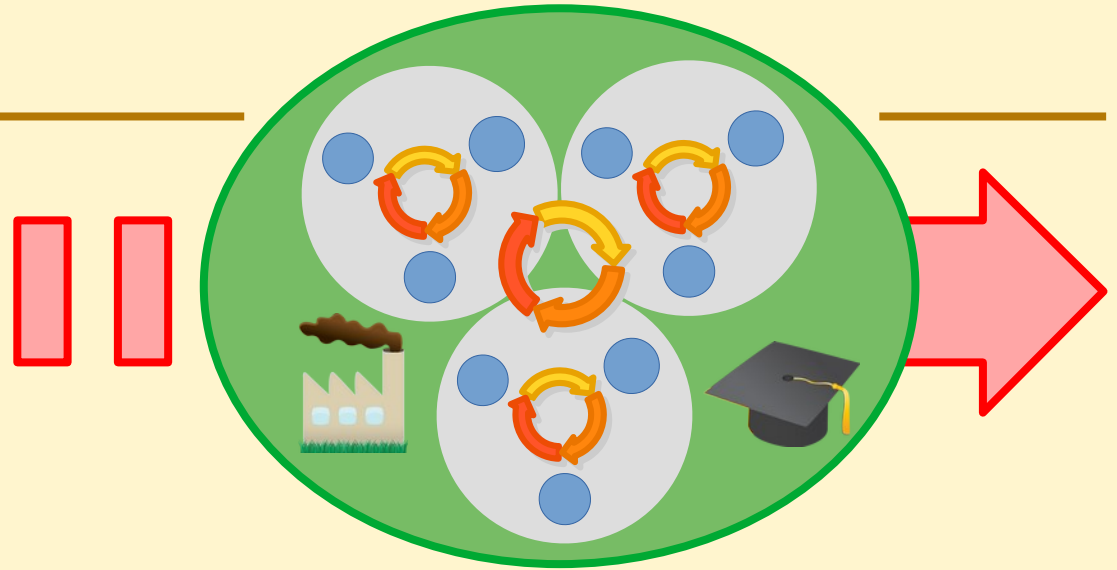
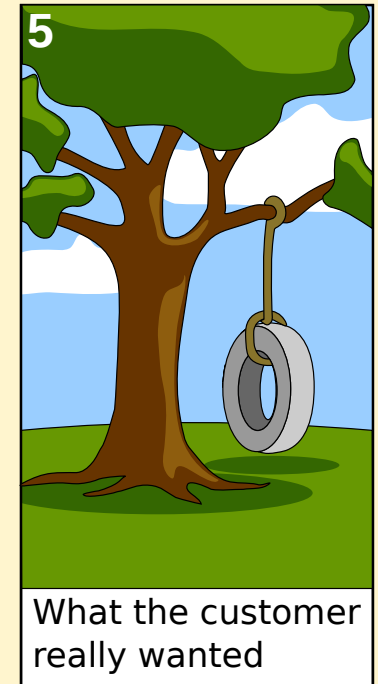
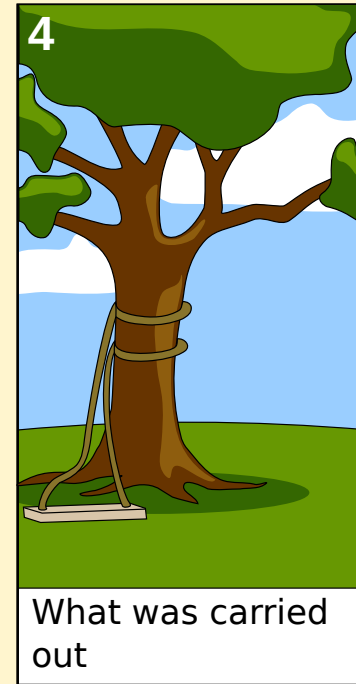
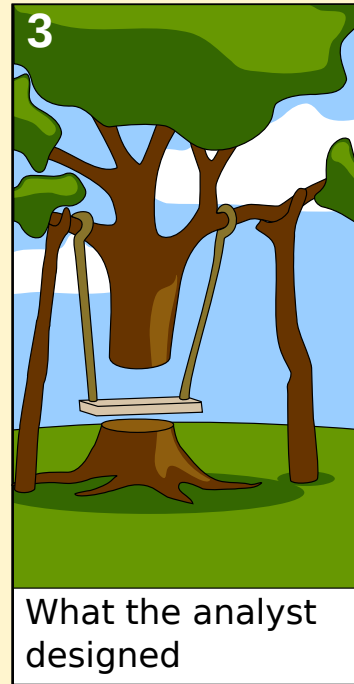
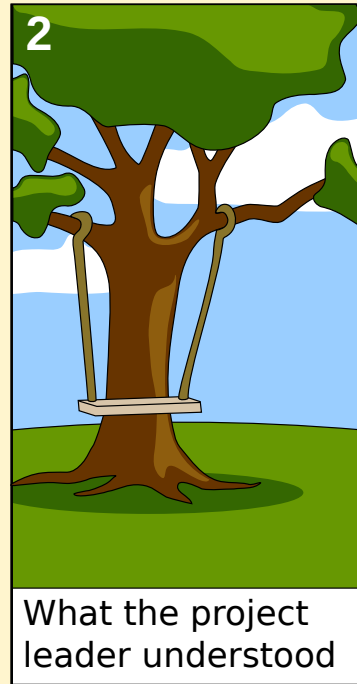
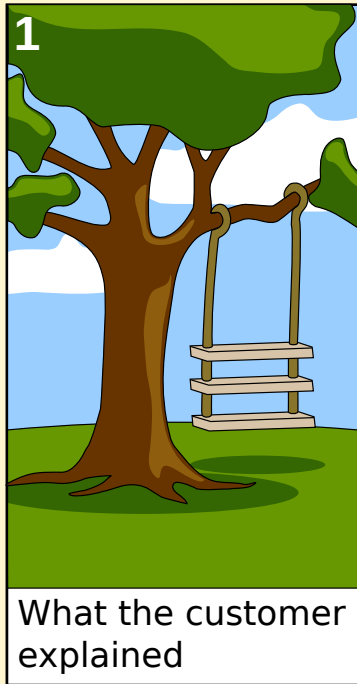


