Understanding the Dynamics of Test-driven Development
The main goal of this work is studying some of the factors that play a role when assessing TDD effects.

This will benefit the adoption and adaption of TDD by the industry.
PROBLEMS

• Effects of Test-driven development not well understood

• Many studies (experiments) but few replications

• Process conformance reported as one of the main issue

• The TDD process (and process conformance) might change according to the context

• Knowledge transfer back to the industry/practitioners world
Solutions

• Replicate existing experiments to support / create knowledge
• Include process conformance in the study design
• Consider the context (development task) in which TDD is used
• Create guidelines for industry/practitioners to adopt TDD
Research Question 1

How the level of process conformance to TDD impacts its effects on:

• External code quality

• Developers productivity
RQ1 – PRELIMINARY RESULTS

• Two close experiment replications:
  • Same task, duration, training, subject’s background
  • Different sample size (18 vs. 22)

• Experiment 1:
  • Process conformance and external quality are *weakly* correlated
  • No impact of conformance on productivity

• Experiment 2:
  • No correlations (or valid regression model) at all
RQ1 – Research Idea

What makes a TDD development session a good TDD development session?
• It’s fine grained (5-10 minutes per cycle)
• It’s uniform (approx. same cycle duration)
• It’s sequenced (cycles follow red-green-refactor)

A better TDD process conformance model!
(based on data from industrial experiment)
What type of task* is better suited for TDD in terms of:

• Software external quality

• Developers’ productivity

*Type of task
  • Algorithmically oriented
  • Architecturally oriented
  • Bugfix
RQ2 - Challenges

It might be difficult to access and compare data for the three task types:

- Use open source codebases (e.g.; GitHub)
- Partially reuse data collected for RQ1
- Use comparative case study rather than (quasi-)experiments
CONTRIBUTION

Academia
• Creation of new evidence about the value of TDD
• Build a conformance model to be implemented in future TDD studies

Industry
• Creation of guidelines regarding the adoption of TDD
Four peer-reviewed papers:
- Replication of controlled experiment (no conformance)
- Two addressing specifically RQ1
- None addressing RQ2

A third paper addressing RQ1 is under preparation

Towards a Model for Assessing Process Conformance in TDD Experiments
PLANNING

3Q-2014
• Finalizing material regarding RQ1

4Q-2014
• Data collection for RQ2

1Q-2015
• Data analysis for RQ2
• Publication(s) for RQ2

2Q-2015
• Publication(s) for RQ2
• Dissertation draft
Q&A

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Are process conformance and external quality linearly correlated?

\[ H_0: \text{QLTY} = \alpha + \beta \times \text{CONF}; \beta = 0 \]
\[ H_1: \text{QLTY} = \alpha + \beta \times \text{CONF}; \beta \neq 0 \]

(R-squared = 0.14)
PROGRESS (I)

Are process conformance and developers’ productivity linearly correlated?

\[ H_0: \text{PROD} = \alpha + \beta \times \text{CONF}; \beta = 0 \]

\[ H_1: \text{PROD} = \alpha + \beta \times \text{CONF}; \beta \neq 0 \]
Are process conformance and external quality linearly correlated? (when considering high and low conformant separately?)

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METRICS

• TEST = unit-tests per minute
• PROD = delivered user stories per minute
• QLTY = sum of external quality of each user story
  • User-story quality = % of passing acceptance tests
• CONF = % of development events categorized as TDD