INSPIRE Reference Validator: status and next steps

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Bucharest, 28/08/2019

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FOSS4G BUCHAREST 2019 44.43555, 26.102347

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INSPIRE Directive

DIRECTIVE 2007/2/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL

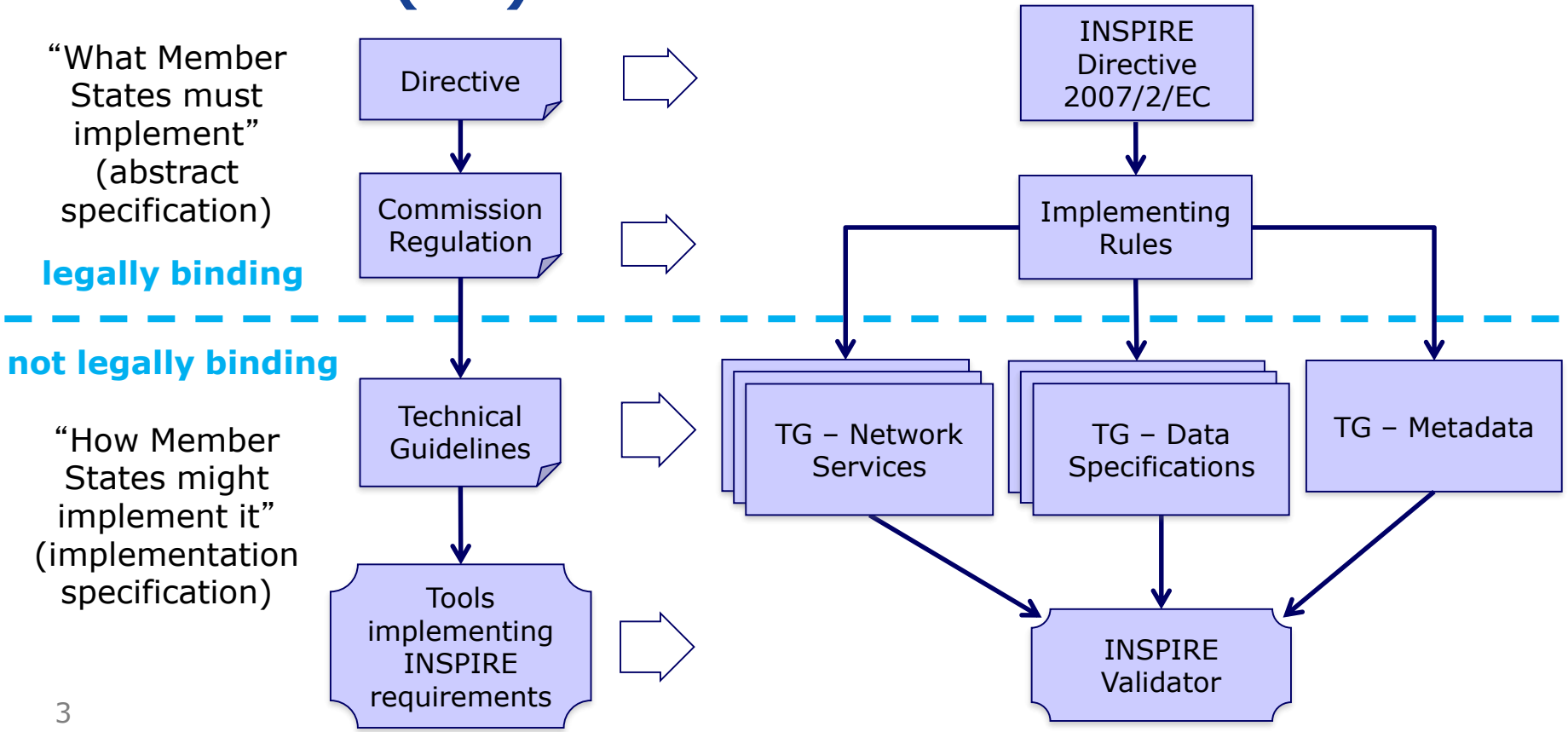
of 14 March 2007

establishing an Infrastructure for Spatial Information in the European Community (INSPIRE)

- Aims to create a European SDI for the purposes of EU environmental policies.
- Provides a comprehensive framework for interoperability of spatial data:
  - inventory (monitoring of implementation)
  - data & service sharing
  - data & service discovery (metadata)
  - network services
  - data interoperability
- based on the SDIs established and operated by the EU Member States

https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX:32007L0002

Implementing Rules (IR), Technical Guidelines (TG) and tools



INSPIRE Reference Validator

- Reasons to develop a common validator:
  - help Member States data providers test resources (metadata, data sets and network services) against INSPIRE requirements
  - help INSPIRE coordinators (DG ENV, JRC & EEA) and national coordinators check INSPIRE implementation progress in Member States & across Europe
    - support Monitoring and Reporting
  - help solution providers check their software solutions against INSPIRE requirements
  - align existing validation services in JRC and some Member States
    - need for consistent results & exploit synergies
- Supported by ARE3NA & ELISE actions under ISA/ISA^2 programmes

 http://inspire.ec.europa.eu/validator/about

INSPIRE Reference Validator – Components

European Commission

INSPIRE Reference Validator – Components

INSPIRE Technical Guidelines (TG)
requirements for all INSPIRE resources

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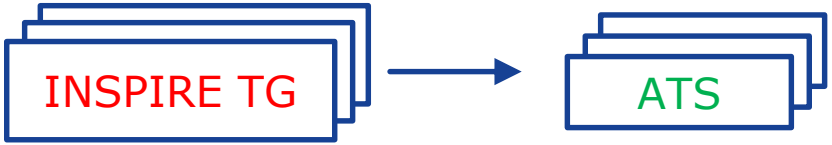
INSPIRE Reference Validator – Components

Abstract Test Suites (ATS)

high-level descriptions of test cases



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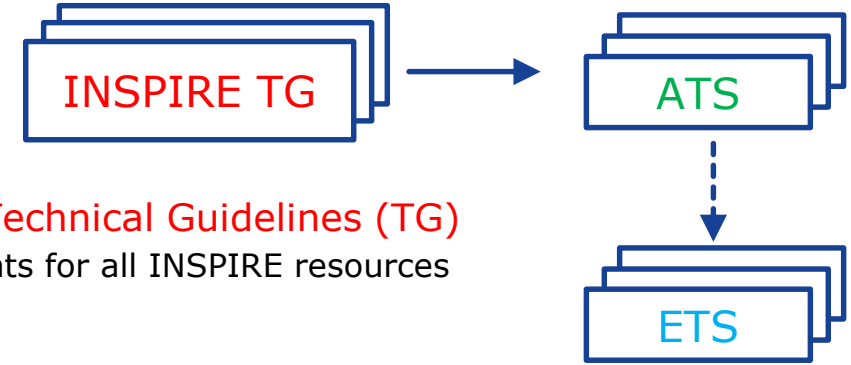

INSPIRE Technical Guidelines (TG)

requirements for all INSPIRE resources

Executable Test Suites (ETS)

lower-level descriptions of test cases

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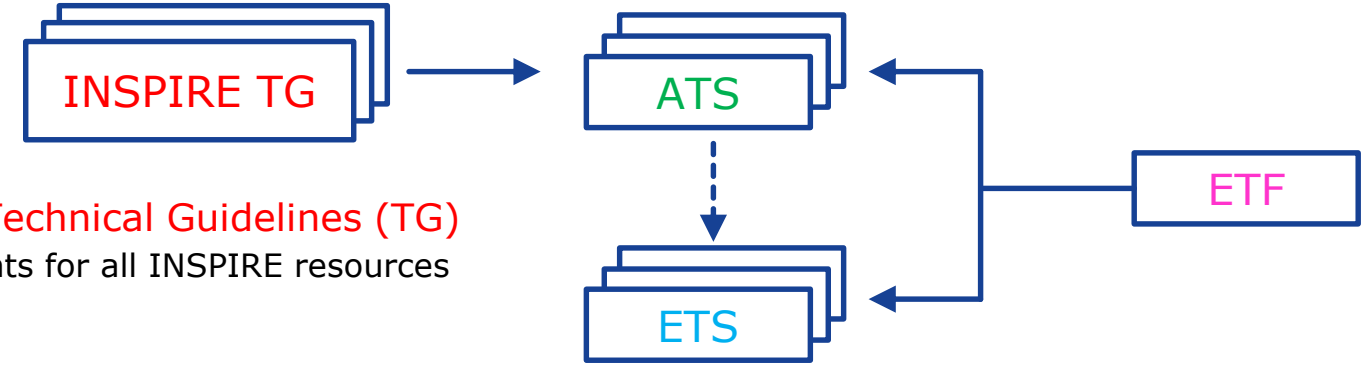
INSPIRE Reference Validator – Components

