Introduction to Project-Based Learning (PBL)

AARHUS UNIVERSITY
SCHOOL OF ENGINEERING

What is a *project*?

How are they different from *courses*?

Project-Based Learning (PBL)

Project-based:

- Methodical *and* technical objectives
- More than 1 student
- Students in control
- Interdisciplinary
- Requires cooperation
- Requires organisation and management of work
- …

Discipline-based:

- *Technical objectives*
- *Teacher is in control*
- *One student*
- *One discipline at a time*
- *Planned*
- *...*

A sample PBL Process

1. *Identify, investigate* and *describe* the problem
2. *Relate* the problem to your prior knowledge – identify "holes" in your competences
3. Make a *plan* (time, resources, goal).
4. Gather information – cover the gaps
5. Work towards the goal.
6. Evaluate and adjust the problem description and plan

Learning is about asking questions and seeking answers

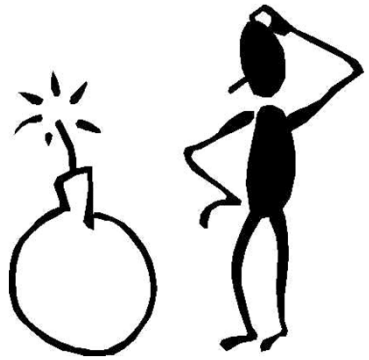
Outcome of PBL

You will develop your…

- Problem-solving skills
- Self-directed learning skills (*)
- Ability to find and use appropriate resources
- Critical thinking
- Social and ethical skills (*)
- Self-sufficiency and self-motivation (*)
- Leadership skills (*)
- Ability to work in a team (*)
- Communication skills (*)

