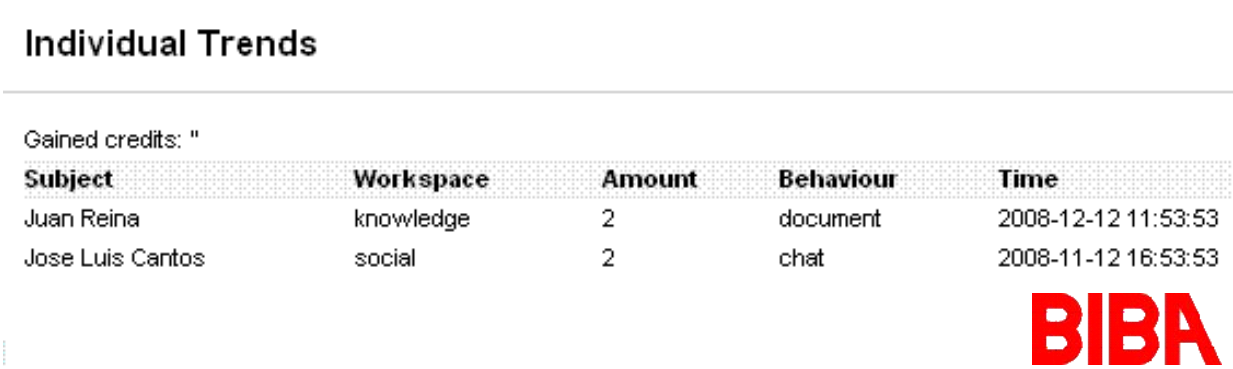


Member Rewarding

- Members can be rewarded for their skills and technical competencies

- Gained credits as performance indicators for participated activities in the portal can be seen





