

Sustainability in computing (education)

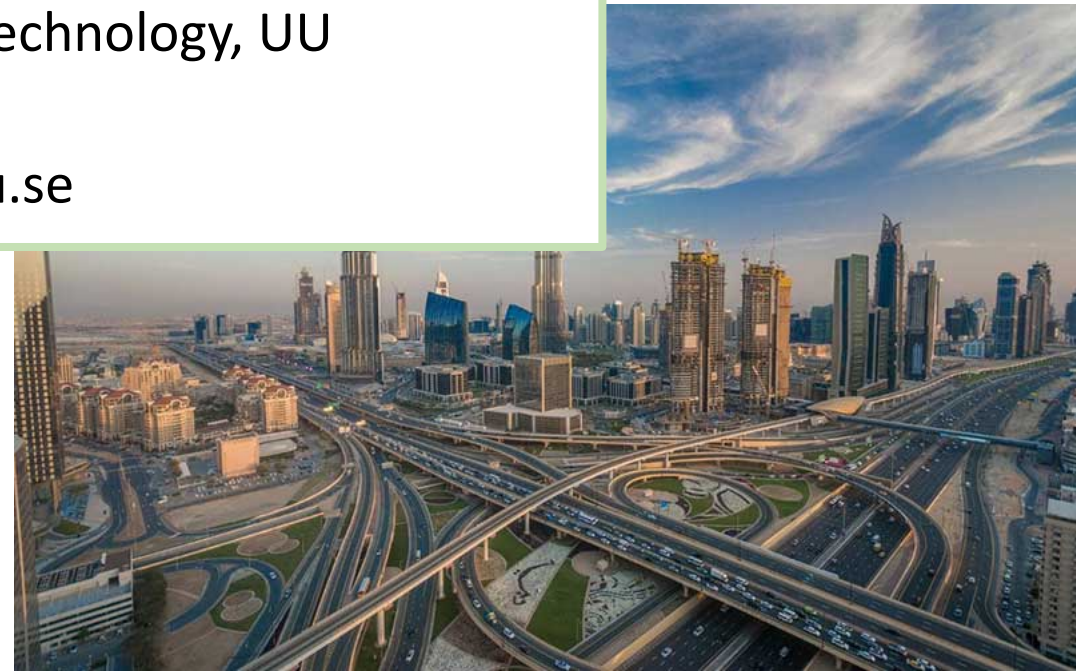
What! A matter of identity?

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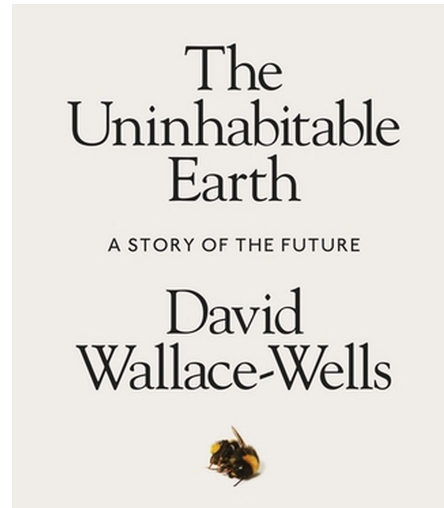
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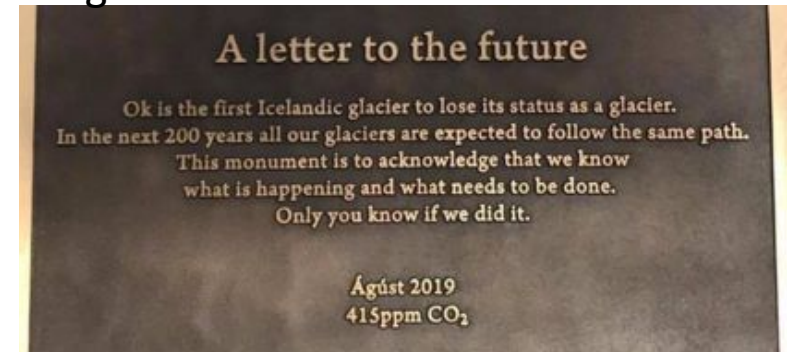
Global Sustainability Crisis