Approach for project-based teaching and learning in the context of engineering sciences



Introduction

Communication in projects – a typical workflow



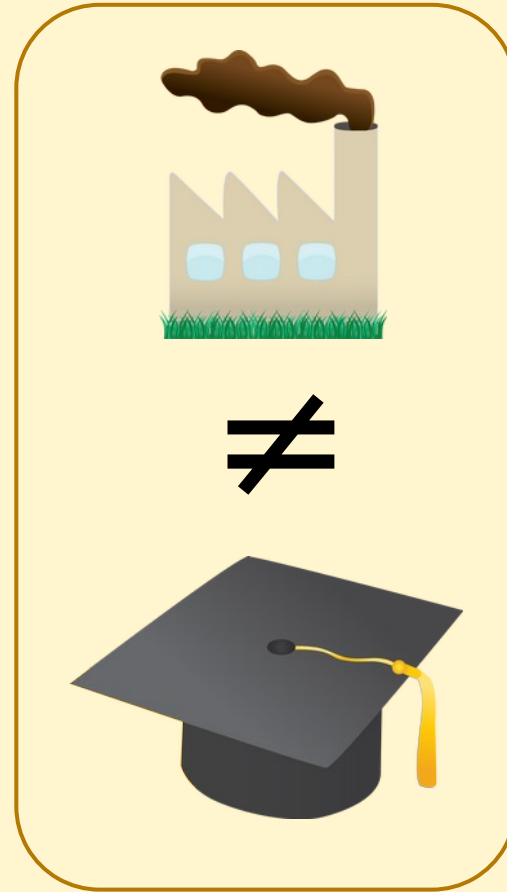
Background and context

Requirements in professional life

- Project-based workflows
- Think networked
- Social competences

Teaching at universities

- Defined in curricula
- Partially implemented
- Can be used more intensively



The approach - Idea

Prepare students for work-life

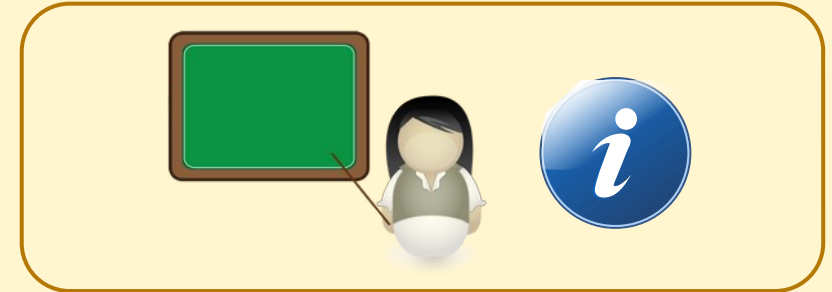
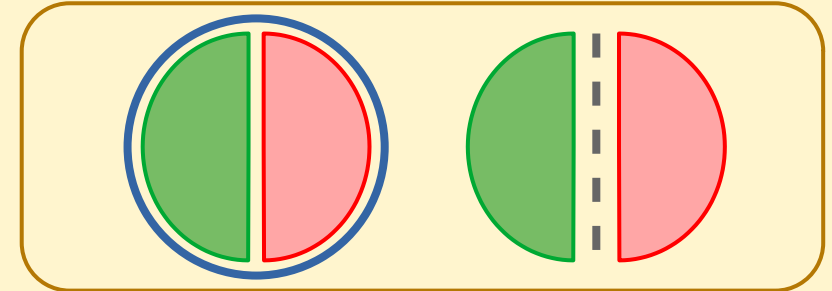
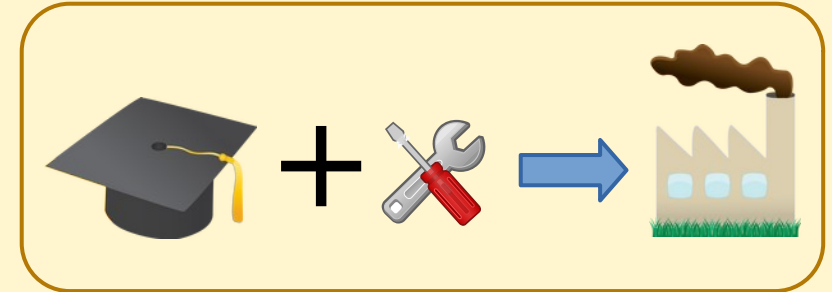
- Skills in project-based workflows
- Expand social competences
- Good start into professional career

Combine and interface knowledge

- Inter-disciplinary, trans-disciplinary
- Network and deepen existing knowledge

Support for teachers

- Project-based lecture design
- For teachers with less experience
- Easy to implement
- Scholarship of Teaching and Learning