Abstract Test Suites (ATS)
high-level descriptions of test cases

Testing Framework (ETF)
software where ETS are run



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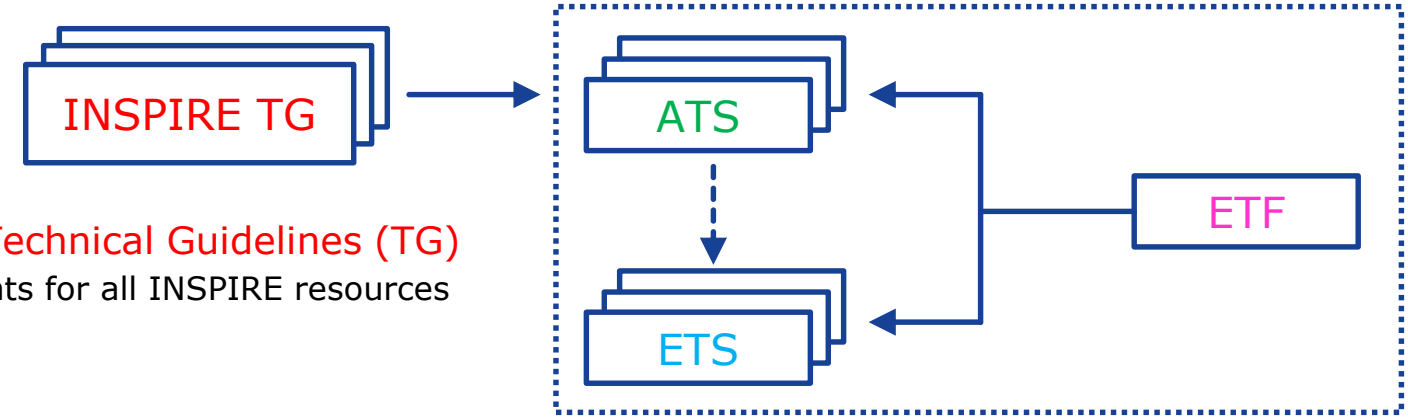

INSPIRE Technical Guidelines (TG)

requirements for all INSPIRE resources

Executable Test Suites (ETS)

lower-level descriptions of test cases

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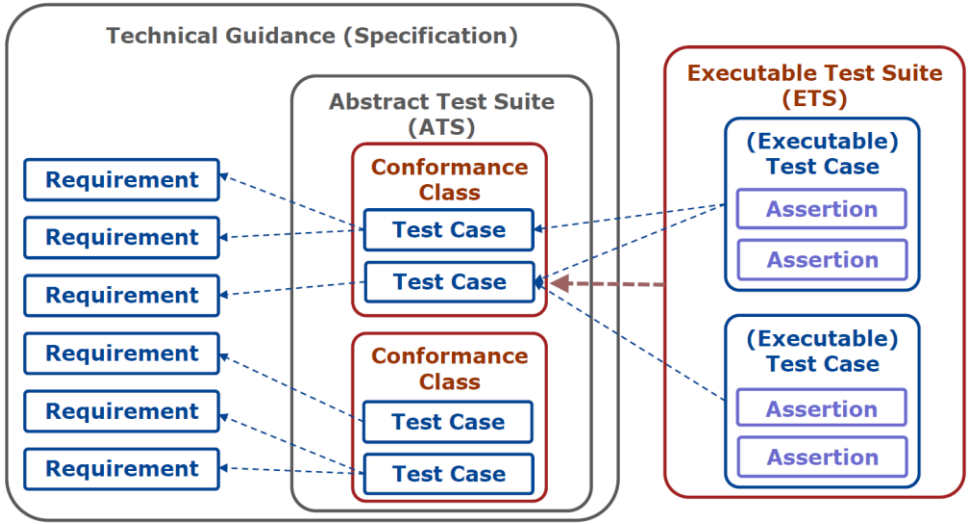
Abstract & Executable Test Suites (ATS, ETS)

- Test cases covering all requirements of INSPIRE TG are organized in ATS:
  - grouped in Conformance Classes
- Executable tests implemented for the agreed ATS:
  - testing all assertions included in each test case
- Agreed by the MIG-T through sub-group 2017.4 on validation and conformity testing



https://github.com/inspire-eu-validation

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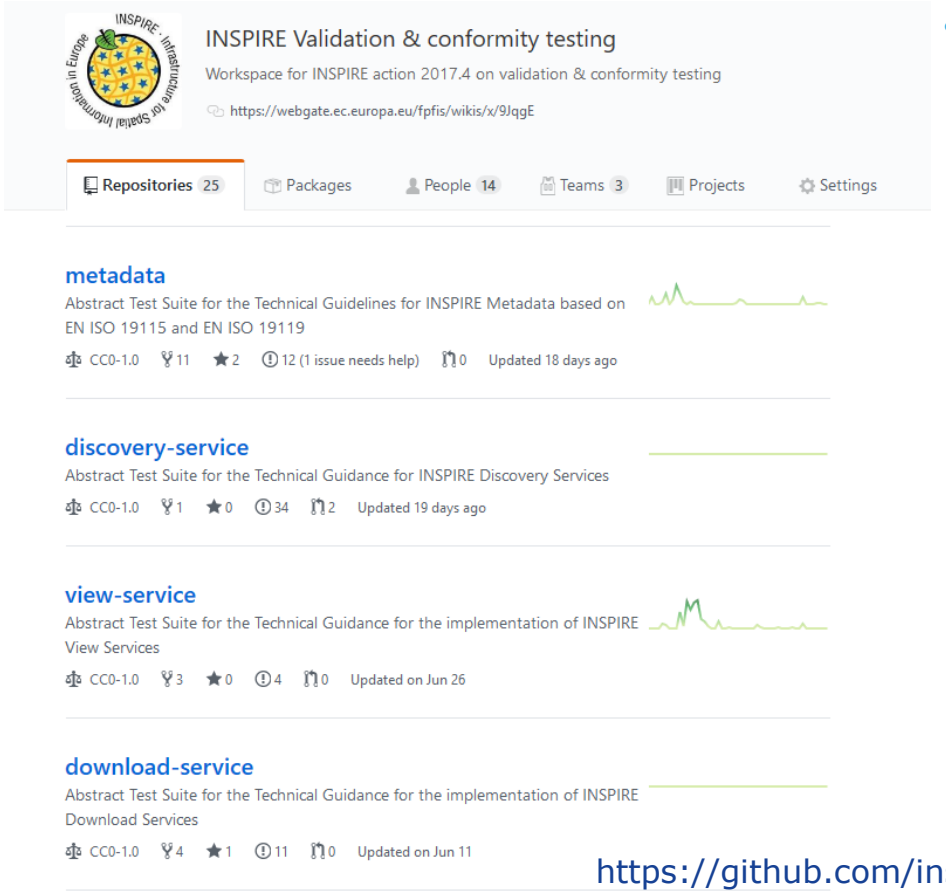
Abstract Test Suites (ATS)



- All the ATS are maintained on GitHub, licensed under CC0:
  - Metadata NEW (MD TG 2.0)
  - Discovery Services NEW
  - View Services NEW
  - Download Services NEW (WCS, SOS)
  - Data specifications
  - Data encoding
  - Annex I data specifications

https://github.com/inspire-eu-validation

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Abstract Test Suites (ATS) – Example

3.1.2.3 Spatial resolution

Spatial resolution refers to the level of detail of the data set. It shall be expressed as a set of zero to many resolution distances (typically for gridded data and imagery-derived products) or equivalent scales (typically for maps or map-derived products).

