<u>Driving Digital Transformation through Software Portfolio Analytics</u>

Invitation to collaborate with our team on a study to improve digital transformation efforts at the software portfolio level. Silverthread has been invited by the NSF to apply for a research grant on the above topic and we seek qualified collaborators interested in participating. Participants will gain unique insights to inform software portfolio management and digital transformation decisions through free access to portfolio analytics, dashboard visualizations, and benchmark comparisons.

Project Overview

Silverthread, Inc's founders have worked together for 15 years as MIT and Harvard Business School Professors and Researchers and hope to work with the NSF on ways to help large enterprises improve digital transformation. On this R&D effort we will collaborate with senior leaders who manage the evolution of large portfolios of code bases and want to explore better ways to drive business outcomes. We're inviting a select number of companies with 100+ systems / development projects to participate. We will choose a sample of 2-3 participants for the pilot Phase I during 2020 Q4 - 2021, and approximately 10 participants for the Phase II Study in 2021-2022. **We aim to cover all costs with R&D funds provided by the NSF if they approve the research grant.**

Expected Outputs & Benefits to You

Although the findings from this research initiative are unknown, in the end, participating in this effort will help you make data-driven decisions related to software assets and ultimately lead you to be more successful with your digital transformation and portfolio management.

Outputs and benefits include:

- Assessment & Dashboard: free access to tools and dashboard view of software portfolio including quantitative metrics and composite scoring across technical health and business performance

- Insights and data-driven action items to inform key decisions

- Summary of study results including benchmark comparisons to contextualize your performance against peers

- The opportunity to connect with a community of leaders in different organizations and work with experts on our team

Additional follow-on phases of this SBIR may include acting on these findings with remediation tools.

If you would like to learn more, please contact NSF_DX@silverthreadinc.com. We will set up a meeting to discuss details.

The Challenge

Organizations driving digital transformation are pushing boundaries on several fronts at the same time. They are adopting DevOps practices to transform the way things are built and value is delivered to the customer. They're moving to the cloud for scalability and economic reasons. They aim to drive business agility, improve time-to-market, respond to new opportunities and risks rapidly. Our team's research has consistently shown that each of these goals require an organization to understand the state of its software

portfolio and to develop healthy and well-structured code bases. While often unappreciated, the 'technical health' of your software is often the dominant driver of your business performance.

Unfortunately, many software leaders lack consistent and complete data on the state of their software projects and systems. In most enterprises less is known about software than any other asset category. To illustrate - an accountant can easily tell you where your physical assets are and what they are worth. CIOs are not so lucky. While software is the most valuable intangible asset, it is often not reliably tracked and its value and health are a mystery. Decisions often rely on the expert opinion of software architects. While very valuable, SME insights are also highly subjective, context dependent, and very labor intensive to collect. Software leaders need objective and data-driven ways to know which systems are in good shape, which to refactor, which should be rewritten, which to transform, and which are 'cloud ready.' They also need to understand when to invest in improvement using financial ROI modeling to evaluate options. On this effort we aim to advance methods, metrics, and tools to help people make better decisions based on an objective and quantitative assessment of software portfolios and projects.

Objectives and Work Plan

The objective of this work is to develop and test a digital transformation readiness indicator that will supplement expert opinion and help you make data driven decisions.

We expect participants to provide:

1. Identify and access 100+ systems / development projects
2. Allocate ~ 6 hours to qualitative interviews with key decision makers to understand the perception of different systems in terms of ease of use and difficulty to maintain
3. Provide access to or describe existing decision-supporting tools (dashboards, spreadsheets etc.)
4. Install our portfolio analysis tool

Silverthread will provide:

1. Run an initial automated software assessment
   a. Cross sectional analysis of many systems to benchmark differences across portfolio
   b. Timeseries analysis to show the history and evolution of individual systems
   c. Predictive analytics on likely business outcomes including agility, developer productivity, defects, and risk
   d. Prescriptive analytics to help determine best course of action. Model the ROI of refactoring or rewriting, or intervening in some other way
2. Present portfolio level results
3. Continuously run automated software assessments, possibly via DevOps integration or similar. Incrementally improve and calibrate models via statistical and machine learning (ML) techniques. Devise new metrics and ways of presenting them
4. Incrementally improve executive dashboards based on user feedback

Key Team Members

Dr. Daniel Sturtevant - CEO and Principal Investigator: Daniel received a Master's degree in Engineering and Management from MIT, and a PhD in Engineering Systems from MIT. He is the Co-founder and CEO of Silverthread, focusing on understanding complexity in largescale software systems, developing methods for quantifying "technical debt," and creating tools that help organizations build insight, reduce risk, and improve business outcomes on difficult software projects.

Dr. Alan MacCormack – Co-founder and Advisor: Alan is an expert in the management of innovation and software product development. His recent work has focused on analyzing software architecture by exploring the networks of interdependencies that can be automatically extracted from software code bases. Alan has a B.S. in engineering from the University of Bath in England, an M.Sc. from MIT's Sloan School of Management, and a Ph.D. from Harvard Business School.

Sean M. Gilliland - VP of Product Development: Sean received an undergraduate degree in Computer Science from the University of Nevada, and a Master's degree in Engineering and Management from MIT. As VP of Product Development, Sean architects innovative solutions to quantify design quality and evaluate software economics. He was awarded three patents in intelligently adaptive game design.

Dr. Carliss Baldwin – Co-founder and Advisor: Carliss has done pioneering work establishing links between an engineering firm's financial performance, its strategy, and how complex physical and software products are structured. Carliss has a Doctorate and MBA from Harvard Business School, and an SB in Economics from MIT.

Confidentiality and Protection of Information

The software portfolio assessment can be done on-premises, eliminating the need for software to leave your site. All data collected by Silverthread will be confidential and aggregate data will be reported anonymously. Should we wish to use quotes or attribute data to you, we will have a separate clearance process requiring your approval.