Network analysis and visualization (WP3) – Chair Nikoline Dohm Lauridsen
28th March 2019

DEFF OPERA WORKSHOP
OPEN RESEARCH ANALYTICS

Capability mapping: using bibliometric data to explore the potential of research ecosystems

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STRUCTURE

- Capability Mapping and Matchmaking - Motivation
- Example case: Knowledge Landscapes, across and beyond silos
- Reflection + Q&A

Capability Mapping and Matchmaking

Motivation

OBJECTIVE

"Insights, experience, competence and analytic tools that captures key aspects of research publishing, collaborative research, research networks and research communication across the main scientific areas"

We need to change the questions we ask

Let’s go for more beautiful questions

Advantages of this community:

- **Broad** cross-disciplinary perspectives

- **Long term** thinking

Rationale: Evolution of the research-support ecosystem

Search	→ Exploration & Discovery
Research stocks	→ Knowledge flows
Descriptive	→ Predictive & Prescriptive
Reactive support	→ Proactive orchestration
Straightforward questions	→ Complex challenges
Evaluation/Tracking/Measuring	→ Allocation of resources

Rationale: Evolution of the research-support ecosystem

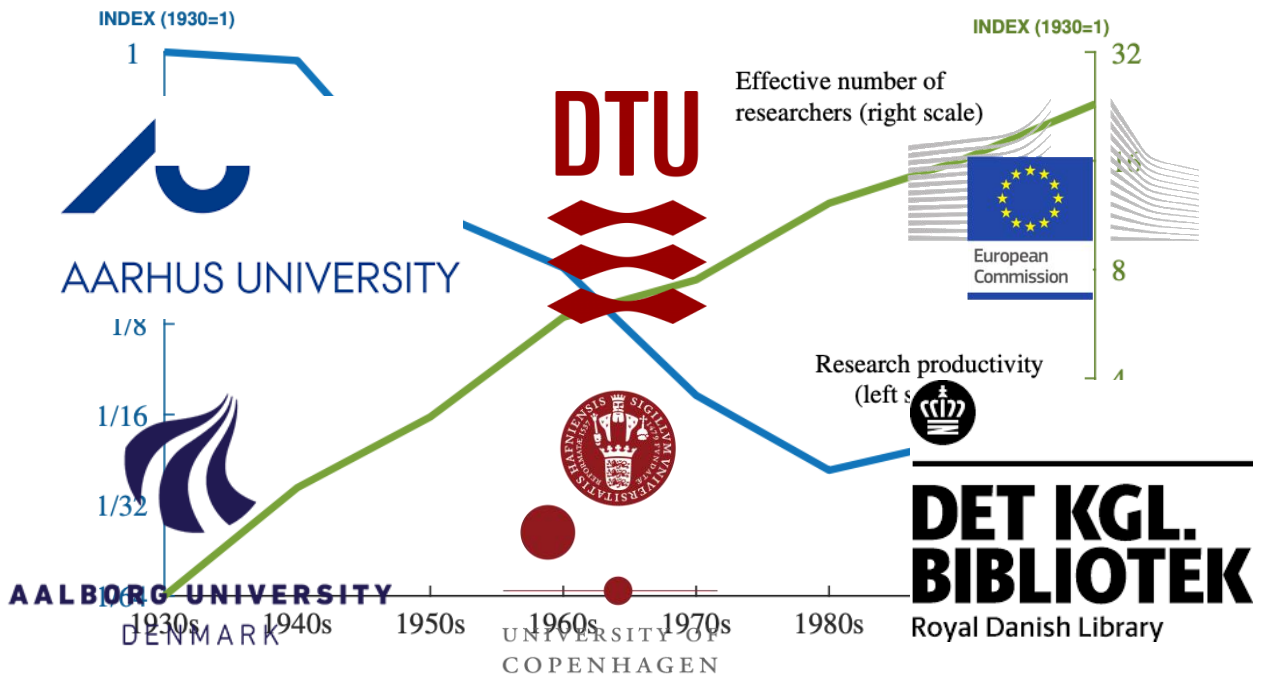
Faster, cheaper and better… at the same time

Rationale: Evolution of the research-support ecosystem

On 2018 the world:

- Wrote over 5 million new scientific publications
- Registered more than 1.5 million patents
- Assigned over 500.000 R&D grants
- Invested on R&D US$ 1.7 trillion

Figure 2: Aggregate Evidence on Research Productivity



Also, "Are Ideas Getting Harder to Find?"

N. Bloom, C. Jones, J. Van Reenen, and M. Webb, "Are Ideas Getting Harder to Find?," 2019.

Example case:

University-Level Knowledge Landscapes

across and beyond silos

Context

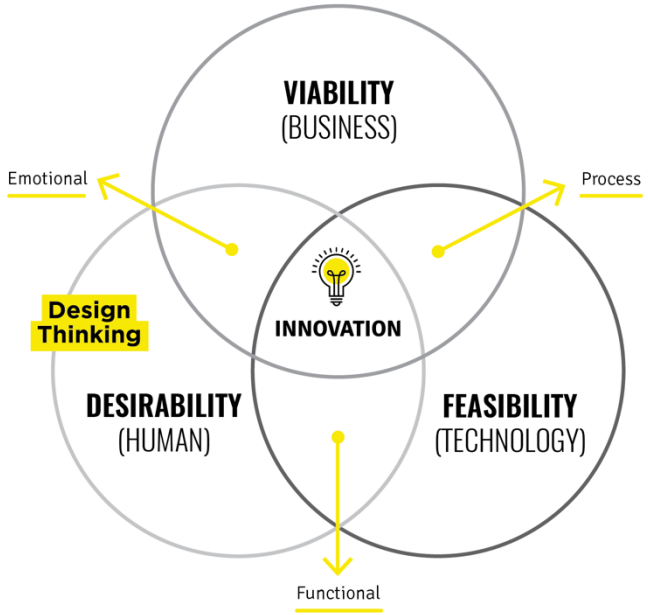
Usage and evaluation within the cases of Scopus, WoS, Dimensions and Orbit data both in isolation and in blends

Design, development and evaluation of new analytic tools

Ingestion of VIVO data and integration of analytics and visualisations within the VIVO environment

Building blocks for the development of the cases include learnings from ROI-AV, DTU RAP, AIDA, maps of science and the EURITO framework

A Design Thinking Approach to Define Data-Science Projects



REF: IDEO. 2012. Design Thinking for Educators Toolkit.

