

# Climate-KIC AMICa

## Advanced Mapping of Industrial Capabilities for Climate

# Background



# An Engineering Systems Perspective...

Focus on interdisciplinary  
design of engineering  
systems



# From Counting



# to Connecting



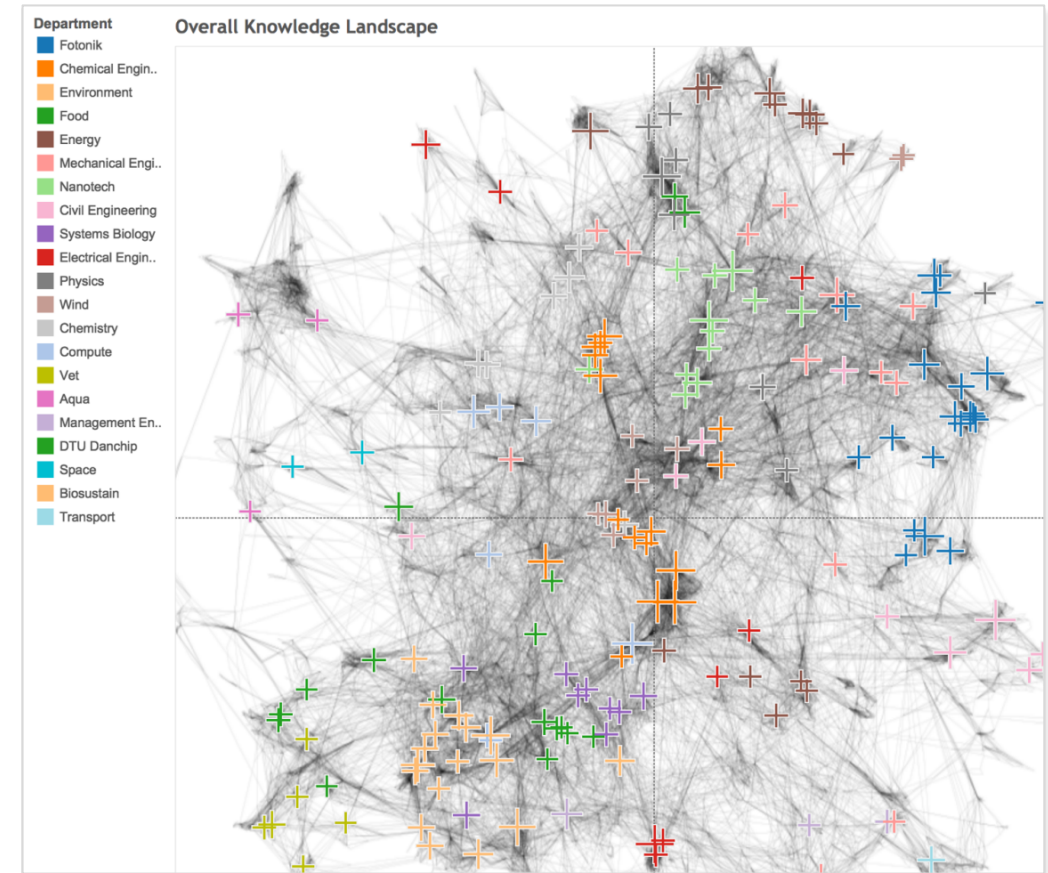


# From Counting



“A spreadsheet way of knowledge”

# to Connecting



A connected way of knowledge  
→ where relations matter



# From Counting to Connecting in practice



Network Insights for Collaborative  
Sustainable Production

Finding the right partner

The urgent need for sustainability





CONNECT WITH GREEN PROFILES

SELECT YOUR SECTOR

- ENERGY EFFICIENCY
- HEATING & COOLING
- INTELLIGENT ENERGY
- WIND ENERGY
- SOLAR & OTHER RENEWABLES
- BIOENERGY
- WATER
- CLIMATE ADAPTATION
- ENVIRONMENT & RESOURCES
- SUSTAINABLE TRANSPORTATION

FILTER BY AREA OF INTEREST

First, please select one or more sectors.

SELECT PROFILE TYPES

- BUSINESS
- PUBLIC SECTOR
- INSTITUTION
- ORGANISATION

SEARCH RESULTS (1-40 / 589)

PROFILE BUSINESS
SEGES
SEGES is the leading agricultural advisor in Denmark and offers solutions for tomorrow's agriculture and food sector. Our prime objective is...



PROFILE BUSINESS
ARKI\_LAB
arki\_lab is a young, Copenhagen-based urban design studio that was founded upon the strong ideological principle of getting closer to...