The approach - Basis

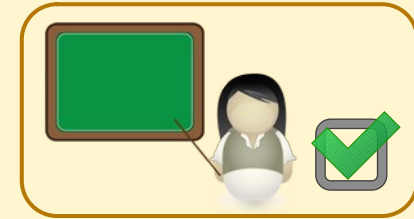
Use existing project-based teaching method

- The “prepared project method” [1]



Use well known teaching methods

- Individual and group work
- Peer review
- Discussions
- Feedback



Use project management tools

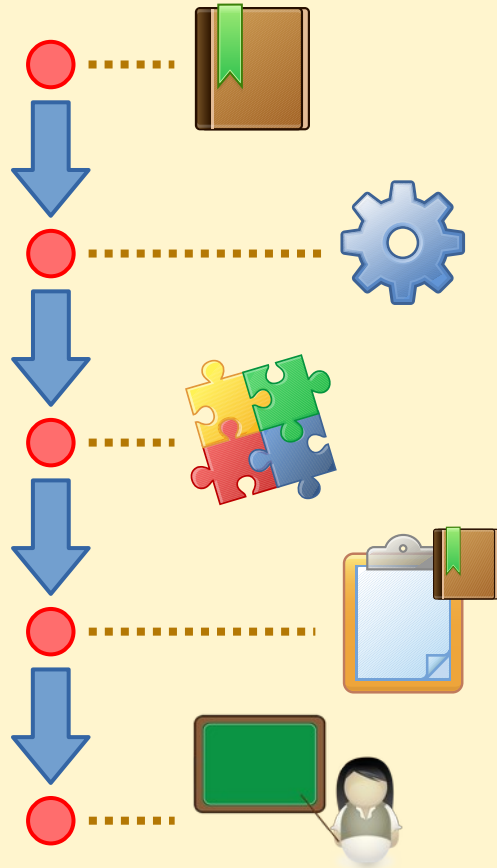
- Project planning and organization [2]



Use your own experience and skills!



The approach - Workflow



Gain skills in project management

- PM seminar [2] and literature [1]

Identify application

- Design new lecture
- Redesign existing lecture

Find project partners

- Other teachers and lectures → “Internal” project
- Industry partner → “Real” project

Implement PM-tools in lecture design

- Planning, organization, performance

Use project-based workflow

- Workshops, milestone meetings, work-packages

Project & Lecture

Project

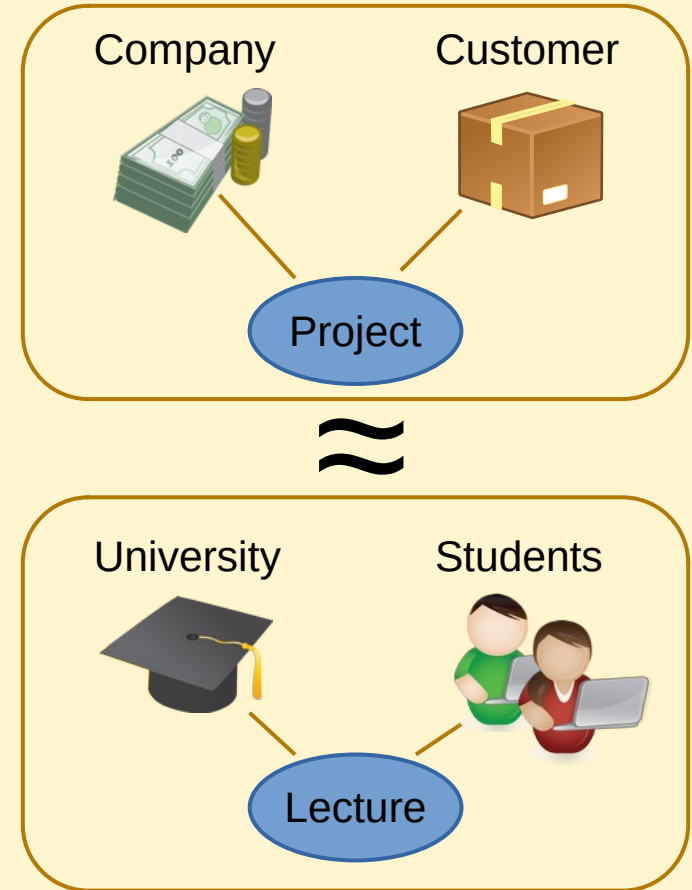
- Focus on objectives, results
- Company and customer are main stakeholders