Problem / Challenge / Opportunity

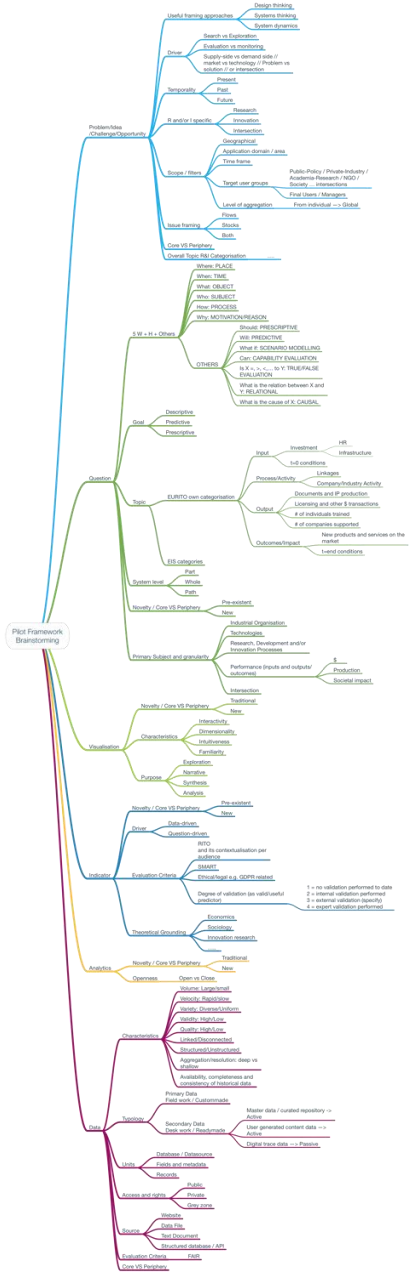
Question/hypothesis

Visualisation

Indicator

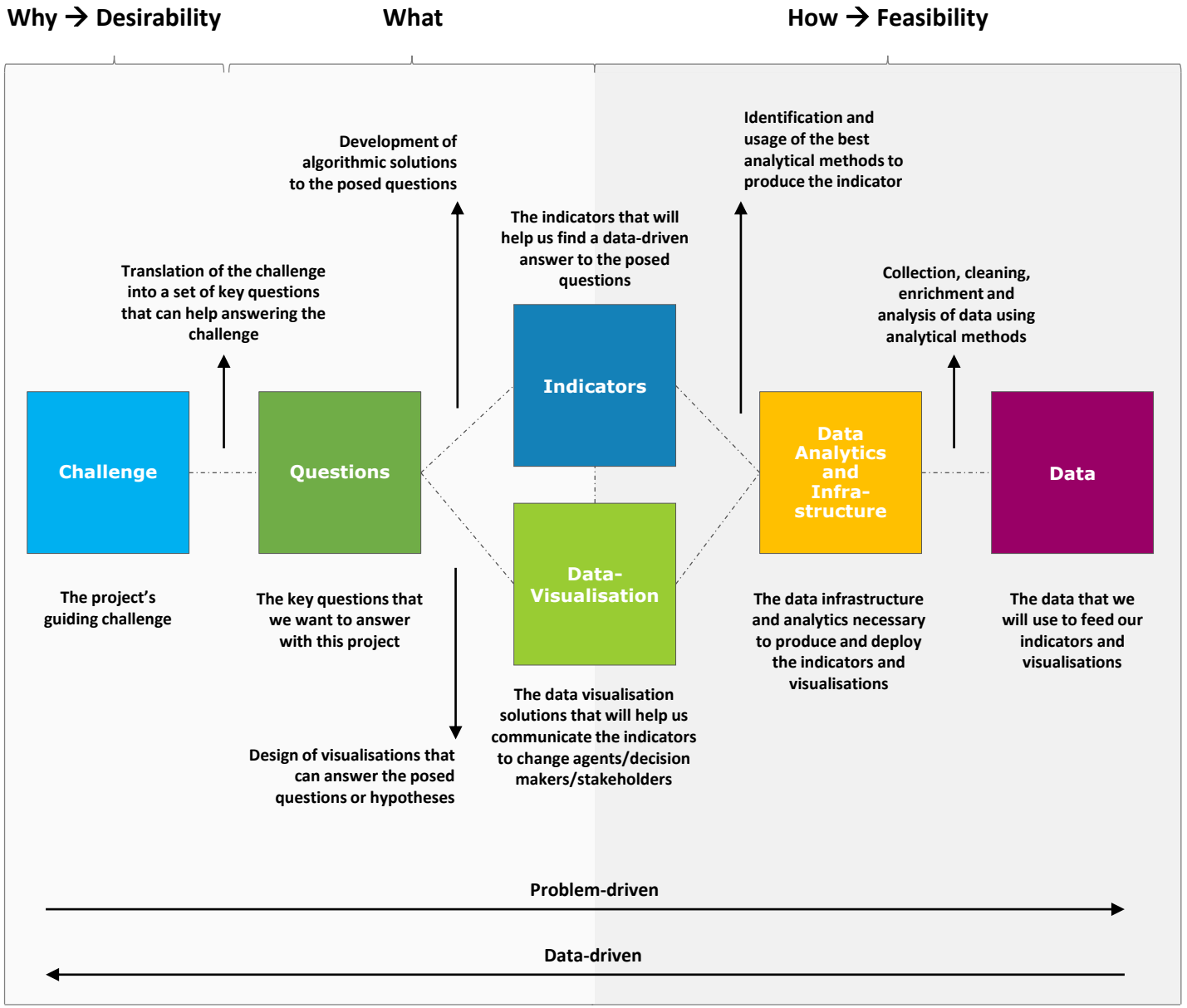
