TECHNISCHE HOCHSCHULE
OSTWESTFALEN-LIPPE
UNIVERSITY OF
APPLIED SCIENCES
AND ARTS

Industrial Software Engineering

Slides

03.2020

Prof.in Dr. Jessica Rubart & Prof. Dr. Robert Mertens
Industrial Software Engineering
Summer term 2020

Organizational Issues

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Organizational Issues

Course

Event	Day	Room	Time
Lecture	Friday	Virtual or 55.015	09.40 – 11.20
Exercises	Friday	Virtual or 55.015 / 1.344	11.35 – 13.15

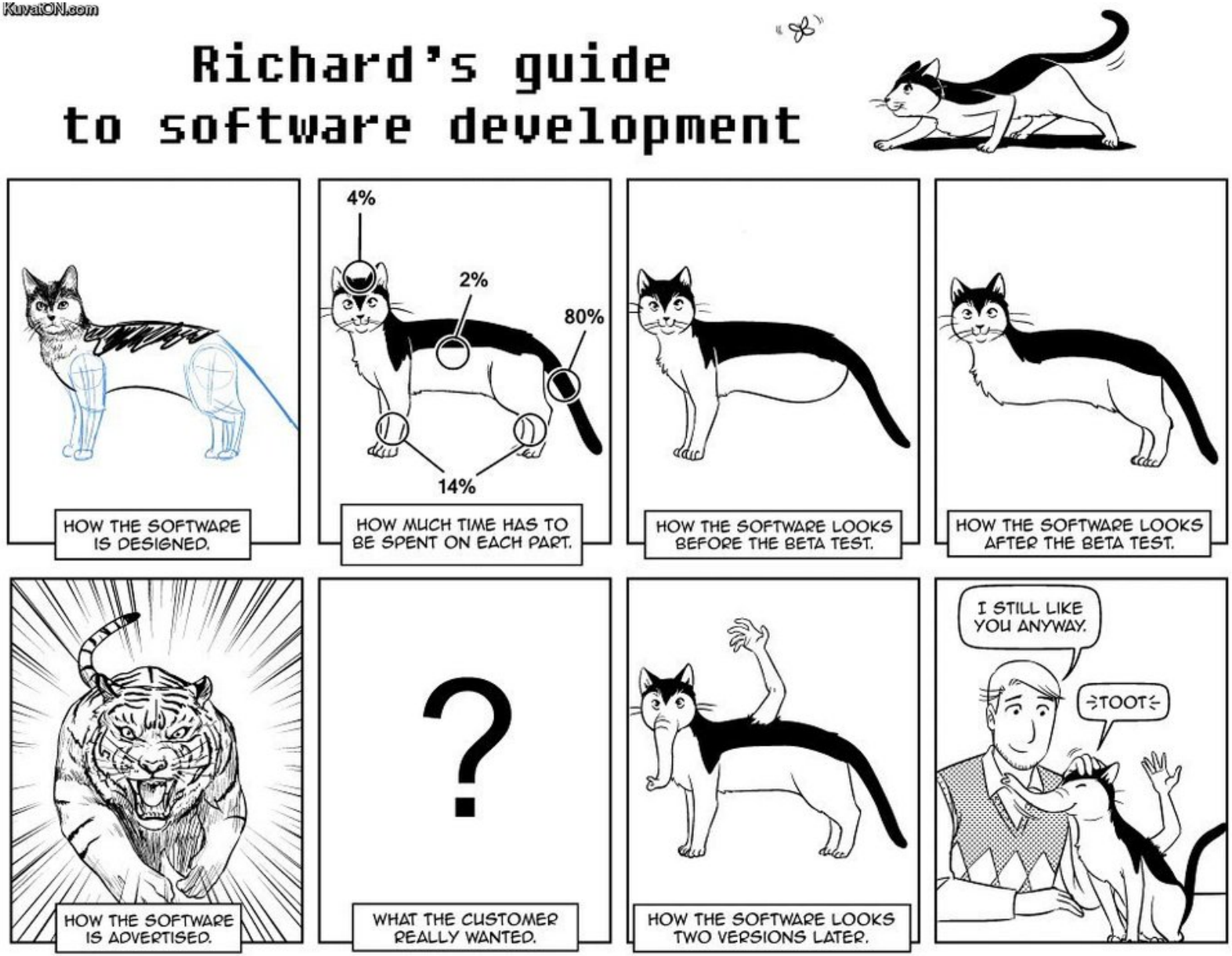
- **Optional course**
- **5 ECTS credits**

