

Enabling Key Competencies by Educational Project Work exemplified by Teamwork and Cooperation

Tobias Deigendesch
EPDE 2008
Barcelona, September 4-5 2008

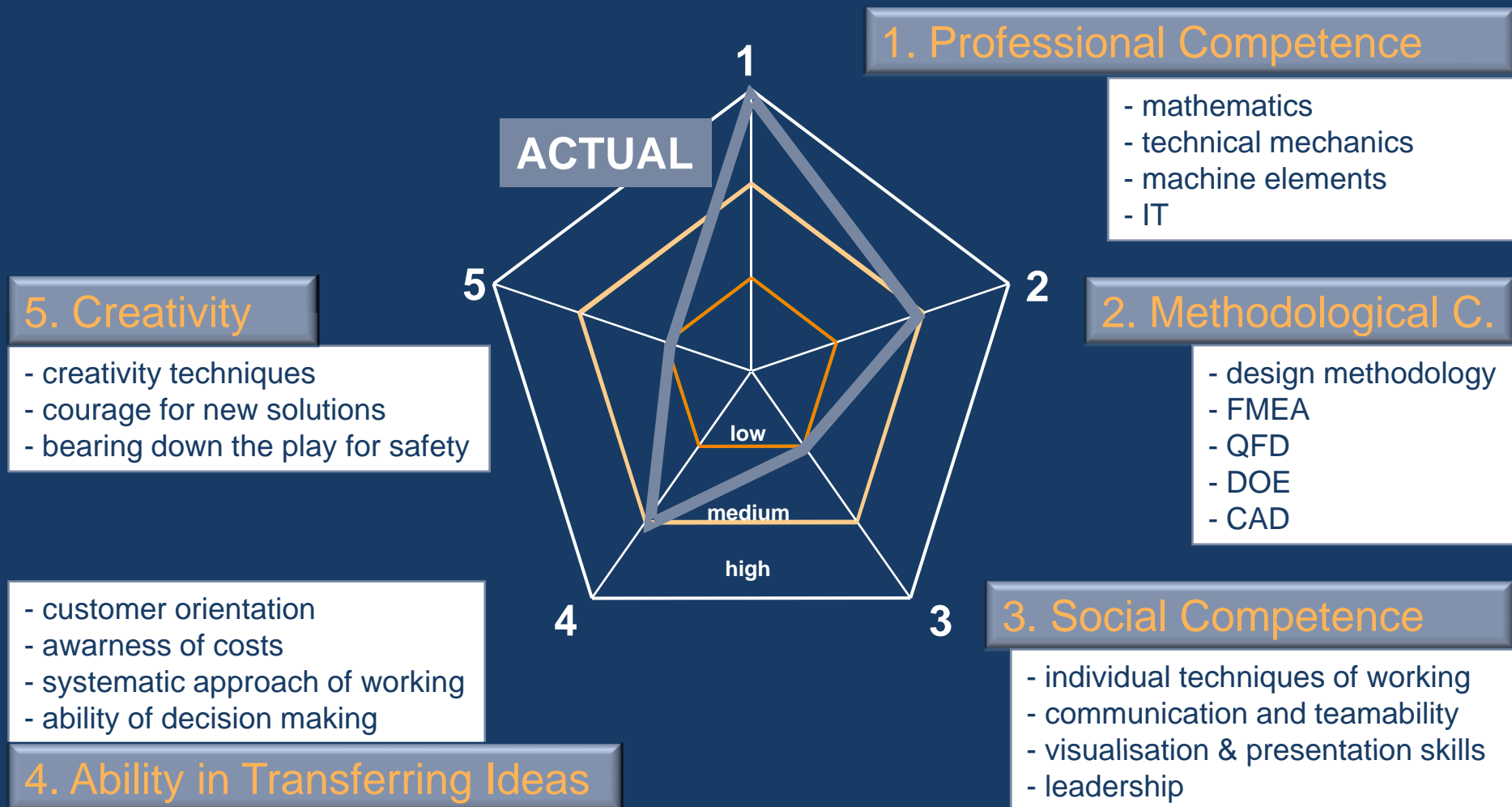
- Objectives of Product Development Education
- Karlsruhe Education Model for Product Development
- Undergraduate Studies: Machine Design
- Graduate Studies: Integrated Product Development
- Summary & Conclusion

