Concept and Methodology Definition for Continuous Integration, Automated Test Repetition and Evaluation

M3 SYSTEMS BELGIUM

15/10/2020

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CONTEXT

GATE4Rail works towards contributing to the GNSS application in the railway industry

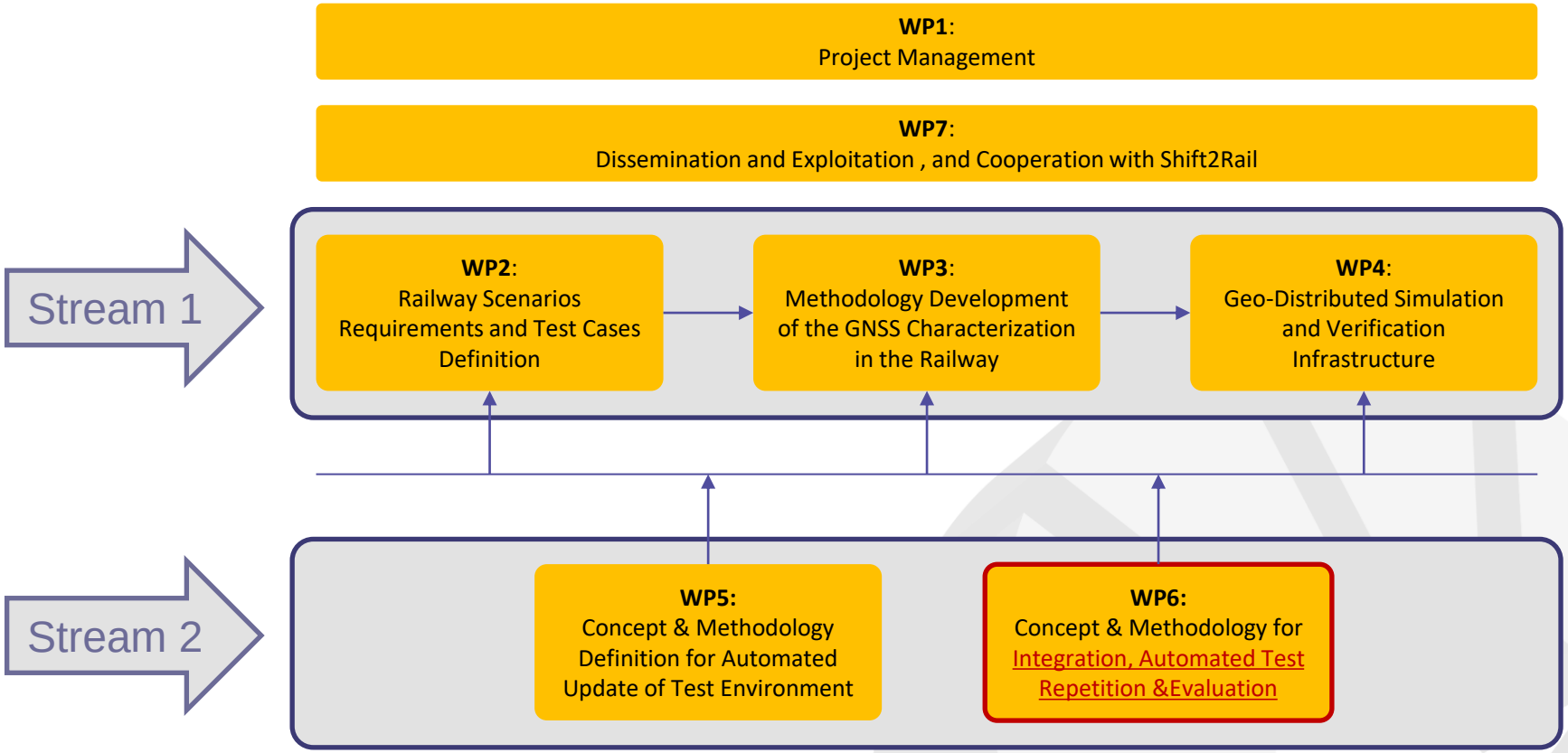
The main objective is to provide a laboratory test architecture where different scenarios for GNSS-based ERTMS applications will be run by integrating simulation blocks and defining their interfaces

