Fostering EOSC uptake through a Quality based approach

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A "Community" endeavour relying on Best Practices

Challenging problems requiring a broad cooperation to advance the state-of-the-art

Quality methodologies, best-practices definition, are fundamental to tackle any of those.

- Human effort: broad network of researchers
- Sociology of large teams
- High investment level: sophisticated equipment, IT, e-Infrastructures

Managerial structures
- Common interest
- Well-defined goals

Quality approach to run HR in large organizations,
Best practices apply to appraisal, career development, conflict management,

Services operation: best practices in management of IT services (e.g., ITIL)

Software: the enabler of e-Infrastructures
Best practices in data handling: at the core of FAIR movement
ESFRI Challenges Quality perspective - II

Best practices in Software Development, Service Deployment and Data handling

- Sustainability
- Reliability
- Performance
- Correctness
- Interoperability
- Reusability
- Security
- Robustness
- Correctness
- Reusability
- Performance
- Interoperability
- Correctness

Quality
Adoption
Trust
EOSC-Synergy Integrated Quality approach

- Data is produced and consumed using software
- EOSC needs
  - software
  - services
  - data
- Quality must be transversal across EOSC software, services and data
Foster EOSC adoption through quality

<table>
<thead>
<tr>
<th>Software and Services</th>
<th>Data</th>
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<tbody>
<tr>
<td><strong>Promote adoption of best practices</strong></td>
<td><strong>Assess quality</strong></td>
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<tr>
<td>Software development</td>
<td>Develop tools</td>
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<td>Services delivery</td>
<td>Automated QA process</td>
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<tr>
<td><strong>Promote the adoption of FAIR principles</strong></td>
<td><strong>Analyse and assess FAIR compliance</strong></td>
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<tr>
<td>Digital objects</td>
<td>Tools for assessment</td>
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<tr>
<td>Data repositories</td>
<td>Integration &amp; automation</td>
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What have we done (in a nutshell):

Inspired by DevOps & Exploiting Continuous Integration and Continuous Delivery (CI/CD)

Provide a Platform to assess the Software, Services and Data Quality in EOSC

Validated with production-level Thematic Services

Based on Open Source tools & deployable “as a Service”

Enabling exploitation of quality criteria and FAIR principles

Establishing the foundations to reward software developers Quality Achievements in EOSC
Provide a Platform to assess the Software, Services and Data Quality in EOSC:

“SQAaaS” → Quality Assurance “as a Service”

How it works in practice?
Generic Case in Earth Observation:
Monitoring “XYZ” using Copernicus Data

Monitoring XYZ using Copernicus data from Sentinel-2

- Code
  - Test Software
- Binaries
  - Deliver Service
- Service
- Data
  - Comply with FAIR Data principles
SQAaaS : first step

Testing Software and Services

- **Quality Assurance** baselines defined
- Automation tool integrated and deployment “as a Service”
Quality requirements: Open development process

- Documents managed through github repositories:
  - https://github.com/indigo-dc/sqa-baseline
  - https://github.com/EOSC-synergy/service-qa-baseline

- Open to external contributions through github issues:
  - Development largely based on discussions, additions, suggestions and corrections via github issues.
  - Collaboration with CESSDA on maturity criteria

- The release process is similar to a software process
  - Release tagging
  - Automatic build of the document - html and pdf formats.
SQAaaS: Automation of Service Delivery

Testing Software and Services

- Quality Assurance baselines defined
- Automation tool integrated and deployment “as a Service”

Deliver Service

- Build container images to automate the deployment
- Deploy virtual infrastructures automatically
SQAAaaS: automated deployment

- Automated deployment of the complete SQAAaaS platform
  - Facilitates SQAAaaS production deployment, testing & promotes adoption
  - Also important for closed / private environments

https://github.com/EOSC-synergy/SQAAaaS
https://operatorhub.io/operator/jenkins-operator
SQAaaS: Assessment of FAIR criteria

- **Testing Software and Services**
  - Quality Assurance baselines defined
  - Automation tool integrated
  - Deployment “as a Service”

- **Deliver Service**
  - Build docker images to automate the deployment
  - Deploy virtual infrastructures automatically

- **Comply with FAIR Data principles**
  - FAIR principles recommendations.
  - Framework to support FAIR best practices: implementation, validation, monitoring
Comply with FAIR Data principles

FAIR Data assessment
Implementation of the EOSC FAIR data principles
Quality assessment for FAIR Data

FAIR principles “from theory to practice” to support research

- Holistic approach from raising awareness to assessment tools, recommendations and training
- Quality for data: repositories and data infrastructure services

Enabling alignment and exploitation of FAIR principles

- Alignment with FAIRsFAIR and 5b projects

FAIR technical framework to support FAIR best practices

- Development of: “FAIR-evaluator” for RDA criteria
- Integration of quality assessment tools in FAIR-evaluator and F-UJI
- Actionable features to enable automated validation

