Master Software Technology

Software Project Management 2 – [01] Introduction, Motivation & Basic Terminology

Bloom's Taxonomy Verbs
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Learning Goals

- ✓ Explain the term Project Management
- ✓ Name project characteristics
- ✓ Give project examples
- ✓ Explain the project management „magic" triangle, phases and control loop, and relate it to operations management
- ✓ Motivate how software projects and their management differ from conventional
- ✓ Explain skill requirements to software project managers
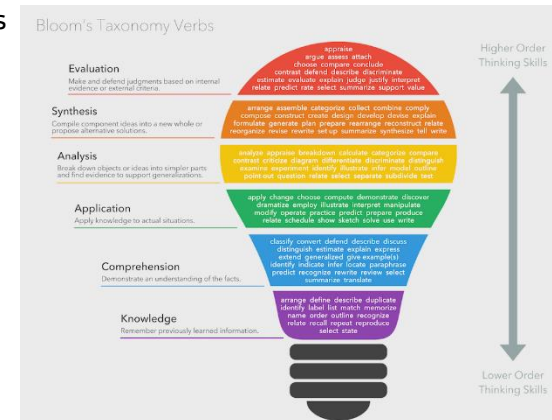
Agenda

Motivation *Software Project Management*

Your previous experience?

Classical and current projects

<mark>Basic Terminology</mark>: characteristics and definitions of projects

Approaches and kinds of projects

Examples of failures

– "case study" toll collect

<mark>Software projects: in how far are they special?</mark>

<mark>Further basic terminology</mark>

– (software) project management

– magic triangle of project management

– phases of a project

– software development process

– project management control loop

Conclusions

Your previous experience & expectations

➢your experience
– projects in daily life
– ...
– (software) projects at university
– programming languages
– SW engineering methods
– Bachelor thesis
– ...
– in some company/student job/…
– ...
➢your expectations

Project: Definitions

➢ "A project is a temporary endeavor undertaken to create a unique product, service, or result."

source: A Guide to the Project Management
Body of Knowledge, PMI, 2009

➢ "[…] a unique endeavor, essentially characterised by its unique composition of constraints, e.g.,
– objectives
– restrictions with respect to time, finance and staff
– different from any other project
– organisation specific for the project"

source: German DIN 69901

no project
– routine work
– standard tasks, completely tackled by one person of staff „in line"

Project **Characteristics**
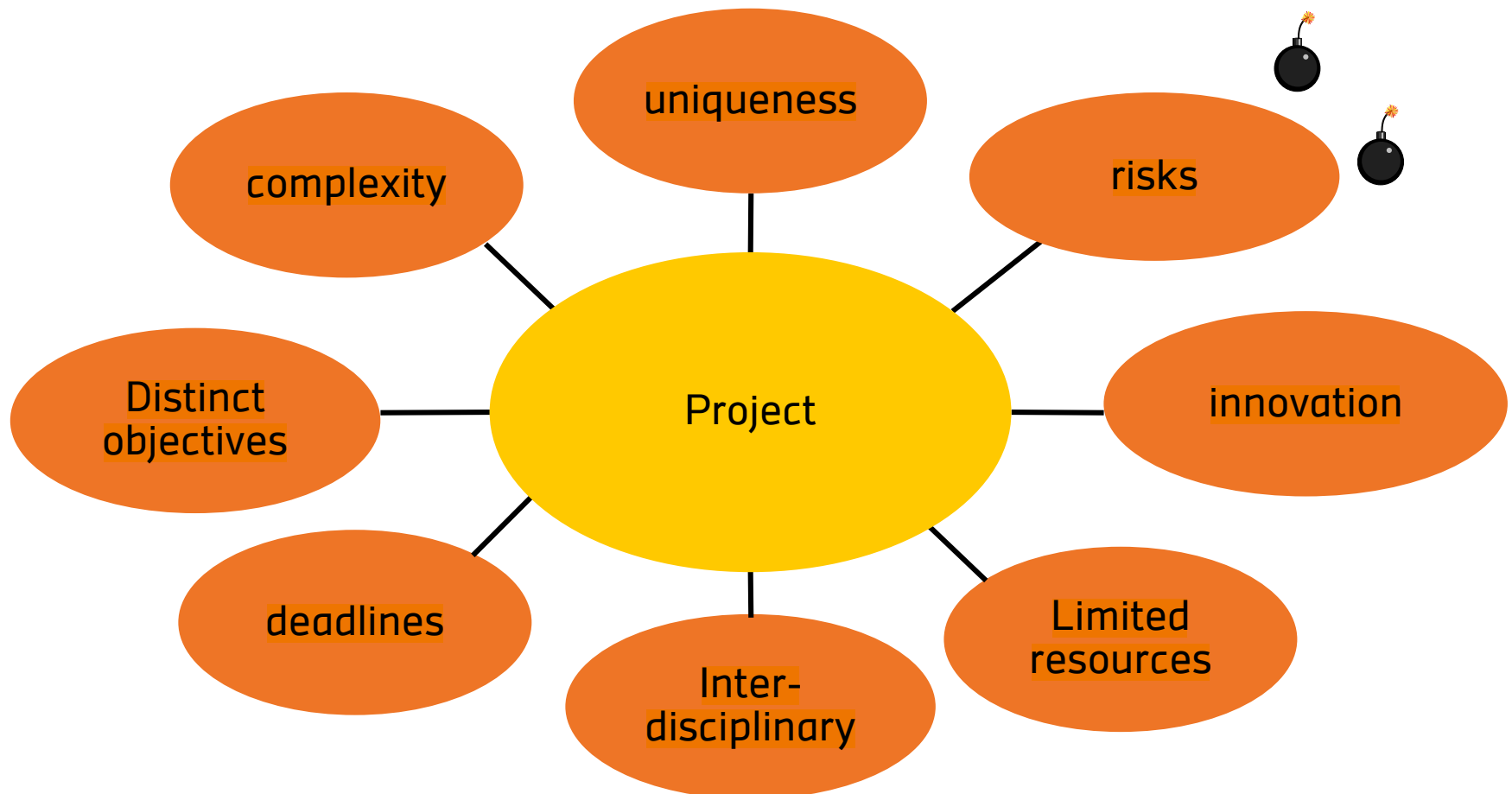
Well known examples of „classical" projects

