

ARTEMIS

A Semantic Web Service-based P2P Infrastructure for the Interoperability of Medical Information Systems

ARTEMIS develops a semantic web services based interoperability framework for the health care domain. This project provides the healthcare industry with an ideal platform to exchange meaningful clinical information among healthcare institutes through semantic mediation.

Objectives of the project

One of the key problems in healthcare informatics is the inability to share patient records across enterprises. There are several standardization efforts to digitally represent clinical data such as HL7 CDA, EHRcom and openEHR. These EHR standards, which are currently under development, aim to structure and mark-up the clinical content for the purpose of exchange.

However, since there are more than one standard, it is still difficult to achieve interoperability and today the clinical data is mostly stored in proprietary formats. **ARTEMIS** message exchange framework is developed to provide the exchange of meaningful clinical information among healthcare institutes through semantic mediation. The framework involves first providing the mapping of source ontology into target message ontology.

This mapping is used to automatically transform the source ontology message instances into target message instances.

The framework proposed is generic enough to mediate between any incompatible healthcare standards that are currently in use.

Project Description

The **ARTEMIS** project addresses the interoperability problem in the healthcare domain where organizations have proprietary application systems to access data. To exchange healthcare information there are different standards (HL7, GEHR or CEN's) **ARTEMIS** project provides an interoperability platform where organizations keep their proprietary systems, but expose the functionality through Web services. Furthermore, an ontology based description of these data exchange standards is proposed within the scope of Artemis infrastructure. One of the goals of using ontologies is to semantically mediate data among the healthcare data exchange standards through semantic mediation.

The interoperability problems of medical information systems are two fold: First there are multiple, incompatible, proprietary approaches to connecting disparate applications. Secondly, there are more than one standard to represent the same

information, which in turn creates an interoperability problem. **ARTEMIS** enables medical practitioners to access patient records securely, seamlessly through a low-cost peer-to-peer infrastructure, regardless of where their patients or their records might be.

“ARTEMIS addresses the interoperability problem in the healthcare domain where organizations have proprietary application systems”

Scenario

ARTEMIS Project has a prototype that realises a scenario where, after an accident, a patient is admitted to a nearby hospital from the ambulance via a mobile device. The hospital admission service then automatically seeks out any relevant healthcare records of the patient in the **ARTEMIS** P2P network, and presents them to the doctor. Different hospital information systems with different messaging and coding standards are used in the scenario in order to demonstrate the semantic-based interoperability platform. In the prototype the mediation between HL7 Version 2 and HL7 Version 3 messages is also demonstrated.



ARTEMIS project provides the healthcare industry with an ideal platform to achieve difficult integration problems. **ARTEMIS** Web service model encapsulates already existing applications and access to documents in a standard way and incorporates service providers, service consumers and service registries. Currently most prominent Web service registries are Universal Description, Discovery, Integration (UDDI) and electronic business XML (ebXML). There are also very recent efforts to use Peer-to-peer networks based on Web services. However both service registries and P2P architectures available do not provide semantically enriched search capabilities. In the **ARTEMIS** project it is provided extensions to these architectures to enable discovery of the Web services based on their semantic descriptions.

Medicine is one of the few domains to have some domain knowledge in a computable form which it is exploited in defining the semantics of medical Web services.

Expected Results & Impacts

In the **ARTEMIS** Project the following results are achieved:

- An OWL Mapping tool (OWLmt) and engine have been developed which enable to semantic mediation of the healthcare messages complying to different healthcare standards.
- **ARTEMIS** P2P architecture enables semantic discovery of healthcare organizations, and their services.
- Comprehensive security and privacy infrastructure is developed.
- The Patient Identification Protocol has been developed, which utilizes the discovery and retrieval clinical information about a particular patient from different healthcare organizations where concrete sources are unknown.
- **ARTEMIS** first integrated prototype is completed successfully, and two pilot applications have been developed one in SEBT, Ireland and one in TEPE, Turkey.



ARTEMIS

A Semantic Web Service-based P2P Infrastructure for the Interoperability of Medical Information

Project co-ordinator:

Middle East Technical University –
Software R&D Center

Contact person:

Prof. Dr. Asuman Dogac

Tel: +90 312 2105598

Fax: +90 312 2101004

Email: asuman@srdc.metu.edu.tr

Website: www.srdc.metu.edu.tr

Partners:

- Software R&D Center, Middle East Technical University, METU-SRDC, (TR)
- Kuratorium Offis E.V., OFFIS (DE)
- South and East Belfast Health and Social Services Trust, SEBT, (UK)
- Altec Information and Communications Systems S.A., ALTEC (GR)
- Tepe Teknolojik Servisler AS, Tepe Technology (TR)
- IT Innovation Center, Southampton University, IT Innovation (UK)

Timetable: from 01/04 – to 06/06

Total cost: € 2.957.604

EC funding: € 1.989.000

Instrument: STREP

Project Identifier:

IST-2002-002103

Keywords:

eHealth networks and architectures, Interoperability of Medical Information Systems, Web services for medical domain, P2P Technologies