Lecture

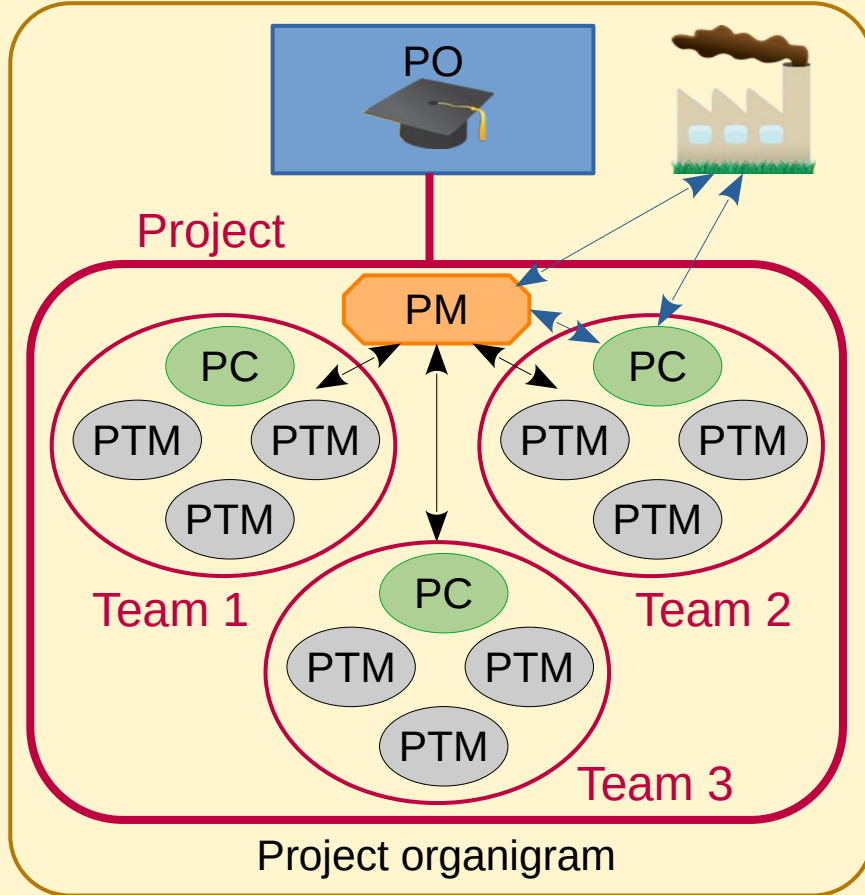
- Focus on creating competence
- University and students are main stakeholders

Structure & Organization

- Similar
- Designations are different



Organization & Roles



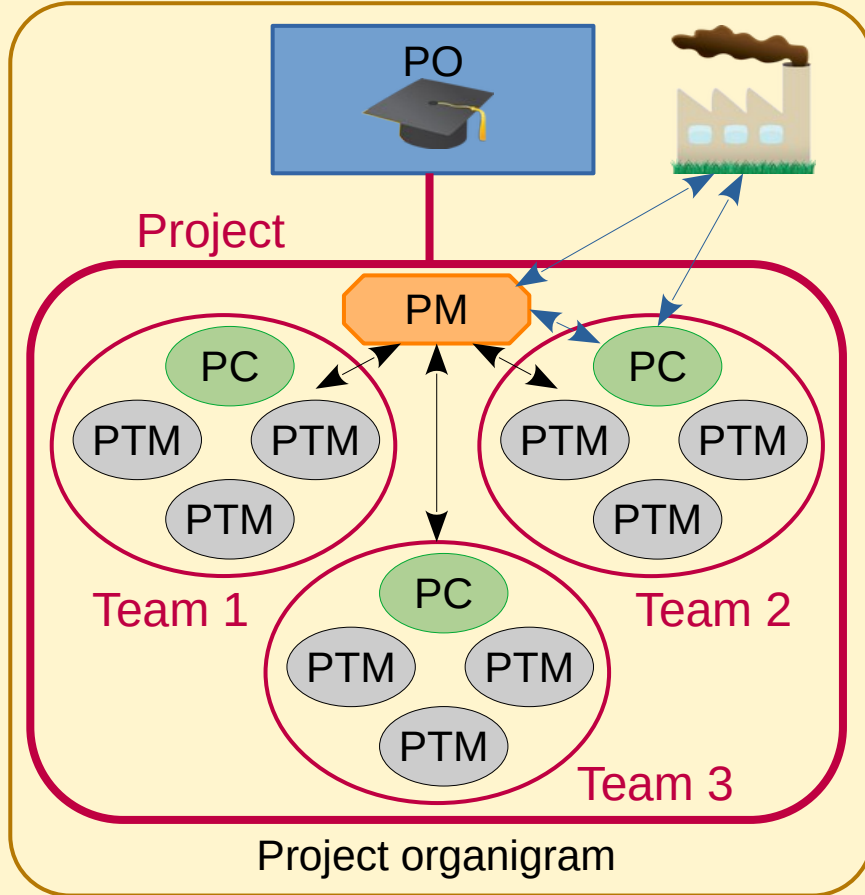
Project – Lecture

- Scope
- Time
- Resources
- Complexity

Project team – Group

- Project team members – students
- Project contributor – tutor, industry partner

