Characterizing Research and Technology Organizations (RTOs) using bibliometrics - The case of the Netherlands

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Outline

- Background
- Evaluating RTOs and bibliometrics
- Research evaluation and science-society connections
- Case study: the Netherlands
- Wrap up

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Background

- RTOs are valuable and relevant actors in the R&D landscape
- RTOs are not universities or academic research institutes
- RTOs often wish to be (and actually are) assessed as academic actors
- Leiden manifesto on use of evaluation metrics

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Leiden manifesto for research metrics

- 10 principles to guide research evaluation
- Principle 2: Measure performance against the research missions of the institution, group or researcher
- This principle implicitly refers to evaluation of RTOs and other non (primarily) academic actors

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Mission RTOs

The European Association of Research and Technology Organizations (EARTO), defines RTOs mission as follows:

"*The core mission of Research and Technology Organizations is to harness science and technology in the service of innovation, to improve quality of life and build economic competitiveness*" (EARTO, 2015).

Why is it unsuitable to assess RTOs as if they were universities?

- Citation based impact is often biased towards the partners they collaborate with;
- Collaboration of PROs often involves dual affiliations.

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Scientific performance TNO

Period	2006-2015
P	5,249
TCS	13,973
MNCS	1.16
PP (top10%)	0.12
PP (collab)	0.90
PP (Intl collab)	0.42

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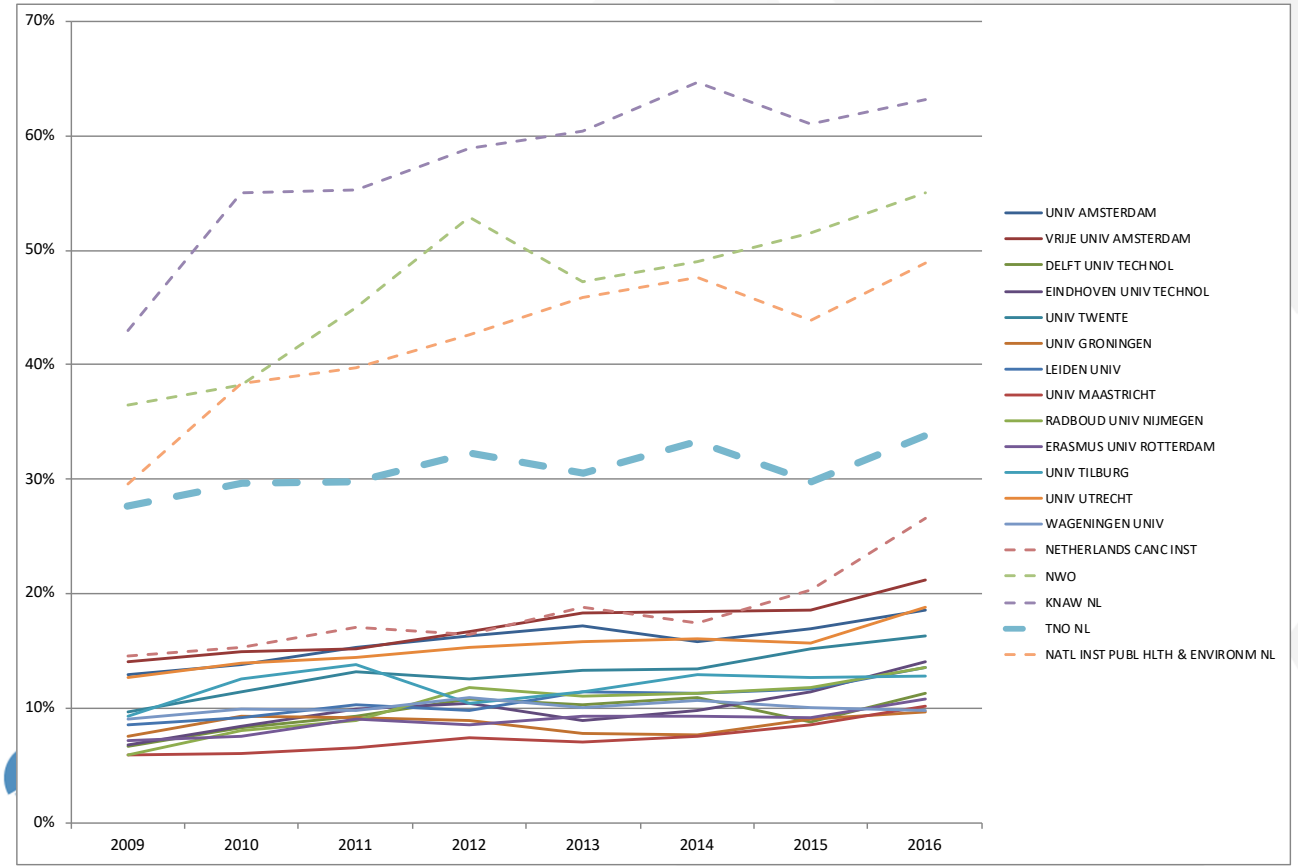
Dual affiliations (share of publications)



How to account for a non-academic mission when using bibliometrics?