Data Infrastructure and Analytics

Data

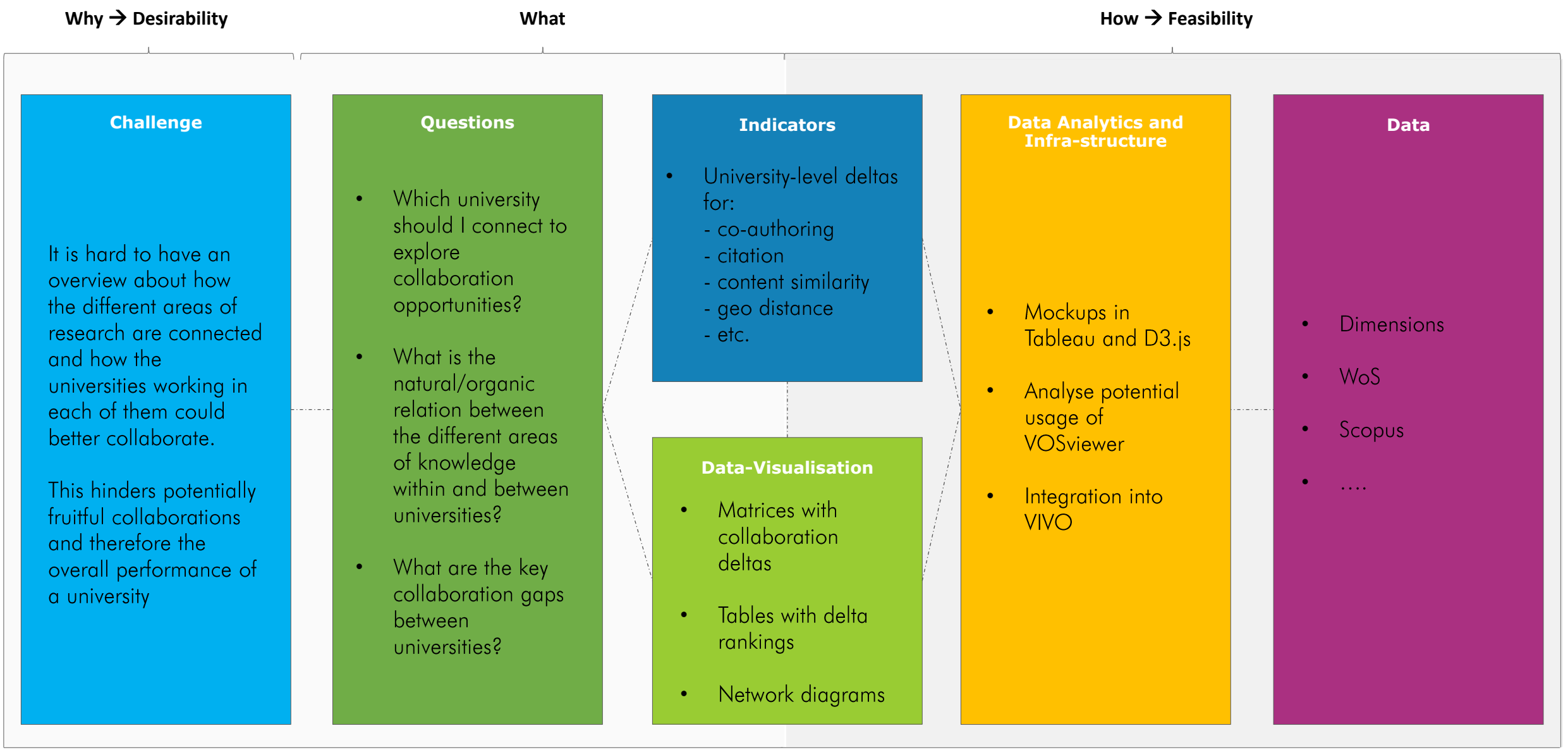


Capability mapping: using bibliometric data to explore the potential of research ecosystems - @parraguezr

