Development of the INSPIRE Test Framework and Executable Test Suites

INSPIRE Validation Workshop – 2/3 June 2016

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Serving society
Stimulating innovation
Supporting legislation

Scope and objectives

An ARE3NA project
- Contractors: PwC and interactive instruments
- Until mid 2017
- Support and accelerate ongoing work in the MIG-T (MIWP-5)
- Conformance testing of INSPIRE Metadata, Network Services and Data Sets
- Currently different validators with different tests are used in Member States
- Development of a reusable, open source, reference validator
- Offering configurable software and test rules for organisations to test conformance
- Build upon existing solutions to create a 'reusable' testing infrastructure for INSPIRE

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Approach

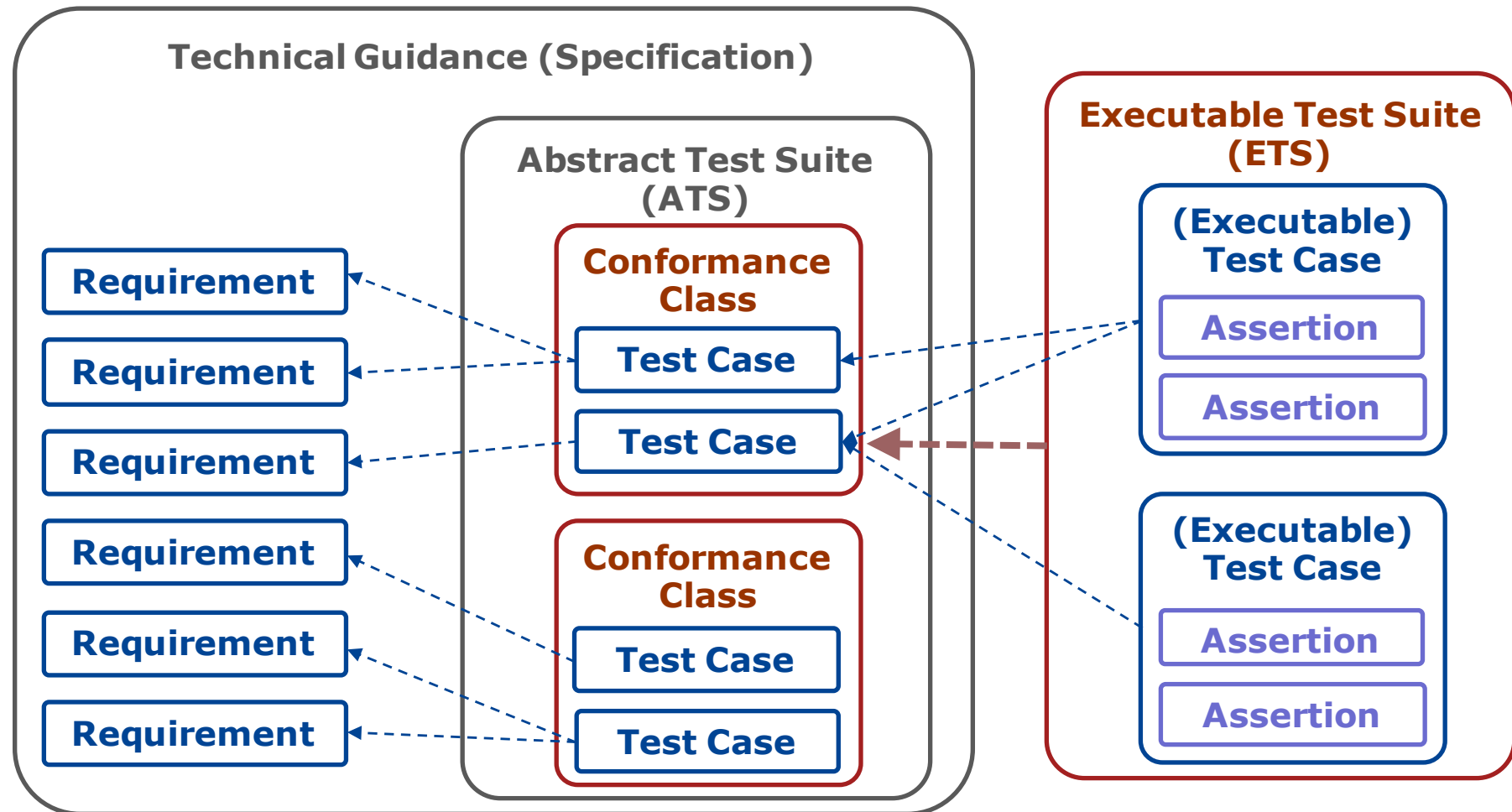**Requirements** are (must be) clearly stated in the **specifications**
- Requirements are stated in the TGs
- TGs should group the requirements into conformance classes
- TGs specify implementation options for the IRs

