Open shop for environmental data

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(PhysOrg.com) -- A new way to access and reuse environmental data from diverse sources has been devised by European researchers. They foresee a future where environmental data and services are offered on the open market.

Every day numerous sensors on earth and in space observe the condition of land, atmosphere and oceans for multiple purposes ranging from weather forecasting to monitoring of nuclear incidents. Important political decisions, such as how to adapt better to climate change, depend ultimately on scientific insights gained from these observations. But at present there is no simple way to access and use that data.

"We are investing lots of resources to make measurements for a particular reason, but the information obtained may never be used again," says Denis Havlik of the Austrian Institute of Technology. "Perhaps people don't know that certain information exists or they cannot access it; sometimes they can access it but they don't know how to use it, or it is too complicated to get in touch with the data owner."

Havlik coordinates an EU-funded project called Sensors Anywhere (SANY) which has created the technical means to allow the free exchange and use of environmental monitoring data regardless of its source.

SANY uses a 'service-oriented' architecture, where applications can be built out of modular services accessed over the internet. One service might obtain some data, another might plot a map, graph or chart, and

another might process the data in some way.

"The SANY Sensor Service Architecture (SensorSA) allows everybody who makes environmental observations to advertise them over standardised service interfaces," Havlik explains. "Anybody who needs environmental data can go and search for it - or look in a catalogue - and retrieve it using standardised methods."

Market for environmental data

It doesn't matter where the data comes from, how it was obtained or what form it is in. The SANY system transforms all data to a standard format set out by the Open Geospatial Consortium (OGS) and can handle all kinds of sensor data, both raw and processed.

The SANY proposal has significant business consequences. "If you are a small company and you believe, for example, that you can predict episodes of air pollution much better than anybody else, then it's easy for you to put your service on the market," Havlik says.

This is not just about allowing small companies to access markets that have traditionally been dominated by big public bodies. "Today, many companies still try to do everything on their own. The new market paradigm envisaged by SANY will allow all involved parties to concentrate on their own strengths, and purchase the missing data and services on an open marketplace."

To demonstrate the potential of the SANY approach, the project has been running pilots in the monitoring of air, water and land.

One air quality pilot spans the border between France and Belgium to demonstrate the feasibility of seamless presentation of data from independent monitoring networks. A second air quality pilot

demonstrates automatic generation of air quality reports, data-fusion-aided quality assurance, and real-time environmental impact modelling for major industrial sites in Linz, Austria.

The SANY air quality pilots also demonstrate the use of SANY and SensorSA as a possible technical basis for the INSPIRE (Infrastructure for Spatial Information in the European Community) directive.

Bathing water forecasts

Meanwhile, a pilot in Gdansk, Poland demonstrates the feasibility of automatic monitoring and forecasting of the bathing water quality at local beaches. At the moment, water quality is checked by taking infrequent samples which need 24 hours to be analysed. That means bathing can only be restricted long after a pollution incident has taken place and some incidents may be missed altogether. The SANY 'bathing water' pilot proposes a different approach: SANY data fusion services can use simple measurements, taken in real time with automatic equipment, to generate indicators for things which are quite difficult to measure, like the bacteriological quality of the water. "The system delivers 24-hour predictions and continuously improves by comparing a posteriori the indicators with laboratory measurements," says Havlik.

A similar pilot is being run in Cornwall, UK where SANY is being used to forecast incidents of microbial contamination of shellfish beds.

The third area being piloted is geo-hazards associated with the security of underground construction sites. A pilot in Barcelona - and two smaller scale pilots in Budapest, Hungary and Toulon, France - are using a combination of existing stationary sensors and SANY wireless ad hoc sensor networks for the real-time monitoring of ground movements in the vicinity of a new metro tunnel. The SANY infrastructure allows instantaneous visualisation of data from all sensors, and the data fusion

services predict the soil settlements and warn the site manager when needed.

SME partners in Belgium, France and the United Kingdom, who have taken part in the pilots, are already using SANY to develop applications of their own.

Important initiatives to share data

SANY builds on work by the EU-funded ORCHESTRA project and received funding from the Sixth Framework Programme for research. Its outcome is directly relevant to two big international initiatives. GMES (Global Monitoring for Environment and Security) is a joint effort of the European Commission and the European Space Agency to assure the long-term interoperability, availability and reliability of earth observation data. At the same time, the EU's INSPIRE directive requires public bodies to exchange geospatial data via a common infrastructure. Both these ventures require information from diverse sources to be handled in a uniform way.

"Parallel developments with proprietary interfaces and undocumented data models are the main obstacle to interoperability," says Havlik. As a consequence, SANY builds on open standards and the key project results will be available to all interested parties. The list of public project results includes the user and technical requirements, architecture and service specifications, pilot specifications, public training events, an introductory book on Sensor Service Architectures, as well as the reference implementations of the key SensorSA services.

The final results of the project and the SANY book are to be presented at the final SANY event in Linz on 19 November 2009.

More information: sany-ip.eu/