Knowledge-oriented Collaboration

SYNERGY research project summary

SYNERGY, a new 3 year European-funded Seventh Framework Research Project commencing on the 1 February 2008, will research the knowledge sharing and collaboration support needs of stakeholders working collaboratively both internally within organisations, and within partnerships and new virtual network and business models. The project offers end user organisations an opportunity to participate in this leading edge research to address their unique requirements, to undergo a knowledge assessment of their collaboration needs, and the potential to pilot and test utility-based services developed during the project. A summary of the project extracted from the formal technical proposal is provided below.

The next phase of enterprise interoperability is the controlled sharing of knowledge within collaborations and virtual organisations and networks to the mutual benefit of all partners. Such knowledge will be a driver for new enhanced collaborative enterprises, able to achieve the global visions of enterprise interoperability. The SYNERGY project envisages the delivery of Collaboration Knowledge services through trusted third parties offering web-based services, exploitable through interoperability service utilities.

Next generation network and service infrastructures will generate new economic opportunities with new classes of Enterprise 2.0 and Web 2.0 networked applications, whilst reducing operational expenditures. New utility-based service approaches are required to overcome the scalability, flexibility, dependability and security bottlenecks, of today's network and service architectures which are primarily static and only able to support a limited number of devices, service features and limited confidence. Such new infrastructures will permit the emergence of a large variety of business models capable of dynamic and seamless end-to-end composition of resources across a multiplicity of devices, networks, providers and service domains.

New software-based services will need to be pervasive, ubiquitous and highly dynamic, and support a wide variety of nomadic interoperable devices and services, a variety of content formats and a multiplicity of delivery modes. They also have to support context awareness and the dynamic behaviour needed for applications with requirements that vary with time and context, and guarantee robustness, resilience, trust and security compatible with networks and software service platforms reaching a complexity and scale that are an order of magnitude greater than those of today's infrastructures.

The overall aim of SYNERGY is to enhance support of the networked enterprise in the successful, timely creation of, and participation in collaborative structures by providing an infrastructure and services to discover, capture, deliver and apply knowledge relevant to collaboration creation and operation. Specifically SYNERGY aims to (a) provide semantic ontology-based modelling of knowledge structures on collaborative working; (b) develop the service-oriented self-adaptive SYNERGY holistic solution for knowledge-based collaboration services; and (c) facilitate the testing and evaluation of the efficiency and effectiveness of the SYNERGY solution in concrete case studies in business and industry.

Knowledge oriented collaboration builds on state-of-the art research on Enterprise Interoperability. Data and information sharing are clear pre-requisites to application and interoperability of knowledge oriented support for collaborative, virtual organisations. Process, service and enterprise models are

fundamental: collaboration knowledge is knowledge of how to adapt and re-combine such models as business structures evolve. SMEs increasingly are integral contributors and innovators in successful networks, and so methods and tools for Collaboration Knowledge Sharing must be accessible without major investment of capital or revenue for software acquisition, or of effort in developing skills to implement and use complex software tools. An Open Source approach to project-related software development will be taken.

Aim and Specific Objectives

The aim of the proposed research is *to enhance support of the networked enterprise in successful, timely creation of and participation in collaborations by providing an infrastructure and services to discover, capture, deliver and apply knowledge relevant to collaboration creation and operation.* The infrastructure must facilitate the sharing of knowledge within an enterprise, between potential and actual partner enterprises, and across industrial sectors, whilst allowing, and indeed actively promoting, the protection of individual and shared commercial interests in operating knowledge, expertise and intellectual property.

This overall, project-level, aim of SYNERGY is decomposed into the following groups of objectives:

Semantic ontology-based modelling of knowledge structures about collaborative working:

- Identify, with end-user partners and others, the range, scope and content of knowledge relevant to collaborative working, including the identification and abstraction of collaboration patterns for the learning enterprise and virtual organisation.

- Provide an ontological and semantic infrastructure to permit shared understanding of, and contribution to such knowledge, formally representing knowledge needed for the inter-organisational networking.

- Include within the semantic infrastructure capabilities for the assessment of collaboration risk and propagation of risk factors through collaboration projects, and for assessment of enterprise collaboration capabilities.

Development of a service-oriented self-adaptive architecture for the SYNERGY knowledge-based collaboration services:

- Define a service oriented semantically-based inter-organisational knowledge management architecture, to foster collaboration between enterprises, supporting best practice collaboration patterns, enabling automatic extension of knowledge.

- Develop software tools for the definition, refinement, composition, adaptation and utilisation of collaboration patterns.

- Ensure the architecture is automatically self-adaptive, able to learn continually from usage (experience), including identification of new knowledge sources.