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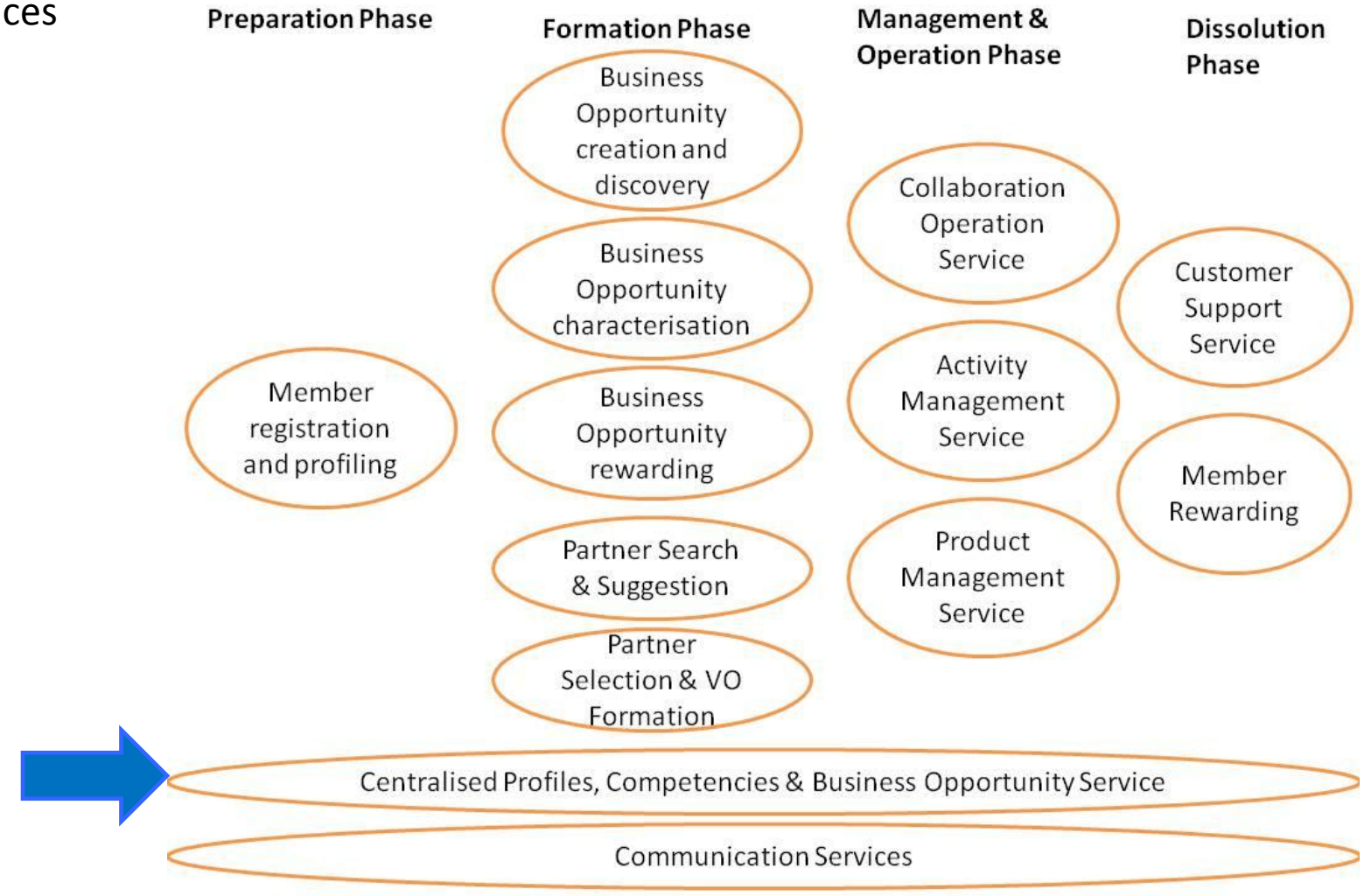
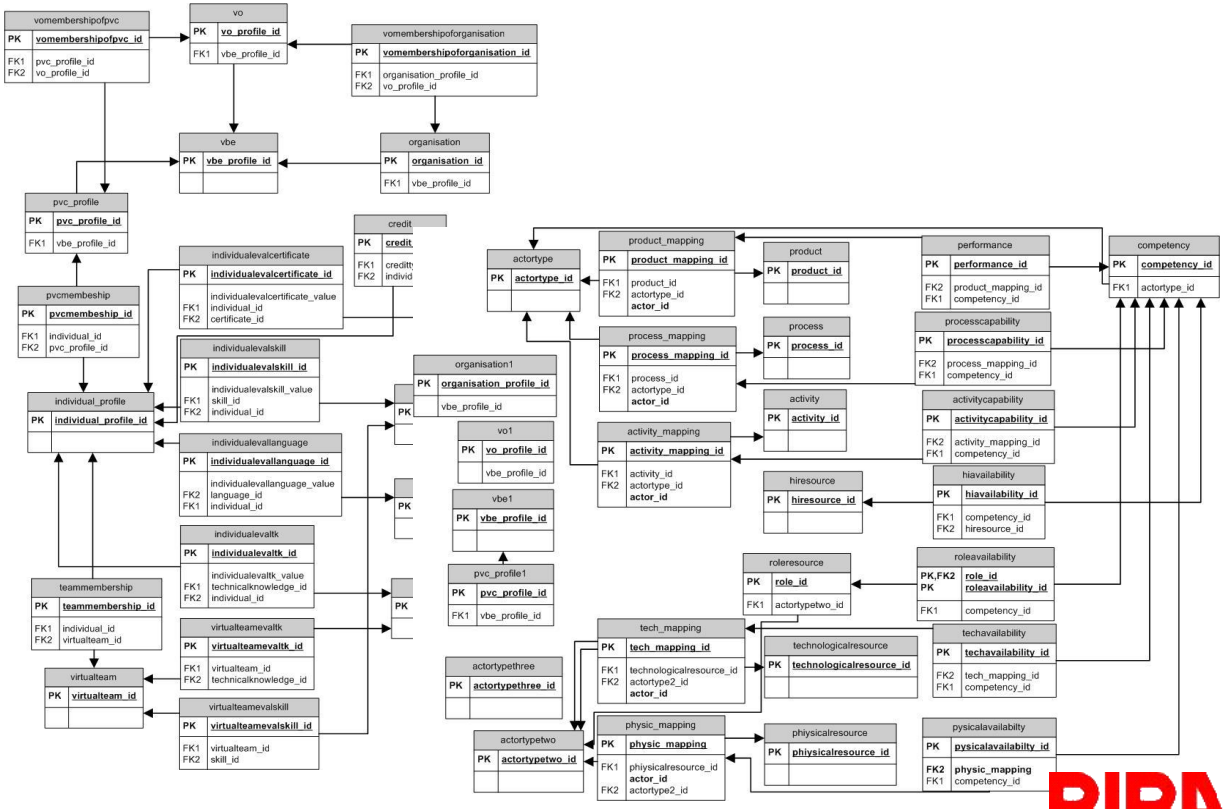


Service to Access the Profiles, Competencies and Business Opportunity Common Repository

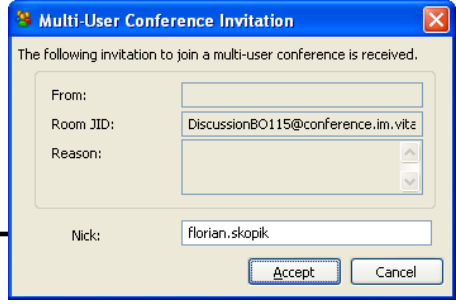
- Support of business opportunity information, individual credits, profiling, human interaction information

- Manages the core data model schema which is used by all baseline tools and services.

