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TIE-23536 Cloud Applications Lecture 1: introduction

Kari Systä

30.08.2019

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Today's content

- Introduction to the course
- Introduction to DevOps
- Next steps in the course

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Student background

- Passed **TIE-23526 Web Architectures ?**
- Passed **TIE-23546 Cloud Platforms ?**
- Now starting **TIE-23546 Cloud Platforms ?**
- Passed **TIE-21107 Software Engineering Methodologies ?**
- Passed **TIE-21201 Software Testing ?**

- Practical experience with Docker?
- Practical experience with Kubernetes?
- Practical experience with AWS?
- Practical experience with Azure Cloud?

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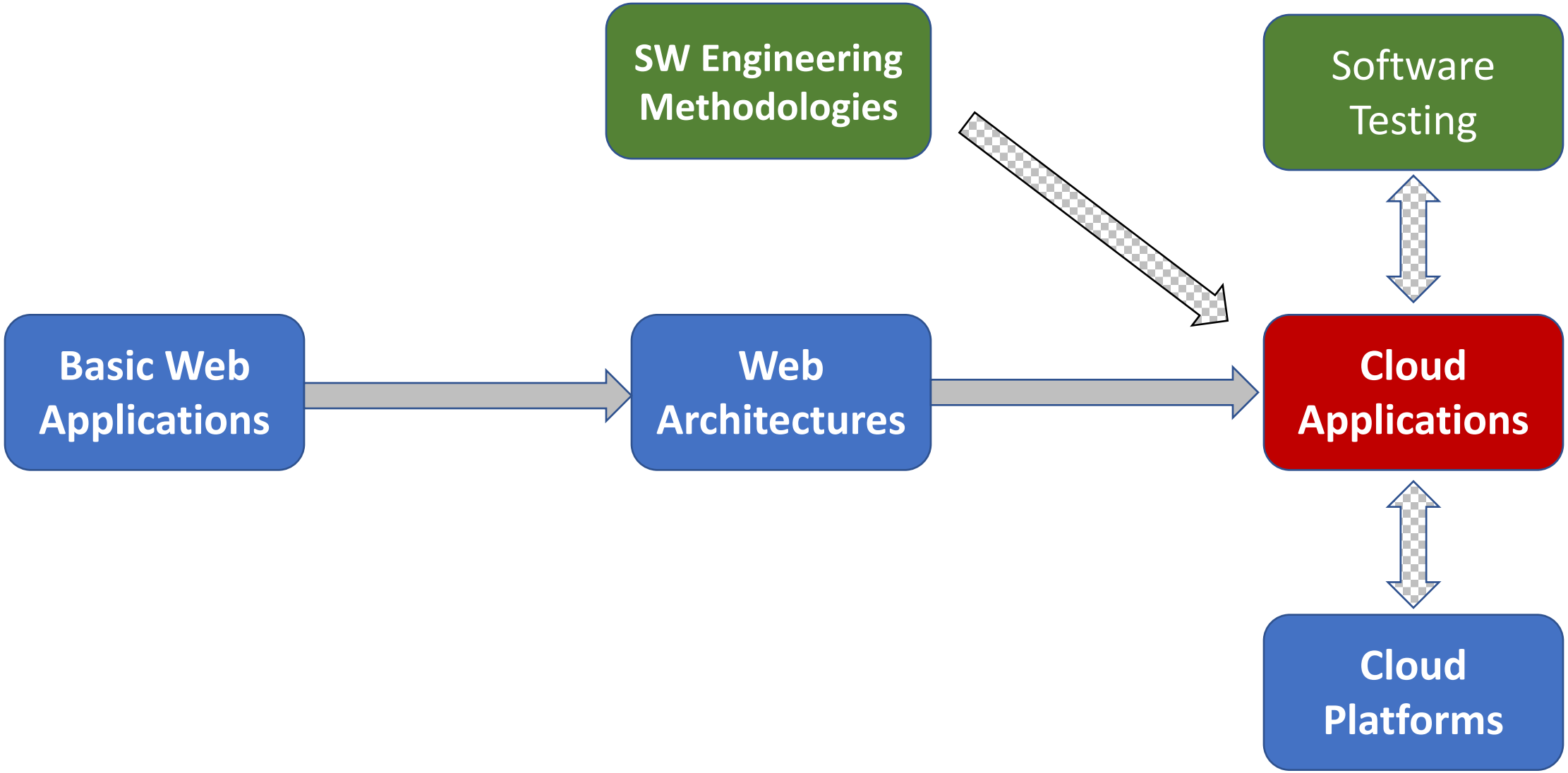
What is this course about

