

Strategic competences for concrete action to sustainability: an oxymoron?

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1

Two cultures

C.P. Snow, 1959, lamented the great cultural divide between “science” and “the arts.”

- *intellectuals often proudly proclaim that science isn't their thing, almost as a badge of honor to indicate their cultural bent.*
- *Scientists being blind to the fact that life is not just about optimisation but also about the values behind that: we have to develop compromises between various, partly contradictory and overlapping, partly qualitative and emotional, demands*

Snow argued that practitioners in both areas should build bridges, to further the progress of human knowledge and to benefit society.

Unfortunately with little result.....

Different forms of Rationality

- Science: aiming for truth
- Technology: aiming for efficiency
- Politics: aiming for power
- Ethics/Law: aiming for justice
- (arts: aiming for beauty)

Two cultures in developing solutions towards the environmental crises

'Analytic': Measuring effects of legislation/product designs/processes. Linear.
Recent addition: dynamic LCA to show 'potential'

Critique:

- 'Hairsplitters': irrelevant details,
- 'Marginal': only applicable for marginal change,
- 'Irrelevant': showing problems does not create solutions

'Change management/policy': reflections on transition processes and incentives to change. Basically searching for non-linearities in society to create/accelerate systemic change.

Critique:

- vague, phrasemongers: 'lots of talk without action'
- low predictive success,

The importance of analysis

- Concrete quantitative targets are convincing/trigger action
- Without proper quantitative analysis/evaluation, change can make things worse

The importance of strategy

Large changes are required, optimizations are secondary
(Cf. Factor X, $I = P \cdot A \cdot T$, etc.)

Long term strategy required for success

(Should we invest in clean coal to produce cleaner electricity....? Or in cleaner engines consuming less electricity?)

Backcasting---

The importance of organisation

Sustainability issues: often no core business for companies and agencies:

Who is championing e.g.

- - industrial and urban symbiosis?
- - energy saving in rental houses?

Who benefits from measures:

- - Municipal district heating systems suffering from the success of passive housing
- - Industry suffering from the success of longer lasting products (e.g. tyres, 1970s)

So Strategic and Organisational competences are required work on SD

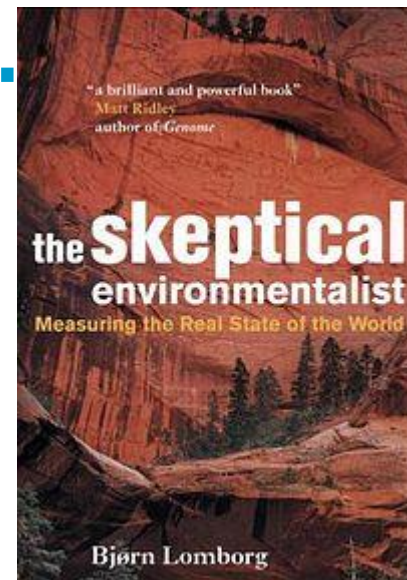
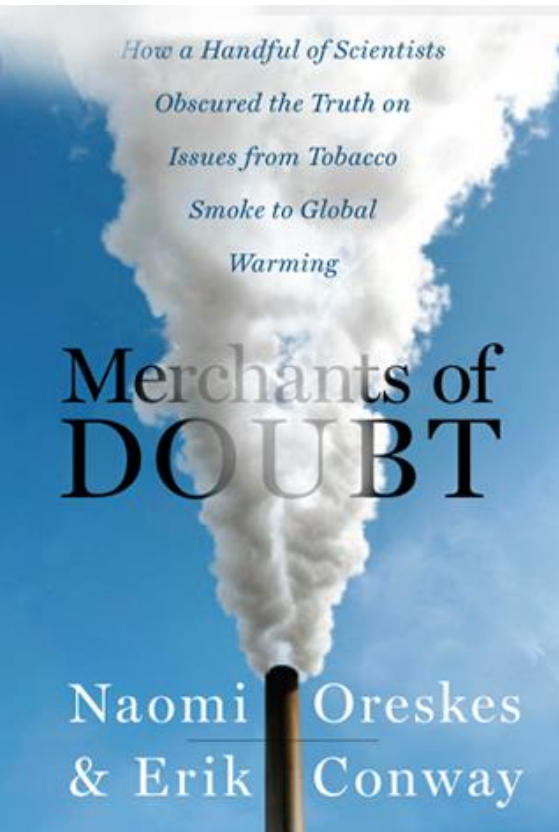
Starting SD education in the 1990s, we started perhaps a little naive:

We have no enemies.....¹

But in designing change you run into power.....

