

Industrial Study on Test Driven Development

Challenges and Experience



MÄLARDALEN UNIVERSITY
SWEDEN

Adnan Čaušević¹, Rakesh Shukla² and Sasikumar Punnekkat¹

¹ Mälardalen University, Sweden

² Infosys Ltd., India



Research Flow

“Respondents would like to use TDD to a significantly higher extent than they actually do currently.”

A. Causevic, D. Sundmark, and S. Punnekkat, **“An Industrial Survey on Contemporary Aspects of Software Testing,”** in Proceedings of the 3rd International Conference on Software Testing, Verification and Validation (ICST), 2010

“Developers inability to write efficient and effective automated test cases is considered to be one of the limiting factors of full TDD adoption.”

A. Causevic, D. Sundmark, and S. Punnekkat, **“Factors Limiting Industrial Adoption of Test Driven Development: A Systematic Review,”** in Proceedings of the 4th International Conference on Software Testing, Verification and Validation (ICST), 2011



Research Flow

“Respondents would like to use TDD to a significantly higher extent than they actually do currently.”

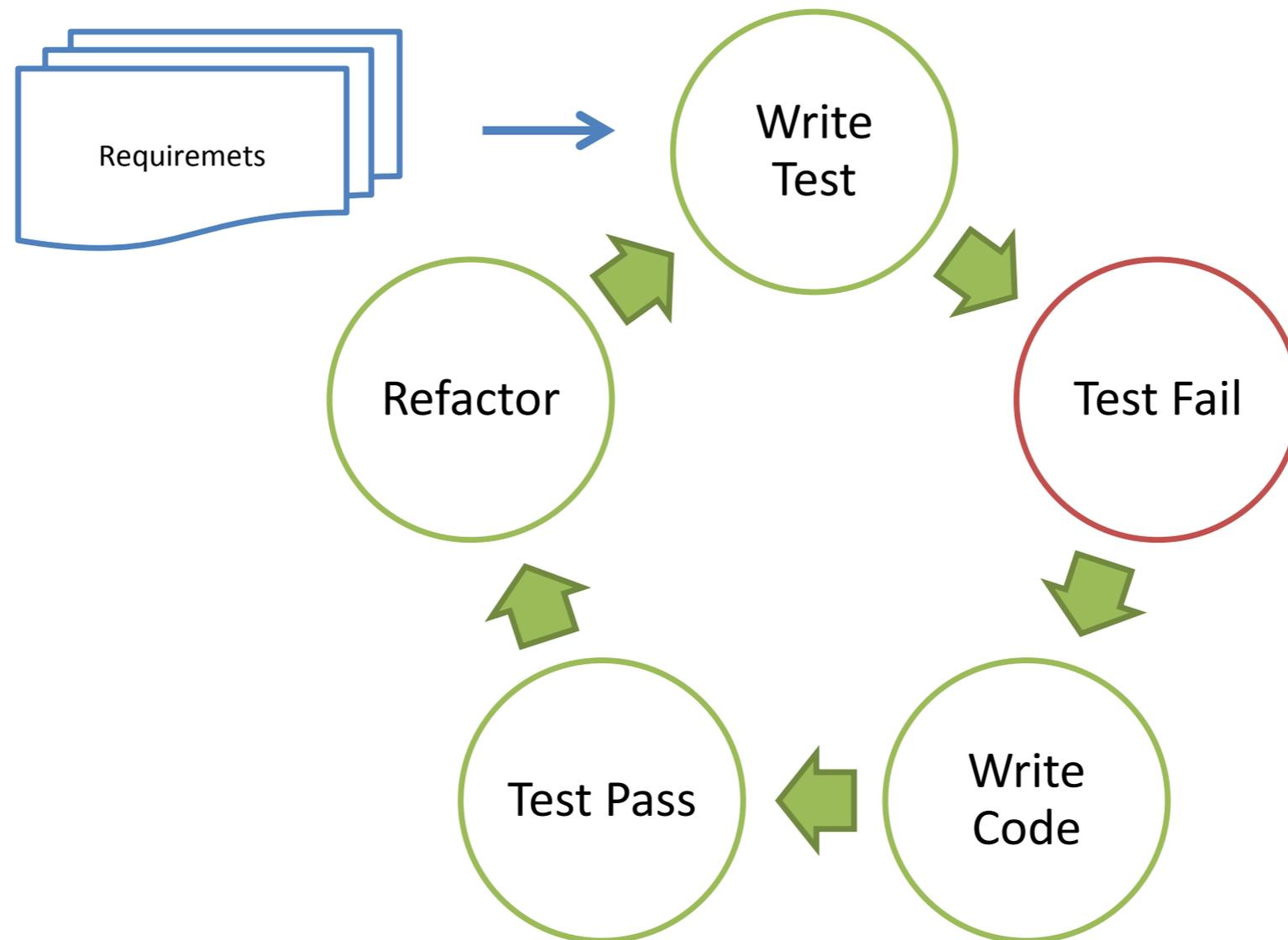
A. Causevic, D. Sundmark, and S. Punnekkat, **“An Industrial Survey on Contemporary Aspects of Software Testing,”** in Proceedings of the 3rd International Conference on Software Testing, Verification and Validation (ICST), 2010

