

Training on Re3gistry/INSPIRE Registry and ETF/INSPIRE Reference Validator

JRC INSPIRE Team

May 29-31, 2024





Housekeeping rules

- Please mute your microphone and turn off your camera when not talking.
- If, during the registration, you did not consent to having your picture taken and recorded during the event, please make sure to keep your camera off for the whole event.
- During the Q&A session at the end of the training, please raise your hand in order to be given the floor.
- During the whole training, you can ask questions in the chat: our team will
 do the best to address these in real-time.
- Slides and recording (only for the training sessions, not the Q&A) will be shared after the event; you will be informed by email.



The trainings

- What: overview of the Re3gistry and ETF open source software tools and their INSPIRE implementations (Registry and Reference Validator)
- To whom: everyone from new to experienced users, developers & admins
- How: through a mix of theoretical notions & hands-on demonstration

Re3gistry and INSPIRE Registry - 29 May 2024, 9:30-12:30

9:30 - Welcome

9:35 - Introduction to the Re3gistry and the INSPIRE Registry

9:50 - Part 1. Getting started with the Re3gistry

- · Installation
- · Description of the application
- · Creation of content & Data governance

10:30 - Q&A session

10:45 - Coffee break

11:00 - Part 2. The Re3gistry in detail

- · Specific Re3gistry features
- · Frontend & Data consumption

12:10 - Re3gistry Starter Kit

12:15 - Q&A session

ETF and INSPIRE Reference Validator - 31 May 2024, 9:30-12:30

9:30 - Welcome and introducation to the training

9:35 - Introduction to the ETF and the INSPIRE Reference Validator: a business perspective

10:00 - Introduction to the ETF and the INSPIRE Reference Validator: a technical perspective

10:30 - Coffee break 🖱

10:45 - Starter Kit for users, developers and admins

11:45 - Q&A session





Introduction to the ETF and the INSPIRE Reference Validator: a business perspective

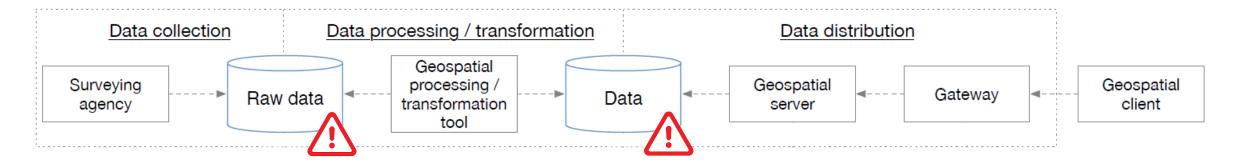
Marco Minghini

May 31, 2024





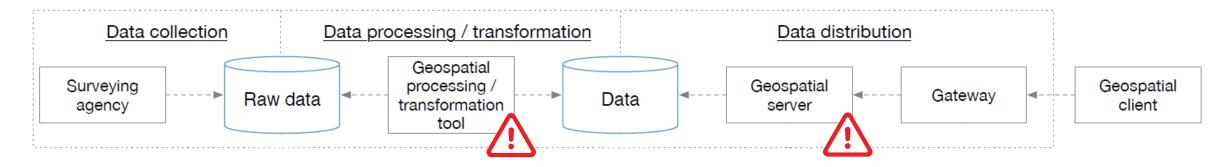
What could possibly go wrong?



incorrect data



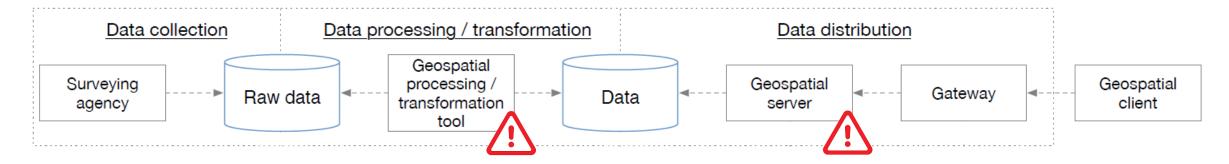
What could possibly go wrong?



incorrect mapping or configuration



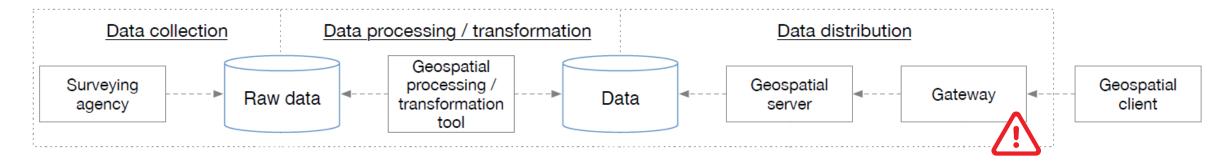
What could possibly go wrong?