- How to design, implement, deploy and operate cloud applications.
- So this is a DevOps course
- A lot about automation of the above


SW Engineering Methodologies
Software Testing
Basic Web Applications
Web Architectures
Cloud Applications
Cloud Platforms

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Rought plan – subject to change

- 30.08: Intro to the course and DevOps
- 06.09: Recap (from earlier courses) on virtualization technologies;
- 13.09: Cloud and scalability
- 20.09: Continuous Deployment – what & why
- 27.09: Continuous Deployment – tools and techniques
- 04.10: Security issues; recap on internet networking (from earlier courses)
- 11.10: Guest lecture on AWS
- 23.10: Issues on cloud-SW: isolation, dependency management etc,
- 30.10: Cloud-native architectures: microservices
- 06.11: Cloud-native architectures: FaaS/serverless
- 13.11: About automation: testing and beyond
- 20.11: Hosting and deployment issues
- 27.11: Guest lecture on Kubernetes
- 04.12: Recap

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06.09: Recap (from earlier courses) on virtualization technologies;

- What and why
- Hypervisor vs containers?
- Technology examples
  - Vagrant
  - Docker

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13.09: Cloud and scalability

- Technical and business perspectives
- Technologies

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20.09: Continuous Deployment – what & why

- Software engineering and business perspectives

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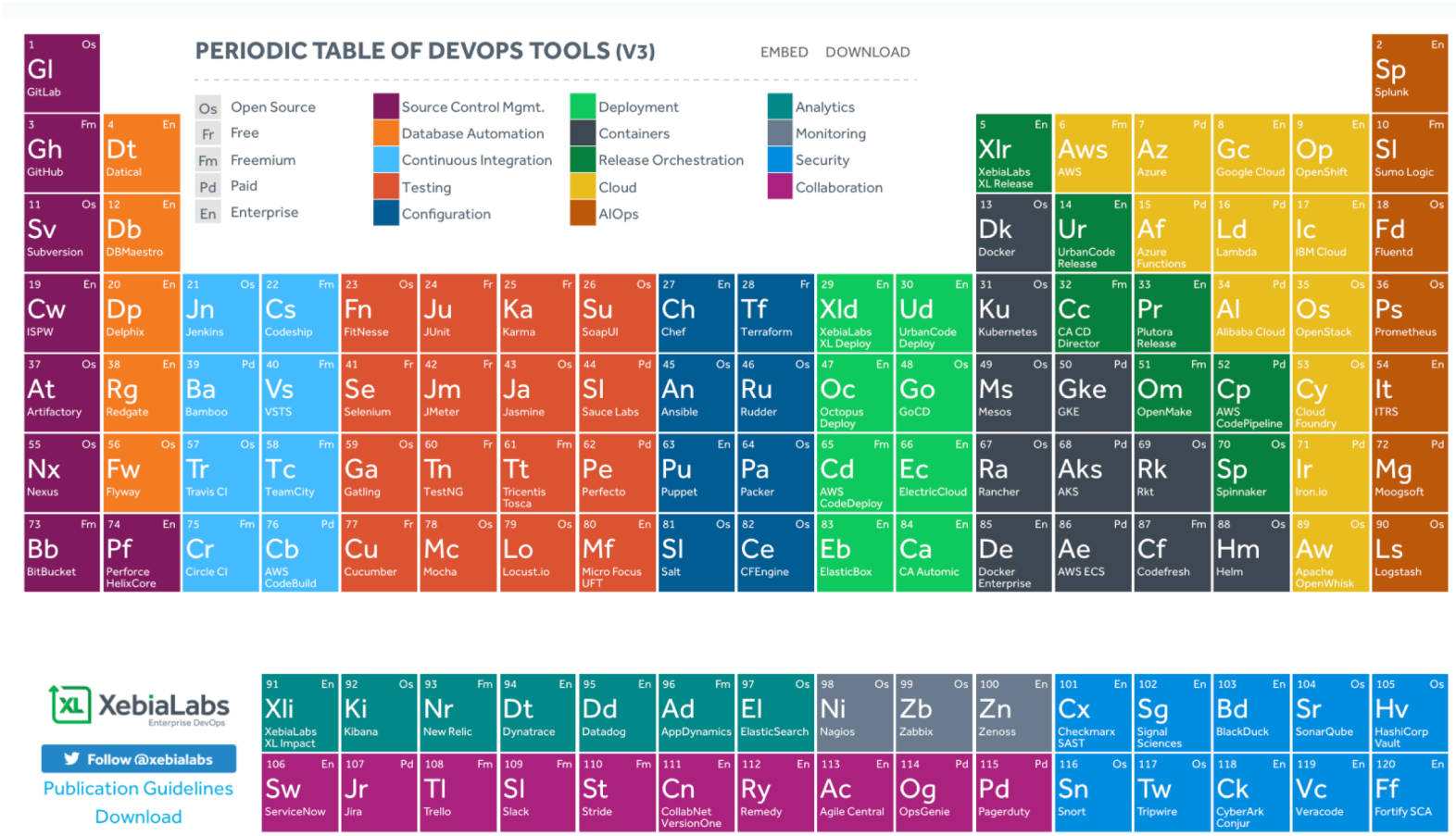
27.09: Continuous Deployment – tools and techniques

