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TRANSITIONING FROM WATERFALL TO AGILE METHODOLOGIES IN SATELLITE DEVELOPMENT: A CASE STUDY OF ORBIT NTNU

Abstract

In the space sector, we cannot fail. On-earth issues are easily fixable by intervention. Equivalent issues in space may lead to disaster, which has considerable consequences on how the phases of the product cycle are implemented. This small margin for error generates a need for attention to detail, historically making waterfall the natural development methodology in most space projects. Even though many other sectors have moved away from this aging methodology, it remains a standard practice within the aerospace sector.

Recent initiatives by prominent actors in the space industry, like ESA, have highlighted the ever-increasing relevance of agile methodologies. This coincides with the rise of the new space sector with the mindset of failing fast to increase productivity, product quality, and speed, which fits poorly with the waterfall methodology's rigidity, sequentiality, or command-and-control management styles. Contrarily, agile methodologies embrace change, iteration, rapid development, human communication, and collaboration, factors that have an increasing relevance the faster a project needs to move.

Additionally, agile methodologies stem from the discipline of software development. This has been successfully applied to several other disciplines over the years. Still, agile work methodologies could be implemented in other disciplines concerning satellite development. Therefore this paper will encompass development in most of the disciplines in satellite development.

This paper addresses the recent developments within the space sector contra dated work methodologies. Furthermore, ways of renovating old work methodologies and fitting agile work into old structures will be explored. The historical risks of a scrum-based approach and mitigative techniques to deal with said risks will also be discussed.

The paper will take a basis in transitioning to scrum within the organization of Orbit NTNU over the timespan of Q1 and Q2, 2023. Orbit NTNU is a volunteer student organization building and operating smallsats out of Trondheim, Norway. This organization lives on the edge of new space and can provide valuable information that will eventually be relevant within the space sector. This paper's practical foundation ensures that solutions will work in real-life situations.