



Software-Engineering in Industrial Practice

Introduction

TU Darmstadt WS 2015/2016

Dr. Martin Girschick

Darmstadt, 16th October 2015



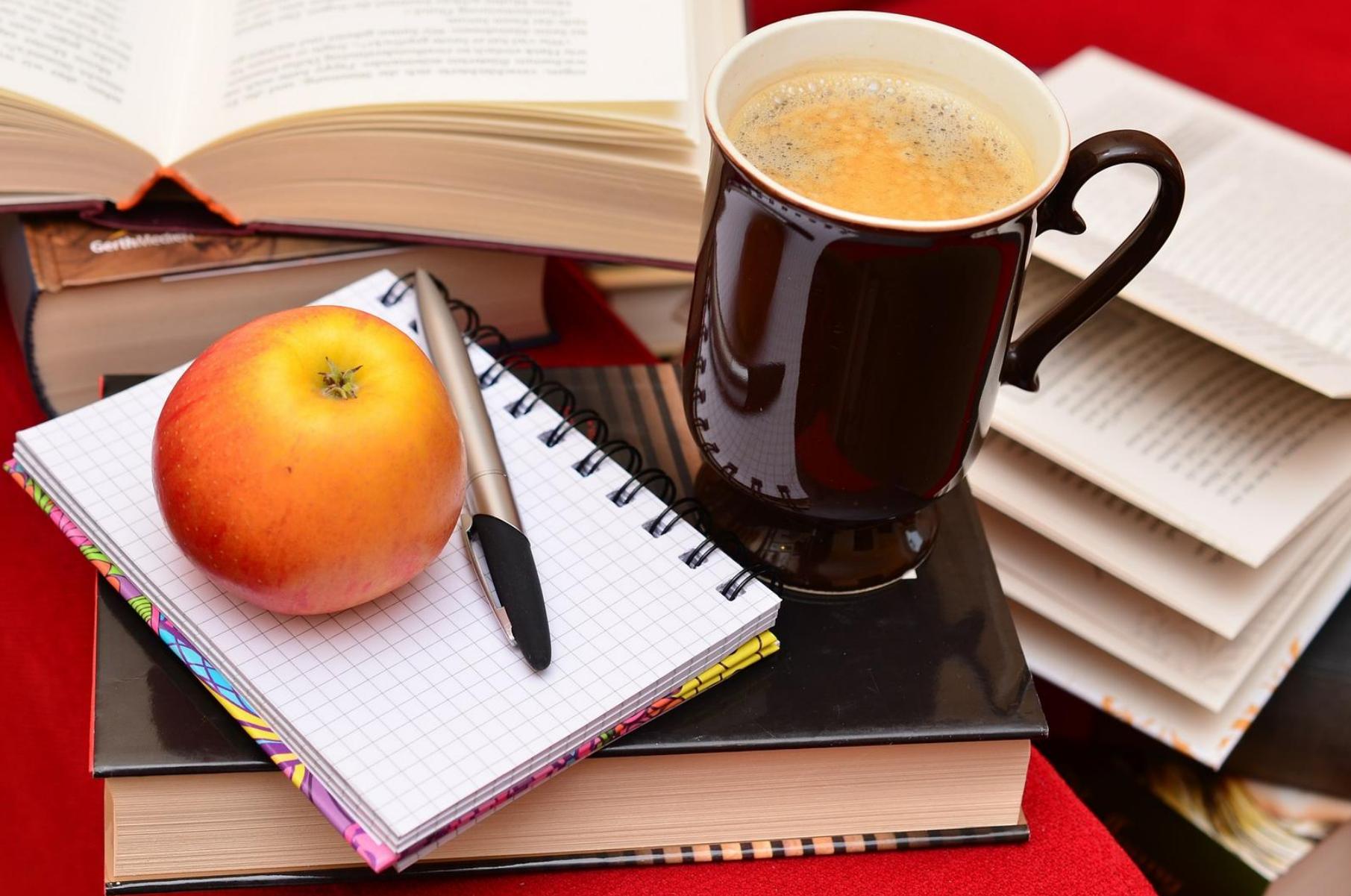


What?

How?



When?





- 1996 – 2002 Computer Science at TU Darmstadt
- 2002 – 2008 Staff member (Department „Metamodelling“)
 - research subjects: Software Engineering, Metamodelling, model-driven software development, process improvement (CMMI)
 - supervisor in Software Engineering Project and several theses
 - organisation of local programming contests
 - graduated in the field „model-driven software development“
- since 2008 Senior Solution Architect at Capgemini (Branch Frankfurt, Service Industries)
 - projects in telecommunications and public sector
 - member of workers council
 - leader of MDD knowledge community
 - university relations for TU Darmstadt

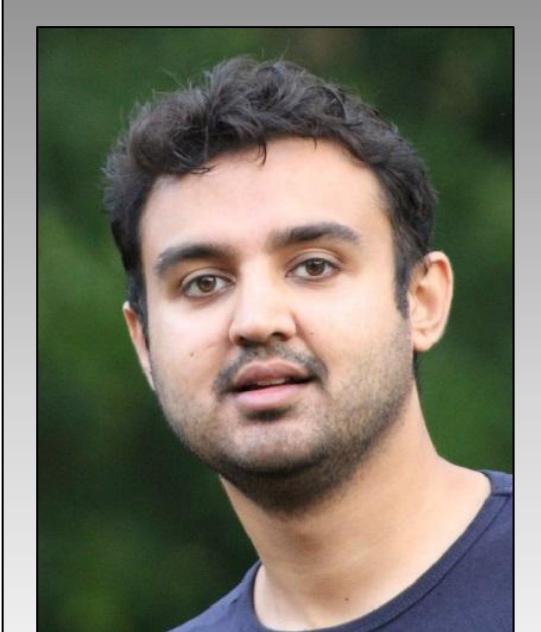
Lecture organisation is supported by three tutors



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With 180,000 employees in over 40 countries support our clients around the globe



