Software Quality Assurance

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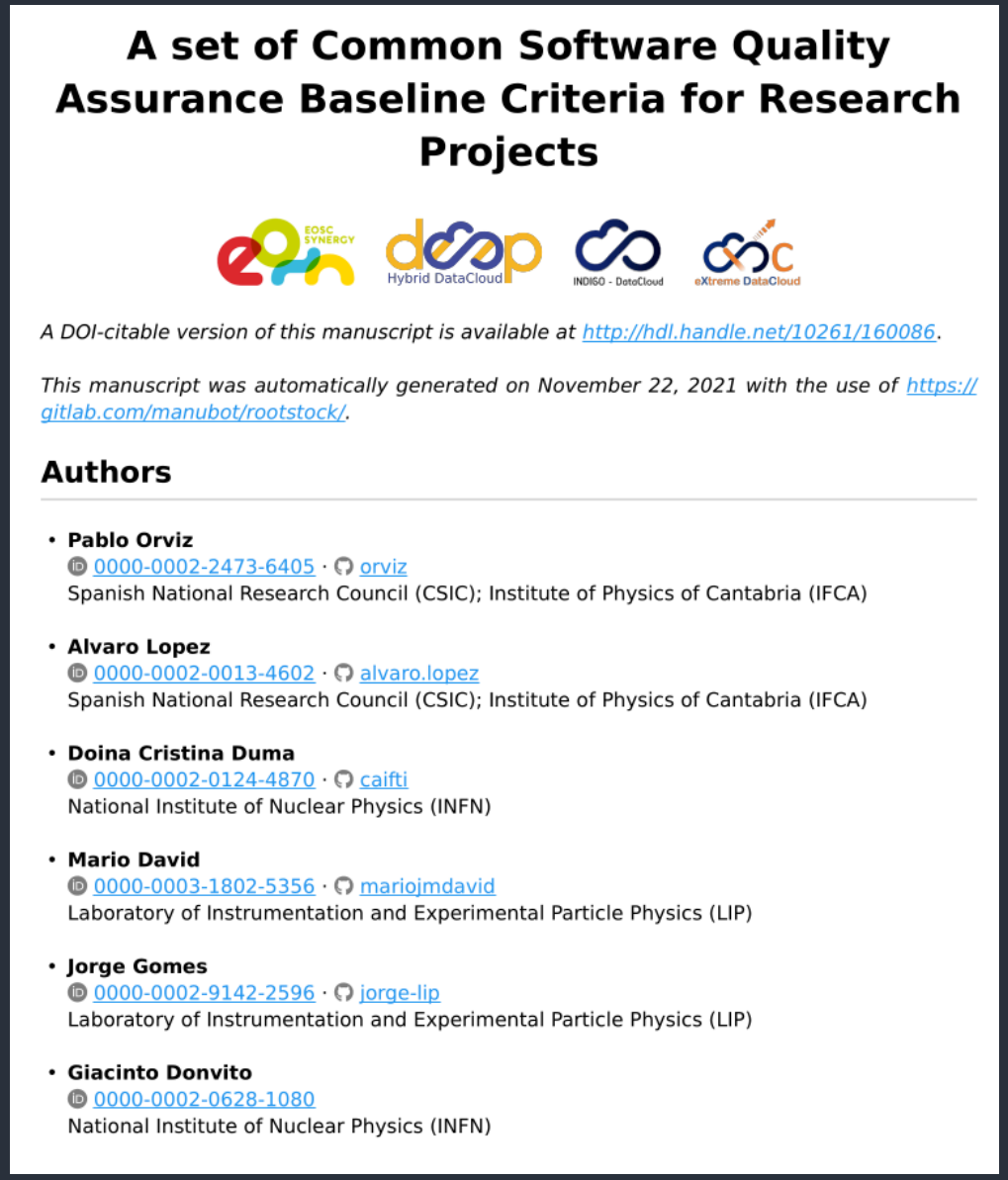
The SW Quality Assurance applies to Software source code best practices and procedures.

