

An assessment of avionics software development practice: justifications for an agile development process

Avionic systems for communication, navigation, and flight control, and many other functions are complex and crucial components of any modern aircraft. Present day avionic systems are increasingly based on computers and a growing percentage of system complexity can be attributed to software. An error in the software of a safety-critical avionic system could lead to a catastrophic event, such as multiple deaths and loss of the aircraft. To demonstrate compliance with airworthiness requirements, certification agencies accept the use of RTCA document DO-178 for the software development. Avionics software development is typically complex and is traditionally reliant on a strict plan-driven development process, characterized by early fixture of detailed requirements and late production of working software. In this process, requirement changes and solving software errors can lead to much rework, and create a risk of budget and schedule overruns. This raises the question whether avionics software development could benefit from the application of agile approaches. Based on the results of three activities: 1) a literature study on industrial experience with the use of agile methods in a DO-178 context, 2) an expert assessment of the DO-178 objectives, and 3) a survey conducted among European avionics industry, an outline is presented of an agile development process, where Scrum is extended to achieve the DO-178 objectives. The application of agile methods is expected to support frequent delivery of working software and ability to respond to changes, resulting in reduced risk of budget and schedule overruns.

Contact: Patrick.Schittekat@sintef.no