…

(*) = different from Discipline based learning



Exercise

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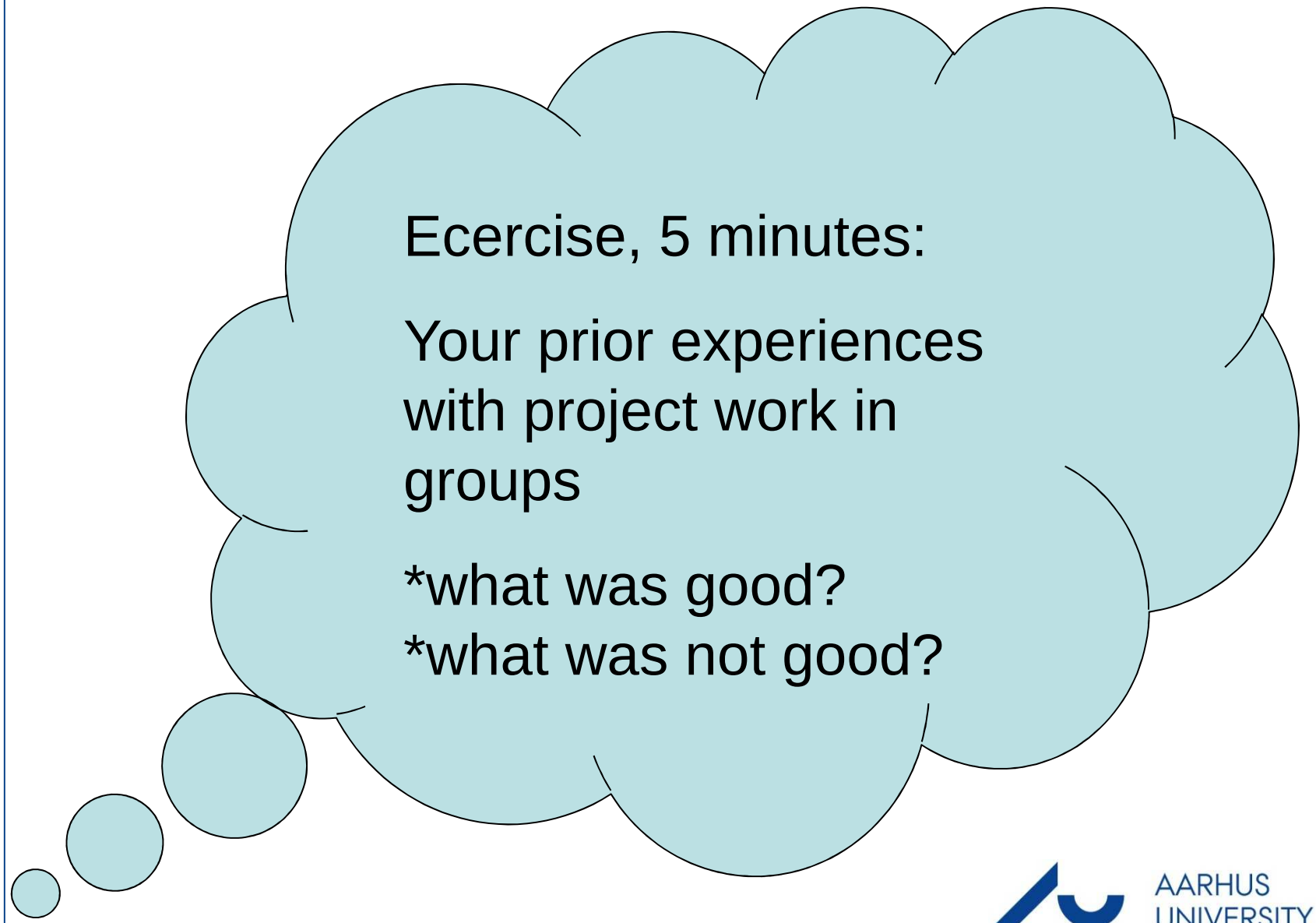
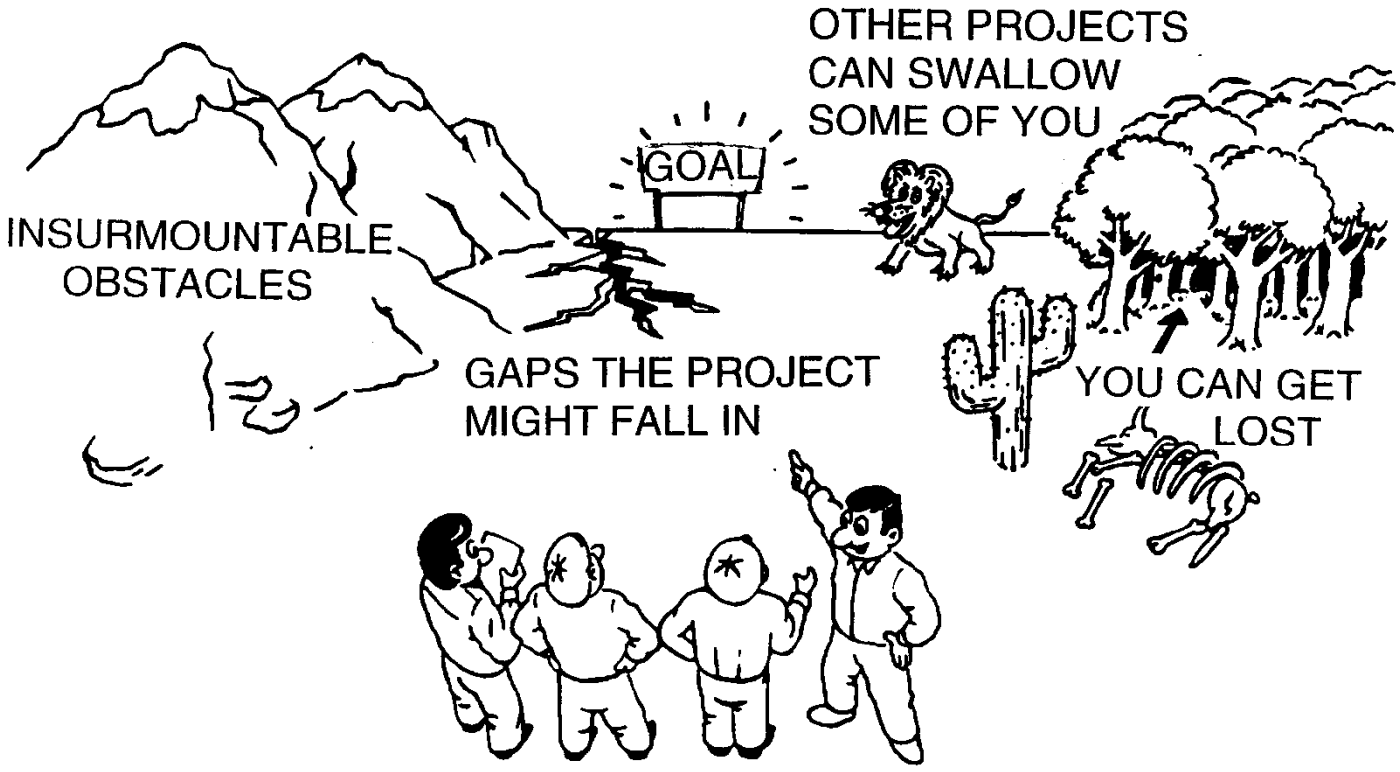