“Developers inability to write efficient and effective automated test cases is considered to be one of the limiting factors of full TDD adoption.”

A. Causevic, D. Sundmark, and S. Punnekkat, **“Factors Limiting Industrial Adoption of Test Driven Development: A Systematic Review,”** in Proceedings of the 4th International Conference on Software Testing, Verification and Validation (ICST), 2011



Test Driven Development





Developer Testing Skills

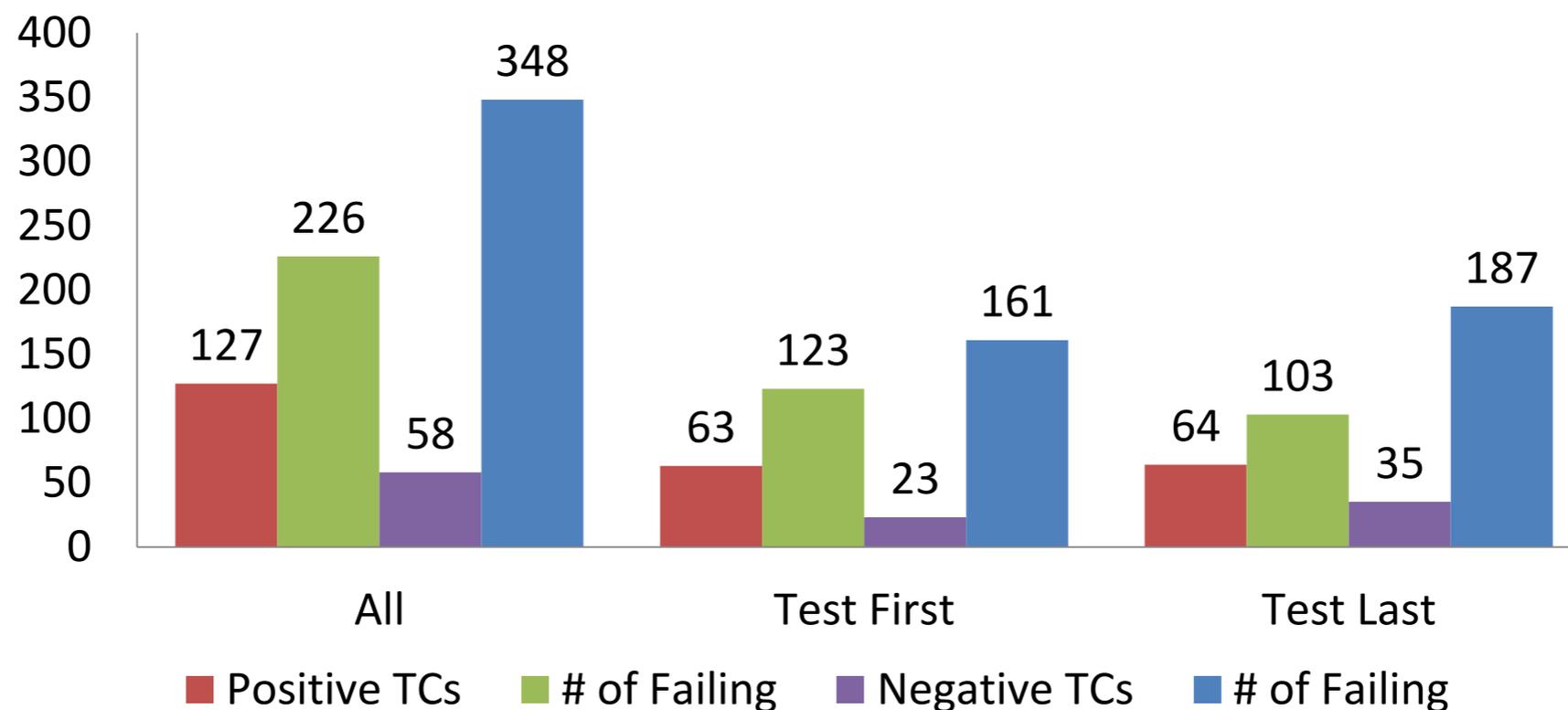
- *Potential limiting factor for TDD industrial adoption*
- *Empirical Study at MDU*
- *Course on Software Verification & Validation*
- *General testing knowledge*
- *No significant difference observed*
- *Analysis pointed out lack of “negative” test cases*