Egyptian pyramids (2550 – 1550 B.C.); e.g., Cheops

– 146 m high, 2.3 Mio. stones

– 20 years building, some 100,000 workers/slaves
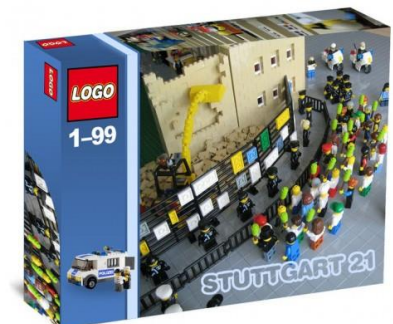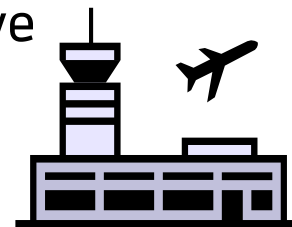
Tower of Babylon (600 B.C.)

– Stairway to heaven

– failure: confusion due to languages

First Man on the Moon (1969)

– Apollo program (1968 – 1972)

– stepwise implementation of the objective

– 2,000 Institutions and companies

– 300,000 people involved

– US $ 25 Bn

Moving the Munich Airport (1992)

– „Erdinger Migration" / „Big bang"

Encarta Enzyklopädie, Giraudon/Bridgeman Art Library, London/New York

Encarta Enzyklopädie, NASA/Science Source/Photo Researchers, Inc.

Current Project Examples

Construction Projects

- Gotthardt Base Tunnel
- Elbphilharmonie
- Stuttgart21
- new Berlin Airport BER (details see further slides)

IT-related Projects

- 1983: F-18 Aircraft turns upside down passing the equator due to sign error
- 1996: Ariane 5 rocket explodes shortly after start due to navigation system error
- 1999: NASA Mars orbiter fails shortly before final destination due to unit error (cm-inch) in ground control station software
- Voyager: great success transmitting data long after planned EOM
- Toll Collect
- German Fiscal Authorities: Fiscus
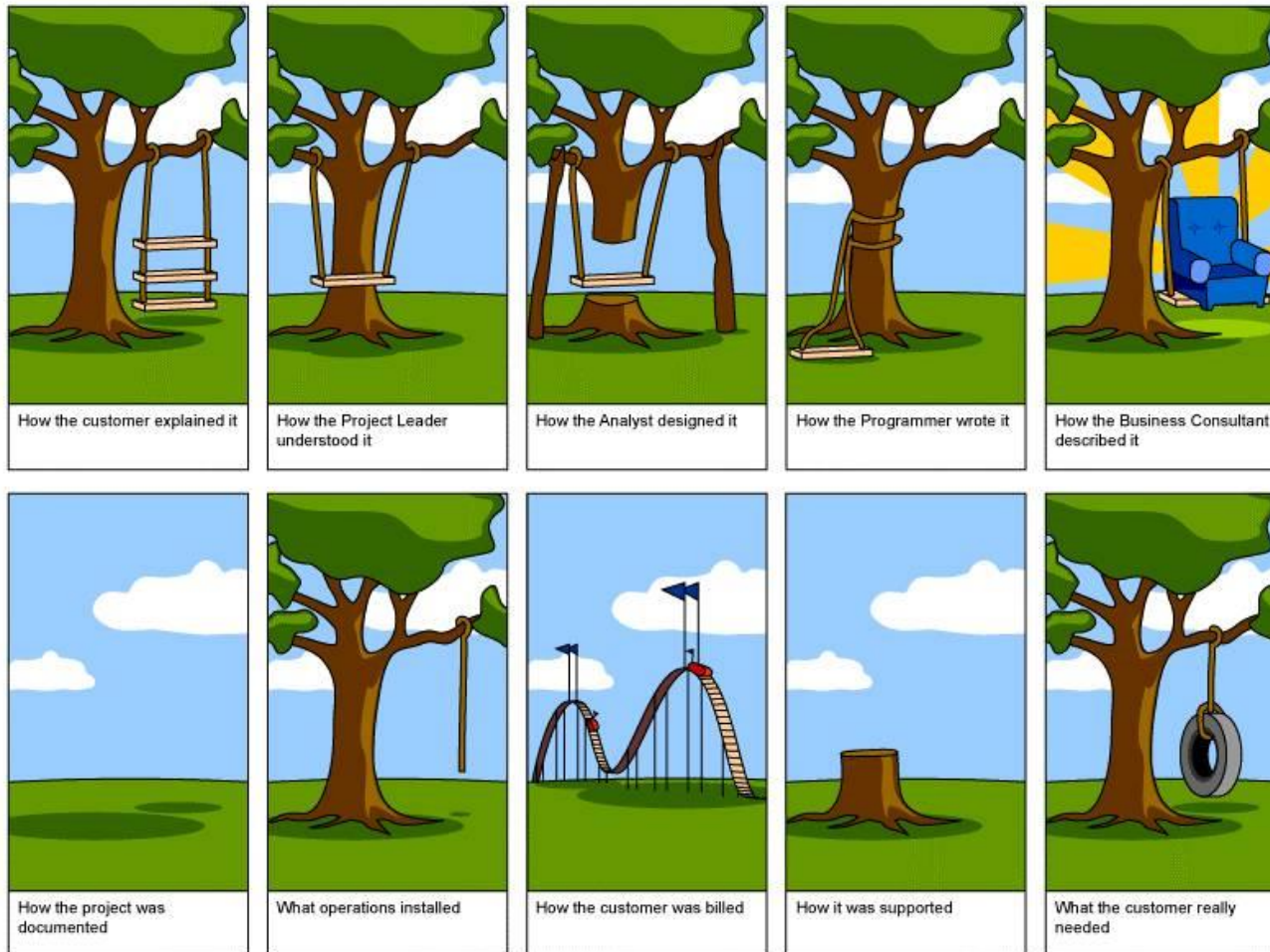- Bundesagentur für Arbeit: Robaso (details see further slides)

