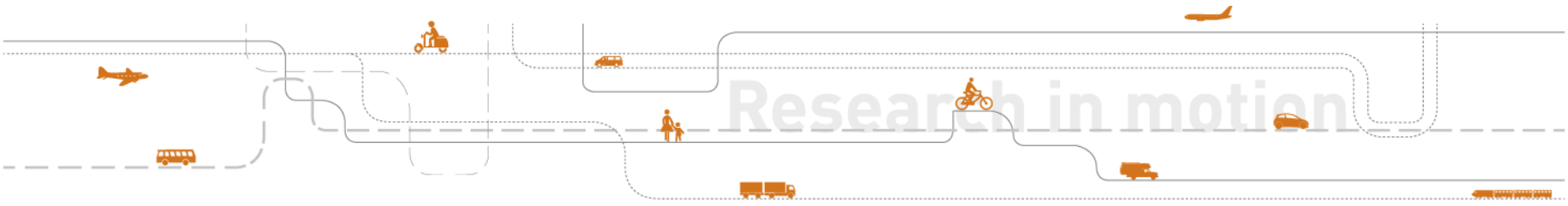
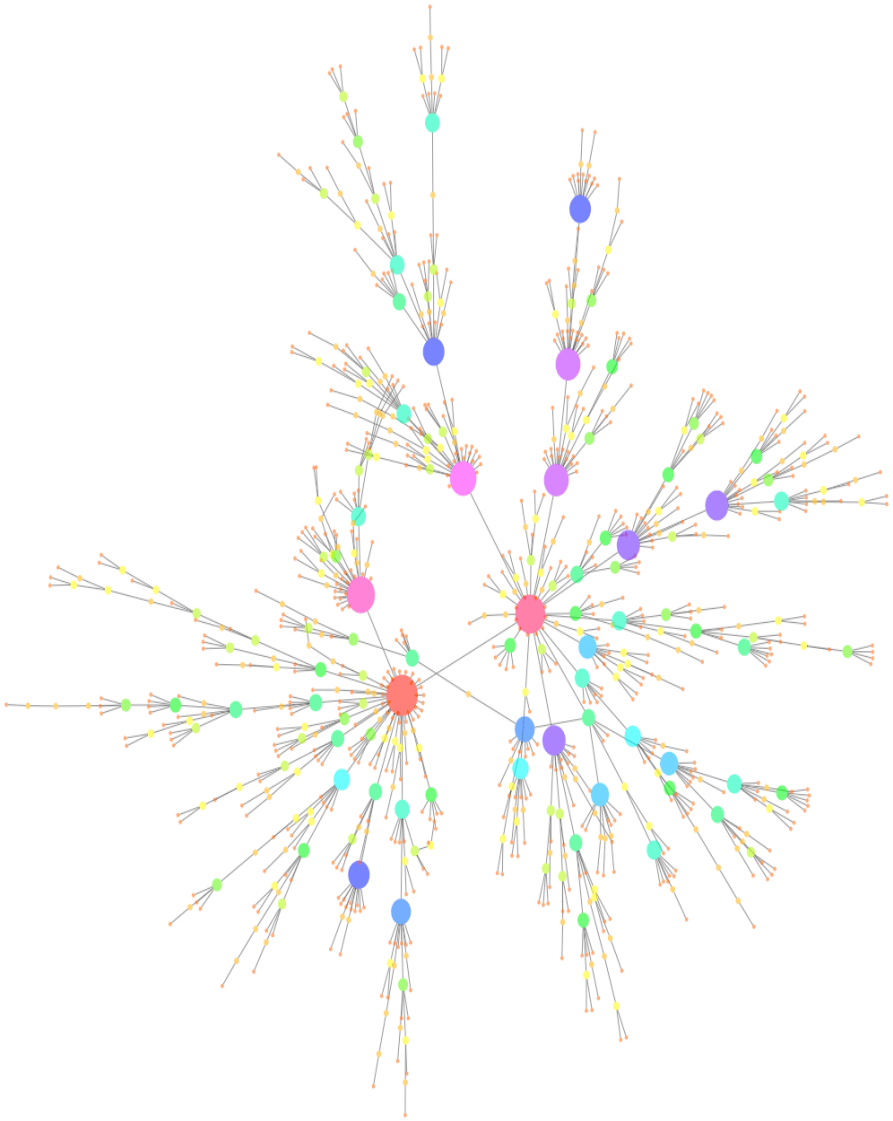
Vibeke Nenseth
Research Sociologist , Institute of Transport Economics (TØI)