Objectives

- Meet the middle of three different stake holders: students, industry, university
- Graduates as technical problem solvers
- Students: competence development according to “real world” requirements

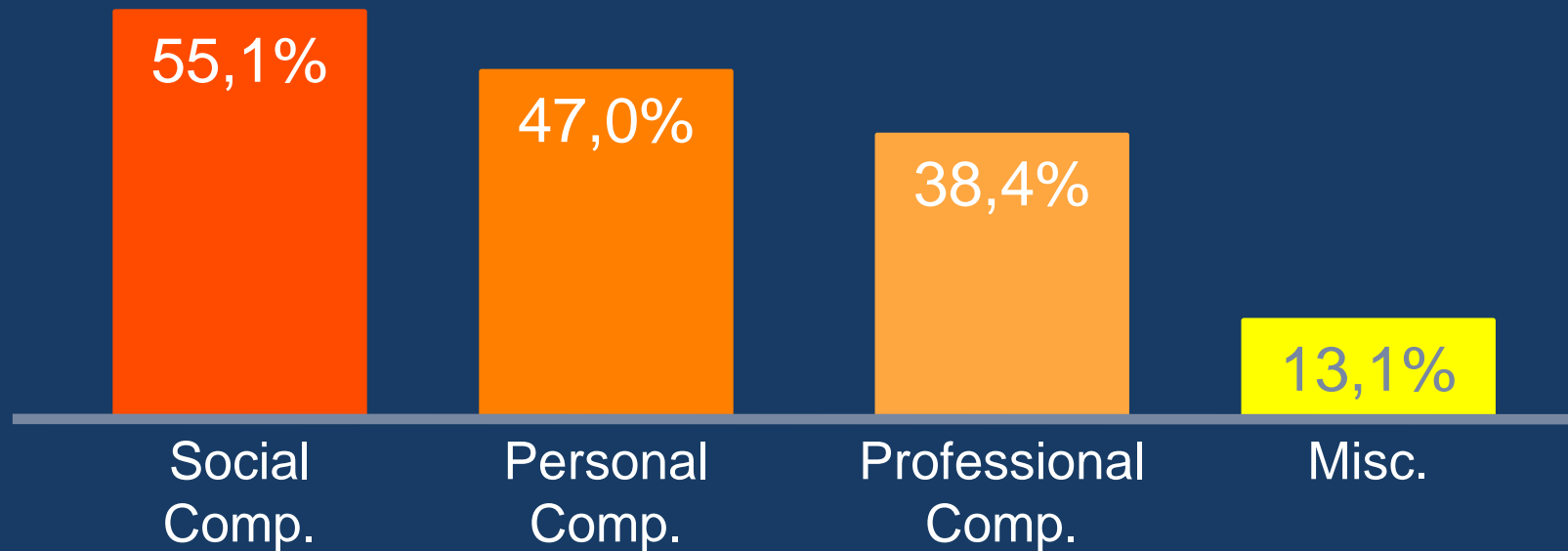
→ Primary Objective: Employability

