# Software is eating the world

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## Most businesses and industries are being run on software


Music

Video

Movies


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Ads


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Agriculture

...

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## Devastating risks due to software failures

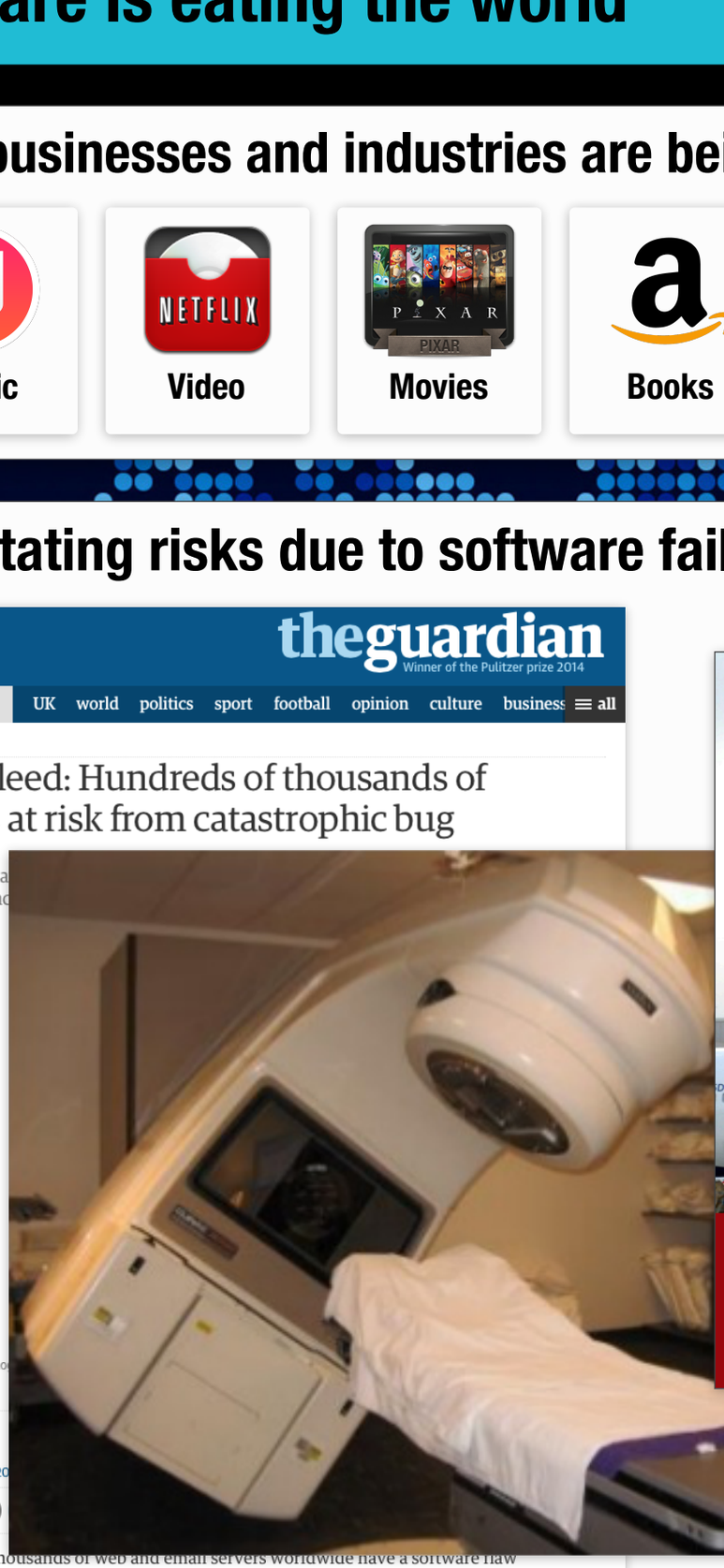
theguardian
Winner of the Pulitzer prize 2014

home › tech | UK | world | politics | sport | football | opinion | culture | business | all

Heartbleed

### Heartbleed: Hundreds of thousands of servers at risk from catastrophic bug

Code error mea
'heartbeat' func



The Heartbleed lo

Alex Hern
@alexhern
Wednesday 9 April 20

Hundreds of thousands of web and email servers worldwide have a software flaw that lets attackers steal the cryptographic keys used to secure online commerce and web connections, experts say.