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Publication data RTOs

Information within

- References
- Citations
- Co-authorships
- Content
- Context

Addition information

- Mentions in policy documents
- Mentions in news
- Mentions in blogs
- Mention in social media
- Citations in Patents

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Impact assessment of RTOs using bibliometrics and related data

- Case study of the Netherlands
- Map of all sciences
- Distribution of science-society communication signals
- Overlay by actor-type (university, PRO, RTO)
- Characterizing actors by dimension

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Signals between science & society

- Information within
  - Co-authorship with non-academic authors
  - Sources
- Additional information on publications (i.e., mentions in)
  - Social media
  - Policy documents
  - News items
  - Patents

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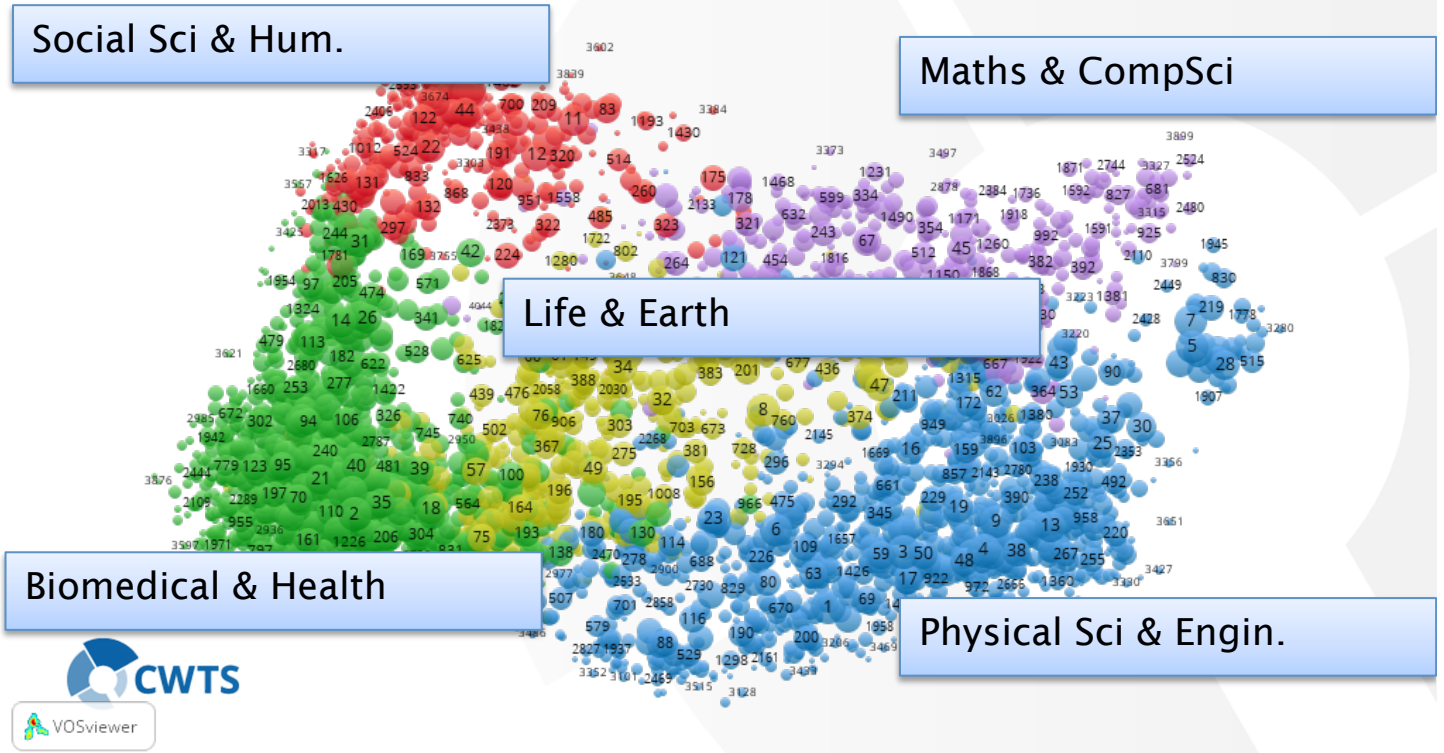
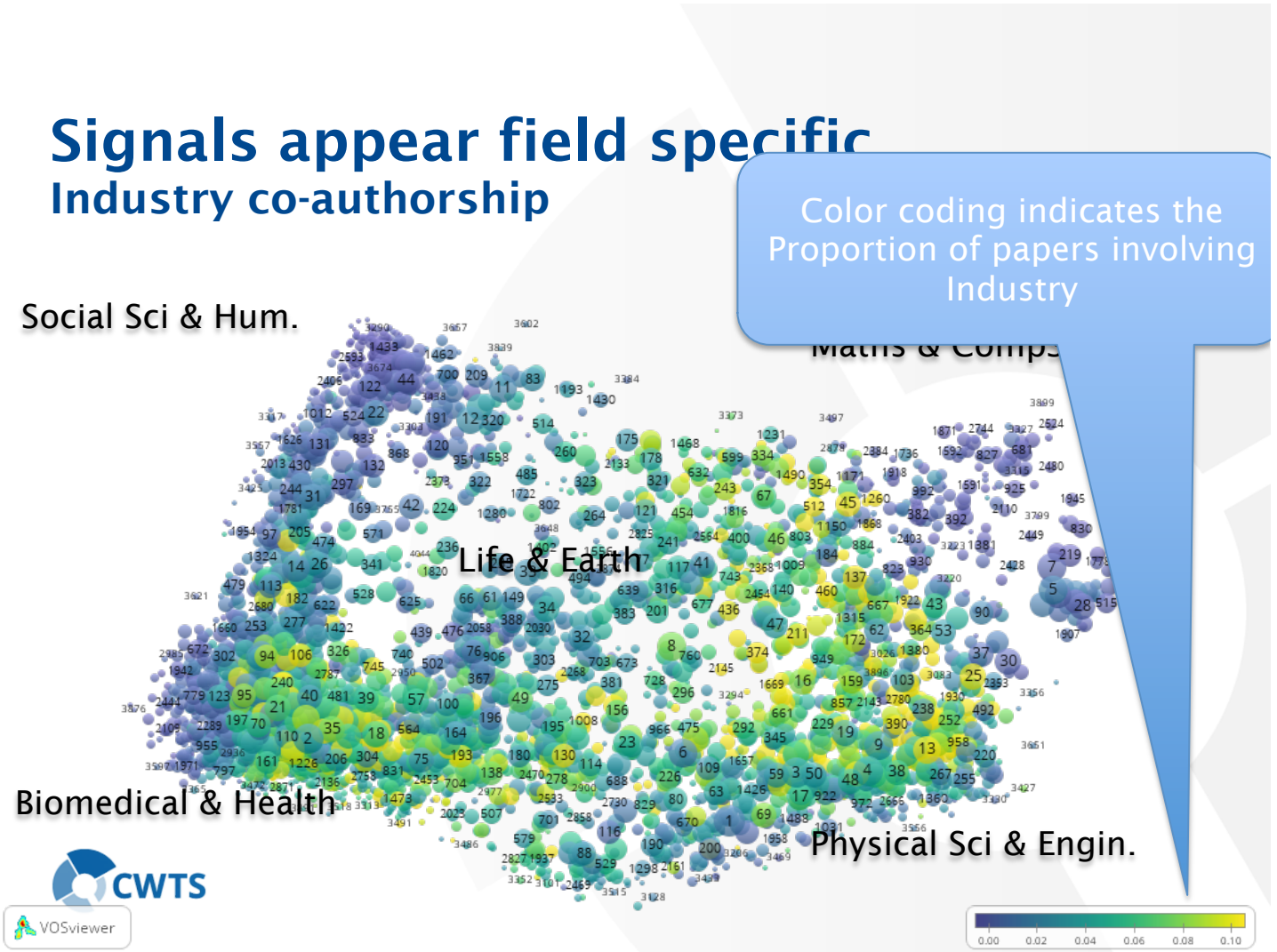
Signals appear field specific