– Knowledge Action Gap

Feb 2019



Aug 2019

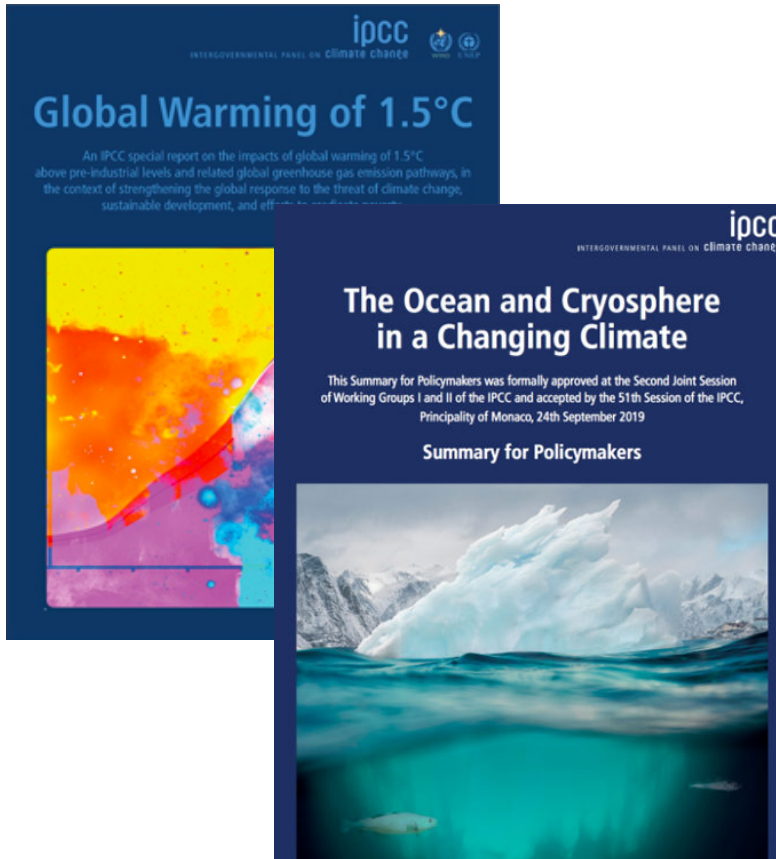


Oct 2019

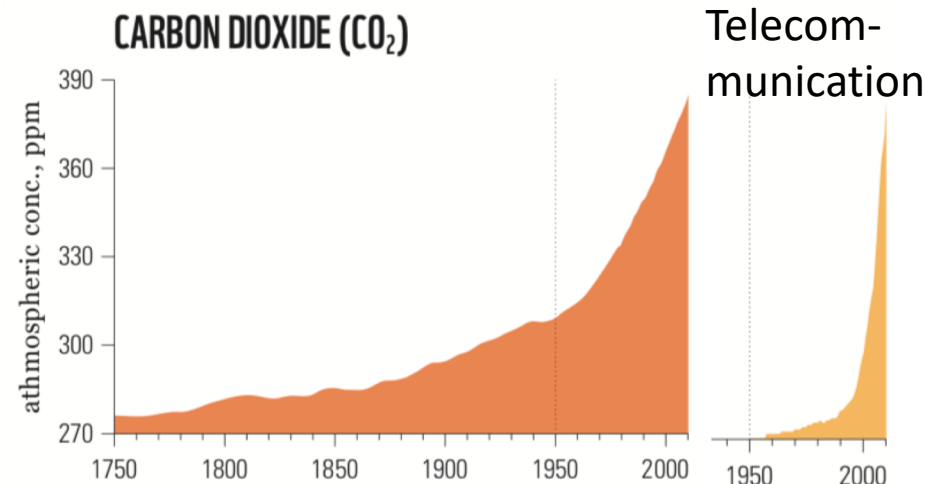
More than 11,000 scientists issue fresh warning: Earth faces a climate emergency

Nov 2019: [Presentation Prof Andersson](#)