INSPIRE TG

6.2. Spatial resolution

Spatial resolution refers to the level of detail of the data set. It shall be expressed as a set of zero to many resolution distances (typically for gridded data and imagery-derived products) or equivalent scales (typically for maps or map-derived products).

An equivalent scale is generally expressed as an integer value expressing the scale denominator.

A resolution distance shall be expressed as a numerical value associated with a unit of length.

The [Regulation 1205/2008], Part B, 6.2 describes an element intended for describing this information: The multiplicity of this element as defined in [Regulation 1205/2008], Part C, Table 1 is zero or more, and it is "mandatory for data sets and data set series if an equivalent scale or a resolution distance can be specified."

TG Requirement 1.5: metadata/2.0/req/datasets-and-series/spatial-resolution

Spatial resolution for data set or data set series shall be given using either equivalent scale or a resolution distance, provided that these have been specified for the described data sets. If both ways have been specified, only one of the ways shall be used.

The spatial resolution as equivalent scale shall be encoded using *gmd:spatialResolution/gmd:MD_Resolution/gmd:equivalentScale/gmd:MD_RepresentativeFraction/gmd:denominator/gco:Integer* element.

The spatial resolution as resolution distance shall be encoded using *gmd:spatialResolution/gmd:MD_Resolution/gmd:distance/gco:Distance* element.

The multiplicity of this element is 0..n.

Spatial Resolution

Purpose: Test that the spatial resolution is defined using either an scale or a distance resolution.

Prerequisites

Test method

ATS

- For every Spatial Resolution,
  - Check that Equivalent Scale or Distance element exists.
- Check that all the Spatial Resolution children are either Equivalent Scale or Distance but not both.
- If any of the checks fails, the test fails.

Reference(s)

- TG MD 3.1.2.3, Req 1.5

Test type: Automated

Notes

The multiplicity of this element is zero or more.

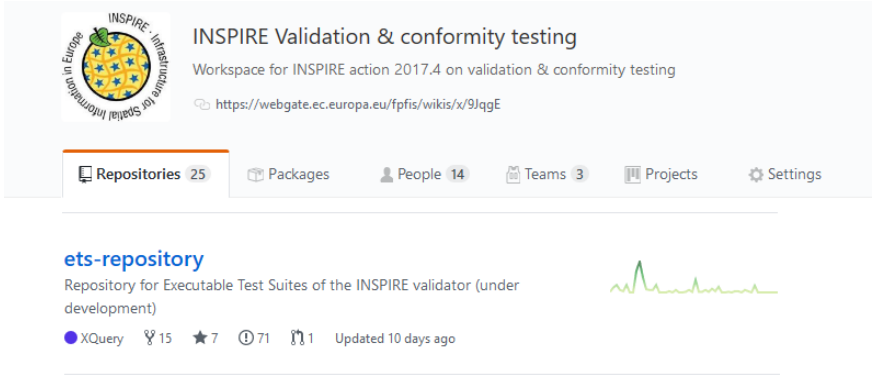
Contextual XPath references

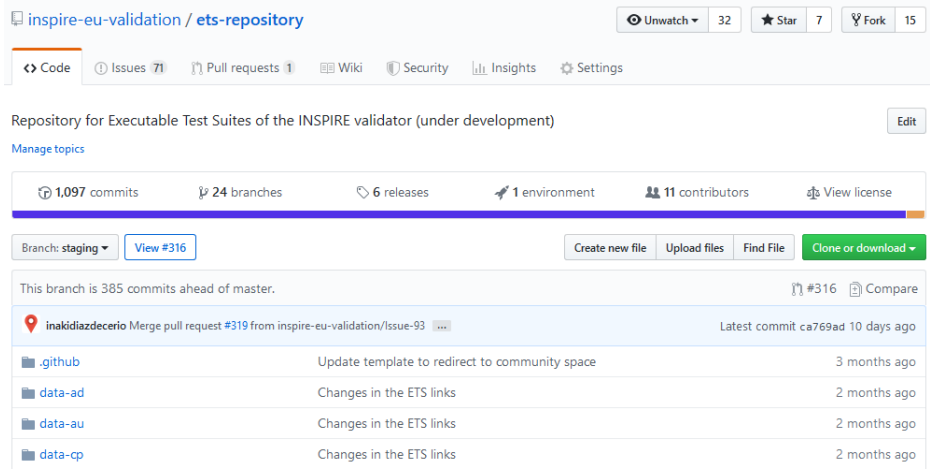
The namespace prefixes used as described in README.md.

Abbreviation	XPath expression (relative to /gmd:MD_Metadata/gmd:identificationInfo /gmd:MD_DataIdentification/gmd:spatialResolution)
Spatial Resolution	/gmd:MD_Metadata/gmd:identificationInfo/gmd:MD_DataIdentification/gmd:spatialResolution
Equivalent Scale	gmd:MD_Resolution/gmd:equivalentScale
Distance	gmd:MD_Resolution/gmd:distance

https://github.com/inspire-eu-validation/metadata/blob/2.0/datasets-and-series/spatial-resolution.md

Executable Test Suites (ETS)





- All the ETS are maintained on GitHub, licensed under EUPL v1.2:
  - Metadata NEW (MD TG 2.0)
  - Discovery Services NEW
  - View Services NEW
  - Download Services NEW (WCS, SOS)
  - Data specifications
  - Data encoding
  - Annex I data specifications

https://github.com/inspire-eu-validation/ets-repository

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Executable Test Suites (ETS) – Example

Spatial Resolution

Purpose: Test that the spatial resolution is defined using either an scale or a distance resolution.

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Reference(s)

- TG MD 3.1.2.3, Req 1.5

Test type: Automated

Notes

The multiplicity of this element is zero or more.

ATS

Contextual XPath references

The namespace prefixes used as described in README.md.

Abbreviation	XPath expression (relative to /gmd:MD_Metadata/gmd:identificationInfo /gmd:MD_DataIdentification/gmd:spatialResolution)
Spatial Resolution	/gmd:MD_Metadata/gmd:identificationInfo/gmd:MD_DataIdentification/gmd:spatialResolution
Equivalent Scale	gmd:MD_Resolution/gmd:equivalentScale
Distance	gmd:MD_Resolution/gmd:distance

ETS

```
<TestAssertion id="EID82a0442f-0185-4d6a-9b4e-0b7356613de7">
        <label>md datasets-and-series 1.5: Spatial Resolution</label>
        <description><![CDATA[<p>Test that the spatial resolution is defined using either an scale
        <p>More information: <a href="http://inspire.ec.europa.eu/id/ats/metadata/2.0/datasets-and-
        <parent ref="EIDc0a43a9d-c2bc-4ea7-a8bb-8e966700f141"/
        <expectedResult>NOT_APPLICABLE</expectedResult>
        <expression>
let $regex_integer := '(^\d{1,40}$)'
let $regex_float := '^-?\d+\.\d{2,}'
let $messages :=
        (for $record in $records
        let $countResolutions := count($record/gmd:identificationInfo[1]/*/gmd:spatialResolution)
        let $countScale := count($record/gmd:identificationInfo[1]/*/gmd:spatialResolution/gmd:MD_Resolutio
        let $countDistance := count($record/gmd:identificationInfo[1]/*/gmd:spatialResolution/gmd:MD_Resolu
        let $invalidScale :=
                for $x in $record/gmd:identificationInfo[1]/*/gmd:spatialResolution/gmd:MD_Resolution/gmd:e
                return
                if(matches($x/text(), $regex_integer)) then ()
                else $x
        let $invalidDistance :=
                for $x in $record/gmd:identificationInfo[1]/*/gmd:spatialResolution/gmd:MD_Resolution/gmd:d
                return
                if(matches($x/text(), $regex_float)) then ()
                else $x
        let $rid := $record/gmd:fileIdentifier/*/text()
        return
        if (($countResolutions &gt; 0) and ($countScale = 0) and ($countDistance = 0)) then
                local:addMessage('TR.noResolutions', map { 'filename': local:filename($record), 'id': $rid
        else if(count($invalidScale) != 0) then
                local:addMessage('TR.invalidScale', map { 'filename': local:filename($record), 'id': $rid,
        else if(count($invalidDistance) != 0) then
```

https://github.com/inspire-eu-validation/ets-repository/blob/2.0/metadata/2.0/datasets-and-series/sample_ets_2.0.xml