Test cases covering all requirements are organized in **Abstract Test Suites** and agreed by the MIG-T / MIWP-5

Executable tests are implemented for the agreed Abstract Test Suites
- On a sufficiently detailed level to interact with the test object
- Testing all assertions included in a test case
- Executable tests are executed in a test engine supporting one or more test languages

Terminology, Part 1

Technical Guidance (Specification)

Abstract Test Suite (ATS)

Executable Test Suite (ETS)

Requirement

Requirement

Requirement

Requirement

Requirement

Requirement

Conformance Class

Test Case

Test Case

Conformance Class

Test Case

Test Case

(Executable) Test Case

Assertion

Assertion

(Executable) Test Case

Assertion

Assertion

Requirements for the INSPIRE Test Framework

- Initial requirements, use cases and ideas gathered in MIWP-5 Validation & conformity subgroup
- Key requirements for the first version of the INSPIRE validator determined in the *MIWP-5 Briefing and Planning meeting on INSPIRE validator implementation* with JRC and MIWP-5 subgroup leaders in December 2015
- Key requirements will be implemented in this project
- Additional requirements with a lower priority may not be realized within the project, but may be subject to future developments

User expectations (Must)

Description
I can validate a Test Object against a set of Executable Test Suites selected by me
I can use a central deployment of the validator to test a Test Object
I can use a local deployment of the validator in my network to test a Test Object
I get informed about the progress of a Test Run and the Test result in useful way
The Test Report includes text that I can copy into the conformance section of the metadata of the spatial data set, service or metadata
I can use the tests in my production and publication workflow using an API
I can add my own Executable Test Suites for INSPIRE extensions / profiles that I want to support

User expectations (Should/Could/Would)

Description
I can validate a Test Object against a subset of the test cases in an Executable Test Suite where the subset is selected by me
I can test a Test Object against all applicable Executable Test Suites that are in force
I can share a Test Report using a hyperlink to it from metadata, websites, etc.
I can find the history of my Test Results
I can find who had similar issues
I can control who has access to my Test Results

Architecture requirements (Must)

Description
The INSPIRE Test Framework is deployable centrally and in the user's environment
The INSPIRE Test Framework is a generic test framework that can process *one or more* Executable Test Suites
The INSPIRE Test Framework and the INSPIRE Executable Test Suites are open source
The INSPIRE Test Framework supports different Test Engines in order to validate different types of Test Objects: • Support for tests on XML data sets (potentially very large) • Support for tests on XML metadata records (smaller documents, together with the network service tests) • Support for general conformance tests on network services (profiles of OGC Web Services, ATOM feeds)

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Architecture requirements (Must)

Description
The INSPIRE Test Framework can be controlled through GUI and API
The INSPIRE Test Framework provides test progress information during Test Runs
The domain model of the relevant artefacts (Abstract and Executable Test Suites, Test Objects, Test Results, etc.) needs to be stable and agreed early
Support validation of a metadata record, download services and spatial data of the data themes of Annex I of the Directive

ETS requirements (Must)

Description
Executable Test Suites should allow easy modification
Executable Test Suites are versioned on two levels; first, on the Conformance Class / Technical Guideline version; second, on the version of the Executable Test Suite for the Conformance Class / Technical Guideline version
Support classification of the severity (or weight) of each Test Assertion
Assertions in Executable Test Suites link to the Abstract Test Suites and the requirements they test

Reporting requirements (Must)

Description
Test Reports are provided in a human-readable representation (HTML)
Test Reports are provided in a machine-readable representation (XML or JSON)
Test Reports may be multilingual *(Text specified in the Executable Test Suites will be in English.)*
Test Results and Test Reports are time-stamped and include the version of the Executable Test Suite(s) *(There is an issue with the current data specifications where the schemas have changed from version 3 to 4, but the specification document has not changed. In general, if there is a new schema version with a new namespace, there needs to be an updated specification document, too.)*
Test Reports include links to the abstract test case, the executable test case and the IR/TG requirements for test cases with errors / warnings