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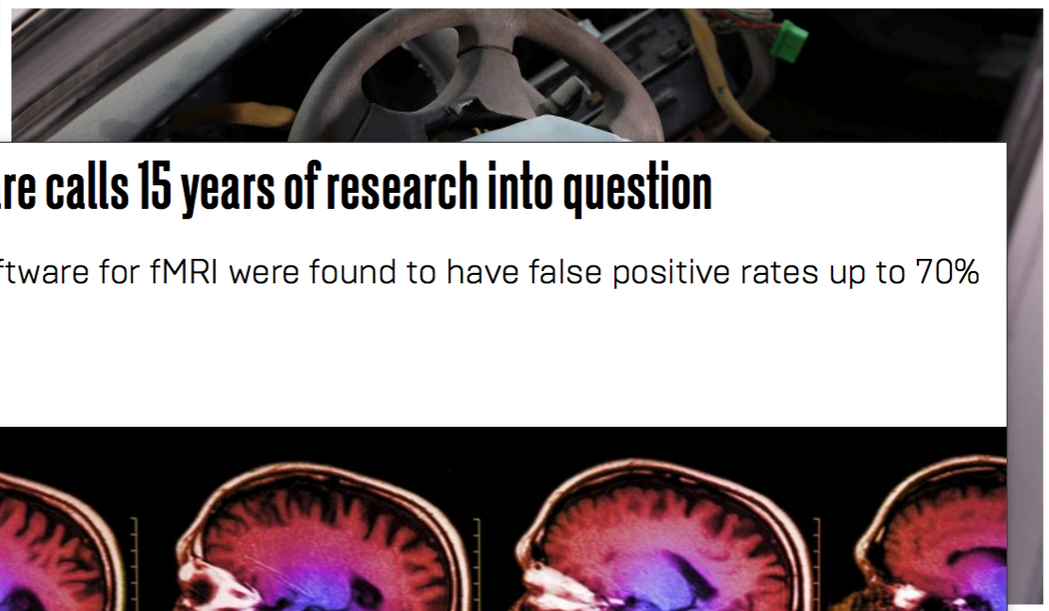
### GM to Recall 4.3 Million Vehicles for Software-Related Airbag Defect

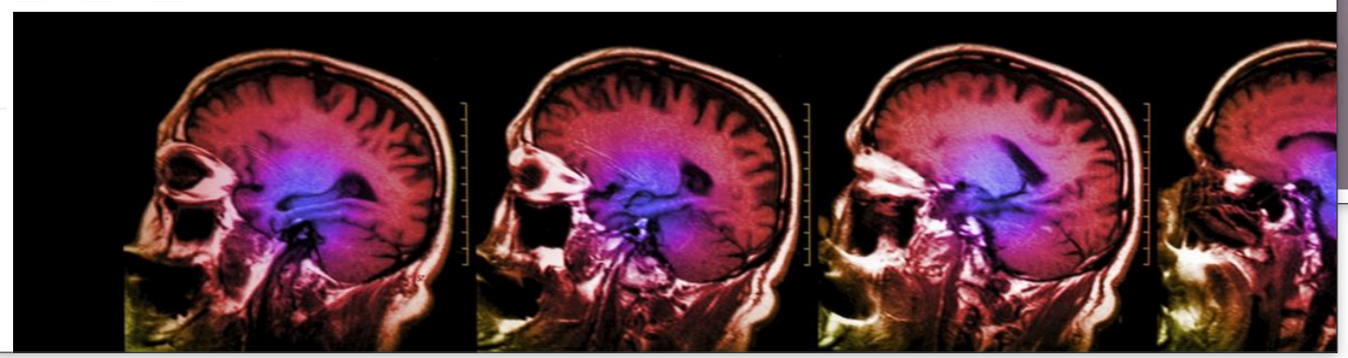
by Reuters SEPTEMBER 9, 2016, 12:37 PM EST