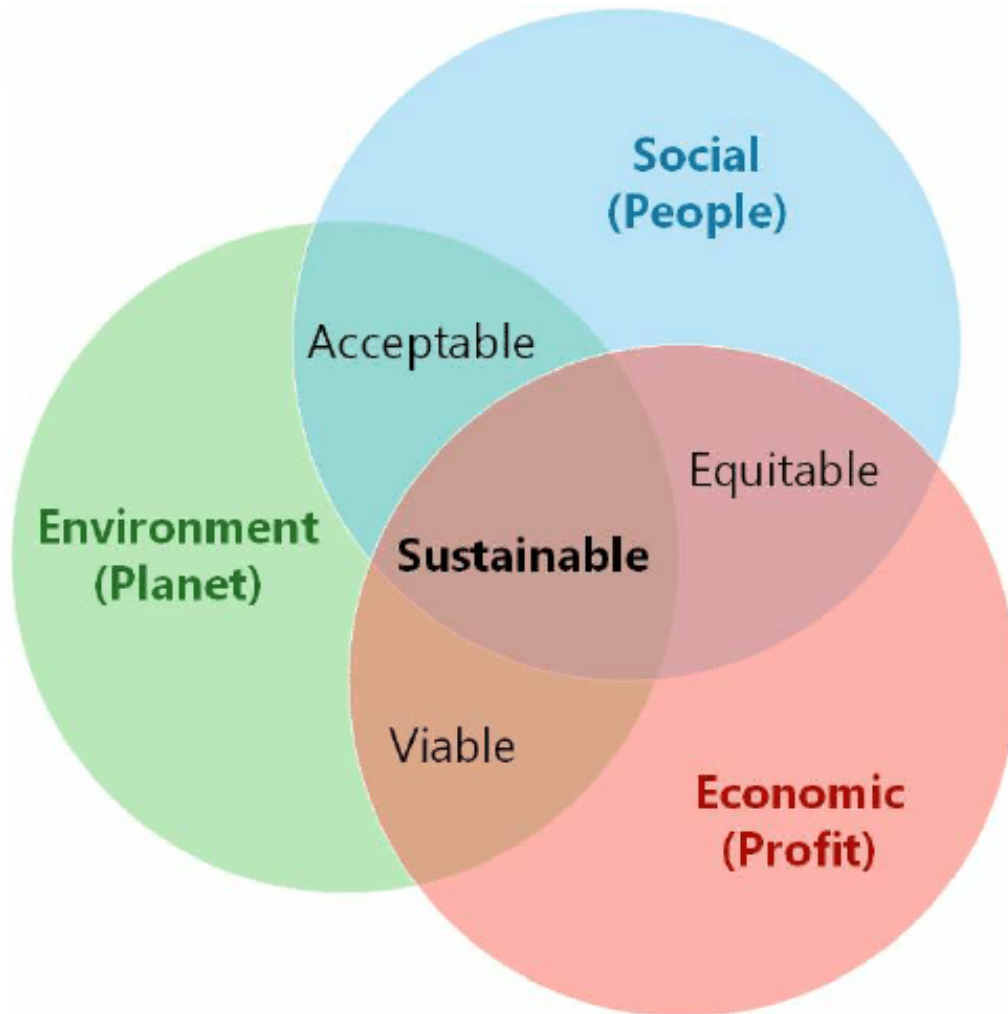
... from delusion to action on climate change



Intergovernmental Panel on Climate Change (IPCC)



Knowledge Action Gap!?



1. We are part of a complex system that needs to change
2. *Computing!* transforms society
3. *Education!* Computing students socialised into **UN**sustainability
(Peters, Pargman, Eriksson, 2019)
4. *Gender!*

From my research on student development

Interview Year 1: “The connection between Computer Science and political science comes naturally.”

Interview Year 3: “I think, one misses a lot when combining politics and CS. [...] *Political science [...] is about discussion [...] without getting anywhere.* [...] The only way to come to a point of right or wrong is to *look at reality.* [...] In *CS* it often feels like [...] I want to do a better solution [...] One tries: Can I do this *algorithm slightly, slightly faster?* *As this is a theoretical, a natural science discipline, one can always test the solution [...] in a very small, secure environment.*”

(Peters 2018)

Students are *socialised* into **Un**sustainability

(Peters 2018)



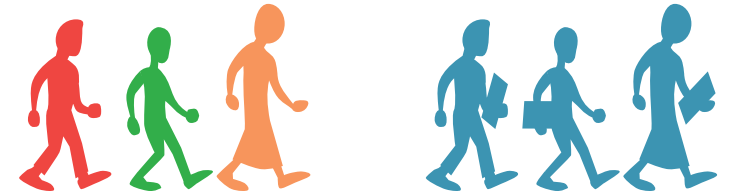
UPPSALA
UNIVERSITET

ANNE-KATHRIN PETERS Learning Computing at University: Participation and Identity

Learning Computing at University:
Participation and Identity

A Longitudinal Study

ANNE-KATHRIN PETERS



Participation in CS/IT at university

Participation in CS/IT is experienced as...

