Software Project Confidence and Risk Metrics: How Much Should We Know?

Background and Project Description:

Metrics have become a common and important topic for modern software development projects to understand the quality of software, the health of communities, and the economic value derived from such projects. Sample software development metrics include such as items “community diversity” or “code commits per day” to provide meaningful and human-readable results. Software project metrics are a popular topic for research studies regarding their use in understanding the development process. Some of the most popular research topics are to measure the impact and effectiveness of software metrics in software development (van Genuchten, 2013; Kumar, 2017). Metrics are becoming more popular because traditional management solutions to complex problems, like software development, do not always work (Shawky, 2016) and metrics provide a way to standardize methods of understanding issues of quality, health, and value.

An example of newly emerging metrics in software development are associated with risk. Risk metrics are commonly used in the medical field to determine factors such as a chance of mortality (Fang, 2016) and genetic risk (Odegaard, 2013). Software development is no different as risk associated with license compliance and software vulnerabilities pose very challenging problems for developers. In this FUSE proposal, I will explore how software development risk metrics are developed, used, and understood by software developers.

Experience as a student and student worker at the University of Nebraska at Omaha’s College of Information Science and Technology’s BRIDGE Lab provides me with knowledge in subjects like risk measurement, software development, and metrics workflow. The primary group I have worked with in the BRIDGE Lab is the CHAOSS project (https://chaoss.community/), a Linux foundation project centered around software development metrics. Taking inspiration from ideas and concepts that help build projects like CHAOSS, I plan to perform a user study focused on user evaluation of risk metrics. In particular, the goal of the FUSE project is to learn if viewing a set of standard risk metrics benefits the user’s confidence in their understanding of a software project’s health. The proposed FUSE project will contribute to both academic and practical outcomes.

Hypothesis:

Evaluating risk metrics related to a software development project benefits the user’s confidence in their understanding of the health of the project.

Methods:

The proposed FUSE study’s primary focus will be to explore risk metrics and the impact they have on modern software development. To better understand confidence that people in in risk metrics, a sample of users will be surveyed. These users will be presented with a set of questions both before and after viewing risk metrics related to selected projects. The questions involving the user’s confidence in their understanding of a project’s health will be answered and evaluated on a 1 to 7 point scale. To ensure that the users will have varied understandings of metrics and risk management, I will find students of varied academic standings and professionals that work with metrics as a routine part of their role as a professional. This study will be conducted in Summer of 2019, beginning in May and terminating in August.
Risk metrics for the study will be deployed on Augur, a subproject of CHAOSS. Augur is an application that analyzes GitHub repositories and Git data to create visual information based on a set of predetermined metrics. With a standard Augur installation, the application connects to a database to retrieve information about specific repositories.

A customized version of Augur will be developed for the study. This version will be isolated from the internet and connected to a local database. The database used for this version will host a certain set of stored GitHub repositories, which will allow the user to study and analyze risk metrics including license and security information.

The risk metrics will be identified via work in the CHAOSS project. The primary risk metric to be used in the study is licensing. Information about licensing compliance and consistency can be key in determining the health of a project. If a user has mismatched or no licensing information, a project is most likely less durable than a project that has consistent and clearly defined licensing. Licensing will be determined by the present and content of SPDX license identifiers at the top of each file. The other metric to be included in the study is the presence and state of a CII Best Practices Compliance Badge (CII, n.d.). The presence or state of this badge is an indication of whether the selected repository follows CII Best Practices particularly around security.

Project Timeline:

<table>
<thead>
<tr>
<th>May 2019</th>
<th>Develop standalone Augur version</th>
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<tbody>
<tr>
<td>June – July 2019</td>
<td>User testing of risk metrics</td>
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<tr>
<td>July - August 2019</td>
<td>Data collection and creation of paper</td>
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</tbody>
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Faculty Mentor Roles:
I have worked with Matt Germonprez (Matt) for several months, and he has always been supportive of my work. He has been a developer of my creativity, but never of my projects. Dr. Germonprez will provide input as an advisor. He will share ideas, help me with the revision process of documents and project milestones and help keep us on a deadline. He will not collect data, code, or content for the project.

Budget and Budget Justification
I am requesting $2000 to complete this study.

| $2000 | Salary for 100 hours for Summer of 2019 ($20/hr) |
References and Citations


Dear FUSE Selection Committee Members,

This letter is to highly endorse Matt Snell in his FUSE proposal at the University of Nebraska Omaha. In this letter I speak directly to Matt’s dedication to the BRIDGE Lab, the Linux Foundation’s CHAOSS project, and his growing interest in academic and applied research. I have had the privilege of knowing Matt for the past year, first as a student in my class and then as a member of our research team, dedicating significant time and energy to build capacity and provide support for others seeking to advance themselves.

As a member of our team, Matt has been an important contributing member in the investigation of open online communities. His work has been funded by Mozilla (independent from this FUSE proposal) and has opened new lines of research, particularly focused on understanding emerging issues around global consent management as evident in our online interactions with people and organizations. Matt’s work in this area can be found here:


Further, Matt’s work has had a direct impact on informing global consent to an international audience, having presented his work at MozFest 2018 in London, England:


Through his work, Matt has developed working relationships with scholars and practitioners including Sean Goggins (University of Missouri) and Don Marti (Mozilla) respectively. These relationships not only provide Matt the opportunity to significantly extend his own work, but they also provide the University of Nebraska at Omaha an international profile as an active research partner with other organizations, whether within the US or across international borders. Fostering these relationships, as Matt has done, is becoming increasingly important in an era of high-profile funding and publishing that rely heavily on building and maintaining impactful research teams.

Matt is dedicated to everything he takes on, whether working alone or within diverse teams. Matt is continually developing his academic skills and is dedicated to making an impact on the Information Technology field through his work, as well as creating an environment within which others can succeed. He is thoughtful and respectful and will represent the field and UNO to the highest degree. I recommend Matt without reservation. Good luck in your process.

Sincerely,

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