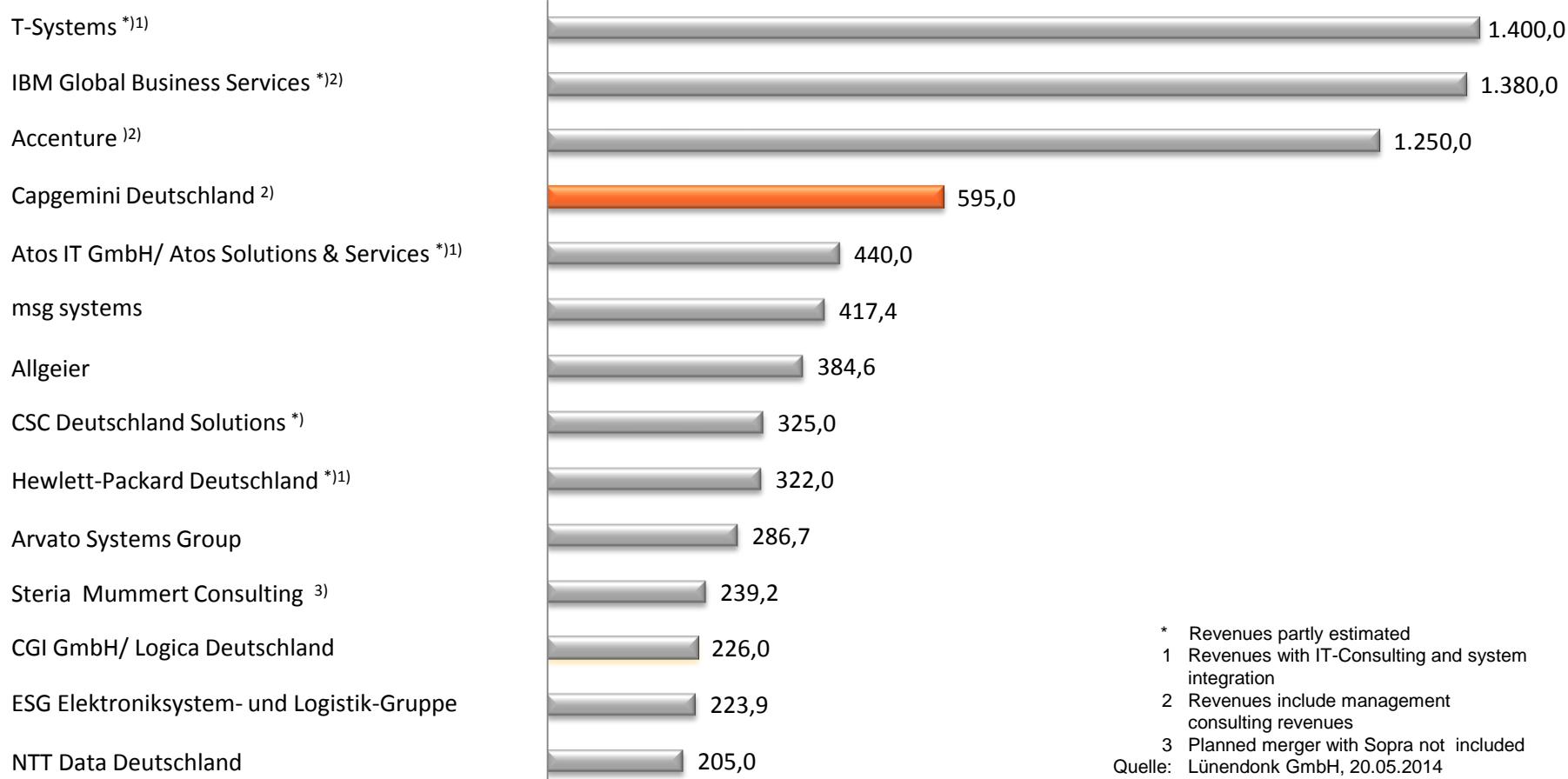
Group Headquarters
Paris, Frankreich

App. 96.000 employees working offshore

Status July2015

Capgemini is a leading IT consultancy and system integrator in the German consulting market