FAIR applied to thematic services

- Assisting thematic services in adopting FAIR practices
- Assessing FAIR compliance
- Establish reference examples
Technical Framework: FAIR assessment

• **Automatic tests to check FAIR indicators:**
  • Criteria
    • published RDA criteria
    • and the FAIRsFAIR subset of them
  • Identify quality criteria suitable for automated validation
  • Performed analysis of FAIR assessment tools focused on automation
  • Development and integration of FAIR assessment Tools:
    • **FAIR-evaluator** => DSpace-CRIS
    • **F-UJI** => Dataverse

→ Integrated in the SQAaaS
Software/Service Quality Assurance “as a Service” (SQAaaaaS)

Implementation of an EOSC Service Integration platform
## SQAaaS: Web interface

<table>
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<tr>
<th>What</th>
<th>User web interface for the SQAaaS platform</th>
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<td>Friendly web interface for the less knowledgeable doing sw development</td>
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<td></td>
<td>User interface that hides the underlying complexity and details of the SQAaaS</td>
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<td>Static web site</td>
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<tr>
<th>Why</th>
<th>Provide easy intuitive access to the SQAaaS capabilities</th>
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<td></td>
<td>Make SQA available to wider audiences</td>
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<td>Facilitate adoption of SQA practices</td>
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<td>Reduce the learning curve to adopt SQA</td>
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<td>Reduce the time and effort required to implement an SQA process</td>
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<tr>
<th>How</th>
<th>Web interface that interacts with the SQAaaS API Server</th>
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<td>Users just need to fill in the required input for each criterion</td>
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<td>Based on the VueJS Javascript framework, intuitive modern, easy to use</td>
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<td>Uses the SQAaaS API Server</td>
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SQAaaS: platform to support integration

Researchers and developers

Programmatic access

Developers, computational scientists, RSE

Pipeline as a Service
Provides custom CI/CD pipelines based on the quality criteria selected by the user

Quality Assessment & Awarding
Evaluates the level of compliance of a source code repository or running service according to the SQA baseline

www.eosc-synergy.eu - RIA 857647
SQAaaS: Web forms

Researchers and developers

A. Pipeline as a Service

Available at: https://sqaaas.eosc-synergy.eu/
# Quality Recognition as part of the SQAaaS functionalities

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<tr>
<th>What</th>
<th>A means for the SQAaaS to reward quality achievements</th>
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<tr>
<td></td>
<td>● Reward of the quality achievements</td>
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<td>● Badges are produced as result of the online Quality Assessment &amp; Awarding</td>
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<th>Why</th>
<th>Provide incentives and verifiable means of rewarding</th>
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<td></td>
<td>● Incentivize adherence to the quality baselines and FAIR principles</td>
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<td>● Improve software, services and data visibility</td>
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<td>● Give users access to quality information</td>
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<tr>
<th>How</th>
<th>Using digital badges as quality credentials</th>
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<tr>
<td></td>
<td>● Following the Open Badges specification</td>
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<td></td>
<td>● Using the Badgr implementation</td>
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<tr>
<td></td>
<td>● The SQAaaS platform through the API Server and web can interact with Badgr and issue badges with metadata</td>
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OBERRED is the Open Badge Ecosystem for the Recognition of Skills in Research Data Management and Sharing.
Quality Recognition as part of the SQAaaS functionalities

- Technology scouting and whitepaper on digital badges.
- Selected Open Badges specification and using Badgr:
  - EOSC-Synergy: https://badges.eosc-synergy.eu/
  - European Badgr: https://eu.badgr.com
- Graphics design of the badges:
- Issuing badges for successful pipelines the SQAaaS
Workflow of a Generic Thematic Service

Development & integration steps: from SQA ⇒ EOSC Marketplace

- Code
- Binaries
- Service
- Data Generation
- Testing FAIR data principles
- EOSC Marketplace

Software Quality Assurance
Service Delivery
Release quality verified software & data

Storage Infrastructures
Metadata repositories

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Summary: provide incentives to foster quality

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<th>Developers and Providers</th>
<th>Users</th>
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<td>to improve Software, Services and Data quality</td>
<td>to adopt EOSC Software, Services and Data via quality</td>
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<td>Establishing the foundations to reward quality</td>
<td>Rewarding quality achievements</td>
<td>Making available mature verified products/solutions</td>
<td>Making EOSC more visible &amp; appealing</td>
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<tr>
<td>Quality criteria</td>
<td>Quality badges</td>
<td>Software and Services</td>
<td>Increase quality visibility and quality transparency</td>
</tr>
<tr>
<td>Quality assessment tools</td>
<td>Quality visibility</td>
<td>Digital objects and Data repositories</td>
<td>Highlight EOSC through the quality achievements</td>
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Gracias !
Obrigado !
Danke !
Dziękuję !
Vďaka !
Dekuji !
Bedankt !
Merci !
Thanks !

https://www.eosc-synergy.eu/thematic-services-brochure/