The Knowledge-Policy Interaction for Sustainable Transport –Eased by Interdisciplinarity?



talk on:

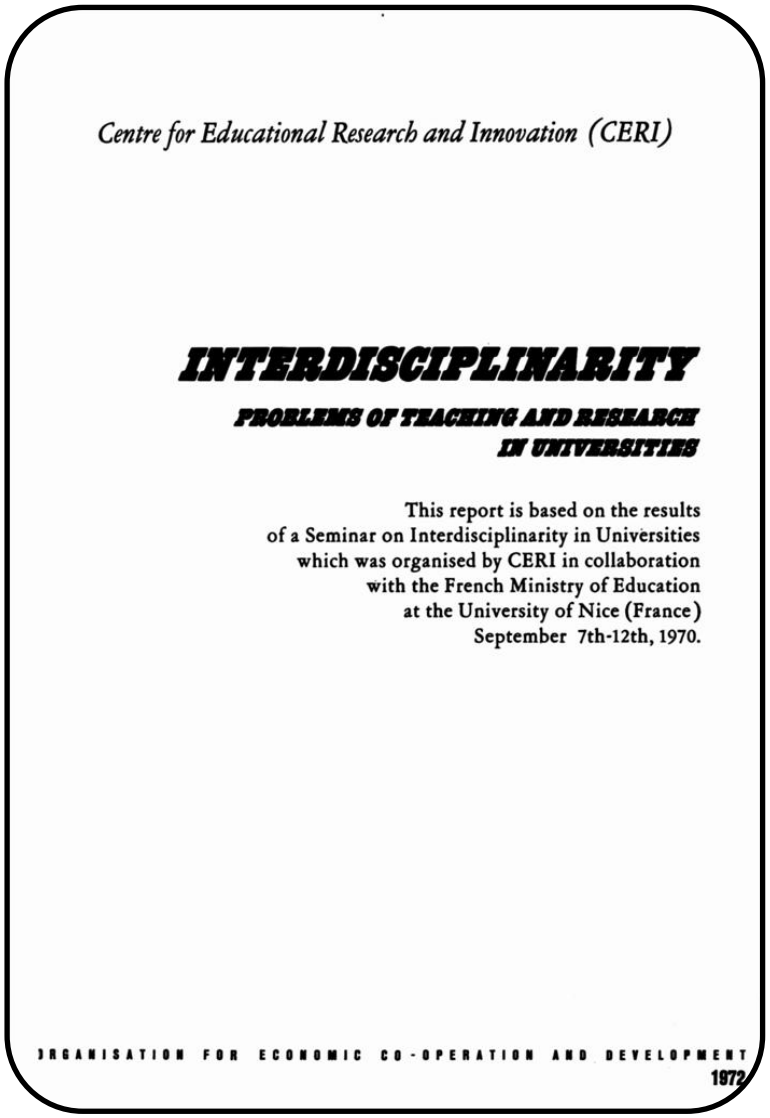
- an interdisciplinary turn?
- empirical focus: sustainable transport
- various relationships between disciplines
- policy failures due to lack of ID?
- ID: both research innovation and policy relevance?



(Not so) Sustainable transport

- sustainable transport: *"…meeting our present mobility needs without compromising the needs of future generations"* Gough&Helmer 2010), i.e. serving economic, social and environmental concerns
- the transport sector:
  - *high technology optimism, yet technological transformation is in delay*
  - *still more than 95 % carbon-based*
  - *particularly sectorial, fragmented, specialised*
  - *characterized by single-handed, ad-hoc policy measures (climate or local pollution (CO_2/NO_2; densification/lgreen land);*