### Bug in fMRI software calls 15 years of research into question

Popular pieces of software for fMRI were found to have false positive rates up to 70%

*By* **EMILY REYNOLDS**
WIRED BRAINS



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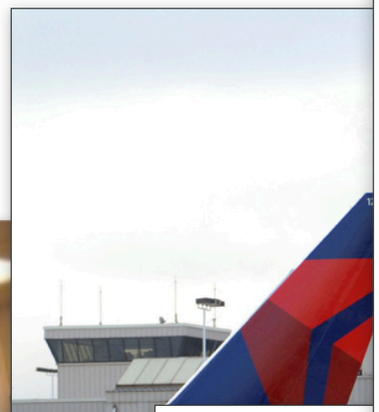

Bug in fMRI

Popular piece

By EMILY REYNOL

WIRED

## Need for more of ICT professionals

TRUSTED INSIGHTS FOR COMPUTING'S LEADING PROFESSIONALS | ACM.org | Join ACM | About Communications | ACM Resources | Alerts & Feeds

COMMU

Home / News

ACM TECHNE

IDC S

By Applicatio
January 21, 2
Comments

VIEW AS:

IDC's 2014 W
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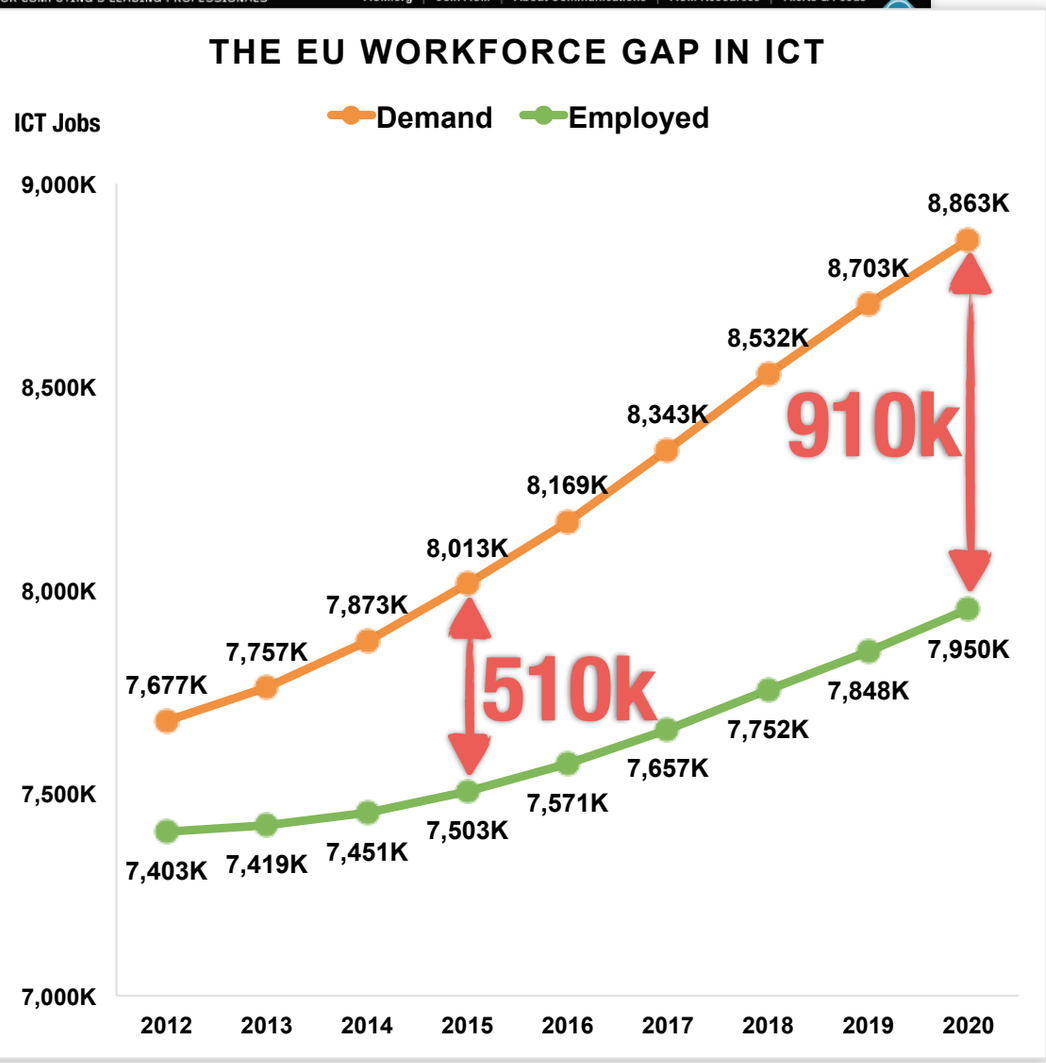