	Label	Social Context
A	... using	<i>Jaylin (CS, year 3): “[As a student], you discuss [. . .] different mini-projects that you are engaged in. [. . .]</i> <i>For example one person was doing some kind of a blinking light-thing for a jacket, so he had a little arduino kit that he programmed.” (Peters, to appear)</i>
B	... learning	
C	... creating	
D	... problem solving	
E	... problem solving for others	
		HCI contexts 3 rd study year
F	... creating new knowledge	Future contexts
G	... contributing to societal endeavours	Future contexts

Participation in CS/IT at university

Participation in CS/IT is experienced as...

	Label	
A	... using	<i>Amari (CS, year 3): "We have this bible, [. . .] a thick book which contains a lot of algorithms [...] and data structures. [...] it is very complete, [...] it contains only necessary text. I: "How did you use it?" Amari: "[. . .] The book contains a list of different algorithms that you can go through to see: 'That algorithm is suitable for this problem!'. I: "How did the book get the name bible?" Amari: "[. . .] Older students have called the book 'the bible', because for many students, CS is all about algorithms and data structures."</i>
B	... learning	
C	... creating	
D	... problem solving	
E	... problem solving for others	
F	... creating new knowledge	
G	... contributing to societal endeavours	
		Future contexts

Participation in CS/IT at university

Participation in CS/IT is experienced as...

	Label
A	... using
B	... learning
C	... creating
D	... problem solving
E	... problem solving for others
F	... creating new knowledge
G	... contributing to societal endeavors

Kim (IT, år 3): [What I take away from my studies is] a special way of thinking when problem solving. Divide and conquer is a good example - when you get a big problem, you split it up in smaller problems, and instead of lifting a mountain, you take one little stone at a time. That is the smartest thing you can do, if you get a problem and think: 'shit, this too hard I will never manage to do that!' then it is important to ask: 'Is there something I can do?' So that you [...] solve small parts of the problems at a time and then, at the end, the problem will be gone. That is the most [...] vital thing we have learnt.

Participation in CS/IT at university

Participation in CS/IT is experienced as...