Addressed Fields of Competence Development

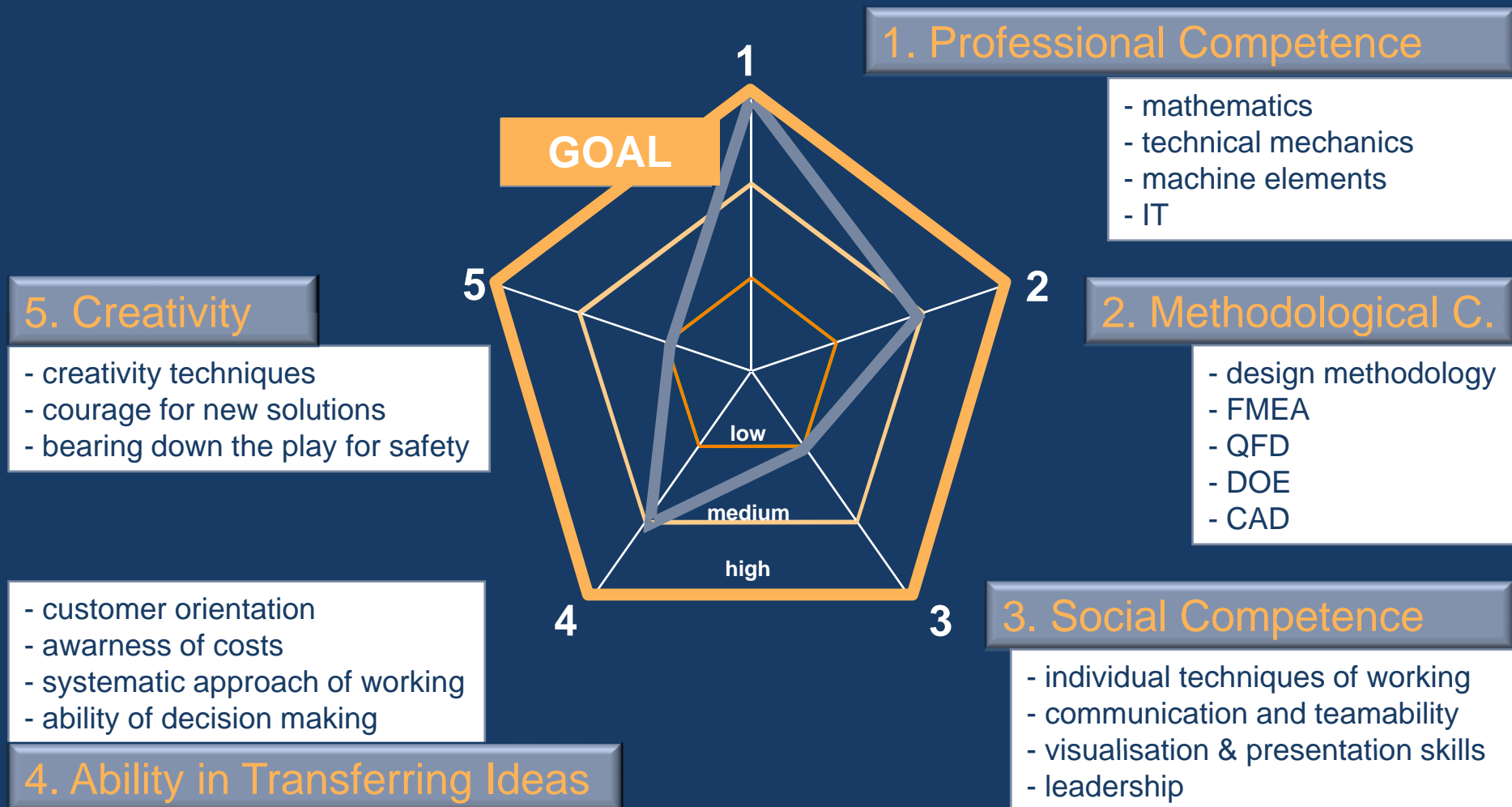


DIHK 2004: Expectations of the Industry Concerning Graduates

Which are the predominant deficiencies of applicants?



Addressed Fields of Competence Development



Three Elements of the KaLeP:

