

# Session on scenarios & 'disciplinarity' ...with Winland project as a case



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MUO-E8016 Knowledge-making  
for sustainability course, 24.4.2019

# Eeva's interjection on group presentations

- these will be organised for the 15. and 22.5.
- The task will begin 8.5. You will be assigned to a group

4 groups on 15.5. to include:

Raffaella

Omar

Anumaria

Laura

Riina

Lassi

Eva

(Luis, Beda, Blinera, Kola)

# WHO & WHAT

- Senior University Lecturer at Water & Environmental Engineering Research Group at Aalto University
- Researcher at WDRG on large Asian river basins
  - Water and its diverse connections with development
  - Multi- & interdisciplinary approach: know-how & know-why
- My own background: studied water management at Aalto (then TKK) + many other things elsewhere
  - Research focused on Mekong River & integrated approaches
  - Now leading multi- and interdisciplinary Winland project

# TODAY'S AGENDA

HOW DOES  
THIS FEEL?

- Session on scenarios as integrative tool for co-creation for researchers & stakeholders
  - Experiences from SRC-funded Winland project
- Discussion and task on 'multi-disciplinarity'
  - Multi-, inter-, transdisciplinarity
- Introduction to the role that water has in SDGs and sustainability ('I cannot help myself' -part)
  - Only if we have time & energy!

# Using scenarios as an integrative method for research and co-creation

*Case: Winland project*

# YOUR FIRST LECTURE:

## Students who succeed the course will be able to

- Plan and argue for their own research
- Sharpen their knowledge of the types of research needed for achieving environmental sustainability
- Better understand the role of knowledge in policy- and decision-making (for sustainability)

## More specifically the course will help you

- Identify key features of professional and scholarly knowledge in fields relevant to CS
- Understand how and why inter-disciplinary work contributes to sustainability debates; Learn and work across and between disciplines
- Recognize and work with local, tacit and non-expert types of knowledge
- **Develop conceptual tools for discussing socio-technical change**
- Critically evaluate sustainability-related knowledge claims

This session: what role scenarios and 'disciplinarity' can have in this?

→ Based on practical experience from Winland project + discussion!

# DOUBLE BUBBLE

## *What is a scenario?*

- *Have you used scenarios in your work or studies?*
- *What are their pros & cons?*



Winland is funded by Strategic Research Council of Finland

→ SRC is new kind of funding instrument that aims for both scientific and societal impact!

SRC =  
CS! :)

→ Requires thus not only multi-disciplinary but also inter- and transdisciplinary research (= *'knowledge-making'*)

→ Scenarios used by several projects as a means to engage stakeholders in future-orientated co-creation process

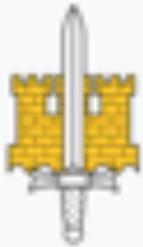
→ Altogether 45 on-going projects under four themes, all of them somehow sustainability-related: check e.g. **transition arenas** under SET & BlueAdapt!



# WINLAND



# WINLAND?



*Funded by Strategic  
Research Council SRC*

# SCENARIOS & WINLAND

## Scenarios as an **integrative method** (Huutoniemi)

→ Multiple aims with multiple benefits:

1. Combining different researchers and disciplines
2. Combining us with our stakeholders into a co-creation process (joint problem definition, analysis & solutions)
3. Providing long-term view, and thus trying to escape from present-day politics and fights over power & resources
4. ..and oh yes: creating alternative views of the future, including both undesirable 'Failands' and desirable 'Winlands'!

*HENCE: at least as much about process as about the end product*

# WHAT IS A SCENARIO?

SCENARIO = “coherent, internally consistent and plausible description of a possible future state of the world.

It is not a forecast; rather, each scenario is one alternative image of how the future can unfold.” IPCC 2012

That was the easy part...

# BUT WHAT ARE SCENARIOS USED FOR?

This gets more tricky, as world is full of different types of scenario processes: and they all are definitely **not** just about creating “a description of a possible future state of the world”

→ Scenarios as a tool for what? (and why?)

# SCENARIOS & WINLAND

Started with Failand-scenarios:  
visioning undesirable future  
Finlands in sectoral workshops  
with our stakeholders

→ Aimed to remind that neglecting  
the basics i.e. energy-food-water  
security can be catastrophic  
(although everything looks ok now)

→ Did the job + also helped us to  
understand the diverse views of  
different actors