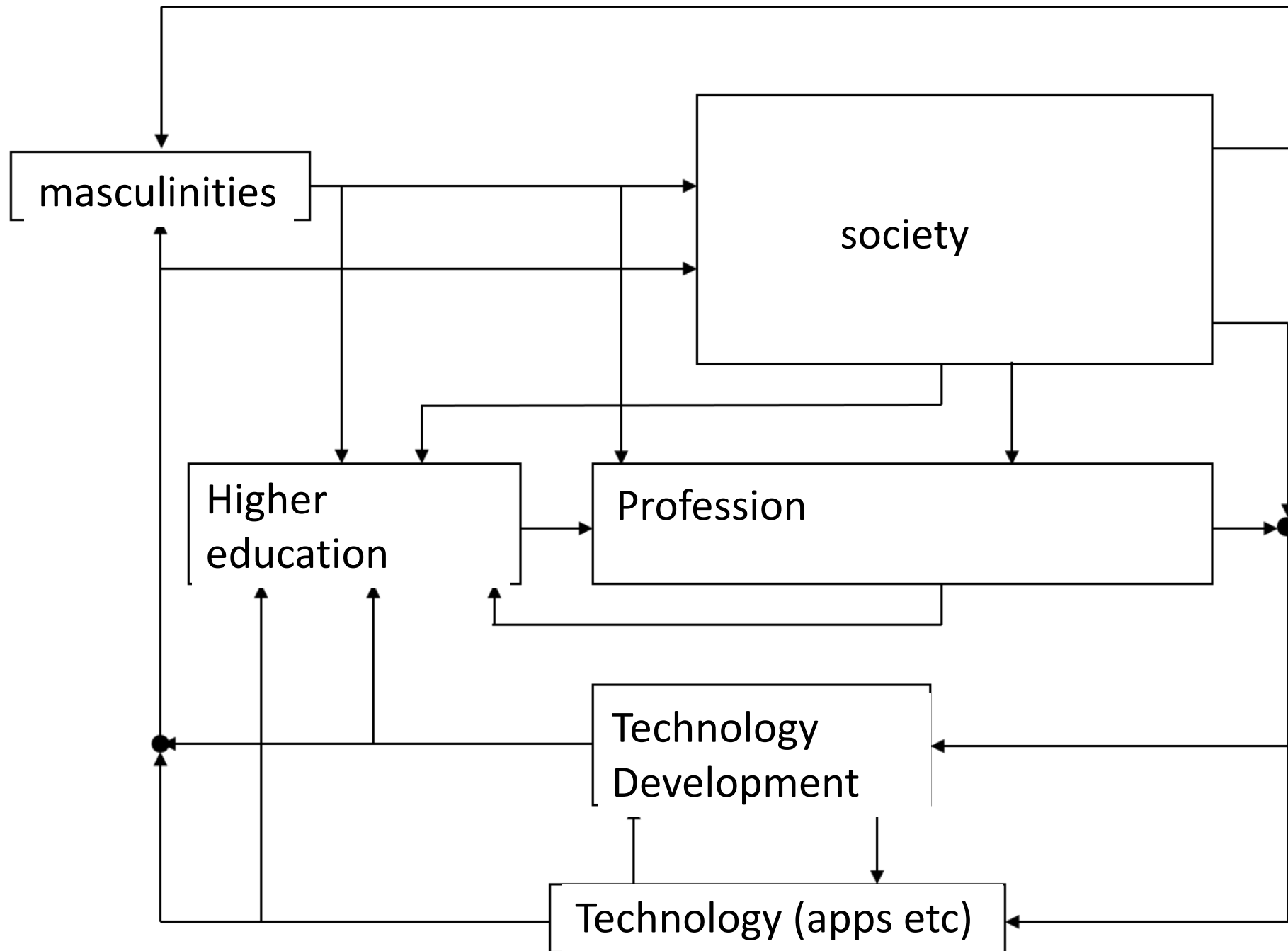
	Label	Social Context
A	... using	<i>Finley (IT, year 3): When you have managed to divide the problem into parts and merge the small solutions, and when you in the end have created something that seems to give the result that you were aiming for, when you realise that this can work, then I feel 'This is fun!' and then you become a junkie - that you want to feel this feeling again and again. And then you work towards that feeling that can exist in other situations as well.</i>
B	... learning	
C	... creating	
D	... problem solving	
E	... problem solving for others	
F	... creating new knowledge	
G	... contributing to societal endeavours	Future contexts

Participation in CS/IT at university

Participation in CS/IT is experienced as...

	Label	Social Context
A	... using	Various, e.g. family, peers, school
B	... learning	
C	... creating	
D	... problem solving	
E	... problem solving for others	
F	... creating new knowledge	
G	... contributing to societal endeavours	

Finlay (CS, year 3): “[The HCI course was about] improving a user’s interaction with a program. [. . .] We got to do a study in which we looked at existing systems. We tried to identify what is good and what could be improved, we tried to do interviews with users [. . .]. That was quite interesting, something that I didn’t think about earlier.”



Digitalisation and Sustainability – two meeting movements!?



ICT4s
ICT for Sustainability

Sustainability Design and Software:
The Karlskrona Manifesto



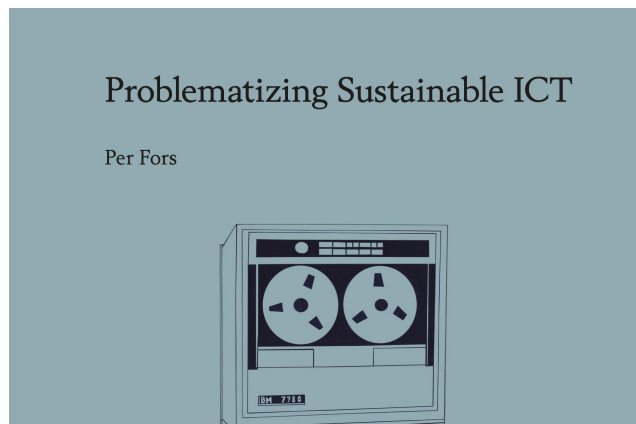
Problematizing Sustainable ICT

Per Fors



Computing norms and practices are being criticised...