OVERALL FRAMEWORK

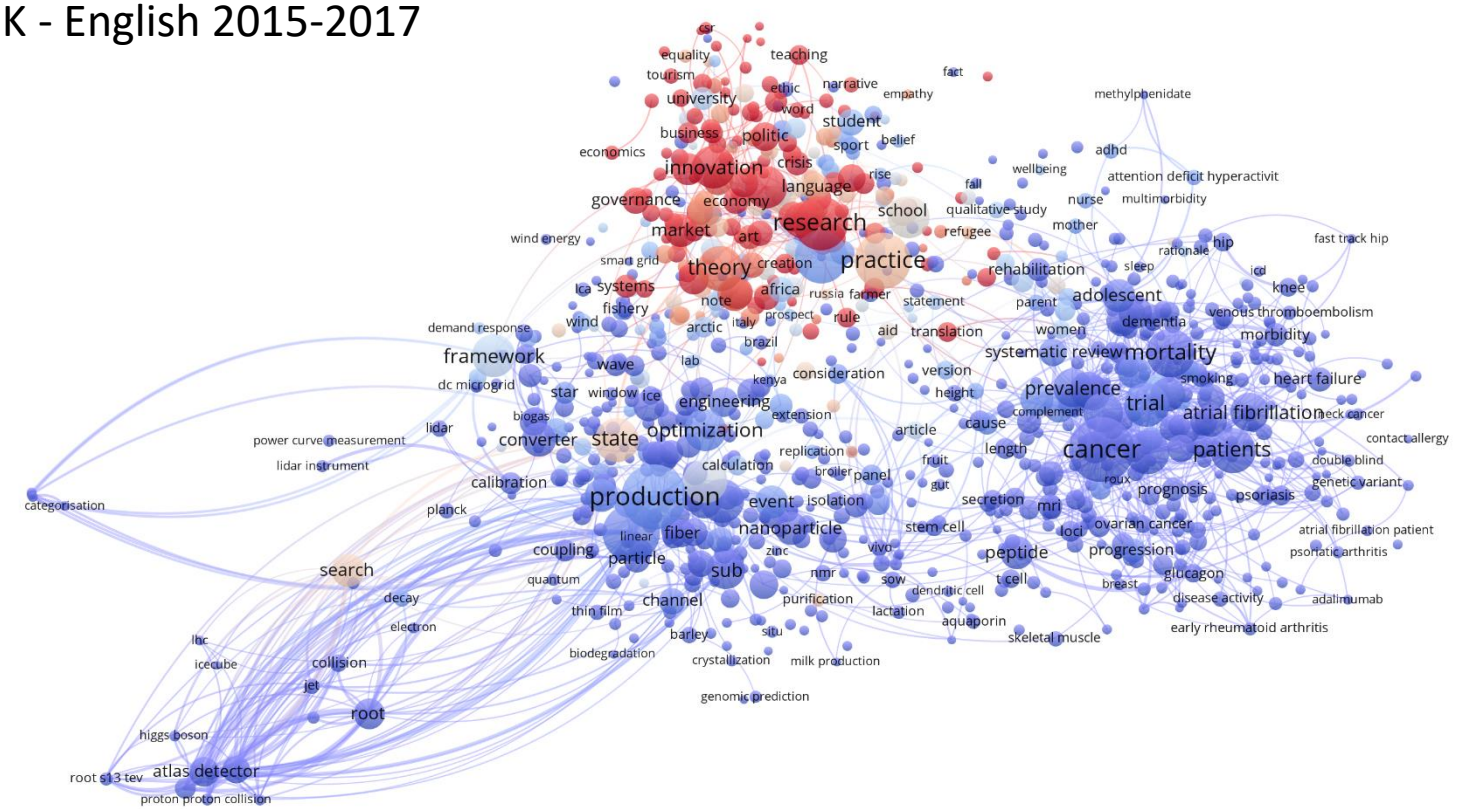


Case 2: Knowledge Landscape - across and beyond silos



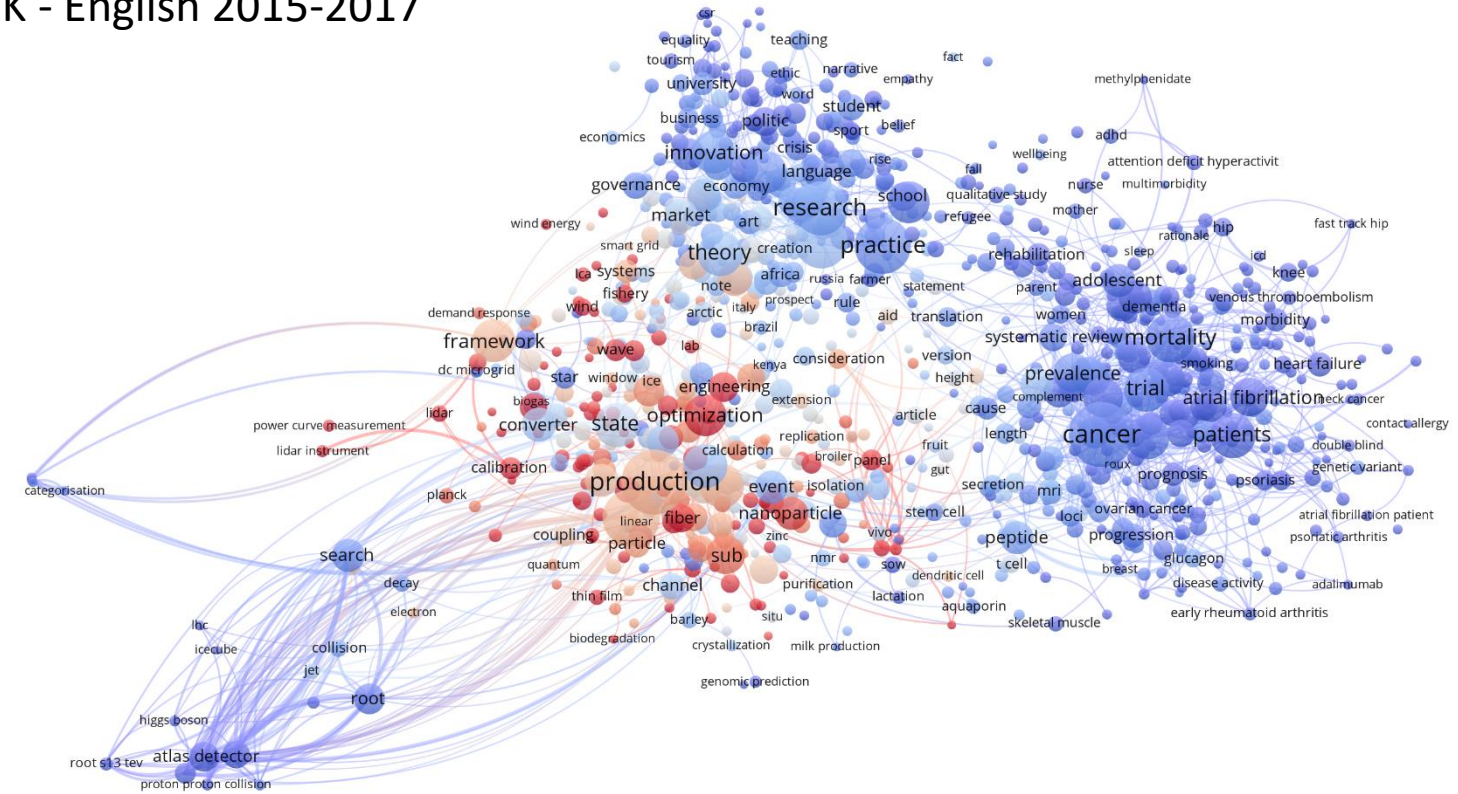
Case 2: Knowledge Landscape - across and beyond silos

