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Visualisations as facilitators of engagement between approaches

Multiplying methods in research evaluation

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S&T indicators as tools in deliberation

- 'Conventional' use of indicators ('Science Arbiter'--Pielke)
  - Purely analytical character (i.e. free of normative assumptions)
  - Seeking convergence (partial converging indicators, Martin and Irvine, 1983)
  - Aimed at justifying 'best-choices' (e.g. excellence)
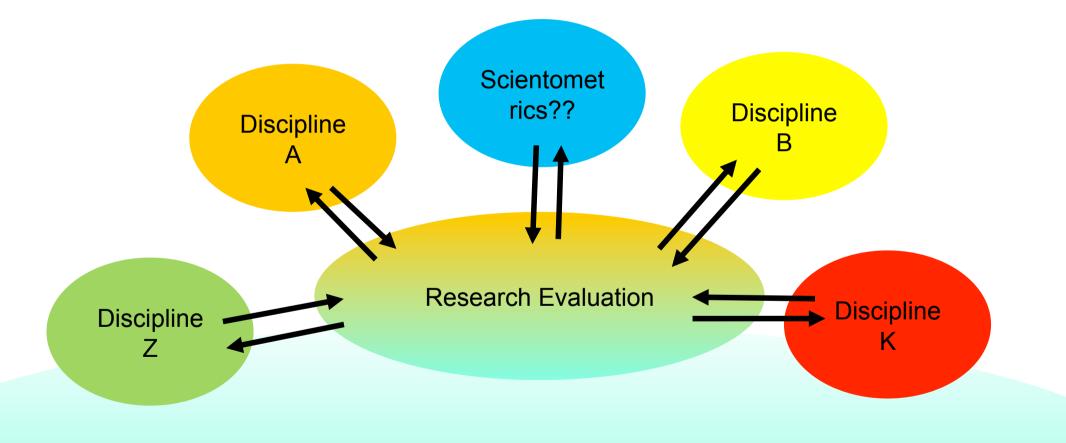 - → **Unitary and prescriptive advice**

- 'Opening up' indicators('Honest broker' --Pielke)
  - Aimed at locating the actors in their context and dynamics
    - → Not predictive, or explanatory, but exploratory
  - Construction of indicators is based on choice of perspectives
    - → Make explicit the possible choices on what matters
  - Supporting 'complex' debate
    - → Making science policy more 'socially robust'
  - → **Plural and conditional advice**   Barré (2001, 2010), Stirling (2008)

Visualisation as a means to convey 'quantitative insights' to diverse stakeholders

Toward 'multiplying methods in research evaluation'

Visualisation as a means to exchange 'quantitative insights' with different audiences – 'interface methods'
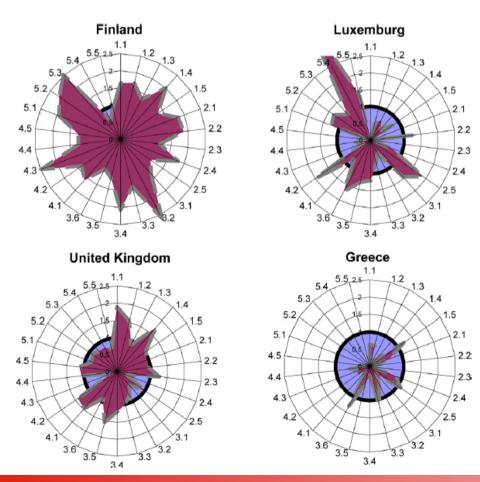
On the use of visualisation to convey complex data
Embrace variation (Schneider, today)
Socially robust knowledge
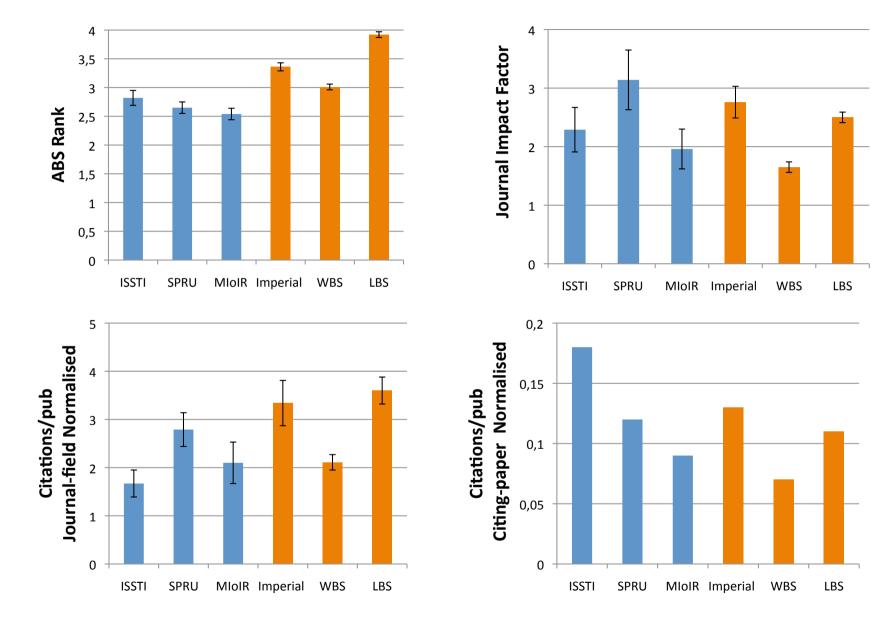
Highlight multiple dimensions

Dimensions of
European Innovation
Scorreboard

Critique to composite indicators by Grupp and Schubert (2010

Use of spider diagrams
allows comparing
like with like

Whereas composite
indicators conceal
the origin of potential
dimensions

Provide contrasting views of same property ('excellence')

Could be done interactively.