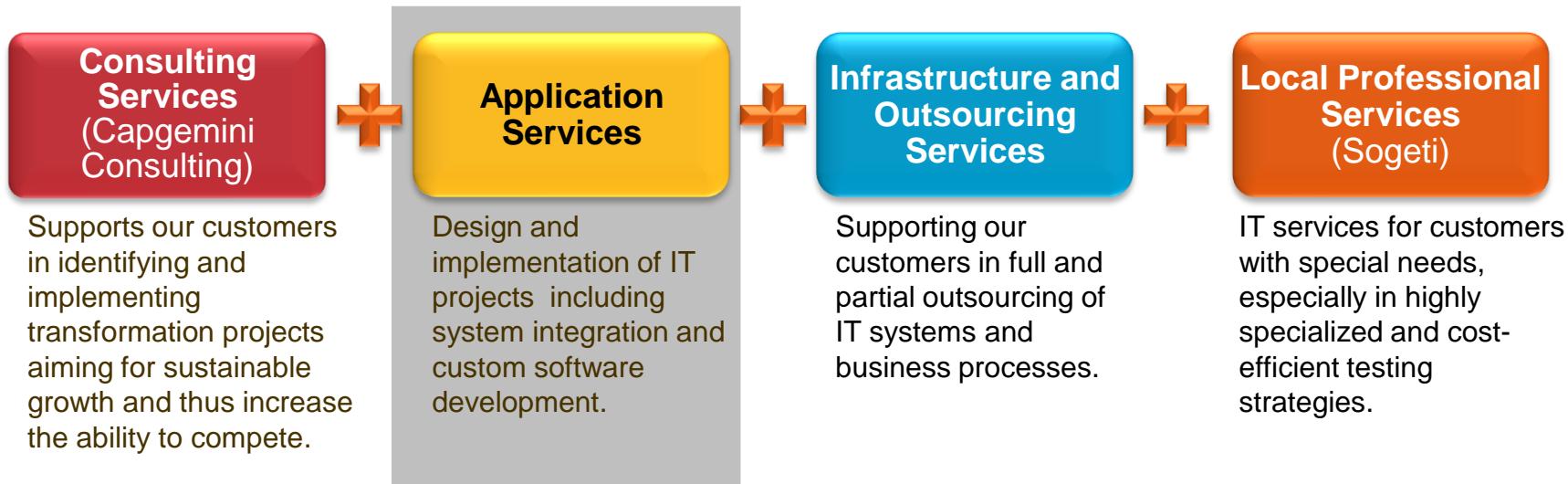
Revenues 2013, in million EUR



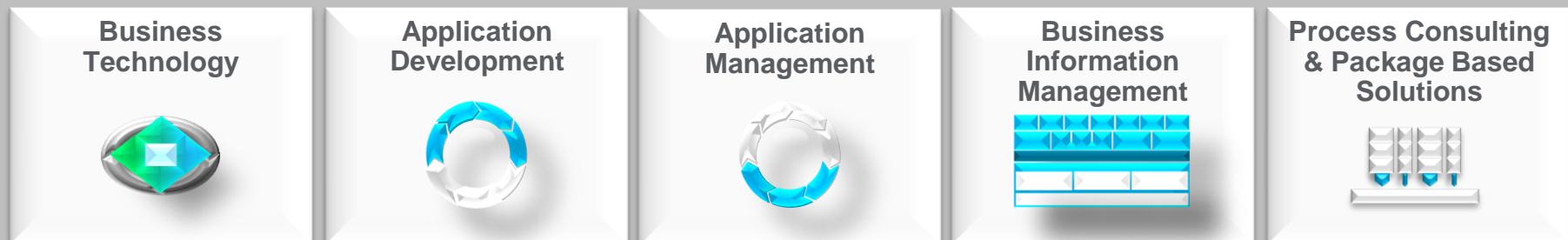
- * Revenues partly estimated
 - 1 Revenues with IT-Consulting and system integration
 - 2 Revenues include management consulting revenues
 - 3 Planned merger with Sopra not included
- Quelle: Lünendonk GmbH, 20.05.2014



Designed to work together.



Custom Solution Development (CSD)



organisation of Apps Germany

Package Based Solutions (PBS)



Our speciality is to design and implement mission-critical enterprise software on time, in budget and with high quality.



Apps Evolve

Knowledge communities and management



What?
Enterprise Information Systems!

From a business perspective an enterprise information system is everything, which is necessary to perform the **core business activities** of a company. This includes information, structures, flows and processes.



Example: Lufthansa reservation system in the 60s

Core processes often require customized software solutions

secondary processes

- support core processes
- required to keep a company running
- examples
 - invoicing
 - customer relationship management
 - human resources
 - fleet management
 - network operations
 - ...

core processes

- support the business case
- required to „produce“ products or support the production or sales process
- necessary to be competitive
- examples
 - booking system of a travel agency
 - foreign citizen registration
 - billing system of a telecommunications company
- not within scope (of enterprise systems)
 - embedded systems to control production process