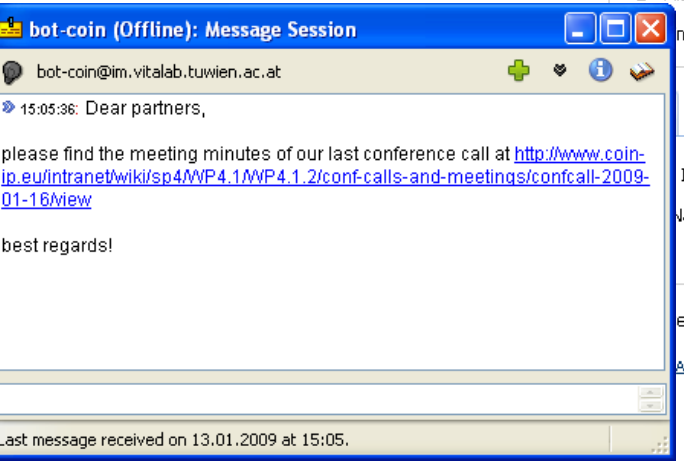
- All tools and services can save/retrieve required data from different, but common, models without any concern of who inserted these data, what is the data structure of the other modules and who will use the saved data

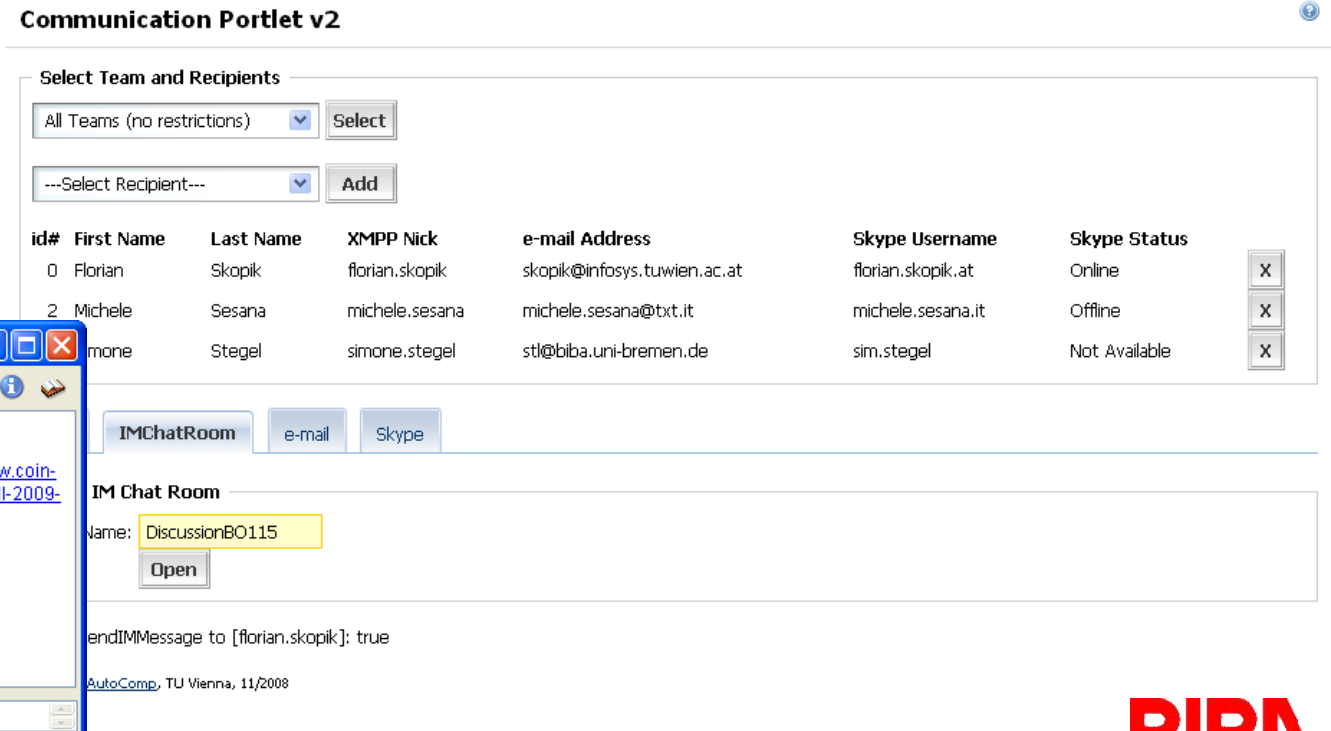


Communication Services