## FAILAND-TULEVAISUUSKUVAT JA NIIDEN KRIITTISET TEKIJÄT, TEMAATTISET HAASTEET JA ELINTÄRKEÄT TOIMINNOT.

KRIITTISET TEKIJÄT	TEMAATTISET HAASTEET	ELINTÄRKEÄT TOIMINNOT
<b>1. Ilmastonmuutoksen kerrannaisvaikutukset iskevät</b>		
Suuren mittakaavan muutto liikkeet ja sään ääri-ilmiöt Yhteiskunnan vakaus lisääntyvässä paineissa	<b>Energia:</b> eri energiantuotantomuotojen ilmasto- ja vaikutusten huomiointi, energiainfrastruktuurin haavoittuvuus, energialähtöjen vastuullisuus ja turvallisuusvaikutukset <b>Ruoka:</b> globaali ruokakriisi ja sen heijastevaikutukset Suomeen, Suomen ruoantuotannon kasvupaineet ja sopeutuminen muuttuneisiin ilmasto-oihin, elintarvikkeiden vastuullisuus ja turvallisuusvaikutukset <b>Vesi &amp; ilmasto:</b> sään ääreväilyminen: kuivuudet ja tulvat, globaali vesikriisi ja sen heijastevaikutukset Suomeen	Henkinen kriisinkestävyys, väestön toimeentuloturva ja toimintakyky, sisäinen turvallisuus
<b>2. Hauras ruokaturva</b>		
Suomen ruokajärjestelmän tehostamispaineeet ja huoltovarmuuden rakenteelliset haasteet	<b>Energia:</b> energiantuotannon riippuvuus fossiilisista tuontipolttoaineista, digitaalisten järjestelmien sähköriippuvuus <b>Ruoka:</b> äärimmilleen optimoitu ja keskittetty tuotanto- ja jakelu järjestelmä altis häiriöille esimerkiksi energianjakelussa, suomalaisen ruoantuotannon ja -jalostuksen ylläpito, resurssinrikkyyden hallinta <b>Vesi &amp; ilmasto:</b> uudenlaisten tautien ja tulokaslajien hallinta	Henkinen kriisinkestävyys, väestön toimeentuloturva ja toimintakyky
<b>3. Energiamurros epäonnistuu</b>		
Energia- ja ilmastopoliittikan, ilmastopoliittikan ja energiaturvallisuuden ristiriitaiset tavoitteet	<b>Energia:</b> globaalin ilmastopoliittikan ja energiaturvallisuuden yhteensovittaminen, sähkömarkkinoiden kyky vastata muuttuviin tilanteisiin ja vaadittaviin joustoihin, polkuriippuvuuden katkaiseminen tuoduista fossiilisista polttoaineista, biomassan kestävyys ja hiileneutraalisuus <b>Ruoka:</b> ruoantuotannon, kuljetuksen ja jakelun energian saannin varmistaminen <b>Vesi &amp; ilmasto:</b> bioenergiatuotannon vesivaikutusten hallinta	Talouden ja infrastruktuurin toimivuus, erityisesti polttoaine- ja voimahuollon turvaaminen
<b>4. Uusi epävarmuuden aikakausi</b>		
Maailmanpolitiikan lisääntyvä epävakaus sekä etupolitiikka	<b>Energia:</b> nationaalinen energiapolitiikka vs. globaali ilmastopoliittika ja yhteisten energiemarkkinoiden kehitys, riippuvuus tuontienergiasta ja sen saannin katkokset, kyberhyökkäykset <b>Ruoka:</b> huoltovarmuus, resurssinrikkyyden, eriarvoistuminen, kyberhyökkäykset <b>Vesi &amp; ilmasto:</b> kyberhyökkäykset	Kansainvälinen toiminta
<b>5. Kriittisen infrastruktuurin romahdus</b>		
Kriittisen infrastruktuurin rappeutuminen ja korjauksen kasvamisen talouspaineissa	<b>Energia:</b> energiahuoltovarmuuden ylläpitäminen energiamurroksessa ja sen jälkeen <b>Ruoka:</b> ruoanjalostus- ja jakelukapasiteetin varmistaminen <b>Vesi &amp; ilmasto:</b> vesihuoltoinfrastruktuurin ylläpito, veden laadun ylläpitäminen sekä epidemioiden ehkäiseminen	Talouden ja infrastruktuurin toimivuus, väestön toimeentuloturva ja toimintakyky