(great) stories since the sixties…

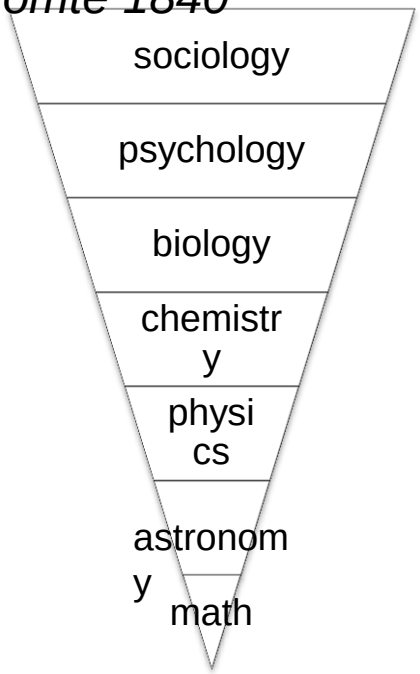


interdisciplinarity claimed and classified

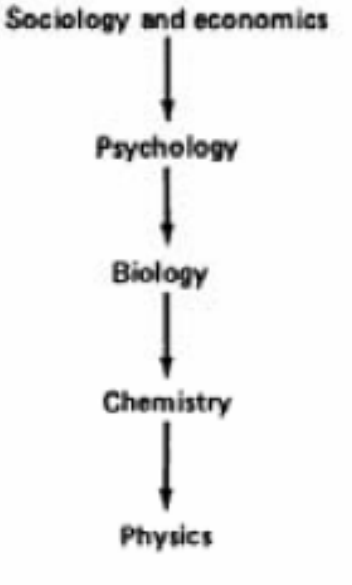
- OECD-seminar Nice 1970: e.g. cross-over disciplinarians like Piaget, Jantsch, Apostel
- main focus: universities and education

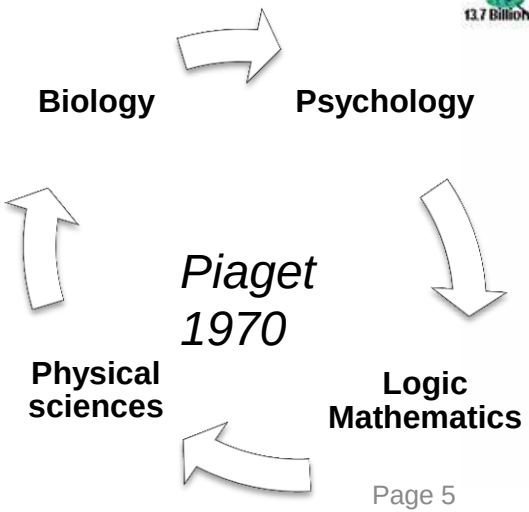
relationships between the disciplines

Hierarchy of Sciences,
Comte 1840



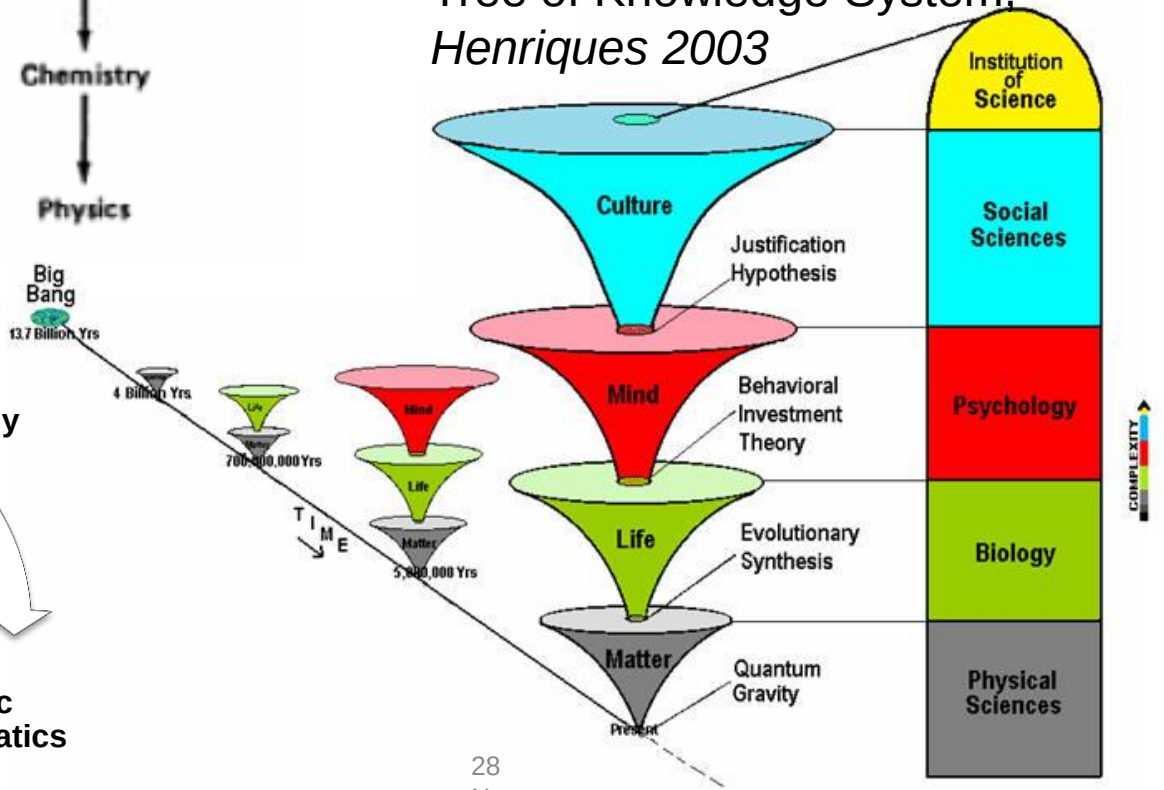
"Reduction is at the heart of progress in science."
Elster 1989