Exercise questions
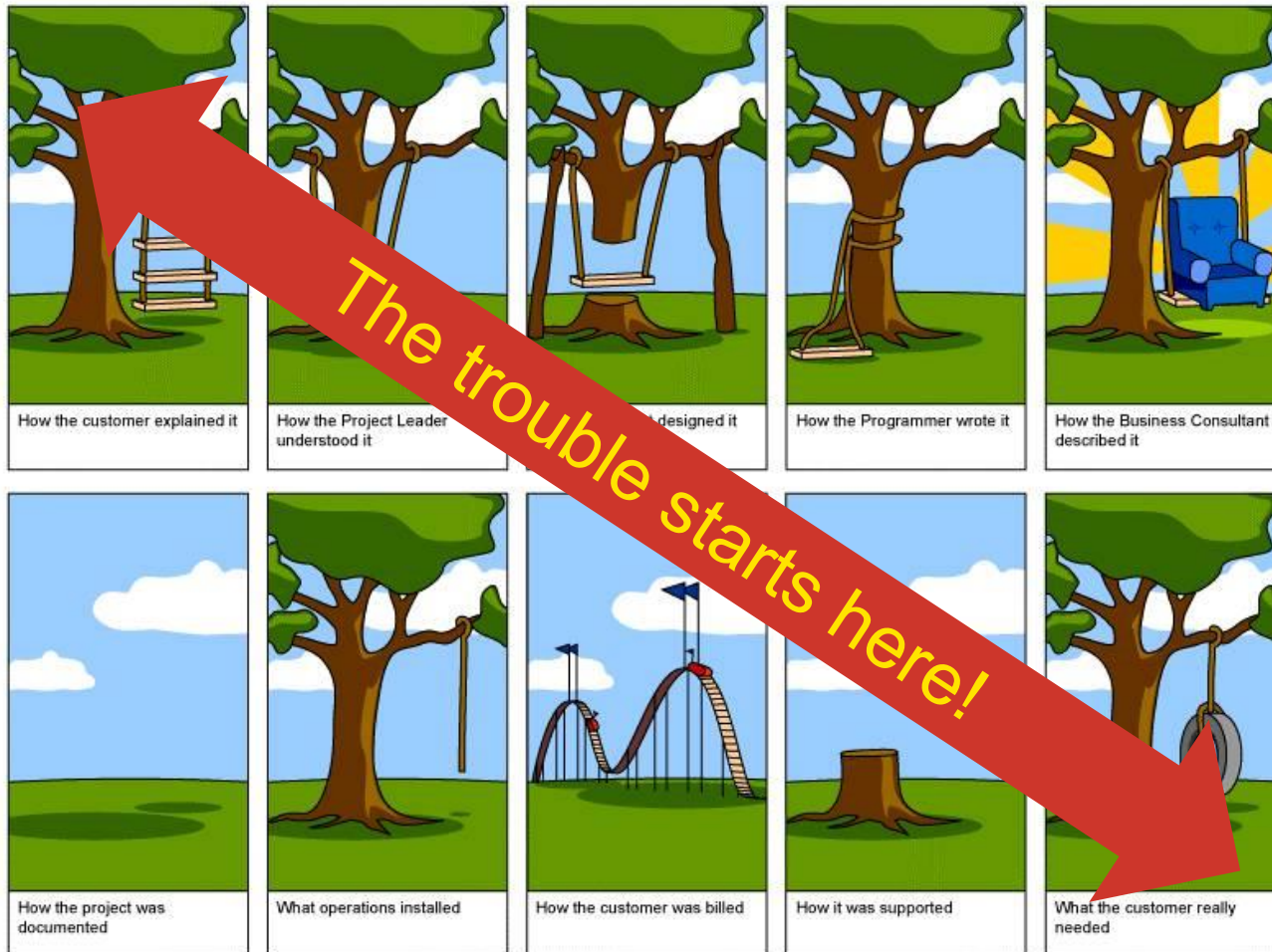
Master thesis: is it a project?

Also decide for these examples:
- designing a new car:
- manufacturing the new model:
- optimizing air conditioning:
- running a server:
- developing the new server concept:

A typical **software** project

A typical software project

Software projects ARE special

Sensitivity
- Strategic Relevance
- Company-wide purpose
- Conflicting interests: management, users, project team
- Conflict Time, Security, Quality
- Conflicts of IT-Projects with the core business
- Distributed, specialist teams

Virtuality
- Results, expectations
- Goals
- Estimations
- Measuring progress

Variability
- Business & project goals, priorities
- Market
- Technology
- People

Based on: http://www.ikmt.de/public/homepage.htm#de/service/management-forum.htm#showthread.php@&tid=334&pid=#p
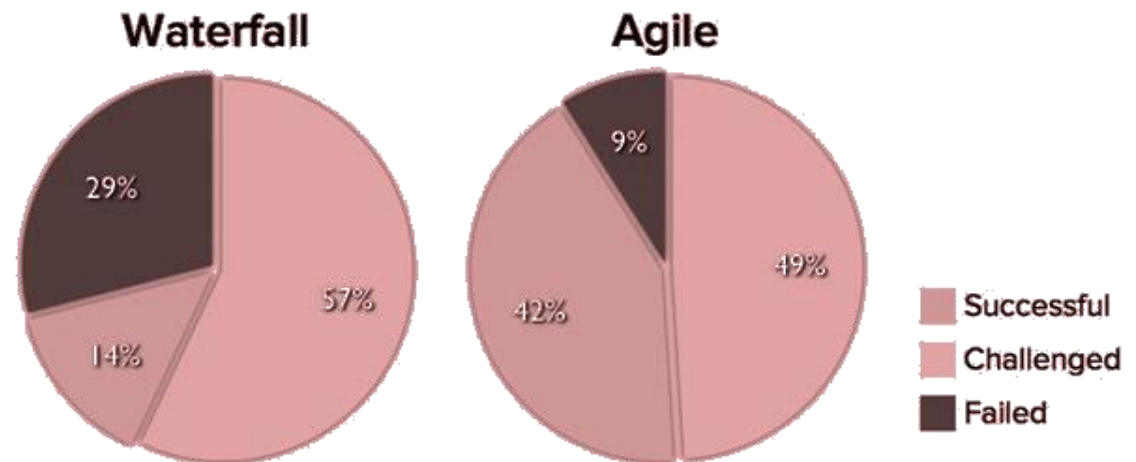
Software projects: empirical studies