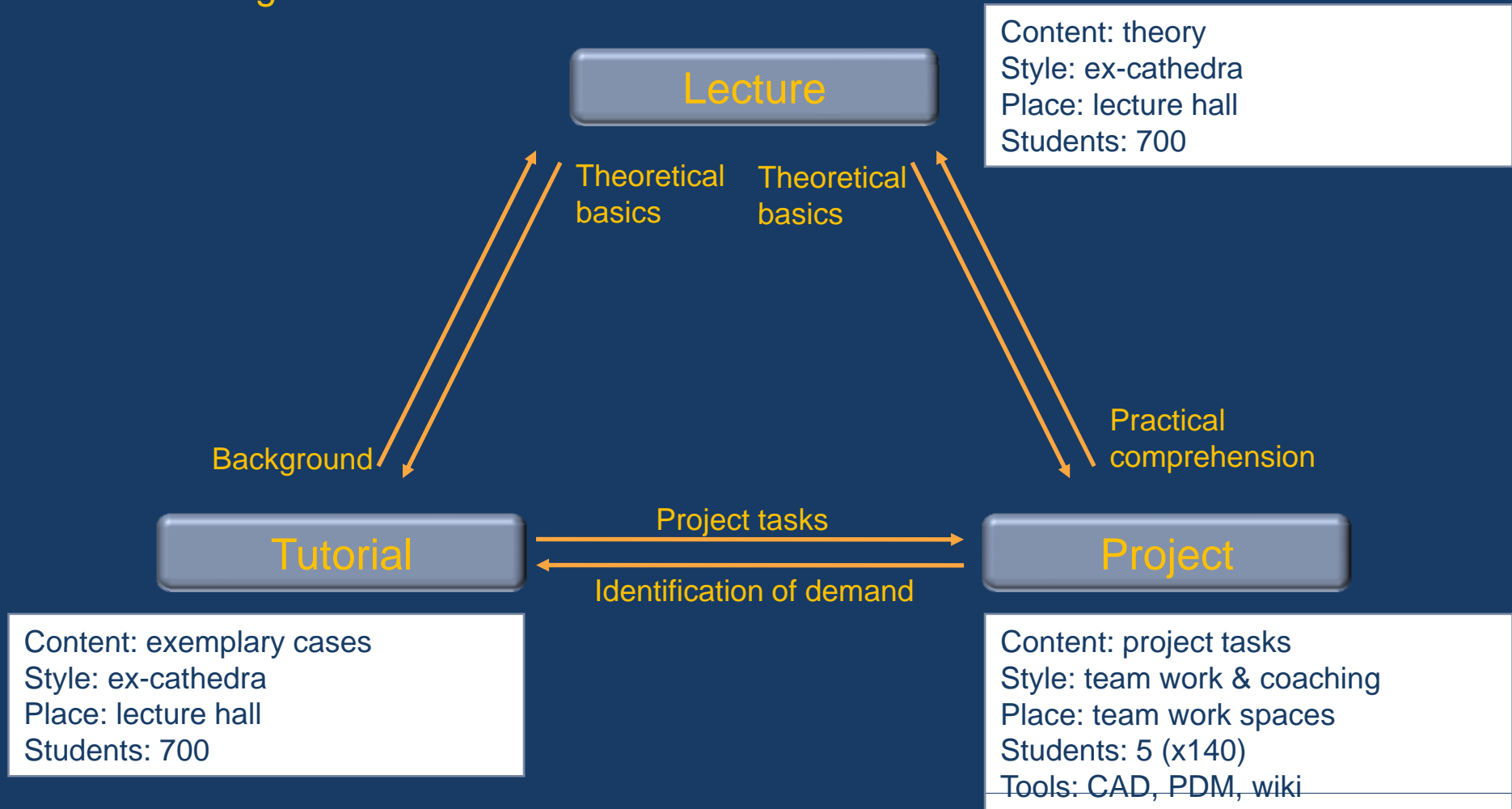
	Systems	Methods	Processes
Course Title	Machine Design	Methods of Product Development	Integrated Product Development
Settings	<ul style="list-style-type: none"> - Lecure - Tutorial - Project 	<ul style="list-style-type: none"> - Lecture - Tutorial 	<ul style="list-style-type: none"> - Lecture - Workshops - Project
Competence Acquisition	High	Medium	Very high
Course Contents	<ul style="list-style-type: none"> - team work - self organization - communication - idea transfer 	<ul style="list-style-type: none"> - Design methods - Creativity techniques 	<ul style="list-style-type: none"> - Team developm. - Team leading - Proj. management - Presentation
Number of Students	700	400	30
Curriculum	Bachelor	Bachelor	Master

Competence Development

- Professional Competence: Design machines (Synthesis*)
 - Machine elements (Analysis*)
 - Mechanics & material science (Application*)
 - Technical drawings (Evaluation*)
 - Design for X (Knowledge*)
- Methodological Competences
 - Dimensioning (Comprehension*)
 - Structural designing in CAD (Application*)
- Social Competences
 - Team work: Finding solutions together (Knowledge*)
- Ability of transferring ideas
 - Costs (Knowledge*)
 - How frustrating design can be... ☹️