software defects



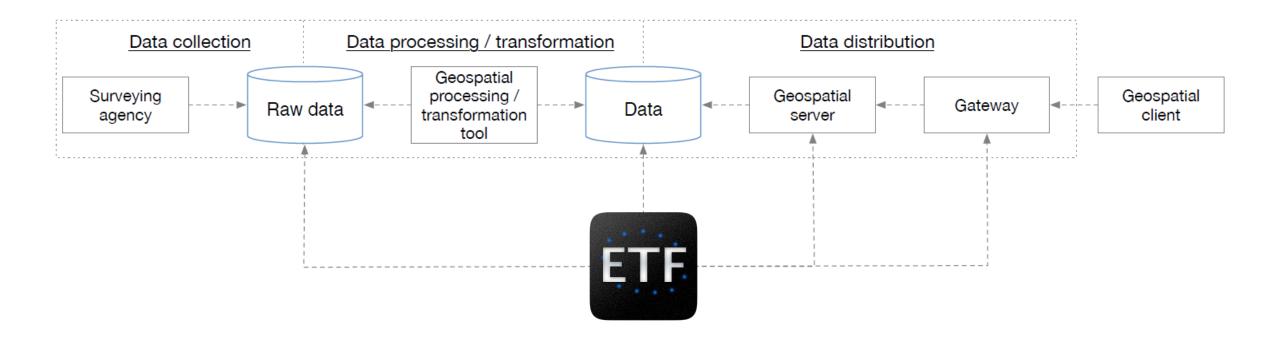
What could possibly go wrong?



other infrastructure-related issues



ETF: testing framework for spatial data, metadata and web services





ETF: testing framework for spatial data, metadata and web services



https://youtu.be/AvFUa_uEHfs



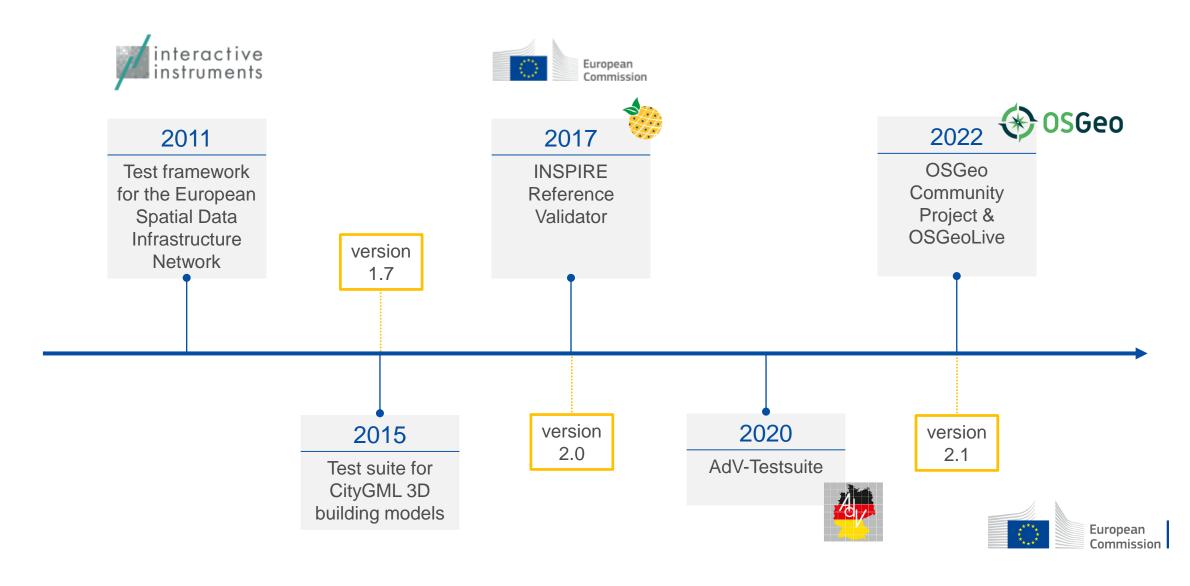
ETF testing framework ETF



- An open source test framework to validate spatial data, metadata & web services in SDIs
 - developed since 2010
 - current version: 2.1.0
- Usable through a responsive web application and a REST API
- Test reports available in HTML, JSON, XML, CSV
- Testable resources
 - datasets (up to several hundreds GBs): XML, GML, shapefile, CSV
 - metadata: XML
 - view services: WMS, WMTS
 - download services: Atom, WFS, WCS, SOS
 - catalogue services: CSW