- **Ausarbeitung**

Round of Introductions

Effort Estimation
Test-Driven Development
Process Models
System Analysis
Business Change Request
Scrum
Software Patterns
Industrial Software Engineering
Software Architectures
User Stories
Quality Management
SOA
RUP
Service-Oriented Architecture
MDA
Background
SIX SIGMA
Expectations
Project Management
Testing
Work Packages
Agile Methods
Kanban
Model-Driven Architecture
Unified Process
Use Cases
Component-Oriented Development
BPMN
Software Evolution
Customer
Project Plan
Requirements Management
Reuse
Prototyping
Business Analysis
Controlling

Motivation



Sandra and Woo by Oliver Knörzer (writer) and Powree (artist) – www.sandraandwoo.com

Contents

Overview

- Rational Unified Process
- Requirements Engineering
- Modeling Business Processes
- System Analysis
- Prototyping
- Effort Estimation
- Scrum
- Software Architecture & Reuse
- Test-Driven Development
- Software Evolution

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Master IT
Industrial Software Engineering

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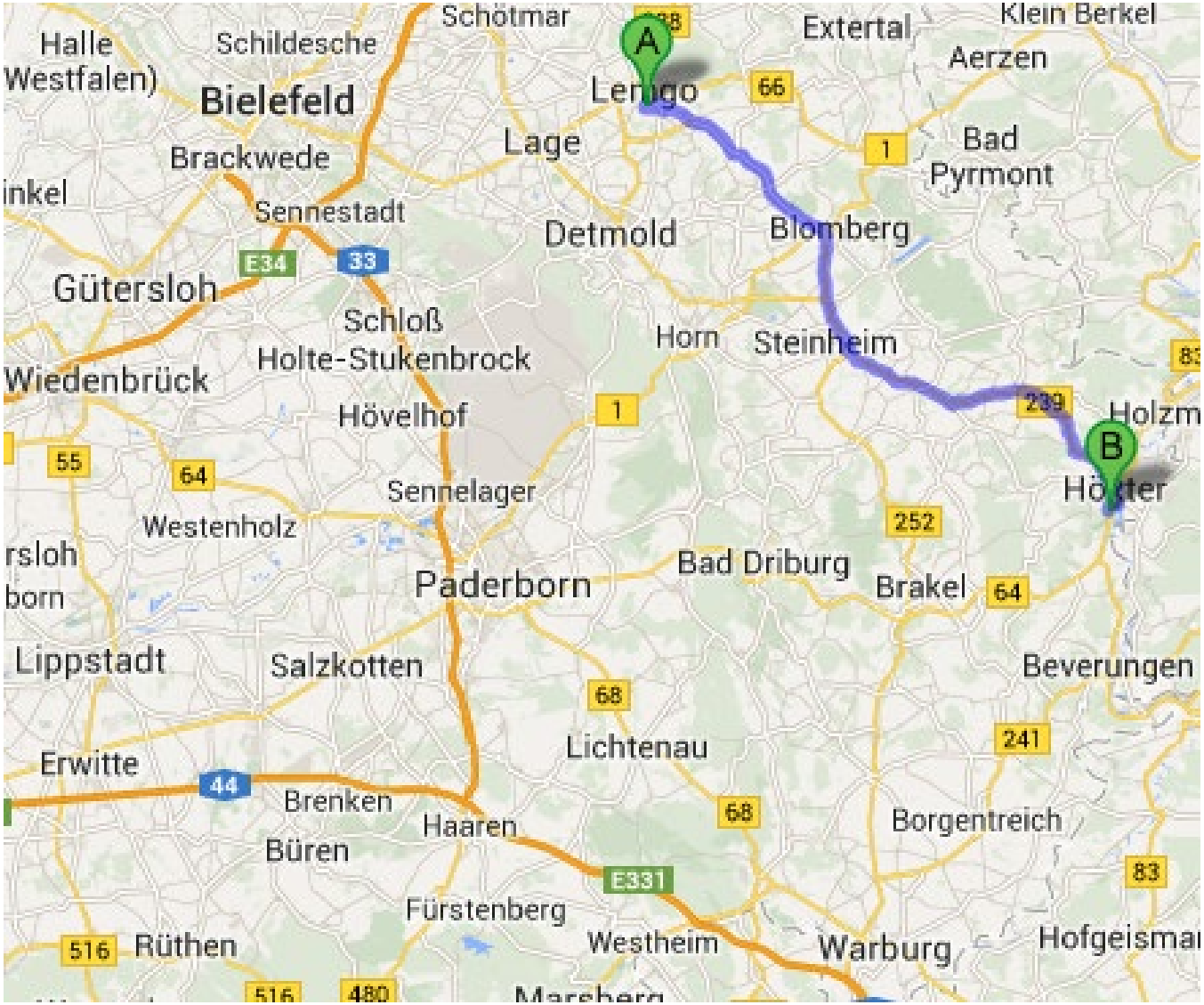

