University of Victoria | Graduate Studies

Notice of the Final Oral Examination
for the Degree of Doctor of Philosophy

of

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"A Framework of *Collaboration via Autonomy* for Commercial Software Teams"

Department of Computer Science

Wednesday, October 18th, 2017
1:00 P.M.
Clearihue Building
Room B017

Supervisory Committee:
Dr. Daniel M. German, Department of Computer Science, University of Victoria (Supervisor)
Dr. Margaret-Anne Storey, Department of Computer Science, UVic (Member)
Dr. Marian Petre, Department of Mathematics, Open University (Outside Member)

External Examiner:
Dr. Brian Fitzgerald, Director, Irish Software Research Centre

Chair of Oral Examination:
Prof. Michael Eby, School of Earth and Ocean Sciences, UVic

Dr. David Capson, Dean, Faculty of Graduate Studies

Abstract

Modern software organizations produce increasingly complex and sophisticated products that build on the effort of multiple individuals and teams. This reality highlights the critical importance of collaboration and the support of its various facets, which are still central concerns for software engineering research and practice. Software organizations also aim to motivate their developers and teams and help them be productive. Knowledge work research highlights the importance of autonomy in work design for satisfaction and happiness. The now pervasive adoption of agile methods and advocacy of self-organization have made autonomy and its challenging practical application a mainstream focus for software engineering research and practice.

Employee autonomy and effective collaboration are thus essential for software companies to motivate developers and help them deliver successful software products. Yet, essential as it might be for organizations to combine them, autonomy and collaboration seem conceptually and practically at odds with one another; is it possible for people or teams that are working together on something be autonomous? One can imagine teams finding it challenging to organize the development work of autonomous developers. Furthermore, on the organizational level it can be difficult to align autonomous agents towards a desirable company strategy. Finally, management may need to be revisited as a function when individuals or teams have autonomy in their work.

This dissertation builds on three substantial case studies based in industry, investigating how several software organizations organize collaborative development work. In the first study I examined how 24 commercial software teams in different companies organize their development work through their use of GitHub. In the second study I probed how Atlassian scales the practices of its rapidly growing development teams and enacts a culture that keeps them aligned to the strategic goals. In the third study I explored the role of engineering managers at Microsoft and how they support software developers and teams to organize their own work and generate quality outcomes that meet organizational goals. The studies are primarily qualitative and I have used a variety of data collection methods including interviews, observations, documentation review, and surveys.

Tension between autonomy and collaboration surfaced in the studies and it became the central challenge I address in this dissertation. By understanding the meaning of autonomy for the studied organizations, the definition and characteristics of autonomy evolved and,

upon synthesis of the findings, I argue that autonomy is not incompatible with collaboration but rather that the two concepts build on each other.

I articulate and propose a conceptual framework of collaboration via autonomy for software companies in this dissertation. This represents a holistic view of organizations and includes four areas to consider when making autonomy the foundation of collaboration: team collaboration practices, scaling strategies, cultural values, and manager roles. The framework has implications for the study of collaborative software development by proposing to look beyond the combination of independence and coordination as the basis of collaboration. At the same time, the framework can guide commercial software teams and organizations on how to empower development teams, yet not compromise strategic vision.