# SCENARIOS & WINLAND

Then: **scenario fatigue!**

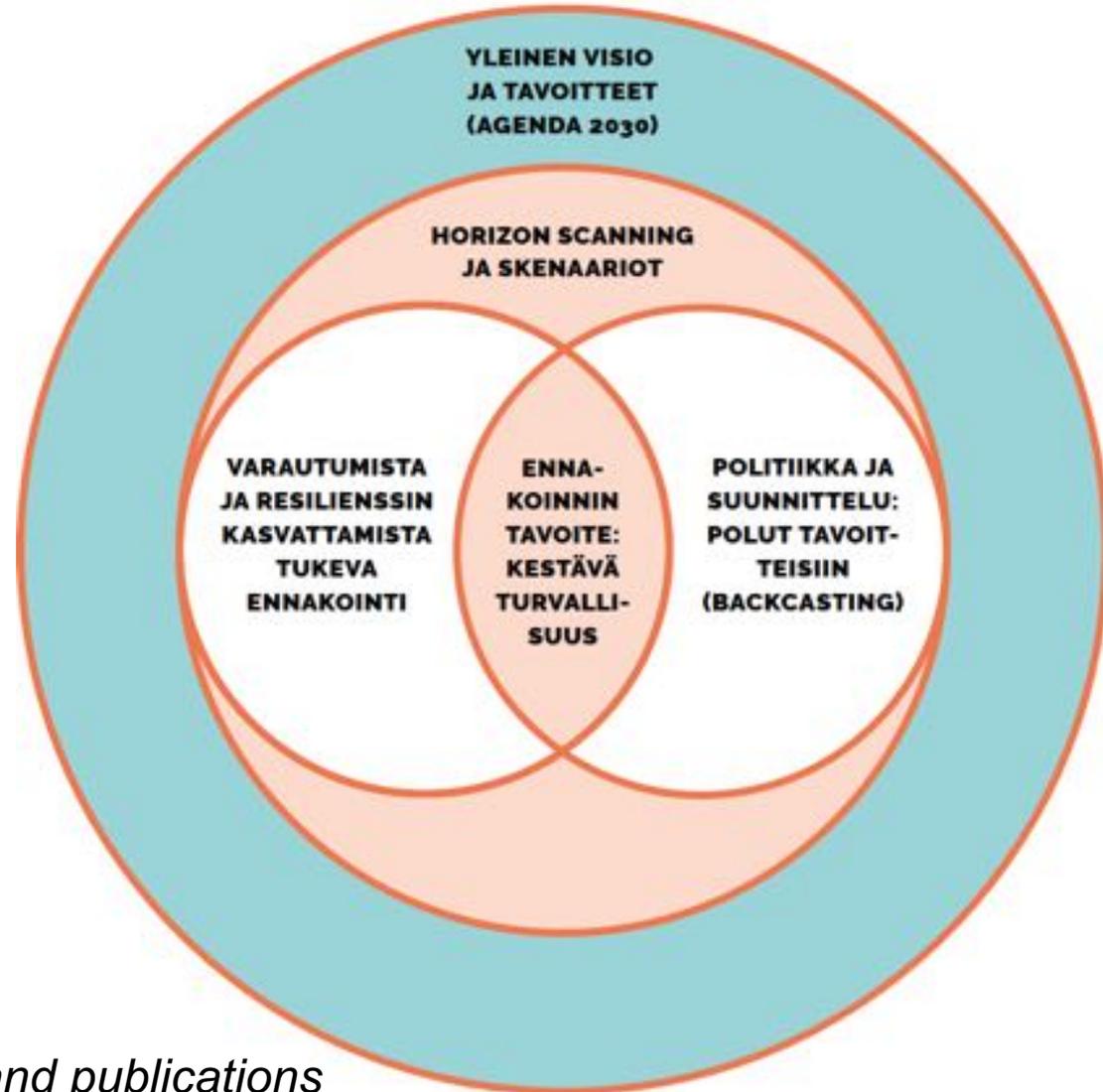
- Several SRC-projects using scenarios (most more as a co-creation process, rather than as knowledge making tool)
- Government also very active on this:
  - Inter-ministerial 'change factors' (VN:n muutostekijät)
  - Scenarios related to National Emergency Supply Agency (HVK)
  - Anticipation as part of Finnish comprehensive security and our Security Strategy for Society 2017

**So what to do?** No more scenarios, but a structured analysis of how scenarios and anticipation is used in decision-making

- Check out Minkkinen (2019) + our briefs (in Finnish, though)

# Winland's take on the security-related anticipation processes in Finland

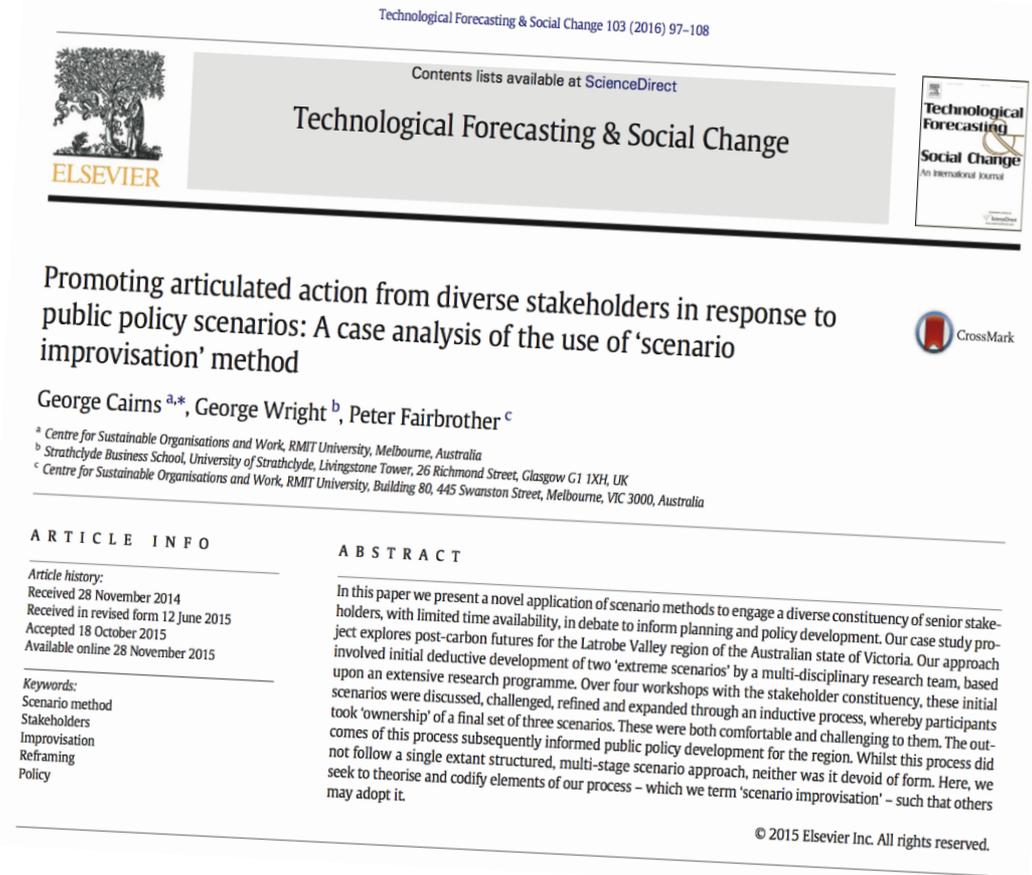
→ Must combine long- and short-term views, and bring sustainability as a core guiding principle for security



*More: see Minkkinen (2019) + Winland publications*

# Who has read this?

→ You should: it was compulsory reading...



