A Proposal for a 1-Year
ABB Research Project with

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Executive Summary

Problem Statement
ABB systems are required to be deployed for a significant time. Long term maintenance is a significant challenge, especially in the presence of changing functionality and technology. Little information is available on the overall structure and evolution of the system through these changes. Raw metrics, such as code churn, defects found, and features added, are usually not verbose enough for project managers and system architects to properly comprehend how the system itself is changing. Currently, these metrics, in their raw form, are combined with expert knowledge on the system to allow some decision making. ABB is quite interested in a solution that can allow technical and managerial personnel to better understand the structure and evolution of the system. Specifically, where defects are in the system, where is the most time spent, how frequently do areas change, and how have these measures changed over consecutive releases.

Proposed Solution
Visualizing these aspects of software structure and evolution will enable a more thorough understanding of the system and its evolution. Past work by Maletic, et al. [1] and others in the field have shown the feasibility of visualizing various aspects of software structure. Research into using these kinds of visualizations to address specific industrial problems is the main focus of the work. In addition, research into visualizing evolution of a system and the potential to add simulation or “what if” analysis to the visualization is desired.

Scope
This collaboration will involve research into visualizing maintenance concerns, creation of a visualization technique and tool, as well as demonstrating these techniques and tools on real industrial scenarios.

ABB Collaborators
Brian Robinson, Ph.D., Principal Scientist, ABB Corporate Research, ABB Principal Investigator

KSU Collaborators
Jonathan I. Maletic, Ph.D., Associate Professor, KSU, University Principal Investigator
Graduate Students: tbd.

Collaborative Benefits
- A meaningful collaboration between ABB and KSU
- Support current research into automated program transformation, validating techniques on industrial systems
- Research ways to automate patterns for transformation
  a. KSU: Research support and real systems to work with.
  b. ABB: Reduced cost of adaptive maintenance
- Collaborative publications and measured benefit

Software Tools and Work Products
The tools developed by Maletic/Collard, including the srcML translator and sv3D, are under a GPL (open source license). The intent of their research is to construct open source tools for researcher and industry practitioners. Any new tools developed by the University Collaborators during this research will also be under a GPL. This will allow ABB to use this newly developed software internally at no cost, while still allowing the University Collaborators to meet their research goals.

References (available at www.cs.kent.edu/~jmaletic)