⇒ To be achieved

"In the framework of the evolution of the simulation environment technologies*"

**S2R-OC-IP2-02-2018 - Modern methodologies and verifications for GNSS in Railways and virtual test environment*

CONTEXT – 2 Work Streams



CONTEXT

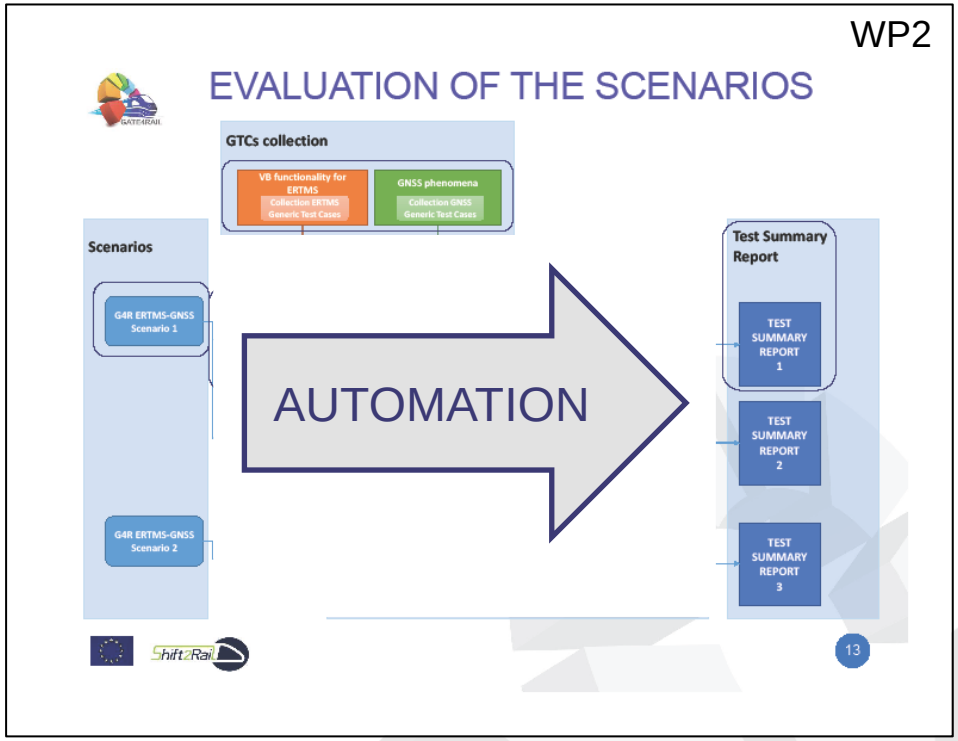
GATE4Rail works towards contributing to the GNSS application in the railway industry

The main objective is to provide a laboratory test architecture where different scenarios for GNSS-based ERTMS applications will be run by integrating simulation blocks and defining their interfaces

It is key to ensure that the test architecture is designed and implemented in such a way it can easily be adapted, enhanced, maintained and upgraded

In order to cope with a continuously evolving test platform, test procedures have to be defined in a flexible yet structured way to ensure high automation level, non-regression verification, additional test definition

CONTEXT



In order to cope with a continuously evolving test platform, <u>test procedures</u> have to be <u>defined in a flexible</u> yet <u>structured</u> way to ensure <u>high automation</u> level, non-regression verification, additional test definition

OBJECTIVES

The main objective of WP6 is to define the approach to ensure a continuous integration, automation of test repetition (including automatic analysis of the test results)

The key objectives are:

- To define methodology and tools for continuous integration and automated tests repetition;
- To define methodology and tools for automated evaluation of test results;
- To provide concept and methodology for linking testing to safety approval.

