Software Engineering

Riccardo Scandariato

Program Manager MSc Software Engineering

riccardo.scandariato@cse.gu.se

About me

Riccardo

- **Coordinator of SE Master Program**
  Associate Professor, CSE department

- Research interests
  - Security and privacy by design
  - Empirical methods for security & privacy

- See www.scandariato.org

About you

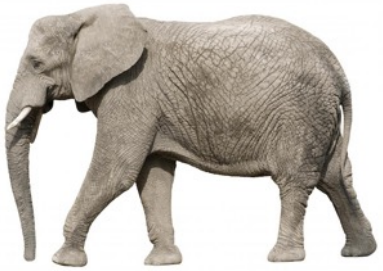
Do you have solid programming skills?


What can possibly go wrong ?!

What can possibly go wrong ?!

- Programming in the small… nothing!

- Programming in the large?



Big & complex

Several teams around the world

Long-living

Lots of stakeholders (conflicting qualities)

Multi-platform

What can possibly go wrong ?!

"Of the IT projects that are initiated, **from 5% to 15%** will be abandoned before or shortly after delivery as hopelessly inadequate.

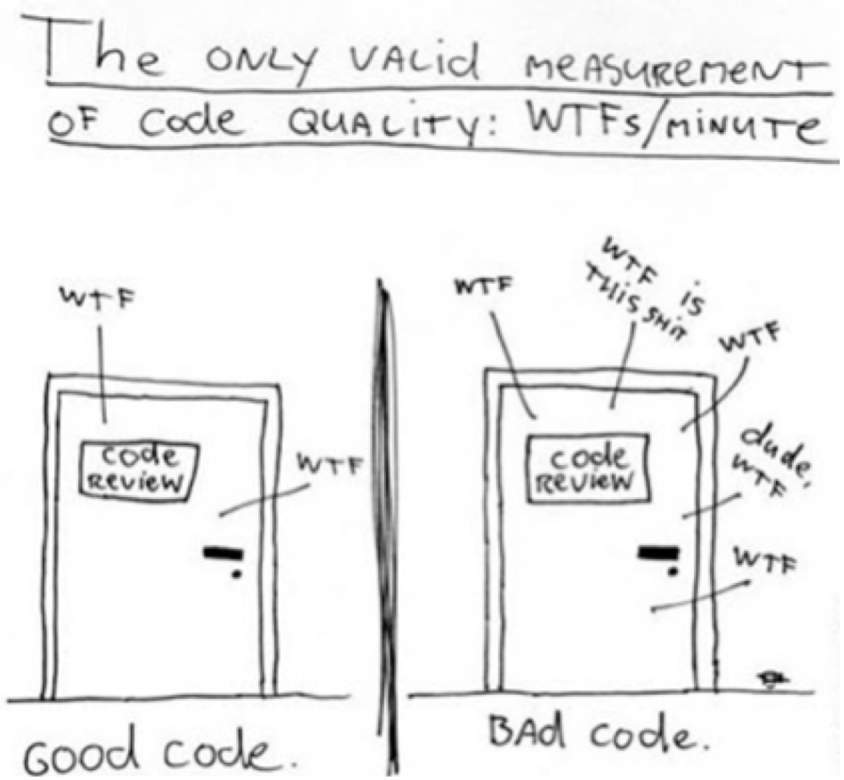
Many more [about **70%**] will arrive late and over budget or require massive reworking.

Few IT projects, in other words, truly succeed."

IEEE Spectrum, Why Software Fails, September 2005

What can possibly go wrong ?!

- Are you delivering quality?
  - Bugs, performance issues, security flaws…



What can possibly go wrong ?!

