Application of Agile Approach for Development of the Avionics Safety Critical Systems

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Over last 10 years Agile methodology became very popular project management approach, mainly for the software development. It proved to be effective in the rapidly growing digital industry. However, so far it has not been applied successfully for development of the safety critical and highly regulated systems, which are common in aerospace industry. Creation and implementation of Agile framework that addresses all the safety critical software requirements and limitation, that is fully compatible with existing regulations and approvable by certification authorities would be a breaking point, for the aerospace industry. According to a successful track record in digital industry, Agile methods would potentially allow to reduce time and cost of the new products development which are the key constrains for the new technologies' introduction in avionics.

A paper will demonstrate one of the methods of incremental and iterative product development. It will outline the main challenges and their solutions for Agile application in safety critical systems development at aeronautical domain. Achieved results stem from industrial practise and have been validated during two avionics projects related to cockpit displays development in GE Aviation.

The development lifecycle in the proposed method identifies the phases of the software creation process and defines the entry and exit criteria for the transition between each of the lifecycle phases.

The main activities for the software lifecycle are:

- Initial Analysis & Planning
- Development Iterations
- Release

The phase of analysis and planning is a crucial initial activity, consisting of a generation of development plans and schedules, preliminary analysis of customer requirements including preliminary requirements review, to check their feasibility and generation of the associated requirements-based tests.

The development iterations are an essential part of the lifecycle where the biggest benefit from applying Agile approach is observed. Every iteration is focused to deliver one feature/functionality of the product including corresponding increment in the project documentation. In each increment a partial SW lifecycle is applied to the features under development. During the development "Intermediate" baseline version of the code is created and scrutinised. Scrutiny activity on "intermediate baselines" gives indications for the quality of the developed items and helps the working team to resolve potential issues and challenges early in the project. The aim is mainly to eliminate all issues before the "formal" scrutiny activity.

In the product release phase after successful completion of the subsequent iterations the remainder of the lifecycle executed as a series of activities focused to deliver certification artifacts.

In comparison to traditional Waterfall way of managing projects the proposed Agile management approach has proven to be more robust and efficient for the small-scale project like a cockpit display design.