A. Causevic, D. Sundmark, and S. Punnekkat, “**Impact of Test Design Technique Knowledge on Test Driven Development: A Controlled Experiment,**” in Proceedings of the 13th International Conference on Agile Software Development (XP), 2012



Effect of Negative Testing on TDD

- *Study performed at MDU, V&V Course*
- *Existence of “positive test bias” acknowledged*
- *Importance of “negative” test cases*



A. Causevic, D. Sundmark, and S. Punnekkat, “**Test Case Quality in Test Driven Development: A Study Design and a Pilot Experiment,**” in Proceedings of the 16th International Conference on Evaluation & Assessment in Software Engineering (EASE), 2012

Infosys®





Infosys InStep Internship program

- *infosys.com/instep*
- *Internship opportunities for bachelor, master and PhD students*
- *8-12 weeks duration*
- *Covering travel expenses, accommodation, monthly allowance, taxi, gym, etc...*
- *Perfect for visiting India 😊*

- *My internship: 4 weeks duration (September 2012)*
- *No time to visit anything 😞*
- *“Best Intern” award*



Preparations for the Study

- *Started in May 2012*
- *Introduction to “Project Mentor” @ Infosys*
- *Original idea: Perform study on the specific day*
- *Mentor suggestion: Make study “open access” for at least 2 weeks*

- *Employees are distributed*
- *Employees will use their own workstations*
 - *Set of tools and instructions have to be provided*
 - *Internal server infrastructure setup*

- *Video training material for jUnit and TDD*
- *Internal promotion of the study*