¹ JOAN BAEZ & JEFFERY SHURTLEFF about the draft resistance movement at Woodstock, 1969

Only a few outspoken enemies..



Heidelberg Appeal



S.Fred Singer

With such marginal enemies, why is there only slow progress in SD?

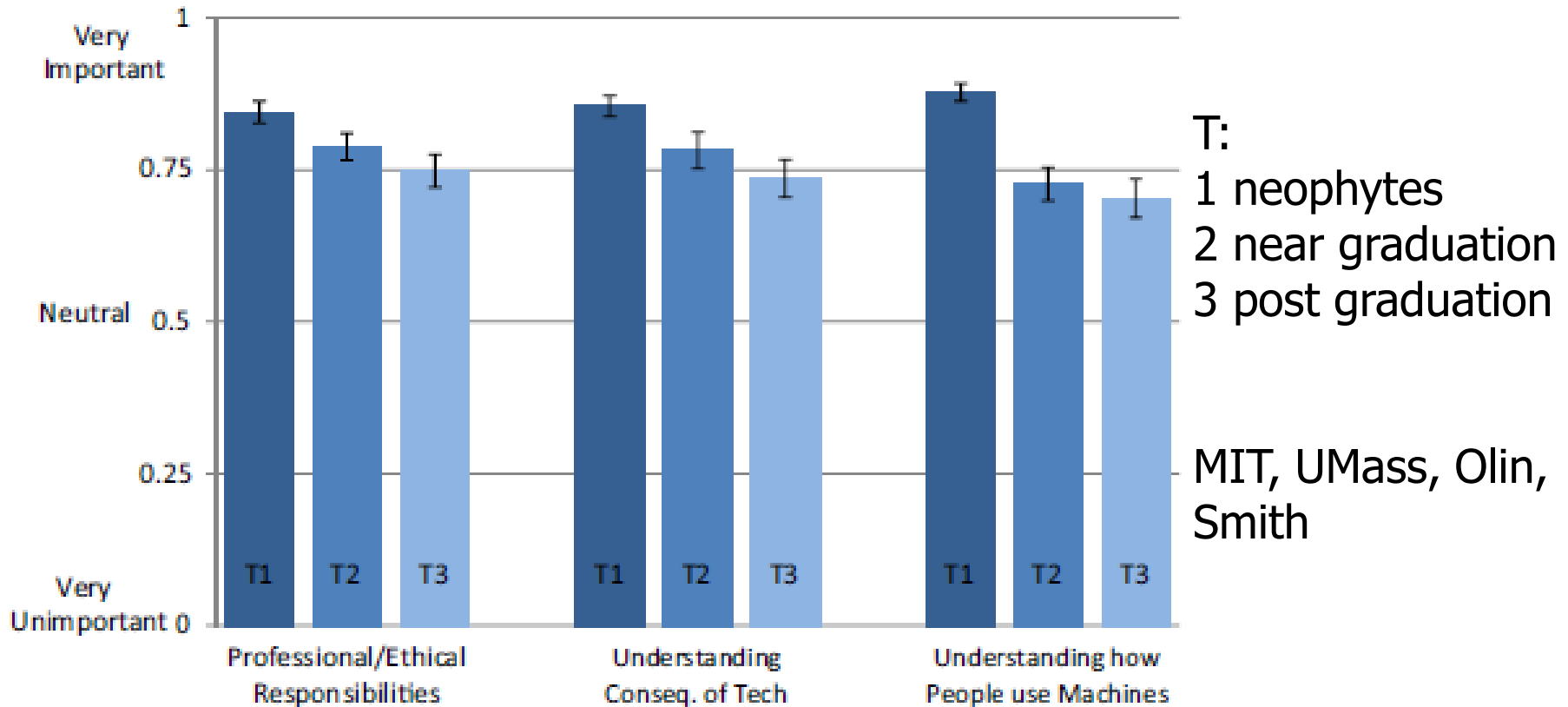


**Better an
honest
enemy
than
a false
friend**

We educate our students to come up with old fashioned solutions
Engineering has in some respects been a false friend

Culture of Disengagement in Engineering Education?