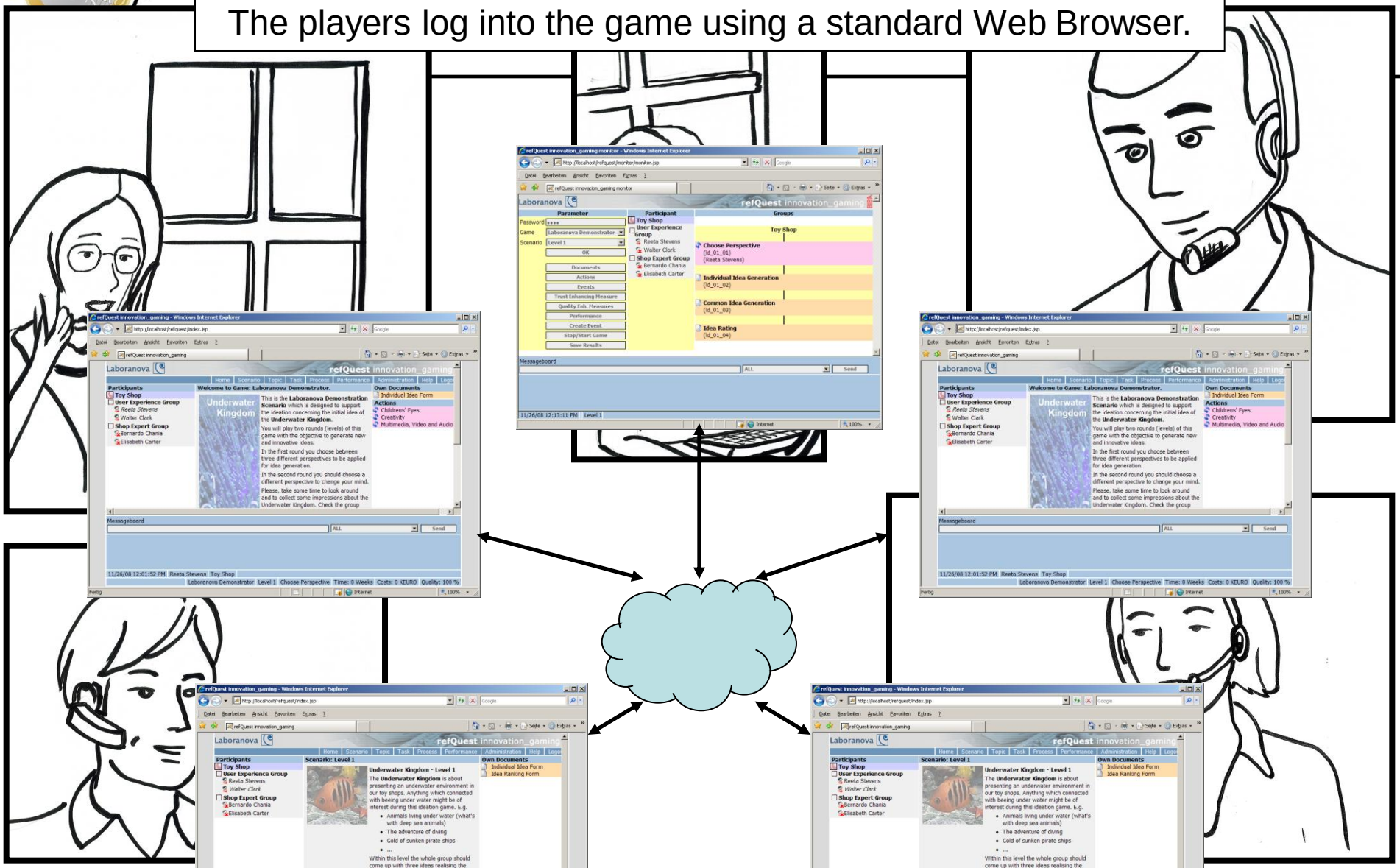
- Communication between humans through e-mail, skype, instant messaging and voice chat
- Utilize the communication services directly
- Services can be used by other services/tools to distribute relevant information
- Notify about important events in all collaboration phases





