Modular approach helps bridging standard-based multidisciplinary imagery and gridded data - ISO 19105 – Geographic information — Conformance and testing

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Big Data **hot topic** in Earth Science & markets
Manifold Big Data in standardization’s realm - coverage & others
e.g. imagery & gridded data
...so **standardization orgnization should have a say**, establish a position

“Big Data” not just big; a main issue: analytics on **variety** of data
Therefore, overarching, **cross-WG** topic

Then, **how to test?** according to standards
Standardization Story

• ISO/OGC coverage related services need conformance testing suite
  • one spec alone has issues, never done rigorously
  • standardized solution may include:
    ➢ service model
    ➢ protocol binding
    ➢ encoding format
    ➢ data model
    ➢ etc., ... More under way:

• Issue: How to do conformance testing in presence of modular world?
  • Not one monolithic test, but conformance class tests with manifold explicit dependencies
  • Executable test scripts need to be modular, too!
Standardization Story

- Takes the index—based built—up index (IBI) calculation of Fuzhou as a study case
  - Tianditu, Rasdaman, OpenLayer and etc.
• Requirements need to be phrased carefully to *allow testing*
• Each standard/specification requirement has corresponding conformante test
Related standards

• **ISO/TC211 standards used**
  - ISO 19105 – Geographic information — Conformance and testing
  - ISO 19123-2 – Geographic information — Schema for coverage geometry and functions - Part 2: Coverage implementation schema
  - ISO/TS 19163-2 – Geographic information — Content components and encoding rules for imagery and gridded data — Part 2: Implementation schema

• **OGC standards used**
  - OGC WCS 2.0 series
    include core and extensions
ISO 19105 – Geographic information — Conformance and testing

- Framework, concepts and methodology
- Criteria to be achieved to claim conformance
- Framework for specifying abstract test suites
- Procedures to be followed during conformance testing
- Dependencies within and between modules

General approach of the conformance testing (ISO 19105)
ISO 19123-2 – Geographic information — Schema for coverage geometry and functions - Part 2: Coverage implementation schema

- Implementable, conformance-testable coverage structure
  - also known as OGC CIS 1.0
- Based on abstract coverages (ISO 19123)
- Suitable for many encoding formats.

The coverage structure (OGC CIS 1.0)
• Based on ISO/TS 19163-1
• Suitable for binding content components and specific encoding formats
• Binding structure as defined in ISO 19123-2

Categories of imagery and gridded data (ISO 19163-1)
OGC WCS 2.0 Series

- Offers multi-dimensional coverage data for access over the Internet.
- Core and extensions
Dependencies

- Dependencies sometimes of type “all required”, sometimes “at least one required”
- In Software Engineering literature known as “AND/OR graphs”

Innovation: bring Software Engineering together with logic world
How the standards are used
Step by step

• Conformance clause
  • conformance classes
• Requirements
• Abstract Test Suite (ATS) structure
  • Without considering dependency relationships, hierarchical structure.
  • concerning modularization and dependencies, directed acyclic-graph
• Abstract Test cases (ATCs)
  • requirement tested in at least one abstract test case
  • conformance class composed of one or many abstract test cases
How the standards are used

• Executable Test Suite (ETS)
  • according to the ATS.
  • consistent with the conformance classes
  • shall be derived from one or more abstract test cases
  • provide reference to the corresponding ATCs
• Implementation under test (IUT) developed
  • according to standard/specification
• ETS tests the IUT
  • meets the conformance classes?
  • test report.
  • overall result synthesis
Summary

• Online analytics-ready imagery data
  • orchestrating a variety of web coverage related standards, ISO, W3C, OGC, IETF and etc;
  • based on existing standard-based approach(e.g via OGC WCS 2.0);
• Concrete, implementable, conformance-testable coverage structure
  • as defined in ISO/TS 19163 that conforms to ISO 19123-2
• Reliable interoperability
  • modular approach
  • overall assessment, global validity of cross-referenced statement
• Overall orchestration
  • spot inconsistencies and incompleteness among requirements, implementations and tests
Thank you!