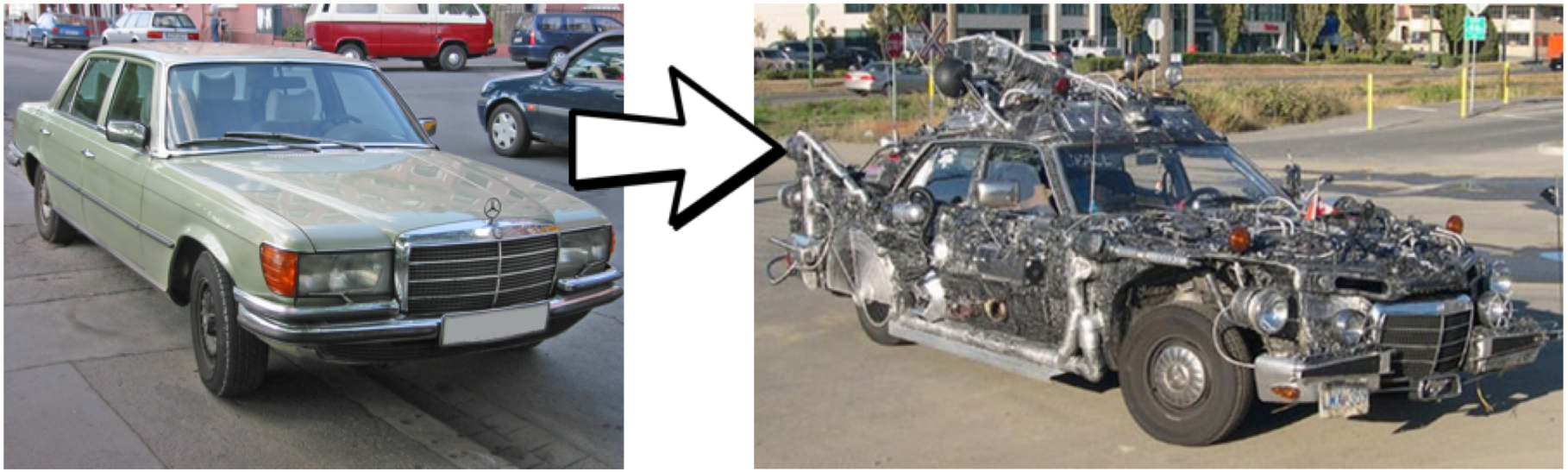
- Did you get the requirements right?

What can possibly go wrong ?!

- Did you get the design right?

What can possibly go wrong ?!