Central deployment

LMO, SDI User

- Software
- User
- **Service**
- **Data Set**

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INSPIRE validator

INSPIRE Test **Framework**

ETS   ATS
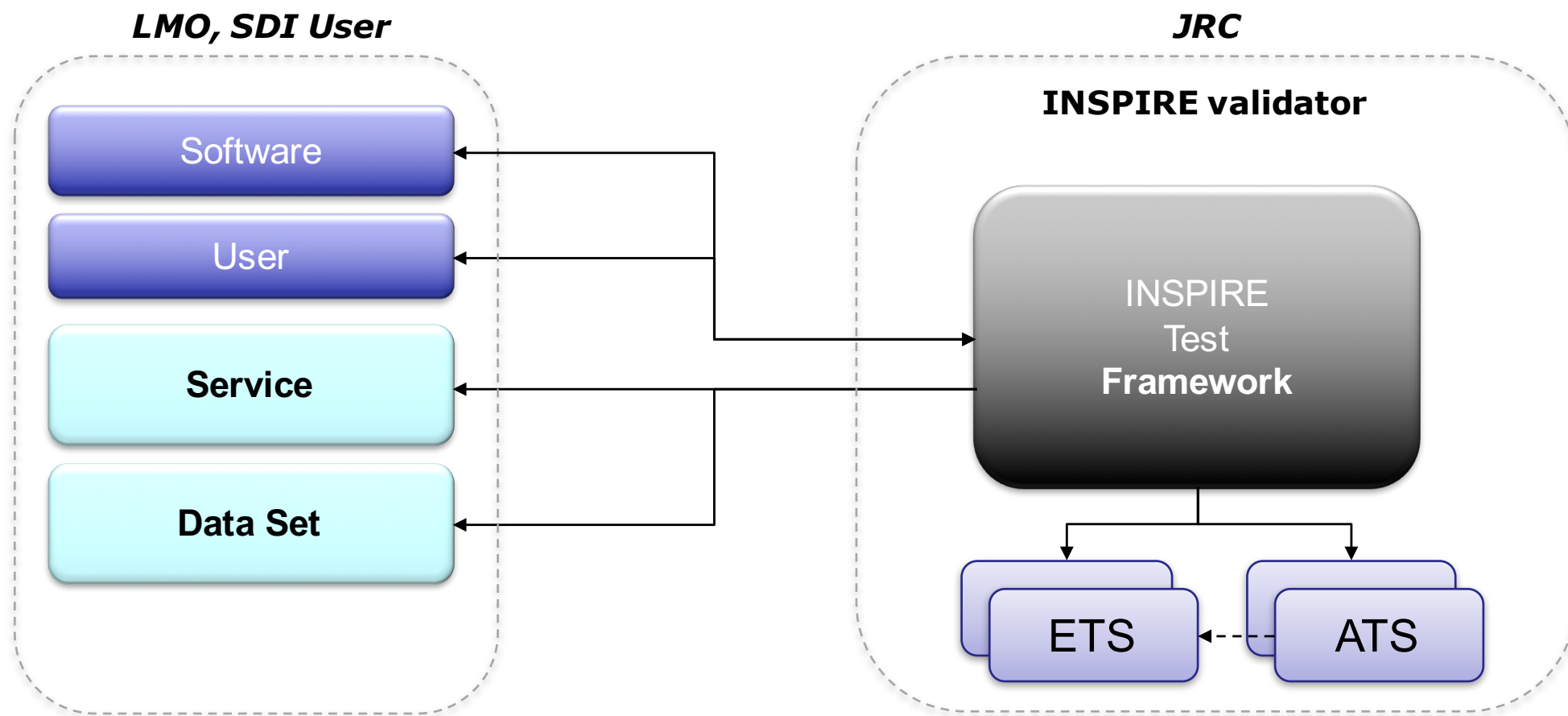
Local deployment, e.g. by an LMO