- Design and implementation of the pipeline
- Technology examples with the xenialab periodic table



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04.10: Security issues; recap on internet networking (from earlier courses)

- A lot of misc. Stuff

- Technology example
  - NGINX

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11.10: Guest lecture on AWS

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23.10: Issues on cloud-SW: isolation, dependency management etc,

- First scare the students with the complexity
- Then, give some solutions

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30.10: Cloud-native architectures: microservices

- OO vs SOA
- Traditional SOA vs microservices
- Typical solutions
  - API gateway
  - Message bus

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06.11: Cloud-native architectures: FaaS/serverless

- What and why

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13.11: About automation: testing and beyond

- What and why to automate
- Research directions

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20.11: Hosting and deployment issues

- Focus on continuity – systems should not break when updated
- Technology examples
  - Blue-green
  - Canary

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27.11: Guest lecture on Kubernetes

- A tool that is currently widely used

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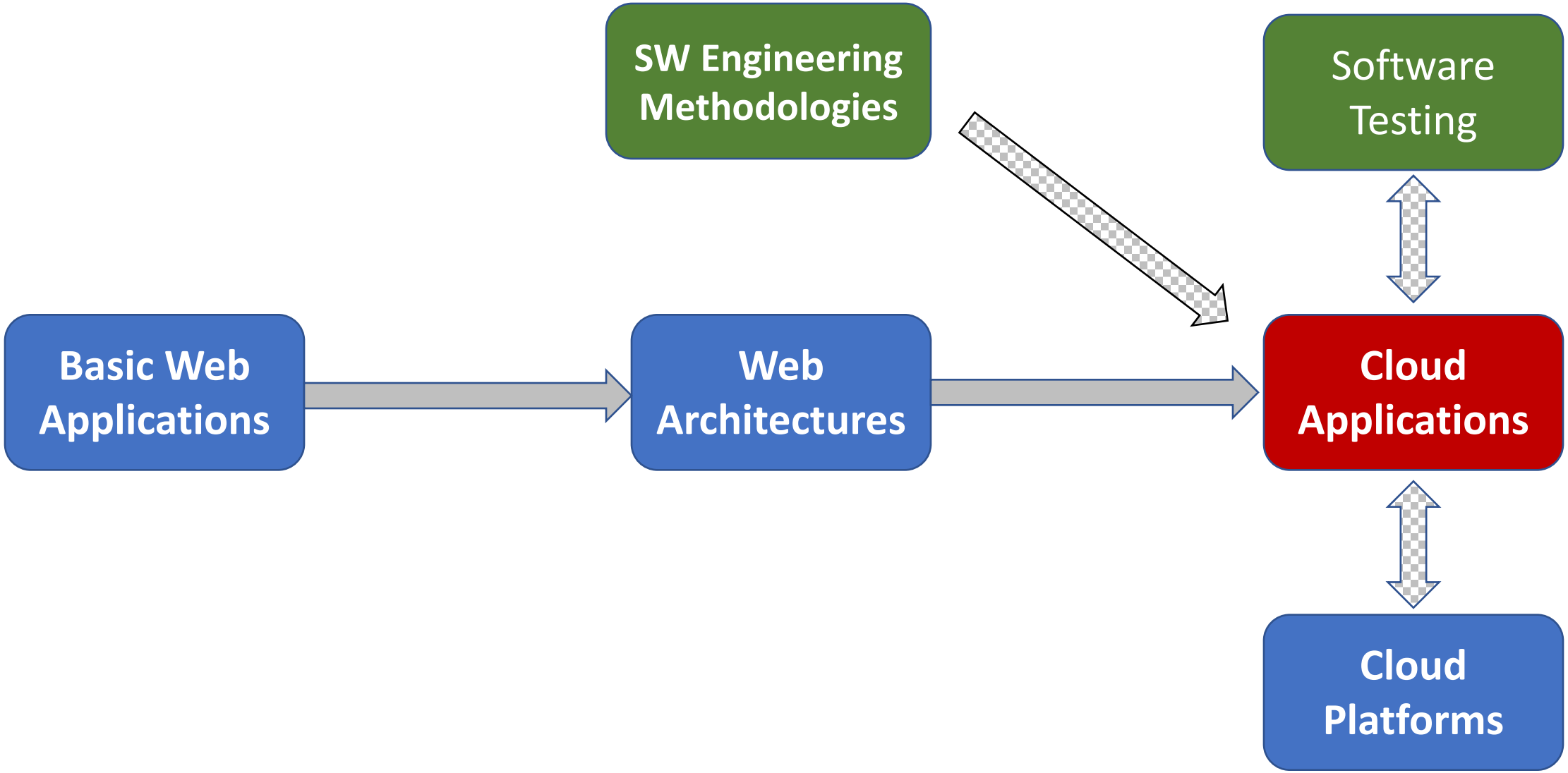
04.12: Recap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You