Organization & Roles



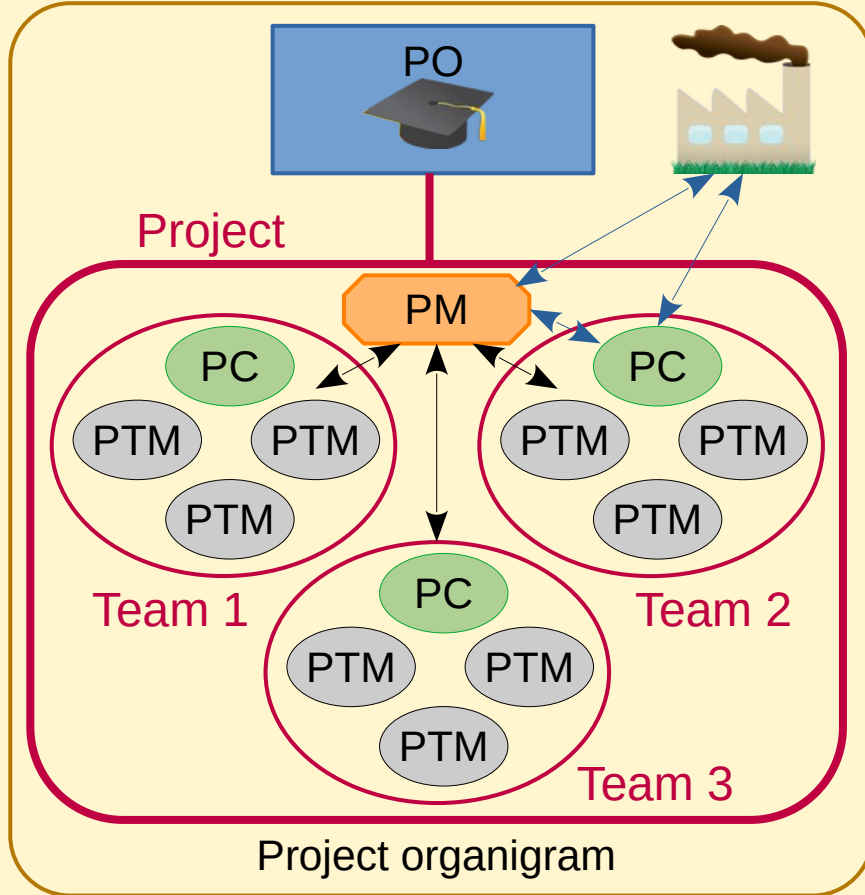
Project owner (PO) – university

- Provide resources (rooms, staff, materials, ...)
- Topics and content (curriculum, syllabus)
- Expect results (certification of learning outcomes)
- Main stakeholder!

Project contributor (PC)

- „Internal“ project – tutor or teacher
 - Support, cooperate with students
- „Real“ project – industry partner
 - Cooperate with students
 - Report to company and teacher
 - Is a stakeholder, conflict of interest possible!

Organization & Roles



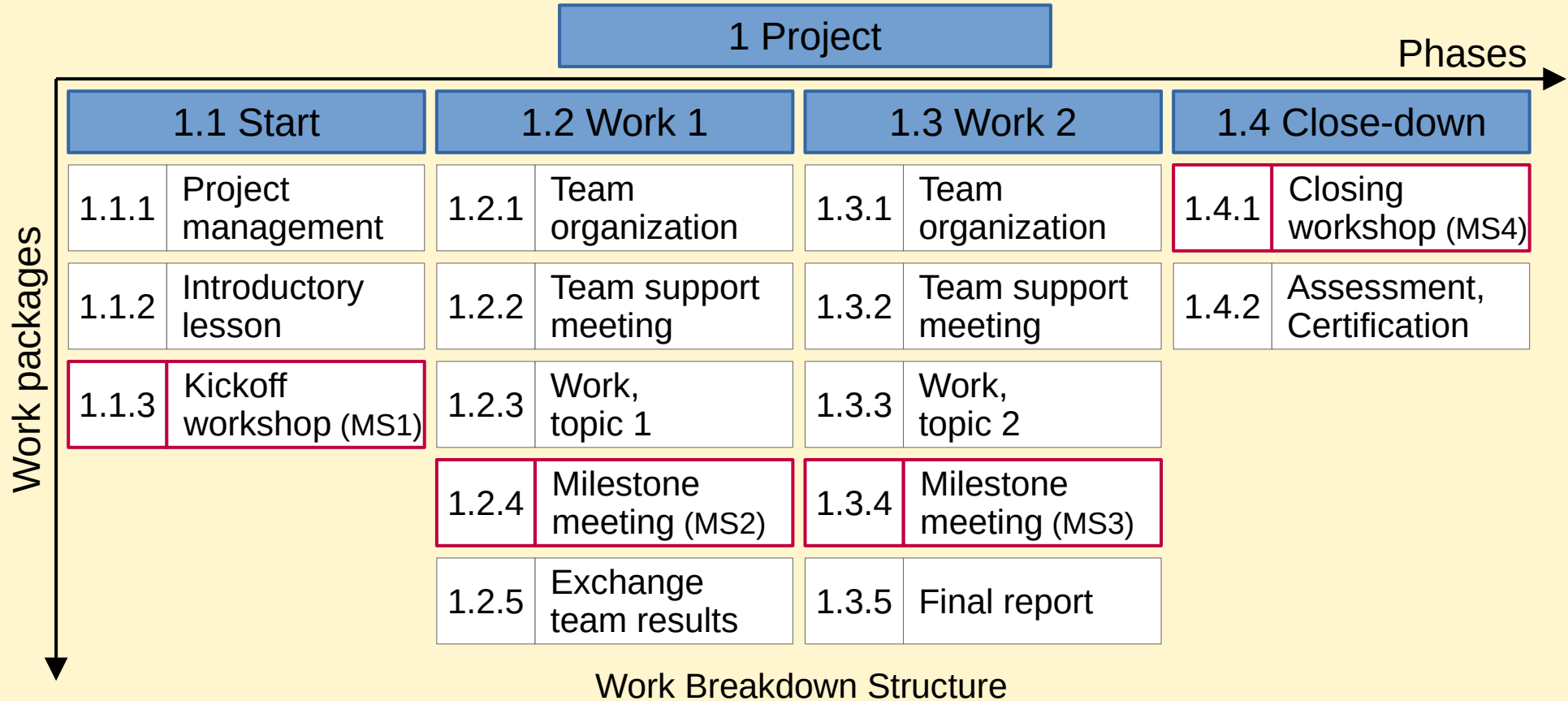
Project manager (PM) – Teacher

- Project planning - prepare and organize lecture
- Project controlling - conduct lecture
- Communication
- Most important role in project communication!

