

Project Synopsis
FP6 - 027324
Triple Space Communication

TripCom – Triple Space Communication

The mission of TripCom is to take a significant move towards a new era of the Internet. The Internet was invented in the 1960's and provides a highly decentralized and scalable architecture for enabling large networks of computers beyond the boundaries of other communication protocols.

The first major evolution step appeared around 20 years later with the wide-spread usage of email. Email changes the communication processes of humans significantly by providing instant communication over any geographical distances in an asynchronous fashion based on the message-exchange paradigm.

The second major evolution step appeared another 10 years later with the wide-spread usage of the World Wide Web. The Web changes communication processes of humans significantly by providing instant publication over any geographical distances in an asynchronous fashion. It is based on broadcasting via **persistent publication** of information.

The two major asynchronous styles of human communication (directed communication via mail and undirected communication via publication) have been significantly improved through email and Web.

The next step for the Internet is likely to be the direct integration of applications and computers via Web service technology. This network no longer directly interlinks humans but interlinks applications and programs to provide integrated services to the human end-user. However, current Web service technology has only very little to do with the Web. It is based on the message exchange paradigm similar to email communication. Truly Web-enabled Web services will communicate via **persistent publication** of information.¹

Realizing this vision and a new technology is the mission of TripCom with the result of the integrating Tuple Space, Semantic Web (triple), and Web service technologies.

Impact

The idea behind TripCom is to make Web-like communication through publication and search *itself* machine-processable: The Web revolutionized human communication by providing a platform where people publish and find globally linked information by retaining scalability. A similarly flexible, semantically enhanced infrastructure will facilitate machine to machine communication at large scale. We will demonstrate the benefits of our approach in the **business process integration** and **health care** domains, proving suitability in some of the most prosperous application areas of current IT research.

¹ Just as email and Web complement each other, service integration based on message exchange and publication will complement each other.

TripCom's main innovation

We will improve the ideas of Tuple Space computing by adding semantics by use of a graph-based data-model to rely on Triples. The Triple Space serves as a persistent publication system for semantically linked information in semantically clustered subspaces. We will develop a scalable and linkable Triple Space storage, based on improving and combining current RDF Stores and Tuple Space infrastructures. We will extend the Tuple Space coordination model by tackling complex problems of checking and maintaining consistency in the Triple Space and, thus establishing a novel Semantic Web service paradigm, the Triple Space Communication model. We will integrate existing Web service technologies with the newly emerging Triple Space and provide enhanced communication functionality for emerging Semantic Web services frameworks. In order to prove the applicability of our approach we will tackle the lack of standardized business data ontologies by ontologizing the current de facto standard EDI/EDIFACT for business to business process integration and deploying our technology in realistic use case scenarios. The Triple Space would remain an unacceptable means for the automation of real world business process integration without ensuring appropriate security and trust mechanisms. Therefore we will provide an infrastructure to ensure that access to triples/Triple Spaces are secure on the one hand and express meta-level semantics on which triples are trusted on the other hand.

The project's results

The primary objective of Triple Space Communication (TripCom) is the development of a highly scalable, semantically enhanced communication infrastructure which is the result of the integration of Tuple Space, Semantic Web (triple), and Web service technologies:

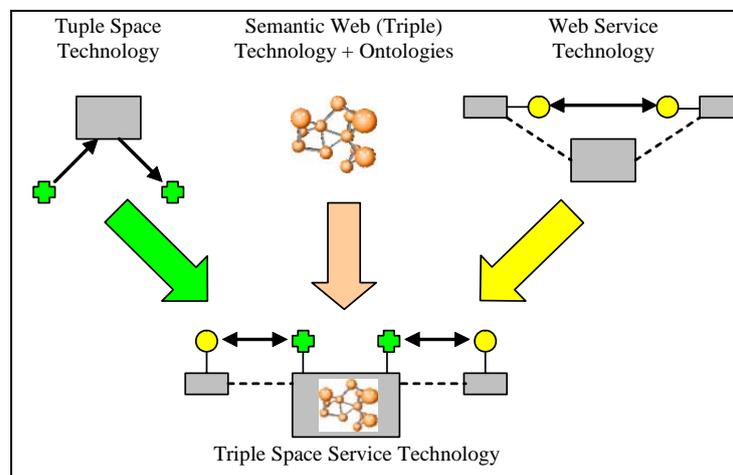


Figure 1: Conceptual Technology Basis for Triple Space Communication

- Based on Tuple Space Computing we will build an innovative *architecture* (called **Triple Space**) as a platform for application integration based on persistent publication. We use ideas from the Semantic Web to provide machine processable semantics for this architecture in order to allow mechanized integration of services (data and processes).
- We define *schemas* (Ontologies) for predefined standards to enable smooth publication of data and process descriptions. Just as HTML as a common schema for Web documents allowed for smooth publication of data on the Web for humans, pre-defined schemas for machine readable data and processes are a pre-requisite for scalability and usability.
- TripCom will be based on Web protocols and Semantic Web technologies. However, as opposed to current technologies subsumed under the term "Web services" which often only

hide synchronous, message-based communication behind Web protocols, we propose a novel Semantic Web service paradigm through:

1. the ability to maintain **stateful communication** thereby empowering Web service choreography and orchestration mechanisms,
2. **asynchronous** communication via **persistent publication** of **semantically linked data** so that Web service scalability and reliability can be improved,
3. robust security and trust mechanisms which are pluggable,
4. decoupled communications that reduce (if not eliminate) the need for *a priori* knowledge of the partner and communication channel thus enabling multi-party interaction for free,
5. easy integration of existing services and legacy infrastructures that use different terminologies by Semantic Web technologies.

More details

The TripCom website is the main platform of the project. It provides an overview of the project, its objectives, structure, progress and management: <http://www.tripcom.org/>

Administrative Details

TripCom is a 3 year Specific Targeted Research Project funded by the European Commission 6th Framework Programme. TripCom started on 1-April-2006 and ends on 31-March-09. The overall budget of the project is roughly € 3.6 Mio. 9 partners from 7 European countries are involved in the project.

List of Participants

Partic .Role*	Partic. no.	Participant name	Participant short name	Country
CO	1	Leopold Franzens Universität Innsbruck	LFUI	AUT
CR	2	National University of Ireland, Galway	NUIG	IRE
CR	3	Universität Stuttgart	USTUTT	GER
CR	4	Technische Universität Wien	TUW	AUT
CR	5	Freie Universität Berlin	FUB	GER
CR	6	Ontotext Lab, Sirma Group Corp.	ONTO	BUL
CR	7	Profium OY	Profium	FIN/DEN
CR	8	CEFRIEL - Società consortile a Responsabilità Limitata	CEFRIEL	ITA
CR	9	Telefónica Investigación y Desarrollo Sociedad Anónima Unipersonal	TID	ESP

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