LMO
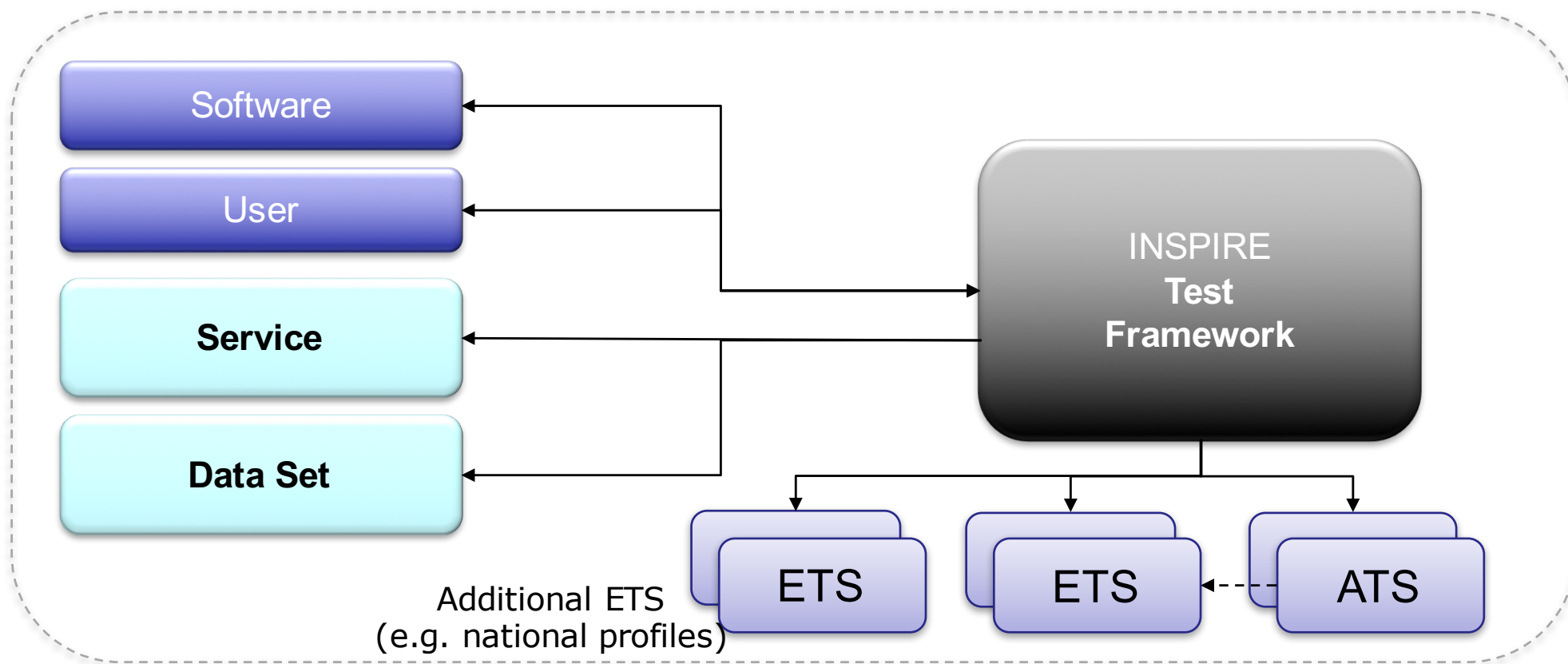
Specification Test Framework Test Suites

Requirements

Initial Design

ATS

now

Demonstrator

Baseline Design

06/2016

Alpha release

ETS
(1 theme,
1 DLS, MD?)

08/2016

Testing and Validation

Updated Design

Incremental releases

ETS
(...)

Release 1.0

ETS
(Annex I,
3 DLS, MD, +)