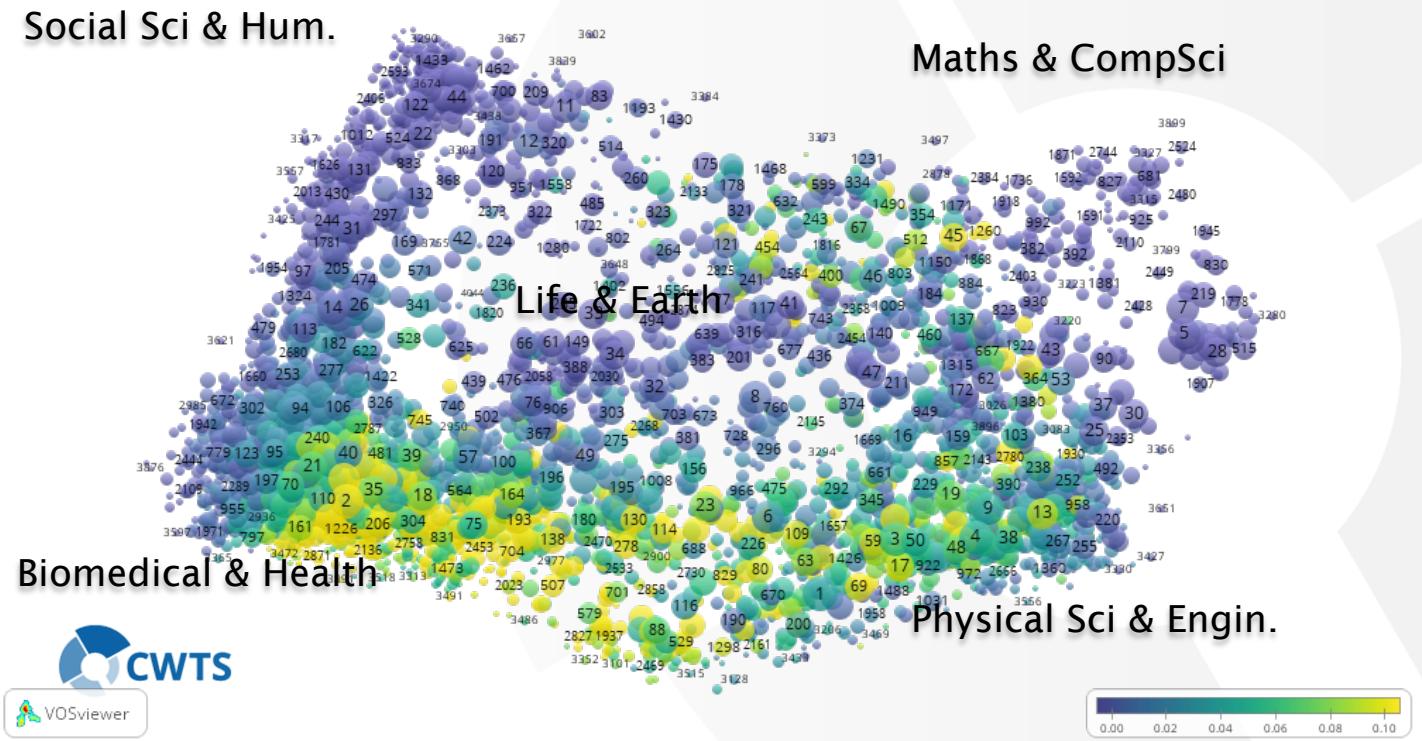


Signals appear field specific

Industry co-authorship

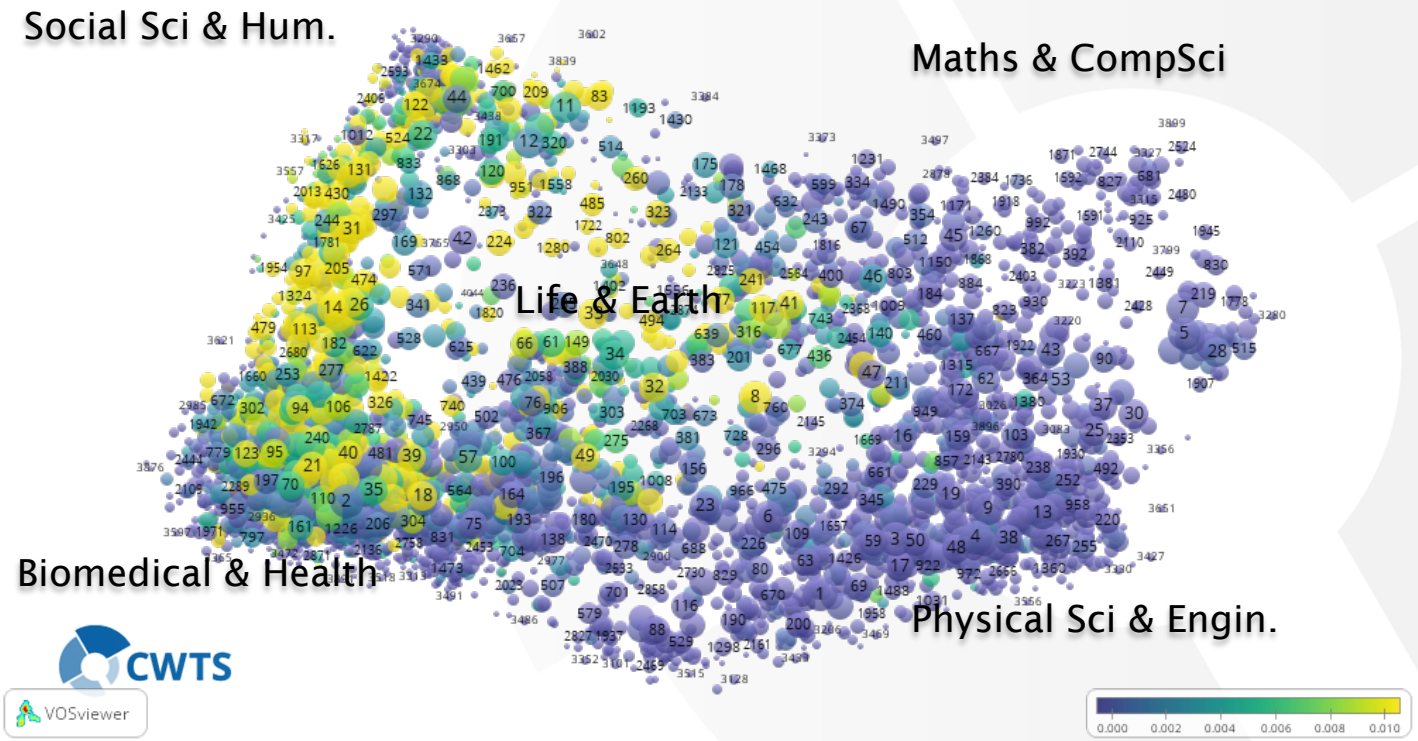