Rafols et al. (2012)

Visualising assumptions, choices

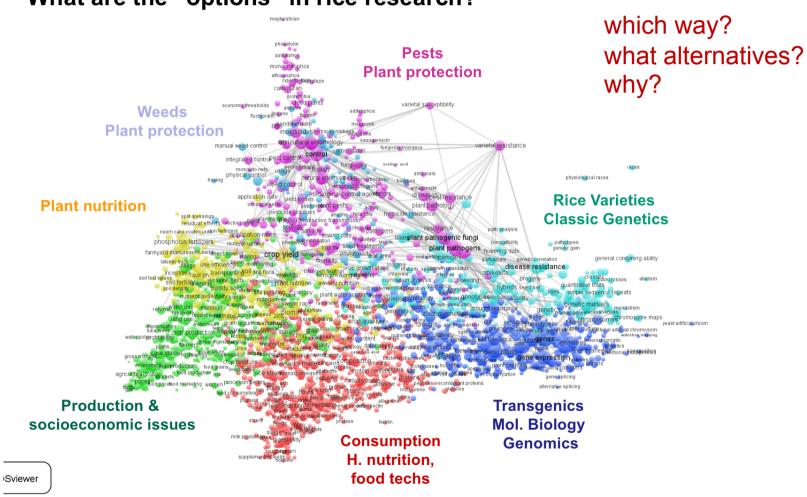**The University Leiden ranking (2011-12)**

- Different measures of performance
  - Mean Citations per fields, Top 10%,
- Under different conditions (fractional, language)
- Include **stability interval** (bootstrapping)

Select indicators

| Dimension of scientific performance: | Impact ▼ | ? |
| Rank universities based on: | PP(top 10%) ▼ | ? ☑ Show stability intervals ? |

Select method of calculation

☑ Normalize for university size ?

☑ Assign collaborative publications fractionally to universities ?

☑ Leave out non-English language publications ?

Rank	University	Country	P	PP$_{top\ 10\%}$	PP$_{top\ 10\%}$ stability interval
1	MIT	🇺🇸	10465	25.2%	
2	Princeton Univ	🇺🇸	5763	22.6%	
3	Harvard Univ	🇺🇸	33511	22.5%	
4	Rice Univ	🇺🇸	2635	22.2%	
5	Stanford Univ	🇺🇸	15032	21.9%	
6	Caltech	🇺🇸	6569	21.7%	

Maps allow exploration of 'directions' in trajectories

What are the "options" in rice research?

which way?
what alternatives?
why?

Ciarli and Rafols (2017)

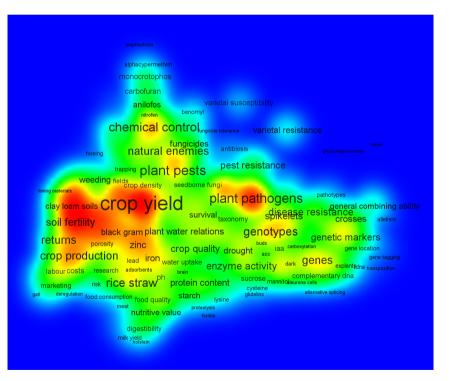# Maps allow exploration of 'directions' in trajectories

Maps allow to present contrasting view, without normatives assumptions.

However – problems of overcomplexity, multiple possible representation, uncertainty is revealed in the making...
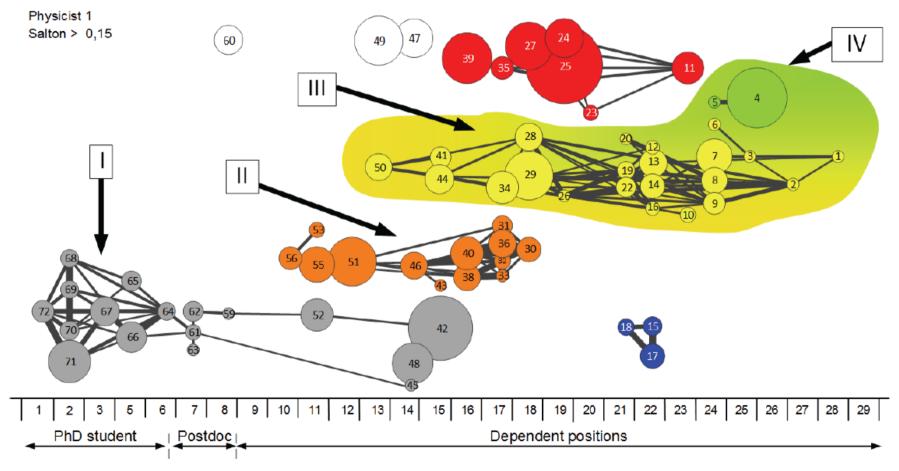
Rice research US