Erin Cech, STHV, 2014



Results & Conclusions

- *'over the course of their engineering education, students' beliefs in the importance of professional and ethical responsibilities, understanding the consequences of technology, understanding how people use machines, and social consciousness all decline'*
- *'..little difference by school in how students' public welfare beliefs change over time. Other than Smith students, whose professional/ethical responsibility beliefs drop less rapidly than they do for MIT students, the decline in public welfare beliefs is consistent across schools.'*

Fear for not meeting learning outcomes

'....EESD is OK but we don't want our bridges to fall apart' (former PM of Netherlands on EESD)

'even programs that explicitly attempt to create a structure and culture that diverges from historical norms have difficulty doing so because of the need to be recognized as legitimate purveyors of knowledge (e.g. through accreditation).'' (Cech, op cit. P. 64)

Corroboration: committed freshman... but...

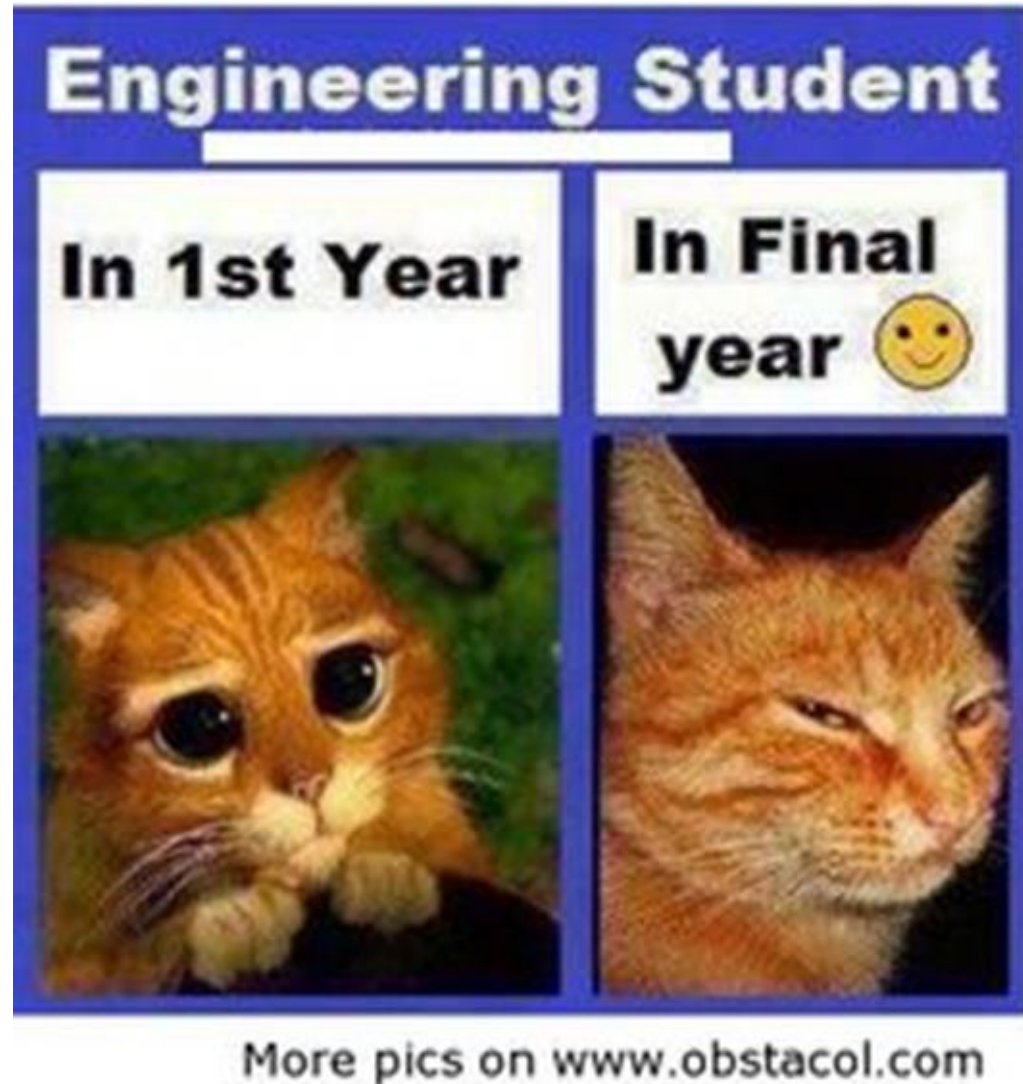
Survey among freshmen arriving at Delft (2000):

