Towards Understanding Assets in Software Engineering

Abstract

Software is now an integral part of many industries. Their products and services are infused with software, forcing companies to transform into software developing organisations. The development of such products is a massive undertaking, and organisations have to manage all artefacts involved in the process. Managing such artefacts that, in many cases, become crucial *assets* is important for success. Not recognising what is and what is not an asset and letting assets (unintentionally) degrade can result in waste. Thus, there is a need to create a structured and organised body of knowledge that can guide and help researchers and practitioners to deal with the assets during the product/service life-cycle. This includes, but is not limited to, what steps are needed to understand the assets' degradation, investigating and examining the existing methods and metrics on how to estimate degradation and understanding the implication of assets' value and degradation.

This licentiate's main objective is contributing to the software engineering field by providing a fresh perspective on assets. We have used a mixed-method approach to address this objective (literature reviews, focus groups, and case studies). The collected data is from peer-reviewed work and collaboration with five company partners.

We have created an asset management taxonomy based on a literature review and industrial workshops. The extracted assets represent not only the stages of software development, from requirements to verification and validation but also operational and organisational perspectives. The taxonomy was created to be extendable as the field evolves and matures.

Understanding and examining the degradation of assets is complicated and requires a more in-depth investigation of each asset type in turn.

As a part of studying assets, we present the impact of various development activities to investigate how source-code degrades. Moreover, we have examined the longevity of specific source-code related issues using statistical analysis. The results will be utilised to create a framework to manage source-code and architectural assets' degradation.

The work done in this licentiate includes; defining the *asset* concept and related terminology, identifying assets and creating a taxonomy of assets, presenting the preliminary investigation of tools and methods to understand source-code and architectural related asset degradation.

We conclude that there is a need for a better understanding of assets relevant for the inception, planning, development, evolution, and maintenance of software-intensive products and services. Our work builds on current methods and details the underlying concepts attempting to homogenise definitions and bring the areas of assets and degradation (a.k.a. technical debt) together. A part of this is a taxonomy of assets that starts the identification and structuring of assets which practitioners can use as inspiration to identify important assets in their daily work, and researchers can use as a starting point and expand on as the area is researched.