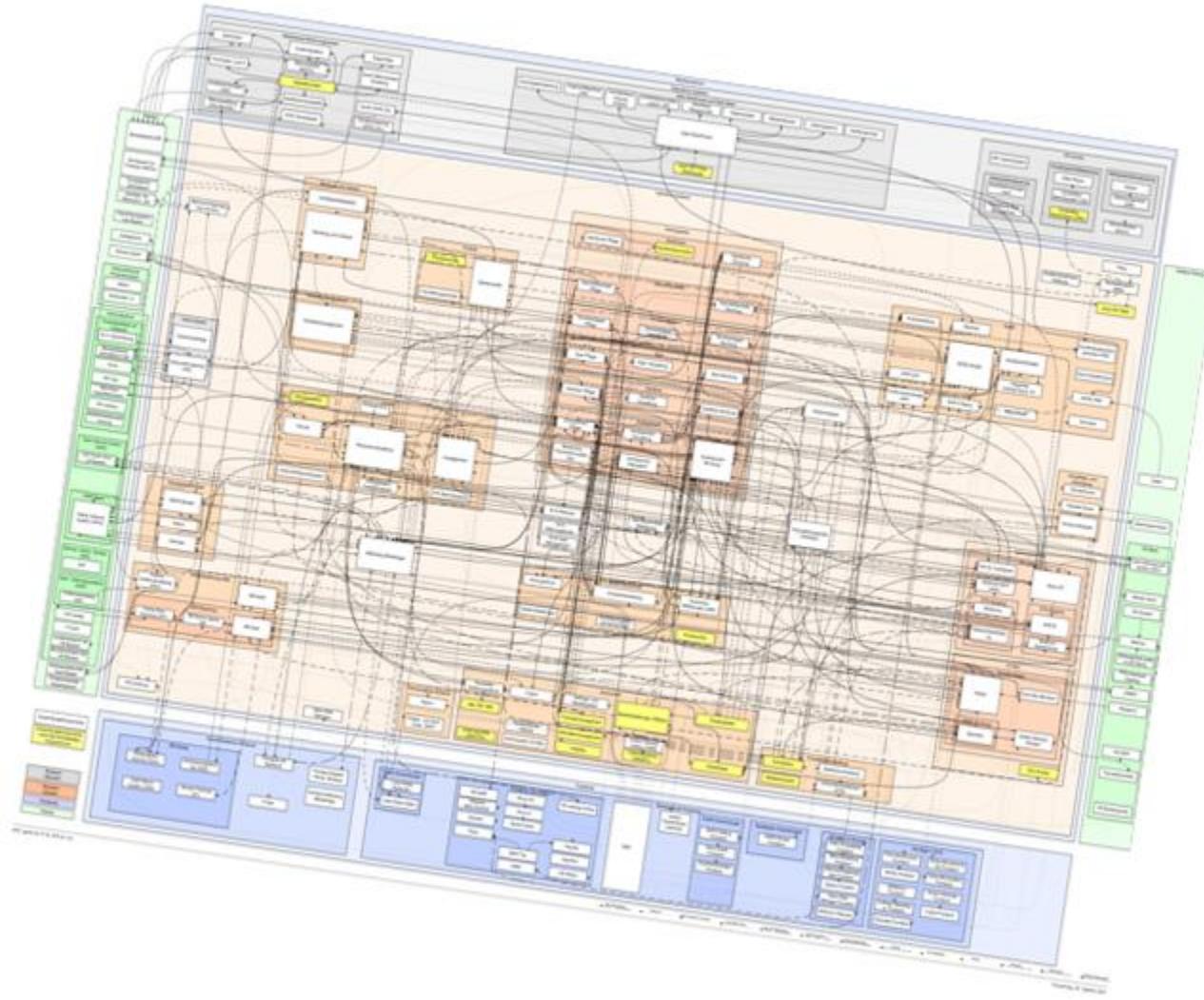


Enterprise information systems can be found in all sectors

Selected customers of Capgemini Apps in Germany

Automotive	Energy, Utilities & Chemicals	Financial Services	Manufacturing, Retail & Distribution	Public Sector	Telecom, Media & Entertainment

Enterprise Architectures give an overview of all information systems within a company or organisation.



- In comparison to a single system, enterprise architectures cannot be fully planned, they “grow”.
- They often hundreds of systems with hundreds of applications and million lines of code

Discussion on enterprise
information systems:
Find typical properties
and important aspects.

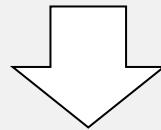


Lifespan and complexity

**lifespan of more than
20 years**

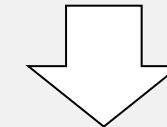
longer than hardware

longer than underlying software



**separation of
technical and
business aspects**

**effort in
man years
millions of lines of code**



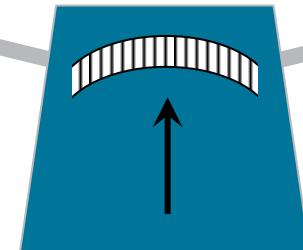
**detailed planning
development in
teams**

Business aspects

ROI

Return on Investment

“Is it worth to build it?”



TCO

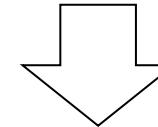
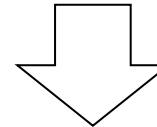
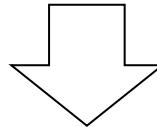
Total Cost of Ownership

***“What does it cost to run
and maintain it?”***



Goals and requirements

Goals
<ul style="list-style-type: none"> • increase productivity • control complexity and amount of data • make information available • reach new markets • decrease cost

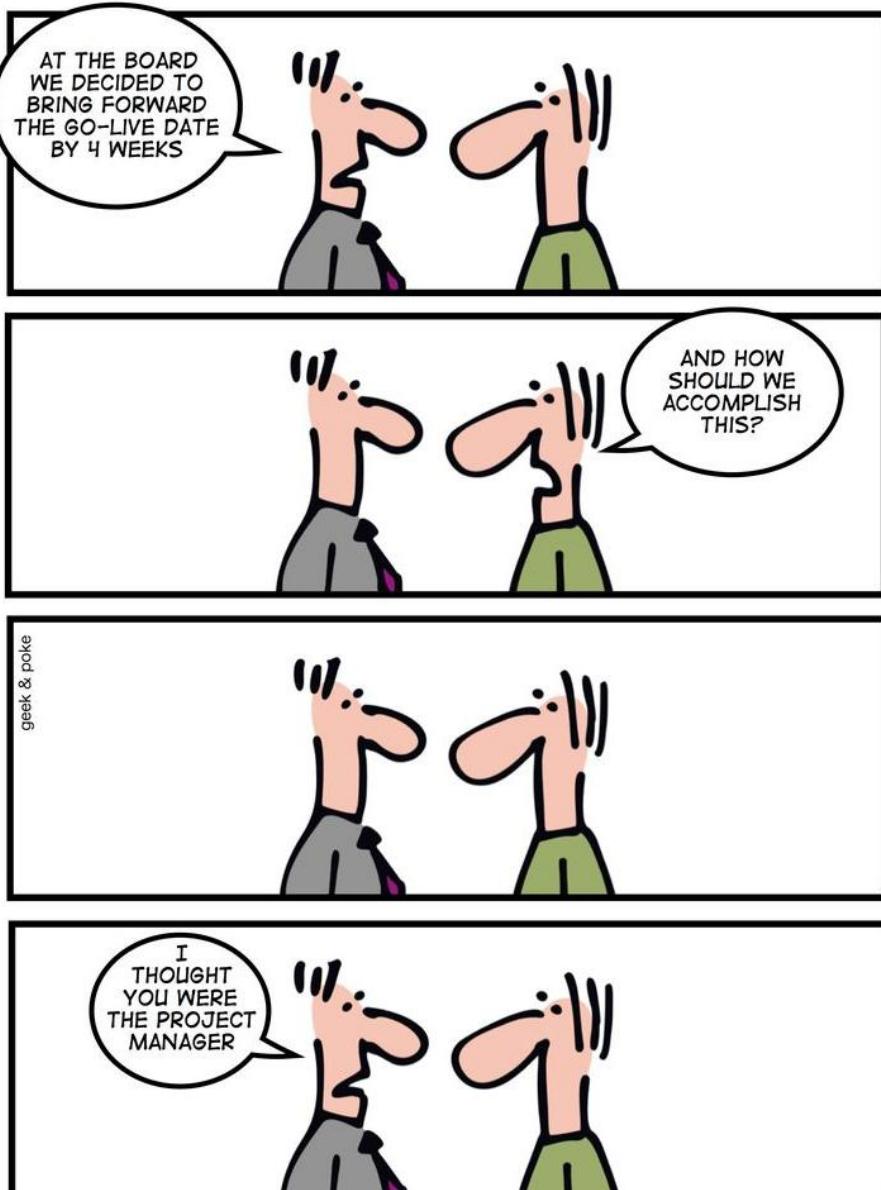


functional requirements	quality requirements	process requirements
<ul style="list-style-type: none"> • workshops • requirements engineering • specification • modelling • interface design • ... 	<ul style="list-style-type: none"> • Stability, availability • security • performance • usability • ... 	<ul style="list-style-type: none"> • project planning • effort estimation • quality & risk management • development techniques • configuration management • ...

