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

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Content

- Standardization Story
- Related Standards
- How the standards are used
- Summary

Standardization Story

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

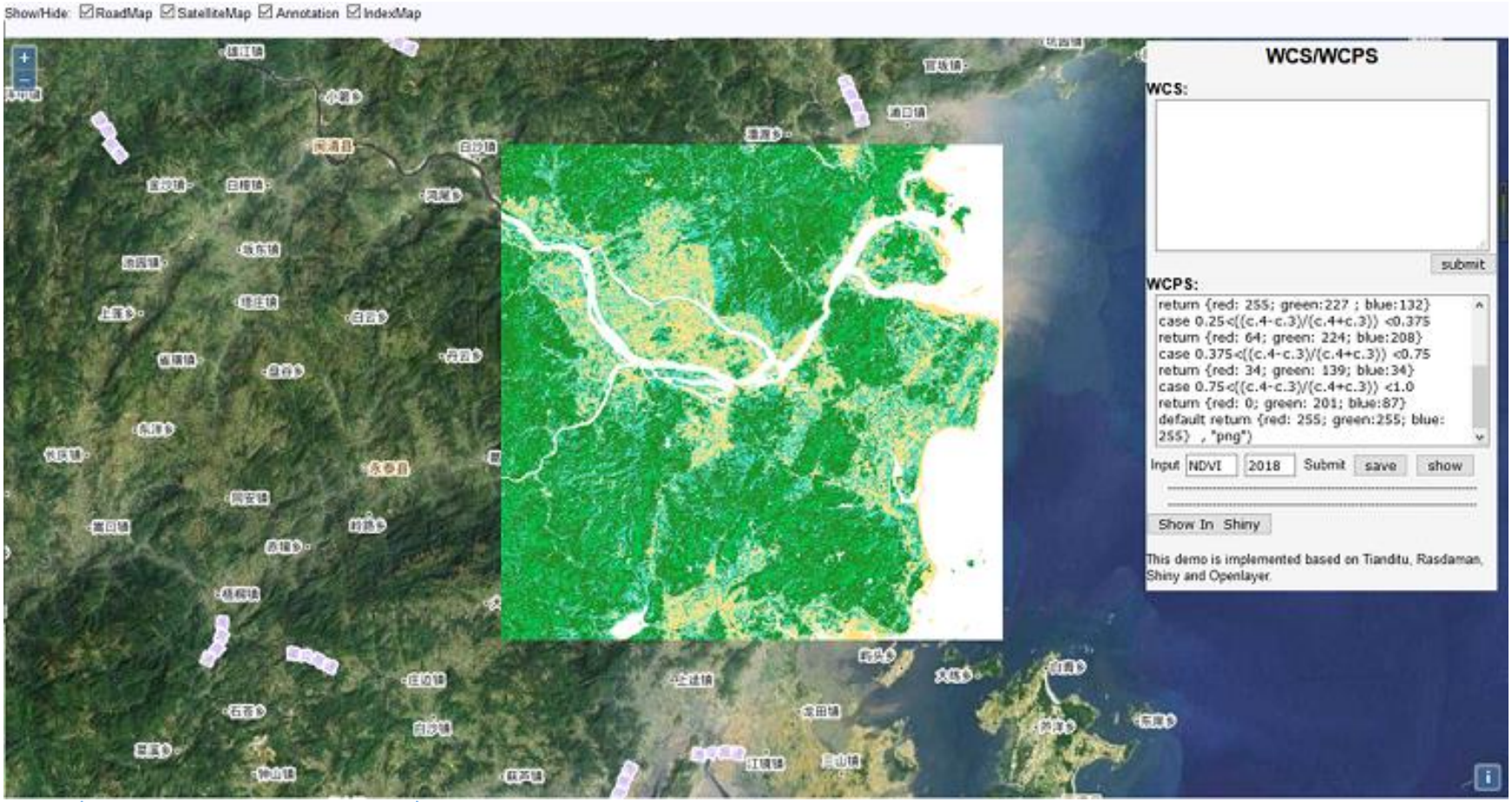
Standardization Story

- ISO/OGC coverage related services need conformance testing suite
  - one spec alone has issues, never done rigorously
  - standardized solution may include:
    - service model
    - protocal 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!*