ETF history and key milestones



ETF testing framework

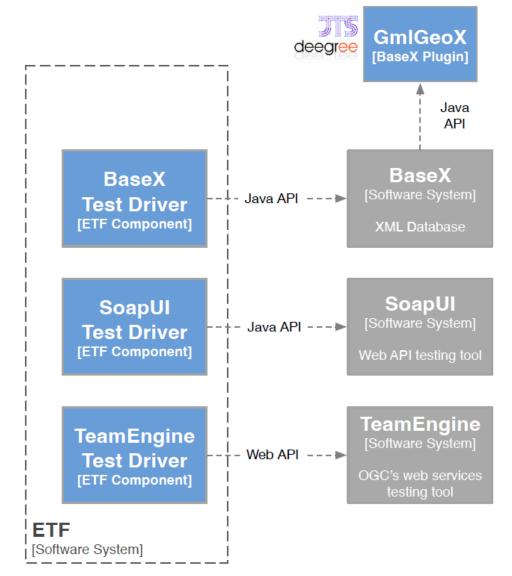
- Open source under the European Union Public License (EUPL) v.1.2.
 - https://github.com/etf-validator
 - https://etf-validator.net
- ETF design goals
 - user-friendly
 - consistent with the standards (ISO/OGC)
 - capable of testing all resources in an SDI
- Manuals for users, developers and admins (http://docs.etf-validator.net)



ETF testing framework



- 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
 - to be replaced with tests using NeoTL
 - BaseX for testing sets of XML documents
 - GmlGeoX plugin to run geospatial queries
 - TEAM Engine the tool used by the OGC CITE tests



ETF governance

- Steering Group (SG)
 - voting system: consensus of all members
 - members: JRC, interactive instruments GmbH
 - ETF Improvement Proposals (EIPs)
- Technical Committee (TC)
 - members proving technical capacity over time
 - technical feedback on EIPs
 - merging pull requests & creation of releases

□ README

ETF Validator Governance

The governance structure and processes of the ETF Validator aim to ensure the use and sustainability of the ETF Validator by the Community, and to keep the it aligned to the Community's needs.

The governance is ensured through the Steering Group and Technical Committee.

Terms of reference

- · Steering Group
- Technical Committee

Project boards

The current status of ETF Improvement Proposals (EIPs) and bug fixing can be tracked through these project boards:

- ETF Improvement Proposals (EIPs)
 - o If you would like to discuss an idea before documenting a full EIP, simply create a new issue using the EIP template. Complete the template as far as possible and mention that this is not a complete proposal yet, but that you are looking for feedback. The ETF Steering Group members monitor the issue and will tag it as an "EIP-draft" and add it to "Proposer: draft/refine EIP". The Steering Group will move it to "SG: discussion" when ready for discussion by the Steering Group. If the Steering Group supports it, it will change the tag to "EIP", move it back to "Proposer: draft/refine EIP" and ask you to complete the proposal.
- Once an EIP is ready for approval, please indicate this in a comment to the issue and the Steering Group
 will move it to "SG: discussion". If the draft needs further updates, it will be moved back to "Proposer:
 draft/refine EIP" until all open questions are resolved.
- Bug fixing
- If you would like to submit a bug report, please create a new issue in the etf-webapp repository using the <u>Bug report template</u>. The ETF Technical Committee members monitor the issues and will add them to bugfixing project board. If additional information is required, you will be contacted.
- o The Technical Committee will update the project board whenever the status of an issue changes.
- o Pull requests for bugfixes are very welcome (see "Contributing" below)!

Contributing

If you are interested in contributing to the ETF project, please read carefully the contribution guidelines.



0 :=

ETF as an OSGeo **Community Project**



Initiatives ~

Community ~

Community projects OSGeo Projects Community projects **Desktop Applications** OSGeo4W View all projects > **Opticks** ETF Choose a project > **OWSLib** FDO OSSIM

Geospatial Libraries TorchGeo

About OSGeo ~

GeoStyler

Open Data Cube Mesh Data Abstraction Library (MDAL)

Pronto Raster pgRouting

Metadata Catalogs

News Wiki Contact Sign in

Other

GeoServer Client PHP Loader

GeoHealthCheck Portable GIS TEAM Engine

Spatial Databases

Giswater MobilityDB rasdaman

Web Mapping

GeoExt GC2/Vidi GeoWebCache MapGuide Open Source mapfish istS0S

ETF

ETF is a testing framework for validating data and APIs in Spatial Data Infrastructures (SDIs). It is used by software solutions and data providers to validate the conformity of geospatial data sets, metadata and APIs.



