The Spatial Information Services Stack (SISS)

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ABSTRACT

The wealth of Australian observation scientific data holdings was previously only available to industry and researchers by contacting each data provider individually, and then deciphering and reformatting the local content, a process which often takes up to 60-80% of the project time and resources.

The Spatial Information Services Stack (SISS) provides the technology required to publish data online in a common format, using agreed terminology for common concepts, delivered using Open Geospatial Consortium (OGC) standards directly from each data custodians’ data store. It is built upon components from multiple open source projects in various domains in order to promote interoperability of spatial data. The Stack standardises on three components:

- Format – that defines the semantics and structure;
- Content – that standardises the resource content; and
- Tools that define service interfaces and protocols to ensure that all components may communicate with each other in an interoperable manner.

To achieve full interoperability, OGC standards are only the beginning. The various services defined in the Stack provide a vessel to enable interoperable data exchange. The key to linking resources in this information exchange model is web-service based access to data, information holdings, and computational services, all using common service interfaces and standard (i.e. community agreed) information models.

SISS is interoperable with other OGC clients and the enhancements of the services in the stack (e.g. complex feature support in Web Feature Service (WFS), vocabulary service, etc.) have client APIs which can be used by client applications. There is a range of readily available client tools that can interact with the Stack components which rely on supported interoperable interfaces and protocols. One of these clients is a sophisticated discovery portal, originally developed in AuScope. It is released as an open-source project and may be used by various communities to derive field-specific data discovery user interfaces and workflows.

The impact that access to data from multiple data providers in multiple science domains provides is potentially enormous. SISS has created a huge opportunity that has gone well beyond geosciences, into meteorology and water management and there are many other opportunities to take this development further. It has already been distributed to multiple Australian Government agencies and research organisations.

SISS is a national e-research project supported by CSIRO, AuScope, Department of Innovation, Industry, Science and Research (DIISR), the Australian National Data Service (ANDS), the Australian Research Collaboration Service (ARCS) through the National Collaborative Research Infrastructure Strategy (NCRIS) and the Super Science Initiative Investments.

ABOUT THE AUTHORS

Pavel Golodoniuc is trained in Computer Science with an emphasis on system architectures and modelling. Since then he has been working on system design and implementation aspects of various innovative solutions for commercial, industrial and governmental sectors. One of his professional interests is in information management standards and systems for interoperable data exchange, which includes information modelling, visualization, discovery and data delivery service interfaces, and validation. Since joining CSIRO in 2008, Pavel has been involved in the AuScope project and took an active role introducing the Spatial Information Services Stack (SISS) to the Australian geoscience community via close collaborative relationships with geological surveys of Australian states and territories. Pavel is collaborating closely with the OGC community to foster greater standards conformance. He is a leading developer and maintainer of the FullMoon project, which forms an essential part of GML Application Schema modelling framework. Other activities of special interest include sophisticated data validation services and Web Feature Services for interoperable data exchange.

Ryan Fraser is a Project Leader within CSIRO’s Minerals Down Under flagship. He leads several large projects dealing with the exchange and delivery of spatial information and eResearch tools. He manages projects that focus on enabling the delivery of data in an interoperable manner to various science domains. He has a software engineering background,
has expertise in high performance data and computational technologies, and has primarily been involved in the design and execution of systems to deliver spatial information and the provision of data and computing services to the research community and industry. He leads a large team to deliver technologies to enable data exchange and orchestrate change within the community.

**Dr Robert Woodcock** is Stream Leader – National Geoscience Information Infrastructure and Integration, for the CSIRO Minerals Down Under Flagship. He is responsible for a portfolio of projects developing e-Research methods advancing national and international earth science information exchange. His current focus is on the development of a national spatial data infrastructure to support earth science information access, analysis; modelling and simulation using open standards based web service technologies across National, State and Territory Government agencies.

**Dr Lesley Wyborn** is Senior Geoscience Advisor on the National Geoscience Information Infrastructure project at Geoscience Australia. She is a member of the Data in Science Committee of the Australian Academy of Science and a member of the Earth and Space Science Informatics Executive Committee of the American Geophysical Union.