Piaget 1970

Tree of Knowledge System,
Henriques 2003



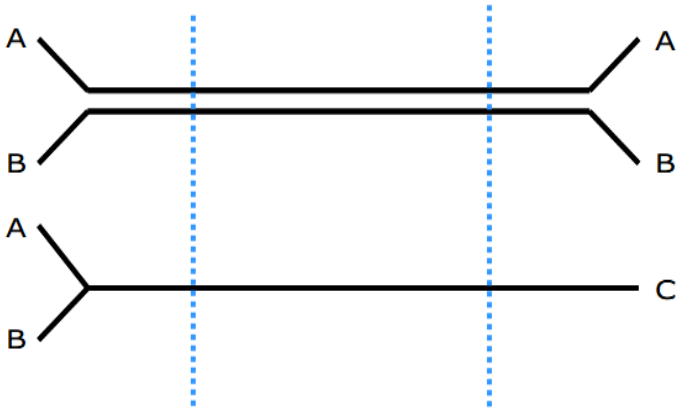
environmental knowledge development

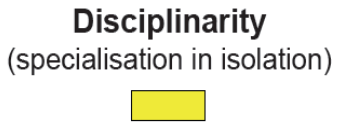
increasingly coping with

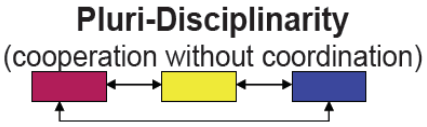
- **complex**, ***wicked*** problems (uncertain, contested, indefinite, dynamic, changing over time, hardly solvable)
- contexts and **inter-relations**, systems and networks (i.e. leaving single problem/unit approaches)
- problems **discovered** by knowledge, ”*threats that require science to become interpretable as threats at all”*, e.g. disciplinary **blind spots** (outside attention) or **white spaces** (outside responsibility)
- problems **caused** by knowledge, ”*we can't solve problems by using the same kind of thinking we used when we created them”* (Einstein)
- man-made problems – **modern risks** - that *“what lies between the specialisation”* and “*fall through the sieve of over-specialisation”* (Beck 1992)
- **policy integration,** coupling of ‘environment and development’, the three dimensional **sustainability** concept, enhanced causal chains (LCA, DPSIR-model) ⇔ a strong need for making new knowledge through new combinations, i.e. **knowledge integration** (the essence of interdisciplinarity)

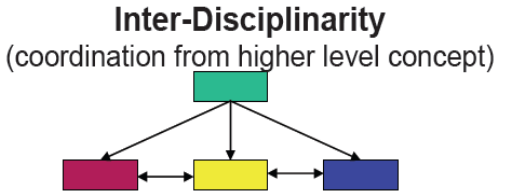
types of cross-disciplinary collaboration

- **crossdisciplinary**: viewing phenomena from the standpoint of another discipline, or cross-fertilization by *borrowing* methods and perspectives from other disciplines (popular!)
- **multi- or pluridisciplinary**: the combination of several content areas that are concerned with one problem, but without intentional integration
- **interdisciplinary:** the integration of concepts, perspectives, theories, methodologies, tools, from two or more disciplines to solve problems that are beyond the scope of a single discipline (Klein 1990)