Visit our website

Goals in designing the ETF software were to create test reports that are user-friendly and self-explanatory as well as to be able to validate large amounts of data, which can be several hundred GB in size. In order to cover different validation tasks and present them in a unified report, the architecture is modular and different test engines can be used. Currently the following test engines are supported: SoapUI for testing web services, BaseX database for testing XML data, TEAM Engine to validate WFS and OGC Web APIs using the OGC CITE tests, NeoTL Engine for testing WFS, OGC Web APIs and datasets.

ETF is the underlying framework used by the INSPIRE Reference Validator to validate metadata, datasets and services against the INSPIRE requirements. ETF is also used extensively in Germany by the Surveying Authorities of the Laender to validate their datasets. Other European Union (EU) Member States are also reusing the FTF to allow their data providers to test resources against national requirements. Finally, some software tools include validation based on the ETF API in their workflow



Core features

Testable resources

- datasets (up to multiple hundreds GB): GML
- metadata: XML
- ▶ view services: WMS/WMTS
- download services: Atom, WFS, WCS, SOS
- catalogue services: CSW
- large data sets (multiple hundreds of GB)

Access

- web-based user interface
- ► REST API
- OpenAPI Specification
- Java client library

Supported test engines

- SoapUI for testing web services
- ► BaseX for testing sets of XML documents
- ► TEAM Engine to support CITE tests developed
- NeoTL for testing OGC WFS and OGC APIs (in development)

Test reports

- user-friendly and self-explanatory
- downloadable in HTML XML and JSON

Implemented Standards

- Catalogue Service for the Web (CSW)
- International Organization for Standardization (ISO)
- (OGC API Features)
- Web Coverage Service (WCS)
- Web Map Service (WMS)

- Geography Markup Language (GML)
- ► Sensor Observation Service (SOS)
- Web Feature Service (WFS) Web Map Tile Service (WMTS)

About ETF

Project type

Geospatial Libraries

Other

Who's involved



View all

End-user resources

Download Software

∉ Issue Trackers □ Documentation

Developer resources

Download Software

-

 Source Code
- □ Documentation

European Union Public License 1.2

ETF in the OSGeoLive

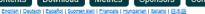












ETF Quickstart

This project is only included on the OSGeoLive virtual machine disk (VMDK)

ETF is an open source testing framework for validating spatial data, metadata and web services in Spatial Data Infrastructures (SDIs). The design standards and capable of testing all resources in an SDI.

This Quickstart describes how to:

- · navigate through the web application
- · start a test
- · monitor a test run
- · watch and manage test reports

Contents

- Start test
- Test Suite Selection
- Test Run configuration
- File-based Tests
- Service Tests
- Dependencies and Parameters
- Monitor test runs
- Test Reports
- Inspect test reports











ETF

ETF is an open source testing framework for validating data and APIs in Spatial Data Infrastructures (SDIs). It is used by software solutions and data providers to validate the conformity of geospatial data sets, metadata and APIs.



About

Goals in designing the ETF software were to create test reports that are user-friendly and self-explanatory as well as to be able to validate large amounts of data, which can be several hundred GB in size. In order to cover different validation tasks and present them in a unified report, the architecture is modular and different test engines can be used. Currently the following test engines are supported: SoapUl for testing web services, BaseX database for testing XML data. TEAM Engine to validate WFS and OGC Web APIs using the OGC CITE tests, NeoTL Engine for testing WFS, OGC Web APIs and datasets,

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Core Features

- Testable resources
 - · datasets (up to multiple hundreds GB): GML
 - metadata: XML
 - · view services: WMS/WMTS
 - · download services: Atom, WFS, WCS, SOS
 - · catalogue services: CSW
- Access
 - · web-based user interface
 - REST API
 - · OpenAPI Specification
 - · Java client library



https://live.osgeo.org/en/overview/ETF_overview.html https://live.osgeo.org/en/quickstart/ETF_quickstart.html



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 to support EU environmental policies aligned with the current green and digital policy context.
- Provides a comprehensive framework for interoperability of spatial data:
 - data sharing
 - data & service discovery (metadata)
 - network services
- based on the SDIs established and operated by the EU Member States.