- Automation: 4
- Doctoral school: 9
- Exchange students: 7
- Electrical engineering: 3
- Science and engin.: 2
- Information techn.: 51
- TSK: 23
- TTK: 2
- Other: 6

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What do I expect from your background

- 10-20 credits of software engineering after the first two programming courses
- Programming routine; typically in this phase you should be able to pick up a new programming language without specific teaching
- Basic knowledge of Linux/Unix operating system; command shell, file system etc.
- Some experience with virtualization, containers and docker.

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The bad news

- This is a new course – that we are just ramping up
- We have a serious lack of teaching staff
- Unless some miracle happens we are forced to limit the number of participants.
- Priority is give to students who are
  - At least on master-level (do you BSc first!)
  - Major is software engineering

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Passing requirements

- Exam
  - Electronic
- Project
  - Details will be published in couple of weeks
- A few compulsory on-line exercises
- Some face-to-face sessions – mainly to help

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Course logistics

- Lectures
  - Fridays 10-12 in SA207
- Weekly/on-line (“alone”) exercises
  - Wednesdays 14-16 in SJ204
  - Fridays 14-16 in SJ204
  - Physical ones will not start before 11.09

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Project

- In which language?
  - YAML
  - JavaScript, Python, Golang…
- The main part is building of pipeline

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Course material

- Will be collected to
  - https://plus.tuni.fi/tie-23536/autumn-2019/
- Examples of recommended reading
  - Humble, Farley: Continuous Delivery: Reliable Software Releases through Build, Test, and Deployment Automation (Addison-Wesley Signature Series)
  - Summary part of “Lwakatare, Lucy Ellen: DevOps adoption and implementation in software development practice : concept, practices, benefits and challenges, ”, http://urn.fi/urn:isbn:9789526217116