Rice research in India

Ciarli and Rafols (2017)

Inclusion of temporal dynamics

Figure 2: The Cognitive Career of a Researcher who Moved to the Innovation BEC without Delay

Physicist 1
Salton > 0,15

Gläser and Laudel (2015)

Visualisations as 'interface methods'

Methods that facilitate engagement with various contexts.

*'emerging methods that we – as social and cultural researchers – can't exactly call our own, but which resonate sufficiently with our interests and familiar approaches to offer a productive site of empirical **engagement with wider research contexts, practices, and apparatuses.'*** (Marres & Gerlitz, 2007)

Examples:

- Gläser and Laudel (2015): Use of maps to discuss scientific trajectories in

- Stirling (2003): Use of interactive graphs for deliberation on prioritisation of technology (Agro) – MCM used in various techs

Humility: insights from one method are partial.
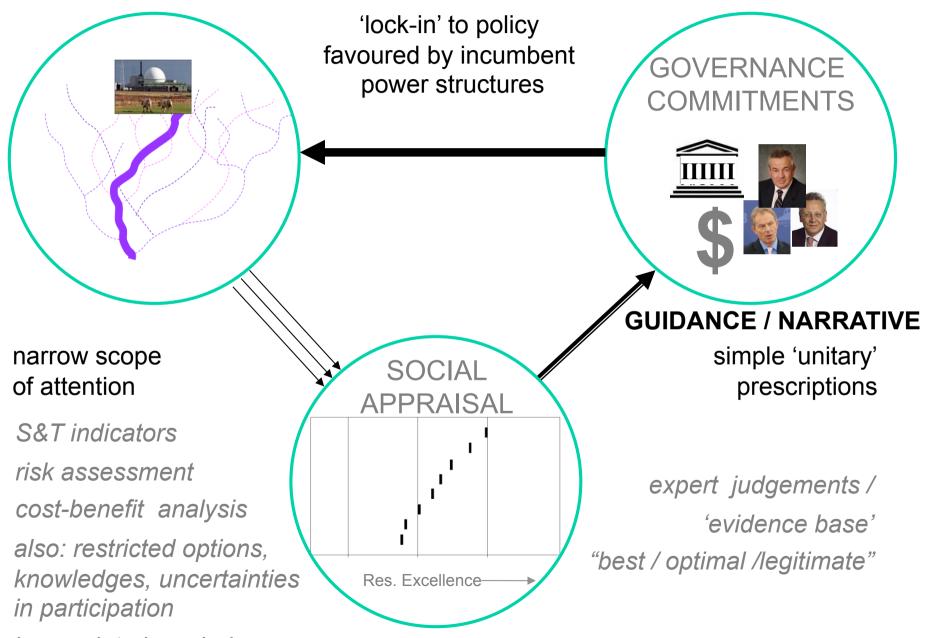
Triangulation. Interpretation.

Strategies for opening up indicators

- From prescriptive indicators to pluralising quantitative evidence
  - Deliberation on indicators and "indicators" for **informing** deliberation processes (Barré)
- Incorporating relevant invisible dimensions
  - Activities and outcomes so far marginalised
- Presenting contrasting perspectives
  - At least TWO, in order to allow choices
- Simultaneous visualisation of multiple dimensions / options
  - Maps, networks Allowing the user take its own perspective
- Exploration of multiple realisations of same concepts
  - Avoiding misplaced concreteness
- Interactivity for checking conditions
  - Allowing the user give its own weigh to criteria / factors
  - Allowing the user manipulate visuals

Conventional Policy Dynamics

Stirling (2010)

'lock-in' to policy
favoured by incumbent
power structures

GOVERNANCE
COMMITMENTS

GUIDANCE / NARRATIVE

simple 'unitary'
prescriptions

narrow scope
of attention

S&T indicators

risk assessment

cost-benefit analysis

*also: restricted options,
knowledges, uncertainties
in participation*

incomplete knowledges

SOCIAL
APPRAISAL

Res. Excellence

expert judgements /

'evidence base'

"best / optimal /legitimate"

Breadth, Plurality and Diversity

Stirling (2010)

MULTIPLE TRAJECTORIES

dynamic portfolios pursuing diverse trajectories

GOVERNANCE COMMITMENTS

broad-based processes of 'precautionary appraisal'

multiple: methods, criteria, options, frames, uncertainties, contexts, properties, perspectives

SOCIAL APPRAISAL

Sustainability

'opening up' with 'plural conditional' outputs to policymaking

viable options under: conditions, dissonant views, sensitivities, scenarios, maps, equilibria, pathways, discourses