*according Bloom's taxonomy

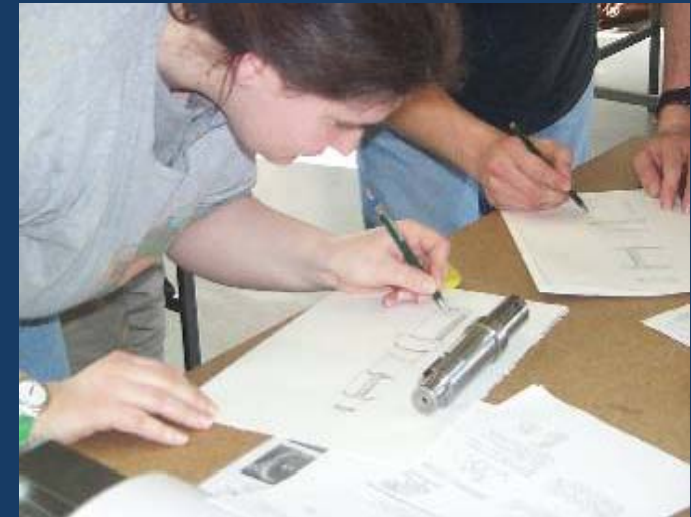
Course Settings



Undergraduate Studies: Machine Design



Analyzing
gear boxes



sketching



Project work



Design review

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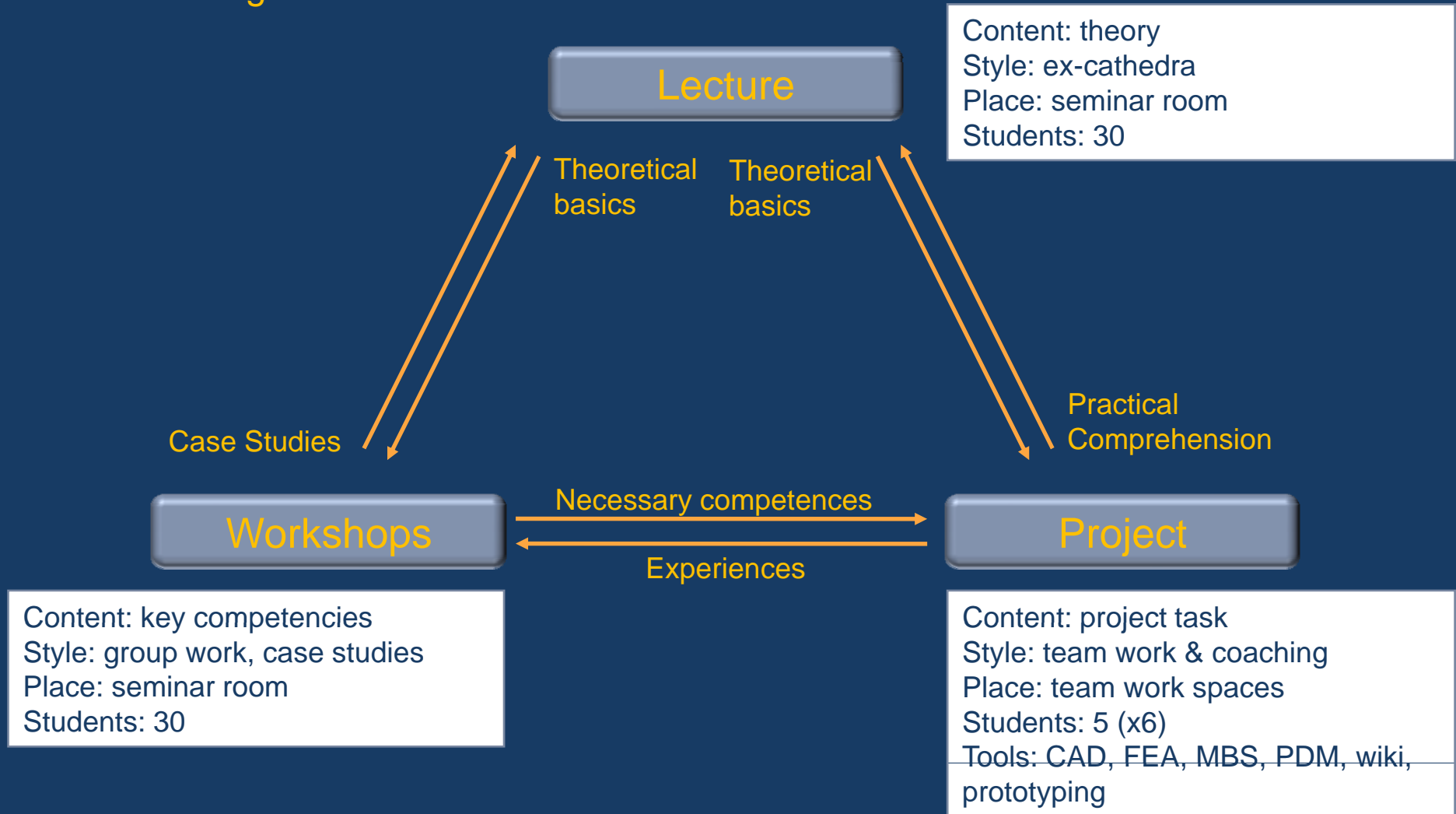
Competence Development