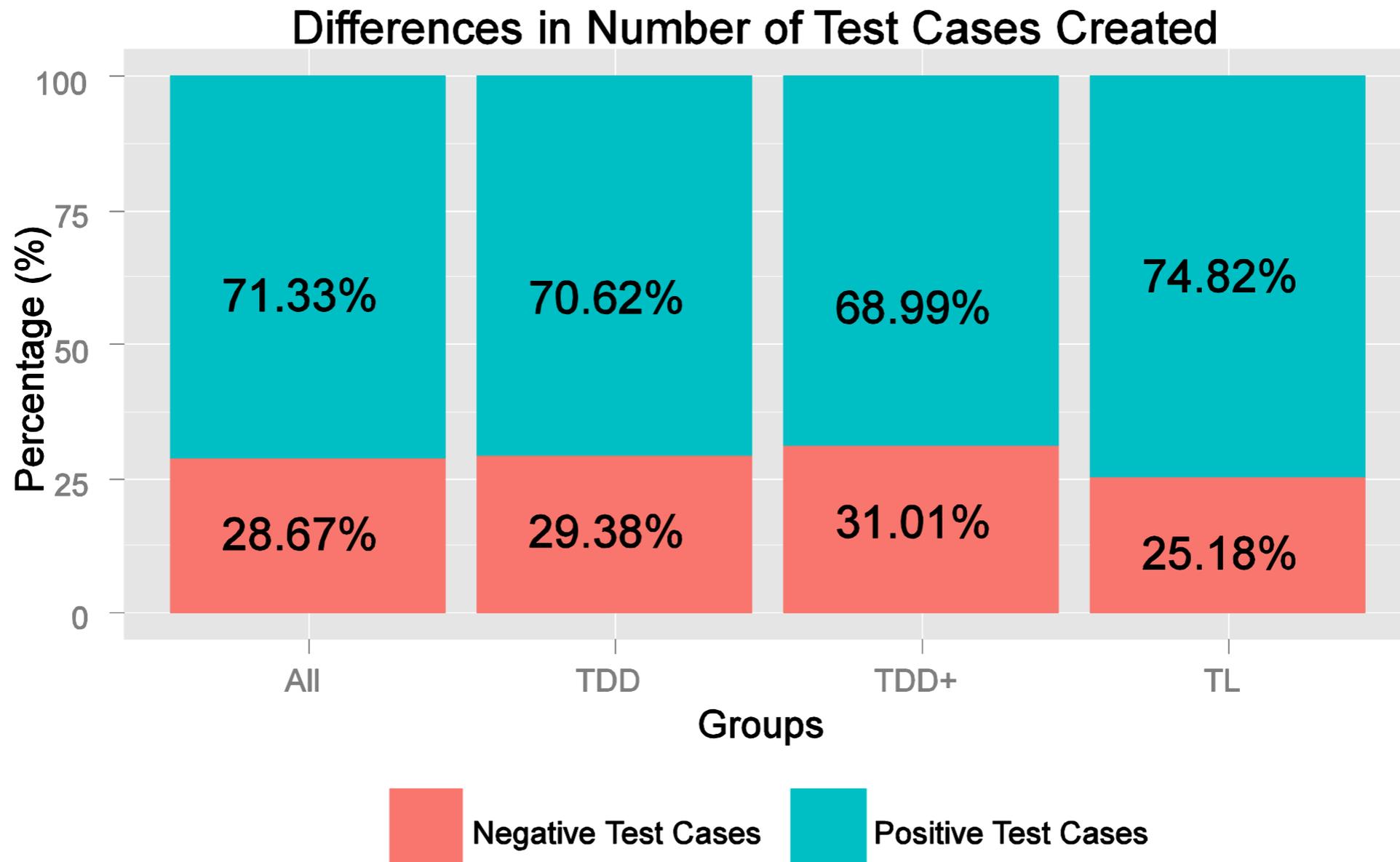


Study Execution

- *Experiment executed from 10th to 21st of Sept. 2012*
- *Participants placed in three groups*
 - *Test Last*
 - *Test Driven Development*
 - *Test Driven Development with the Support of Negative Testing*
- *Participants from: Bangalore, Beaverton, Brussels, Chennai, Hyderabad, Mangalore, Melbourne, Mysore, Pune, Trivandrum*
- *Problem with SharePoint server limit*
- *Alternatives in obtaining material*