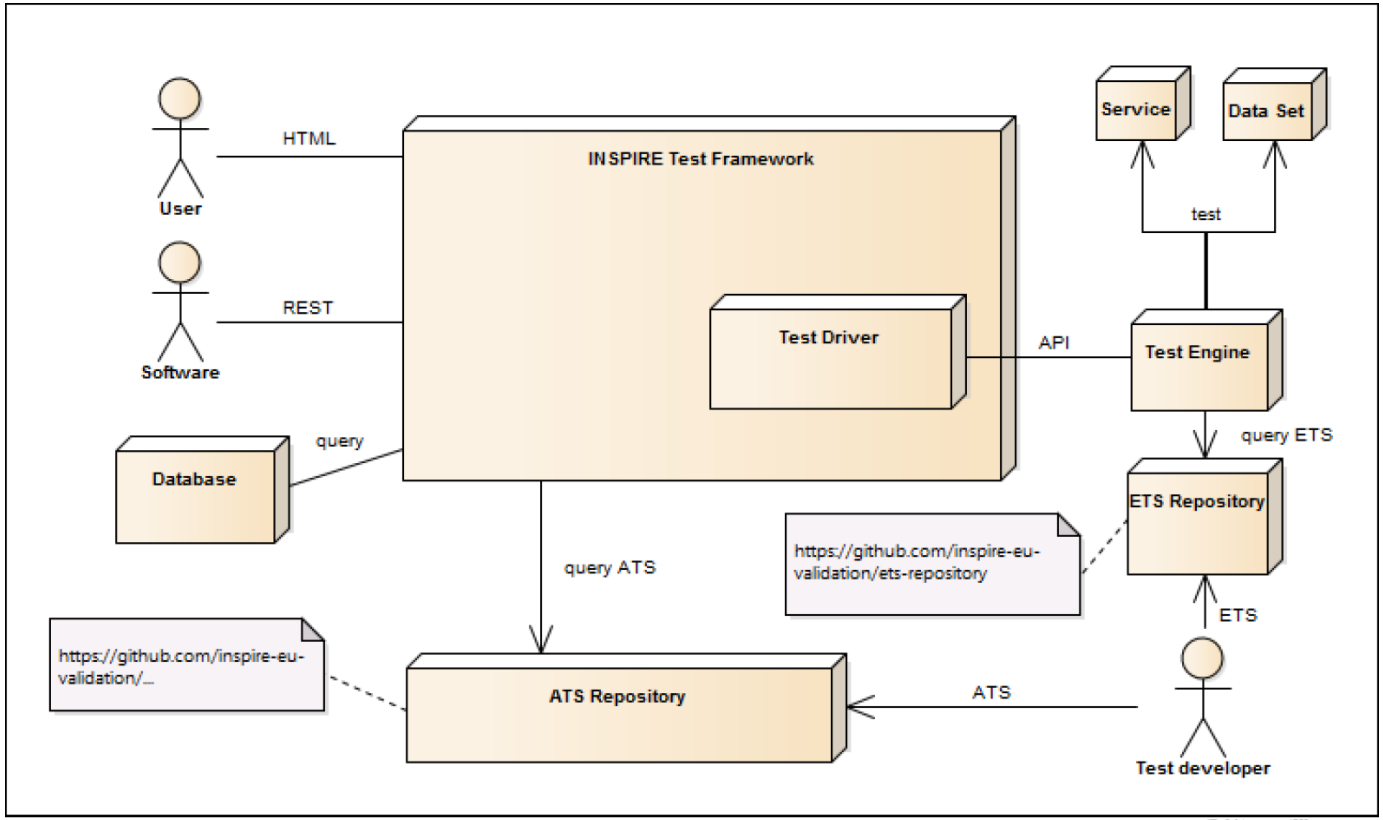
Testing Framework (ETF)

- A Testing Framework is a software to run ETS.
- INSPIRE Validator makes use and further extends ETF:
  - a testing framework to validate data, metadata & web services in SDIs
  - developed since 2010
  - open source under EUPL v1.2
  - current version: 2.0 (January 2019)
  - ETF design goals:
    - user-friendly
    - consistent with the standards (ISO/OGC)
    - capable of testing all resources in an SDI
  - manuals for users, developers and admins (http://docs.etf-validator.net)

Testing Framework (ETF)

- Any ETF deployment is composed of:
  - a database
  - one or more test engines
  - a servlet container
- Currently supported test engines to execute ETS are:
  - SoapUI for testing web services
  - BaseX for testing sets of XML documents
  - TEAM Engine – the tool used by the OGC CITE tests
- ETF can be used by:
  - a responsive web application (https://github.com/etf-validator/etf-webapp)
  - a REST API (http://docs.etf-validator.net/v2.0/Developer_manuals/WEB-API.html)
- The easiest way to deploy ETF is a Docker container, available on Docker Hub.

Testing Framework (ETF) – Technical context



https://etf-validator.net | https://github.com/etf-validator

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INSPIRE Validator – Web application

- 2 instances:
  - staging instance (http://staging-inspire-validator.eu-west-1.elasticbeanstalk.com/etf-webapp)
    - includes bug fixes & latest features for testing purposes
  - production instance (http://inspire.ec.europa.eu/validator)
    - includes only consolidated developments

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INSPIRE Validator – Web application

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    - includes bug fixes & latest features for testing purposes
  - production instance (http://inspire.ec.europa.eu/validator)
    - includes only consolidated developments
- Both instances deployed on the cloud:
  - improve performance
  - keep up with peaks of requests
  - minimize downtime on maintenance
    - horizontal & vertical scaling