An der Wilhelmshöhe 44
37671 Höxter

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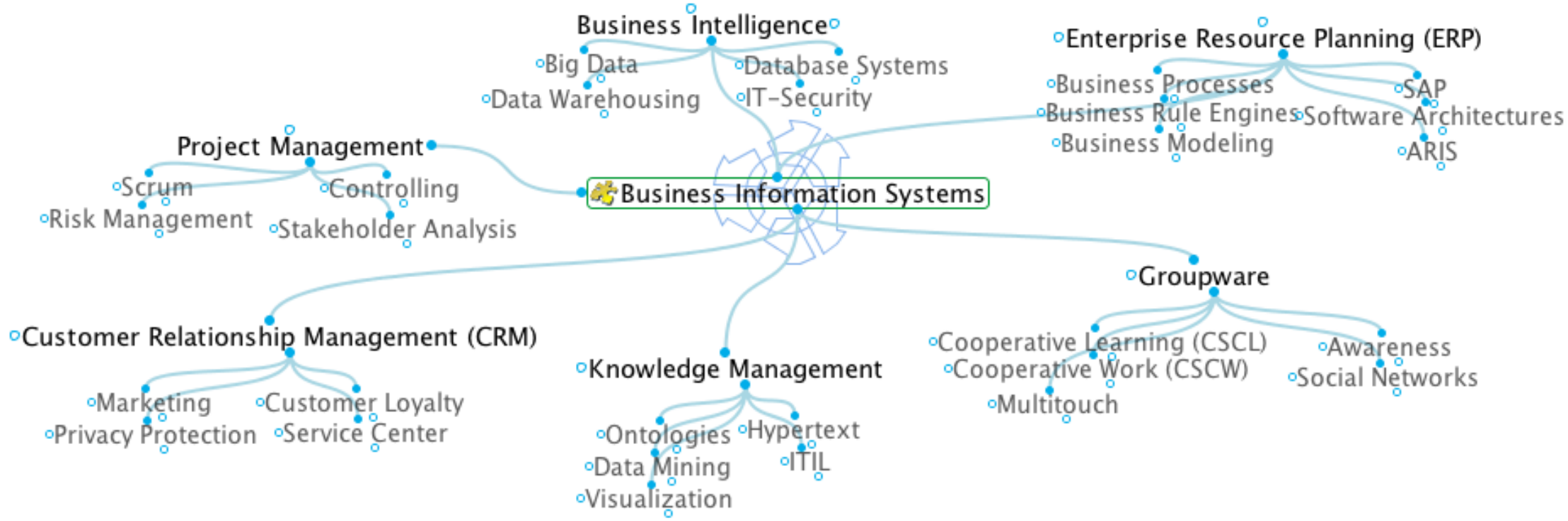