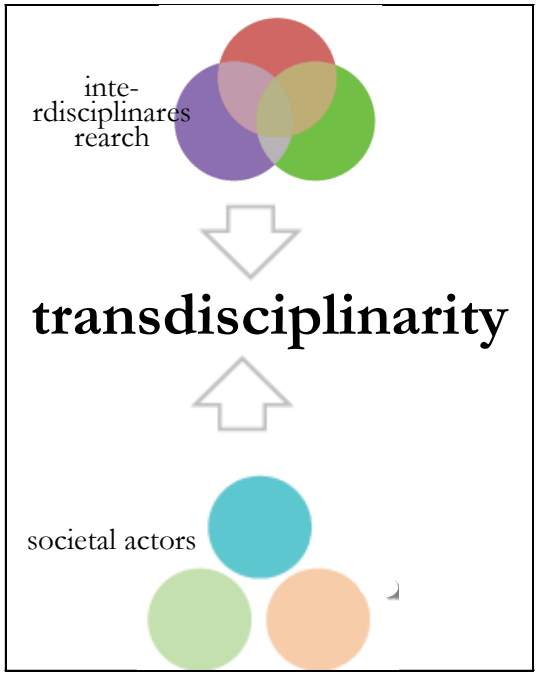
e.g. Jantsch 1972

monodisciplinarity

cross-disciplinarity

multi-disciplinarity

interdisciplinarity



drivers for interdisciplinarity in environmental research

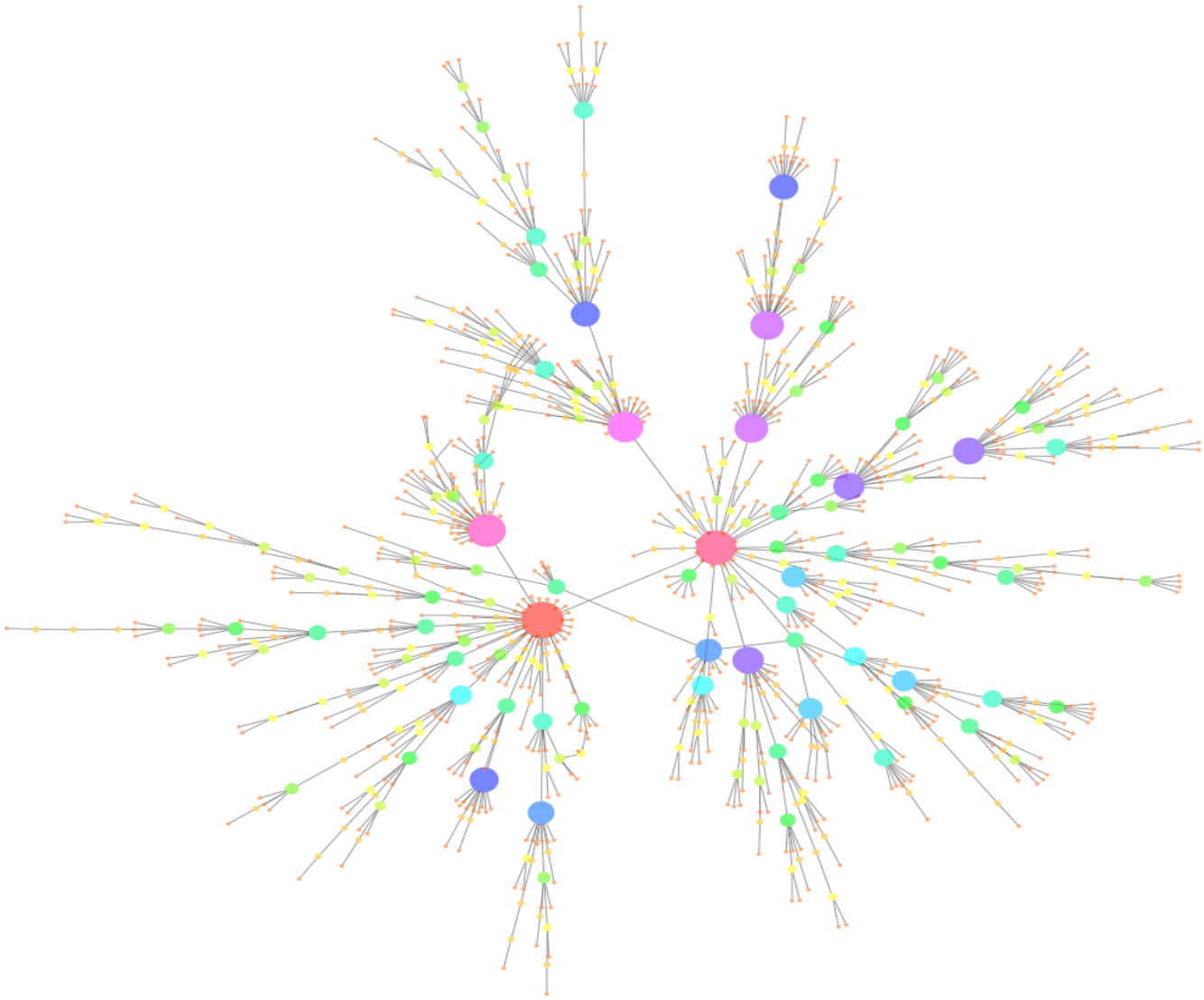
1. **scientific curiousity** organised by scientific **scepticism** - more easily hold by outsiders at a discipline's border than midst in a disciplinary 'hard core'
2. **societal problems**, demand-pull dynamics from various knowledge sources in search of innovative, broad-spectred policy solutions for increasingly severe environmental threats

