**SWING project: description and case-study**

Today, a number of non-semantic web services are available within the geospatial domain. The scarcity of semantic annotation and the lack of a supportive environment for discovery and retrieval make it difficult to employ such services to solve a specific task in geospatial decision making. SWING aims at deploying Semantic Web Service (SWS) technology in the geospatial domain. In particular, has to be addressed two major obstacles that must be overcome for SWS technology to be generally adopted, i.e. to reduce the complexity of creating semantic descriptions and to increase the number of semantically described services. Today, a comprehensive knowledge of logics, ontologies, metadata and various specification languages is required to describe a service semantically.

Swing will develop methods and tools that can hide the complexity – and automate the creation – of the necessary semantic descriptions. The objective of SWING is to provide an open, easy-to-use SWS framework of suitable ontologies and inference tools for annotation, discovery, composition, and invocation of geospatial web services.

SWING builds on the DIP and SEKT IPs, by adopting, combining and reinforcing their results. A main key to the solution is adapting the SWS technology of DIP to handle geospatial services and content. Another key is utilising and advancing the technology of SEKT to annotate geospatial services with semantic information. A targeted synergy between these two research initiatives are demanded to maintain and extend Europe's leading role in SWS. The SWING framework and pilot application will increase the use of distributed and heterogeneous services in geospatial decision making. The results can be reused in other domains and will boost the availability of semantic services and bring the vision of the SWS a great leap forward. Exploitation of SWING's results will provide Europe’s decision makers and citizens with a new paradigm of information retrieval and new business opportunities.

The scientific and technological objectives of SWING are:

- to develop an open, easy-to-use Semantic Web Service framework of suitable ontologies and inference tools for annotation, discovery, composition, and invocation of geospatial web services.
- to evaluate the appropriateness of this framework by developing a geospatial decision-making application that can dynamically find and provide interoperable semantic web services.

Scientific and technological subgoals to achieve the main objectives are:

1. To capture the semantic requirements of geospatial services and geospatial decision-making application scenarios by developing relevant ontologies.
2. To develop a tool for semantic annotation of geospatial web services based on semi-structured description, natural language texts and geospatial data.
3. To adapt existing semantic web service technology (WSMO/WSML/WSMX) to provide a semantic discovery and execution tool to facilitating discovery and invocation of semantically described geospatial web services.
4. To provide an open, easy-to-use development environment that hides the complexity and integrates the semantic annotation, the semantic discovery and execution tool.

5. To innovate and integrate semantic web service technology in existing web catalogues for the purpose of enhancing the functionality and improving the hit-rate in service discovery.

6. To develop a web-based geospatial decision-support prototype to evaluate the appropriateness of the proposed framework and to show dynamic service composition in practice. This prototype will have the potential of being further developed and turned into a management and assessment system for natural resources.

Today, a number of non-semantically enabled web services are available within the domain of geospatial information. It is unlikely that their owners want to, or are capable of describing them semantically. Geospatial services usually conform to international standards, which mandate the use of metadata in the form of semi-structured data such as ISO 19115 in addition to textual descriptions. Unfortunately, service developers tend not to describe their services very well, even though technology for registration exists. IONIC, for example, provides an open catalogue of geospatial services, were various service owners have registered over 1000 services, but only a few has attached meta-information. This makes it difficult to use key-word search to find a service that delivers a particular type of geospatial data. If the services had been described semantically, e.g. by the Web Service Modelling Ontology (WSMO) and the Web Service Modelling Language (WSML), one could utilise SWS technology such as the Web Service Modelling Execution Environment (WSMX) to increase the efficiency and accuracy of discovering and integrating geospatial web services used to support European land-management decisions and natural resource planning. Sustainable planning of infrastructure development, spatial occupation and resource consumption requires a long-term perspective and an integrated approach to land-use management across Europe. Today, many datasets are made available through web services. However, the lack of associated semantic information is an expensive barrier towards discovery and utilisation of the best available knowledge; it leads to insufficient analyses and to suboptimal decisions (COM 265, 2000; COM 572, 2003).

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1 WSMO, WSML and WSMX are developed in the DIP project (http://dip.semanticweb.org/). The project’s objective is to develop and extend Semantic Web and Web Service technologies in order to produce a new technology infrastructure for Semantic Web Services (SWS) - an environment in which different web services can discover and cooperate with each other automatically.