*What are important activities in
„real world software engineering“?*



MANAGING PROJECTS



HAVING MANAGEMENT ATTENTION IS KEY



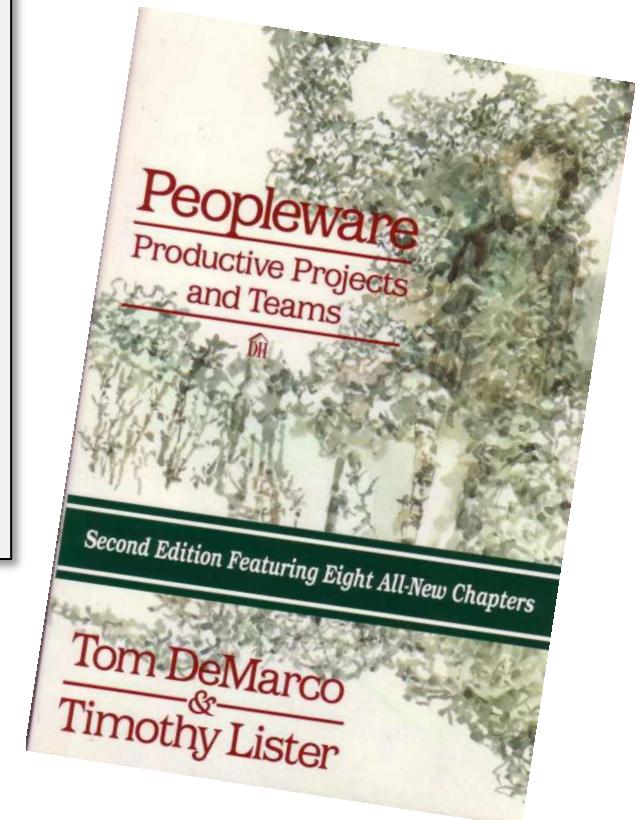
Project Management

- often large teams (>20 people)
- teams spread across the world
- Contractual requirements
- progress control
- external coordination with customer

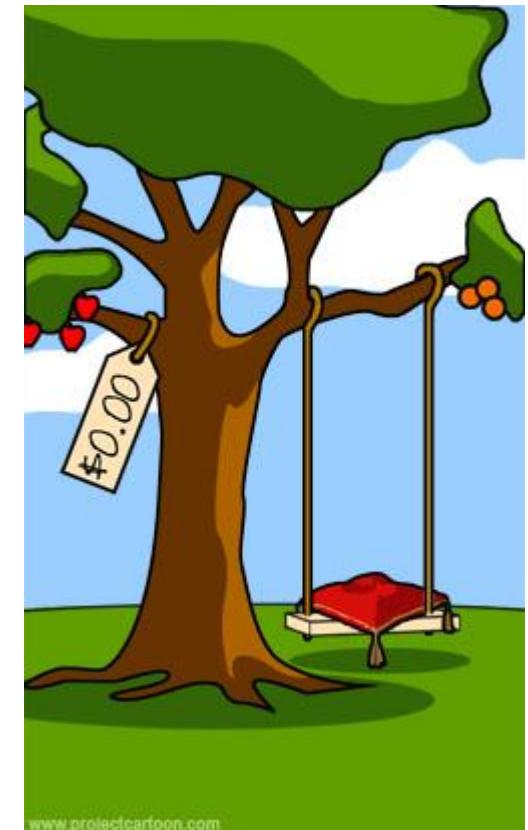
Consequences:

- 10-20% of the overall effort
- continuous planning and controlling
- change request management
- effort estimation

Do you know Hofstadter's law?



REQUIREMENTS AND SPECIFICATION



<http://www.projectcartoon.com/cartoon/1078>

www.projectcartoon.com



Respect the customer, address complexity and size.

- The customer is involved in the decision process
- There's a business reason for developing it
- He is paying for the system

Consequences:

- build trust and use psychological and soft skills
- not only technical but also business know-how
- defined processes

- many involved parties
- extensive data models
- exceptions from standard cases
- seldom complex algorithms

Consequences:

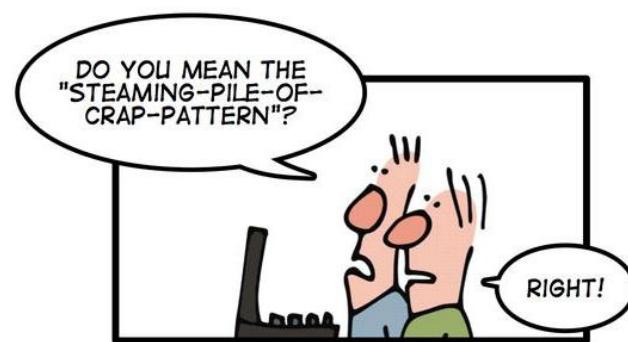
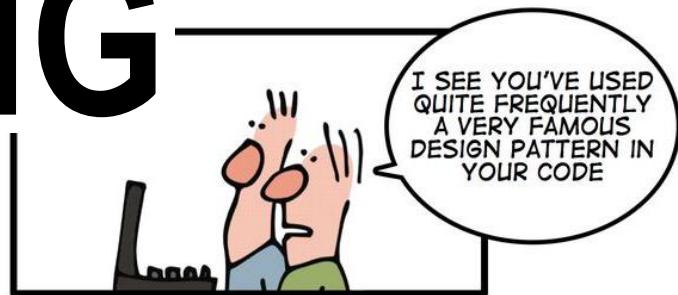
- clear definitions, modelling
- standard architectures and proven methods

- Millions of entries in database
- Millions of transaction per day
- ...