- If,
- research (whether academic or policy relevant) implies **solving problems**, not building disciplines, *"…most scientist would say that they work on problems, almost no one thinks of her- or himself as working on a discipline "* (Lenoir 1997) and
- research is **innovation-driven**, depending on an "*"…ability to make **unexpected connections**"* , bringing ideas into new relationships (Neumann 2007)
- Then,
- **innovative problem-solving** in research is essentially **synthetic**, stimulated by interdisciplinarity

no need to rely on self-claimed interdisciplinarity – it can be measured

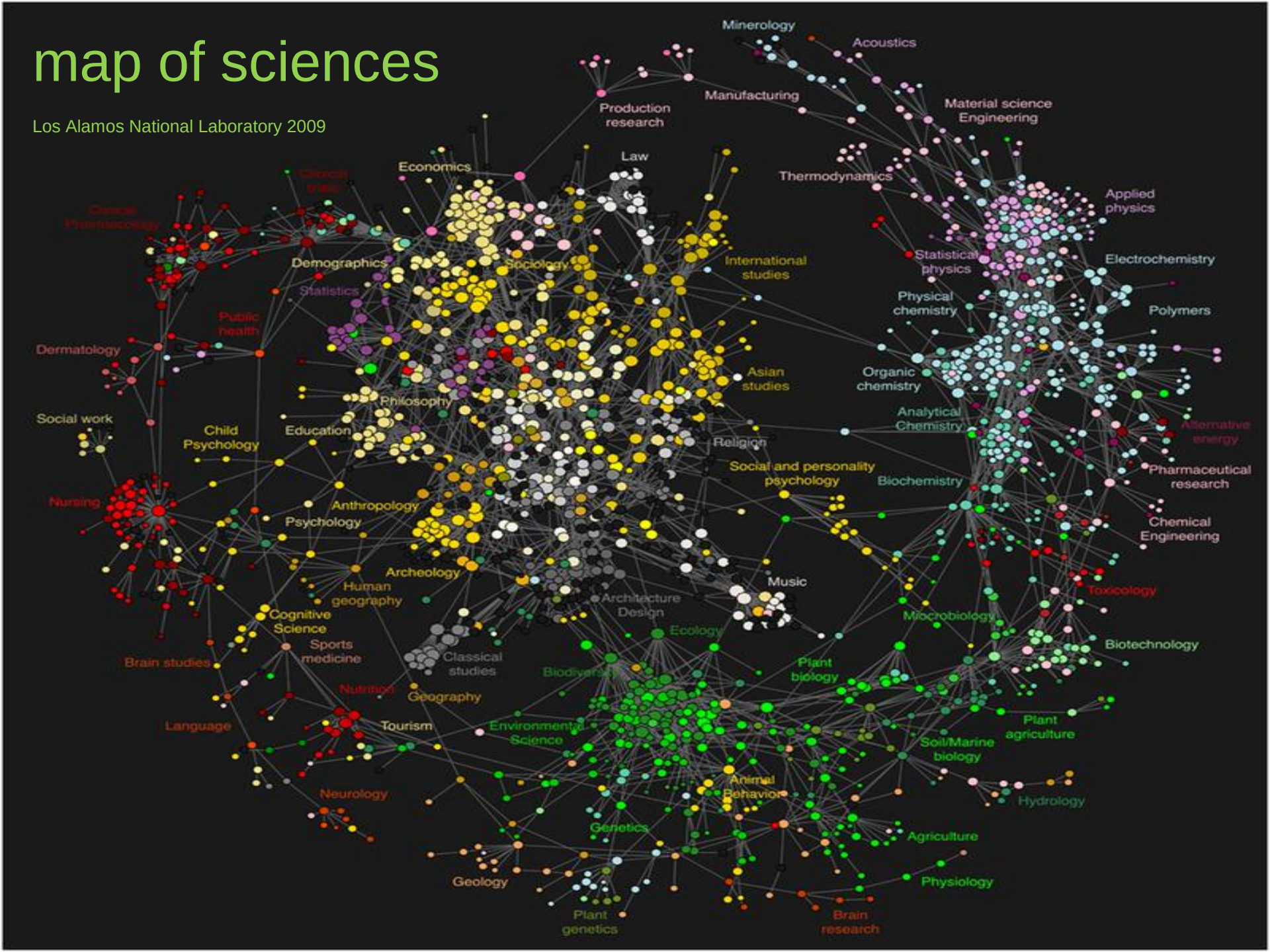
- **evaluation of interdisciplinarity - why, what, how**