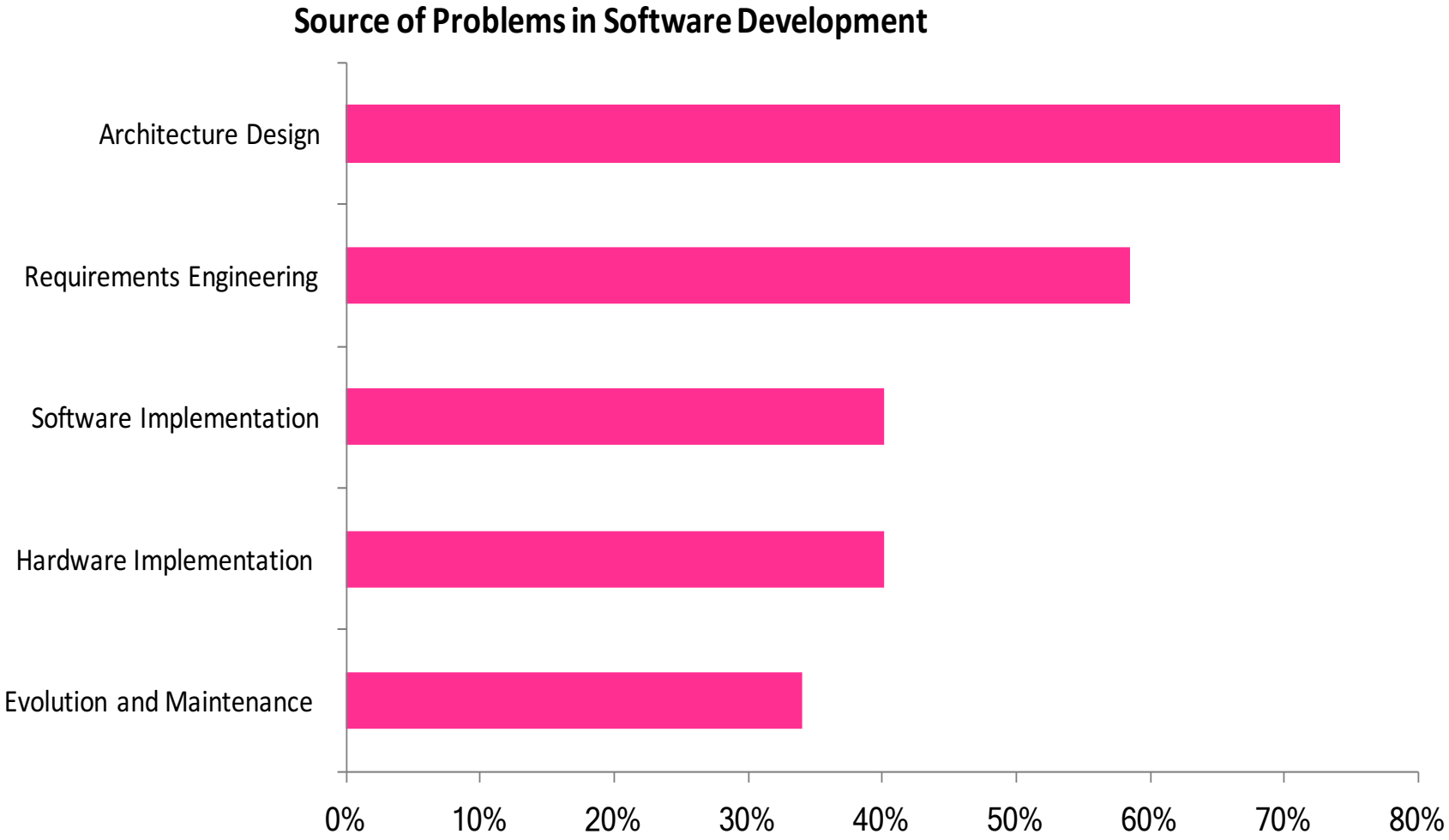
- More bugs, more performance issues, requests for new features…



Delivered

Evolved

What does go wrong ?!