Consequences:

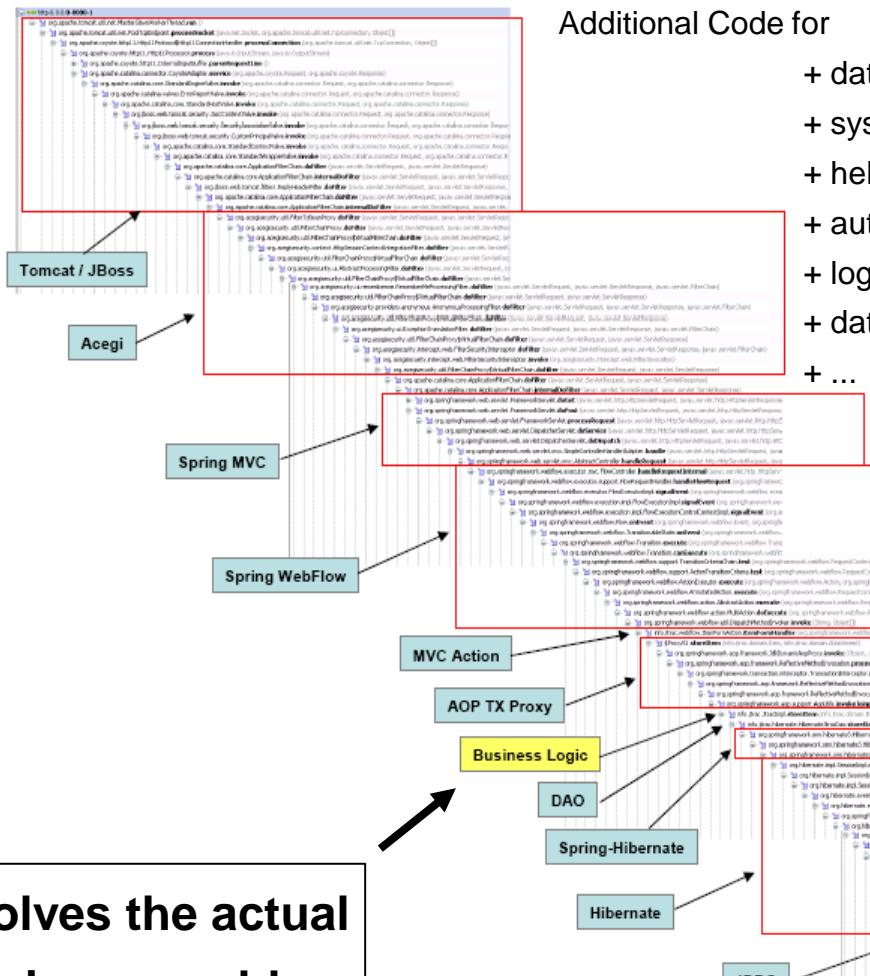
- highly efficient user interface
- batch-based data processing
- performance measuring and control

ARCHITECTURE AND PROGRAMMING



THE HYPE IS LONG GONE BUT
DESIGN PATTERNS ARE STILL USEFUL

Enterprise systems contain lots of code. Only a minor part solves the actual business problem.



Additional Code for

- + data
- + sys
- + hel
- + aut
- + log
- + dat
- + ...

- Not everything has to be programmed manually from scratch.
- Integration becomes more important.
- Not everything can be handled in one application. Everything is networked.

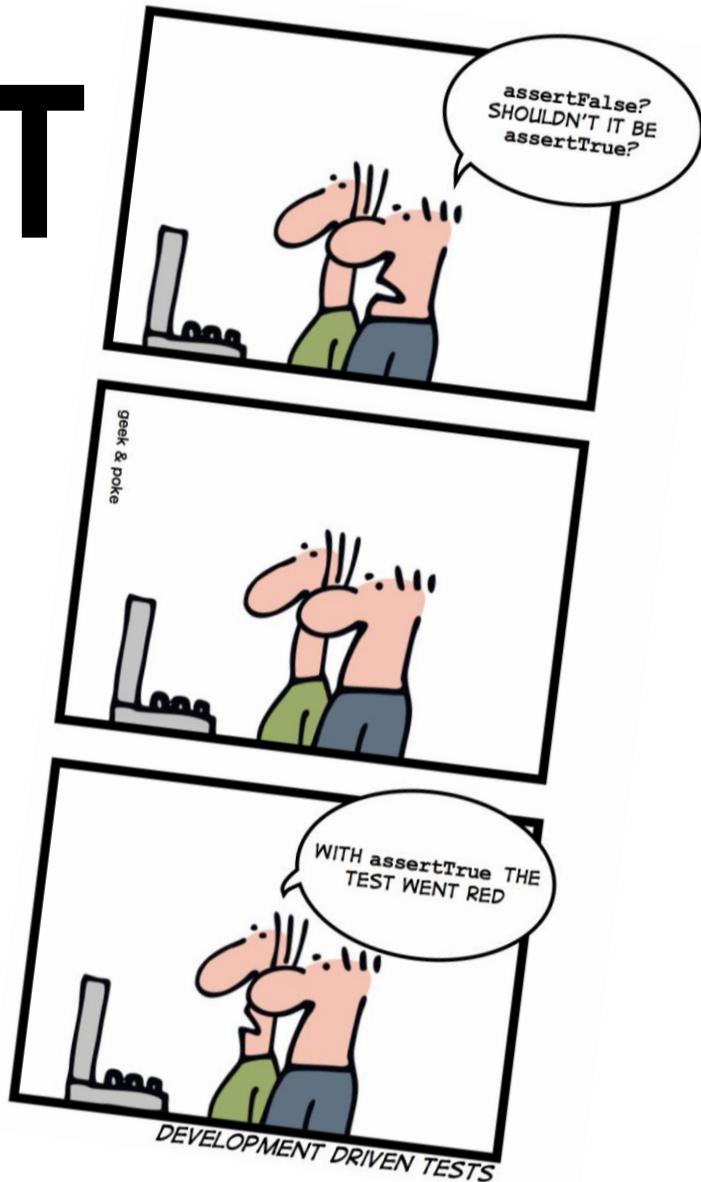
Consequences:

- simple solutions preferred to clever ideas
- component architectures
- tools for code quality and code generation
- standardized platforms
- security considerations
- iterative processes
- maintainability is a huge issue

**code, which solves the actual
business problem**

<http://ptrthomas.wordpress.com/2006/06/06/java-call-stack/>

QUALITY MANAGEMENT AND TESTING



Necessity for quality management in all project phases

- quality assurance for all project artefacts
- testing areas for software
 - modules
 - subsystems
 - system integration
 - approval by customer
 - regression

Consequences:

- clearly defined goals and processes
- high degree of automation
- suitable and available testing environments



Is this everything?