- Develop a set of web based services for knowledge discovery and acquisition, a distributed knowledge repository specific to, or shared by, an individual enterprise, virtual organisation, or industry sector; and a collaboration moderator detecting potential collaboration decision conflicts and opportunities.

- Integrate the generated software components within a flexible service-based software framework that will support the formation and operation of collaborations.

Facilitation, testing and evaluation of the efficiency and effectiveness of the SYNERGY solution at end users sites:

- Define a methodology for developing and applying knowledge-based collaboration services which may be of value to individual partners or groups of partners within a consortium or partnership.

- Pilot test the SYNERGY software tools for the definition, refinement, composition, adaptation and utilisation of collaboration patterns. This will enable abstraction of new knowledge of the process of collaboration to be generated from current and past behaviour (successful or otherwise) of enterprises, networks or industrial sectors.

- Evaluate all resulting services and demonstrators through use-cases identified and elaborated by end-user partners.

Assessments & Applications

The proposed research will take into account real-world requirements and facilitate high impact in practice supporting the learning organisation, that continually enhances core competencies and collaborative capabilities between enterprises. Current interoperability solutions are often oriented toward integration of *data* required for executing a business contract – but without supporting sharing of *knowledge* needed to perform the business more effectively, in a virtual organization or any form of inter-organisational, knowledge-based collaboration. Often, there are systems supporting interpersonal communication in an isolated, *ad-hoc* manner, without considering all available knowledge sources and without fostering a commonly understood language. Such an organisation of collaboration is not only ineffective, it also leads systematically to missed opportunities and it cannot be continually improved (i.e. it cannot learn from documented, good or bad experience).

In applications with stakeholder partners, we will first gather requirements for an efficient knowledge sharing in inter-organisational settings, heavily driven by practical requirements by analysing the SYNERGY cases, but also settling upon several international partners' long experience in collaborative-work in research, inter-organisational knowledge management, virtual enterprises, virtual organisations, and concurrent engineering. We will perform a detailed analysis of related work regarding knowledge-oriented collaboration in order to identify the gap between the state-of-the-art and the requirements collected. In the next task, this gap will be analysed in terms of implementation challenges. The knowledge dimension of these challenges will be conceptually structured by a set of top-level ontologies; the system dimension of the challenges will motivate the conceptual architecture of the whole SYNERGY system to be defined, i.e. the functional description of the main system parts and their relationships.

During the pilot experiments, extensive tests, under real working conditions, will take place while all the software components will be integrated and accessible through service utilities to guarantee proper and correct software operation. Experience from the pilot operations will be collected and the performance of the customized systems will be assessed for further improvement of the functional and technical features of the overall service infrastructure. The evaluation will focus on the macro level uptake and use of the SYNERGY tools to support both SMEs and larger industry organisations in establishing, running and improving knowledge-based collaborative solutions, and on the social and

economic impact of such solutions. The aim is to identify and validate metrics, which clearly demonstrate and measure the impact and benefits of the SYNERGY methods and tools on efficiency and effectiveness of networked, knowledge-based businesses.

Knowledge Assessments will be supported by a blended combination of co-working Knowledge Cafes and Web 2.0 support tools. The group discussions will provide a detailed understanding of the knowledge sharing and collaboration needs and issues of service creation and operation for stakeholders working within virtual network and organisation contexts including specifically:

- knowledge needs of a **complete virtual network** -e.g., in knowledge sharing and community of practice activity, opportunity matching for partners, Requests for Proposals (RFPs), creation of integrated knowledge resources and repositories, semantic-based knowledge creation and retrieval.

- Supporting **sub-set collaboration groups** created from the virtual network e.g., the activities of a virtual service group created from expertise in the network, the infrastructure for support on collaborative R&D projects, the creation of **consortia** from the network to create emergent **communities of innovation** based on a foundation of shared meaning and strategy, trust and understanding from community of practice activity, and finally the creation of virtual services for industry that could be supplied from such consortia.

- Knowledge needs in individual SMEs and larger organisations and in the **partnerships** that they increasingly work in and have to manage.

We will subsequently specify and document Requirements and Use-cases for a diverse range of situations, select partners and use-cases for piloting and testing of SYNERGY services, and collect, reflect on and disseminate both explicit and tacit knowledge from the Lessons Learned from the analysis, deployment, testing and validation.

If interested in discussing the applications of this research to your collaboration needs, applying for becoming a knowledge assessment case or piloting services developed in the SYNERGY project, please contact Dr. Barry Hardy, barry.hardy -(at)- douglasconnect.com, +41 61 851 0170

DouglasConnect

SYNERGY Consortium members:
Coventry University, Forschungszentrum Informatik an der Universität Karlsruhe,
Institute of Communications & Computer Systems (NTUA),
CIM College d.o.o., Loughborough University, Douglas Connect,
Technology Application Network, EBM Websourcing