P. G. Neumann, Computer-Related Risks, Addison-Wesley, 1995

Software projects are complex operations

Stakeholders

Architect

Developers

Requirements Engineer

Testers

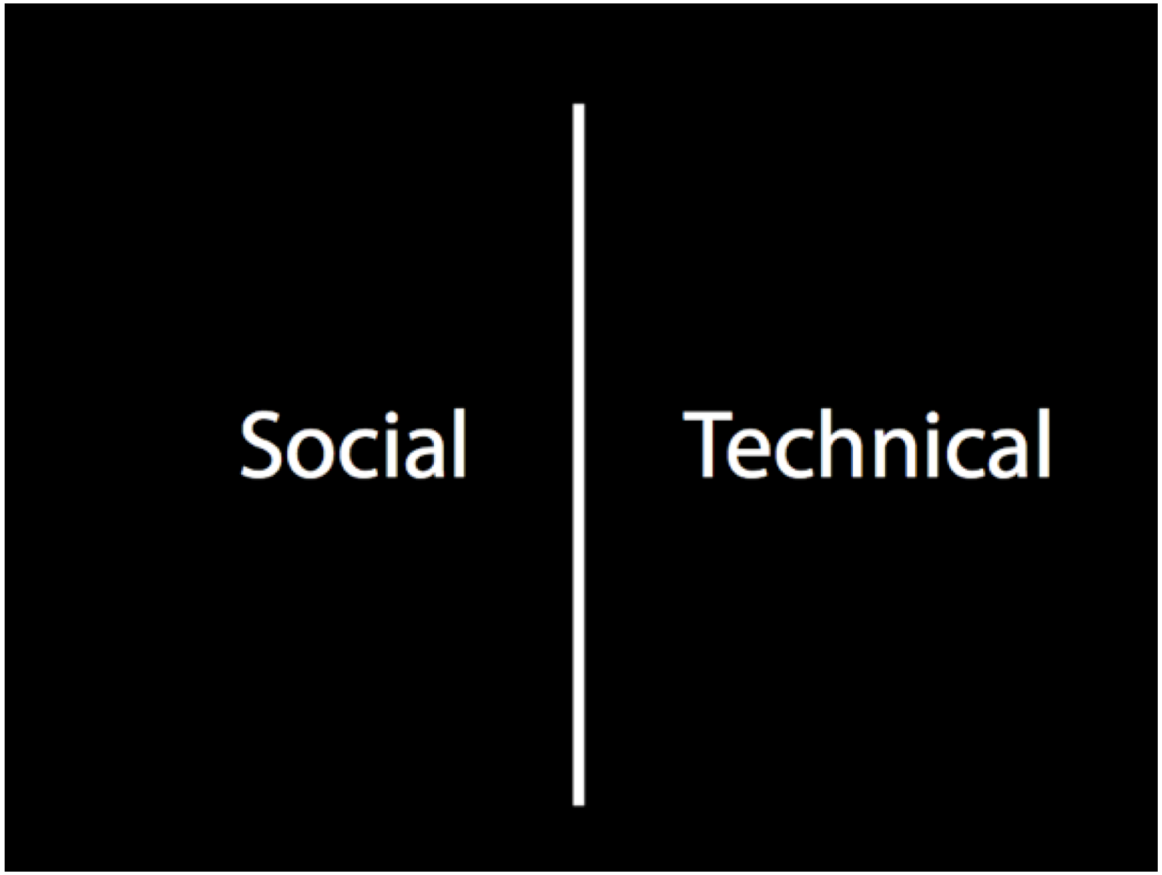
Requirements

Software Architecture

Software Product

Software engineering

Software engineering



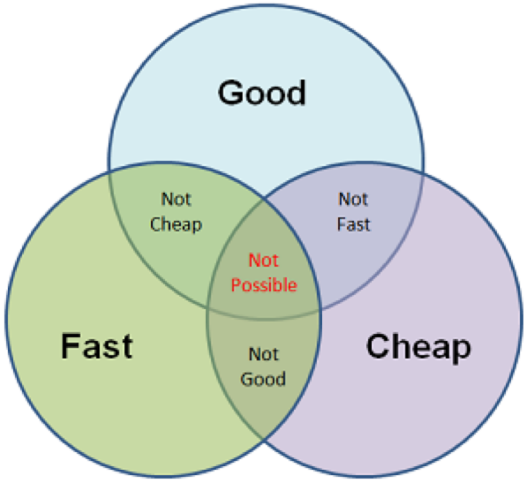
IEEE definition of software engineering

- The application of a systematic, disciplined, quantifiable approach to the development, operation and maintenance of software

- … that is, the application of engineering to software !

In other words

- Software engineering is a **branch of computer science**
- Using well-defined engineering concepts required to produce (+operate, +evolve) quality software products, in-budget and on-time



Software engineering problems

Just a few examples…

"Can I predict how many post-release bugs to expect in this file?"

✓Software metrics + machine learning

Software engineering problems

Just a few examples…

"How can I reduce the no. of defects per kLOC?"

- ✓ Pair programming, inspection,
- ✓ Test-first, integrate test with commit
- ✓ Use seamless static analysis…

Software engineering problems

Just a few examples…

"How can I reduce the maintenance costs for my SW product?"

- ✓ Clone detection (via code analysis)
- ✓ Improve architecture (e.g., use layers)

Resources

- *IEEE Software Engineering Body of Knowledge* (SWEBOK) https://www.computer.org/web/swebok

- Ian Sommerville, Software Engineering (10th Edition)