More on the trends in Software Engineering will be discussed next week!

Further reading:

<http://www.gartner.com/smarterwithgartner/gartners-top-10-strategic-technology-trends-for-2015/>

<http://www.gartner.com/newsroom/id/2867917>

Merging the Real World and the Virtual World

Computing Everywhere



The Internet of Things



3D Printing



Intelligence Everywhere

Advanced, Pervasive and Invisible Analytics



Context-Rich Systems



Smart Machines



The New IT Reality Emerges

Cloud/Client Computing



Software-Defined Applications and Infrastructure



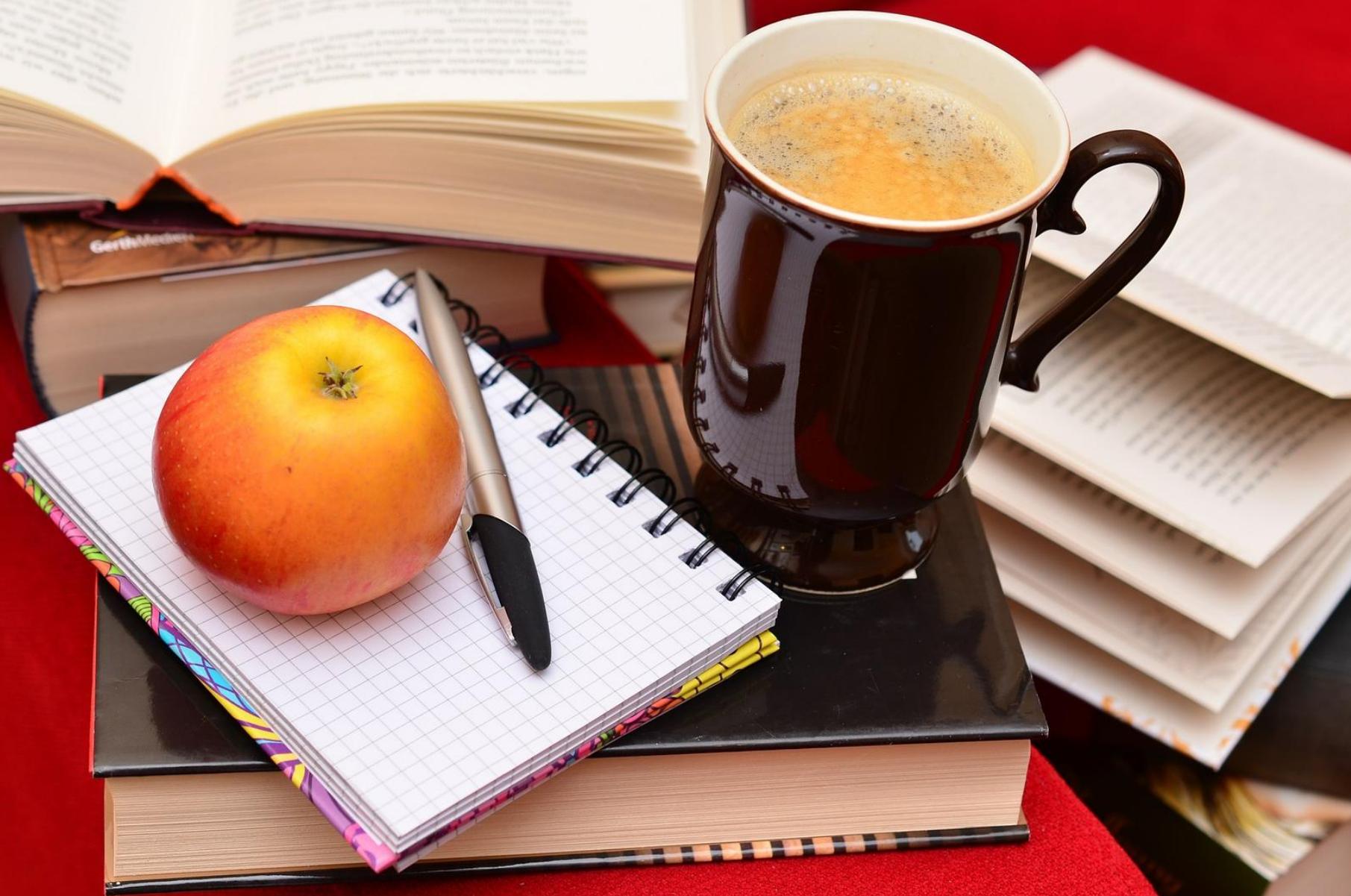
Web-Scale IT



Risk-Based Security and Self-Protection



When?