Succeeded:
– on time,
– on budget,
– all features originally specified

„challenged": project completed, but
– over time,
– over budget,
– less functionality

Failed:
– cancelled before completion,
– never implemented

Waterfall

29%
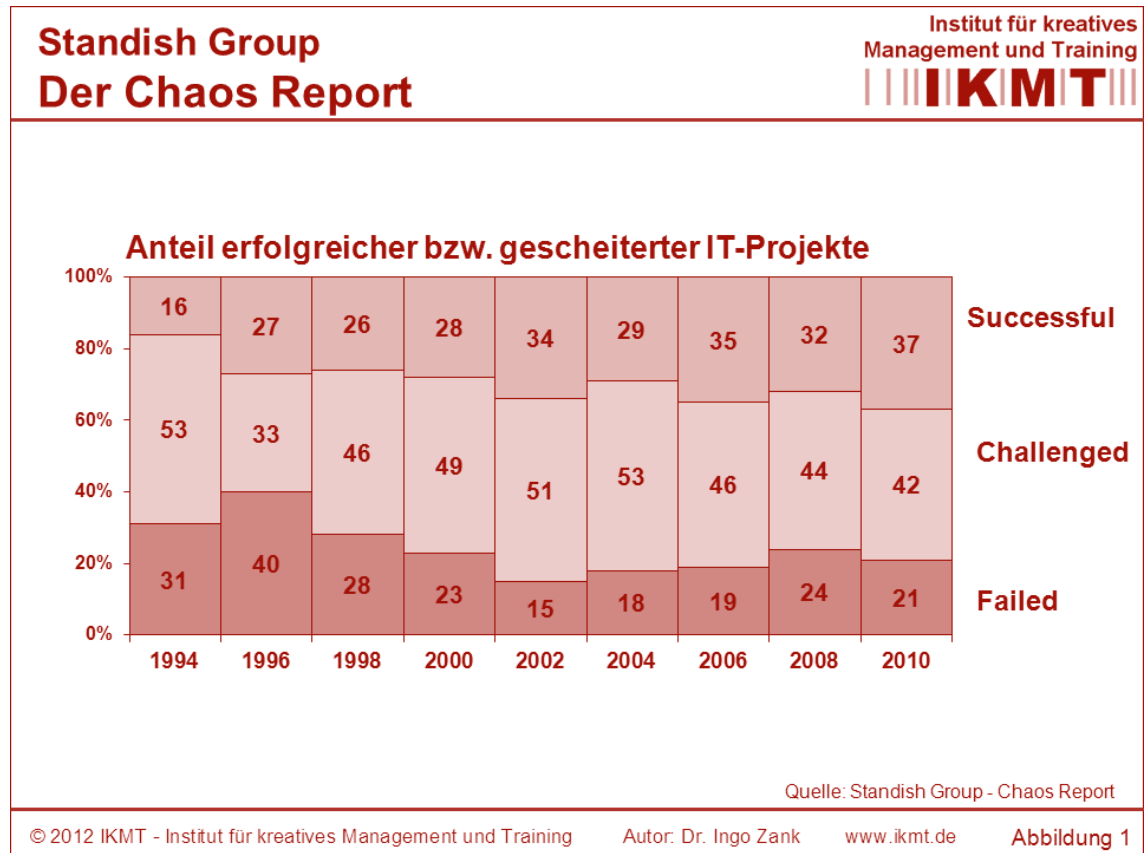14%
57%

Agile

9%
42%
49%

Successful
Challenged
Failed

Source: The CHAOS Manifesto, The Standish Group, 2012.

Software Projects: „increasingly successful"

Based on 30,000 application projects in US companies of all sizes since 1994

**Standish Group
Der Chaos Report**

Institut für kreatives
Management und Training
||I|K|M|T||I

Anteil erfolgreicher bzw. gescheiterter IT-Projekte

	1994	1996	1998	2000	2002	2004	2006	2008	2010	
Successful	16	27	26	28	34	29	35	32	37	
Challenged	53	33	46	49	51	53	46	44	42	
Failed	31	40	28	23	15	18	19	24	21	

Quelle: Standish Group - Chaos Report

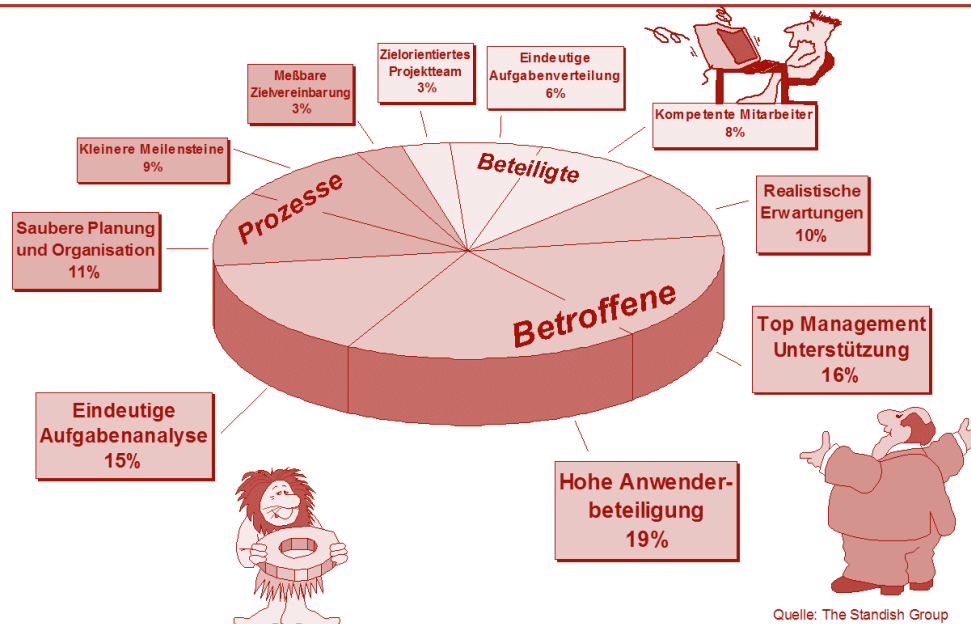© 2012 IKMT - Institut für kreatives Management und Training   Autor: Dr. Ingo Zank   www.ikmt.de   Abbildung 1

source: Standish Group,
quoted from http://www.ikmt.de/public/homepage.htm#de/service/management-forum.htm#showthread.php@&tid=334&pid=#pid