e.g.
Map of Science DK - English 2015-2017
KU



Case 2: Knowledge Landscape - across and beyond silos

e.g.
Map of Science DK - English 2015-2017
DTU



Case 2: Knowledge Landscape - across and beyond silos

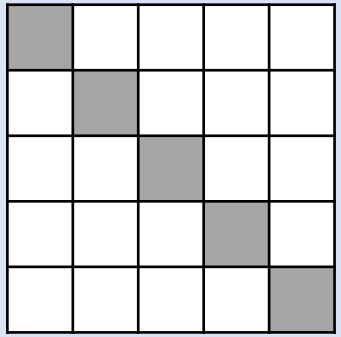
Actual interaction

Interaction “potential”

CITATION MATRIX

University

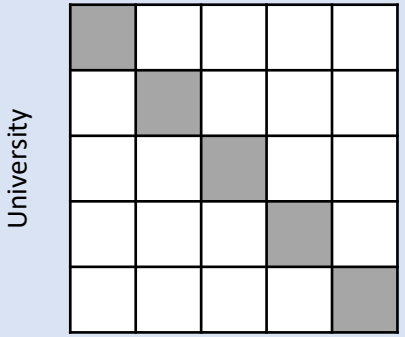
University



CO-AUTHORING MATRIX

University

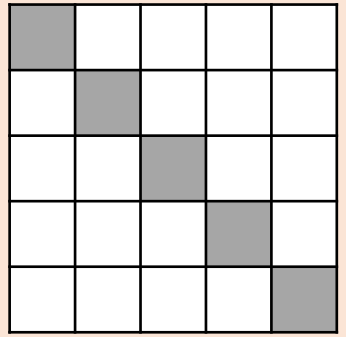
University



DOC SIMILARITY MATRIX

University

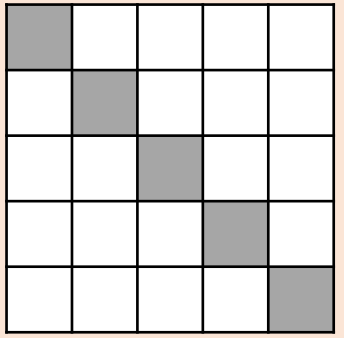
University



CLASSIFICATION CO-OCURRENCE MATRIX

University

University



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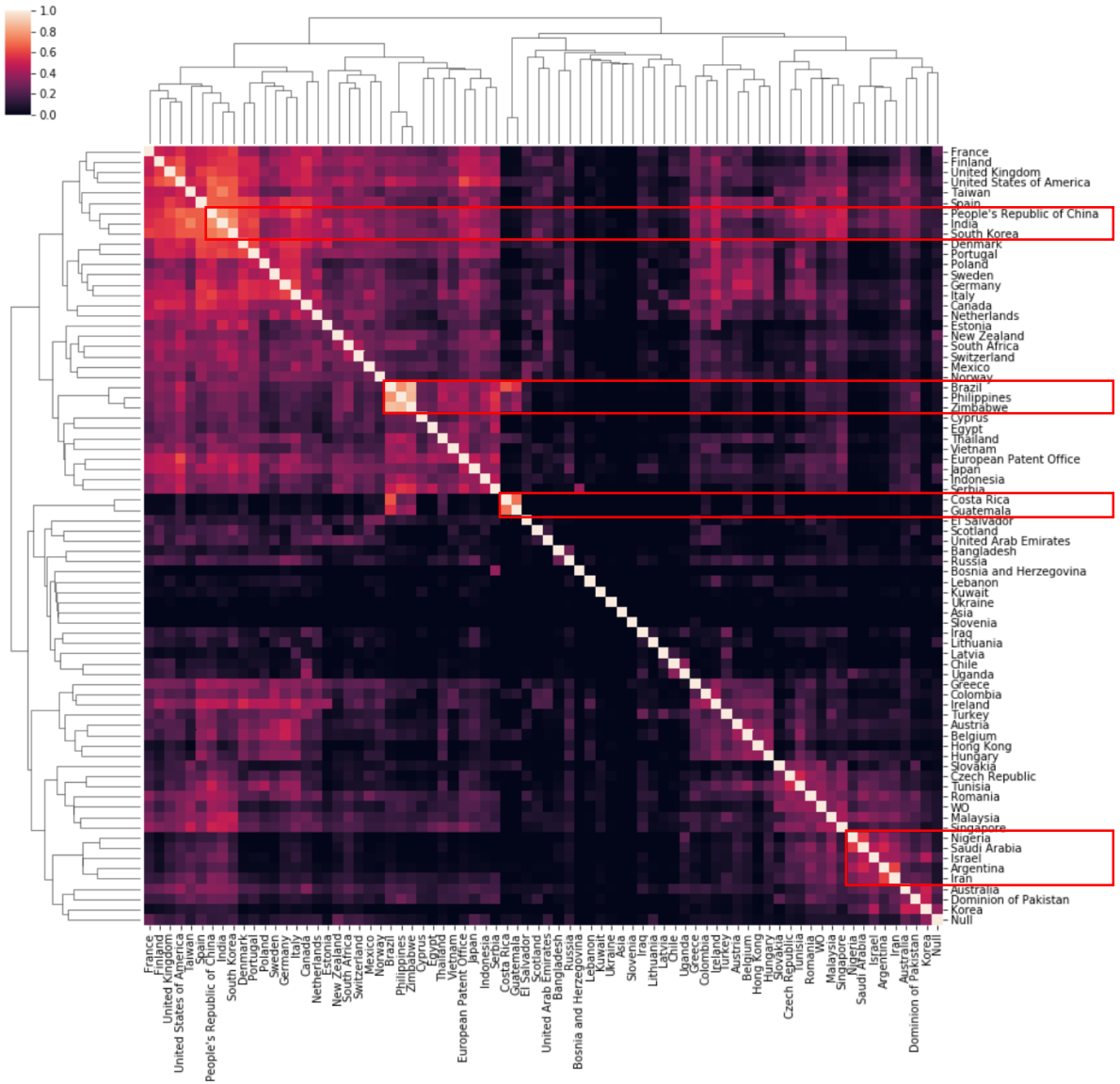
DELTA MATRICES