Overview of lecture topics

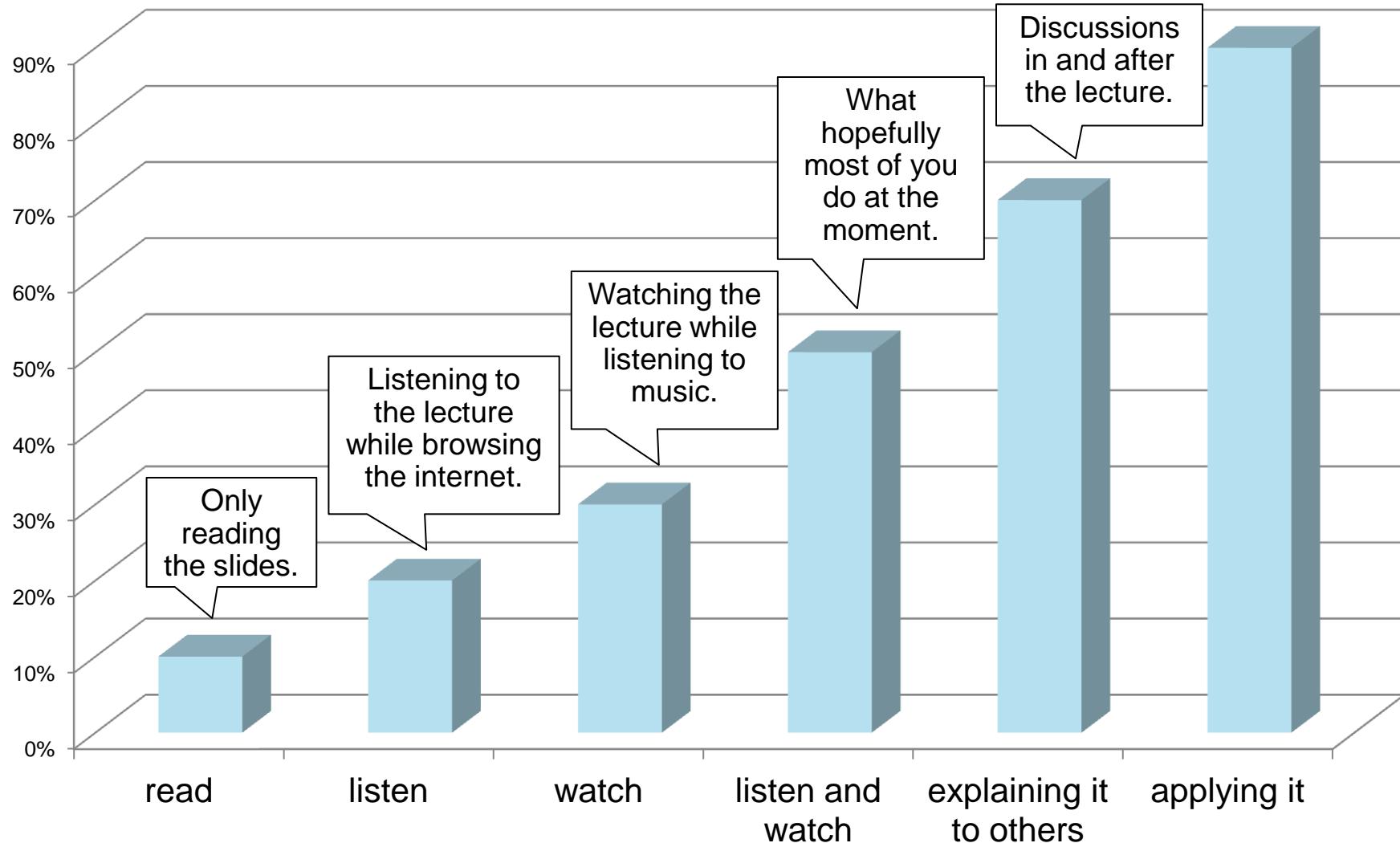
No.	Date	Subject
1	16.10.2015	Introduction
2	23.10.2015	Different Application Lifecycles for different needs
3	30.10.2015	Estimation and Project Management
4	06.11.2015	Requirements Management
5	13.11.2015	Specification
6	20.11.2015	Quality Management
7	27.11.2015	— Workshops —
8	04.12.2015	Designing Software Architectures Part 1/2
9	11.12.2015	Designing Software Architectures Part 2/2
10	18.12.2015	Modern Technology Stacks
11	15.01.2016	Creating and Maintaining Open Platforms
12	22.01.2016	— Workshops —
13	29.01.2016	Model Driven Development
14	05.02.2016	Performance, Operations and Continuous Integration
15	12.02.2016	Enterprise Architecture

13.11. expedITion Workshop

Christmas
break

How much do you want to take with you?

Doing Exercises.





Organizational issues

- Some lecture topics are presented by guest speakers from Capgemini
- Exercises have three phases
 - Initial answers are prepared by student
 - Those are discussed and refined in groups
 - Final discussions and presentations in workshops
- Registration for first exercise block starts on 27th of October
- Second exercise block starts in December, choice of two subjects
- Exercises are not mandatory, but you get bonus points for exam
 - Each exercise block has a maximum of 5 points, which is 1/3 of a grade (improvement of exam by 0.3-0.4)
 - Attendance in workshop is required
 - Bonus points will not help to pass exam
- The slides will be available in moodle (in most cases the day before the actual lecture)
- Exam is on Friday, 4th of March 2016 9:30-10:30

Feedback and Questions

- Feedback

- Necessary to improve lecture and address your needs!
- Talk to lecturer after presentation or send an email
- Use the moodle forum
- Use the official feedback form (Fachschafts-Feedback)

- Questions?

- Please use the forum, if possible
- For other cases contact us under seiip@informatik.tu-darmstadt.de

<https://moodle.informatik.tu-darmstadt.de/course/view.php?id=461>

expedITion Workshops 2015

IT, die fasziniert. Von Menschen, die begeistern.

Technology enables business – Smart Finance is SAP's answer

Frankfurt
13.11.2015

Erlebe in unserem Workshop, wie wir SAP-HANA Projekte bei Capgemini vorantreiben und werde selbst für einen Tag Berater in einem solchen Projekt. Unterstütze unseren Kunden bei der konzernweiten Konsolidierung seiner Systemlandschaft auf ein zentrales HANA System.

Erarbeite dazu, gemeinsam mit anderen Teilnehmer und mit Hilfe von erfahrenen Capgemini Beratern, in kleinen Gruppen einen Projektplan, den Du dann im Plenum vorstellst.

Beim abendlichen Get-together nach dem Workshop hast Du dann die Möglichkeit, Dich mit Capgemini-Mitarbeitern – vom Berufseinsteiger bis zur Führungskraft – auszutauschen.

Du bist Student, Absolvent oder Young Professional und begeisterst Dich für IT- und Technologiethemen? Dann freuen wir uns auf Deine Anmeldung!

Weiter Infos und Anmeldung unter www.capgemini-expeditIon.de



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