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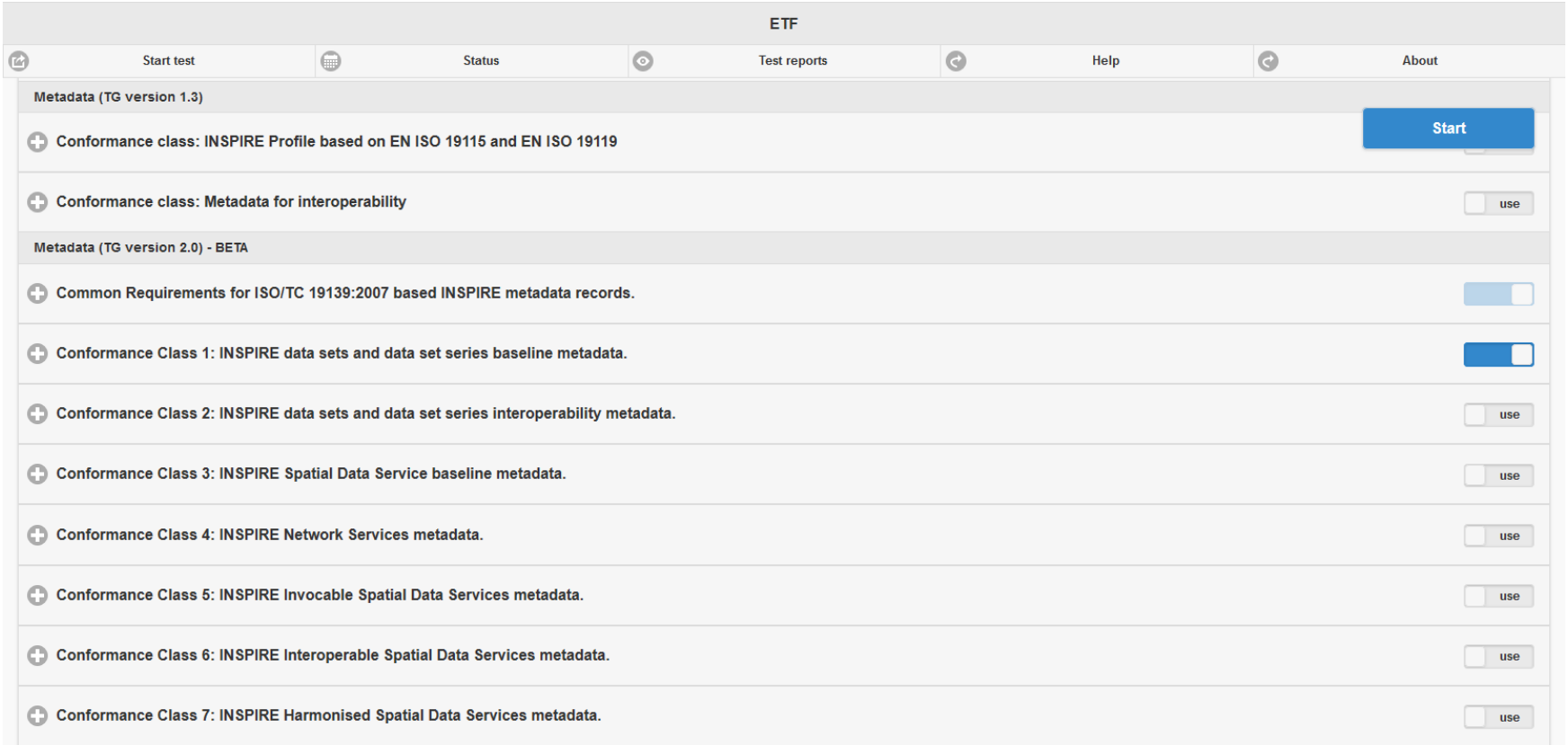
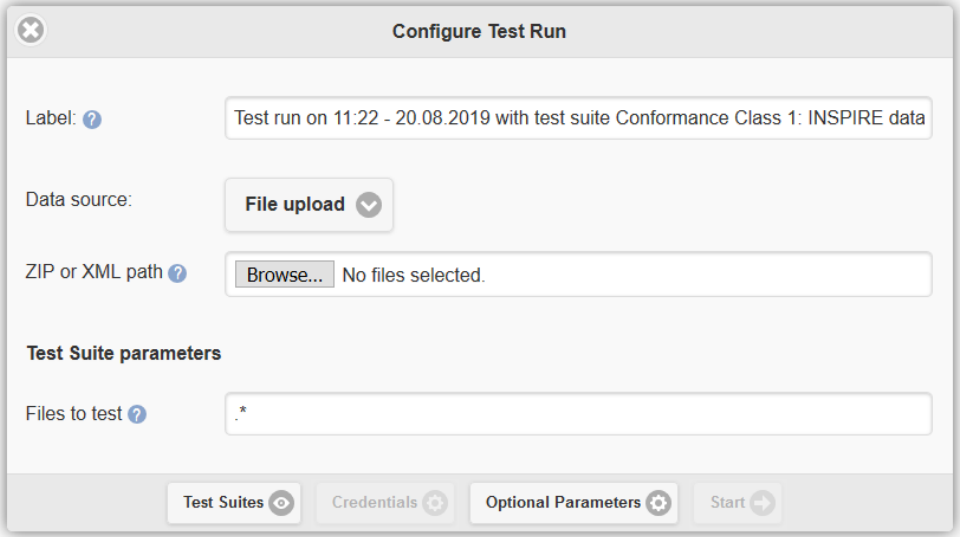
INSPIRE Validator – Web application

- Select the Conformance Class(es) to test:



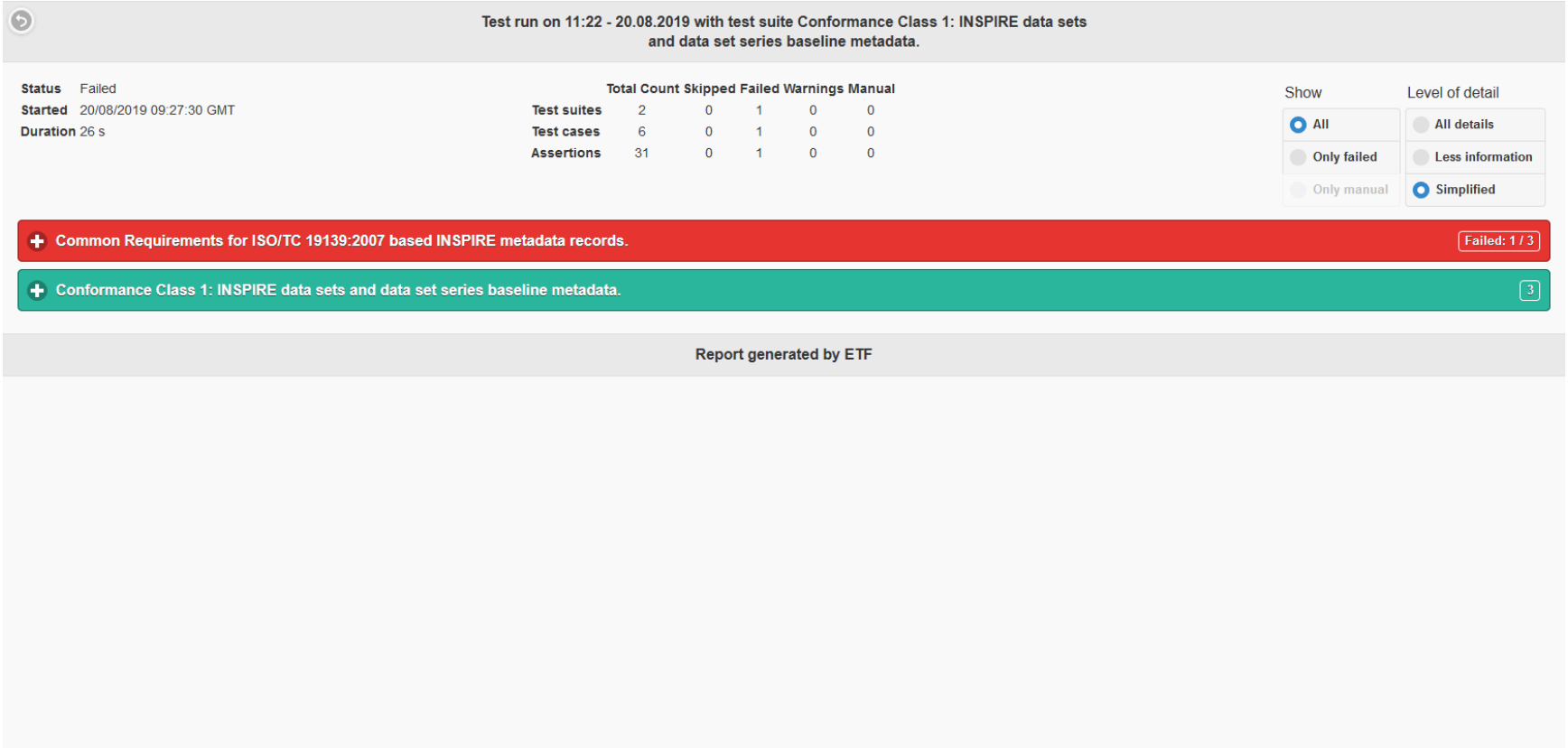
INSPIRE Validator – Web application

- Upload/link the resource to test:



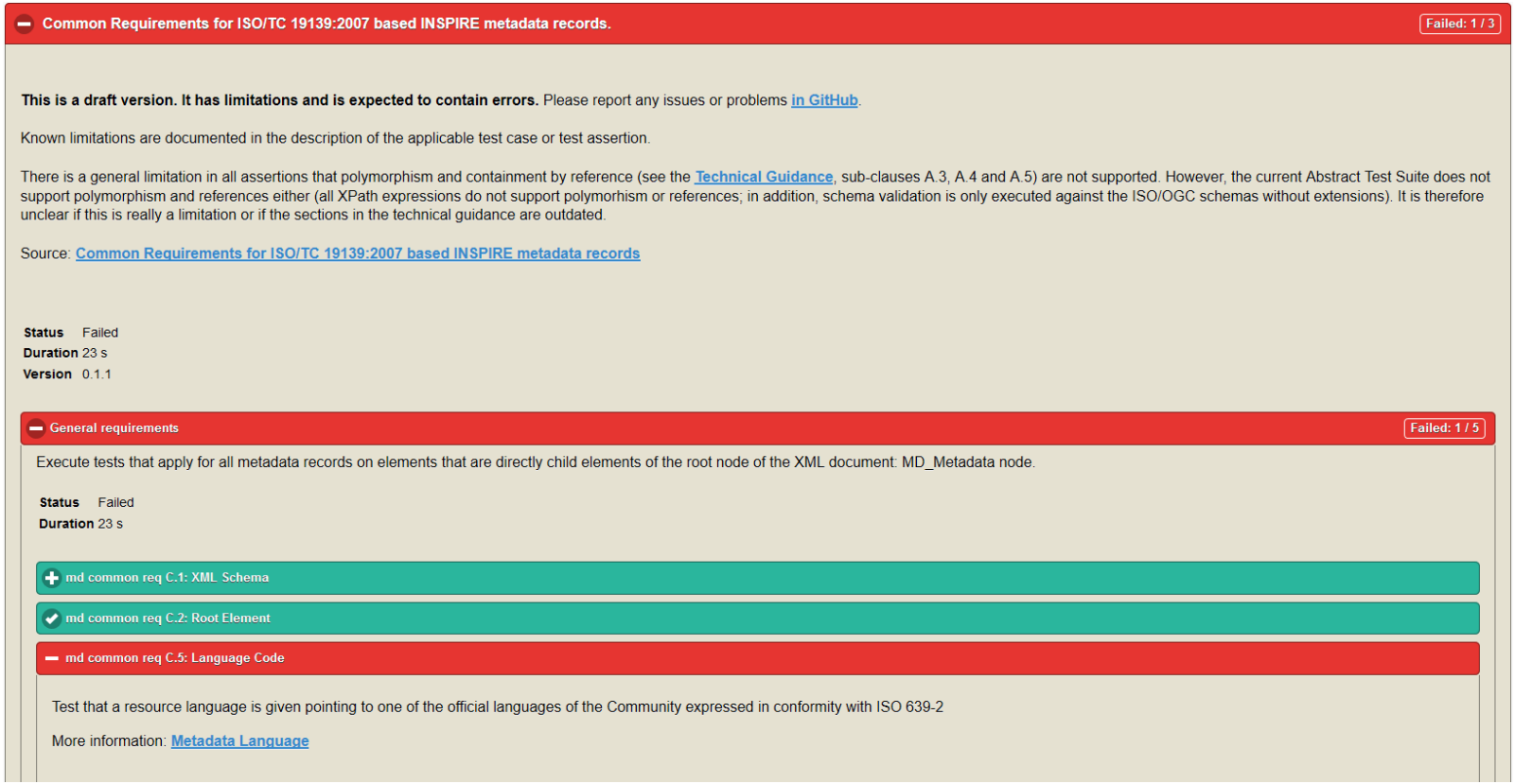
INSPIRE Validator – Web application

- Access the HTML test report:



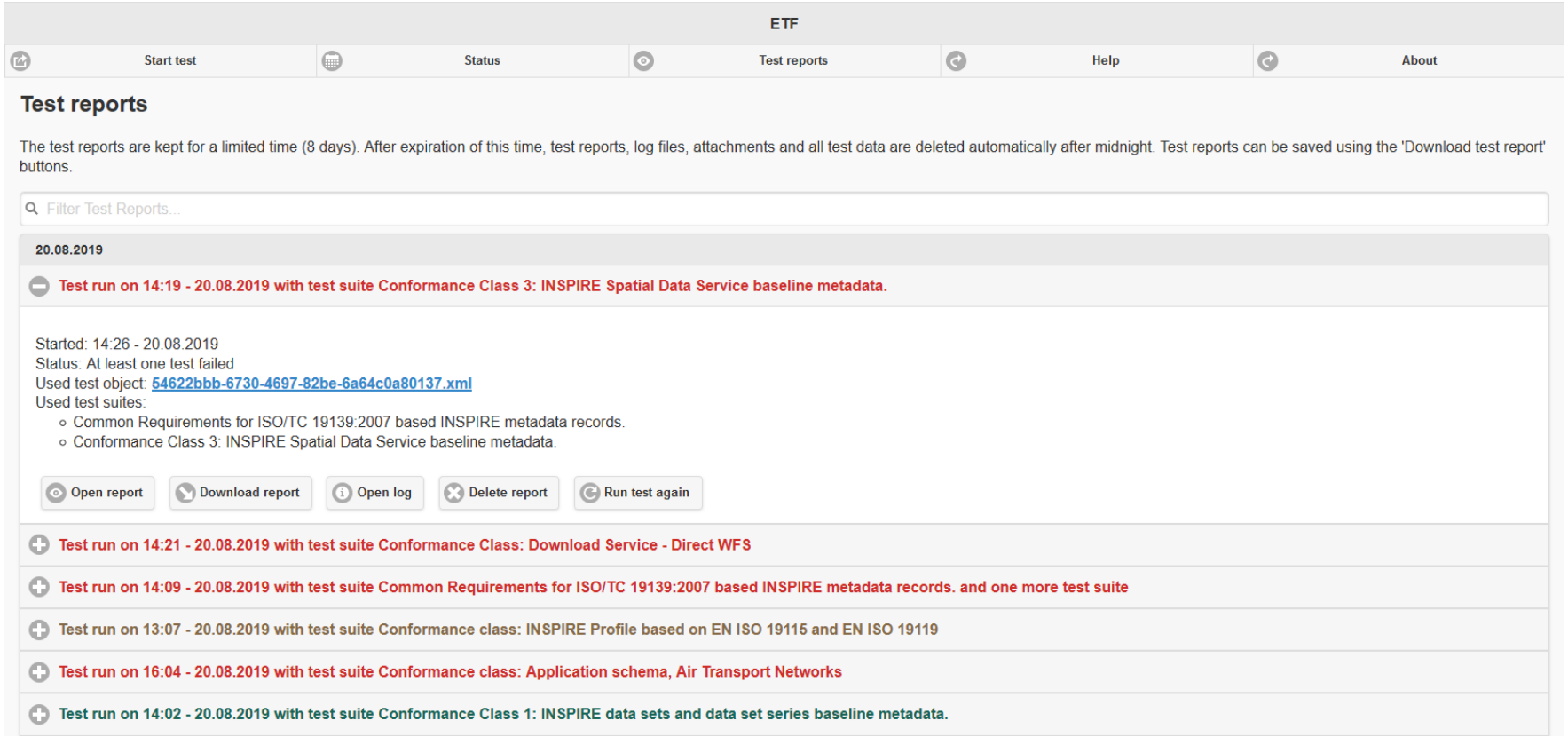
INSPIRE Testing Validator – Web application

- Access the HTML test report:



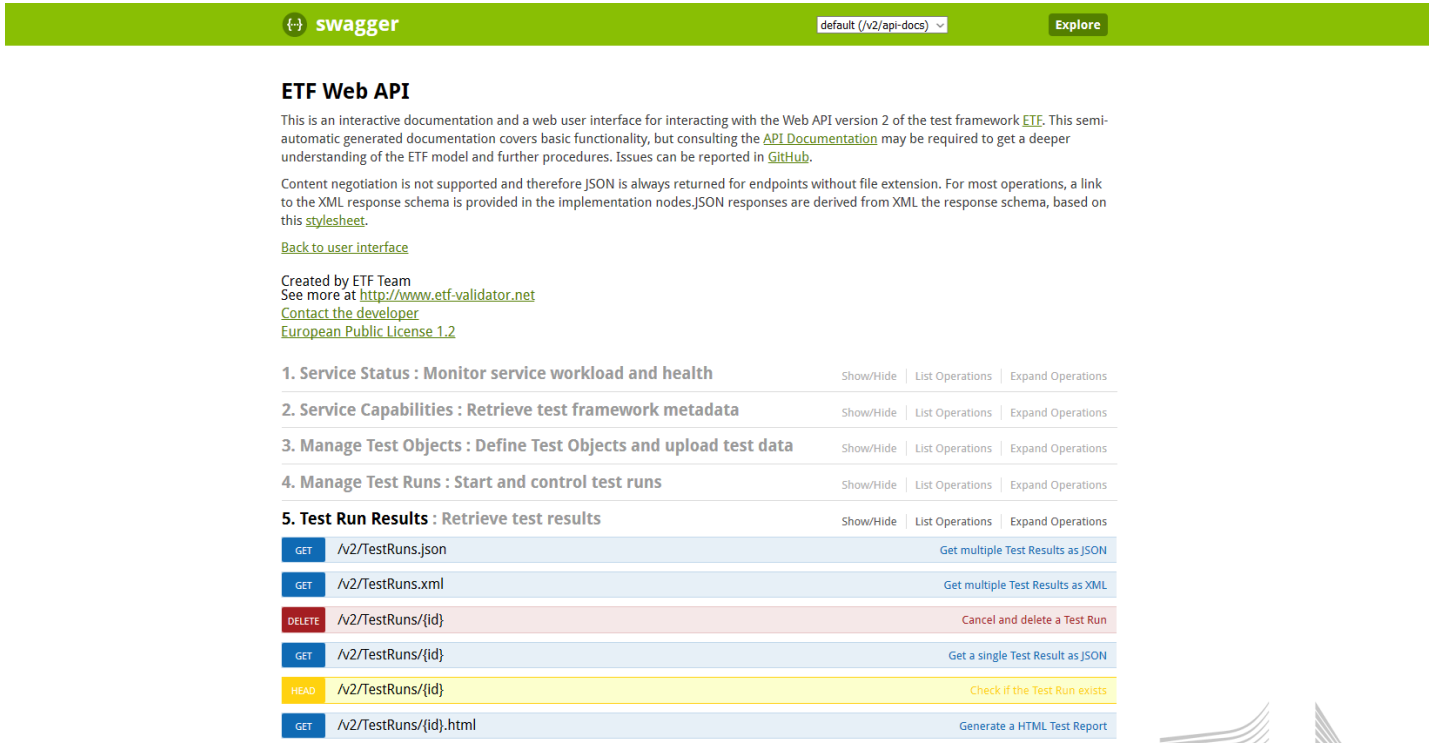
INSPIRE Validator – Web application

- Access the list of test reports:



INSPIRE Validator – REST API

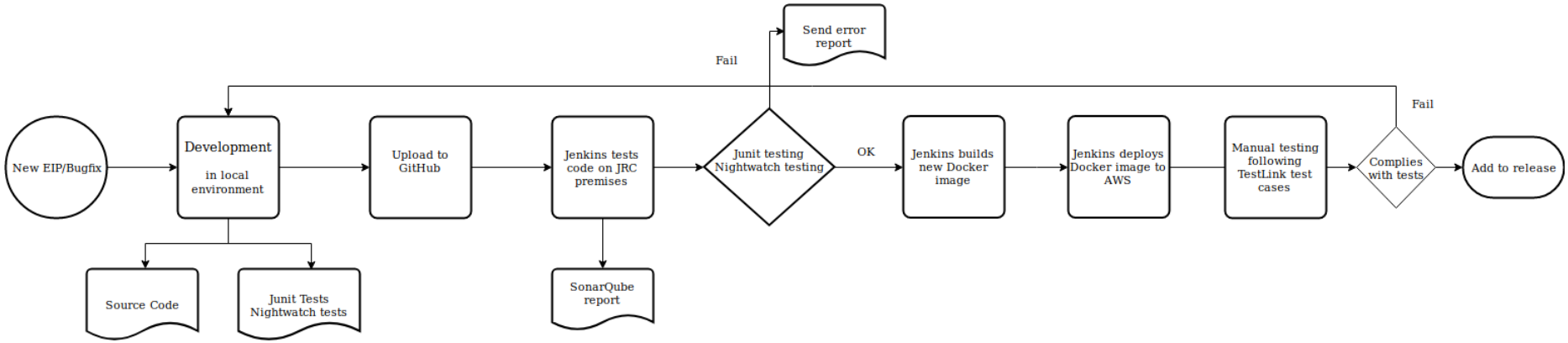
- Documented using OpenAPI:



http://inspire.ec.europa.eu/validator/swagger-ui.html

INSPIRE Validator – Future developments

- Continuous testing & integration of new ETS and ETF developments



- Provision of additional download formats for test reports (including PDF)
- Separation of automatic from manual tests in the test report
- Improvement in filtering test reports (by tags, date and conformance class)
- Provision of simplified ways to start tests

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INSPIRE Validator – Future developments

- Visual improvement of test reports with graphics

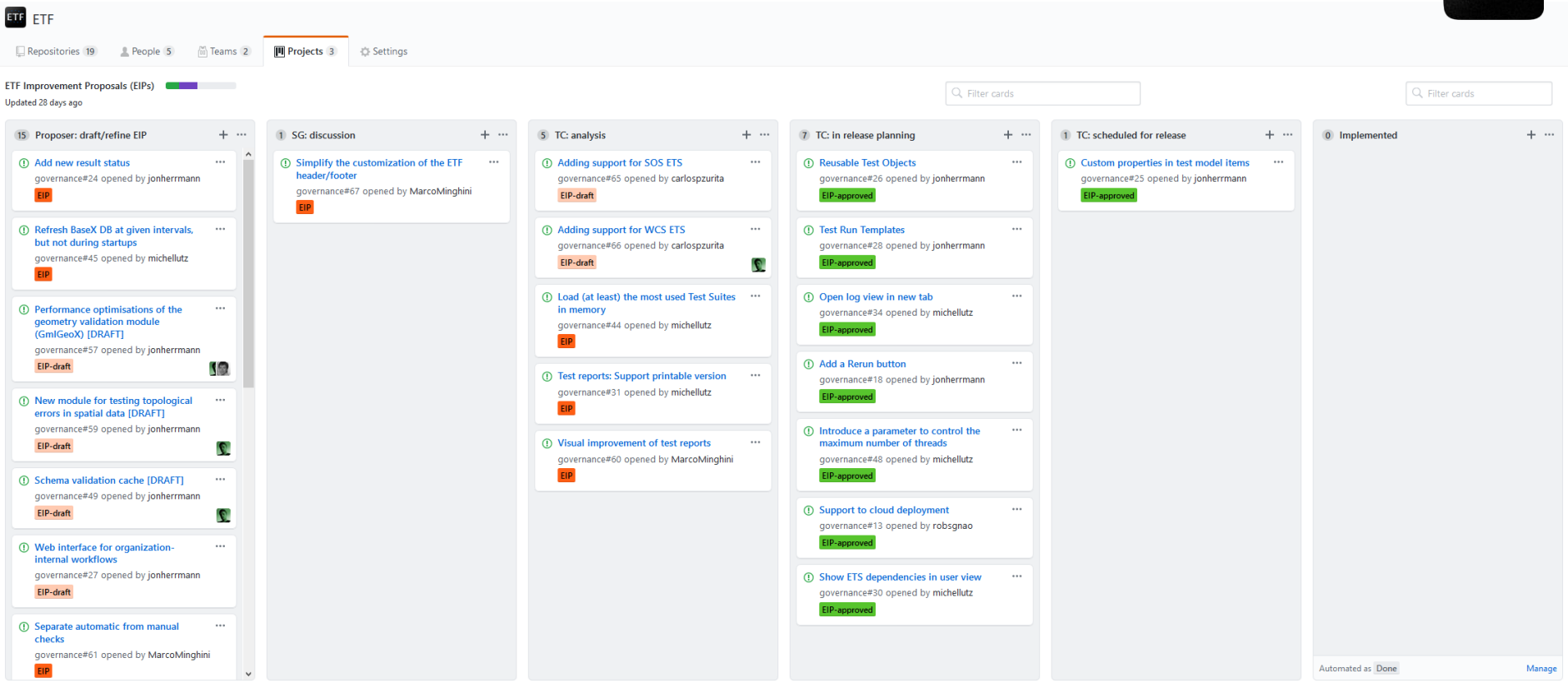
- Restyle of the web application UI in line with the EU Commission guidelines