# Software is eating the world

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# Software Dependability

**Fabio Palomba**
**ZEST @ Ifi**
**University of Zurich**

# Who am I?


## 2013
## Master's Degree in Computer Science

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# Who am I?

## 2017
## European PhD Degree in Management and Information Technology

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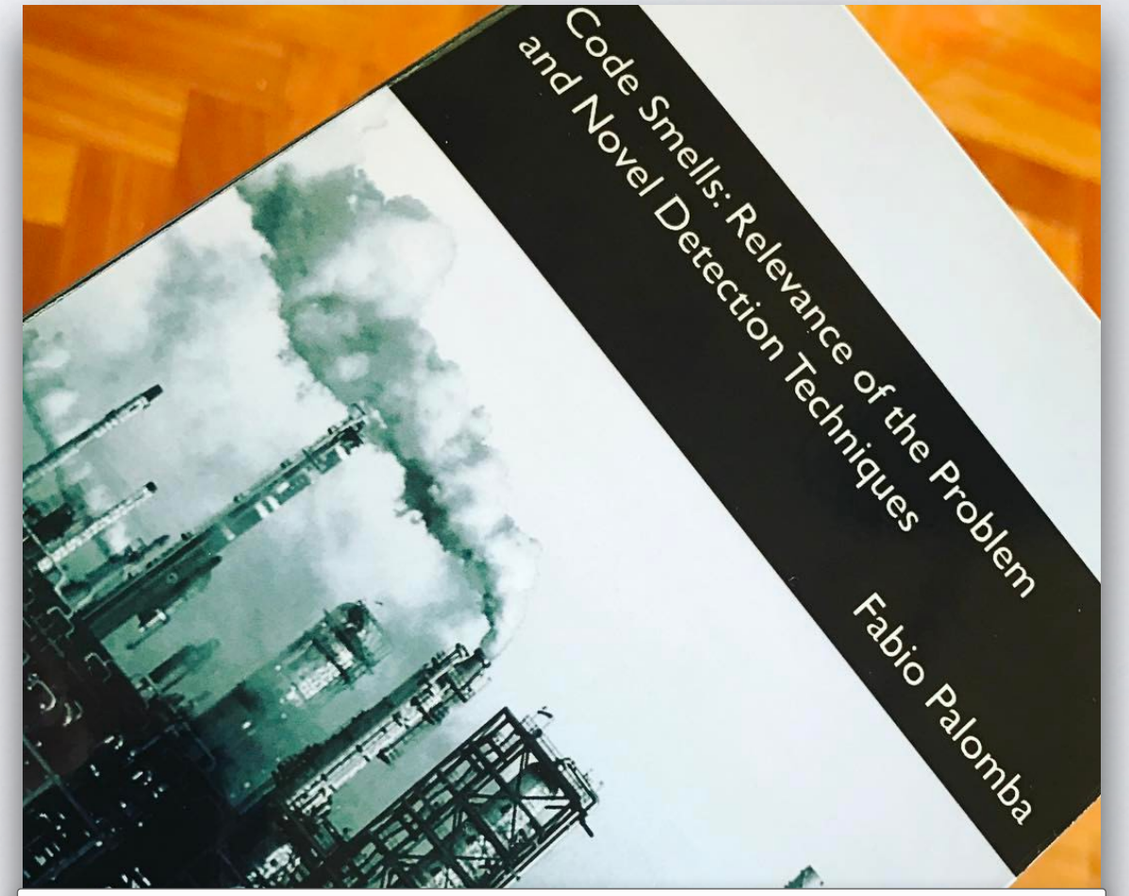