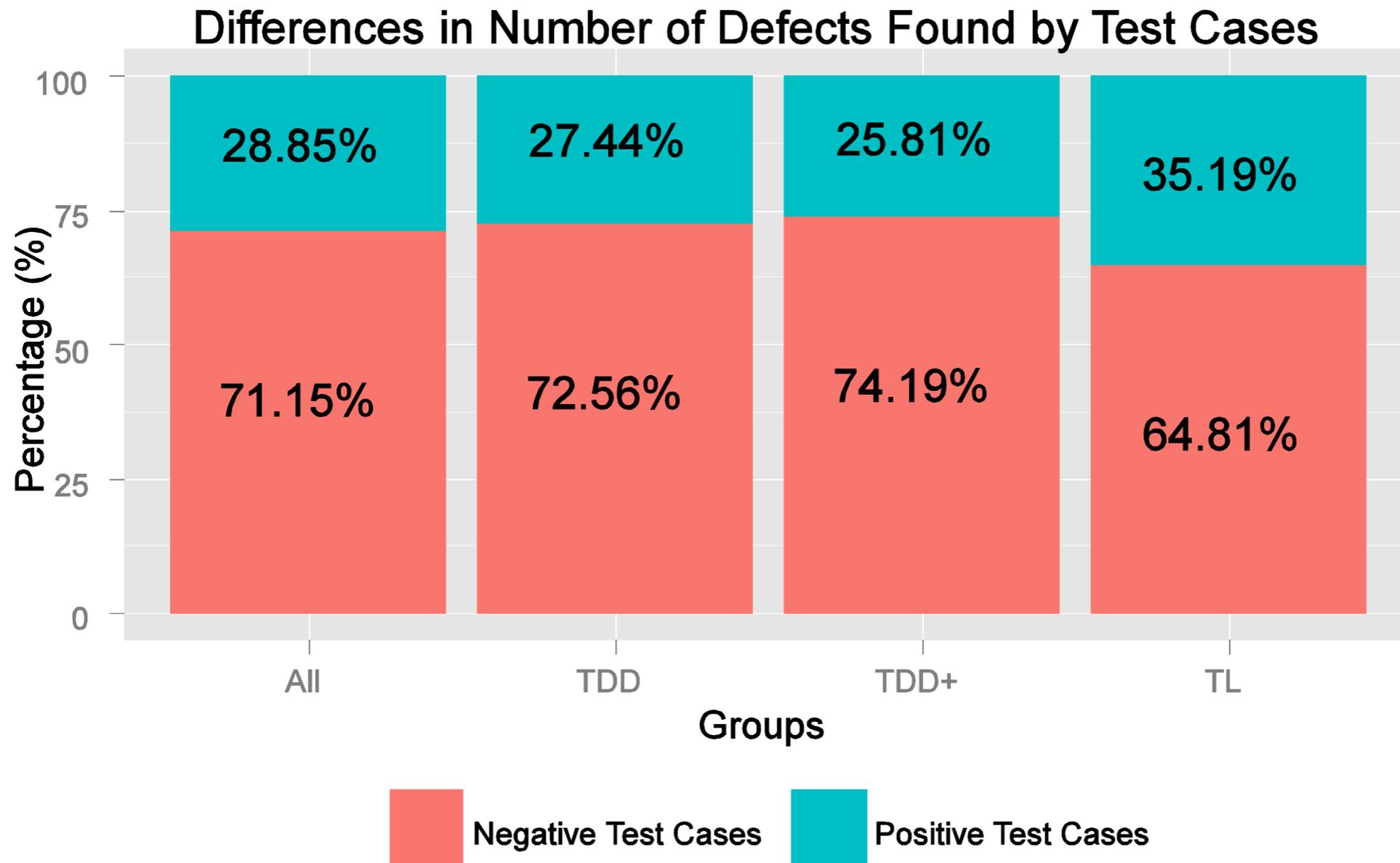


Results





Results





Benefits of the Study

- *Industrial perspective*
 - *Training provided to employees*
 - *Video tutorial currently used by training division*
 - *Corporate researchers collaborated with academia*
- *Academic perspective*
 - *Direct access to high number of employees*
 - *Collaboration with industry*
 - *Costs of performing the study*



Lessons Learned

- *Employees are busy, use their time wisely!*
- *Curiosity and wiliness to learn something new*
- *Suspicion about being evaluated*



Future Work

- *Further enhancements to TDD*
 - *Combining TDD with test design techniques*
- *Empirical evaluation*
 - *Trial in academia*
 - *Full study in industry*

Thank you!

Questions?



MRTC
MÄLARDALEN REAL-TIME
RESEARCH CENTRE

Infosys®

Building
Tomorrow's Enterprise