Signals appear field specific
Cited by patents

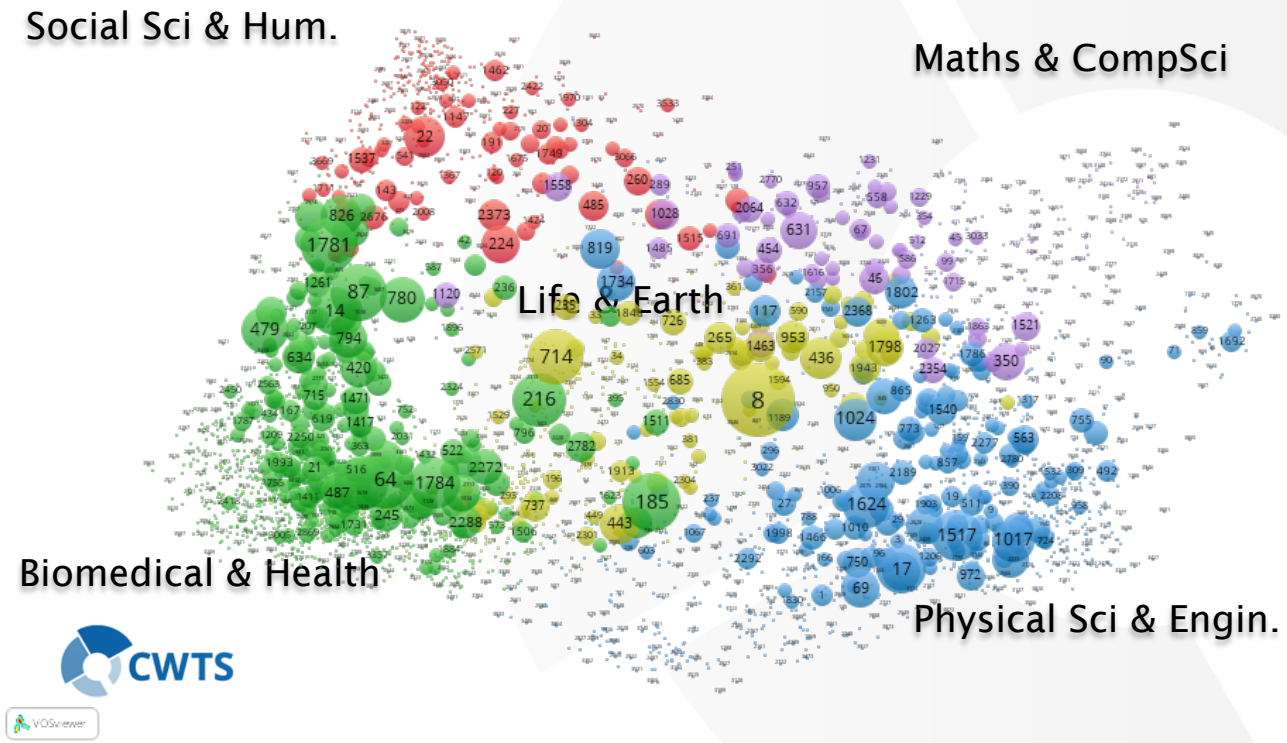


Signals appear field specific