**IEEE Computer Society**
**Best PhD Thesis Award**

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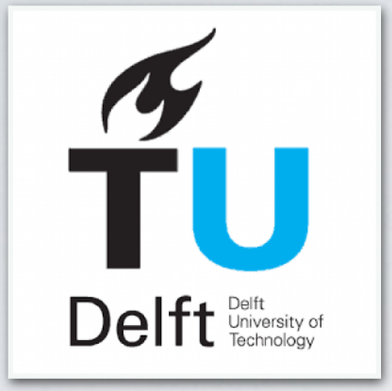


## 2017
## Post-doctoral Researcher

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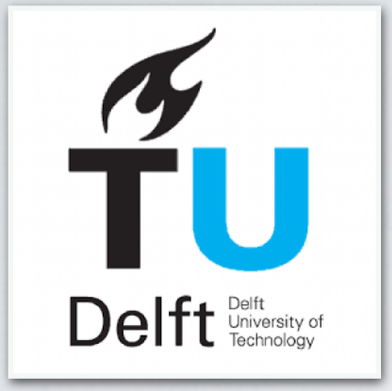


## 2017
## Post-doctoral Researcher

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- 
- 


## 2018 - current
## Senior Research Associate

# Who are we?

## ZEST

The **Z**urich **E**mpirical **S**oftware Engineering **T**eam
at the University of Zurich

### Education

- Software construction
- Data science for Software Engineering
- Advanced Software Engineering
- Software Testing

- B.Sc. and M.Sc. Theses
- M.Sc. projects

### Research

- Software quality
  - Peer code review
  - Software testing
  - Technical debt management
- Fundamentals of Data Science for Software Engineering
  - Predictive Analytics
  - Mining Unstructured Data
  - Large-scale API Mining

# Who are we?


Google ABB HUAWEI AdNovum

Microsoft moz://a Software Improvement Group

# Who are we?

**Domenico Serra** — “On the Effectiveness of Manual and Automatic Unit Test Generation: Ten Years Later” Published at MSR’19.

**Fernando Petrulio** — “The Developer’s Perspective of Lambdified APIs” Submitted to TSE.

**Roberta Guadagni** — “The Secret Life of Software Vulnerabilities: An Empirical Study”

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**Fabiano Pecorelli** — Working on improving test code quality

# administrative information: general information

| | |
|---|---|
| **lecturer** | Fabio Palomba |
| **teaching assistant** | Yours truly |
| **lectures** | Mon, Tue, Thu, Frid - This week;<br>Mon, Tue, Thu - Next week. |
| **GitHub repository** | https://github.com/fpalomba/SWDependability-Unisa2019 |
| **email** | palomba@ifi.uzh.ch<br>fpalomba@unisa.it |
| **email hours** | Mon—Fri 12:30 - 13:30 |
| **office hours** | By appointment |

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| Lecture 1 | Prologue & Dependability Requirements |
| Lecture 2 | Bad Code Smells |
| Lecture 3 | Software Security |
| Lecture 4 | Machine Learning for Dependability |
| Lecture 5 | Software Defect Prediction |
| Lecture 6 | Software Metrics, Traceability and Impact Analysis |
| Lecture 7 | Software Dependability Hands-on |
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**Midterm exam - Multiple Choice + Open Questions + Oral (optional)**

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- Safe system operation depends on the system being available and operating reliably;
- A system might be unreliable because its data has been corrupted by an external attack or because of poor implementation solutions applied by developers.