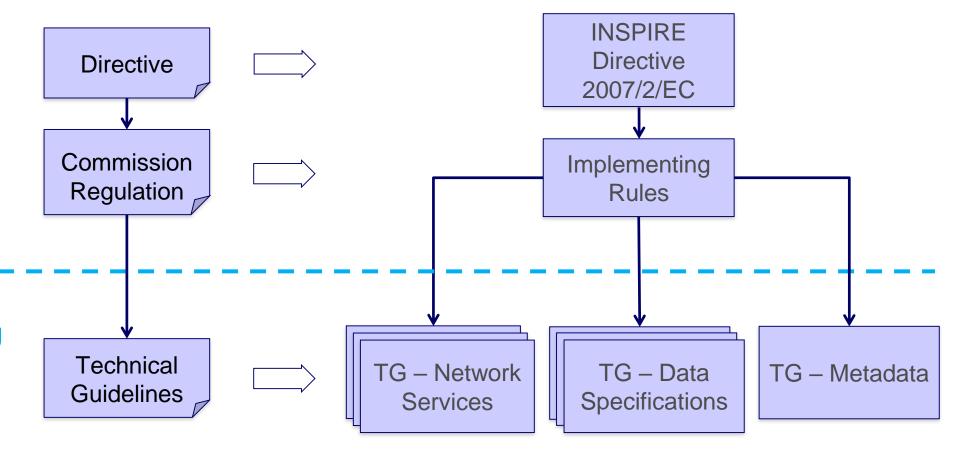
Implementing Rules & Technical Guidelines

What Member States must implement (abstract specification)

legally binding

not legally binding

How Member
States might
implement it
(implementation
specification)





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 the annual 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



INSPIRE Reference Validator

- Supported by ARE3NA & ELISE actions under ISA/ISA2 programmes and more recently from the Digital Europe Programme
- Purpose: provide tests for all INSPIRE Technical Guidelines
- History
 - 2017: Annex I data specifications, Metadata (TG v1.3), Download Services (Atom, WFS)
 - 2018-2019: Metadata (TG v2.0), View Services (WMS & WMTS), Download Services (SOS, WCS), Discovery Services (CSW)
 - 2019-2020: Annex II/III data specifications
 - 2021-today: new validation requirements emerging from INSPIRE Good Practices (e.g. OGC API - Features, IACS metadata, data-service linking simplification)
- Requirements:
 - modular, reusable, open source, providing configurable test rules





INSPIRE Technical Guidelines (TG)

requirements for all INSPIRE resources



Abstract Test Suites (ATS)

high-level descriptions of test cases



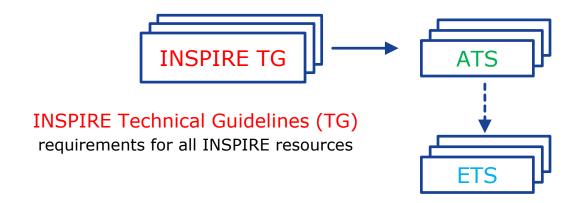
INSPIRE Technical Guidelines (TG)

requirements for all INSPIRE resources



Abstract Test Suites (ATS)

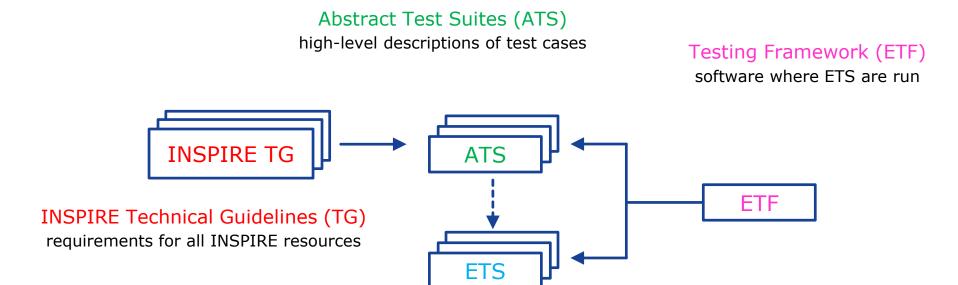
high-level descriptions of test cases



Executable Test Suites (ETS)

lower-level descriptions of test cases





Executable Test Suites (ETS)

lower-level descriptions of test cases

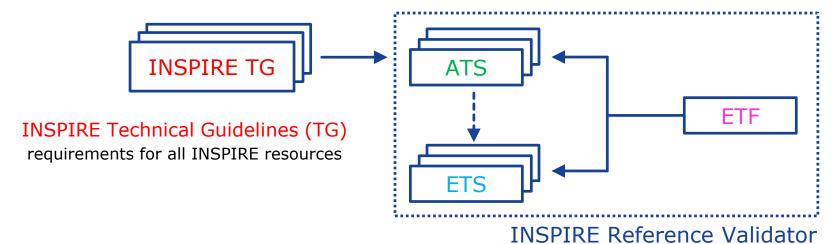




high-level descriptions of test cases

Testing Framework (ETF)