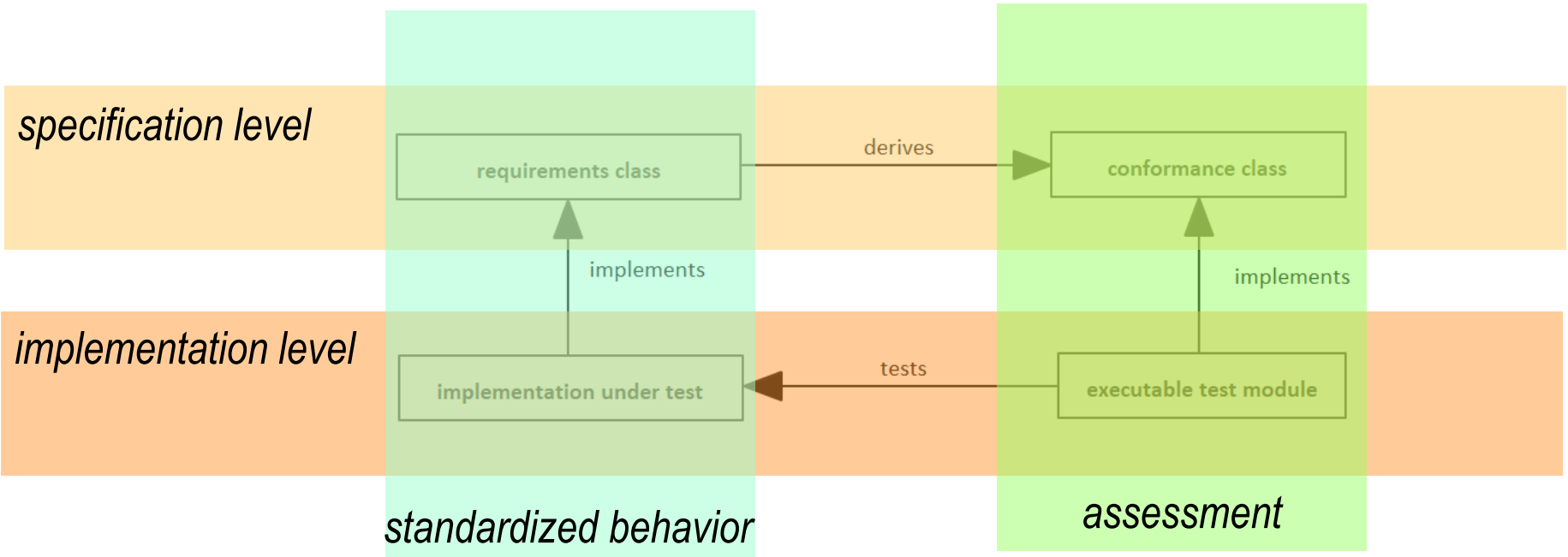
Standardization Story

- Takes the index—based built—up index (IBI) calculation of Fuzhou as a study case
  - Tianditu, Rasdaman, OpenLayer and etc.



Standardization Story

- Requirements need to be
  phrased carefully to allow testing
- Each standard/specification requirement has corresponding conformante test



Related standards

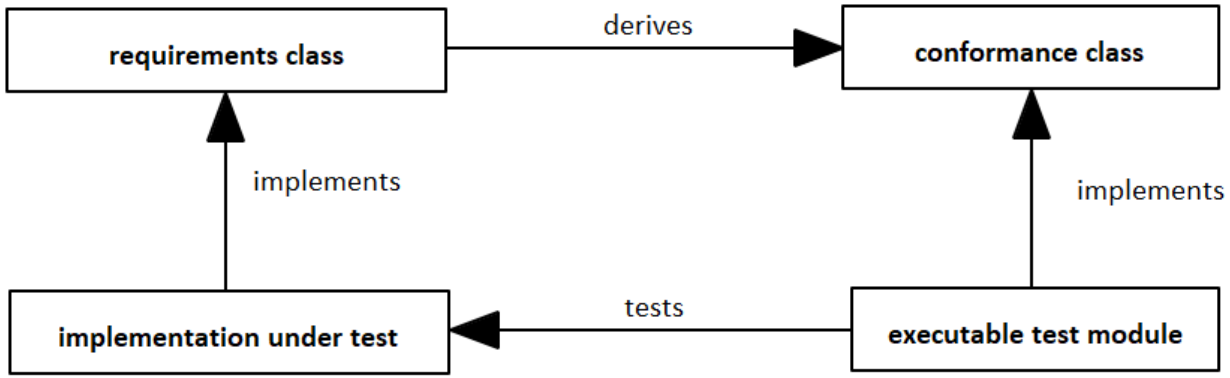
- **ISO/TC211 standards used**
  - ISO 19105 – Geographic information — Conformance and testing
  - ISO 19123-2 – Geographic information — Schema for coverage geometry and functions - Part 2: Coverage implementation schema
  - ISO/TS 19163-2 – Geographic information — Content components and encoding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