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## Dependability is part of the business

- Dependability issues should be considered alongside other business goals, as they can automatically lead to organisational problems.

# Software dependability - A closer look

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- We are NOT going to investigate this further, but we rather focus on other aspects that can indirectly address availability (e.g., defect prediction);

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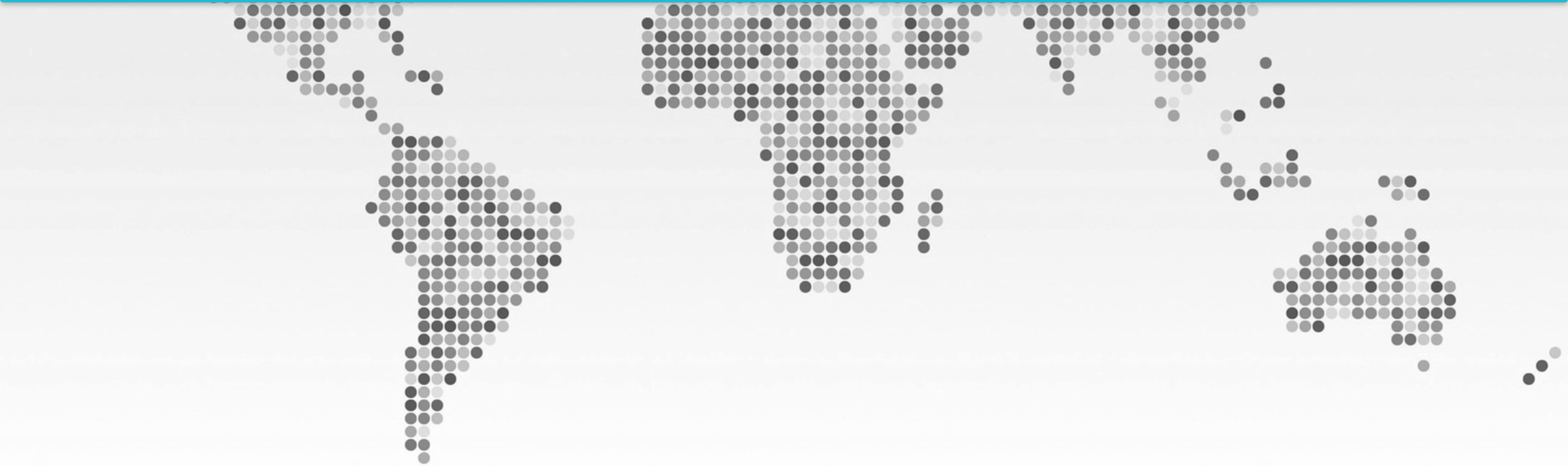
- Security is somehow connected to maintainability, as indicates wrong design or implementation choices applied by developers;
- The area of vulnerabilities is still full of open challenges and opportunities in research, as there are no fully reliable tools to identify and refactor potentially vulnerable pieces of code;
- We are going to study some of these open challenges through the analysis of the state of the art. You will have a look to empirical studies and potentially useful techniques that you are required to understand and analyse with respect to their limitations and possible improvements.

# End of the first part



# Software dependability - Getting ready for practical stuff

## A simple use case scenario

**https://github.com/SERG-Delft/jpacman-framework**

- Cloning and setting JPacman; Run the test;
- A quick look to Git and its features.

## To run the Linux command line:

- Cygwin: **https://www.cygwin.com**