Empowering Productivity

Mission
The modern workplace demands more of its employees than ever before. We empower the productivity of software developers, improving the efficiency and effectiveness of software development teams by amplifying the cognitive capabilities of individuals.

Objectives
We focus on empowering the productivity of individuals and teams by analyzing, modelling, and developing novel approaches that foster productive behaviours at work. In particular we focus on the following topics:

Increasing focus at work
Knowledge workers experience frequent interruptions from their co-workers. While some of these interruptions are important and necessary, others can cause a high cost, especially if they happen at inopportune times. We aim to reduce expensive interruptions, both external and self-induced, to increase focused work time. An example of our research is the FlowLight, a desktop traffic light that indicates a worker’s interruptibility to co-workers and has been shown to significantly reduce interruptions.

Monitoring productivity
Little is known about how to best measure the productivity of developers, teams, and organizations. Assessing productivity is especially challenging given today’s complex, highly fragmented, and collaborative work. Our objective is to use personal and biometric data to understand and monitor productivity, provide meaningful self-monitoring approaches, and foster productive behavior in developers. One example of our research is PersonalAnalytics, a self-monitoring approach that provides (actionable) productivity insights for individuals.

Automating workflows
Developers have to perform a variety of complex tasks while they work. To accomplish these tasks, developers have to perform several atomic steps, combine many disparate sources of information, and use multiple tools and applications. We aim to automatically identify developers’ task workflows and automate the atomic steps so developers can focus on the intent of their high-level tasks. One approach we are currently working on is Devy, a voice-activated conversational assistant (like Apple’s Siri) that automates complex cross-application workflows for high-level tasks.

Reducing information overload
Software development teams constantly deal with an avalanche of information. Making smart decisions as development proceeds can be difficult given the time constraints most development

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1 This proposal has been expanded and submitted for the 2017 GCRC competition in conjunction with collaborators from Computer Science (Science), Psychology (Arts), Psychiatry (Medicine), School of Public Health (Medicine), and Organizational Behaviour (Sauder). An updated SE-specific strategic plan will be submitted by Nov 13.
teams face. We work on recommenders that can help bring forward the right information to make a
decision at the right time in the development process. An example of a past project is the Eclipse
Mylyn project that provides a recommendation of which files and source code are associated with
a given task. Current recommenders being investigated focus on identifying and representing
design constraints that exist for a system under development to help a development understand
and evolve the design of a system to meet desired quality goals.

**Supporting effective testing**
Software quality is an invariant in the modern workplace; despite increases in velocity and
complexity, there is an expectation that the quality of work is maintained. Our objective is to help
developers to achieve continuous high quality by supporting effective testing. In particular, we aim
to identify metrics and develop approaches that help developers to track, review, and improve the
quality of their work. As an example, we have previously shown that common metrics for
assessing the effectiveness of automated testing approaches are insufficient and are currently
working on new and more meaningful metrics to help developers better assess the quality of their
work.

*Who We Are*
Dr. Gail Murphy, Dr. Reid Holmes and Dr. Thomas Fritz are all professors in Computer Science. We
work collaboratively in the Developer Productivity Group (DevProG) currently supervising more than
20 graduate and undergraduate students. We are in the process of increasing the lab size to
adequately address our research objectives and vision.

*Impact and Industrial Relationships*
Our ultimate goal is to improve the productivity of professional developers and knowledge workers. To
achieve this, we are collaborating with more than 20 industrial partners. Collaboration takes many
different forms. For instance, one form of collaboration involves placing tools we develop into the work
site to provide continuous insights on and suggestions for their teams’ work practices. As another
example, we frequently conduct formative interview-based studies at work sites to gain an industrial
perspective and propose new projects that can improve the work site practices. We further develop
concrete approaches and tools to improve productivity, some of which have already been deployed
with more than 500 professionals over periods longer than a year.

*University Collaborations*
Given the multi-disciplinarity nature of our objectives, we are actively collaborating with researchers
within the department of Computer Science, in particular researchers in Human Computer Interaction
and Cognitive Sciences, as well as within the university environment, including researchers in
psychology, business, information sciences and engineering.

*Teaching*
We train our students to be top software developers as soon as they leave the university and create a
measurable impact on the productivity of the teams they are working in. By fostering active interaction
between students and professional software developers, they are able to contribute effectively to the
productivity of their teams directly after graduation.