# What are your thoughts about it?

**Table 1**  
Summary of key characteristics of scenario approaches.

Scenario approach Characteristics	IL	BLM	CSM	SI
Participant time commitment	High	High	High	Low
Participant knowledge of scenario construction process (gained over the exercise)	High	High	High	Low
Required knowledge of the substantive issue of concern by the workshop facilitators	Low/medium	Low/medium	Low/medium	High
Role of participants in scenario development	Scenario generators	Scenario generators	Scenario generators	Respond and refine
Role of scenario facilitators	Facilitators	Facilitators	Facilitators	Scenario generators/ Facilitators
Use of 'Remarkable person' to generate challenge to participants	Recommended	N/A	Not listed – optional	Scenario team function to present challenge
Role of 'client' in scenarios	External observer	Active participant	Not listed – optional	Reactive and active
Scenario iterations	Multiple	Multiple	Multiple	Multiple
No. of scenarios	4	One or more	4	As appropriate
Form of scenario development	Multi-stage structured	Multi-stage structured	Multi-stage structured	Follow forms as appropriate
Mode of inquiry	Inductive	Deductive	Inductive	Inductive/ Deductive
Pre-workshop interviews by scenario team	Recommended – not essential	Not essential	Not listed – optional	Essential
Background research on issue	Participants	Participants	Participants	Research/ Scenario team

- **IL = intuitive logics-based 'forward-chaining'**: scenarios are constructed through building chains of cause-effect or chronological linkage, based upon a structured analysis of the present (e.g. PEST/STEEP)
- **CSM = critical scenario method**: considering power & politics, and engaging multiple stakeholders with diverse and conflicting values and beliefs, but with a focus on achieving some form of 'common good' for the future
- **BLM = 'backwards logic' method**: requires participants to develop the logic of a presented 'extreme' future scenario through intuitive effect-cause analysis; builds thus partly on the idea of backcasting
- **SI = scenario improvisation** by Cairns et al: applying different scenario methods in the most appropriate way to engage time-poor key decision makers in a democratic conversation that would inform policy and planning on their region's future

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Role of scenario facilitators	Facilitators	Facilitators	Facilitators	Facilitators
Use of 'Remarkable person' to generate challenge to participants	Not used	Not used	Not used	Used
Role of 'Remarkable person'	Not used	Not used	Not used	Used
Scenario No.	As appropriate	As appropriate	As appropriate	As appropriate
Form	Follow forms as appropriate			
Method	Inductive/Deductive	Inductive/Deductive	Inductive/Deductive	Inductive/Deductive
Pre-Back	Recommended – not essential	Not essential	Not listed – optional	Essential
Back	Participants	Participants	Participants	Scenario team

Scenarios = many ways to do them  
→ Depends also what you want out of them!

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# SCENARIOS: benefits

Scenarios potentially POWERFUL in:

## 1) COMBINING

- Differing views & interests, of variety of actors
- Different (scientific) information, from models to policy analysis
- Scientist and policy-makers, around same table with long-term view

## 2) COMMUNICATING

- Complexity & uncertainty through alternative futures
- Wild cards and other 'vague' aspects (typically neglected in research)

## 3) DISCUSSION & FEEDBACK on research

# SCENARIOS: challenges

Scenarios potentially PROBLEMATIC in:

## 1) HIDING

- Varying quality & sheer lack of information

## 2) MISLEADING

- Can become subjective interpretations: scenario processes of very varying quality being done and promoted

## 3) FRUSTRATING

- For above reasons, possibility for quite serious scenario fatigue or even distrust (which would be a shame)

HOW  
DOES  
THIS  
RELATE  
TO YOUR  
PREVIOUS  
SESSION?

## Students who succeed the course will be able to

- Plan and argue for their own research
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## More specifically the course will help you

- Identify key features of professional and scholarly knowledge in fields relevant to CS
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- **Develop conceptual tools for discussing socio-technical change**
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*Questions?*  
*Comments?*



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- Session on scenarios as integrative tool for co-creation for researchers & stakeholders
  - Experiences from SRC-funded Winland project
- Discussion and task on 'multi-disciplinarity'
  - Multi-, inter-, transdisciplinarity
- Introduction to the role that water has in SDGs and sustainability ('I cannot help myself' -part)
  - Only if we have time & energy!