Mentions in policy documents

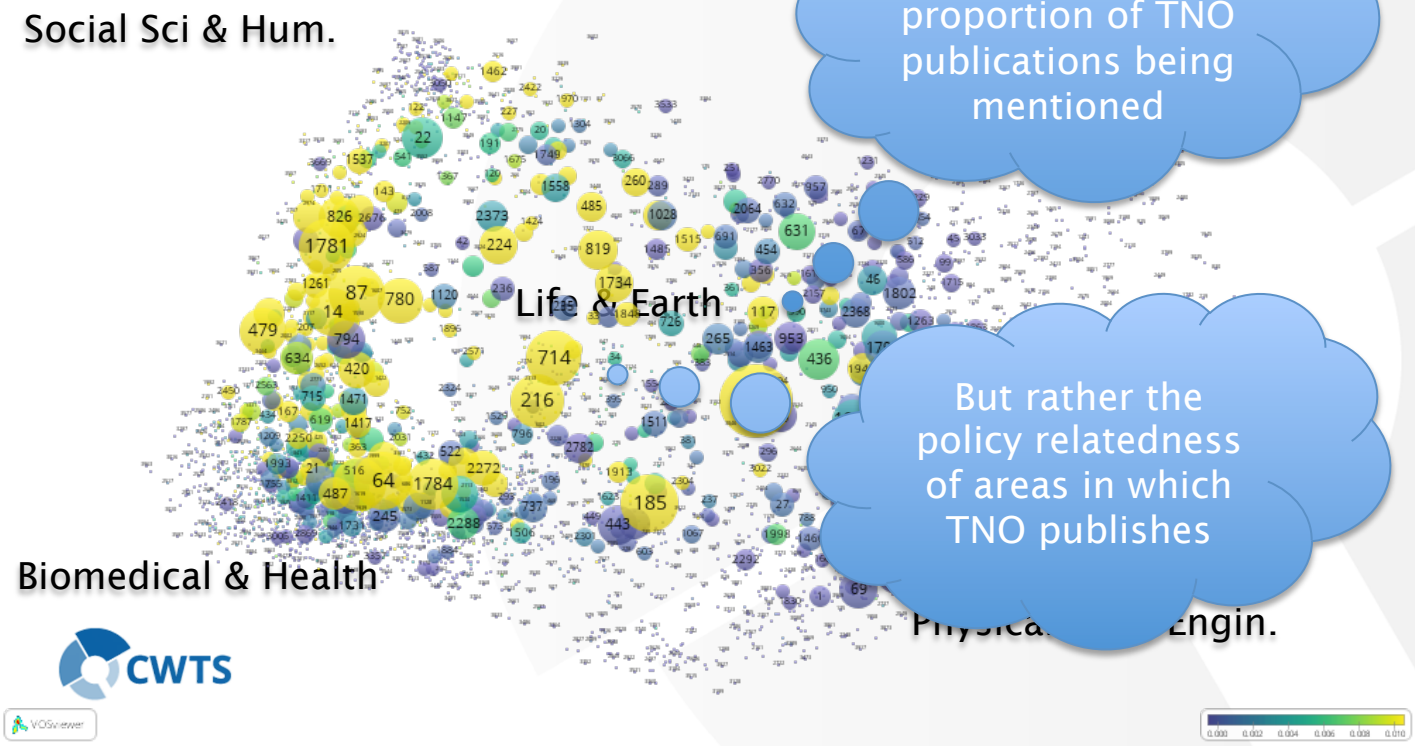


TNO research profile



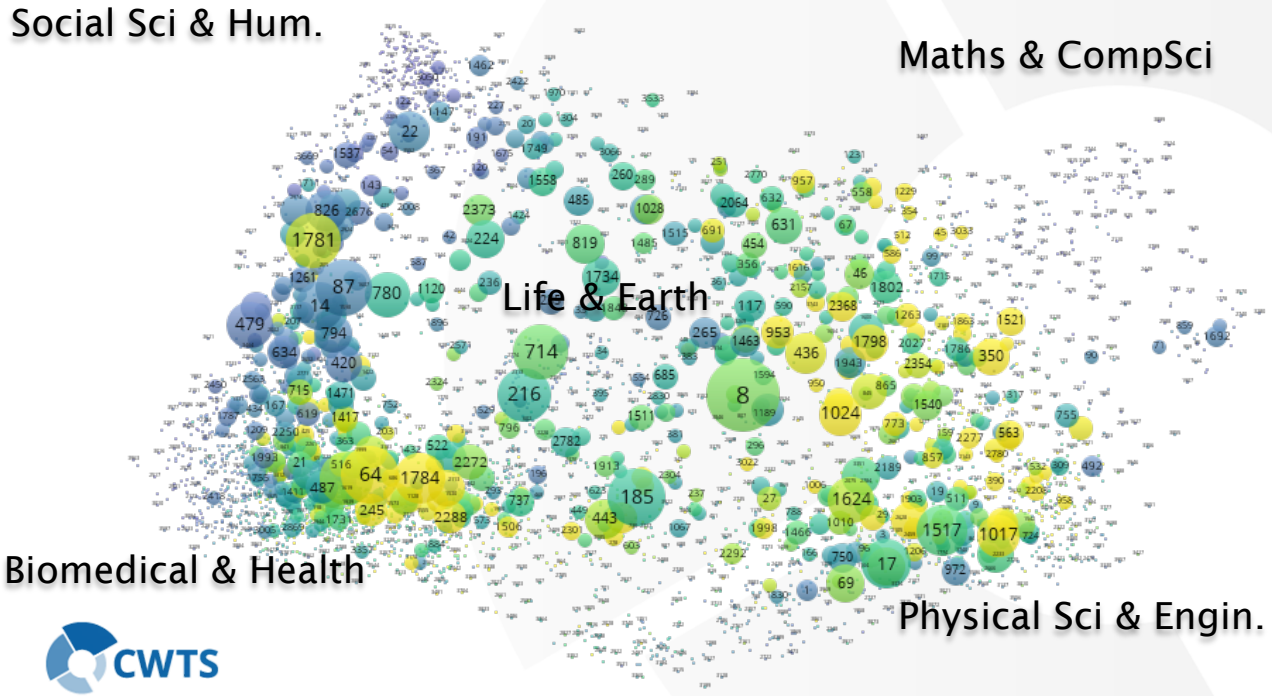