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DevOps

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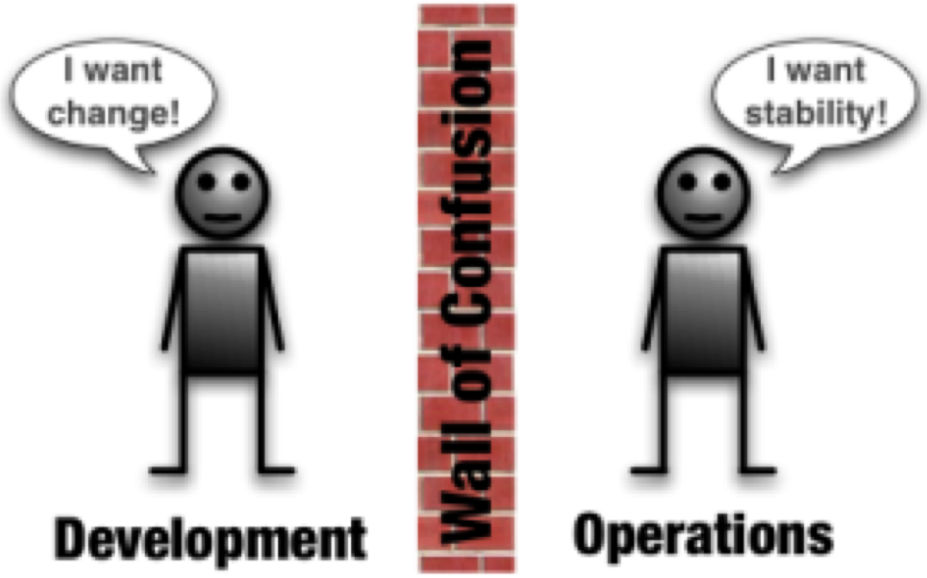
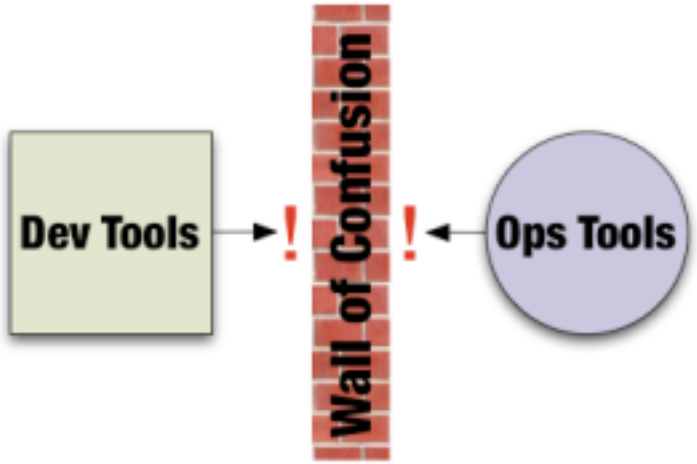
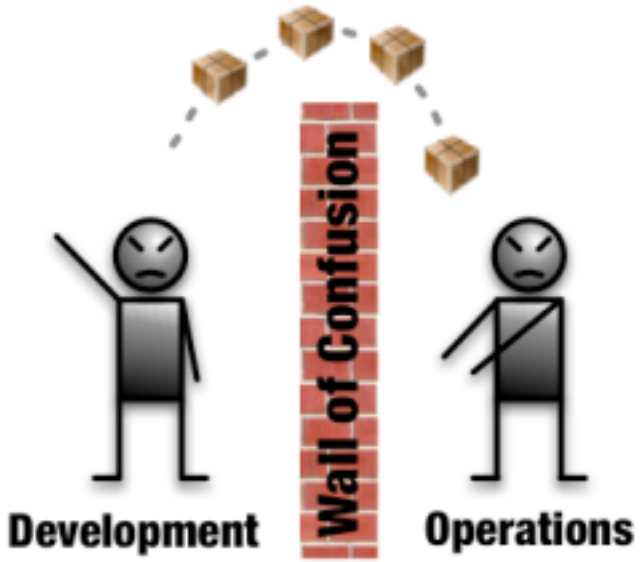
DevOps – where it started (http://dev2ops.org/2010/02/what-is-devops/)

- DevOps is a response to the growing awareness that there is a disconnect between what is traditionally considered development activity and what is traditionally considered operations activity. This disconnect often manifests itself as conflict and inefficiency.
- Wall of confusion