Other matrices include geographical distance and shared collaboration partners

Case 2: Knowledge Landscape - across and beyond silos

e.g.

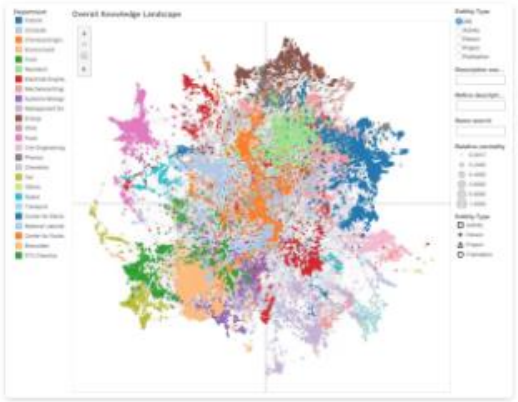


DTU Knowledge Landscape

Data-driven network insights

Welcome

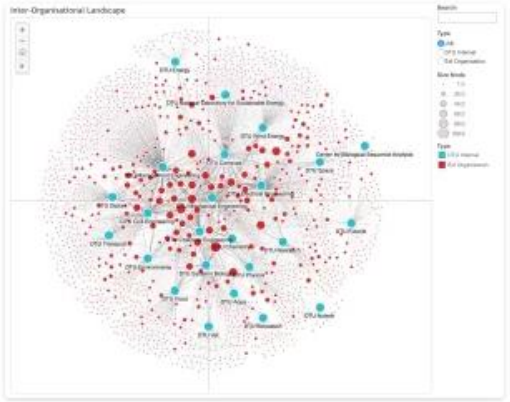
This website provides rich interactive visualisations for two important sets of data at DTU: 1) knowledge assets, including publications, projects, activities and the people that produces these knowledge assets. 2) The interactions of DTU's departments with external organisations.



1) DTU's Knowledge Landscape

The first interactive visualisation (1) shows different views of what we call **the knowledge landscape**, which includes a map that allows to identify groups of knowledge assets, search and filter by departments and keywords.

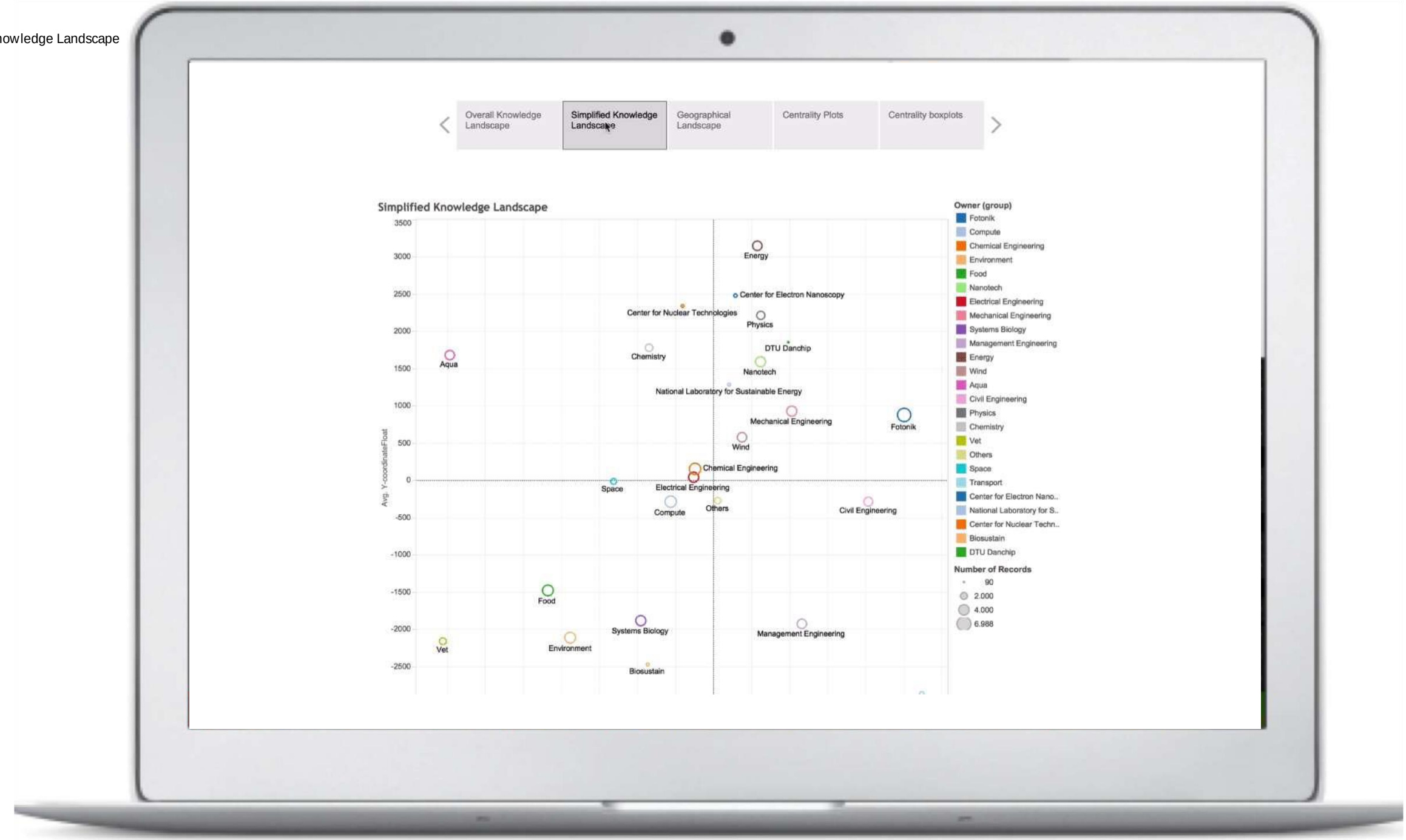
The second interactive visualisation (2) shows what we call the **inter-organisational landscape**, which allows for a network view of the connections between each department and external organisations.



