

# Integration of SD in curricula – experiences at Delft University of Technology

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# Outline

- Project group Education for SD at TU Delft
- Integrating SD into existing courses and projects – developing the Individual Interaction Method
- Methodology used, challenges, and results

# Background

- Delft University of Technology – founded in 1842
- 13,000 students, 2300 staff
- From the website of TUD: “Social issues are getting more complex and demand a multidisciplinary approach. TU Delft uses her expertise to solve these problems. In fact society itself is our principal commissioner.”
- Project group Education in Sustainable development started in 1998 for 6 years
- Backing from university board
- Integration at 3 levels

# Integration of SD at TU Delft

- Basic course on SD at several faculties with corresponding learning objectives
- Graduation specialisation (15 ECTS, SD integral part of thesis project)
- Intertwining of SD in regular engineering courses
- Necessary for students to see relation of SD with other courses they follow, not just in separate SD course to be able to (contribute to) solve SD problems
- Network SD for people interested in SD (staff, PhDs and students)

# Basic course – central element: role of Technology

- Story of Easter Island
- $I = P * A * T$
- SD is a challenge for engineers and technology
- However, technology in context! Theories from STS and innovation studies, such as system innovation, actor networks, etc.
- North-South issues
- Half: general SD, half relation with own discipline
- Threat: BSc-MSc structure -> introduction of minors -> no room for SD course

# MSc specialization Technology in SD (15 ECTS)

Obligatory course Technology in SD (4 ECTS):

- Appr. 2 \* 25 students with different engineering backgrounds per year: interdisciplinary!
- Week 1: general technology related SD issues, so called boat week
- Week 2: Backcasting for SD
- Optional courses (11 ECTS)
  - Design, analysis and tools (technical)
  - Organisation and society
- Integration of SD in thesis project – faculty referents assessing quality of SD

# Intertwining of SD in existing courses and projects

- More difficult than basic course and optional specialization
- Requires lecturers to actively integrate SD in their courses and projects
- Also requires support from university and faculty management (educational director) and commitment from departments and individual lecturers: top down and bottom up.
- After a project integration is not finished! Long process of change
- Obstacles can be
  - Academic culture (disciplinary approach of science),
  - Organisational culture (courses owned by groups, # ECTS),
  - Engineering culture (quantify and optimise, neglect other aspects)

# Road to Individual Interaction

## Method

- Experiences at other universities: top-down implementation does not work!
- Contribution of ESD-group to working group of national educational SD network
- So called discipline reviews on Physics, Civil Engineering, Computer Science
- From discussions during interviews:
- Process of talks and interviews more important than the result of the discipline review book!
- Lecturers should be approached as a source of knowledge
- Lecturers are willing to tell how their discipline can solve many problems, including SD-related problems

### Conclusion:

- Approach lecturers individually in interactive interviewww

# Individual Interaction Method - challenges

- Make SD specialist a good discussion partner for science/engineering specialist
- Search for and identify challenges SD poses to discipline together with lecturer
- Challenges from literature review and interviews with SD experts from within the discipline (inside and outside university)
- Opinions from big names can be more convincing than opinion from young and enthusiastic idealist
- Leave concept of relation between SD and discipline open and ask for contribution
- Individual discussion on contribution to disciplinary review or other form of written publication
- Assist in altering courses and projects (resource function)

# Projects so far

- Chemical Engineering
- Maritime Engineering
- Industrial Engineering
- Applied Physics
- Computer Science
- Applied Earth Sciences (in progress)

## Results:

- Maritime engineering: agreement on who does what, SD coordinator
- Industrial engineering: sections active with subject during meetings on education
- Technical Physics: support for course on SD
- Computer Science: track through BSc on societal issues
- AES: new course with guest lectures, book publication on geotechnology and SD, based on lectures

# Pros and cons of the IIM

- Pro:
  - Direct contact with lecturers in stead of booklet
  - Useful as tool to make change in curriculum
  - Systematic approach
  - Learn about faculty: research and education
  - Discover SD opportunities
- Con:
  - Labour intensive
  - Not finished after report is delivered; ongoing process of change and monitoring. Who is responsible? Who monitors?
  - Dependent on educational director/management

# Concluding remarks

- Integration of SD in existing non-SD courses is necessary, but difficult
- Barriers: organizational, academic and engineering culture
- Individual approach and disciplinary review useful
- Combination reaps benefits of both and minimizes disadvantages
- Interaction with lecturers more effective than sending booklets or training lecturers
- Let lecturer think about contributions from field of expertise
- Look for right 'interviewer'
- Applied in 5 faculties with good results
- + Active integration of and support for SD
- - Labour intensive