Example Project “Höxterprise”

- Integration of the Lemgoer Modellfabrik with the simulated company "Höxterprise" (ERP-System)
- For optimizing processes and energy consumption (in cooperation with Prof. Dr. Wrenger und Prof. Dr. Niggemann)

- Controlling Popcorn Production
- Supporting Business Processes

Example Project “ERP to go”

- Agile production planning and control (in cooperation with Prof. Dr. Hartweg)
- Integration of QR-Codes, RFID-Tokens, or Beacons in a laboratory
- Mobile production data acquisition
- Decentralized processes

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Example Project “Cooperative Applications for Big Multitouch-Displays”

- Evaluation of software frameworks and development environments for the development of cooperative multitouch applications
- Innovative cooperative planning and creativity applications, e. g. a cooperative multitouch Scrum task board

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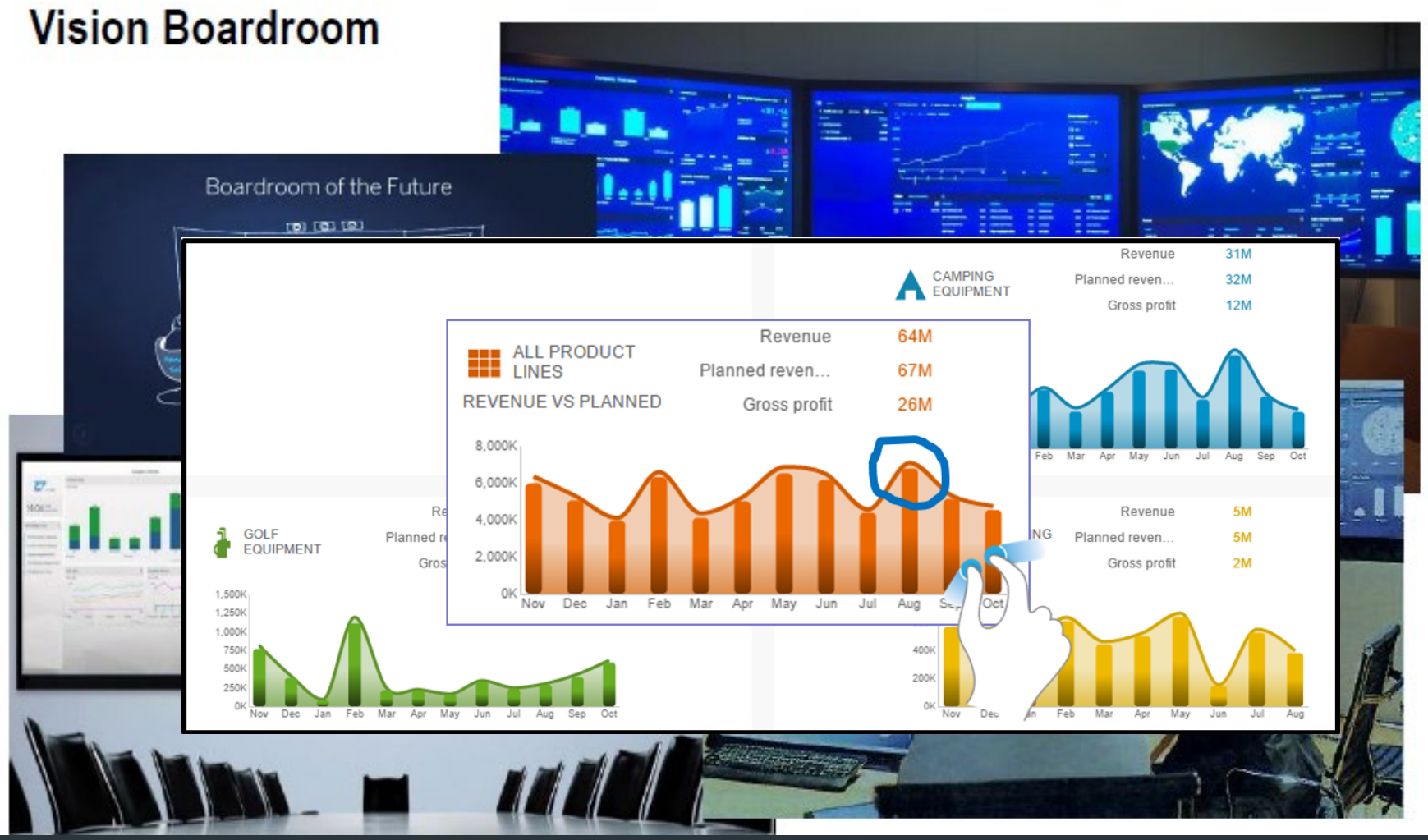
Example Project “Multitouch-based Discussion in a Digital Boardroom”



