



## **Semantic Sensors for Rapid Application Development for Environmental Management**

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Critical environmental management decisions depend on information provided by a variety of sources (e.g., legacy databases with historical data, real-time data coming from various kinds of sensor networks, mathematical models and simulations, etc.). As the cost of deploying intelligent sensor networks falls, we expect to see more sensor networks being deployed, and an even greater dependence on information coming from sensor networks for better situation assessment and decision making. As a result, decision support systems for environmental management will face the following challenges:

- They will need to perform computations (for data fusion and integration, mining and other purposes) on large amounts of real-time data stemming from heterogeneous, autonomously developed and deployed sensor networks possibly combined with other existing data sources.
- They will need to respond to sensed data in real-time, possibly adapting the behaviour of the sensor network, to respond to emergency situations.
- They will have to deal with very dynamic sensor network sources and changing application requirements that might call for using data in new and possibly unexpected ways, outside the immediate scope of the project where they were deployed.

Therefore, it will be common for third parties to integrate and enrich data from historical databases, live sensor networks that were deployed independently by different providers and other sources in order to support their decisions (e.g., flood warning, fire warning, etc.). In most cases, there is a clear need for third parties to be able to use data unexpectedly in a manner that was not previously envisioned (e.g., satellite products, data from tidal gauges, etc.), and make relevant data and information easily publishable using Web and mobile communications.

We will present the advances that we have made in this direction in the context of the SemsorGrid4Env project, where we have proposed an architecture and technologies covering components that deal with the ontological and spatio-temporal based registration and discovery of data sources (including sensor networks), the semantic integration of heterogeneous data sources (including historical databases, live data streams and sensor networks with in-network query processing capabilities), service-oriented and resource-oriented (REST and Linked Data) access to these data sources, and provision of flexible user interfaces that hide most of the complexity out from end users. In summary, we seek to provide solutions that are simple, live, and dynamic.