# Integration in science: 'disciplinarity'



# DISCIPLINES

- What is a discipline?  
'a specific field of study that creates its own branch of scientific knowledge'
  - A discipline thus provides the scientist with an identity: maintains an institutional order and has own professional standards and publication + education procedures
- Yet, the division of research into separate disciplines is due to historical development rather than to scientific necessity
  - Challenge: leading to overspecialisation and too narrowly defined research questions

‘ Society  
has **problems**,  
universities  
have **disciplines**’

*Adapted from Scholz & Marks (2001)*

# DISCIPLINARITIES

- An increasing drive to find ways to link different disciplines more closely together
  - Different kinds of 'multi-disciplinarity'
- Also research thus seeing increasing drive towards integration
  - Reasons are also similar:
    - Defragmentation of separate disciplines
    - Sustainable development

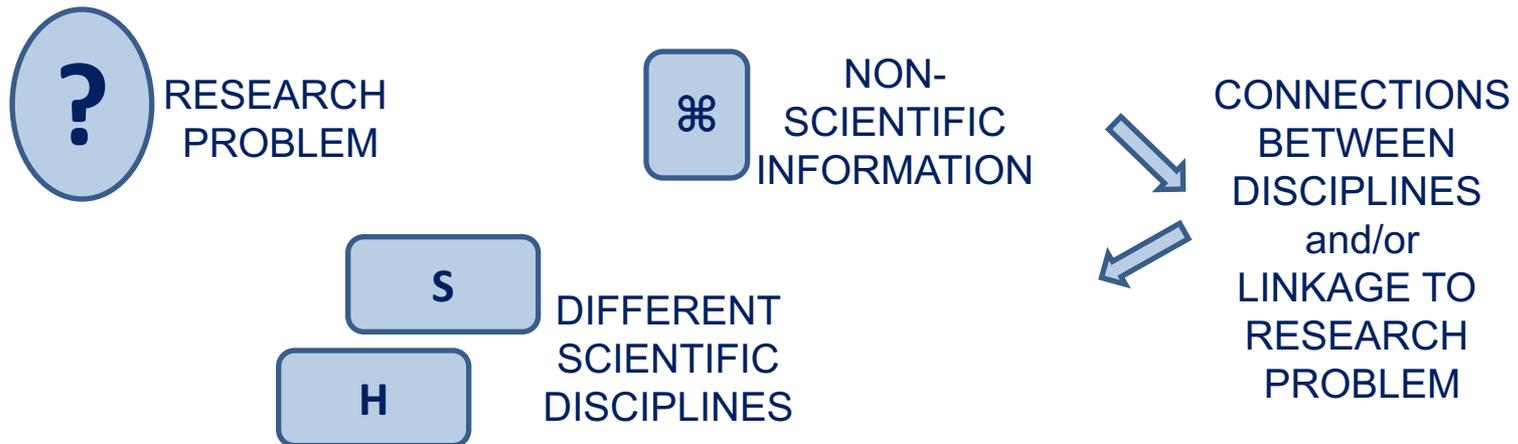
(already Agenda 21 of Rio's UN Conference on Environment and Development in 1992 called for research that would be interdisciplinary and integrated)

# 'MULTI-DISCIPLINARITIES'

- Disciplines can naturally be connected in different ways: different kinds of 'multi-disciplinarity'
    - Multidisciplinarity ('monitieteisyys')
    - Crossdisciplinarity ('poikkitieteisyys')
    - Interdisciplinarity ('tieteiden välisyys')
    - Transdisciplinarity ('tieteiden ylisyyys')
    - Others, too (mono-, pluri-, post-)
- But how these differ?

# TASK: VISUALISING MULTI-DISCIPLINARITIES

- Draw a visualisation for three multi-disciplinarity (multi-, inter- & transdisciplinarity)
- You can use e.g. the following shapes (add your owns, if needed)



# TASK: VISUALISING MULTI-DISCIPLINARITIES

What did you find out?

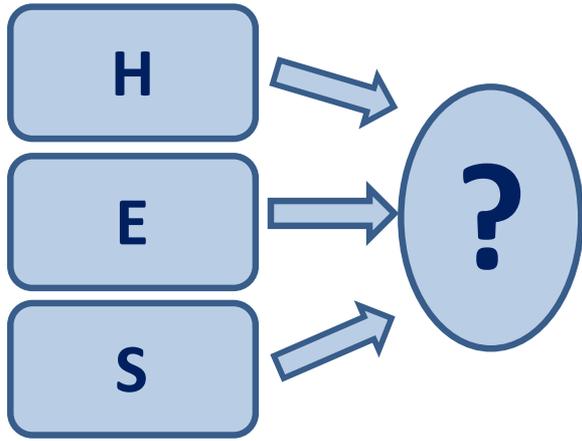
- Are there differences?
- How they can be described?
- Does this make sense?

Plenty of literature on disciplinarity,  
but not very clear definitions for their  
differences – and even less visualisations

I like diagrams, as force you to focus

→ Next my visualisations, from my Doctoral Thesis  
(available at AaltoDoc): not as such right,  
but just to give you an idea how I think about this

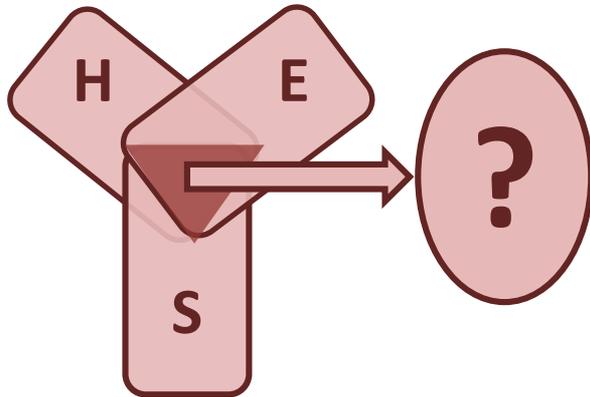
→ Check the Thesis for good references, too