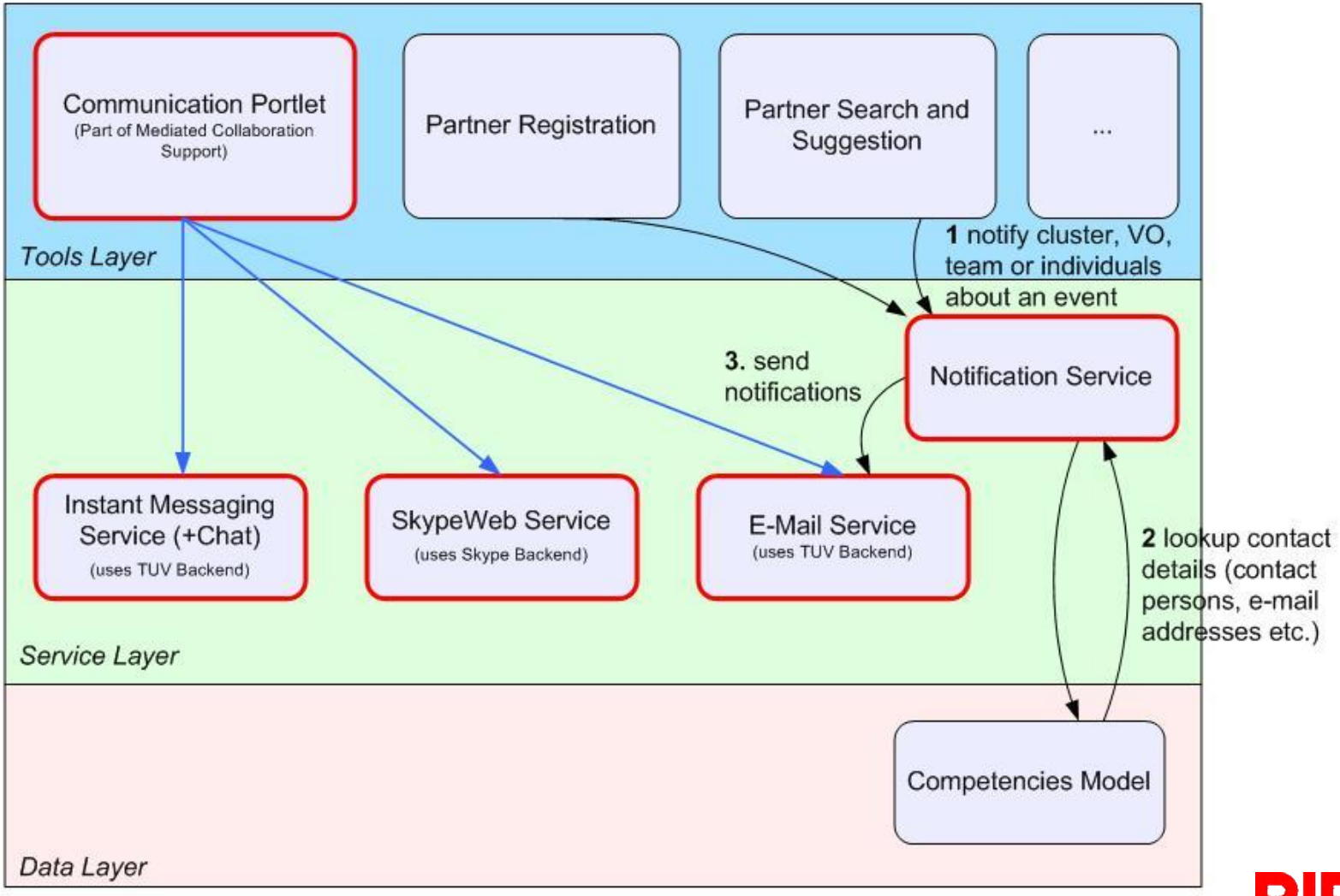
Creating Business Opportunities

The players log into the game using a standard Web Browser.



What‘s new in COIN EC Baselines?

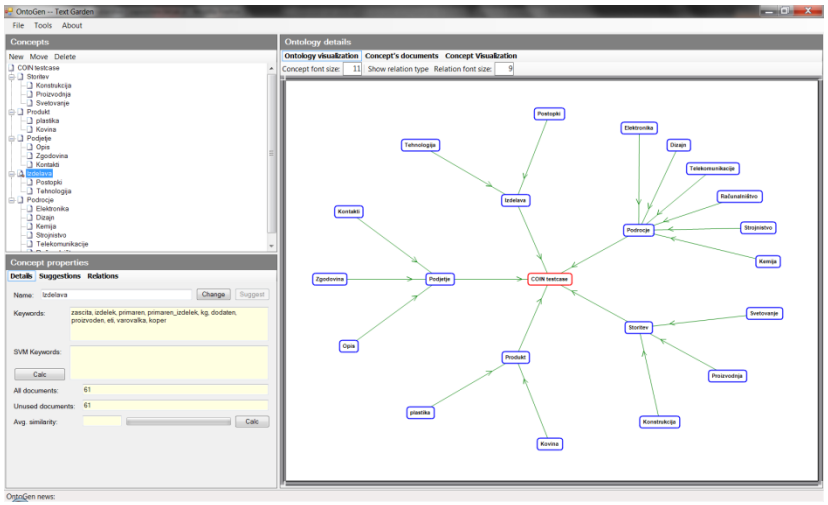
Human Interaction Communication Services



c-PD services

Automatic and Intelligent Construction and Instantiation services (AICIS)

AICIS services provide **Automatic adaptability** to different clusters and collaborative networks systems.