- in order **to test** the wide-spread assumptions of interdisciplinarity as e.g. providing the more innovative and policy relevant research
- means **to investigate** how interdisciplinarity is defined, organised and practised (composition, collaboration, leadership, recruitment, etc.) – as well as the academic significance and policy impact of the research results
- **have found** e.g. that deep interdisciplinary collaborations, across institutes, or intense disciplinary mixing of researchers are much less common that one would expect from the discourse (Rafols 2008)
- **can be done**
  - ***qualitatively:*** *informant interviews/focus groups with involved researchers and users, on institutional setting, interaction patterns, motivation and outcome; personal, cognitive and institutional benefits and penalties, possibilities and barriers, or*
  - ***quantitatively****, by scientometrics: i.e. cognitive mapping by crunching data from interactions on scholarly databases (click streams, mapped patterns of interest, cross-journal citations, co-keywords, etc) in order to present a map of the relationships between different fields of science:*



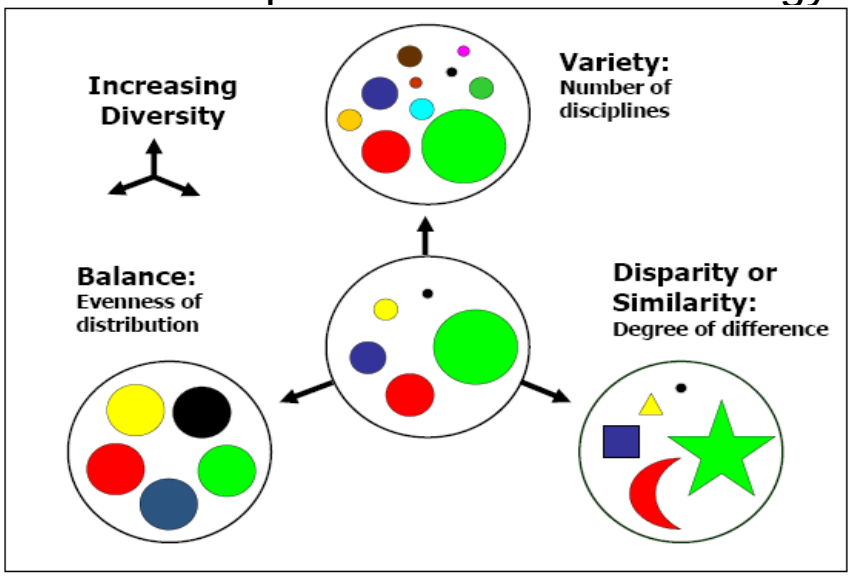
map of sciences

Los Alamos National Laboratory 2009



interdisciplinarity: diversity and interaction

- concepts borrowed from ecology and network analysis (Rafols 2008, 2009)



- Disciplinary diversity
  - number of disciplines
  - balance (power balance, no disciplinary hegemony)
  - disparity (difference/similarity of disciplines)
  - the reverse of specialisation

- Interdisciplinary network coherence
  - the intensity of interaction
  - the density (actual/possible links)
  - the centrality, e.g. hub nodes
  - the set of commonalities (goals, concepts, methods) *bonding* linkages (tight links)
  - *bridging* linkages (many or significant brokers)