What should change in Engineering Education?

Overwhelming response: More EESD

Afterwards: declining enthusiasm

Students gradually are drawn into a technocratic identity that supports an analytic SD approach without a strategic SD approach



Culture of Technocracy, some anecdotes:

Dean Electrical Engineering:

*'SD is none of our business: **the shaft is the divide**. In generating electricity, the fuel consumption and emissions are from steam production which is Mechanical Engineering'*

Dean at Physics Engineering:

'We don't want our students to do assignments in companies/agencies. They are methodological too unscientific'

Professor at Maritime Engineering:

'Can you believe it: Government sent a sociologist over to interview me on green shipping policies..... A sociologist for God sake ...!'

Professor at Civil Engineering to his students:

'Don't engage with politicians... avoid it if you can and disregard their comments, because you know better than they do'

Professor at Aerospace engineer during a meeting "Focus on Africa":

'How my designs might help reduce poverty in Africa? Well, Africans are wellcome to learn from my work too....'

General: Don't care about the issues that you cannot calculate

The anti SD message between the lines:

Science and Technology are well ordered by their internal subdivisions and their own rationality. Challenges are internally defined

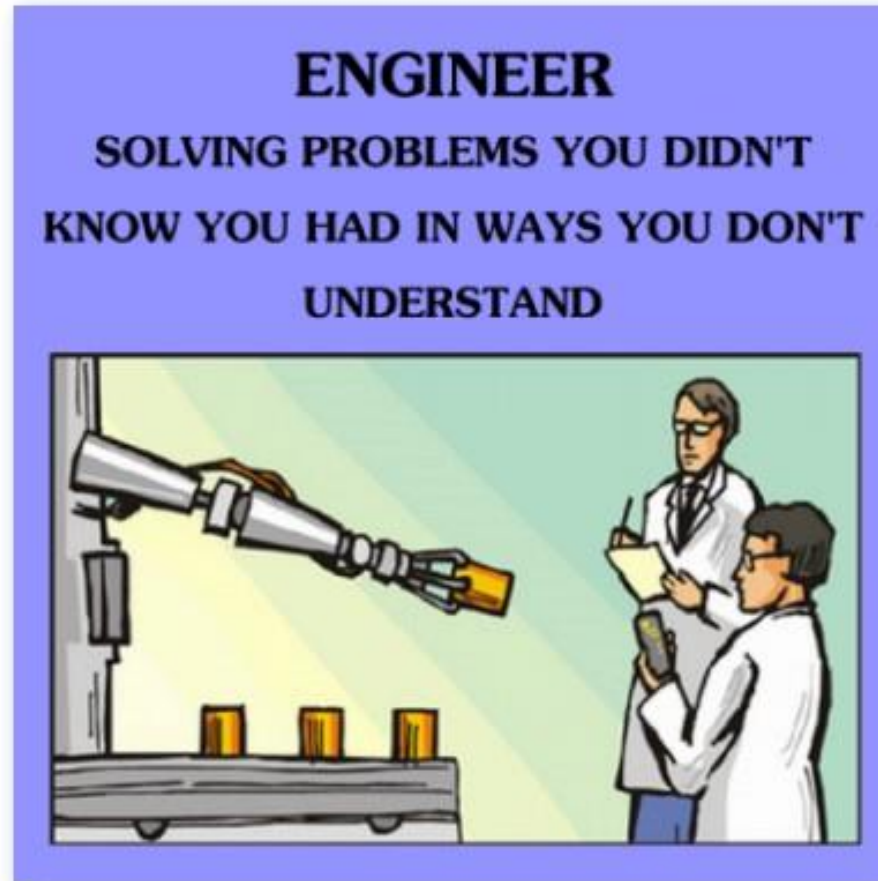
keep the messy reality of non- scientists out!

