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Developing an INAF infrastructure for Software Quality Assurance

Rosanna Sordo (INAF OA Padova), Andrea Balestra (INAF OA Padova), Elia Costa (INAF OA Padova)

Software Quality Assurance (SQA) is an increasingly important task in modern software development for astronomy. This is obviously true for space projects, where ESA enforces ECSS standards which involve adoptions of strict SQA procedures for the software operating on their space missions. In the last few years, also ground based projects have been pressed to provide higher quality software for their instruments, since stakeholders, like ESO, are more and more aware of the hidden costs linked to software issues.

The SQA management plan, that sets the road to achieve that goal, is a deliverable requested in the early stages of a project and, being based on a set of standards, it could be formalized, leveraging on the commonalities of the general INAF projects, to deal with a generalized set of requirements, in a framework where the best practices, tools and procedures are not only outlined but actually implemented.

Taking advantage of CI/CD techniques, we build a versatile SQA automated pipeline that implements the project-specific requirements for quality in a continuous manner, strictly following the natural development of the software and avoiding delays in the product improvement. This prototype framework is under testing in different ground-based projects (MORFEO, MAVIS, CUBES) and it is foreseen to be adapted to ANDES project.

The SQA pipeline already implements the set of tools integrated into the ESO framework and that will be executed by ESO at milestones.
At this stage, we already successfully integrated:

- **Polyspace** (INAF license available) for CI activity and static analysis
- **Understand** and **Parasoft C/C++** Test for in-depth analysis offline.
- **Prospector** for Python code

In addition, we are investigating other tools to implement in this pipeline, either commercial or open source.

We aim to set up an INAF common framework to carry out SQA activities for INAF projects, taking advantage of pre-existing experience and knowledge gained in multiple projects, aiming to a more efficient use of INAF resources. For example, a common framework for different projects would avoid duplication in acquisition of tools.
The framework would then become an INAF infrastructure, i.e. a service offered to any INAF projects (not necessarily ESO related), easily adaptable through ad hoc tailoring .

Contact point: rosanna.sordo@inaf.it
andrea.balestra@inaf.it