SQA Baseline

The SW Quality Assurance baseline - I

- The SQA baseline is a set of abstract criteria that should be applied to the process of SW development.



A set of Common Software Quality Assurance Baseline Criteria for Research Projects

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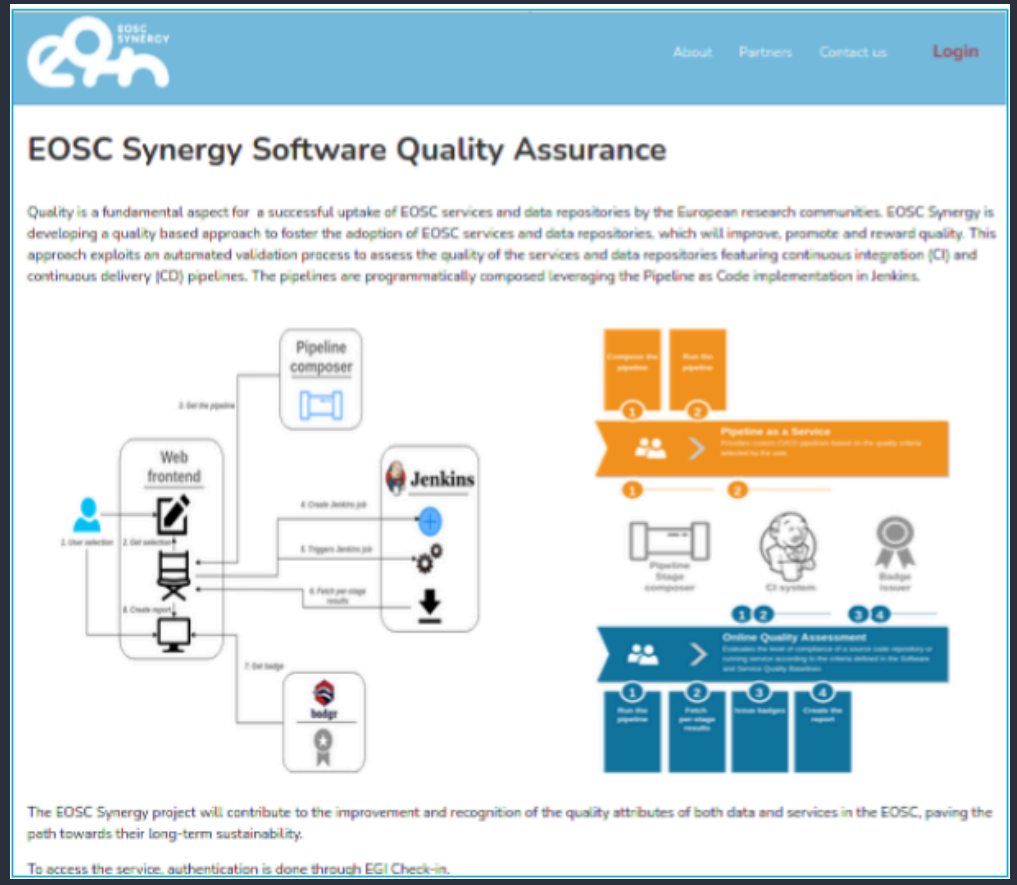
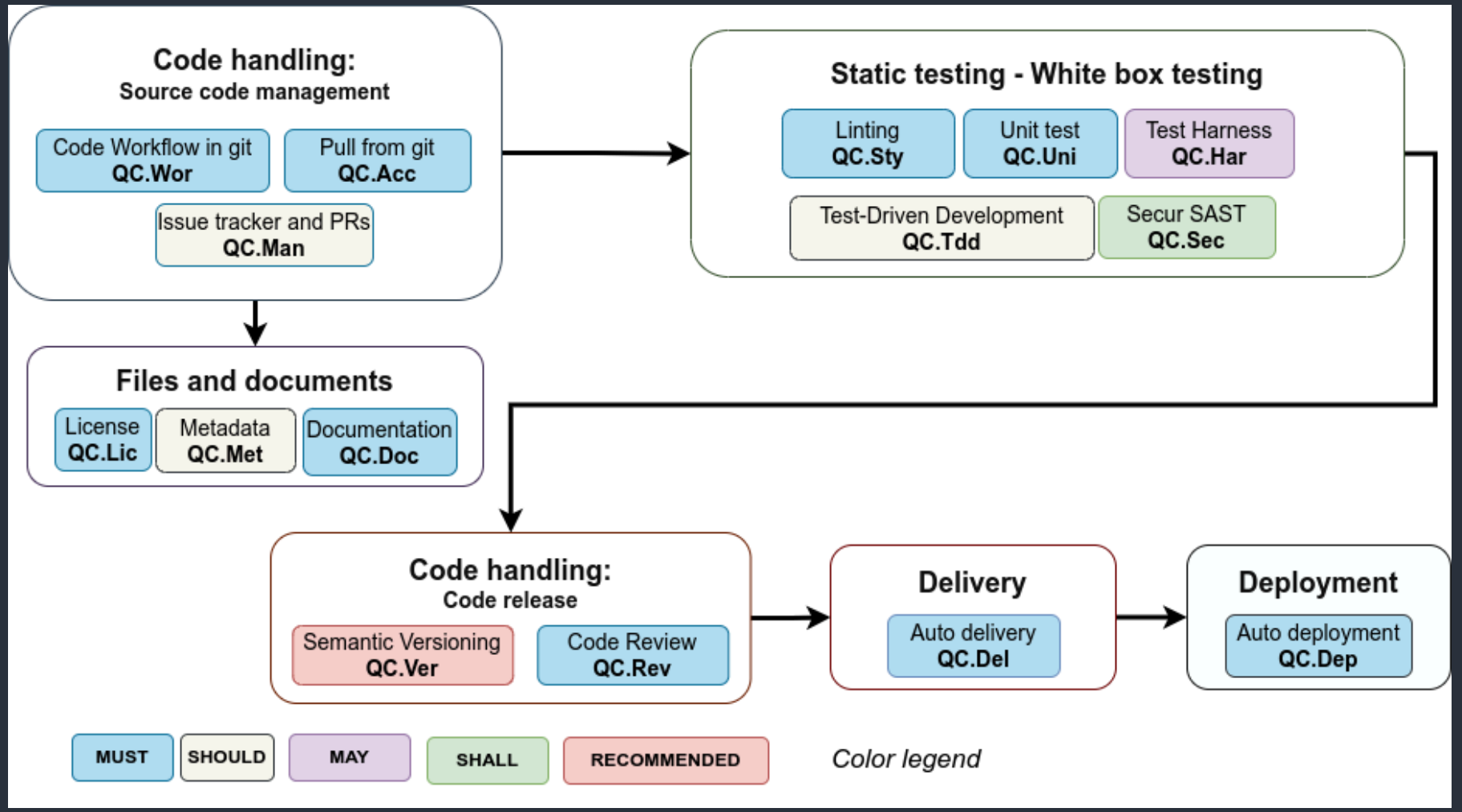
The SW Quality Assurance baseline - II