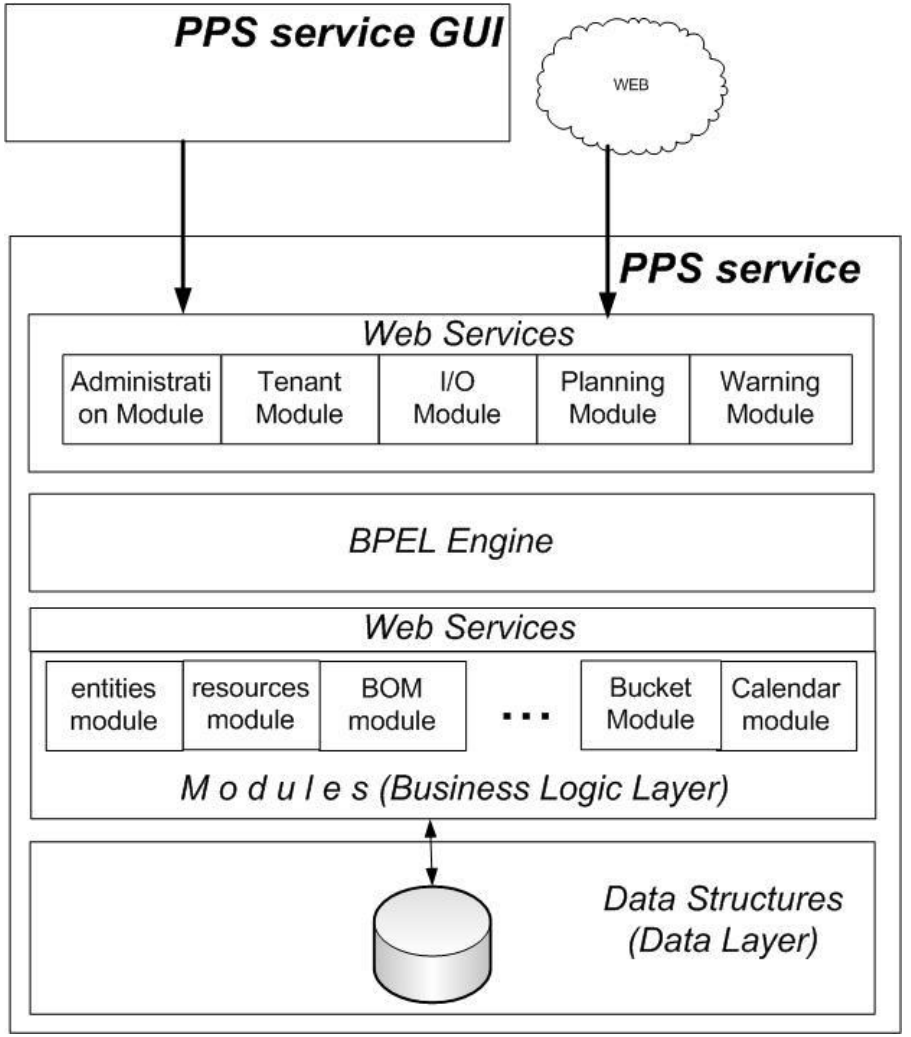
Automatic building of the ontology, based on relational databases used in the cluster or on unstructured data

The innovation in COIN is to implement ontogen services to function automatically **i.e, to build up ontology automatically from the given set of documents.**

Automatic instantiation of the ontology, based on **cluster documents.** A service to automatically classify the document into an existing ontology has been implemented.