## MULTIDISCIPLINARITY

Problem analysed through different disciplines, with experts working as one team but still using their own disciplinary methods

→ Discipline-driven: disciplines define the problem



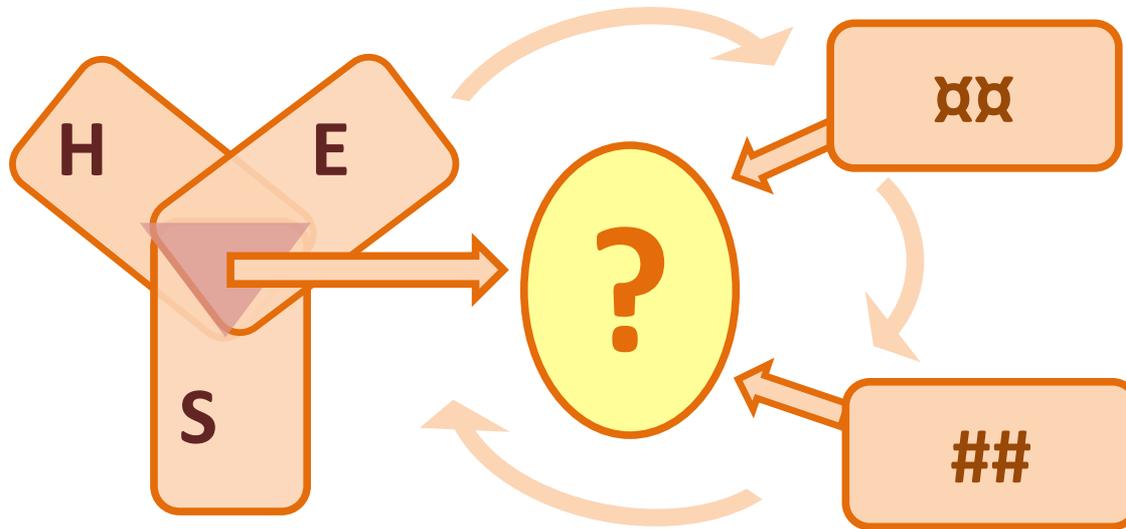
## INTERDISCIPLINARITY

Problem analysed with the help of methods developed by the team for this particular problem, integrating knowledge, theories and methods from different disciplines

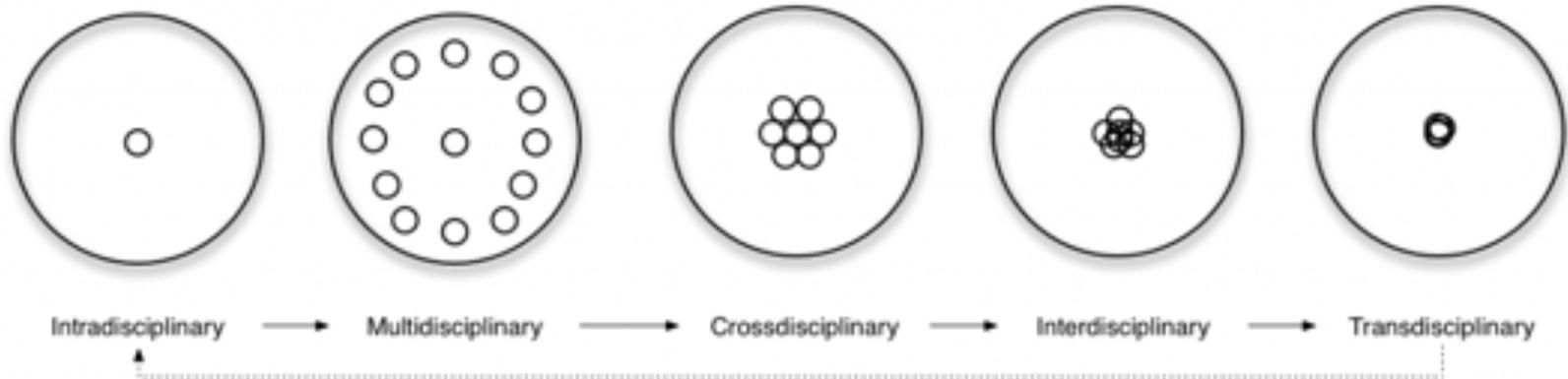
→ Problem-driven: problem defines the disciplines

# TRANSDISCIPLINARITY:

Collaborative, dynamic problem solving approach crossing both disciplinary boundaries & different forms of knowledge production



# ALTERNATIVE VIEWS, TOO!



<http://www.arj.no/2012/03/12/disciplinarity-2/>

# 'MULTI-DISCIPLINARITIES'

Naturally also many other ways to conceptualise / visualise multi-disciplinarity exist

- The level of 'common ground'
  - Research context vs. question
- Generalism vs. holism (Willamo)
  - Generalism: multiple views i.e. multidisciplinary (existing methods), Holism: comprehensive i.e. interdisciplinary (new methods)
  - When research team grows, generalism tends to dominate as holism becomes more difficult

# WAY FORWARD?

- Need for multidisciplinary / -sectoral teams with interdisciplinary / -sectoral approaches
  - Team interaction more & more important
- ‘Doing more with less’: successful integrated management may actually require less detailed disciplinary studies and much more interaction
  - Slow, long process
- Integration works as mindset, but not always as actual approach
  - Also **fragmentation**’ is good in some cases

# LINK TO RESEARCH

- Research on sustainability has to be inter- and even transdisciplinarity
  - INTER: not only bringing different disciplines together, but taking a problem-specific view with (new) methods suitable for that specific purpose
  - TRANS: considering also other, non-scientific forms of knowledge (particularly local/traditional knowledge)
- This links to education, too
  - T-people needed
  - Great to be here today!