- Technology assumed to be value-free and deterministic
- focus on the development and implementation of technical systems
- humans are viewed as independent and rational, technology as instrumental
- focus on easily quantifiable aspects rather than on sociocultural aspects
- ICT development supports the consumer culture with its negative impacts on the environment

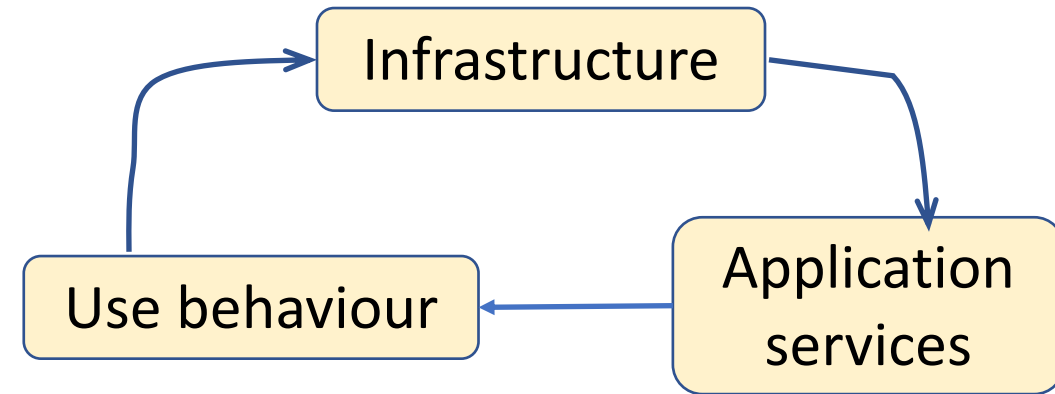


Any thoughts when you see this? Can you see gender here?

New understandings of technology development!?

- Energy consumption
- Application effects, e.g. mining, waste
- Scaling effects

Ref: Hilty & Aebischer (2015) ICT for sustainability:
An emerging research field. In *ICT Innovations for Sustainability*, Springer