Cf. Focus magazine 48/2015; Eventix AG/SAP

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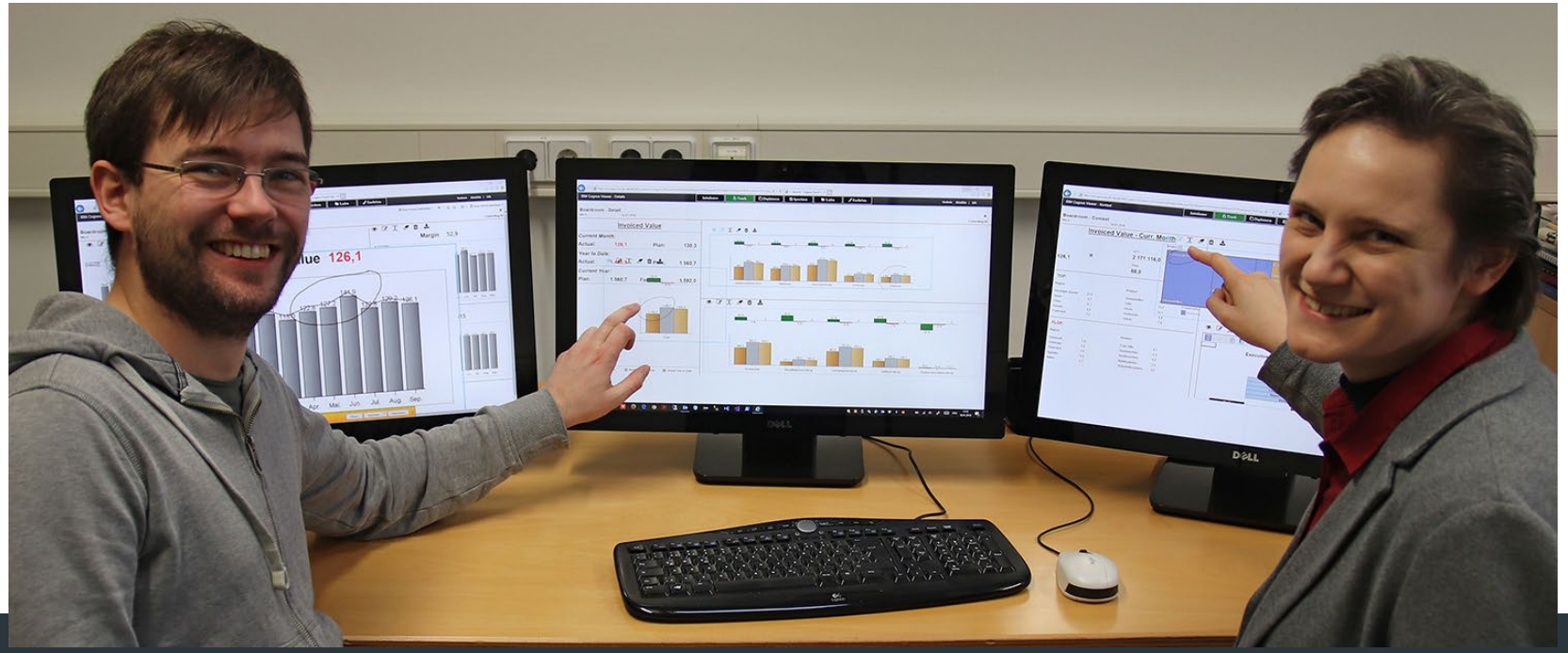
Example Project “DROPS – Data Mining based Optimization of the Production, its Control and Monitoring”