- Each criterion has a severity according to the keywords defined in RFC2119: "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL".
- Each criterion is binary, with a value of "0" or "1" such that when implemented in practice, it "*passes*" or it "*does not pass*" that criterion.



Quality model



Criteria categories - I

1. Source Code management:
    - Criteria describing where source code should reside, and how it should be managed when there are changes.
2. Files and documents:
    - Criteria describing what files should exist such as licensing and code metadata, and documentation.
3. Static testing ⟶ White box testing:
    - Criteria regarding code style and "White box" testing such as unit tests and static security tests.

Criteria categories - II

4. Code release:
   - Criteria regarding the release of SW such as versioning and code review/approval before the release.
5. Build and publish ⟶ Delivery:
   - Criteria for automated build of SW artifacts, notification and publishing in SW public repositories.
6. Deployment:
   - Criteria for automated deployment of SW into a working/production ready state, with configuration management tools.

Quality attributes explained

Source Code management - I

Following the open-source model:

- The source code being produced must be open and publicly available.
  - This is a way to promote the adoption and augment the visibility of the software developments, as well as promoting external contributions.
- The management must be done in a version control system:
  - As the way the support contributions from multiple developers through the branching model.
  - Each developer can work on his branch independent from the others.
  - The changes can be pulled or merged to a *next release* branch when a given fix or feature is complete.

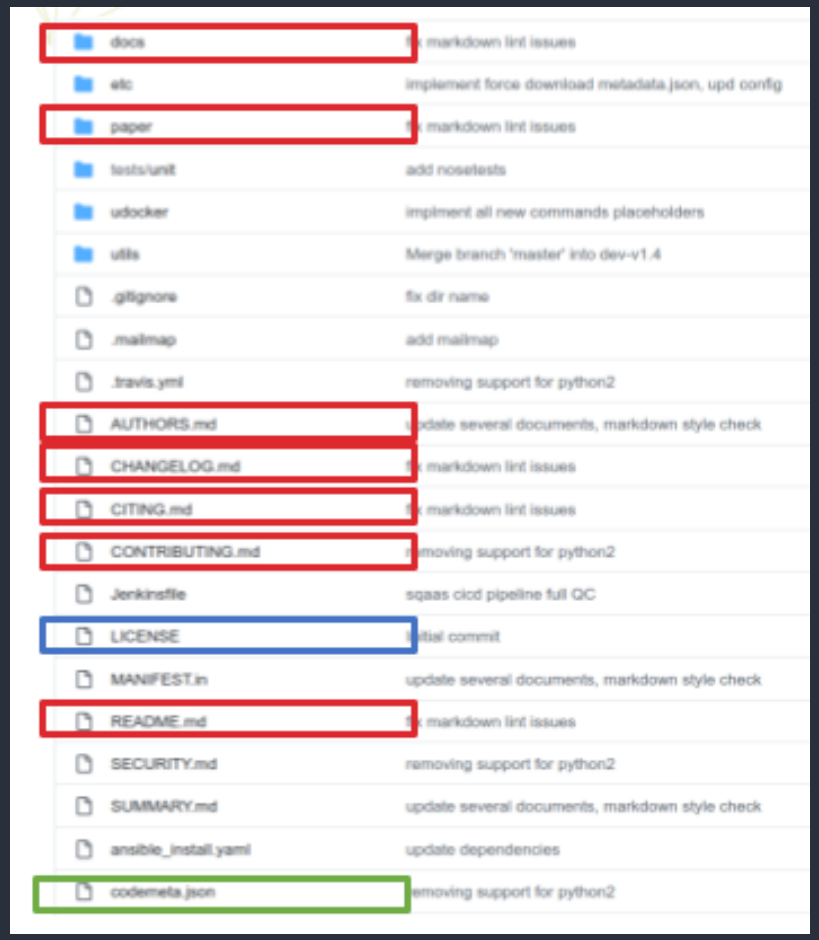
Source Code management - II

- A given master or main branch can be kept in a working state (latest release):
  - Pulled/merged changes are only accepted if they have passed/gone through a full set of automatic tests
  - As well as peer review.
- The management of source code must have:
  - An issue tracker where bugs, corrections and features are reported and followed.
  - When the developer works and completes a given bug fix, correction or new feature, he can refer to the corresponding issue.

Files and documents - I

- Existence of an open source **License**.
- Existence of **metadata** describing the SW:
  - Towards FAIR for SW.
- **Documentation**:
  - Exists alongside the source code.
  - Details all documents that should be present.
  - Is treated as code - Version Controlled
  - Written in plain text format using some markup language.