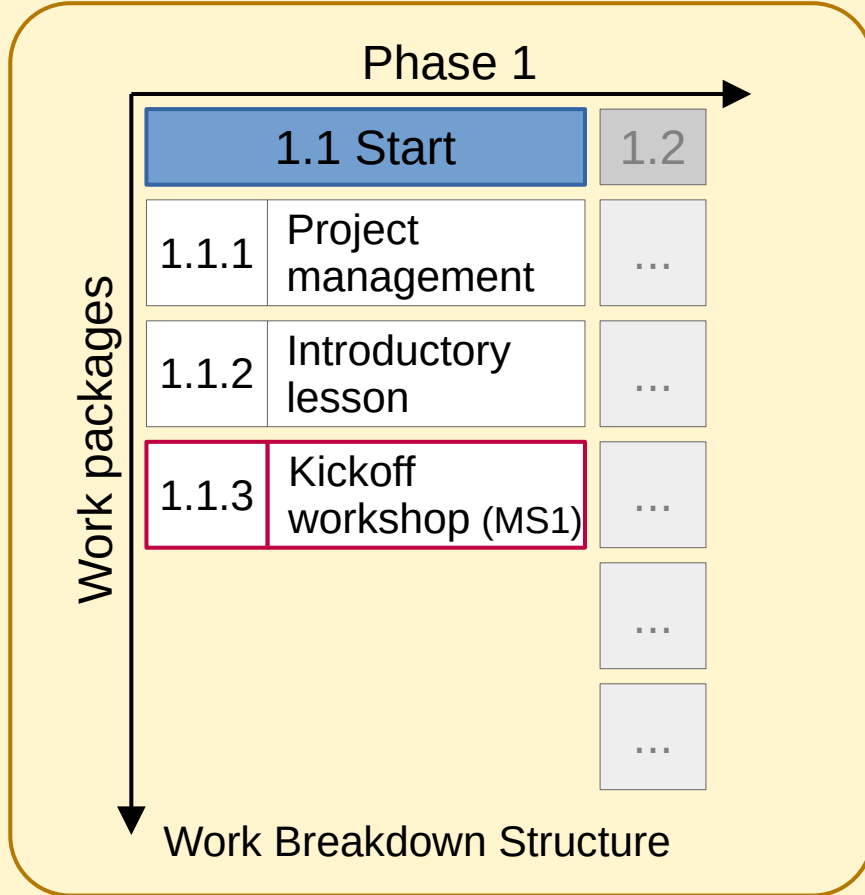
Project team members (PTM) – Students

- Organize and perform work
- Participate in meetings
- Report to teacher and/or tutor
- Expect results (certificate, competence)
- Main stakeholder!

Lecture workflow



Lecture workflow



1.1.1 Project management

- plan and organize project (lecture)
- find project partners

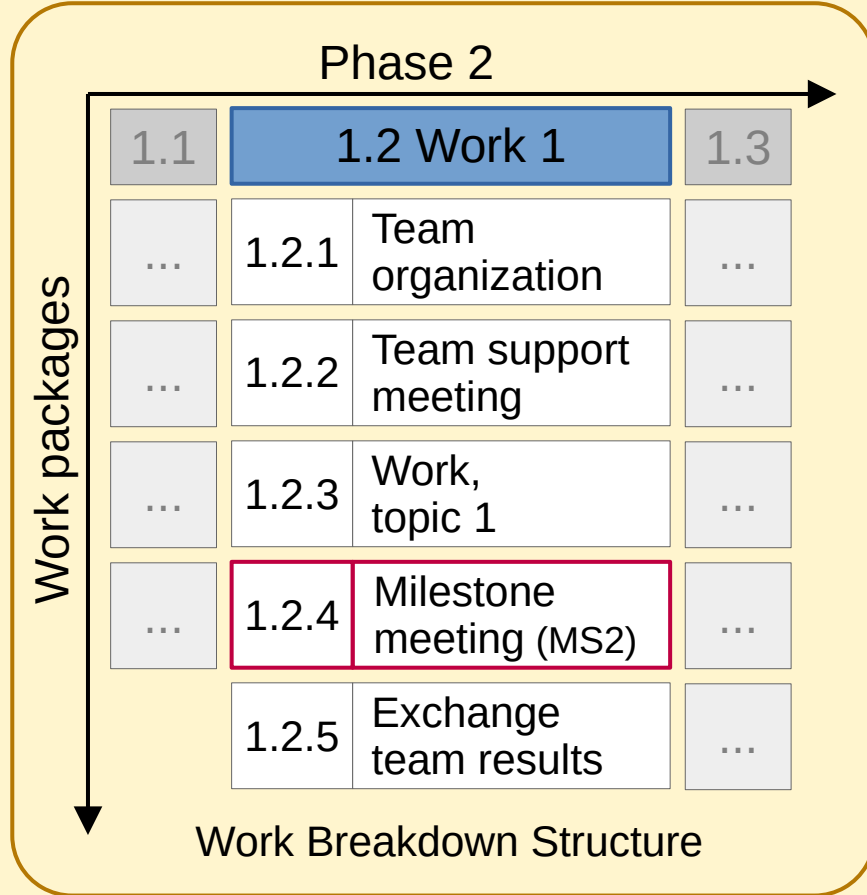
1.1.2 Introductory lesson

- Introduce students to project management
- Inform about project (lecture) organization

1.1.3 Project Kickoff Workshop (MS1)

- Assign students to (sub)teams
- Assign tasks to teams
- Introduce students to team work (role game)
- Agree about project culture
- Outlook to next project phase