- In cooperation with **HSW University of Applied Sciences** and Next Vision GmbH
- Development of a platform to analyze, predict, and optimize production processes



Gefördert durch:

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aufgrund eines Beschlusses des Deutschen Bundestages

ZIM Zentrales Innovationsprogramm Mittelstand

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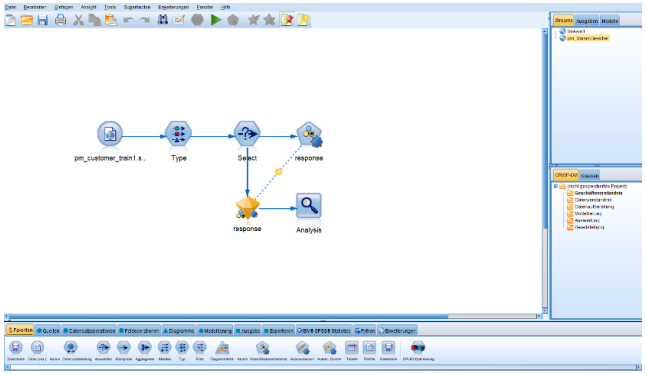
Example project „DROPS“

Sensors
Log data
Target values
…

→

Predictive analytics
Classification
Clustering
Association analysis

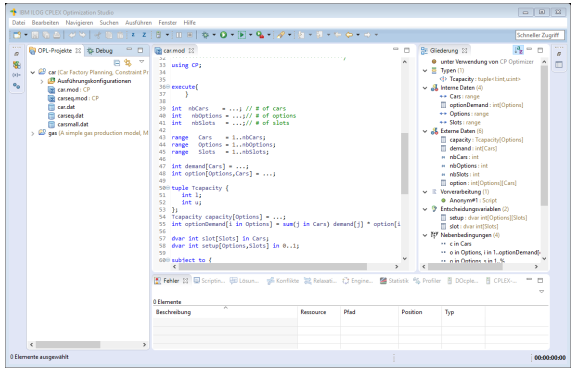


e.g. IBM SPSS Modeler

→

Optimization

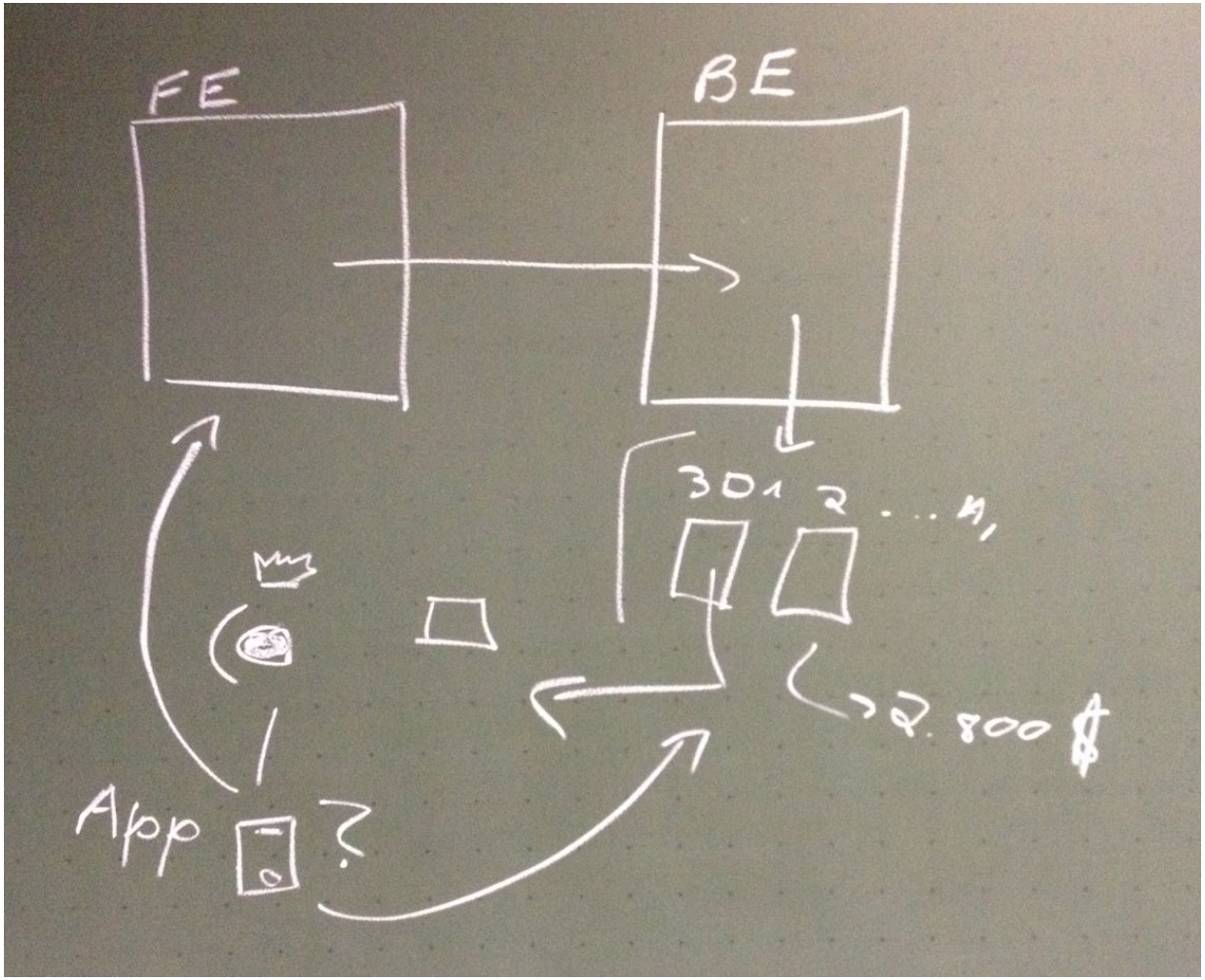
$$\min \sum x$$

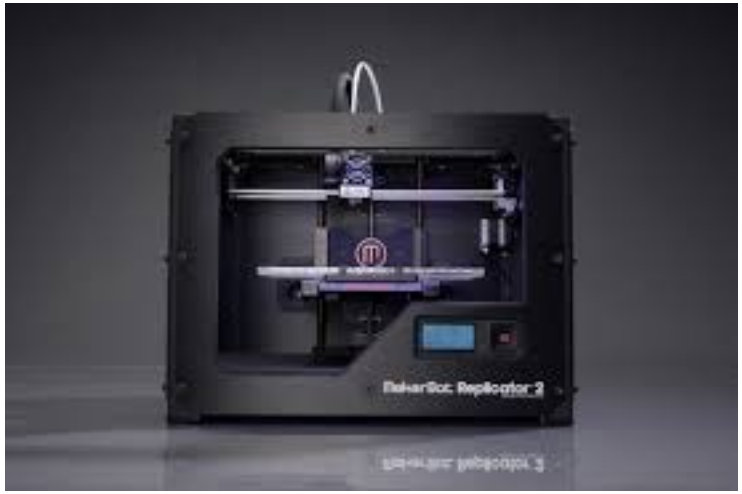


e.g. IBM ILOG CPLEX

Practical Example

3D Printer Project





Practical Example

Beacon Technology (I)

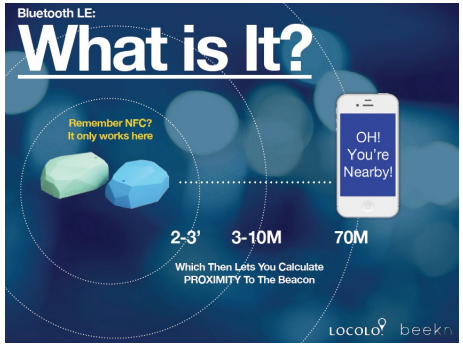
Beacon transfers location data

Smartphone App gets signal

Data is analyzed via Push & Track platform

User gets customized information or instructions

Source: http://www.meinmarketing.de/beacon-tracking-technik/?gclid=CMrQwKvI0sQCFc7LtAodbkwA6g)



