

The Why-How-and-What of Software Development

– enhancing software development to the next level

Starting Position

"Software is eating the world"¹. This famous saying has never been more true than today. The digitalization of the economy and society is ubiquitous. At the same time software development is undergoing really disruptive changes – agile development has become standard, highly distributed development has arrived, with establishing hybrid collaboration as the new way, DevSecOps is coming. At the same time AI tools are becoming more and more standard, the impact of the shift from project-centric development to sustainable software product development on work style, businesses, and tools is not yet foreseeable. So we are living in a very exciting time in software development with many opportunities and chances. At the same time, even today's software product development still suffers from many shortcomings: low code quality, badly tested code, legacy code, high maintenance effort and costs, hard extensibility of code, and budget and schedule overruns. Why is this the case?

Goals

In this series of research projects, we want to study *why* software product development and software management is still done like it is done today. In each master project, we investigate one select topic. Each master project might apply the following scientific approach. In a grounded theory based study we analyze the *why* of an existing shortcoming in depth (P7). In a second step, we want to develop new concepts and prototypes of *how* the shortcoming could be solved (P8). This is finally followed by the *what* tools we need to develop to overcome the current liabilities of software development and validate the applicability of the developed tools. Possible topic to investigate:

- Software testing
- Coding quality and style
- AI tool usage
- Software documentation
- New features over quality

This list is by far not complete and will be adapted to new issues appearing on the horizon, or to the students' interests. We are aiming to publish the results at international software engineering conferences.

Used Technology / Required Skills:

Interest in improving the way we develop software, develop new tools; interest in digging into new topics, and to get to the bottom of things
Interest in basic research and statistic analysis

Others: In this project we aim to cooperate with the Victoria University of Wellington, Wellington, New Zealand. If interested, an exchange might be arranged. Project language is English

Tasks for the Master student

The interested student can select from the wide range of challenges. Develop concepts, prototypes, implement solutions and validate them. A possible master program might be: user studies and analysis (P7), develop concepts and prototypes (P8), develop tools and validate (P9).

Study type: Fulltime
 Part time 50%

Project organisation: Single and/or in a project team possible

Work place: Windisch

Advisor: Prof. Martin Kropp

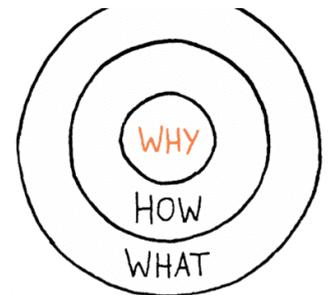
The Golden Circle

WHAT ...of software product development

WHAT
Every organization on the planet knows WHAT they do. These are products they sell or the services

HOW
Some organizations know HOW they do it. These are the things that make them special or set them apart from their competition.

WHY
Very few organizations know WHY they do what they do. WHY is not about making money. That's a result. WHY is a purpose, cause or belief. It's the very reason your organization exists.



¹ <https://a16z.com/why-software-is-eating-the-world/>