software where ETS are run



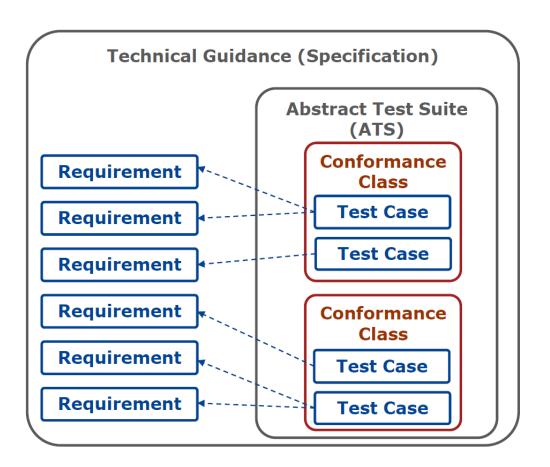
Executable Test Suites (ETS)

lower-level descriptions of test cases



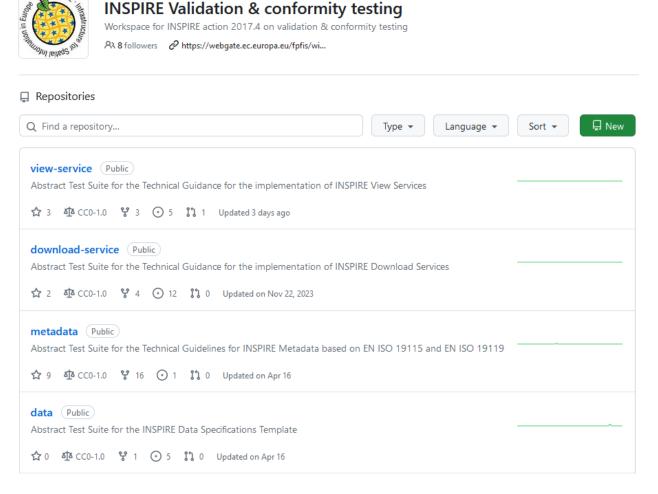
Abstract Test Suites (ATS)

- Test cases covering all requirements of INSPIRE TG are organized in ATS
 - grouped in Conformance Classes
 - developed by the JRC in agreement with the INSPIRE MIG-T
 - former sub-group 2017.4 on validation and conformity testing





Abstract Test Suites (ATS)



- All ATS are maintained on GitHub, licensed under CC0:
 - Metadata
 - Discovery services
 - View services
 - Download services
 - Data specifications
 - Data encoding
 - Annex I, II, III data specifications



Abstract Test Suites (ATS) – Example

INSPIRE TG

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).

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/reg/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

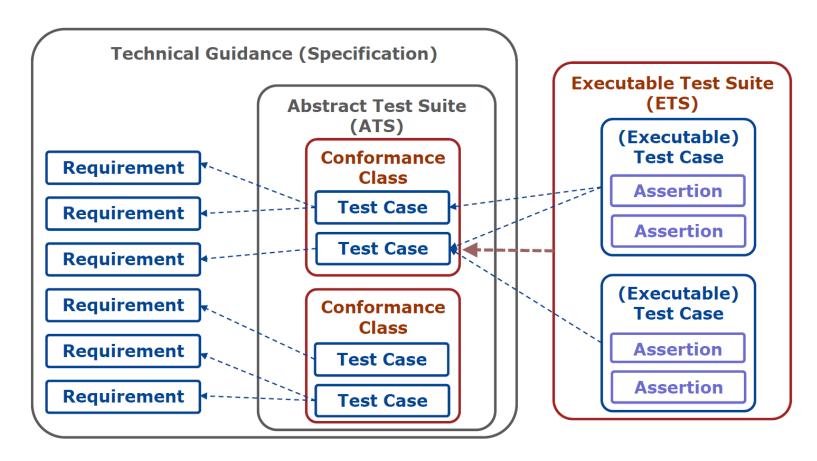
The namespace prefixes used as described in README.md.

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

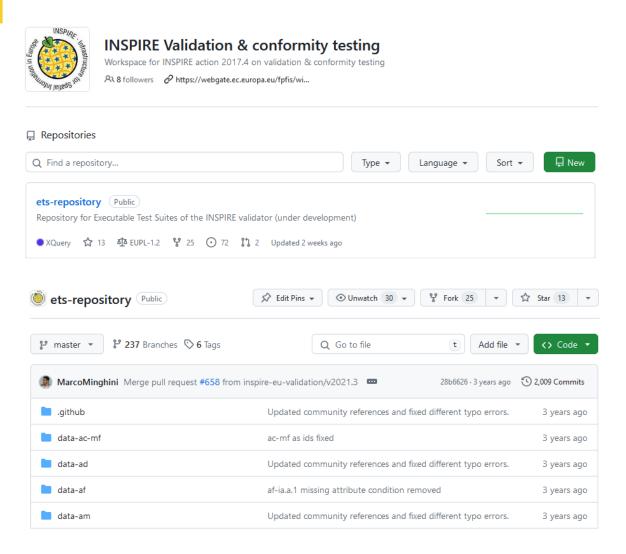
Executable Test Suites (ETS)