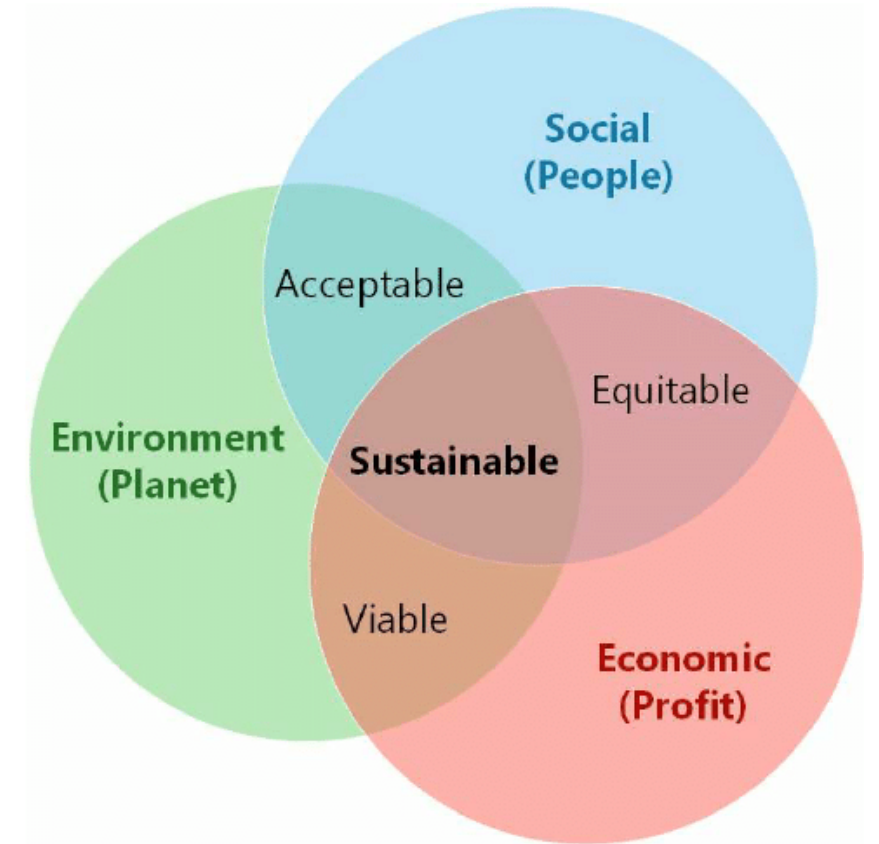
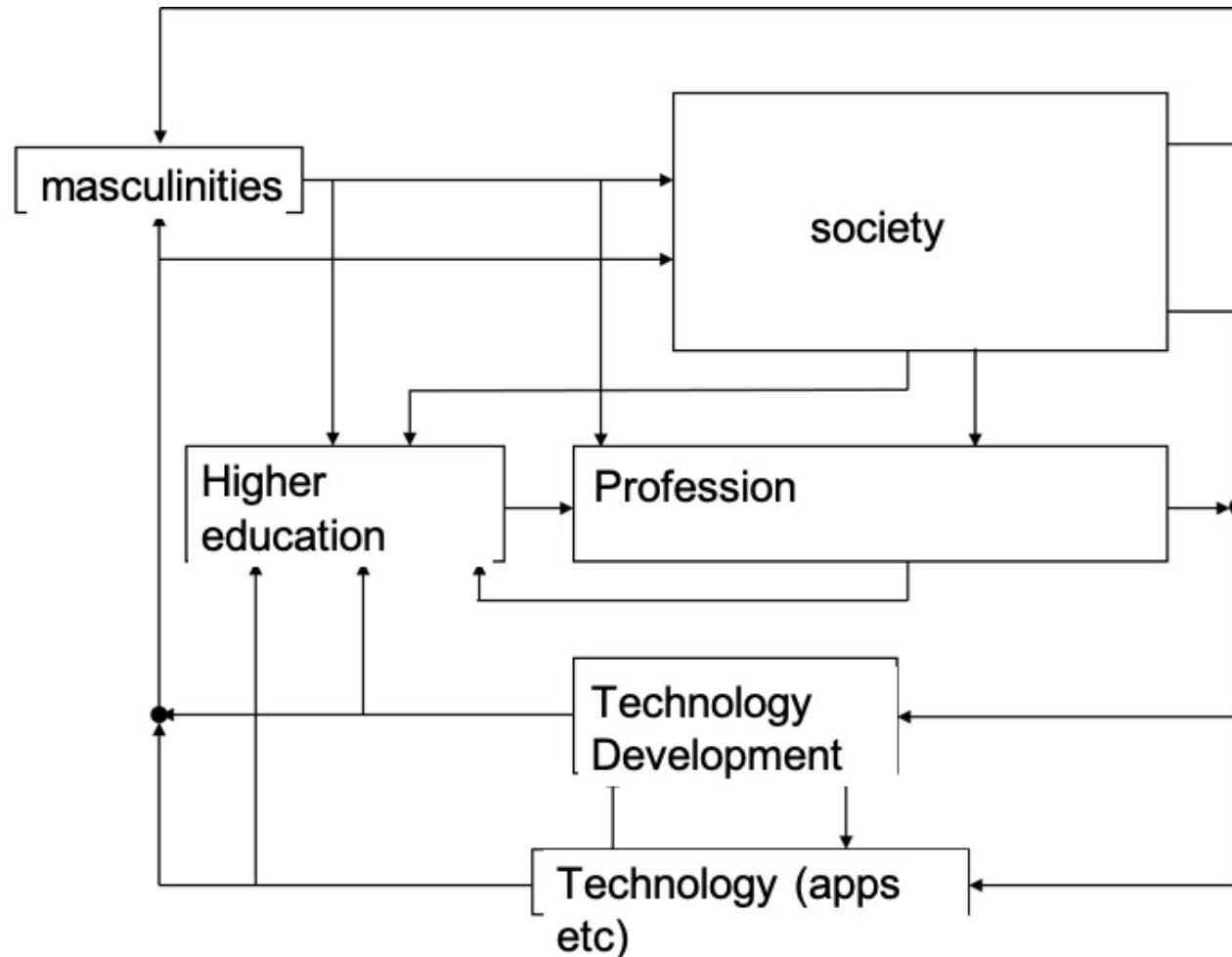
- The Role of IT for sustainability

... and education should be changing...



Keri Facer 2019

So maybe the system is changing...!?



2 minutes to reflect

1. What have you learnt today?
2. What are your comments to us?