TNO research profile

characterized by mentions in policy d



TNO research profile

characterized by industry involvement



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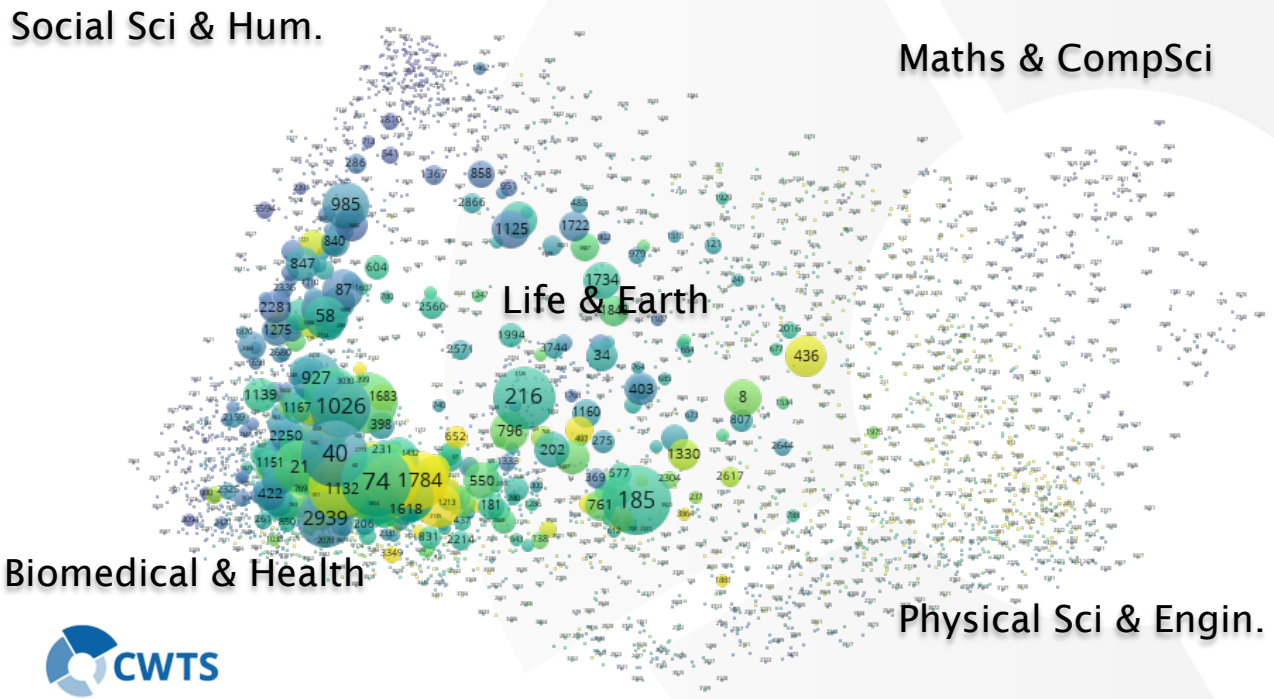
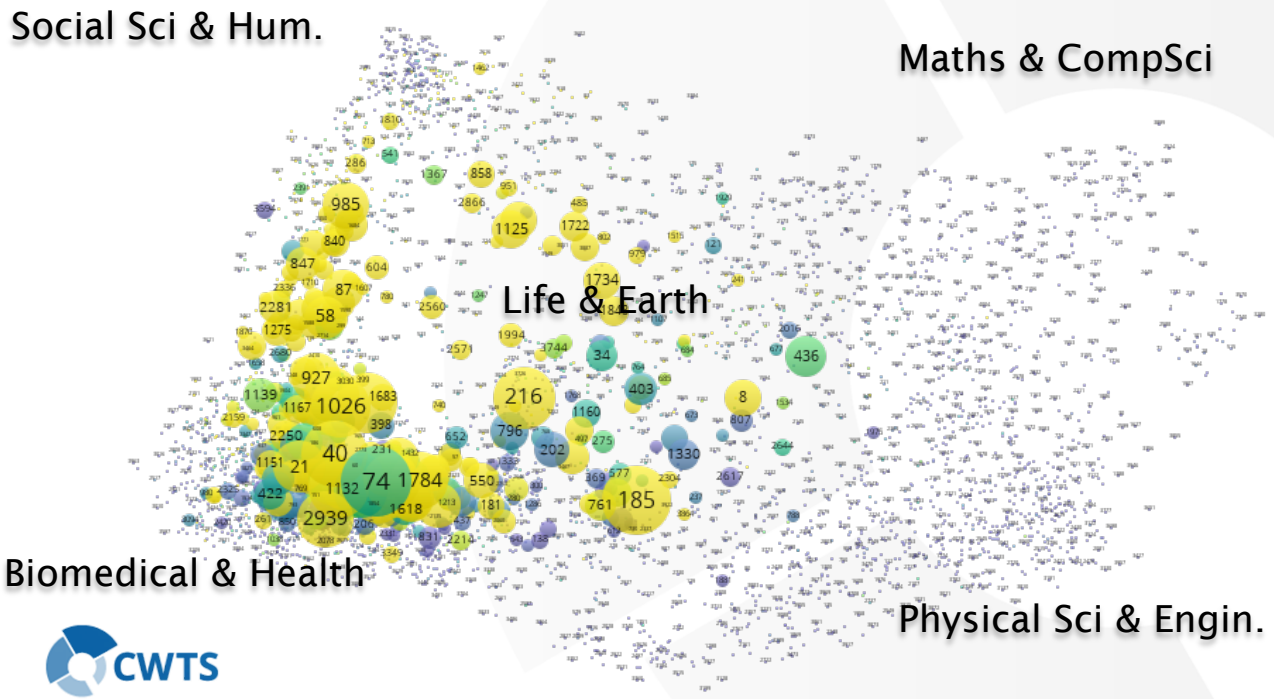
RIVM research profile