- Executable tests implemented for the agreed ATS
 - testing all assertions included in each test case





Executable Test Suites (ETS)



- All ETS are maintained on GitHub, licensed under EUPL v1.2:
 - Metadata
 - Discovery services
 - View services
 - Download services
 - Data specifications
 - Data encoding
 - Annex I, II, III data specifications



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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Equivalent Scale	gmd:MD_Resolution/gmd:equivalentScale
Distance	gmd:MD_Resolution/gmd:distance

```
<TestAssertion id="EID82a0442f-0185-4d6a-9b4e-0b7356613de7">
                                                                                                                                                                                                <label>md datasets-and-series 1.5: Spatial Resolution</label>
                                                                                                                                                                                                 <description><!fCDATAf<p>Test that the spatial resolution is defined using either an scale or a distance resolution
                                                                                                                                                                                                 More information: <a href="http://inspire.ec.europa.eu/id/ats/metadata/2.0/datasets-and-series/spatial-resolution">http://inspire.ec.europa.eu/id/ats/metadata/2.0/datasets-and-series/spatial-resolution
                                                                                                                                                                                                 <narent ref="FTDc0a43a9d-c2bc-4ea7-a8bb-8e966700f141"/>
                                                                                                                                                                                                 <expectedResult>NOT_APPLICABLE</expectedResult>
                                                                                                                                                                                                 <expression>
let $regex_integer := '(^\d{1,40}$)'
                                                                                                                                                                                                                                                                                                                                                                                           ETS
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_Resolution/gmd:equivalentScale)
                                           let $countDistance := count($record/gmd:identificationInfo[1]/*/gmd:spatialResolution/gmd:MD_Resolution/gmd:distance)
                                           let $invalidScale :=
                                                                 for $x in $record/gmd:identificationInfo[1]/*/gmd:spatialResolution/gmd:MD_Resolution/gmd:equivalentScale/gmd:MD_RepresentativeFraction/gmd:denominator/gco:Integer
                                                                 if(matches($x/text(), $regex_integer)) then ()
                                                                 else $x
                                           let $invalidDistance :=
                                                                 for $x in $record/gmd: identification Info [1]/*/gmd: spatial Resolution/gmd: MD_Resolution/gmd: distance/gco: Distance and the state of the state
                                                                 if(matches($x/text(), $regex_float)) then ()
                                            let $rid := $record/gmd:fileIdentifier/*/text()
                                           if (($countResolutions > 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': $rid, 'invalid': fn:string-join($invalidScale,'; ')})
                                           else if(count($invalidDistance) != 0) then
                                                                 local:addMessage('TR.invalidDistance', map { 'filename': local:filename($record), 'id': $rid, 'invalid': fn:string-join($invalidDistance,'; ')})
                                                                 for $spatialResolution in $record/gmd:identificationInfo[1]/*/gmd:spatialResolution
                                                                  if \ (count(\$spatialResolution/gmd: \texttt{MD}\_Resolution/gmd: equivalentScale}) > 0 \ and \ count(\$spatialResolution/gmd: \texttt{MD}\_Resolution/gmd: distance}) > 0) \ then \ (count(\$spatialResolution/gmd: \texttt{MD}\_Resolution/gmd: \texttt{MD}\_Resolution/gmd:
                                                                                     local:addMessage('TR.mixedResolutions', map { 'filename': local:filename($record), 'id': $rid })
                                                                 else ()
                      )[position() le $limitErrors]
(if ($messages) then 'FAILED' else 'PASSED',
   local:error-statistics('TR.recordsWithErrors', count(fn:distinct-values($messages//etf:argument[@token='id']/text()))),
                                                                                                                                                                                                </expression>
                                                                                                                                                                                                 <testItemType ref="EIDf0edc596-49d2-48d6-a1a1-1ac581dcde0a"/>
                                                                                                                                                                                                 <translationTemplates>
                                                                                                                                                                                                                    <translationTemplate ref="TR.recordsWithErrors"/>
                                                                                                                                                                                                                     <translationTemplate ref="TR.noResolutions"/>
                                                                                                                                                                                                                     <translationTemplate ref="TR.mixedResolutions"/>
```