Software projects: <mark>factors for success</mark>

Schlüsselfaktoren für Projekterfolg

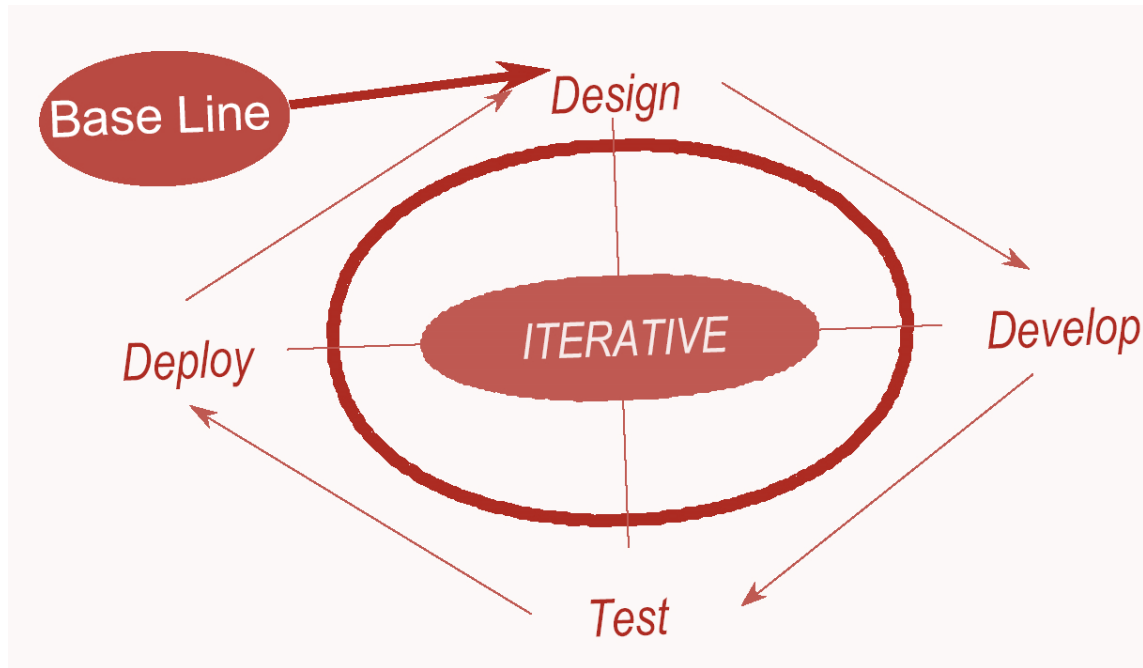Institut für kreatives
Management und Training
IIIIKMTIII

some observations:

– factors change over time

– previous study: user <mark>involvement most important factor</mark>

– 2003 (see next slide): user involvement again most important

– people do (not) learn?!?

source: Standish Group,
quoted from http://www.ikmt.de/public/homepage.htm#de/service/management-forum.htm#showthread.php@&tid=334&pid=#pid

Software projects: „formula for success"

source: Standish Group

important:

- Focus on important things, especially in the beginning
- Incremental/ iterative approach

Project Management

leading

– Goal setting
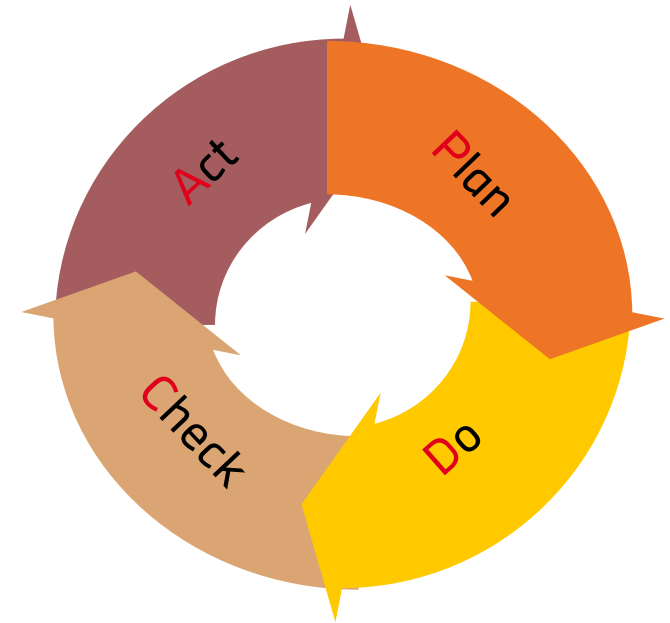– Leading and managing people
– Control and supervision

organisation

– Project organisation
– Project supervision

techniques

– Motivate team members
– Meetings and presentations
– decision-making

means for guiding

– Project management, control and supervision
(work packages, capacities, deadlines and milestones, costs)

Basic questions:
➢ What do we have to do?
➢ Who does it?
➢ How do we do it?

Project vs. Process Management

Managing projects	Managing routine processes
	operations
	Organisational focus
	No deadline
	Job index (for general business)
	Output oriented
	General work load
	Standard staff
	„monotonous"
	More secure

Different kinds of projects → different management approaches

==research projects==
– objectives only roughly defined
– „pioneering projects", subject to frequent parameter changes

==planning projects== (feasibility study)
– objective: study and concept for subsequent large project
– testing feasibility and economic efficiency

==development projects==
– objective clearly defined: new product
– time to market very important

==organisational and implementation projects==
– reorganising job index and processes
– objective: more efficient business processes

==rollout projects (in large enterprises)==
– objective: introducing a new application or technology for the whole enterprise after a successful pilot test

Software Project Management

Do you agree with the following statements?