PROFILE BUSINESS
VIKING WIND
Viking Wind produces strong and reliable 25 kW household wind turbines based on the Danish Design principles of functionality and...



PROFILE BUSINESS
1ST MILE
1st Mile makes green businesses meet. We are interested in joining cross-border projects with the aim of bringing new technologies to...



PROFILE INSTITUTION
UNIVERSITY OF COPENHAGEN
With over 37,000 students and more than 7,000 employees, the University of Copenhagen is the largest institution of research and...



PROFILE BUSINESS
BURMEISTER & WAIN SCANDINAVIAN CONTRACTOR
BWSC is a world-leading provider and operator of turnkey power plants, based on a wide variety of advanced technologies using...



PROFILE BUSINESS
ID-ADVICE
ID-advice is a specialist in Auto-ID, primarily RFID solutions. ID-advice knows how to do RFID in logistics and storage, where tracking...



PROFILE ORGANISATION
THE ALEXANDRA INSTITUTE
The Alexandra Institute is an R&D company that helps public and private organisations apply the newest IT research and technology. We have a...



PROFILE ORGANISATION
COPENHAGEN CENTRE ON ENERGY EFFICIENCY
The Copenhagen Centre on Energy Efficiency helps governments and cities reach their UN Sustainable Development Goals. We connect the dots between Public, Private, Research...



PROFILE BUSINESS
VISBLUE
VisBlue is a spinout company with deep roots in both Aarhus University and the University of Porto. VisBlue produces Vanadium...



PROFILE BUSINESS
ENERGI DANMARK GROUP
Energi Danmark is currently the largest Danish player in the market for trading electricity for business customers. The company has...



PROFILE PUBLIC SECTOR
ENERGINET.DK
Energinet.dk connects people and energy Can more than half of the Danish electricity come from wind? Can biogas freely float...



PROFILE BUSINESS
SPICA TECHNOLOGY
Spica Technology is an international engineering company dedicated to the wind power industry. We have designed, tested, built and installed...



PROFILE BUSINESS
POLYTECH
PolyTech PolyTech is a fast-growing global company highly specialized in the wind industry. PolyTech's focus is the design and manufacture of...



PROFILE INSTITUTION
DTU WIND ENERGY
A considerable part of Denmark's electricity production is based on wind. In 2016 the electricity production from wind energy reached...



PROFILE BUSINESS
NOENCO - NORDIC ENERGY CONSULTING
We specialize within energy optimization, energy conversions and energy management. Targeted Marine Industry, Industrial installations of any kind, Agriculture, Horticulture...



PROFILE BUSINESS
HELIAC
Heliac's concentrated solar power (CSP) panels produce high-temperature heat in utility scale at costs below any other source of energy...



PROFILE ORGANISATION
STATE OF GREEN
State of Green is a public-private partnership operating the official green brand for Denmark. We give an easy gateway for...



# FROM COUNTING

## TO CONNECTING

State of Green  
Join the Future. Think Denmark

DEUTION 78 79 80 81 ABOUT PARTNERS CONTACT PRESS JOIN SIGN IN TO PROFILE AREA

Search

**SECTORS**  
Explore green sectors

**CONNECTION WITH GREEN PROFILES**

**SELECT YOUR SECTOR**

- ☐ WATER EFFICIENCY
- ☐ HEATING & COOLING
- ☐ INTELLIGENT ENERGY
- ☐ WIND ENERGY
- ☐ SOLAR & OTHER RENEWABLES
- ☐ BIOENERGY
- ☐ WASTE
- ☐ CLIMATE ADAPTATION
- ☐ ENVIRONMENTAL & RESOURCES
- ☐ SUSTAINABLE TRANSPORTATION

**SOLUTIONS**  
Find solutions for a greener future

**CONNECT WITH GREEN PROFILES**

**SELECT YOUR SOLUTION**

- ☐ WATER EFFICIENCY
- ☐ HEATING & COOLING
- ☐ INTELLIGENT ENERGY
- ☐ WIND ENERGY
- ☐ SOLAR & OTHER RENEWABLES
- ☐ BIOENERGY
- ☐ WASTE
- ☐ CLIMATE ADAPTATION
- ☐ ENVIRONMENTAL & RESOURCES
- ☐ SUSTAINABLE TRANSPORTATION