Implications?

- SD courses/programs are succesful in developing understanding (Lourdel/Segalas)
- Meanwhile, students become less engaged (by the institutional culture of disengagement,)
- Professionals that can combine analysis, strategy and action?
- Deeper change of disciplins and educational programmes?
- Universities/disciplins are really conservative: external allies are needed for change
- Engineering is analytic and multidisciplinary, but needs strategic competences...

Engaged professionals

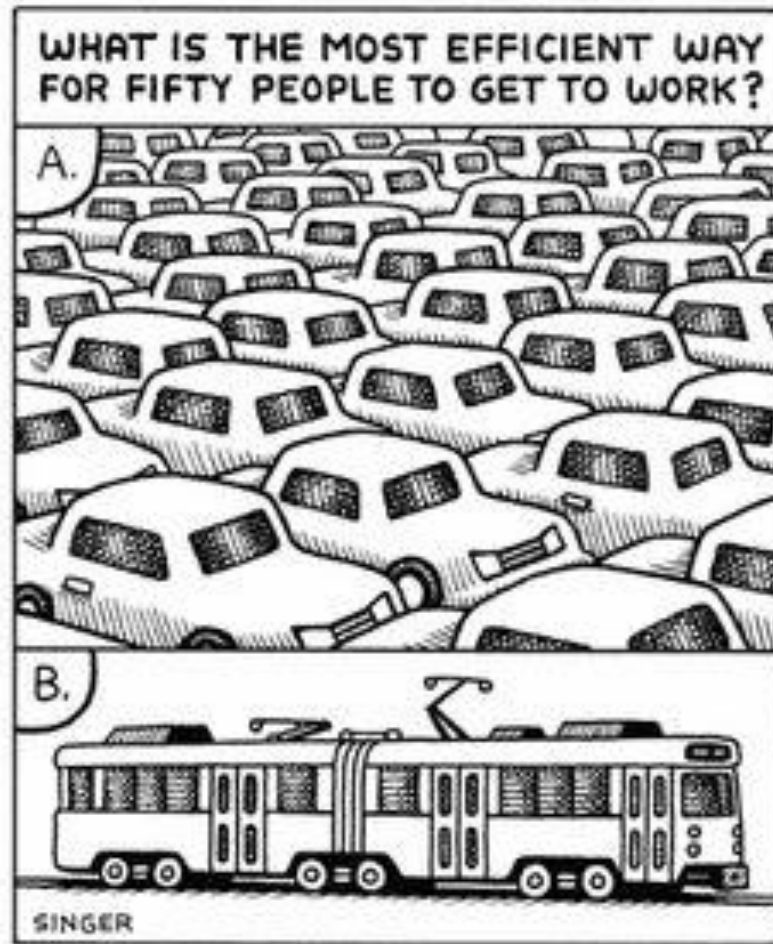
committed to solve current or future problems of people



Are able to interact productively with their stakeholders



Are able to analyse socio-technical systems



Are able to design/organise processes of change

I'm an
~~Engineer~~
~~Engineere~~
~~Engenere~~
I'm good
with math



"Whoa, don't ask me any math questions — I'm a *social* engineer!"

Are able to make estimates of the short- and long term impacts of technological change



What will it do after it grows up?

So how to transfer these competences in our universities?

- Dialogue, no force: no 'administrative targets' and no obligatory staff courses,
- Create concrete practical SD projects and invite various disciplines to join

Changing education

- It is hard to change universities, they exist for almost a millennium
- As an institution only the Catholic church exists longer...
- But if we achieve real change, it will last...