03/2017

Joint Research Centre
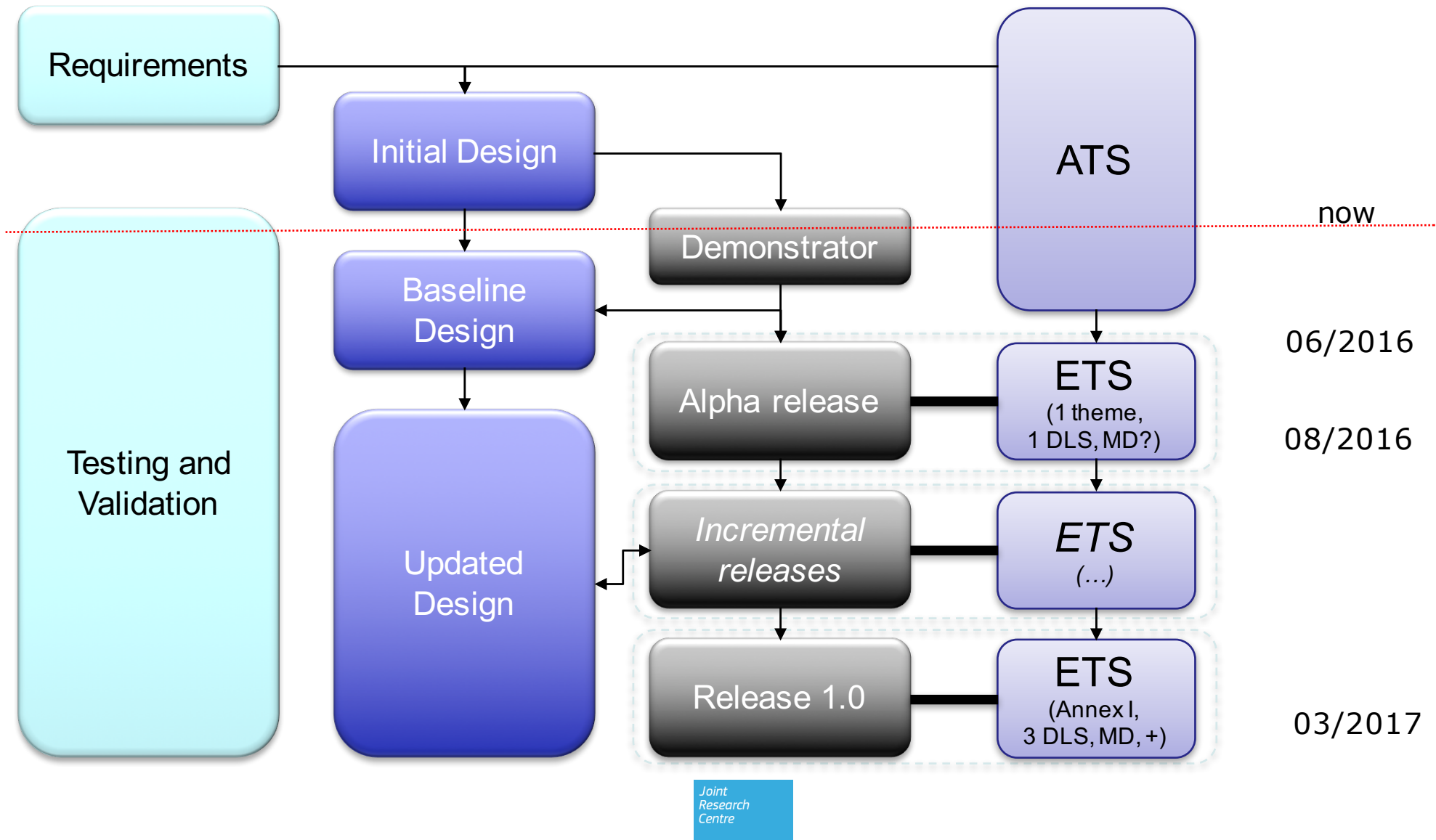
Planned collaboration with MIG-T

Input from MIG-T - through the MIWP-5 sub-group:

- Feedback on requirements and design
- Provision of test objects (data, metadata, network services) for testing the Test Framework and its Executable Test Suites
  - Potentially also for use in unit tests
- Testing of draft releases

Lower priority, but very welcome:

- Development of an Executable Test Suite, in particular if the test suite is not included in the list of test suites with the highest priority
- Contributions to the development of the Test Framework, in particular, if the implemented requirement is not part of key requirements
- Translations for linguistic texts used in the web application and the online documentation

Design Report

Initial Design
- Version 0.3, 12/04/2016
- Fairly complete design of the implementation
- Distributed to
  - MIG-T / MIWP-5 (link)
  - ISA GITB

Baseline Design
- Version 1.0 of the document
- Basis for development of the INSPIRE Test Framework

Joint Research Centre (JRC)