Is there a need for distinctions?

Is *Software* Project Management "special"?

- ➢ (software) product is intangible
- ➢ (software) product is uniquely flexible
- ➢ software engineering is not recognized as an *engineering* discipline as much as others
  - • e.g. with the same status as mechanical or electrical engineering
- ➢ The software development process is not standardized (there is no single process model).
- ➢ Most software projects are one-off projects.

Software Project Managers' 34 compentencies (Futrell et al. 2002)

Software (Product)	Project	Management
1) Assessing processes	12) Building a work breakdown structure	23) Appraising performance
2) Awareness of process standards	13) Documenting plans	24) Handling intellectual property
3) Defining the product	14) Estimating cost	25) Effective meetings
4) Evaluating alternative processes	15) Estimating effort	26) Interaction & communication
5) Managing requirements	16) Managing risks	27) Leadership
6) Managing subcontractors	17) Monitoring development	28) Managing change
7) Performing initial assessment	18) Scheduling	29) Negotiating
8) Selecting methods & tools	19) Selecting project management tools	30) Planning careers
9) Tailoring processes	20) Tracking processes	31) Presenting
10) Tracking quality	21) Tracking project progress	32) Recruiting
11) Understanding development activities		33) Selecting a team
		34) Teambuilding

Software Project Managers' compentencies systematized

<table>
<tr><td>Software (Product)</td><td>Project</td><td>Management</td></tr>
<tr><td>

1) Processes (standards awareness, assessment, tailoring, evaluating alternatives, understanding developemnt)
2) Defining the product
3) Managing requirements
4) Managing subcontractors
5) Tracking quality
6) Selecting methods & tools

</td><td>

7) Building (work breakdown structure, plans)
8) Estimating (effort, cost)
9) Scheduling
10) Monitoring (processes, development, project progress)
11) Managing risks
12) Selecting project management tools

</td><td>

13) Leadership
14) Team management (Recruiting, selecting building, performance appraisal, careers planning)
15) Effective interaction & communication, presentations, meetings, negotiations
16) Managing change
17) Handling intellectual property

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The Project Management „Magic" Triangle/Square