# 'DISCIPLINARITIES' @ AALTO?

Aalto University's old strategy recognised both multi- and inter-disciplinarity, while new strategy talks about 'multidisciplinary collaboration'

→ I argue that interdisciplinarity very important, and could actually be what makes Aalto unique!

**SOCIETAL:** solving the major challenges of our society requires out of the (disciplinary) box –thinking

**ACADEMIC:** new scientific innovations (and even new disciplines) emerge often from scientific boundaries

**EDUCATIONAL:** students should be given broad, systemic view + complement that with specific expertise

# TODAY'S AGENDA

HOW ARE YOU  
FEELING?

- Session on scenarios as integrative tool for co-creation for researchers & stakeholders
  - Experiences from SRC-funded Winland project
- Discussion and task on 'multi-disciplinarity'
  - Multi-, inter-, transdisciplinarity
- Introduction to the role that water has in SDGs and sustainability ('I cannot help myself' -part)
  - Only if we have time & energy!

# BLUE PLANET'S BLUES

The volume of world's water is fixed:  
it doesn't increase or decrease

1'386'000'000'000'000'000'000 litres

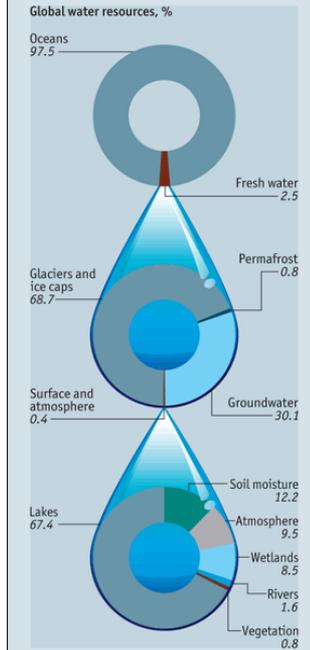
BUT: only 2,5% of world's water is fresh-water and 30% of this available for use

1%

→ only less than percent of world's water is actually available for human use

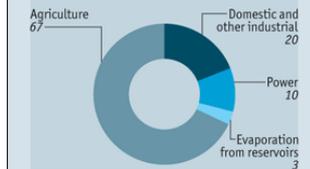
← BUT WHY IS THIS HERE?