Source: http://blog.3g4g.co.uk

Practical Example

Beacon Technology (II)

Technology	Pros	Cons
Wifi	• Technology available today with Wifi and can be used across all smartphones • Relatively in-expensive	• Requires an installed app by user to engage • Investments in Wifi SW/HW to achieve accuracy*
NFC/RFID	• Great accuracy for use with payments and product information • Very low cost of RFID sensors/stickers (0.01 USD)	• Not supported by Apple • 20 cm (7.9 Inch) range
iBeacon/ BLE	• Based on Bluetooth 4.0 and available on most new smartphones	• Requires an app to be installed and Bluetooth to be running • Requires new technology/ investments and becomes complex to maintain when you scale up

* Cisco, Navizon, Meridian, KAIST, WirelessWerx, GISi Indoors, Euclid, etc

Source: https://www.qualcomm.com

Source: http://blog.3g4g.co.uk

Literature

- Sommerville, Ian: Software Engineering. Ninth Edition, Pearson, 2010.
- Schwaber, Ken: Agile Project Management with Scrum. Microsoft Press, 2004.
- Poppendieck, Mary and Tom: Implementing Lean Software Development, Addision-Wesley, 2007.
- Pyzdek, Thomas and Keller, Paul A.: The Six Sigma Handbook, Third Edition. New York, NY: McGraw-Hill, 2009.
- Yacoub, Sherif M. and Ammar, Hany H.: Pattern-Oriented Analysis and Design: Composing Patterns to Design Software Systems, 2003.
- Herzum, P. and Sims, O.: Business Component Factory: A Comprehensive Overview of Component-Based Development for the Enterprise. OMG Press, John Wiley & Sons, 2000.
- Dahm, Markus H./ Mohos, Csaba: Lean Six Sigma in IT Management: Enhancing Quality and Productivity, Erich Schmidt Verlag, 2012
- Slama, Drik/ Puhlmann, Frank/ Morrish, Jim/ Bhatnagar, Rishi: Enterprise IoT: Strategies and Best Practices for Connected Products and Services, O'Reilly, 2015
- Voulgaris, Zacharias: Data Scientist: The Definitive Guide to Becoming a Data Scientist, Technics Publications, 2014

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Thanks for your attention!

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Business Information Systems

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Anwendungsentwicklung und Medieninformatik