Lecture workflow



1.2.1 Team organization

- Distribute workload and responsibilities
- Create time schedule
- Establish communication channels

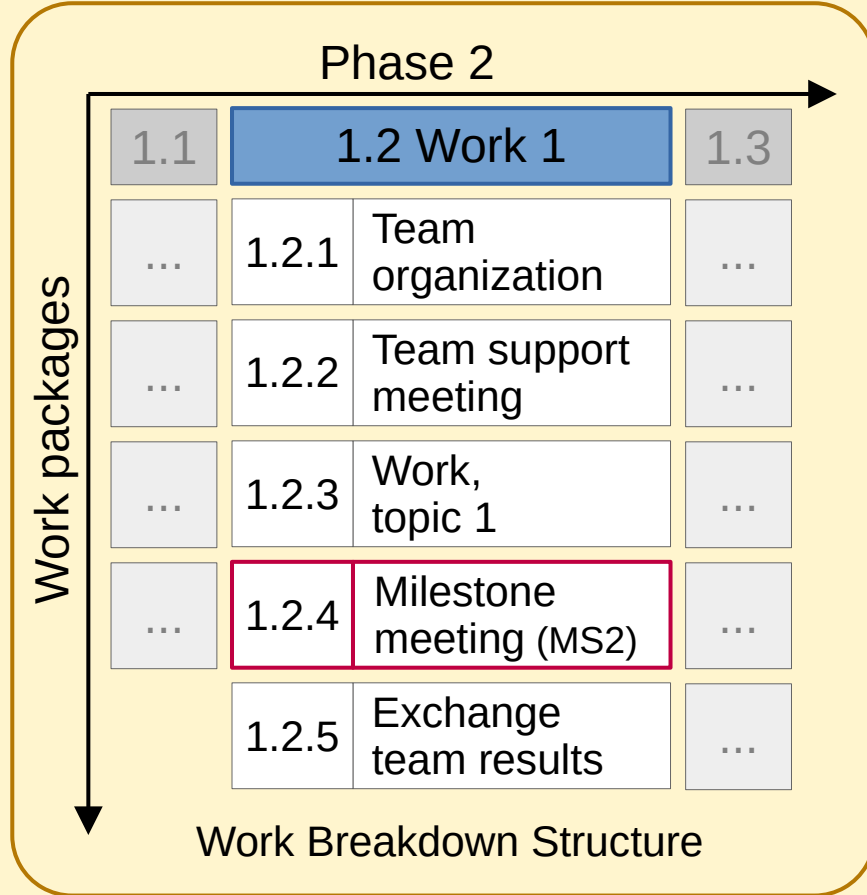
1.2.2 Team support meeting

- Review of team organization by teacher or tutor
- Support and additional information
- Discuss problems, conflicts
- Outlook to work on topic 1

1.2.3 Work, topic 1

- Students perform work, discuss problems and solutions
- Combine work, prepare presentation
- Supported by teacher or tutor

Lecture workflow



1.2.4 Milestone meeting (MS2)

Teacher(s)

- Host meeting, provide structure
- Lead discussion (problems, solutions, lessons learned)
- Acquire feedback, give support
- Assign next tasks to teams, outlook to next phase

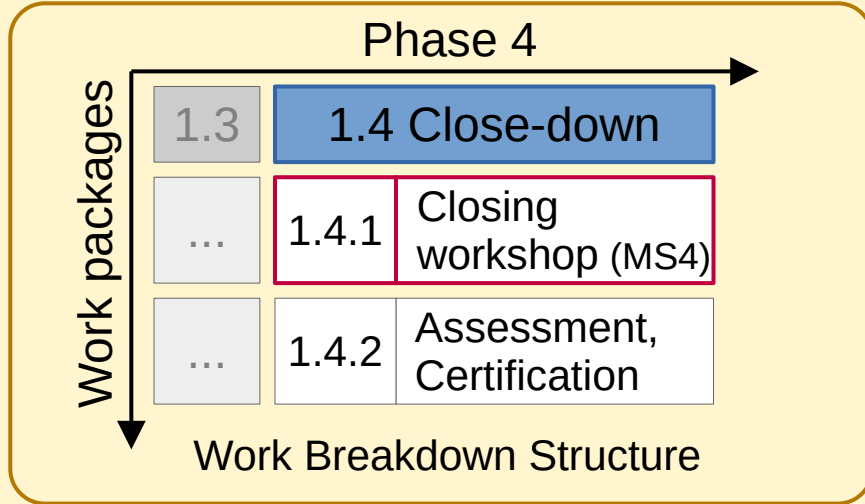
Students

- Present team results
- Participate in discussion, give feedback

1.2.5 Exchange team results

- Incorporate outcomes of milestone meeting
- Hand over results to other team
- Establish communication channel to other team
- Review work of other team, Q&A session

Lecture workflow



1.4.1 Project closing workshop

- Similar to milestone meeting
- Final presentation of results
- Wrap-up entire project
 - What worked well?
 - What worked not so good?
 - Problem solving strategies
 - Lessons learned

Project culture

Rules

- Agree about rules (Kickoff workshop)
- Attendance in meetings, be on time, responsibility, social interaction, ...

Communication

- Define responsibilities
- Communication channels
- Reporting, conflict situations, feedback, ...

