Notice of the Final Oral Examination
for the Degree of Master of Science

of

ARMAN YOUSEF ZADEH SHOOSHTARI

BSc (Shahid Beheshti University, 2018)

“Taxonomies of Software Ecosystem Health Metrics and practices: A Systematic Literature Review”

Department of Computer Science

Monday, December 7, 2020
4:00 P.M.
Remote Defence

Supervisory Committee:
Dr. Margaret Anne Storey, Department of Computer Science, University of Victoria (Supervisor)
Dr. Daniel German, Department of Computer Science, UVic (Member)

External Examiner:
Dr. David Lo, School of Information Systems, Singapore Management University

Chair of Oral Examination:
Dr. Dean Karlen, Department of Physics and Astronomy, UVic

Dr. Stephen Evans, Acting Dean, Faculty of Graduate Studies
Abstract

Context: Since the beginnings of software engineering, metrics (such as SLOCs) and practices have been used in an attempt to measure and improve the features of software development projects, their process, or their contributors. Measuring and enhancing software ecosystem features brings a new complexity level because a software ecosystem comprises several interrelated software projects. Over the past two decades, software ecosystems have gained considerable attention, and researchers have proposed various metrics and practices to measure and improve software ecosystems' health.

Objective: This thesis presents a systematic literature review that aims to build comprehensive taxonomies for software ecosystem health metrics and practices. These taxonomies synthesize the results of previous categorizations and update them with newer metrics and practices proposed since then. This study also aims to collect and synthesize all the definitions, metrics, and practices proposed to define, measure, and improve software ecosystem health in the literature.

Method: I conducted a systematic literature review and identified 40 primary studies related to defining and measuring software ecosystem health. I extracted the definitions, metrics, and practices for software ecosystem health from the primary studies, and then I categorized the metrics and practices to build the taxonomies.

Results: I identified a total of 7 different definitions for software ecosystem health, 142 different metrics, and 174 various practices for software ecosystem health. Our taxonomies for software ecosystem health metrics and practices have three categories (niche creation, productivity, and robustness). Each of these categories has several sub-categories of metrics and practices.

Conclusion: Software ecosystems have a wide range of stakeholders that have different perspectives regarding software ecosystem health. To satisfy this spectrum, researchers have proposed various metrics and practices to measure and improve software ecosystems' health. To improve unifying contrasting opinions, I conducted this study. The metrics and practices proposed are diverse in both purpose and the data required to compute them. Some metrics are presented along with a method on how to compute them. In contrast, others are defined abstractly without an operational approach to calculate them, and some are mentioned without a clear rationale. Furthermore, the same metric or practice is often proposed in more than one publication using different names. This thesis addresses these alignment problems.