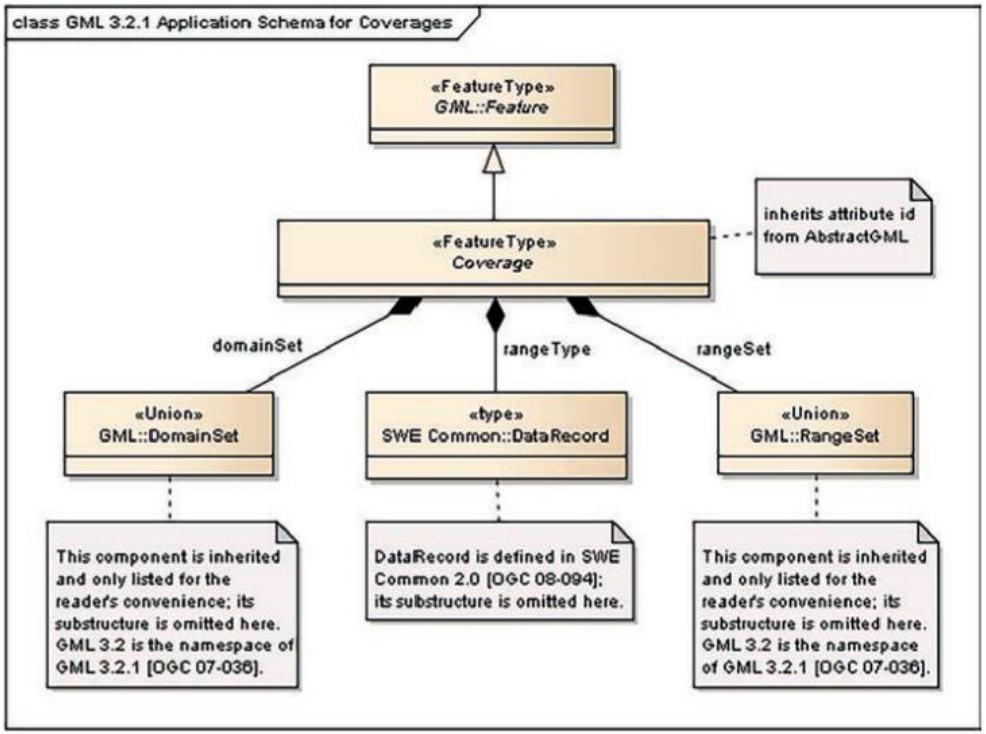
- Framework, concepts and methodology
- Criteria to be achieved to claim conformance
- Framework for specifying abstract test suites
- Procedures to be followed during conformance testing
- Dependencies within and between modules



General approach of the conformance testing (ISO 19105)

ISO 19123-2 – Geographic information — Schema for coverage geometry and functions - Part 2: Coverage implementation schema