</translationTemplates>

</TestAssertion>



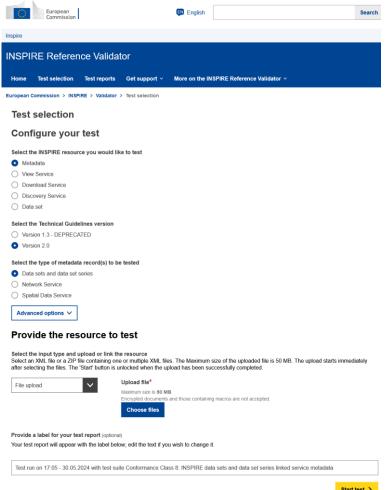
INSPIRE Reference Validator – Instances

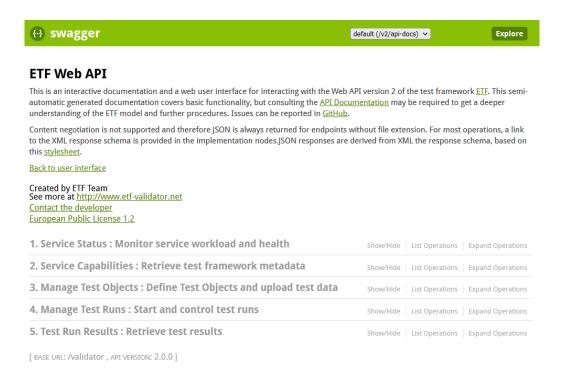
- 2 instances:
 - staging instance (http://staging-inspire-validator.eu-west-1.elasticbeanstalk.com/etf-webapp)
 - includes bug fixes & latest features for testing purposes
 - production instance (https://inspire.ec.europa.eu/validator)
 - includes only consolidated developments
- Both instances deployed on the cloud
 - minimize downtime on maintenance
 - avoid dependence on JRC infrastructure
 - improve performance
 - horizontal and vertical scaling



INSPIRE Reference Validator – Access

Interactive User Interface and REST API





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



INSPIRE Reference Validator – Release plan

Annual releases

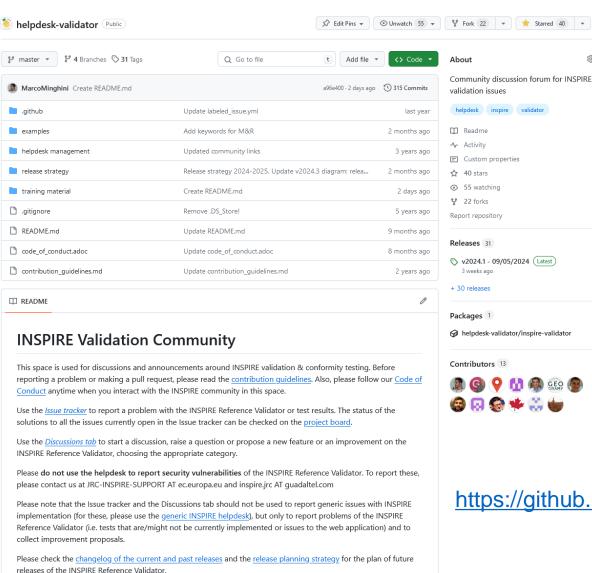
As mentioned above, several releases of the INSPIRE Reference Validator are scheduled each year with the main goal of concentrating breaking changes in the first half of the year in order to produce the major release used for the end-of-year Monitoring process already in June. The scheduled annual releases are described in detail in the next sub-sections. In addition to the different infrastructure and deployment environments, the different releases are managed using different branches of the <u>ets-repository</u> repository.

For simplicity, the descriptions make explicit reference to releases in the years 2024/2025, but the same release schedule will be applied consistently over the following years:

- v2024.1 30/04/2024: it includes both breaking and non-breaking changes.
- v2024.2 30/06/2024: it includes both breaking and non-breaking changes.
- v2025.b 30/06/2024: it includes both breaking and non-breaking changes which are planned to become effective (for Monitoring purposes) in the following year.
- v2024.3 15/09/2024: it only includes non-breaking changes, so that any INSPIRE resource passing the test in the previous release automatically passes the same test in this release. This release is the one used for the end-of-year Monitoring process.
- v2025.0 15/01/2025: it includes both breaking and non-breaking changes, including those available in the beta instance of the previous year.



INSPIRE Reference Validator – Community



- GitHub repository for community resources
 - sample resources
 - training materials
 - release plan & releases
 - helpdesk management strategy
 - helpdesk service

https://github.com/INSPIRE-MIF/helpdesk-validator



Thank you!



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Parts of the slides were adapted from:

- Herrmann J., Minghini M., Portele C., Lutz M., Cira P. (2022) ETF testing framework: past, present and future.
 FOSS4G 2022, Florence (Italy), 22-28 August 2022 (CC BY 4.0)
- Minghini M., Lutz M., Portele C., Herrmann J., Soriano E., Palma C., de Cerio Paniagua I.D., Sáez B., Hernandez L., Francioli D., Vinci F. (2019) INSPIRE Reference Validator: status and next steps. FOSS4G 2019, Bucharest, Romania, 26-30 August 2019 (CC BY 4.0)



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