

Optimising the Effectiveness of Geosensor Networks: Geospatial interoperability and test-bed development.

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Introduction

- Early emphasis in GI remote sensing community was on single sensor or simple combinations and non-real-time data
- Now increasingly rich scenario's of multi-sensor and real-time analysis using networks of sensors
- Also increasingly diverse range of disciplinary and applications backgrounds involved
- Example of DGI 200x annual conferences

Impact of Developments from other sectors

Example areas:

- Telecommunications
- Web Search technology
- Public safety
- Intelligent transport services
- Social networking
- Robotics
- Nanotechnology
- Computer Games

Many of these developments are very recent and profoundly change the technology and applications framework within which geospatial scientists work.

Examples of technology developments and the pace of change:

- The first SMS message was Dec. 1992
- CCTV cameras only started to become common in UK public \ places in the mid-1990's yet now there are more than 15m or 1 for every 5 man, woman and child!
- Google didn't exist as a Company 10 years ago. In Sept. 1998 it consisted of 3 people.

More Examples:-

- The world's first GPRS data transfer call over a live GSM network was Nov. 2000
- The 1st Nokia GPS phone was only launched last year yet under the headline “Nokia aiming to banish paper maps” the BBC reports that Nokia expects to sell 35m mobile phones equipped with GPS this year (2008) <all of course with digital cameras>
- Nokia CEO Quote “navigation is one of the foundations of the context-aware mobile phone. We believe it will be as important as voice capability was 20 years ago....The future is about bringing context, time, place and people to the web”

And looking forward a little:-

- Data transmission speeds for mobile networks – at this years Mobile World Congress Korea's LG was promising downloads of up to 60 Mbps (40 Mbps upload) with its LTE “market ready” technology
- Developments in autonomous navigation – in the air, on land in the sea: note progress with the DARPA Grand Challenge and Urban Challenge
- And in the pipeline – wearable computers, the results of micro and nano-robotics developments, mind-to-machine communications,

Need for focus on the intersection of multiple technologies

The University of Nottingham like other large Universities had strong Computer Science, GIS/Remote Sensing, Geodesy and positioning and Human Factors Departments but these were structured within the standard academic + disciplinary framework.

Yet the challenges raised / opportunities presented by these technologies to society are increasingly focussed on the intersection of them all rather than their individual offerings.

The implication is that a SDI should be designed to support or facilitate a wide range of contributions and to have the breadth and flexibility in the associated data, interface and service specifications and standards to evolve to accommodate associated and emerging technologies as they themselves evolve

Background to the Centre for Geospatial Science

- Launched in Nov.2005 to address the multidisciplinary integrational challenges presented by SDI's
- Has recruited geoinformatics, computer science, maths/stats, human factors researchers (currently 8 research staff + 7 PhD students)
- Works with the established disciplinary experts at U. Nott. (and elsewhere)
- Has as its major research focus geospatial interoperability and geospatial intelligence and as a tool for this research the development of a persistent geospatial interoperability test-bed

Background to Test-Bed Developments

- Need for a persistent test-bed as a research platform to address issues of geospatial interoperability
 - To aid productivity within the Centre
 - To engender stronger collaborative research between research groups
 - To enable a faster and more flexible approach to research by building on standards
 - To ensure greater continuity of research programmes across funding and project life-cycles
 - To more directly contribute to emerging governmental and commercial SDI initiatives at a national, European and international level (e.g. INSPIRE, GMES, GEOSS, UNSDI, Oracle-TeleAtlas initiative)

Test-bed related activity:

- (i) OGC related (esp. OWS-Series)
- (ii) EU + ESA initiatives e.g. linked to INSPIRE + GMES
- (iii) GEOSS related
- (iv) Defence Test-beds
- (v) European Center for Innovation in Geospatial & LBS Test Bed
[Oracle et al]
- (vi) AGILE/EuroSDR/OGC Persistent Test Bed

Test-bed related activity:

EU INSPIRE / GMES : Multiple projects that have aspects of / relevance to a test-bed – FP6 Projects such as Orchestra, Motiive, RISE, SANY, FP7 proposals, eContentPlus projects such as GIS4EU

ESA: Especially the Heterogeneous Missions Accessibility Testbed (HMA Test-bed) – current tender – “to permit the evolution and test ...to support industry and institutions in the testing of their own products ...”