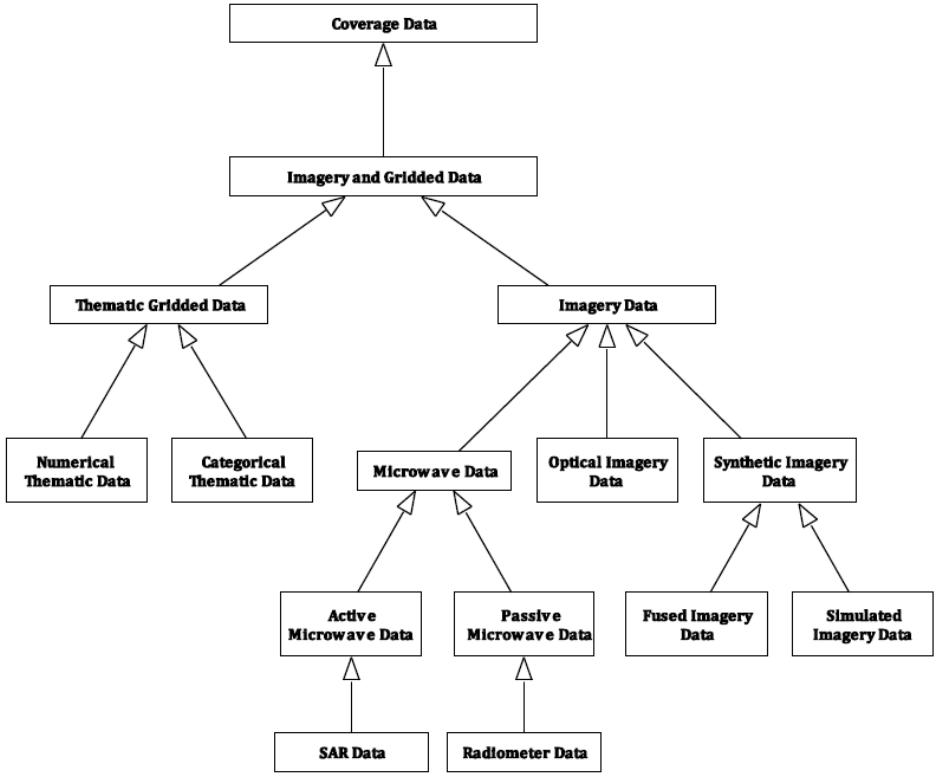
- Implementable, conformance-testable coverage structure
  - also know as OGC CIS 1.0
- Based on abstract coverages (ISO 19123)
- Suitable for many encoding formats.



The coverage structure (OGC CIS 1.0)

ISO/TS 19163-2 – Geographic information — Content components and encoding rules for imagery and gridded data — Part 2: Implementation schema

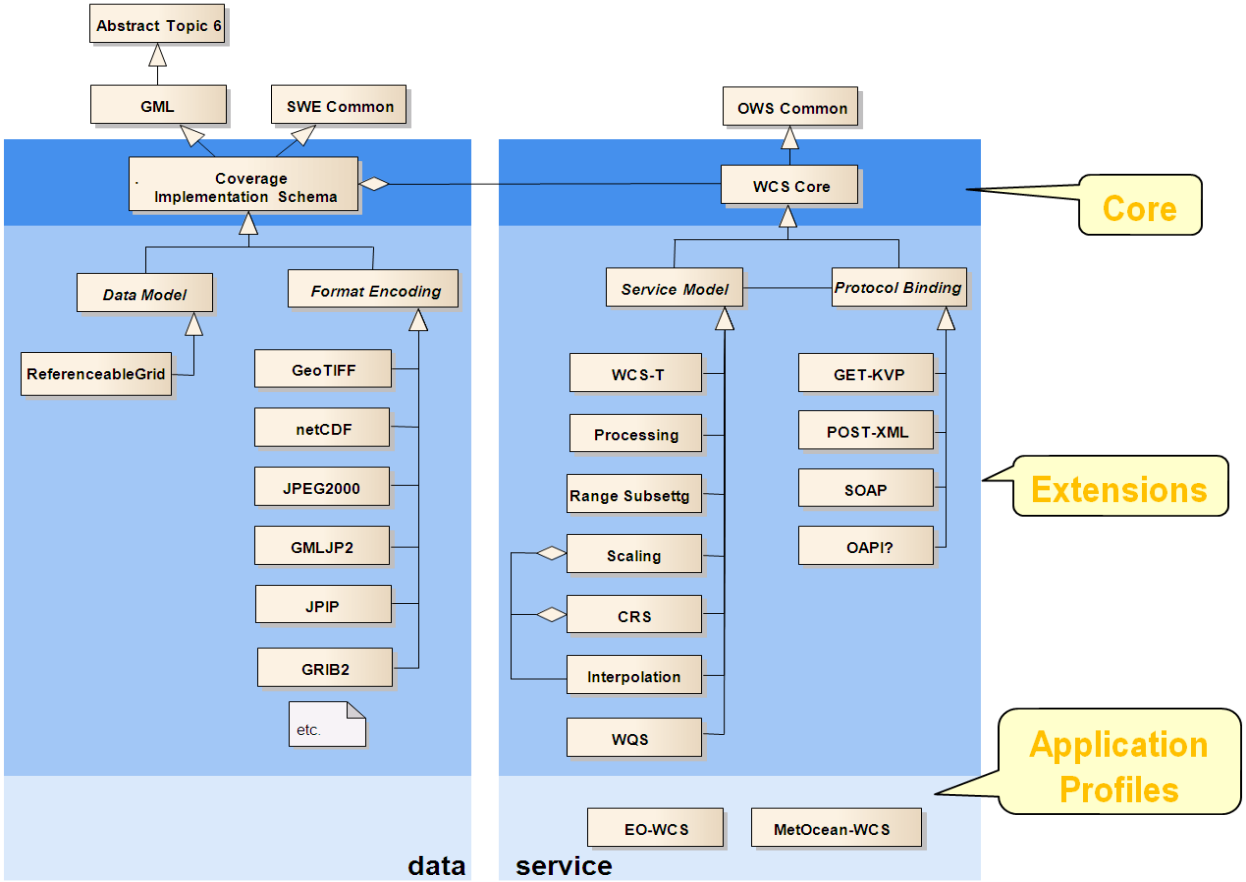
- Based on ISO/TS 19163-1
- Suitable for binding content components and specific encoding formats
- Binding structure as defined in ISO 19123-2