- Professional Competence:
 - Managing Product Development (Application)

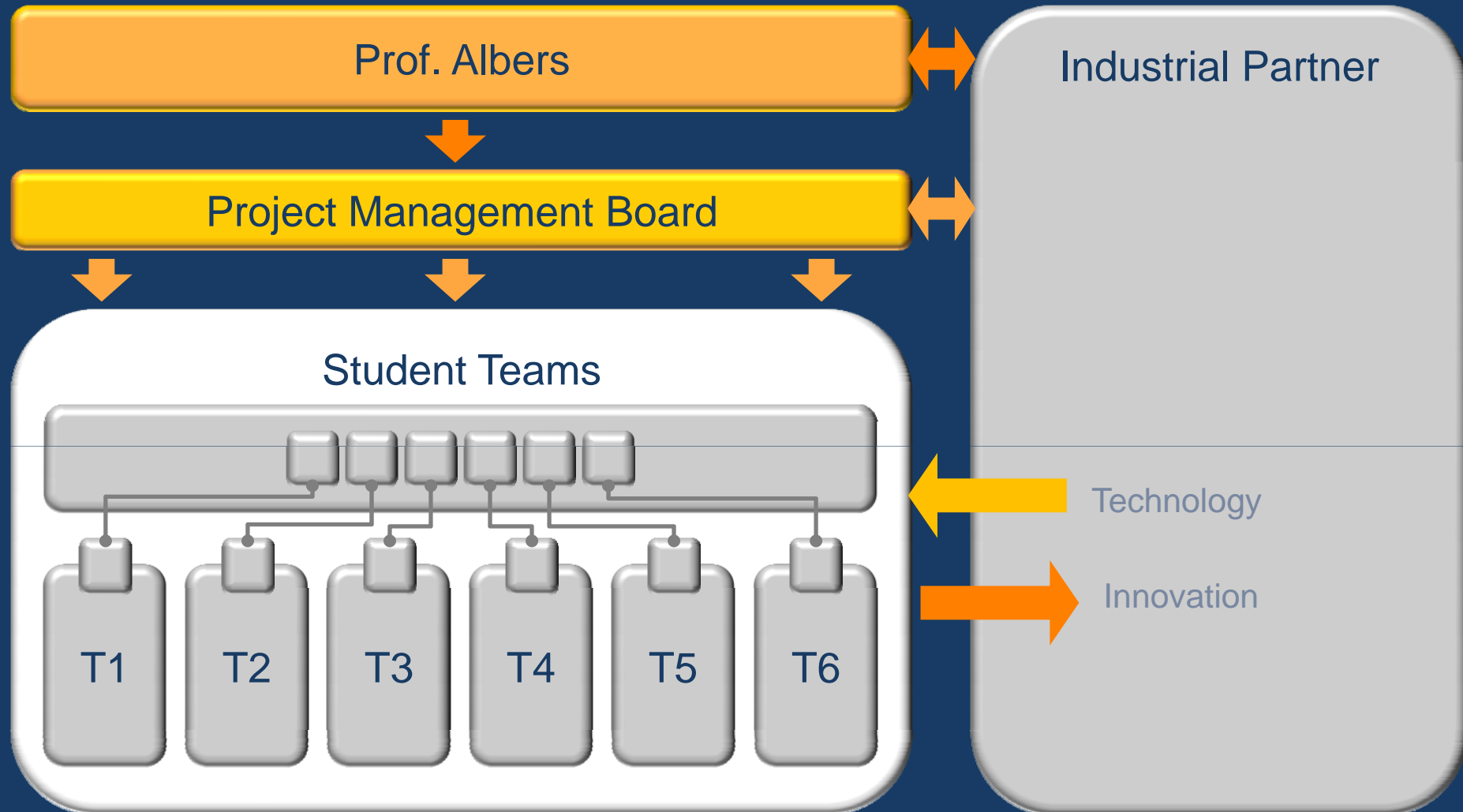
This requires (extract):