INSPIRE Test Framework - Design Report

Are3na Re3ference Platform

Date: 12/04/2016
Doc. Version: v0.3

PM²
PROJECT MANAGEMENT
METHODOLOGY

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Terminology, Part 2 (technical context)
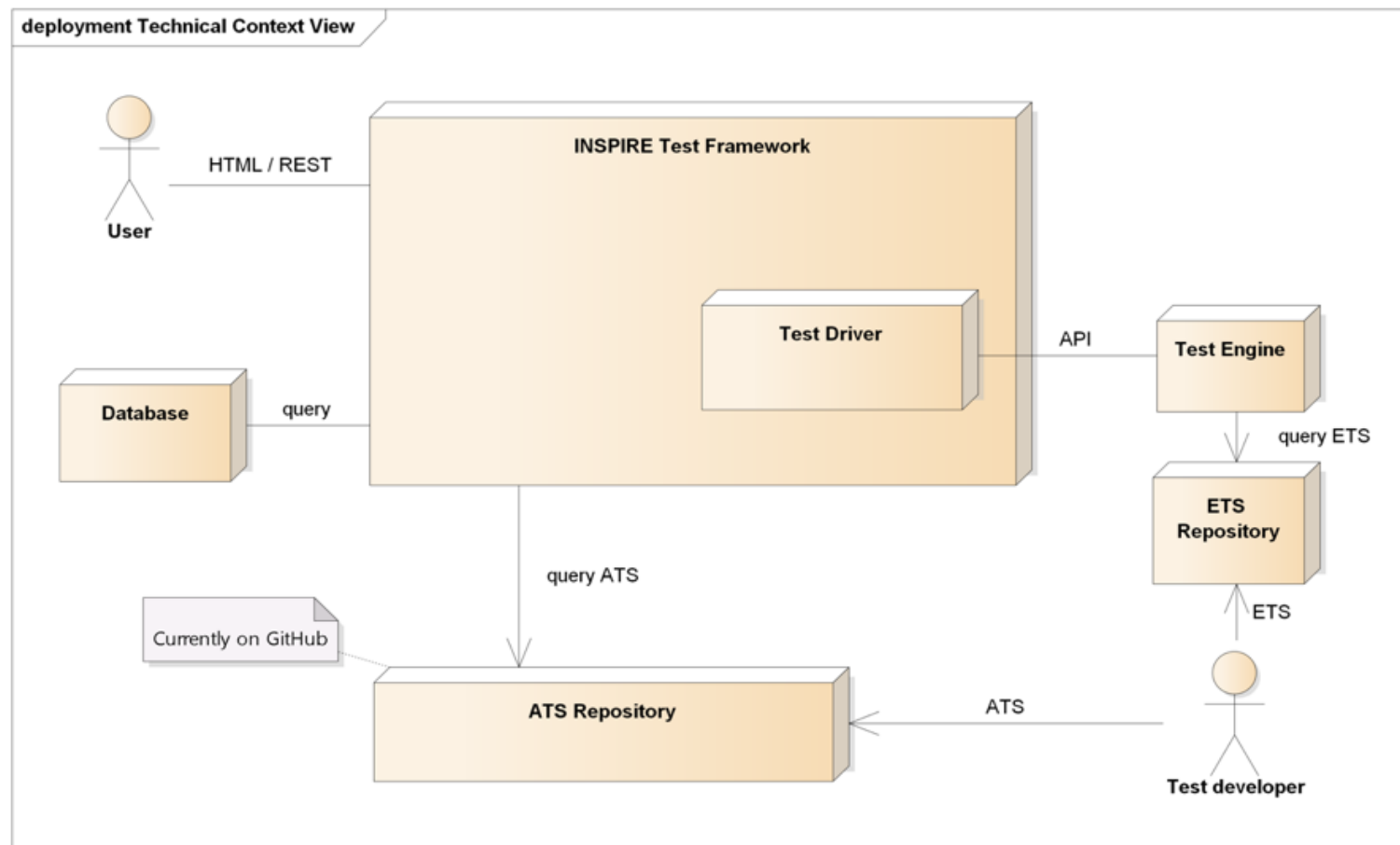
Initial Design: fairly complete and detailed

