

# The Implementation of Semantic Web Service Architecture and Testing of the Architecture on a Mobile Platform

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## TÜBİTAK

### Abstract

The SWSA (Semantic Web Services Initiative Architecture) committee, which has been contributed by the OWL-S, WSMF (Web Service Modeling Framework) and W3C Web Service Architecture working groups, has created a set of architectural and protocol abstractions that serve as a foundation for Semantic Web service technologies. The proposed architecture is based on the multi-agent infrastructure.

The SWSA architecture describes the overall process of discovering and interacting with a Semantic Web service in three consecutive phases. The first phase, called candidate service discovery, is the distributed search for available services that can (potentially) accomplish some set of a client's internal goals or objectives. The second phase, called service engagement, includes the process of interpreting candidate Web service enactment constraints and then negotiating with prospective services until reaching an agreement. The following phase is the service enactment which completes mutually agreed upon objectives of client and service by following the service's published protocols. The client provides required inputs for the service to be executed and knows what to do whether service succeeds or not.

It is apparent that SWSA describes the architecture extensively in a conceptual phase. However it doesn't define required details and theoretical infrastructure to realize the architecture. Hence, the main goal of this project is to define, realize and test a multi agent based software platform which fulfills fundamental requirements of SWSA's all subprocesses (service discovery, engagement and enactment) in an industrial scale.

The software architecture of the Semantic Service Platform will be composed of three modules. Requestor module includes a "light" agent infrastructure specially designed for mobile devices and a Mediator Agent that is responsible of managing mediation between mobile agent knowledge (stored using XML) and platform ontologies.

The second module is the Broker Agent which includes the required infrastructure and architectural components to execute subprocesses of SWSA. Those to be used in semantic service discovery, engagement and enactment are modeled as reusable plans and these plans are executed within a goal governed agent platform.

The final module of the platform, called Provider Agent, converts WSDL or OWL-S defined external services into agents those are capable to execute SWSA's defined processes. This module includes inner services like WSDL to OWL-S Converter, Ontology Mapper and Translator that provides mapping of services ontologies into the platform's ontologies, stores those mapping ontologies and serves ontology translation. Planner component of the Provider Agent realizes registration of the related service into the platform and executes interaction plans concerning service engagement and enactment.

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### **Related Publications:**

1. Kardas, G., Goknil, A., Dikenelli, O. and Topaloglu, N. Y. (2009) "[Model driven development of semantic web enabled multi-agent systems](#)", International Journal of Cooperative Information Systems, vol. 18, no. 2, pp. 261-308, DOI: 10.1142/S0218843009002014.
2. Gümüs, Ö., Gürcan, Ö., Kardas, G., Ekinci, E. E. and Dikenelli, O. (2007) "[Engineering an MAS Platform for Semantic Service Integration based on the SWSA](#)", In proceedings of the 3rd International Workshop on Agents and Web Services in Distributed Environments (AWeSOMe 2007), held in conjunction with the OnTheMove Federated Conferences 2007 (OTM 2007), November 25-30, 2007, Vilamoura, Portugal, Lecture Notes in Computer Science, vol. 4805, pp. 85-94, DOI: 10.1007/978-3-540-76888-3\_28.
3. Gürcan, Ö., Kardas, G., Gümüs, Ö., Dikenelli, O., Cakirlar, I., Cetin, Ö, Eliacik, A. B. and Kir, H. (2007) "[An Agent Based Semantic Service Platform](#)", In proceedings of the 3rd Turkish National Software Engineering Symposium (UYMS 2007), September 27-29, 2007, Ankara, Turkey, pp. 279-286 (in Turkish).
4. Gürcan, Ö., Kardas, G., Gümüs, Ö., Ekinci, E. E. and Dikenelli, O. (2006) "[A Planner for Implementing Semantic Service Agents based on Semantic Web Services Initiative Architecture](#)", In proceedings of the 4th European Workshop on Multi-Agent Systems (EUMAS 2006), December 14-15, 2006, Lisbon, Portugal, CEUR Workshop Proceedings, vol. 223, pp. 249-259.