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Accelerate embedded software development with an MBD approach

A leading European land defence company turned to Expleo to help develop and implement a Model-based design (MBD) approach, by using MatLab-Simulink, that would accelerate embedded software development across its range of products, including armoured vehicles, artillery, weapons and turrets.

Defence – Land

The Challenge

Identifying ways to automate manual-based processes and customise solutions to work across multiple disciplines is critical in speeding up defence project outcomes and delivering significant cost-savings.

A leading European land defence organisation recognised it needed to move away from its traditional design process which was built around each product area having its own embedded software development team and methods for a similar system.

This silo-based approach meant expertise and learnings from features such as weapon position control in vehicles, weren't being applied to, or transferred across into, other relevant applications, for example weapon control for artillery. Vital economies of scale were being lost.

The current Design approach needed all textual requirements to be manually coded, inspected and tested on each project. This was a time-consuming and error-prone process that would benefit significantly from automation.

Expleo was tasked with applying its technical and engineering expertise to develop more efficient, digital-first systems that met key demands of being both customisable, easily maintainable and reusable.

Solutions

Expleo was responsible for successfully developing and implementing a state-of-the-art MBD approach across the entire range of land defence products. A 30-strong multidisciplinary team including experts in embedded software, RAMS, Software Quality and data management was deployed to deliver the two-part project scope.

The first part was to determine optimal development process and organisational structure to enable horizontal interoperability and effective process transformation. This was achieved through analysis and workshops that were crucial to achieving internal buy-in to the new model-based design approach. Resource allocation, organisation workflows and guidelines were developed by Expleo to ensure effective implementation of MBD.

The second part was the development of embedded software to enable automatic code generation, in a more visual language and reusable on a different project. To demonstrate the efficiency of the new MBD approach, Expleo deployed its Centre of Excellence to develop the weapon and turret position control software that could be applied across different products, including self-propelled howitzer, armoured combat vehicles and naval gun turrets.

Outcome

Enabling automatic code generation and development of reusable embedded software delivered cost-savings of around €1 million, equating to a gain of around 2,300 days, for each next feature.

Expleo developed the software so that the reusable components are robust and easy to understand. This means junior embedded software engineers can now deliver high-quality code, freeing up senior resource to be allocated to added-value projects.

In addition, to cost and lead time reduction, the reusable software components delivered quality improvements by minimizing human intervention and error.

> "Automating manual processes and switching to a Model-based design approach delivered savings of up to €1 million in single feature development. A horizontal organisation was created for the embedded software development which facilitated learnings across multiple product lines and optimised efficiency gains."

Laurent FIORIO
Senior Business Development Director Defence & Space, Expleo

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