Components and APIs
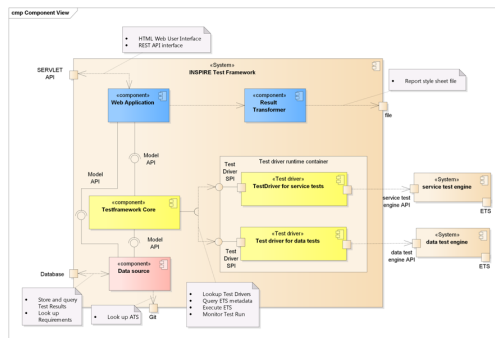
Component designs
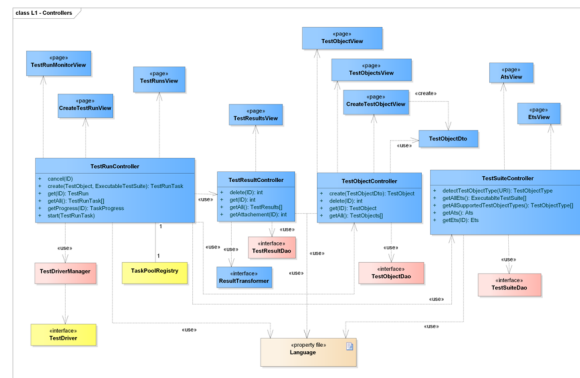
Domain model
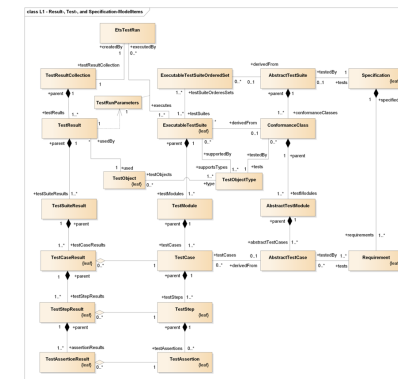
Internal control flow
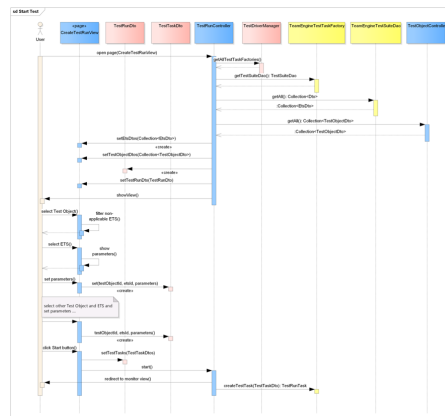
API workflow

GUI workflow
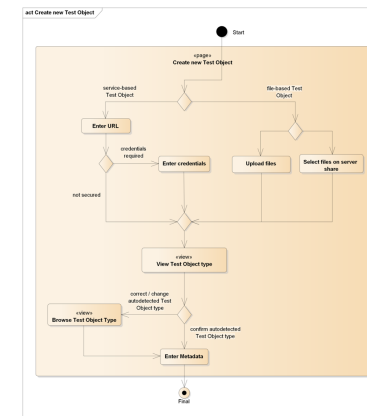
Initial design assumes that the ETF tool will be used as the basis of the INSPIRE Test Framework

Reasons:
- based on the concepts of ISO 19105 and the OGC specification model
- already meets many of the "must" requirements
- already supports test engines for validating web services (SoapUI) and very large XML document sets (BaseX)
- existing ETSs for INSPIRE view and download services (used e.g. in the Netherlands and the ELF project)
- candidate with which the authors of this document are most familiar with

More on ETF in ELF presentation

Key extensions to ETF planned

To support the INSPIRE Test Framework requirements:

- Extend and document API (REST interface)
- Conformance classes and ATS
- Multilingual reports
- Single test runs with multiple ETS which may depend on each other
- Test driver for TeamEngine (OGC CITE tests for WFS 2.0 and GML 3.2)

New capabilities added for the INSPIRE Test Framework would be included in the ETF code base

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Planned ETS development

- Based on Abstract Test Suites

- Reuse of existing test suites
  - Integrate OGC CITE Tests not depending on a reference data set (currently: WFS 2.0 and GML 3.2) as basic tests
  - Use ETF tests for DLS + VS as starting point
    - WMS 1.3 / INSPIRE View Service
    - WFS 2.0 Pre-defined / INSPIRE Download Service
    - WFS 2.0 Direct Access / INSPIRE Download Service
    - ATOM INSPIRE Download Service
    - They need updates for the Abstract Test Suites

Planned ETS development

- Development of new test suites
  - Use BaseX/XQuery for tests on XML documents (GML, GMD)
  - Use SoapUI for web service tests

- Priorities
  - Metadata
  - Data sets (Annex I)
  - Download services

- First release now planned for August 2016

Work on ATS for Data Specifications together with a prototype ETS

Thank you