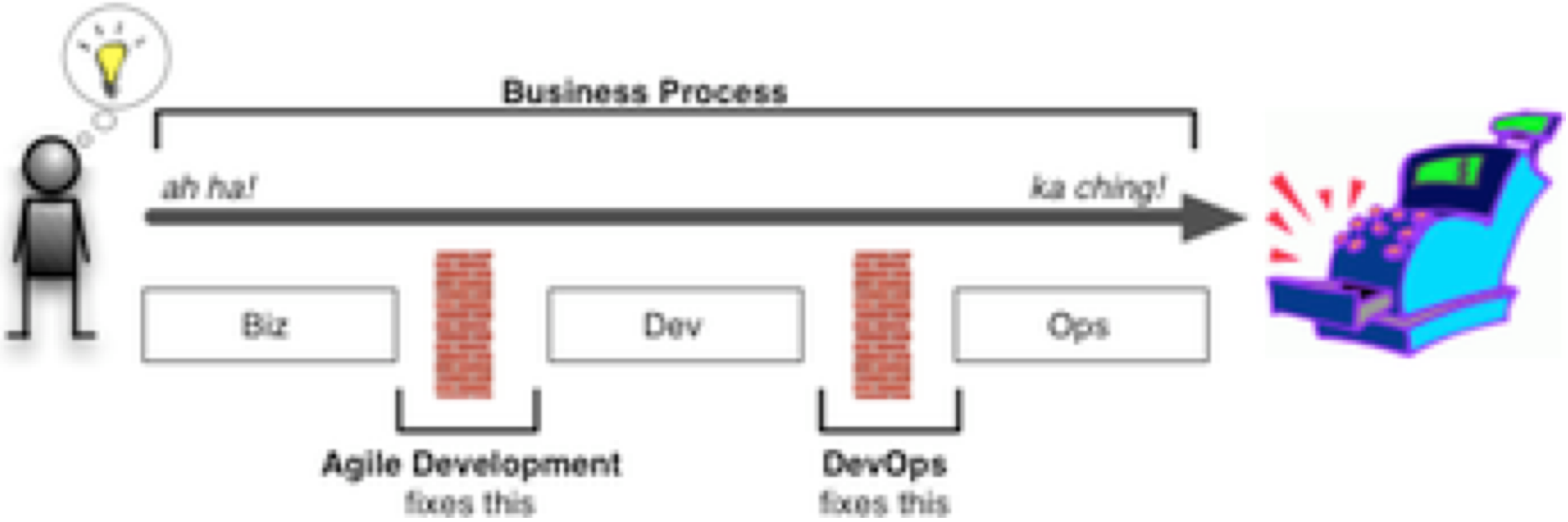

Dev Tools
!
Wall of Confusion
!
Ops Tools


Development
Wall of Confusion
Operations


Development
Wall of Confusion
Operations

=

The lifecycle



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What is DevOps (there are several definitions)

- Lucy Lwakatare:
  - DevOps is a concept that embodies a **cultural and mindset change** that is substantiated with a **set of practices** to encourage **cross-disciplinary collaboration between software development and IT operations** within a software company. The main purpose for the collaboration is to enable the **fast release of quality software changes** while simultaneously **operating resilient systems**.
  - From a **socio-technical perspective**, DevOps practices are focused on the **automation practices** of software deployment and infrastructure management, specifically automation of configuration management and monitoring.

DevOps practices

- Organizational (draw a picture!)
  - increased scope of responsibilities for developers;
  - intensified cooperation between development and operations.

- Technical
  - automation,
  - monitoring
  - measurement

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DevOps - benefits and challenges

- **improvement in speed (release cycle time)**
- **continuous deployment of system changes**
- **productivity of operations work**
- **improved morale, knowledge and skills**

- **resource constraints;**
- **insufficiencies in infrastructure management;**
- **high demands for required skills and knowledge, and**
- **difficulties in monitoring microservices**

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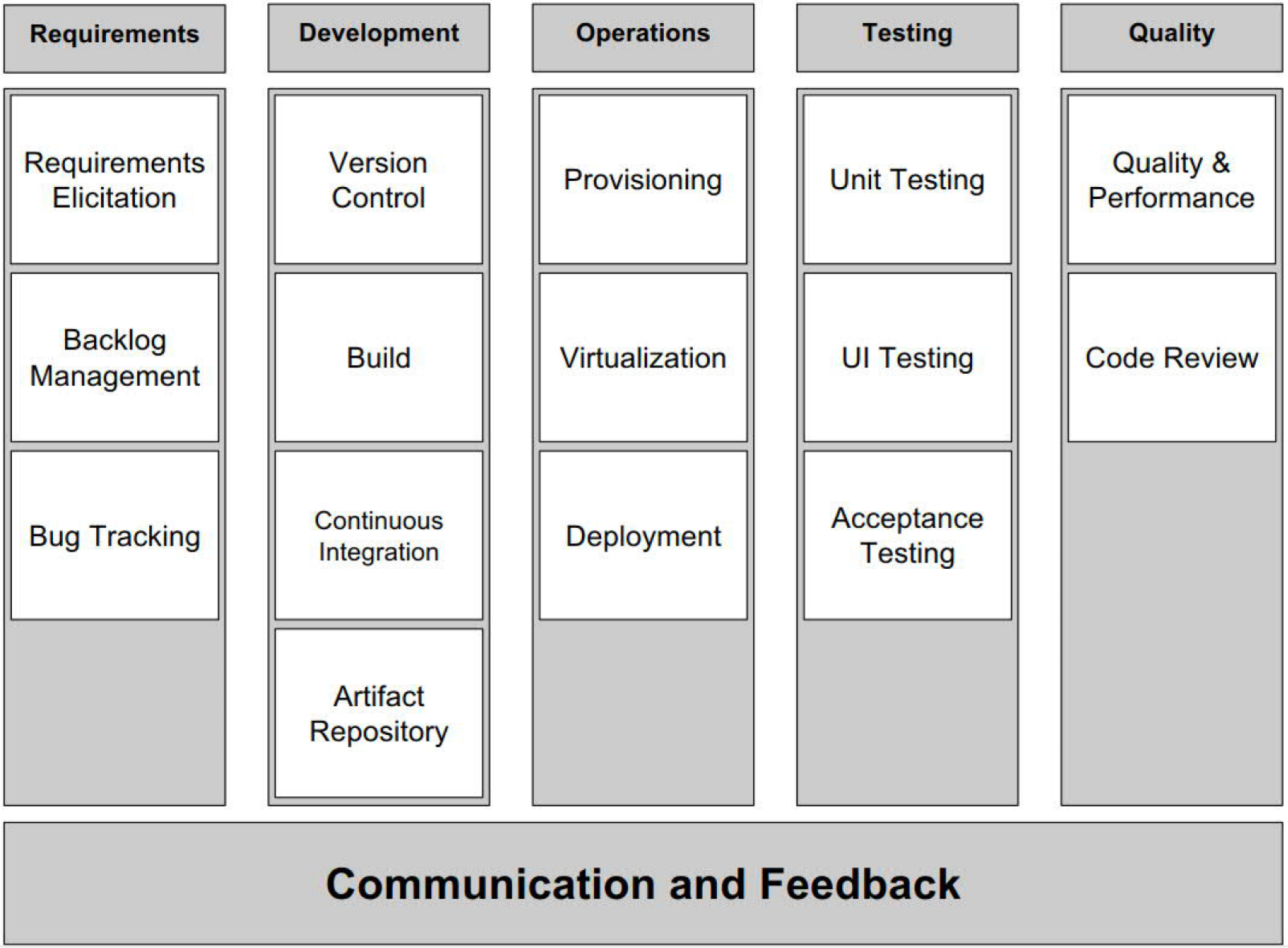
Tools