OGC Web Services, Phase 5 (OWS-5)

Proposal for participation Closing Date: 8 June, 2007

Overview

... a global, hands-on and collaborative prototyping program designed to rapidly develop, test and deliver proven candidate specifications into OGC's Specification Program, where they are formalized for public release ...

.... **technology providers' work together to solve specific geo-processing interoperability problems posed by the initiative's sponsoring organizations.** ...

... designed to encourage rapid development, testing, validation and adoption of open, consensus based standards specifications.

Content of the OWS-5 initiative be organized around the following 6 threads:

Sensor Web Enablement (SWE)

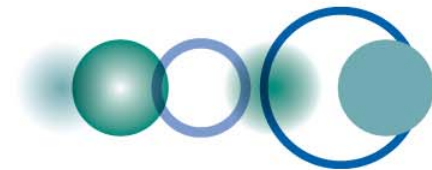
Information Communities and Semantics (ICS)

Compliance Testing (CITE)

Geo Processing Workflow (GPW)

Agile Geography

CAD / GIS / BIM



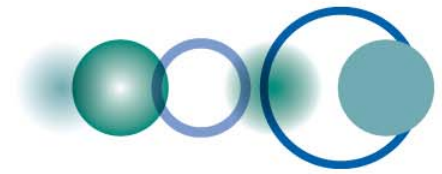
GEOSS ADC Architecture Workshop

See - http://www.ogcnetwork.net/system/files/GEO_Architecture_3c.ppt

Session 3c Test Facility for GEOSS Registration

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“A new functionality for 2008 is the establishment of a network accessible test facility that support service providers to test if their services meet the standards used as GEOSS Interoperability Arrangements”

“Permanent character of Testing Facility is important”



Test-bed related activity:

Defence: e.g.

- (i) CWID [Coalition Warrior Interoperability Demonstration] which is a US led activity including NATO, Canada, Australia and New Zealand and has related national activities [e.g. see www.cwid.org.uk]
- (ii) Vendor based e.g. the Lockheed UK SWIFT facility <http://www.lm-isgs.co.uk/intelligence/swift.htm>

Test-bed related activity:



EUROPEAN CENTER FOR
INNOVATION IN GEOSPATIAL &
LOCATION BASED SERVICES

1. Development of a Community Test-bed environment.

The Test-bed environment for the utilization of our Community will make special focus in the commercial sector.

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OGC[®]
Open Geospatial Consortium, Inc.

**May 2007 Call for Design and Implementation of a
Persistent Testbed for Geo Web Services for Research
and Education**



Objectives:

- To act as a **research test-bed** for collaborative European research in geospatial interoperability,
- To aid the **assessment of the current standards** for geospatial interoperability in terms of research compatibility, completeness, consistency and ease of use and extensibility,
- To provide an **environment for teaching** standards and techniques for geospatial interoperability,
- To provide a **resource to AGILE/EuroSDR/OGC** for the coordination of research requirements as well as definition, testing, validation and development of open standards.



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Progress:

- Strong response to call: > 30 organisations responded from 16 countries
- Meetings held in Barcelona (Nov. 2007) and Stresa (Dec. 2008)
- No dedicated funding to project manager / co-ord activity as yet
- Gobe Hobona (CGS) Gobe.Hobona@nottingham.ac.uk acting as PM for Phase 1
- Wiki established by Rob Lemmens (ITC) lemmens@itc.nl: <http://plone.itc.nl/gitestbed/>
- Request for use cases issued and first Use Cases now on Wiki
- Next meeting at AGILE 2008 May Girona, Spain www.agile2009.es

Conclusions

- Geosensor networks are an increasingly important part of the overall geospatial intelligence chain
- Standards development for interoperability needs to consider a broad range of technology development
- A persistent interoperability test-bed is needed because:
 - of the complexity of the emerging systems environment
 - The rapid evolution of the contributory technologies
 - The diversity of data sources
 - The need to under-take multi-disciplinary / multi-organisational research
 - To aid productivity, speed development, reduce costs
 - To maintain fluidity in standards development
 - To reduce risk for adopters in the midst of rapid change



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Questions

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