2) DTU's inter-organisational landscape

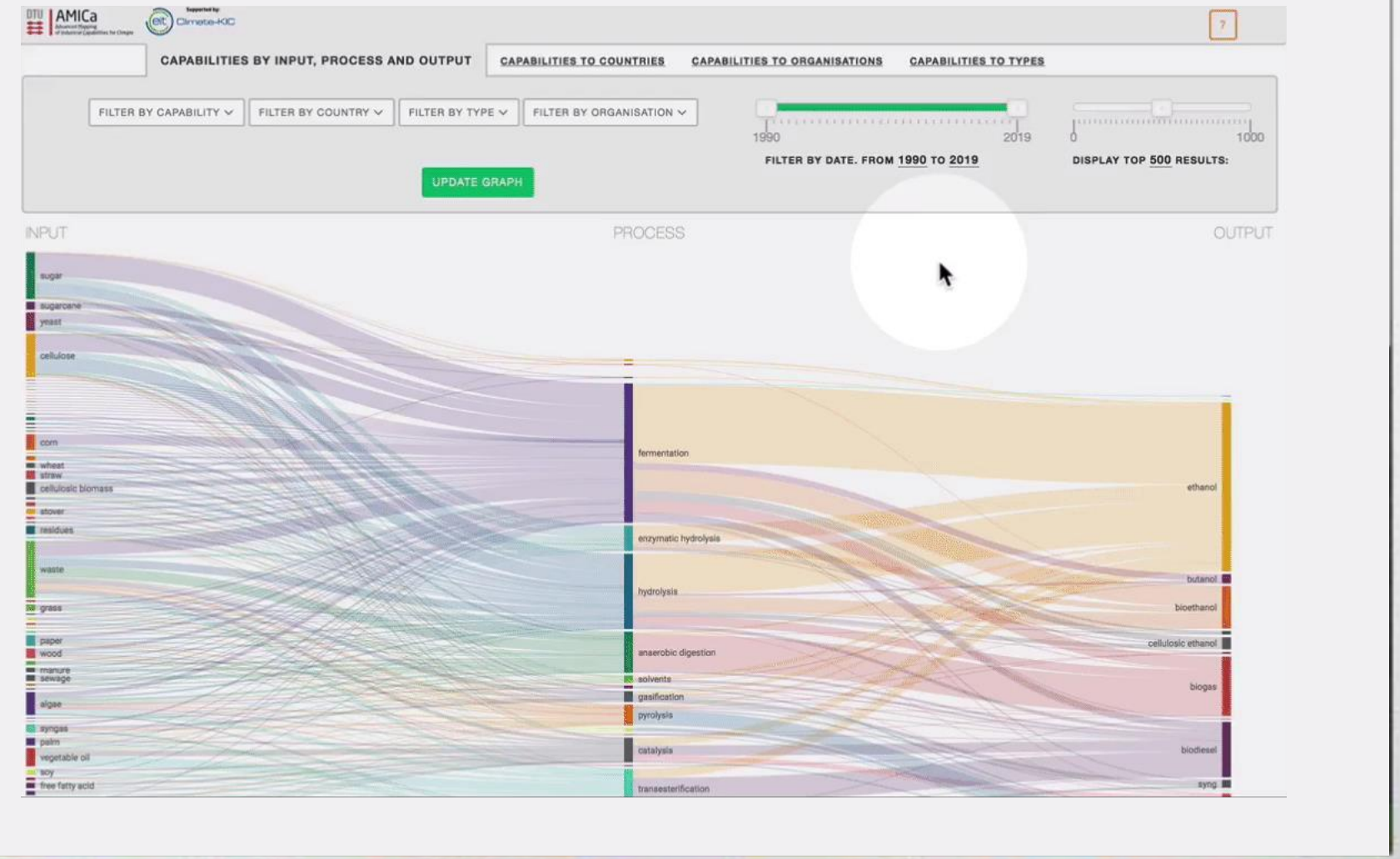
For more information about this tool and its functionalities please visit the help section. To contact the team behind this initiative and other issues please visit our about page.


Overall Knowledge Landscape
Simplified Knowledge Landscape
Geographical Landscape
Centrality Plots
Centrality boxplots
Department
Fotonik
Compute
Chemical Engin..
Environment
Food
Nanotech
Electrical Engin..
Mechanical Eng..
Systems Biology
Management E..
Energy
Wind
Aqua
Civil Engineering
Physics
Chemistry
Vet
Others
Space
Transport
Center for Elect..
National Labora..
Center for Nucl..
Biosustain
DTU Danchip
Overall Knowledge Landscape
Entity Type
(All)
Activity
Person
Project
Publication
Description search
Refine description ..
Name search
Connections
2
50
100
150
200
233
Entitity Type
Activity
Person
Project
Publication
Connections
2
233