Ecercise, 5 minutes:
Your prior experiences with project work in groups
*what was good?
*what was not good?

Some major challenges in group work

1. Agreeing on your goals
   (analysis, ambitions, expectations, …)
2. Organizing your work
   (time, resources….)
3. Project management:
   1. Making decisions – achieving consensus
   2. Delegating work – making QA
   3. Sticking to the plan
4. Working in teams
   (using shared resources, managing conflicts)
5. Having efficient meetings
6. Separating personal and professional issues
6. Presenting solutions

Agree on your goal or you won't reach it !



The goal should be very clear to all participants

Setting SMART goals (requirements)

S - Specific

M - Measurable

A - Accurate (& agreed upon)

R - Realistic

T - Time framed

A: "*improve the sewer system*"

B: "*reduce wastewater overflows by 50 % by installation of equalization basins in the catchment area before the end of 2012.*"

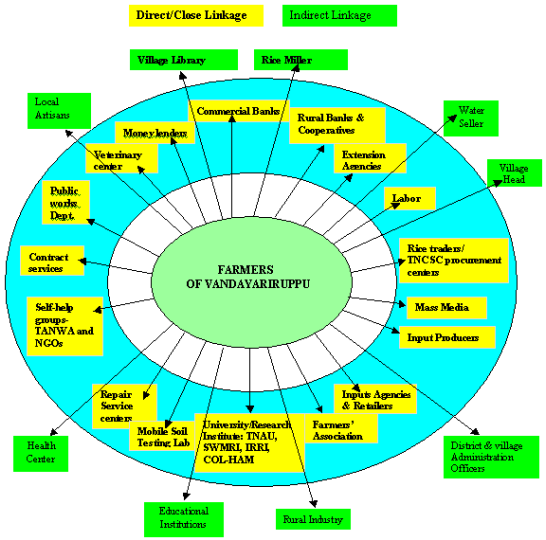
Why do an analysis?

What shall I do to get
from the Edison building
to the center of Aarhus in 20 minutes?

How to do an analysis?

- Ask questions
- Estimate
- Measure
- Compare
- Evaluate
- Identify alternatives
- Constructively criticize
- …

An example analysis process: Stakeholder analysis



- Identify stakeholders
- Identify stakeholders' objectives and expectations for the project/product
- Subject objectives to tests (e.g. the "Boss Test")
- Identify the common grounds and conflicts

Learning objectives and the product

Be aware of the difference between:

- **The learning objectives** of the semester
- **The project goal** – the production of a final technical report describing the problem, your work and your conclusions.

Learning outcome != ”technical” result

The (very real) cultural challenge

- You have different backgrounds – different norms and ideas, biases ("mental programming")
- Be open – ask if you are not sure you understood correctly
- Give the benefit of the doubt to your team mates
- Sum up discussions: Make sure everybody share a common view
- Have self awareness – what do I want? Do I communicate this clearly?

The desert game

Consensus recommendations:

Do not argue for you personal opinion just because it's yours – use reason to find the best solution

Support others by asking for the background and the reason for their ideas

Do not change your opinion to reach consensus – do it because you are convinced!

Show that you change your opinion

Listen to others – get everyone's opinion