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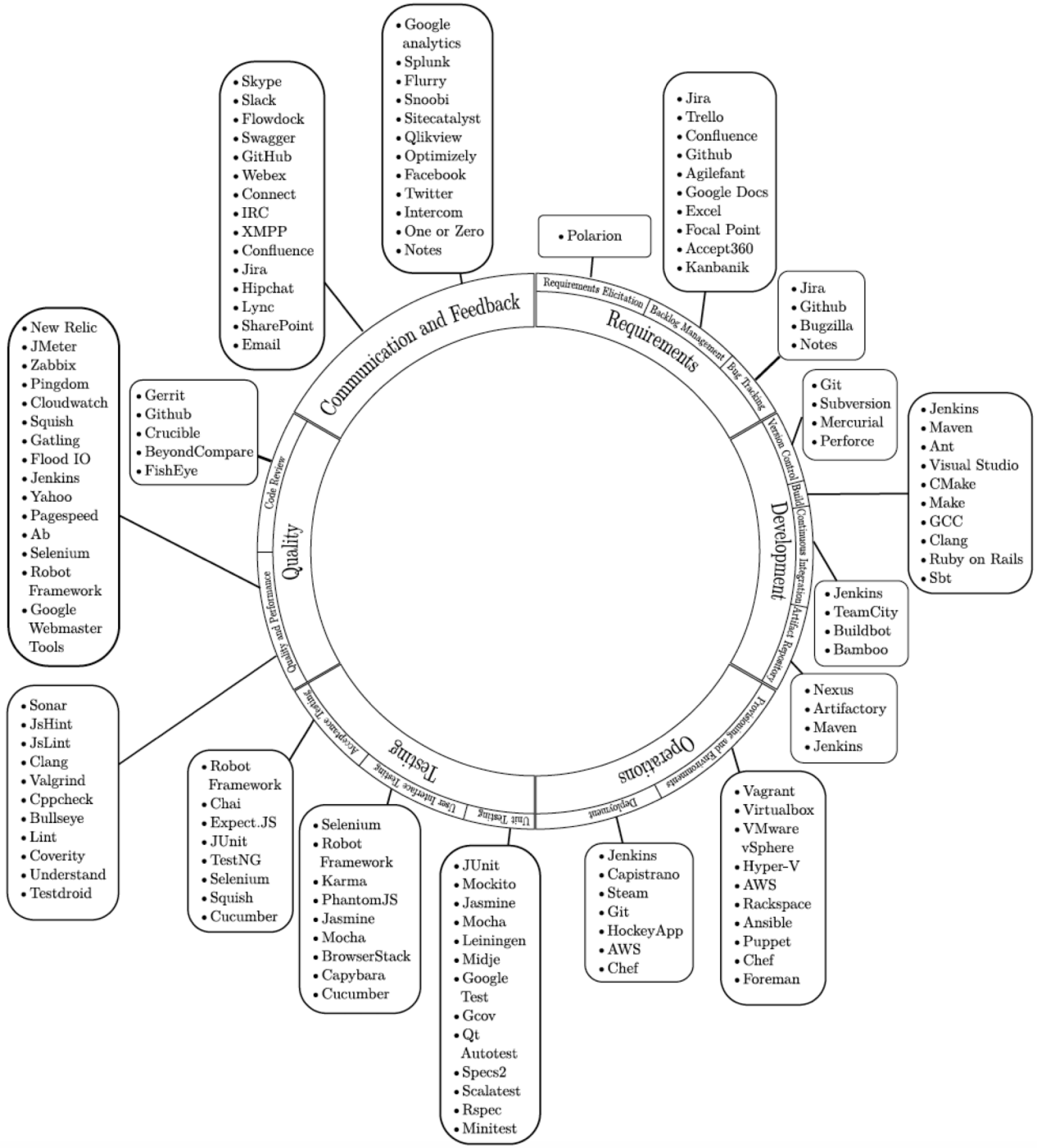
Tools