Testing Framework (ETF) – Governance

- Steering Group (SG): Project Governance
  - very significant contributions: Organizations and Developers
  - voting system: consensus of all members (where possible)
  - inaugural members: JRC, interactive instruments
- Technical Committee (TC): Technical management
  - proven technical capacity over time
  - TC analyzes and propose candidates
  - SG assesses and accepts/rejects new TC members proposal
- Developers: Project Contributions
  - regulated by EUPL & Developer Certificate of Origin (DCO)

https://github.com/etf-validator/governance

Testing Framework (ETF) – Governance



https://github.com/orgs/etf-validator/projects/2

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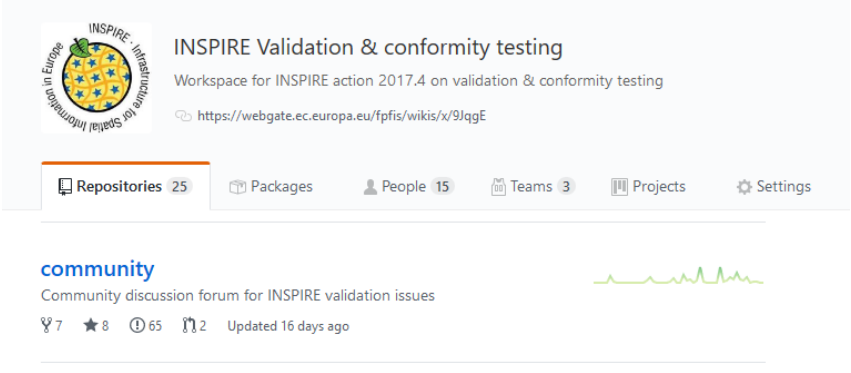
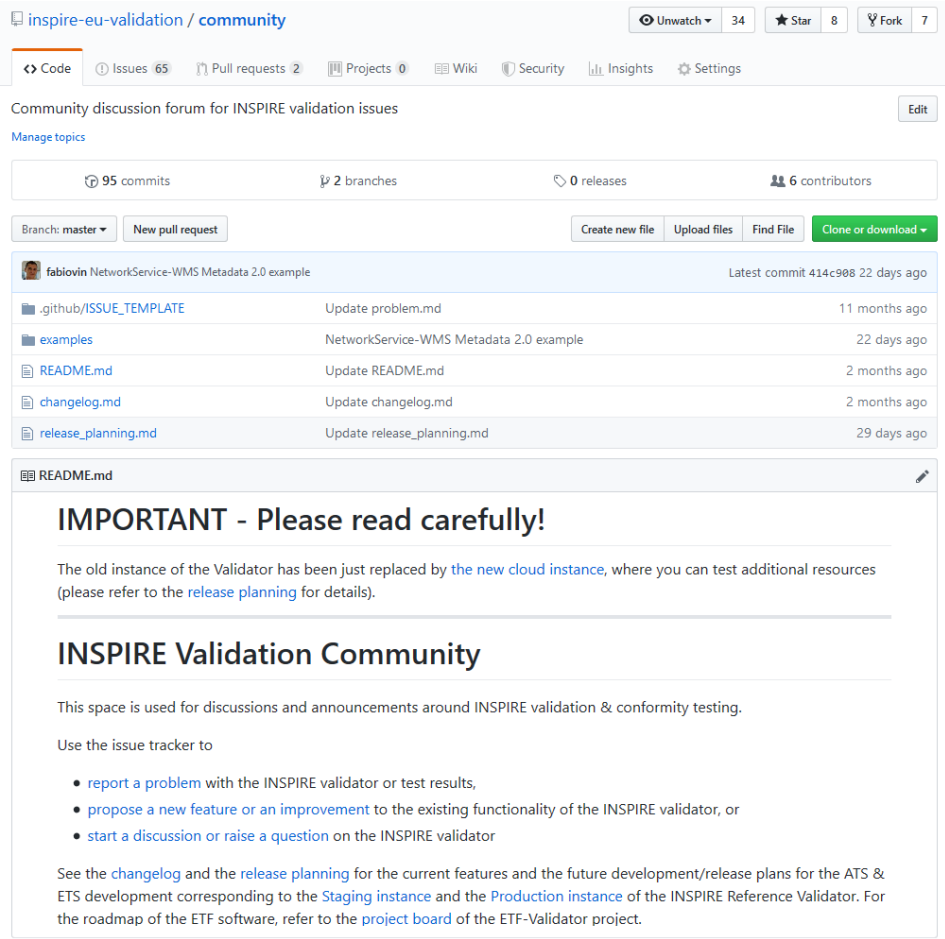
INSPIRE Validation Community

- The central place of interaction for the INSPIRE community:
  - changelog & release planning
  - helpdesk to
    - report problems
    - propose new features
    - open discussions

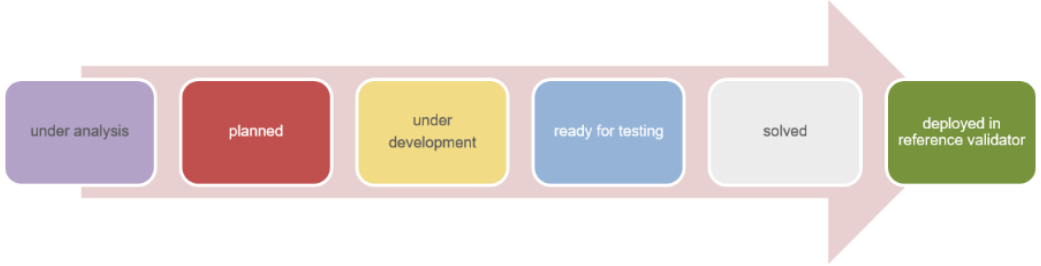


https://github.com/inspire-eu-validation/community



INSPIRE Validation Community – Helpdesk

- Use of labels to track the implementation status according to the workflow
- Contributors' guidelines (for pull requests) under development



65 Open ✓ 14 Closed — Author ▾ Labels ▾ Projects ▾ Milestones ▾ Assignee ▾ Sort ▾

- Schema Validation error with gmd:report/gmd:DQ_AbsoluteExternalPositionalAccuracy [under analysis] — 1
  #99 opened 6 days ago by sparlar
- NetworkService_WMS_metadata_2.0_example fails GEMINI 2.3 validator [under analysis] — 4
  #96 opened 21 days ago by nmtoken
- Metadata dataset: Resource Locator / Check that at least one resource locator is defined. [for-2017.4-discussion] — 1
  #95 opened 21 days ago by fxprunayre
- Metadata dataset: Resource Locator / Add some context so that end user knows what the test is looking at. [under development] — 4
  #94 opened 21 days ago by fxprunayre
- Validate XML documents - how to express year only dates [solved] — 11
  #89 opened 28 days ago by felnne
- Metadata 2.0 XML schema validation [ready for testing] — 2
  #85 opened on Jul 10 by skafka

https://github.com/inspire-eu-validation/community/issues

INSPIRE Validator – Future work

- Use of the INSPIRE Validator to test metadata conformity within 2020 Monitoring and Reporting
- Development of new ATS/ETS on:
  - Annex II/III data specifications
  - coverage data sets
  - new validation requirements emerging from INSPIRE MIWP
    - alternative encodings (GeoJSON)
    - simplification of data-service linking
- Workshop on the INSPIRE Validator
  - October 1-2, 2019 at the JRC
  - separate sessions for users & developers

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Thank you!

Questions?

marco.minghini@ec.europa.eu
@MarcoMinghini

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Inspire Helsinki 2019

22–24 October, Finland

- Organised by the Finnish National Land Survey and Ministry of Agriculture and Forestry & supported by the JRC of the European Commission and Spatineo.
- A technical event focused on new technologies for geospatial data:
  - keynote presentations
  - hands-on workshops
  - data challenges
    - team registration open until September 8, 2019
    - prizes and benefits worth more than 20’000€!

https://www.inspire-helsinki-2019.fi

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