

THESIS FOR THE DEGREE OF DOCTOR OF PHILOSOPHY (PH.D.)

Psychological Group Processes when Building Agile Software Development Teams

LUCAS GREN

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Abstract

Background With the agile approach to managing software development projects, comes an increased dependability on well functioning teams. Agile teams are profoundly influenced by social-psychological factors since more communication and cooperation are needed both within the organization and team, but also with customers.

Objective The objective of this thesis is to investigate if and how psychological group processes, i.e. the temporal perspective often referred to as group development, is related to what is meant by an agile team.

Method A diversity of research designs and data collection methods were used, including surveys, interviews, and project data, to find and explain connections between team agility and group developmental stages, but also agile maturity model validity and individual nontechnical skills. A total of 311 people participated in the studies from 19 different companies situated in the US, Brazil, The Netherlands, and Sweden.

Results The results show that there are connections between group development maturity and what is meant by an agile team, demonstrating the relevance of psychological group processes when building agile teams. Group developmental issues were related to many aspects of how team agility is described, including team planning effectiveness, interpersonal conflict, open communication, and dedication. Moreover, the mature use of agile practices could not be explained by individual nontechnical skills and the efficiency of task implementation in agile software development teams were not dependent of group maturity, but instead individual technical skills.

Conclusions Our first conclusion is that many agile measurement scales are not scientifically validated and the construct of *agility* needs to be broken down into parts that need to be researched separately; one such part being what is meant by *team agility*. Secondly, agile teams at different group development stages adopt team agility differently, and the implementation and management of agile projects need to be adapted to what stage the team is in from a group-developmental perspective. We also conclude that efficiency, but not effectiveness, in agile software development might be more dependent on individual technical skills than group development and that individual nontechnical skills are poor predictors of the maturity of agile practices.

Keywords agile teams, group development, social psychology, software engineering

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