Main *barriers* to interdisciplinarity: little diversity, disciplinary dominance, low density, disciplinary bonding (cliques)+ few interdisciplinary bridges = fragmented overall network (cf Granovetter)

The knowledge-policy interaction

- an *instrumental* approach seeing knowledge primarily as ‘facts’ or as ‘neutral’ *data*
- an *advocacy* approach seeing knowledge utilization mainly as opportunistic legitimization or as political ammunition in interest conflicts;
- a *discursive* approach when knowledge presents innovative conceptualization and new ideas for discursive justification

Interdisciplinarity presupposes the discursive approach, but multidisciplinary research often starts with exchange of facts and data (quantitative methods, statistics,indicator sets)

CIENS Projects	**Participation institutes**	**Period**
SACRE – Felles fagprogram	Alle i CIENS	2003-2006
Vanndirektivet - FoU behov	NIVA, NINA, UiO	2008-2009
SINCIERE - kinesisk-norsk tverrfaglig miljøforskning	Alle i CIENS + kin. forskn.inst.	2007-2009
EUTROPIA - forvaltning av eutrofiering	UiO, NIVA, NINA, NIBR	2008-2012
CLIMADAPT - kommunal klimatilpasning	NIBR, NIVA, NIBR, UIO	2008-2011
Tverrfaglighet i miljøforskningen	TØI, NIBR, NIVA, UiO	2009-2010
TEMPO - virkemidler for miljøvennlig transport	**TØI, CICERO, mfl**	**2009-2013**
CIEAR - laboratorium for analytisk miljøkjemi	NIVA, NILU, UIO mfl	2009-2010
Ansvar og virkemidler i klimatilpasning	NIBR, CICERO, NIVA, TØI	2009-2010
WAPABAT- Implementering av Vanndirektivet	NIBR, NIVA, UiO	2010-2013
Common **CIENS-SIS 'Sustainable transport** : Drivers, Changes, Impacts, Policies'	**TØI, CICERO, NIKU, NILU**	**2011-2015**
Common CIENS-SIS 'Climate effects – from mountains to fiords'	NIVA, NINA, NILU, NIBR, NVE	2011-2015

Interdisciplinary environmental research – experiences from CIENS

- Interdisciplinary (ID) projects and proposals not only to satisfy the Research funding bodies, e.g RCN
- and not only because the researchers think ID is so fun
- ID used to be a task, a responsibility and a concern mainly for the social scientists
- Now interdisciplinarity is actually demanded from strong natural scientists and in their proposals
- ID projects seem to be strongly welcome from the policy makers
- However, the *power relationships* between the disciplines need to be further reflected upon (the (borrowing) *cross*-disciplinary approaches seem to be more elaborated than actually interdisciplinary research cooperation; e.g. behaviour economist; land use planninge engineers)

some paradoxes and imperatives

1. The necessity in **thinking differently** faced with the environmental and climate threats - is the main driver for interdisciplinarity in environmental research
2. Interdisciplinarity is based on a **contradiction** or a **balance** – between differentiation and integration, diversity and coherence, bonding and bridging
3. Watch up for **self-claimed** interdisciplinarity - how diverse and interactive are they (you, we) really? Interdisciplinarity is measurable!
4. Evaluate interdisciplinarity in environmental research by *general* concepts, methods, tools *common* to both natural and social sciences (diversity, network; multivariate analyses/-metrics)! Successful interdisciplinarity leads to new disciplines – or teams (programmes, centres) of **T-shaped** interdisciplinarians
5. Successful interdisciplinarity characterised by **novelty** in facts and findings, **attractiveness** to recruits/researchers, **growth**, and societal and political **influence**
6. Interdisciplinarity is much more talked about than practiced - but keep up talking, the discourse seems to disciplinating (sic!)
7. Norwegian environmental interdisciplinarity is in a boom, but still under **adhocracy** rule – based on single, short-lived projects, shifting goals, people and affiliations
8. Interdisciplinarity in environmental research requires active **institutional commitment** (from research institutes, funders, users) - not only sporadic **'dugnad'**

fruits, salads and smoothies -
a working definition of interdisciplinarity (Nissani 1995)

- or art?

Arcimboldo 1550

Institute of Transport Economics
Norwegian Centre for Transport Research

thanks for your attention!

vibeke.nenseth@toi.no