Categories of imagery and gridded data (ISO 19163-1)

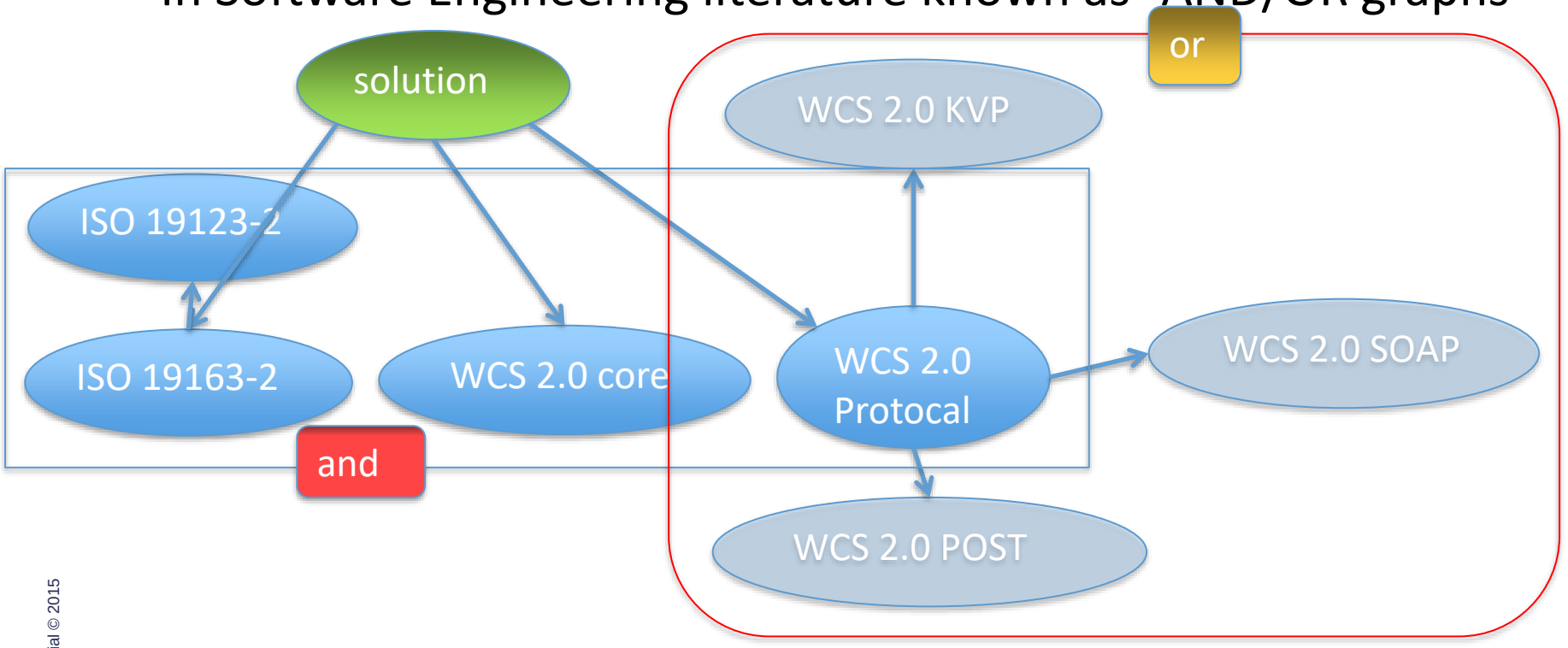
OGC WCS 2.0 Series

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



Dependencies

- Dependencies sometimes of type “all required“, sometimes ”t 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 exsisting 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!