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SCRUM SCORING TOOL FOR SPACE ELECTRONICS DEVELOPMENT

Abstract

Scrum has gained popularity as an Agile framework to develop engineering projects in rapid, adaptive iterations. While Agile has been traditionally applied to software projects, its adoption in space hardware developments is increasingly observed, in particular in small satellites. Scrum organizes the design process in sprints. Each sprint is decomposed in user stories defining the features to be implemented. Man hour effort associated with each user story is estimated through empirical scoring during planning sessions conducted in team meetings. While user story scoring is more of an art than a science, as it does not typically rely on analysis but rather on expert assessments by the team, it still holds a key role in the success of Agile.

This paper presents the results of the development of a scoring tool to estimate story points in Scrum planning sessions, specifically tailored for space electronics development. The tool is based on a mathematical model correlating historical data of space electronics development with time required to complete a given task, as a function of fundamental engineering parameters of the electronics.

The tool consists in an model that, starting from a block diagram of the system to be realized, and knowing its main components and connections, estimates the time required for the design of the system. As the design process is strictly linked with the individual capabilities and skill of the engineer working on it, the tool takes advantage of old data (from previous designs) and partial data from the current one to estimate the time to completion of the remaining tasks. Test runs demonstrated a capability of estimation with a mean squared error lower than 10. The tool supports the user to evaluate the probability of faults in the designed system and therefore the number of iterations needed before reaching a error-free system.

In this paper we present the initial findings of the formulation and implementation of the tool based on the development of a New Space mission, and discuss the extent to which the results obtained can be generalized to address other similar space mission developments.

Finally we discuss strengths of the approach and limitation related to the granularity of the assessment and the effort required to setup such models in project settings. We discuss opportunities for future work in developing a Scrum toolkit addressing a complete set of use cases related to Agile space hardware development.