

# Managing fisheries with semantic technologies

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A semantic software development toolkit designed by European researchers could help the UN's Food and Agricultural Organisation (FAO) improve its management of the world's fisheries.

Helping countries manage the world's food supply sustainably is the challenging task of the FAO. Now the organisation is working with the EU-funded NeOn (Networked Ontologies) project to find better ways to do the job.

The NeOn team is creating an industrial-strength development toolkit for semantic applications, software that works with the meaning of data rather than simply its label or file name.

Semantic applications work by describing information in a way that can be understood by computers. These descriptions are called ontologies.

An ontology defines the concepts and relationships used to describe and represent a domain of knowledge. An ontology specifies standard conceptual vocabularies with which to exchange data among networked systems, provide services for answering queries, publish reusable knowledge bases, and offer services to allow interoperability across multiple systems and databases.

Ontologies make it possible for machines to find valuable information currently buried in databases and on Web pages, saving time. More importantly, the applications access information that might otherwise be

missed, and can find unsuspected connections between different pieces of information.

“I like to call it intelligent linking,” explains Johannes Keizer, the FAO’s representative in the project. “At the moment, if you enter the phrase ‘herring diseases’ as a query, you get a list of links, and then you need to go through them to see what’s relevant.

“But with intelligent linking, or ontologies, the query will present you with data on herring diseases, biological information about the species, a list of experts in each disease, links to reported outbreaks, areas where herring are caught, the names of countries – and even vessels – that fish for herring. All this information would be listed by type, too.”

The project’s researchers still have a lot of work to do before the software they are developing reach that stage. However their work with NeOn is a crucial first step, and the NeOn platform makes it a lot easier, says Keizer.

### **Baptism of fire**

There are many projects that have, at the cost of great effort, resulted in semantic applications, but NeOn’s researchers are creating what is called a ‘development environment’. Their strategy is the difference between making just one car and employing a production line so that lots of people can work together to make more cars quicker.

The FAO fisheries test is a baptism of fire for the NeOn platform technology. The FAO is testing the tools as a means of creating an over-fishing alert system as a means of improving the management of the world’s fisheries.

The FAO’s fisheries data is stored in hundreds of vast databases, scattered across the world, using different formats and software

platforms.

The FAO also hosts a wide range of data types, with information relating to species, biology, shipping, ecology, migration, and weather. Much of the information is updated in real time.

“The databases are currently a bit like silos, isolated from each other,” says Keizer. “An FAO analyst might have to query many databases to study a particular issue. NeOn will help to develop a system where the analyst enters a query, and the computer finds relevant information from all the databases.”

The NeOn team is creating a toolkit and an overall semantic application methodology. The toolkit currently allows users to link ontologies together across a network. It also allows collaboration between teams. The researchers are also working on an advanced developer interface designed to accept software plugins, or modules, that can extend functionality.

The toolkit is a good fit with the FAO’s efforts to extract the best possible quality analysis from the vast sea of available data.

“We are constantly developing new ways to access and query our databases, like the Fish Global Information System (FGIS), and our work with NeOn will enable us to take the next evolutionary step,” Keizer says. “So far, we have developed the framework for linking diverse databases, but we will be working with the NeOn platform for a long time to come.”

### **Working with Spain’s pharma sector**

The project’s work with Spain’s pharmaceutical sector is also impressive. The researchers intend to put semantic technologies into the hands of non-experts, pharmacists, warehouse managers and others with no

background in the field. Currently, one of the tasks of the NeOn platform in Spain is focused on electronic invoicing. Electronic invoicing costs less, moves quicker through the system and is less prone to transcription errors.

But every hospital, distributor and supplier uses different invoicing systems, some quite sophisticated and others still in hard-copy only. Traditionally, the solution would be a gateway that translates all the different invoicing formats and characteristics into one universal standard. The process is expensive, time-consuming and requires expert supervision.

NeOn's team will use a semantic gateway, one that establishes all the possible invoicing characteristics. End users such as pharmacists and office workers can adapt their invoicing system to a universal standard, on the fly, in real time.

“Without the networked ontologies component of the NeOn platform, it would take a lot longer,” explains Jose Gómez, who manages the Spanish case study for NeOn. “And without the NeOn interface, currently in development, I do not think we could show end users how to use ontologies for their invoicing.”

The end-user test goes live in February 2009. It will be the final validation of the NeOn platform – a rapid application development environment that will take semantic technologies from the laboratory to the real world.

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