WORK DONE

- Benchmark of the State-of-the-art approaches in terms of continuous integration and the associated tools

Jenkins Buddy GitLab BuildMaster go

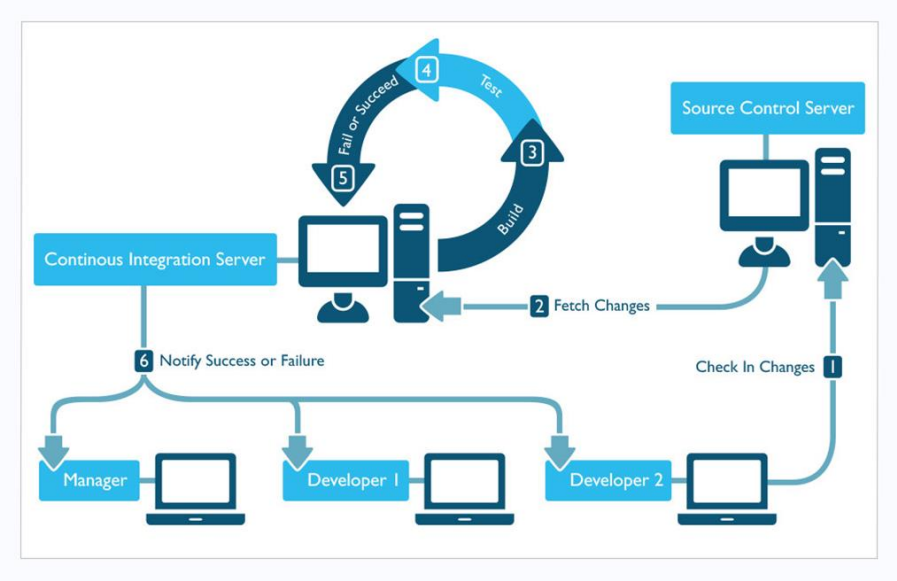
- Analysis and evaluation of the most promising CI approaches

- Selection of the most suitable approach for the project: **GitLAB**
  - Selection criteria: Coverage/completeness, Open Access (or open source), community support, existing interface with other solutions, user friendly
  - Cons: no real experience within the consortium

- Definition of test results evaluation automation process

WORK DONE

- CI purpose is to establish a consistent and automated way **to build**, **package** and **test** applications.

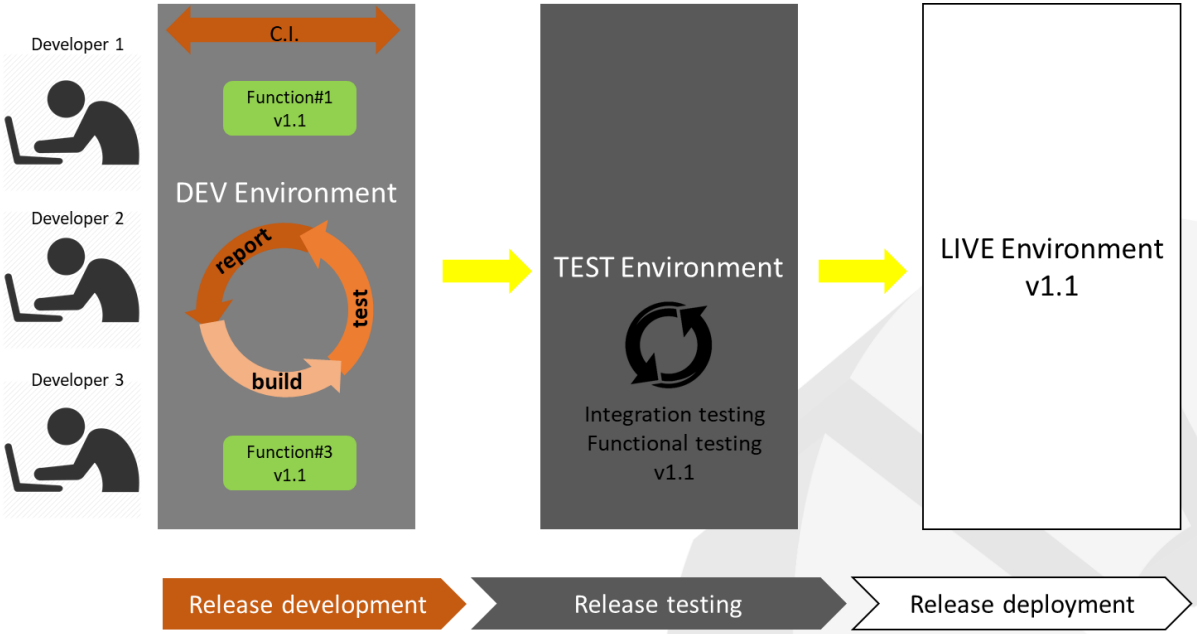


CI is adapted to other software development best practices such as:

1. Version control
2. Automated testing
3. Build automation
4. Automated deployments

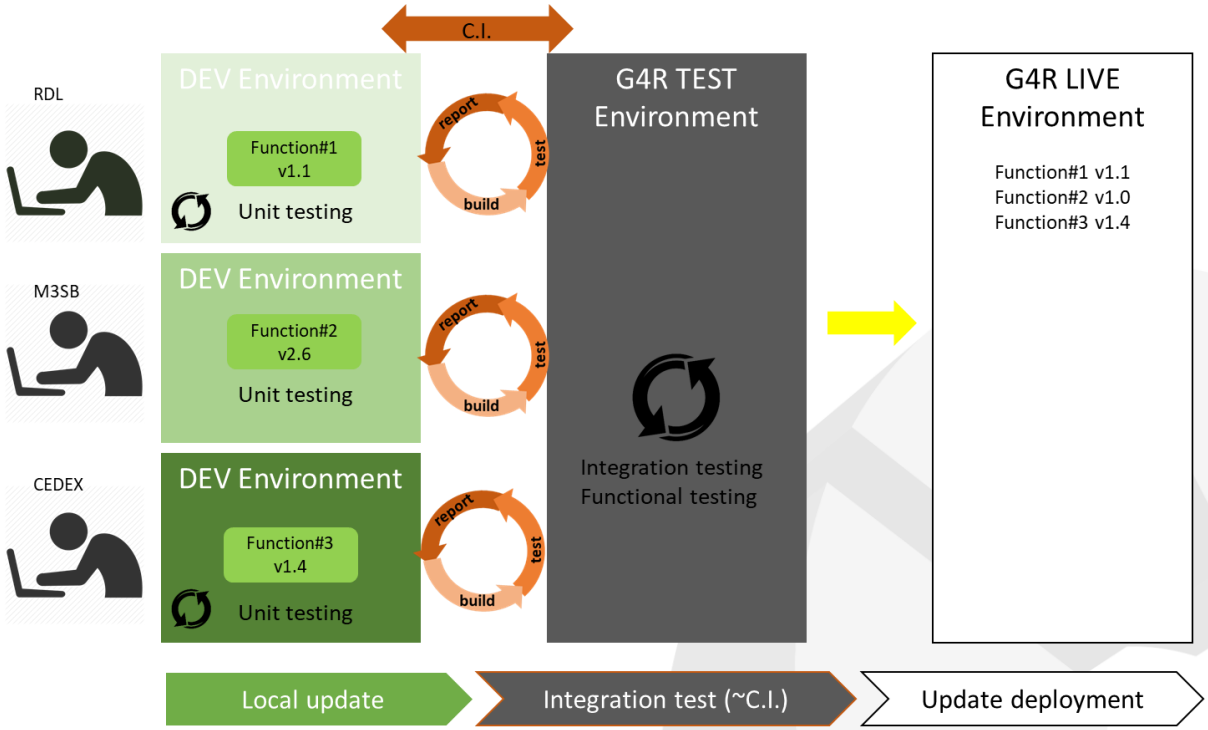
WORK DONE

- Usual CI working way



WORK DONE

- GATE4RAIL CI working way



WORK DONE

Methodology for automated evaluation of test results

- **Automatic testing** is based on the definition of test vectors and the associated results.
- The test vectors contain the complete input parameters for test to be performed, and the associated expected results consist in a validated version of the test results which is associated (or even part of) the test vectors.

Test automation is to be applied at:

- Unit test level: each function of the architecture independently
- System test level: once the sub-systems have been integrated together
- Operational layer: what is done in the platform by the users

EVOLUTION. FUTURE WORK. EXPORTED ISSUES

GATE4Rail is demonstrating the proof of concept of integration of GNSS and ERTMS modules

→ the methodology/tools have been defined for the implementation of future GATE4Rail platform evolution, ensuring higher TRL level solution (project target: TRL4)

QUESTIONS?