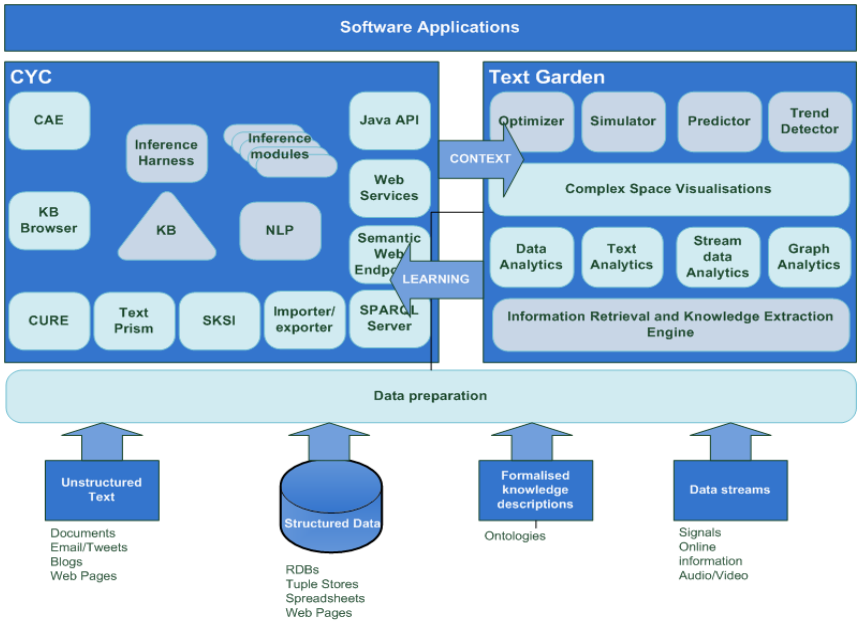
Production Planning Service (PPS)

- Purpose
  - SaaS Production Plan system
- Innovations
  - Production Plan solution agile and low cost for SMEs
  - Multi-tenenant architecture
  - Natively integrated in C3P for collaboration purposes
- Main users
  - SMEs



Supply Chain Information Services (SCIS)

SCIS - covers supply chain or material logistic planning (+ alerting and management as an addition to planning) processes in an organisation.



Two main innovative features in SCIS:

- Implementation of innovative features for **prediction, trend detection and anomaly detection**. Services that are in development are based on various methods that have been developed to handle vast amount of data in real-time.
- Integration of top-down (knowledge driven) methods and bottom-up (data driven methods) for the SCIS domain. Here the main innovation features comprise among others knowledge formalization of SCIS domain, justifying methods with reverse reasoning, and integration with CycKB.

Innovative methods and services that are solely being developed for COIN are:

- **Anomaly detection service for SCIS:**
  - use of sparse vectors techniques
  - methods that are based on active learning methods
- **Trend detection service for SCIS:**
  - to predict long-term trends that can be calculated off-line on a basis of a wide time span
- **Prediction service for SCIS:**
  - to predict events in a complex environment with multimodal data and in real-time

Service oriented text enrichment services (SOTES)

SOTES is set of services that provide the context to any textual information. These services are needed by service in COIN that are dealing with semantics.

Service oriented text enrichment services (SOTES) have been developed because they present the basic infrastructure for many planned and future semantically enriched services.

With SOTES the content is being enriched with the large contextual information that then provides far better results in semantic services ranging from machine learning algorithms, data, text and web mining, social software, network modelling tools to semantics and reasoning.

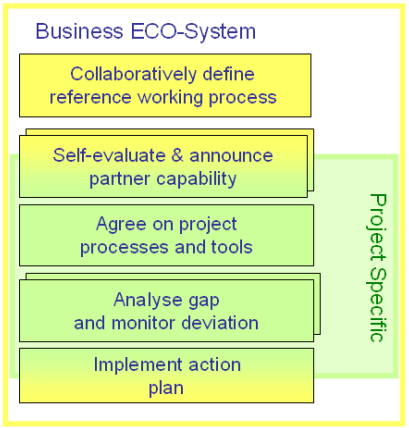
- We can distinguish two innovation streams:
  - development of all SOTES basic services: sentence splitting, tokenization, part of speech, entity extraction, entity resolution, co-reference resolution, anaphora resolution, topic classification, triplet extraction, semantic graph and summarisation.
  - first integration of all necessary services in the context enrichment suite

Project Alignment Booster (PAB)

Services for: Social and Collaborative Management of Projects, supporting

- Shared and delegated project management responsibility,
  - self organised and trusted project management activities
  - participative definition of project management and work processes,
- Identification of gaps, pm task fulfilment, learning objectives, risks

The development is based on industrial requirements and SOA in CNO, PM, Web2.0,



Service Users

- Participants in global complicated project
- Business Ecosystems and Collaborative networks that want to improve operations

Progress beyond State-of-the-Art & Innovations

- The project alignment process, supported by a complete tool.
  - Unified work processes in a distributed environment
  - Shared and delegated project management responsibility
  - Self-evaluation methodology for partners' capability and engineering competence.
  - Detecting the need for additional capabilities and competencies, project risks, possible timing problem
- The Project Alignment Model (PAM).
  - Configurable framework for describing project alignment tasks
  - Model template content for engineering projects
  - Including non-quantitative levels. E.g. organisational culture elements

Collaborative Project Meeting Process Management (PMPM)

The transition to globally distributed engineering work requires a shift also project collaborative working methods and communication.