Quality

Time

Budget

Scope
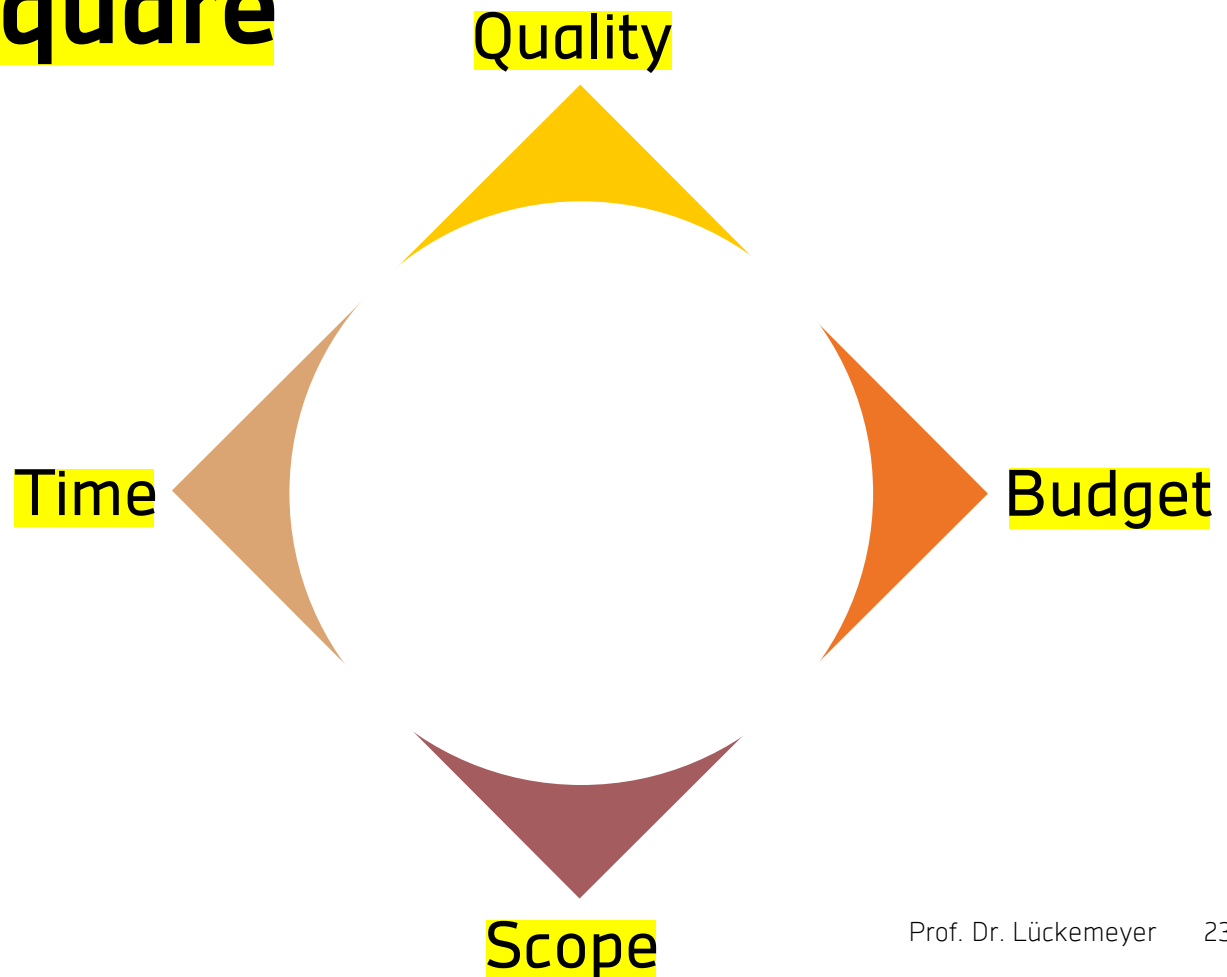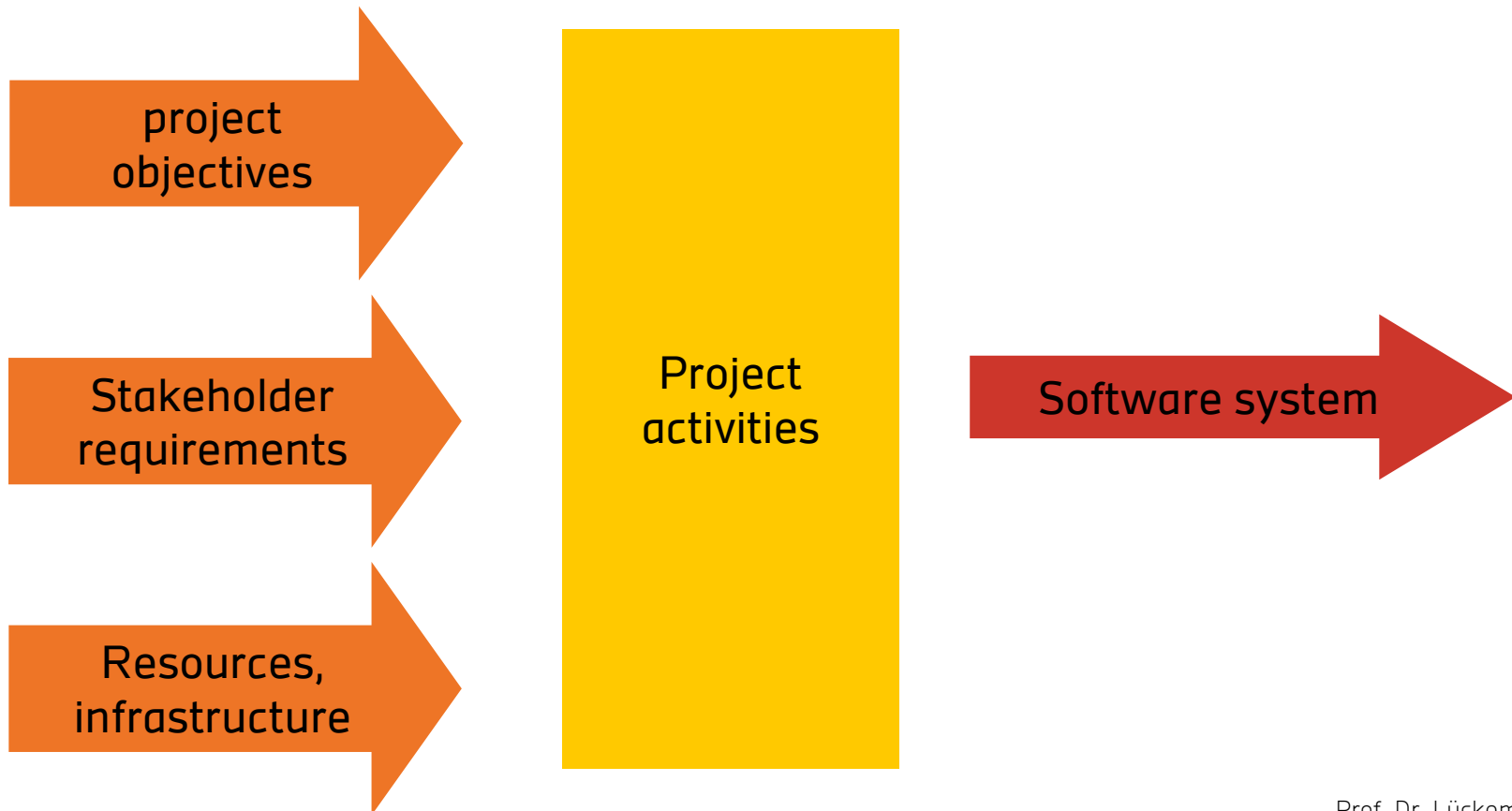
Project phases