- Methodological Competences
 - System theory
 - Development process models
 - Problem solving processes
 - Idea & decision finding
- Social Competences
 - Team development
 - Team work
- Ability of transferring ideas
 - Customer orientation
 - Cost management
 - Frustration tolerance
 - Project management
- Creativity
 - Creativity techniques
 - Courage for proposing exceptional solutions

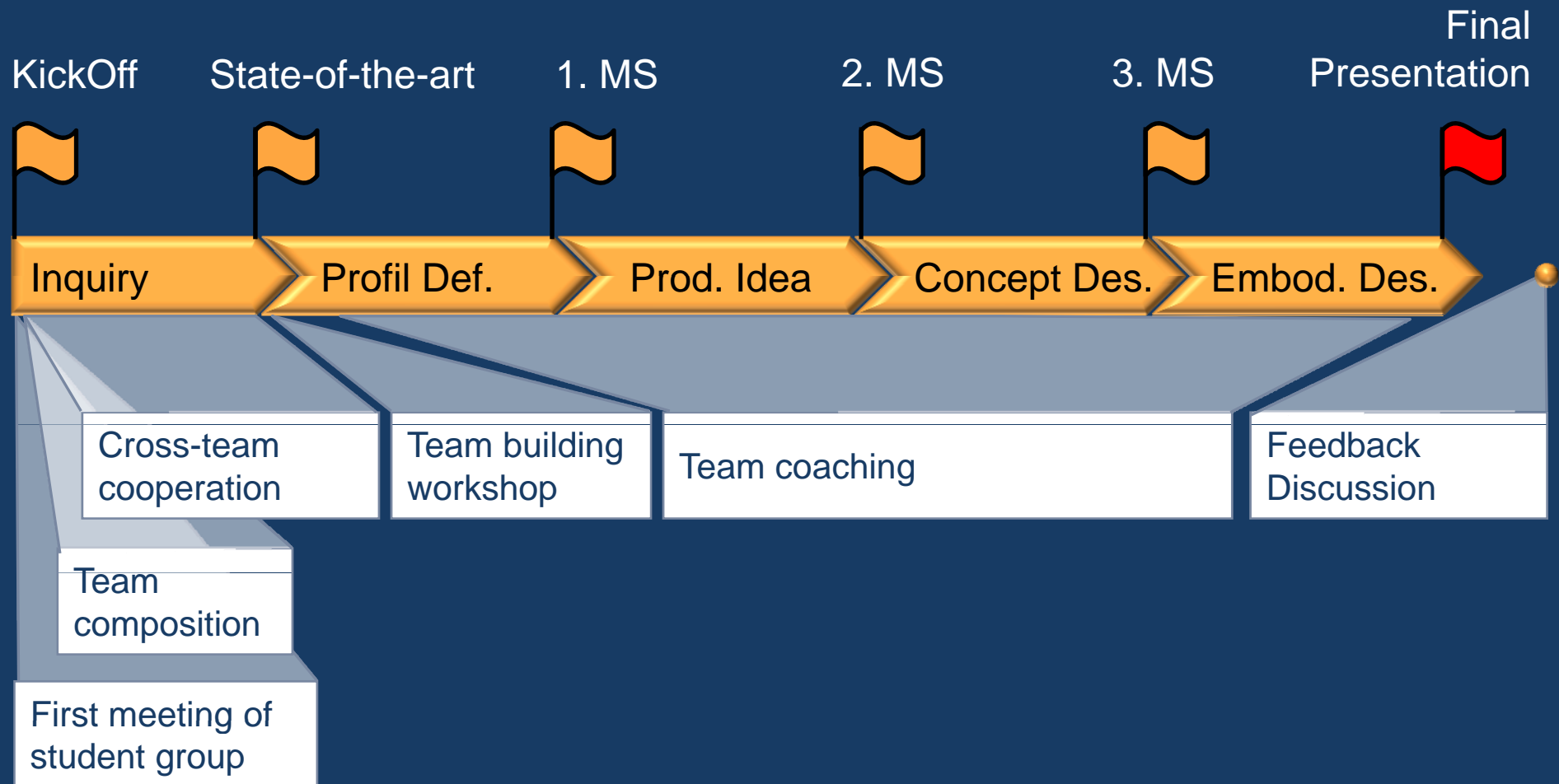
Course Settings



Project: Organizational Structure



Example: Team Development (time scale: 3 months)

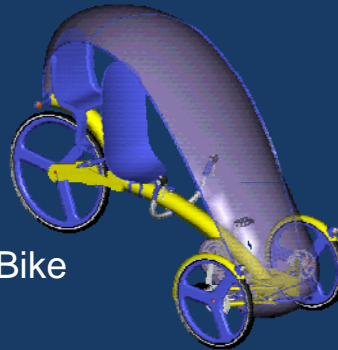


IP Project History

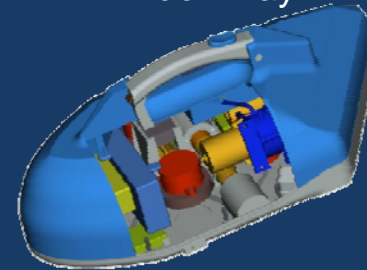
1997/98
Coffee Machine



1998/99
Campus-Bike



1999/2000
Window Fay



2000/01 Metabo
Projekt X

2001/02 SFB 588