characterized by industry involvement



RIVM research profile

characterized by mentions in policy docs



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VOSviewer

Dutch R&D organizations characterized by signals
(a science-society connectedness profile)

wos_name	avgPPind	avgpppatcit	avgppnews	avgPPpol
NATL INST PUBL HLTH & ENVIRONM NL	0.057	0.040	0.065	0.016
NETHERLANDS CANC INST	0.048	0.070	0.058	0.006
TNO NL	0.067	0.038	0.046	0.010
WAGENINGEN UNIV	0.043	0.035	0.045	0.011
UNIV TWENTE	0.050	0.040	0.034	0.005
EINDHOVEN UNIV TECHNOL	0.062	0.046	0.024	0.002
DELFT UNIV TECHNOL	0.063	0.035	0.024	0.004
ERASMUS UNIV ROTTERDAM	0.041	0.040	0.058	0.009
UNIV MAASTRICHT	0.040	0.037	0.060	0.009
LEIDEN UNIV	0.040	0.043	0.059	0.006
UNIV UTRECHT	0.042	0.040	0.055	0.008
VRIJE UNIV AMSTERDAM	0.037	0.033	0.061	0.009
UNIV GRONINGEN	0.039	0.038	0.054	0.007
RADBOUD UNIV NIJMEGEN	0.035	0.036	0.056	0.007
UNIV AMSTERDAM	0.036	0.035	0.053	0.008
UNIV TILBURG	0.024	0.008	0.053	0.010
KNAW NL	0.037	0.045	0.060	0.004
NWO	0.030	0.014	0.042	0.002

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Conclusions
(primarily based on the Dutch case)

- RTOs can be assessed by bibliometric data, but
- Scientific performance (based on citations) may be misleading
- Alternative metrics provides an addition to monitor socio-economic impact
- Publication-based classification together with signal data provide framework for assessing society connectiveness of research

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Discussion point

Science-society connectedness should not be measured or monitored at the level of actors but on the level of the research area, the community to which an actor belongs

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Thank you

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