project phases

- comprise tasks that follow a certain timing
- have certain logical dependencies
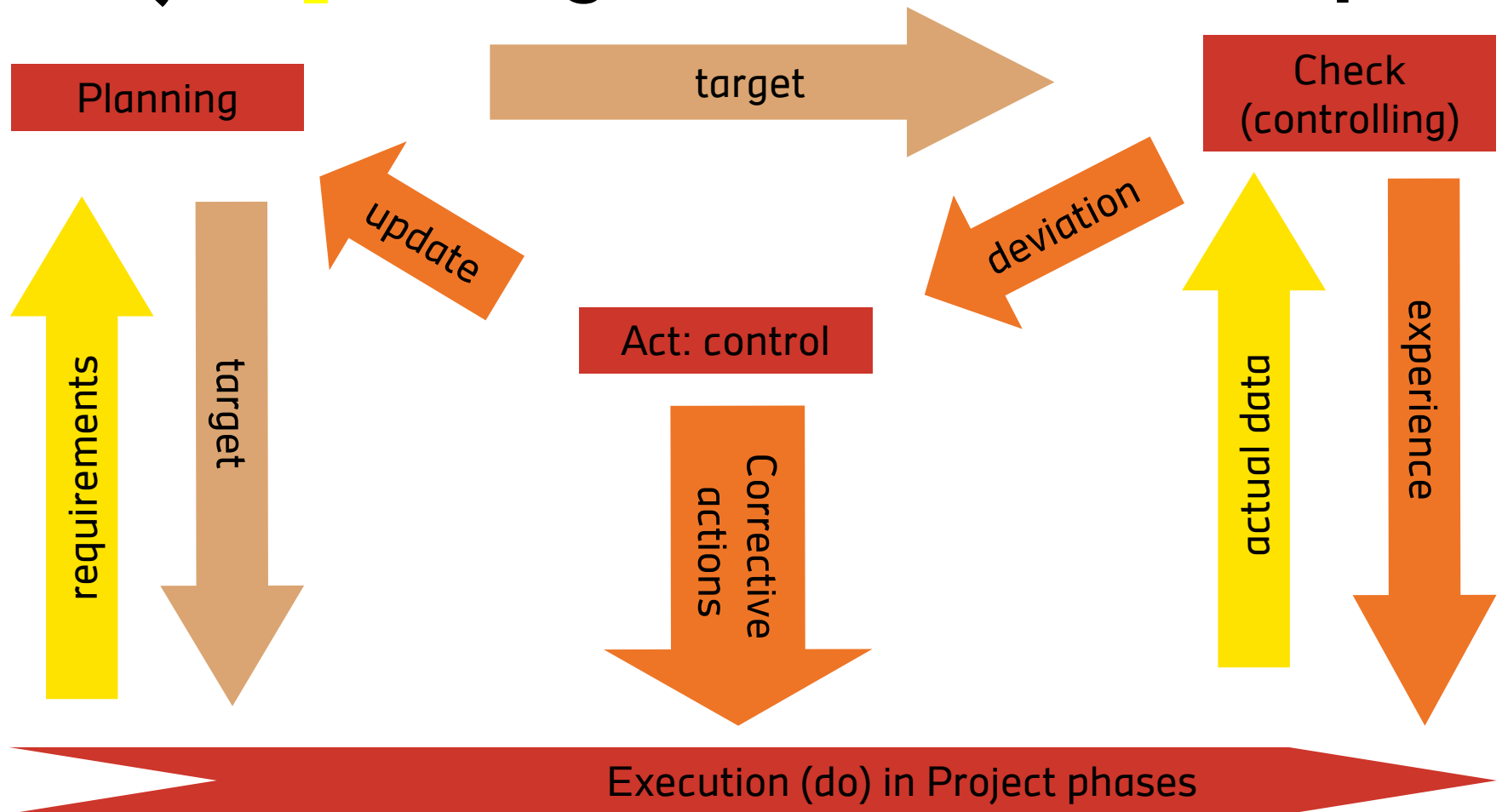
typical phases along the time axis:

1. Feasibility study   →   Go/No-Go-Decision
2. Analysis
3. Design
4. Implementation
5. Test
6. Acceptance -> payment!
7. Project closure (includes feedback, lessons learned)

time ↓

Software development process Input/Output view

Project management control loop

Case Study: airport BER

Currently estimated 6.5 bn € total construction cost, opening 2018

Cost rose from etimated 2 bn € at project start in 2006
Scheduled finish date at project start: 2011, rescheduled four times since

Reasons:
– Scope:
  – unfinished planning when opening the public project bidding process
  – Changed massively during construction: 2nd Airbus A380 gate, more shopping area
  – Scheduled further extension for after finish

Case Study: airport BER

Stakeholders:
- Politics
  - Strong representation in Supervisors' Board: federal & Berlin & Brandenburg state government
  - Strong influence on scope (changes see previous slide)
  - Strong influence on process
    - No general construction subcontractor to save money
    - Planning contractor (successor to architects) fired in 2013
    - Pressure to cut into very many small tasks to employ small Brandenburg based companies
  - Strong influence on staff
    - Management changed three times, fourth change to politician this month!

Case Study: airport BER

Stakeholder:
- Management
  - Supervisors' Board staffed with large share of politicians
  - Bad cooperation between Executive & Supervisors' Board
  - Personal frictions
  - Mismanagement
  - Corruption
- Externals
  - Protests against pollution, noise and for environmental protection

BER: chronicle of disaster

2003 Politics fail to acquire private consortium, decision to build publicly

2004 Permission to build airport @ existing Schönefeld site with additional requirements: own planning by three companies, small work packages, planned cost: 1.7 bn €

2006 start of construction, scheduled completion 2011

2008 construction of two additional wings for larger capacity raises cost to 2.2 bn €

2010 planning company files for bancrupcy, opening delayed to 2012

2012 flight routes announced, new noise protection requirements due to protests

2012 € 2.5m interim check-in hall torn down

2012 problems with fire protection, main planners and Chief Technical Officer (CTO) fired, opening delayed to 2013

2012 new CTO suggests systematic defects audit and new opening date 2013, costs estimated 4.3 bn €

2013 opening delayed indefinitely due to fire protection problems, dependency on single subcontractor that filed for bancrupcy, CEO fired, Supervisors' Board leader changed

2013 after frictions between new CEO and CTO, CTO fired with 40,000+ defects listed

2014 test operations in one wing cancelled due to lack of supervisors' support for CEO

2014 moving operations temporarily to southern runway allowed only after completing additional noise protection

2014 CEO fires Chief Planning Officer

2014 corruption in the BER management: fire protection supervisor fired

2014 companies demand an additional 1 bn € as costs were calculated improperly. Esitmated cost 5.4 bn €.

2014 fire protection planner turns out a technical drawer instead of an engineer

2014 no bids on a Europe-wide planning offer

2014 new opening: end of 2017

2015 stop of construction works enforced as main hall may collapse

2015 new Chief of Supervisors' Board

2015 new CEO after predecessor differences with Supervisors' Board

2016 CEO fires CTO

2017 Supervisors' Board fires CEO and re-hires CTO, new political CEO To be continued...

Time

Case Study 2: BfA RoBasO (Rollenbasierte Oberflächen)

Goal: integrate 14 applications in a single platform

Planned 2009, Started 2010

Established development method, used in previous large projects

„Lab" Phase with factual tests

Up to 500 developers

2013 risk management supported by external contractors

Pilot test from Oct. 2015

Feb. 2016: feedback reveals RoBasO too inflexible, change use cases overlooked

Cancelled Feb. 2017 after € 60 mio. investment, 42 mio. to external service partners

Reasons: the many factual changes not economically feasible

→ agile method for re-start projected

Problematic Software Projects

Have you participated in or are you aware of any examples of "problematic" projects?
Within a single company:

‒   …

Among two or more companies:

‒   …

Public administrations:

‒   …

Questions? Questions!

THANK YOU VERY MUCH FOR YOUR ATTENTION!