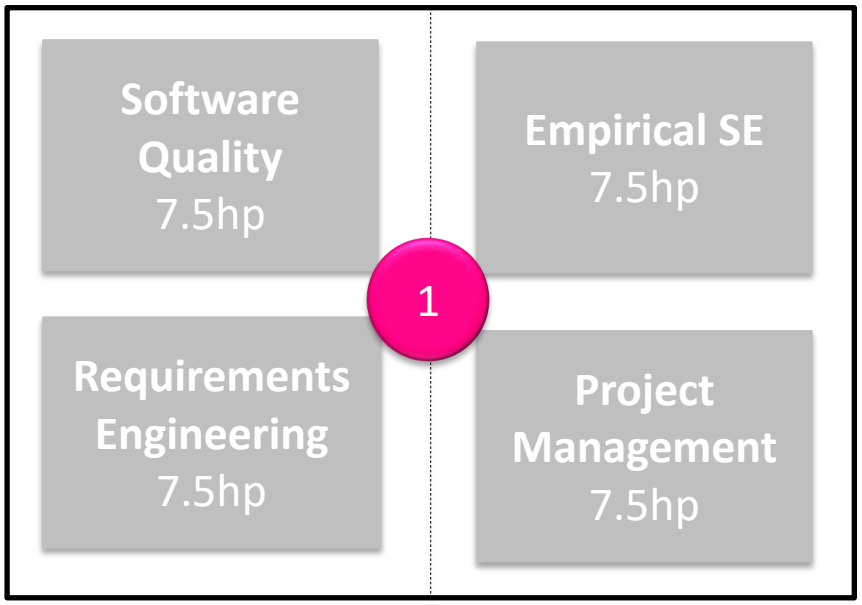
Questions ?

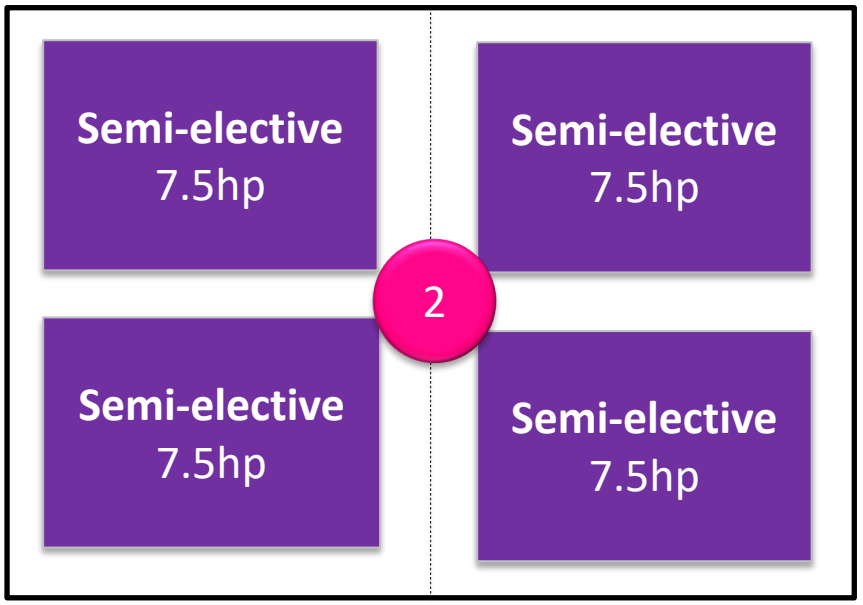
Master in Software Engineering in Gothenburg