Project identity

- Project name, logo
- Social events (milestone meetings)
- Students identification with team and project
- Sentimental value, link content to emotions



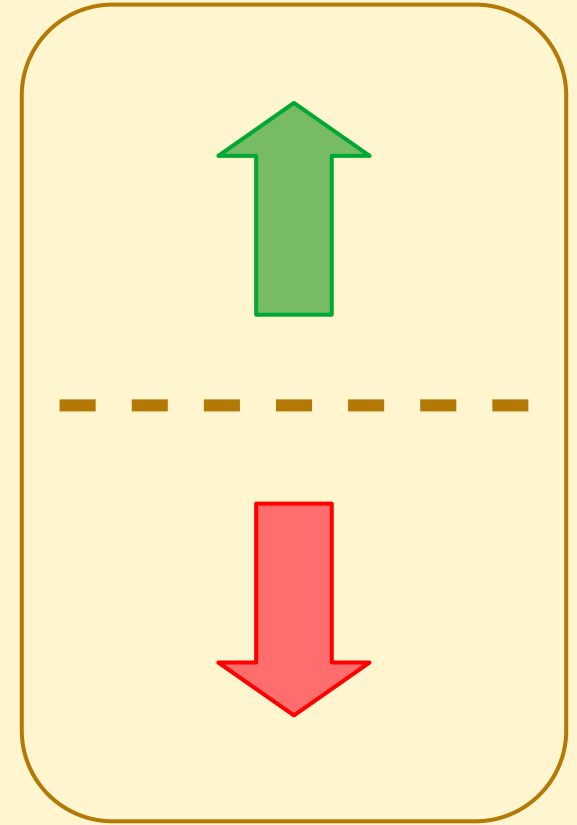
Up- and Downsides

Upsides

- Training on project-based workflows
- Network and deepen existing knowledge
- Expand social skills
- Foster new learning strategies
- Activation of students

Downsides

- Communication indispensable
- Less “new” discipline specific content possible
- Not applicable on “all” topics or lecture formats
- Teacher needs PM- and leadership skills
- Lecture preparation different to classic lectures
- Additional risks in “real” projects (expectations)



Applications

Lecture formats

- All kind of tutorials
- Combined lecture formats (lecture + tutorial)
- Whenever topic fits to project workflow
- “Internal” or “Real” project



Placement in curriculum

- Engineering sciences (requirement from industry)
- Master studies (network and deepen existing knowledge)



Scholarship of Teaching and Learning

Assumption, teaching hypothesis

- Preparation, organization, methods, ...
"will lead to expected learning outcomes"

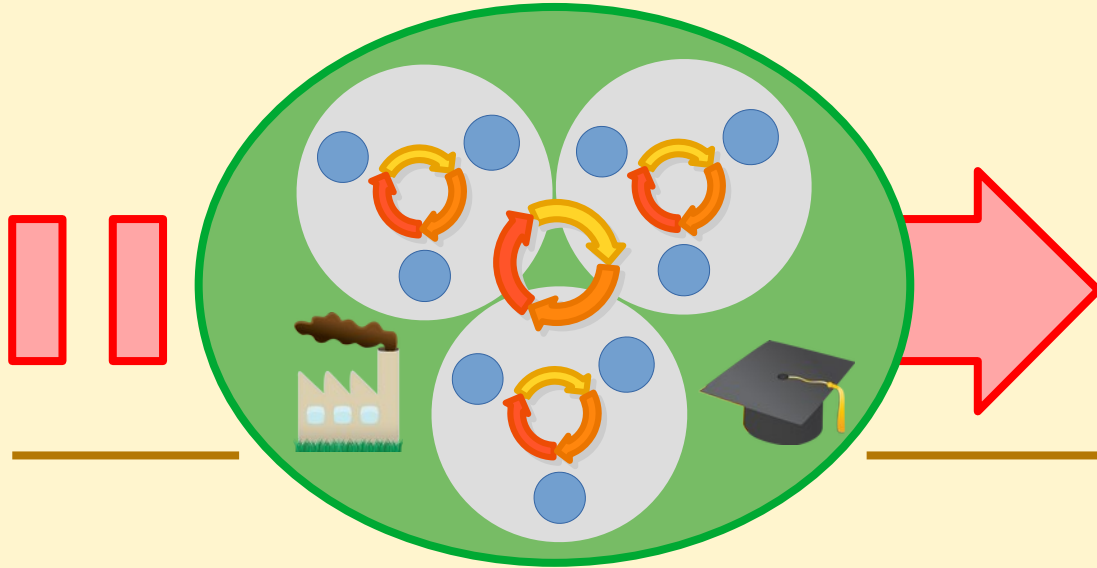
Triggers for SoTL

- Assessments (presentations, reports)
- Feedback from students (meetings and talks)
- Feedback from colleagues (audit)

Adaptations

- PM skills, leadership skills, social skills
- Materials, methods
- Information- and communication management





**Thank you for
your attention!**

Appendix

Acknowledgments

Many thanks to Dominik Ruffeis (Teaching Academy, TU Graz) for reviewing and making suggestions in the course of the preparation of this presentation. Also, many thanks to Verena Schwägerl-Melchior (Head of the Teaching Academy at TU Graz) for introducing me to Scholarship of Teaching and Learning, the discussions and feedback during the module “Teaching Expert” of the Teaching Academy. That helped me a lot to further develop my teaching and to create this work.

References

[1] Holzbaur, Ulrich, Monika Bühr, Daniela Dorrer, Ariane Kropp, Evamaria Walter-Barthle, and Talea Wenzel. “Die Projektmethode.” In Die Projekt-Methode, 53–92.

[2] Roland Gareis Consult, 2021. Seminar „Management of (Research) Projects“, organized by TU Graz (SSIW).

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