Files and documents - II



Static testing / “White box” testing

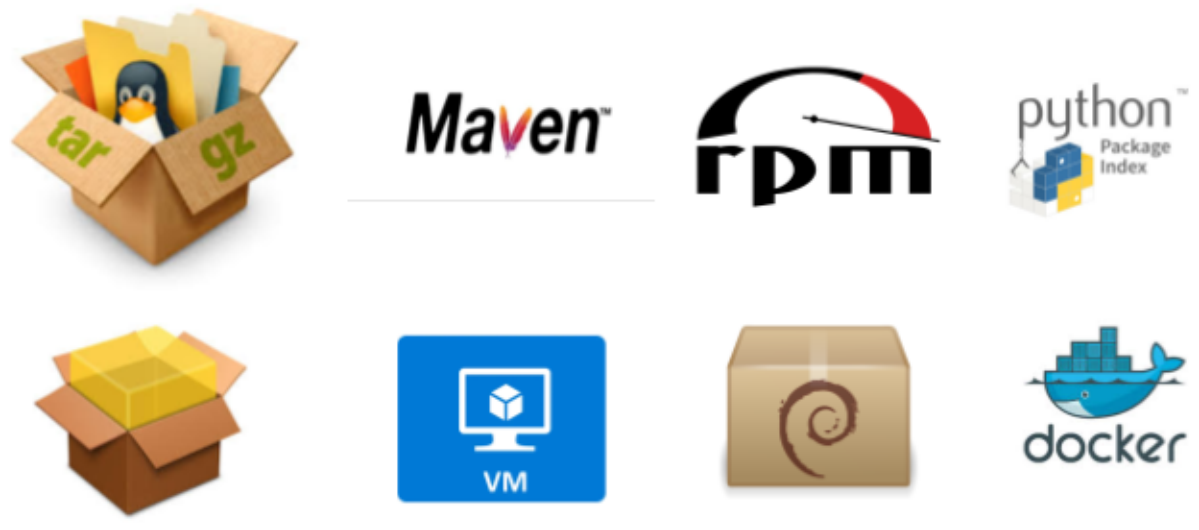
- White box testing techniques analyze the internal structures the used data structures, internal design, code structure and the working of the software.
  - It pertains in general to "Unit Tests".
- The quality model presented here, relies on a broader category called "Static testing" that includes all types of tests that
  can be performed on the "source code":
  - "Code style".
  - "Unit tests".
  - "Test Harness".
  - "Test-Driven Development".
  - "Static Security testing".

Code release

- Version format Semantic Versioning.
- Code review:
  - Implies the informal, non-automated, peer review of any change in the source code.
  - It appears as the last step in the change management pipeline, once the candidate change has successfully passed over the required set of change-based tests.
  - Open and collaborative, allowing external experts revisions.
  - Review of documentation.
  - Assess the inherent security risk of the changes, ensuring that the security model has not been downgraded or compromised by the changes.

Build and publish; Automated Delivery

- The build of Software into an artifact.
- Its upload/registration into a public repository of such artifacts.
- Notification of the success of the process.



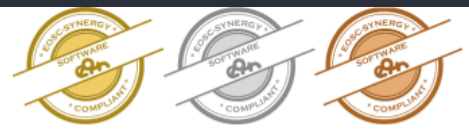
Automated Deployment

- Production-ready code can be deployed as a workable system.
- Minimal user or system administrator interaction.
- Leveraging software configuration management (SCM) tools.

Awarding badges according to criteria passed

EOSC-Synergy approach defines three different badge classes:

- Bronze, Silver and Gold.
- Maps between quality criteria and EOSC-Synergy digital badges:



	Software Classification			
Quality Criteria	QC Code	Quality Badges		
		Gold	Silver	Bronze
Code Accessibility	QC.Acc			
Licensing	QC.Lic			
Code Style	QC.Sty			
Code metadata	QC.Met			
Unit Testing	QC.Uni			
Documentation	QC.Doc			
Security	QC.Sec			
Code Workflow	QC.Wor			
Semantic Versioning	QC.Ver			
Code Management	QC.Man			
Automated Delivery	QC.Del			