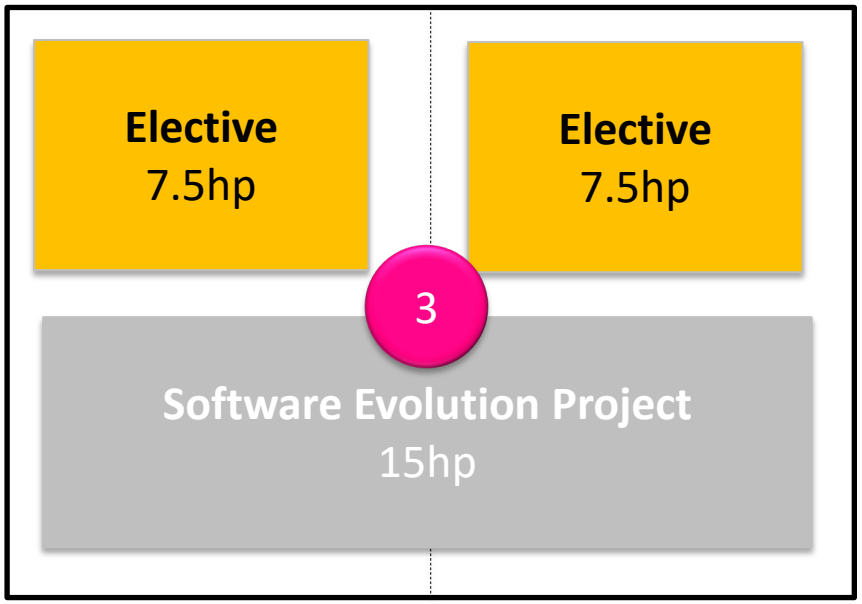
Riccardo Scandariato

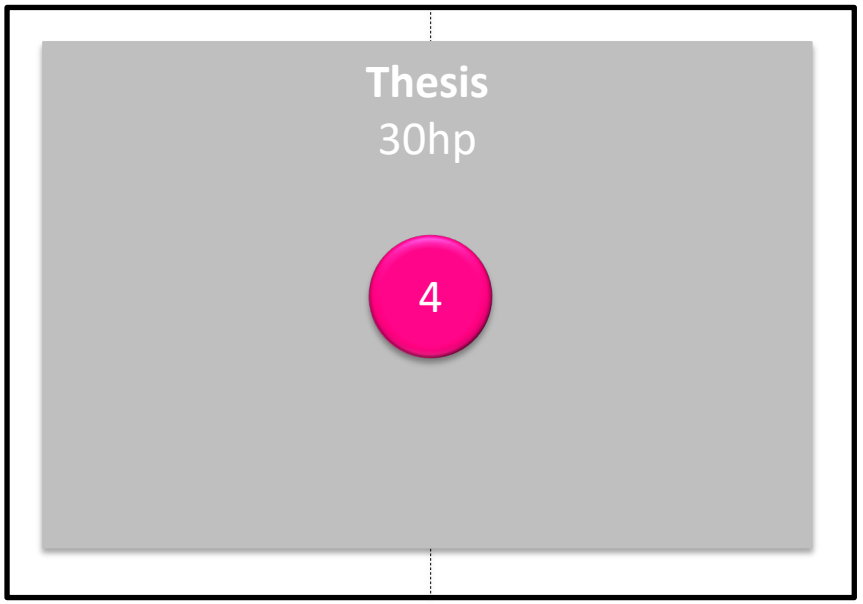
Program Manager MSc Software Engineering

riccardo.scandariato@cse.gu.se


Software Quality 7.5hp
Empirical SE 7.5hp
1
Requirements Engineering 7.5hp
Project Management 7.5hp


Semi-elective 7.5hp
Semi-elective 7.5hp
2
Semi-elective 7.5hp
Semi-elective 7.5hp


Elective 7.5hp
Elective 7.5hp
3
Software Evolution Project 15hp


Thesis 30hp
4

Recommended profiles

Software Engineering and Management

University of Gothenburg

- Architecture and processes Modeling
- User experience
- Data science
- Strategy and leadership
- Communication

Software Engineering and Technology

Chalmers

- Architecture and processes
- Modeling
- User experience
- Real-time system
- Security
- Algorithms

GU: Entry requirements

- 7,5 cred programming
- 4,5 cred OO design
- 7,5 cred algorithms and data structures
- 15 cred practical projects

CTH: Entry requirements

- 15 cred mathematics
  - 7,5 cred discrete math
  - 7,5 cred linear algebra
- 15 cred programming
  - Including 7.5 cred of OO programming
- 7,5 cred algorithms and data structure
- 7,5 cred basic sw engineering or sw eng project

What do I do with this degree ?

Reality check: the first few years you will likely *"develop and test"* … like anybody else

The SE program prepares you to be effective in an agile environment

Ambition to do *"more than coding"*?

E.g., requirements engineer, quality attribute leader, product leader…

⇨MSc in software engineering is an accelerator!

Questions ?