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Back your course

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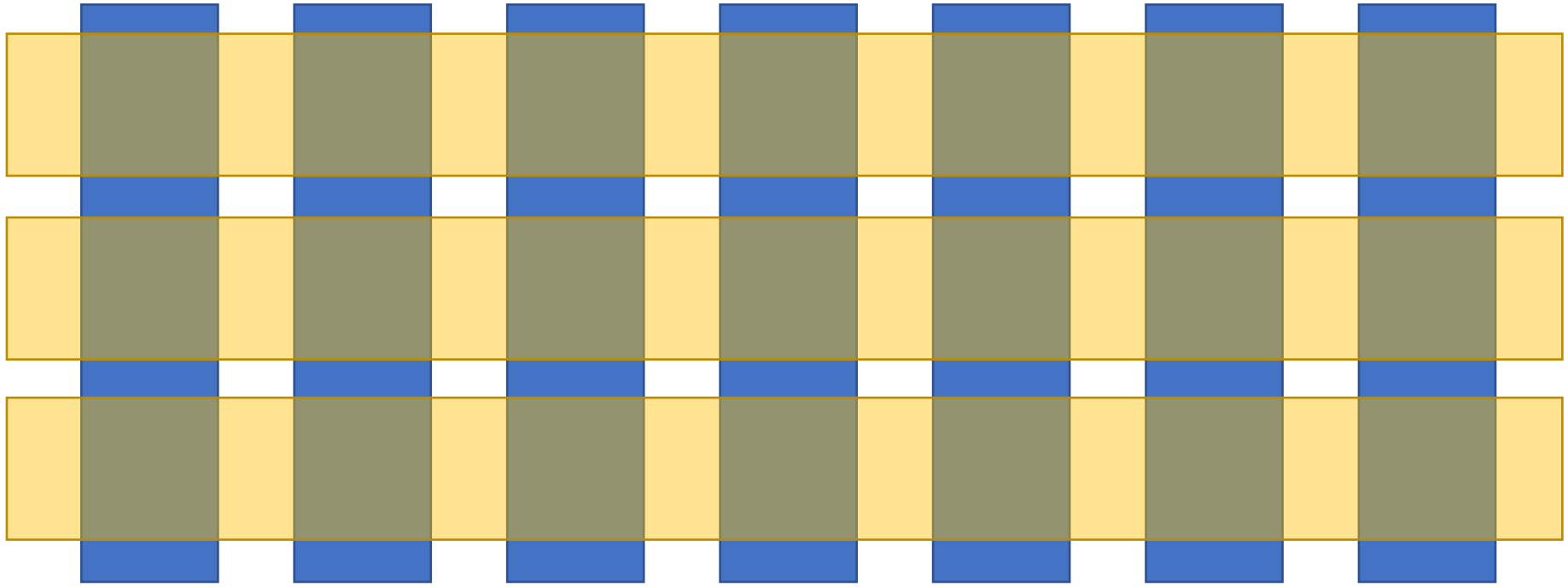
What and why?

tools

ECO-systems
- Azure
- Amazon
- Google



Underlying principles

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Course material will be in ”plus”.

- Seminar from last Spring:
  - https://plus.cs.tut.fi/cloudapps/spring-2019/
- This implementation
  - https://plus.tuni.fi/tie-23536/autumn-2019/

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Back to the bad news

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The bad news

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  - Major is software engineering

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Second bad news

- Our plan was to offer virtual machines for you to play with. Unfortunately, the system is still ”under construction.”
- Thus you need a ”Linux”.
  - I strongly recommend a virtual machine (and back-up snapshots)

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Before limiting the number of students

- Let’s see if I can get more teaching staff
- If some students realize that this course is not for them at this point
- Decisions done 06.09 (by the latest)

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First plus-”exercise” is a background check

- Info will be sent as a ”pop”-message
  - Deadline 06.09 @ 09:00
- Second will be hands-on with Docker
  - Deadline 13.09 @ 23:59