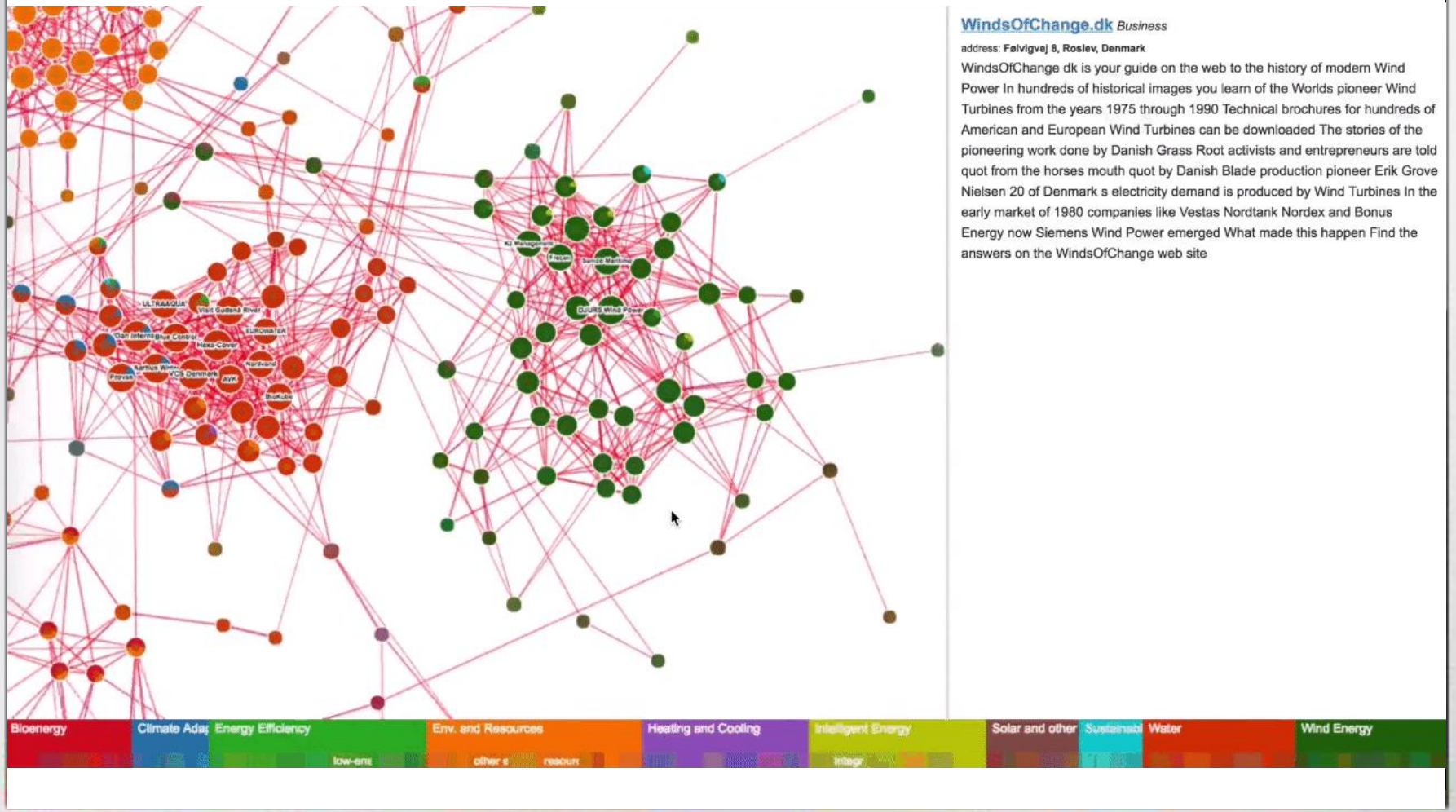

Overall Knowledge Landscape
Simplified Knowledge Landscape
Geographical Landscape
Centrality Plots
Centrality boxplots
Simplified Knowledge Landscape
Avg. Y-coordinateFloat
3500
3000
2500
2000
1500
1000
500
0
-500
-1000
-1500
-2000
-2500
Energy
Center for Electron Nanoscopy
Center for Nuclear Technologies
Physics
DTU Danchip
Chemistry
Aqua
Nanotech
National Laboratory for Sustainable Energy
Mechanical Engineering
Fotonik
Wind
Chemical Engineering
Space
Electrical Engineering
Compute
Others
Civil Engineering
Food
Systems Biology
Management Engineering
Vet
Environment
Biosustain
Owner (group)
Fotonik
Compute
Chemical Engineering
Environment
Food
Nanotech
Electrical Engineering
Mechanical Engineering
Systems Biology
Management Engineering
Energy
Wind
Aqua
Civil Engineering
Physics
Chemistry
Vet
Others
Space
Transport
Center for Electron Nano..
National Laboratory for S..
Center for Nuclear Techn..
Biosustain
DTU Danchip
Number of Records
90
2.000
4.000
6.988

AMICa

Advanced Mapping
of Industrial Capabilities for Climate



Net-Sights



DTU

Project Key Resources and Activities

Bibliometric Data

+

Network Science

Incl. Social network analysis & complex adaptive systems

+

Data-Science & Analytics

laravel

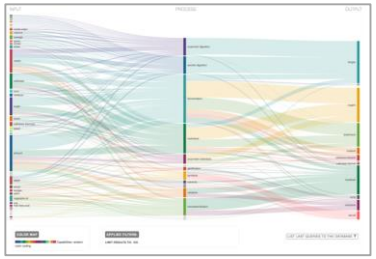
python™

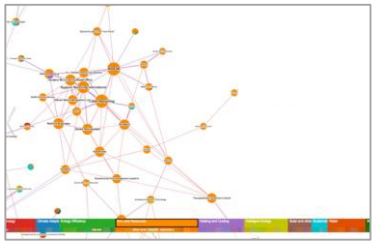
neo4j

Incl. graph databases

+

Information Visualisations





Incl. Advanced and intuitive representations of complex system models

Reflection + Q&A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