DEVELOPAIR

Our Customer Story

CAF POWER & AUTOMATION

How to maximize railway software quality while boosting competitiveness through smart automation

Keywords: Railways, EN50657, SIL 0-SIL 2, development efficiency, Test generation, IBM DOORS, Simulink and CXXtest.

Developair has closely collaborated with CAF Group for the past 6 years. CAF Power & Automation is a subsidiary of the CAF Group, it specializes in developing electric traction systems, energy storage solutions, and control systems for rolling stock. They develop software according to the functional safety standard EN50657 (Railways Applications - Rolling stock applications - Software on Board Rolling Stock) which is closely related to EN50128 (Railway applications - Communication, signaling and processing systems). This study focuses on the development of software with safety requirements between Basic Integrity and SIL 2.

The Challenges

Requirements quality: CAF P&A was defining software requirements in IBM Doors, using natural language. Despite this practice has been proved to be effective, the increasing complexity of the software combined with an expansion of the engineering team, can lead to situations where the requirements, so defined, are subject to **interpretations and ambiguities**. The requirements definition becomes a blurry process and, in some cases, it results in **inconsistencies, conflicts, and errors**.

Manual V&V activities: in CAF P&A the quality of requirements was proved by software designers and test engineers. Normally, unit testcases are manually written by testing teams and then exported into testing tools to be performed. The writing of testcases and the re-addressing of requirement issues, are known to be **highly time-consuming activities** due to the number of requirements and tests. CAF P&A noticed that these practices were forcing the engineering team managers to allocate valuable resources in amanuensis activities, while putting on hold other tasks. This ongoing situation leads to **constant pressure** on the teams, who are asked to deliver a quality product within strict time-frames and cost-effectively.

The Solution

CAF P&A was exploring technologies that could bring smoothness and dynamism to the software development workflow. The team was keen on AI tools because of their assistance skills; however, meticulousness and precision were paramount to maintain CAF's quality targets. Developair offered a solution based on symbolic AI which, by definition, performs at its best in environments requiring rigorous processing and rule-based reasoning.

Developair proposed to define low level software requirements using the Smart Editor's building blocks methodology to achieve standardization. The AI assistant, acting on the verification of requirements, adds agility to the process in ensuring optimal quality from early stages. Meanwhile, the Automatic Test Generator does the heavy lifting of testcases writing, relevance identification, and traceability.

CAF P&A can now enjoy a dynamic workflow thanks to the seamless integration of Developair's platform within CAF's existing requirement management tools and testing tools. Developair's team has created smart connectors that, in the process of exporting the information form the platform to the chosen tool, translate it automatically into the language recognized by the tool of choice (for example: natural language for IBM Doors; model based for Simulink; C++ code for Cxx Test).

The Outcomes

Following the collaboration, Developair has worked on an impact report analysis. These are the results:

- 52% less effort and time spent in low-level software requirement definition
- 80% less effort and time spent in implementation and documentation of unit tests
- 37% boost of the overall software development process
- 42% cost reduction of the entire software development process
  - Increase in software development budget
- 30% of the software engineering team reallocated to more productive activities
  - Increase in employee retention rate
    - More resources to focus on new R&D projects
- Maximized quality software
  - More dynamic fulfillment of safety regulations and standards