## Where the water comes from...

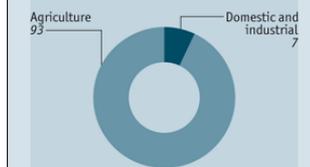


## ...and where it goes

Water abstraction from rivers, lakes and groundwater, %



Consumptive use\* of abstracted water, %



Source: World Bank: World Development Report 2010

\*Water unavailable for further use in the system

# The Water Cycle

Water storage in ice and snow

Water storage in the atmosphere

Condensation

Precipitation

Sublimation

Evapotranspiration

Evaporation

Snowmelt runoff

Surface runoff

Streamflow

Evaporation

Freshwater storage

FISHERIES

Water storage in oceans

HYDRO-POWER

AGRI-CULTURE

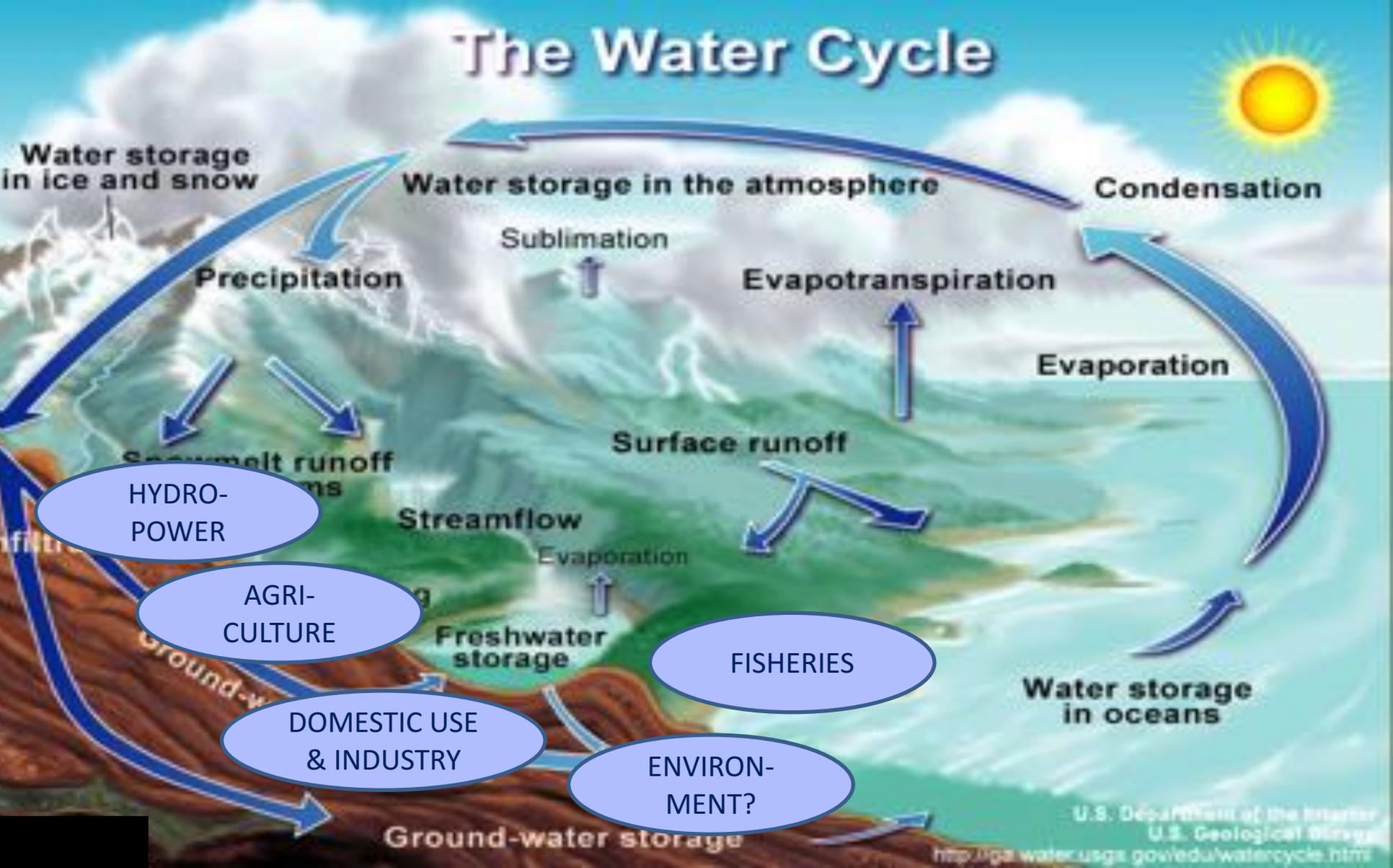
DOMESTIC USE & INDUSTRY

ENVIRON-MENT?

Ground-water storage

U.S. Department of the Interior  
U.S. Geological Survey

<http://ga.water.usgs.gov/edu/watercycle.html>



# WATER & DEVELOPMENT?

## 1) CLEAN WATER: Lack of water supply & sanitation

- ~700 million lack access to water, ~2 billion to sanitation
- >2 billion suffer from diseases linked to water

## 2) ENOUGH WATER: Competing water uses

- Most of the world's water is used for agriculture: on average ~70%, many developing countries ~90%
- Other, competing water uses: hydropower, industry, households, environment/fish...

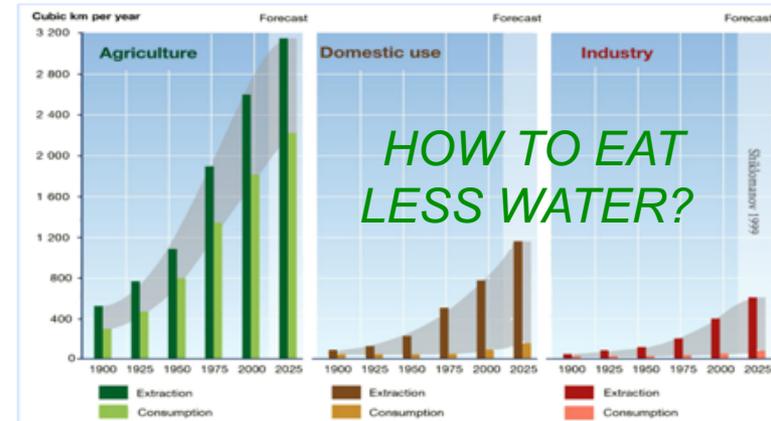
→ Both very relevant, but approaches differ hugely!



# THE PROBLEM

Volume of water is fixed, but its use increases  
(and availability changes)

- Population growth & urbanisation
- Changes in consumption
- Changes in diet
- Climate change
- Decreasing water quality



→ Less water available per person

→ Competing water uses

# THE PROBLEM – version 2

” There is a water crisis today.

But the crisis is not about having too little water to satisfy our needs.

It is a **crisis of managing water so badly** that billions of people –and the environment– suffer.”

*World Water Report 2000*

# SO WHAT TO DO?

- We need to manage water in broader, more comprehensive ways
  - Taking into account various uses of water: different groups + environment (*sustainability*)
  - Links to various different sectors (*defragmentation*)
- But water use is increasingly political
  - Increasing *participation*: key stakeholders included
- Integrated approaches address this 'triple challenge' / *sustainability, defragmentation & participation*

# IWRM?

The Paradigm for management of water currently

→ Binding agreement, not just a promise *(WSSD 2002, 2012, SDGs)*

→ Acknowledged also outside water field

”IWRM is a **process** which promotes **coordinated development** and management of water, land and related resources, in order to maximize the resultant **economic and social welfare** in an equitable manner without compromising the **sustainability of vital ecosystems**”

*Essentially a  
co-creative  
knowledge-making  
process!*

GWP 2000



# KIITOS!

# COMMENTS? QUESTIONS?



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 @keskma

[wdrg.aalto.fi](http://wdrg.aalto.fi)

[winlandtutkimus.fi](http://winlandtutkimus.fi)