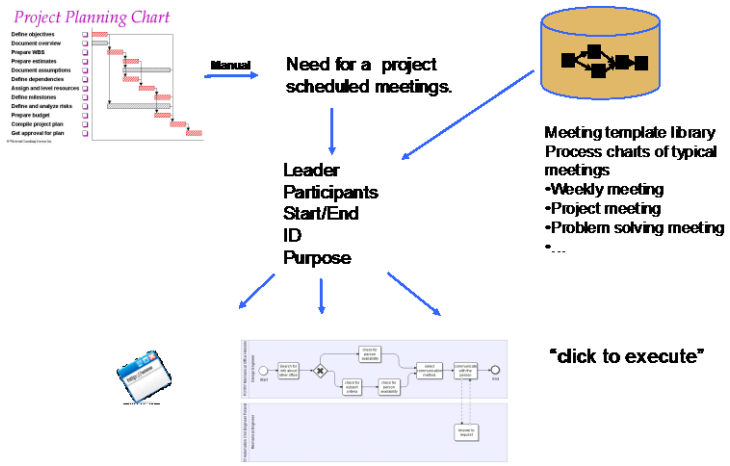
The development base on expressed industrial needs:

→Management of asynchronous and long meeting processes.

- Participants from different locations, time zones and latitudes
- Managing the whole process,
- Usage of best fit existing tools for individual steps

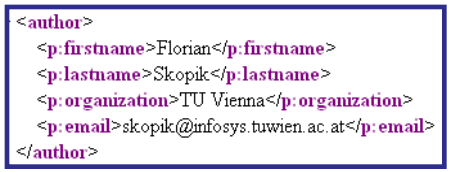
Usage scenario:

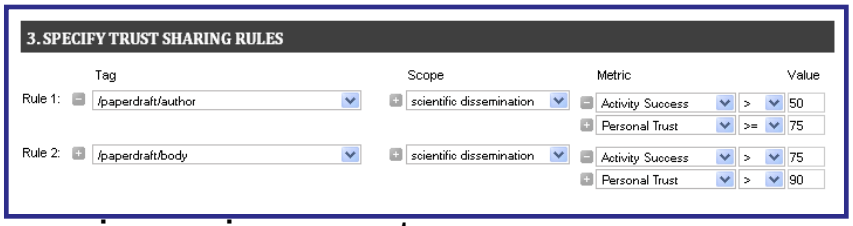
- Global project organizations need distributed meetings.
- Asynchronous contribute to project management decisions in advance

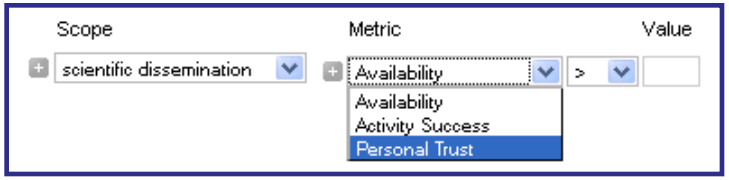


Trusted Information Sharing (TIS)

- Document-centric information sharing accounting for:
  - Dynamically changing skills, expertise and interests
  - Dynamically adapting and evolving social and collaborative structures
    - Altering social relations
    - Flexible activity participation
- Application Scenarios
  - Sharing of sensitive data in highly dynamic environments
  - Sharing of information in social campaigns (propagation of invitations)
- Innovative Concepts
  - Dynamically changing access rights
    - Based on previous collaboration outcome
    - Based on emerging social relations
  - Fine-grained sharing model
    - Define sensitivity levels within a document depending on info type (XML)
    - Share more information with closer collaboration partners (system managed)
  - Actively facilitate collaborations
    - Push information to close partners (avoid spamming but stimulate interest)







Trusted Online Help and Support (TOHS)

- Flexible discovery and involvement of trustworthy experts accounting for:
  - Dynamically changing skills, expertise and interests
  - Contextual constraints to find best available expert in community (availability, online state, organizational boundaries, comm. channel …)
  - Personal preferences and social trust relations
- Application Scenarios
  - Ad-Hoc expert discovery in emergency situations
  - Team assembly
  - Interest group formation
- Innovative Concepts
  - Personalized expert discovery
    - Focusing on someone's surrounding social network
  - Flexible involvement of experts
    - No negotiations and agreements
    - But instant involvement through baseline interaction services
  - Account for contextual constraints, e.g., from higher level process
    - Deadlines and urgency influence interaction channel selection (e.g., e-mail v.s. Skype)