KALIMERO



2002/03 SFB 499
 μ -ProFi



2003/04 STIHL
Greenkeeper



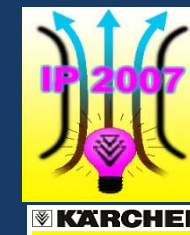
2004/05 LuK
Drivetrain 2015

2005/06 Freudenberg
Water Supply Systems



2007 Hilti
Drill Hammer

2007 Kärcher
UV-Water
Sterilization



2008 Blanco
Kitchen Sinks

Objective:

- Competence Development
- Employability

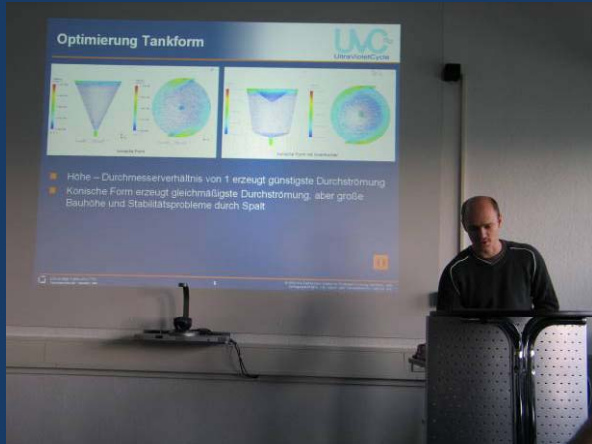
Approach:

- Problem-based learning
- Company-like structure
- Process organization: Project character
- Team work
- Real cases from industry partners
- Intense coaching & feedback

Evaluation:

Feedback of students, former students and our industry partners make us confident to have an appropriate and promising teaching approach.

Impressions



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