

# Abstract

The development of software 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. Recognising assets and letting them (unintentionally) degrade can result in maintainability problems. Thus, there is a need to create a structured and organised body of knowledge that can guide practitioners and researchers 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 different perspective on assets focusing on assets' value for the organisation. We have used literature reviews, focus groups, case study, and sample study to address this objective. The collected data is from peer-reviewed work, collaboration with five company partners, and 31 OSS from Apache Foundation.

First, we have defined the concept and terminology in a position paper. We have created an asset management taxonomy based on a literature review and focus groups – four focus groups conducted in 2019 with 29 participants. 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.

Then, we have performed a more in-depth investigation of selected asset types. As a part of studying assets, in a case study, we present the impact of bug-fixing, refactorings, and new development to investigate how source code degrades. In another sample study, we examine the longevity of specific source-code related issues in 31 OSS from Apache Foundation using statistical analysis.

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 architecture related asset degradation.

We conclude that a good understanding of the relevant assets for the inception, planning, development, evolution, and maintenance of software-intensive products and services is necessary to study their value degradation. Our work builds on current methods and details the underlying concepts attempting to homogenise definitions and bring the areas of assets and degradation together. A natural progression of our work is to investigate the measurements to evaluate the degradation of assets. This licentiate thesis starts investigating the value degradation of source-code related assets. We plan to continue investigating the degradation of architecture in our future work.

**Keywords:** *Assets in Software Engineering, Asset Management, Asset Degradation*