**PROFILES**  
Connect with Danish expertise

**SELECT YOUR PROFILE**

- ☐ BUSINESS
- ☐ PUBLIC SECTOR
- ☐ INSTITUTION
- ☐ ORGANISATION

**TOURS**  
Visit Denmark as a State of Green Tour

**SELECT YOUR TOUR**

- ☐ BUSINESS
- ☐ PUBLIC SECTOR
- ☐ INSTITUTION
- ☐ ORGANISATION

**NEWS**  
Stay updated on the latest news

**SELECT YOUR NEWS**

- ☐ BUSINESS
- ☐ PUBLIC SECTOR
- ☐ INSTITUTION
- ☐ ORGANISATION

**EVENTS**  
An overview of green events worldwide

**SELECT YOUR EVENT**

- ☐ BUSINESS
- ☐ PUBLIC SECTOR
- ☐ INSTITUTION
- ☐ ORGANISATION

**IN FOCUS**  
Green publications, facts & perspectives

**SELECT YOUR IN FOCUS**

- ☐ BUSINESS
- ☐ PUBLIC SECTOR
- ☐ INSTITUTION
- ☐ ORGANISATION

**SEARCH RESULTS (140 / 589)**

**SHOW PROFILES** **SORT** **HIGHEST** **ALPHABETICAL** **FILTER** **SECTOR**

**PROFILE BUSINESS**

**SEGES**

SEGES is the leading agricultural solution in Denmark and offers solutions for tomorrow's agriculture and food sector. Our prime expertise is:

**PROFILE BUSINESS**

**ARKI LAB**

ARKI Lab is a young, Copenhagen-based urban design studio that was founded upon the strong ecological principle of getting closer to nature.

**PROFILE BUSINESS**

**VIKING WIND**

Viking Wind produces strong and reliable 25 MW household wind turbines based on the Danish design principles of functionality and safety.

**PROFILE BUSINESS**

**1ST MILE**

1st Mile helps green businesses meet. We are interested in joining cross-border projects with the aim of bringing new technologies.

**PROFILE INSTITUTION**

**UNIVERSITY OF COPENHAGEN**

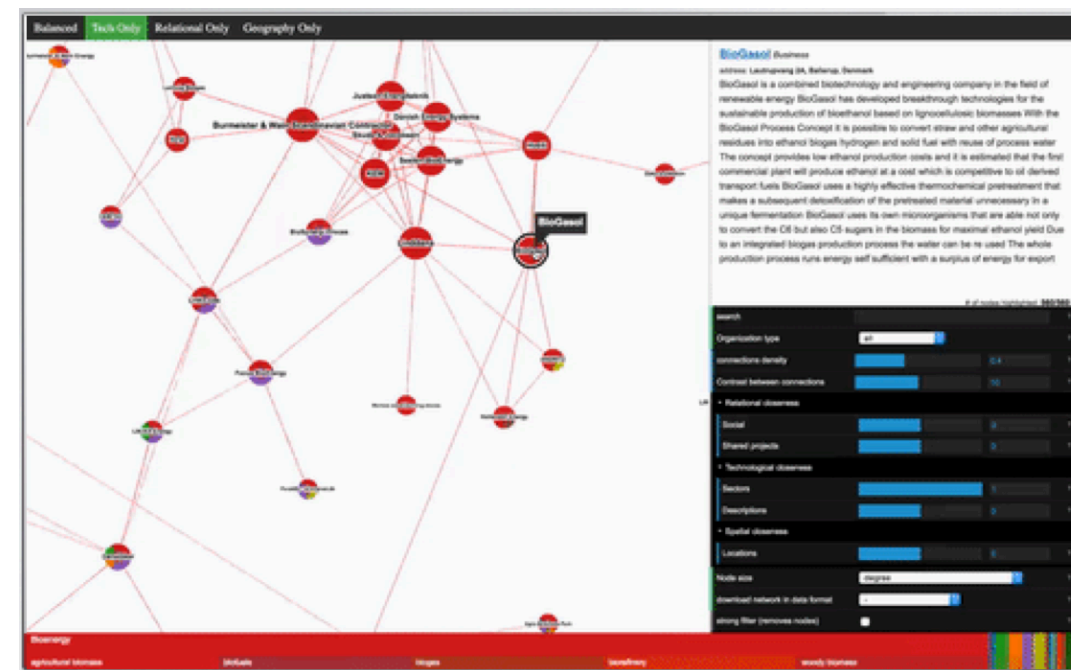
With over 37,000 students and more than 12,000 employees, the University of Copenhagen is the largest institution of research and education in Denmark.

**PROFILE BUSINESS**

**BURNEMSTER & WAIN SCANDINAVIAN CONTRACTOR**

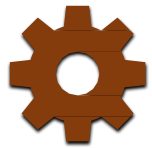
BWSC is a world-leading owner and operator of turnkey power plants, based on a wide variety of advanced technologies using:

**VIEW MORE** **TOOLS** **LIST** **MAP**





## Overview of interlocking capabilities in Cleantech



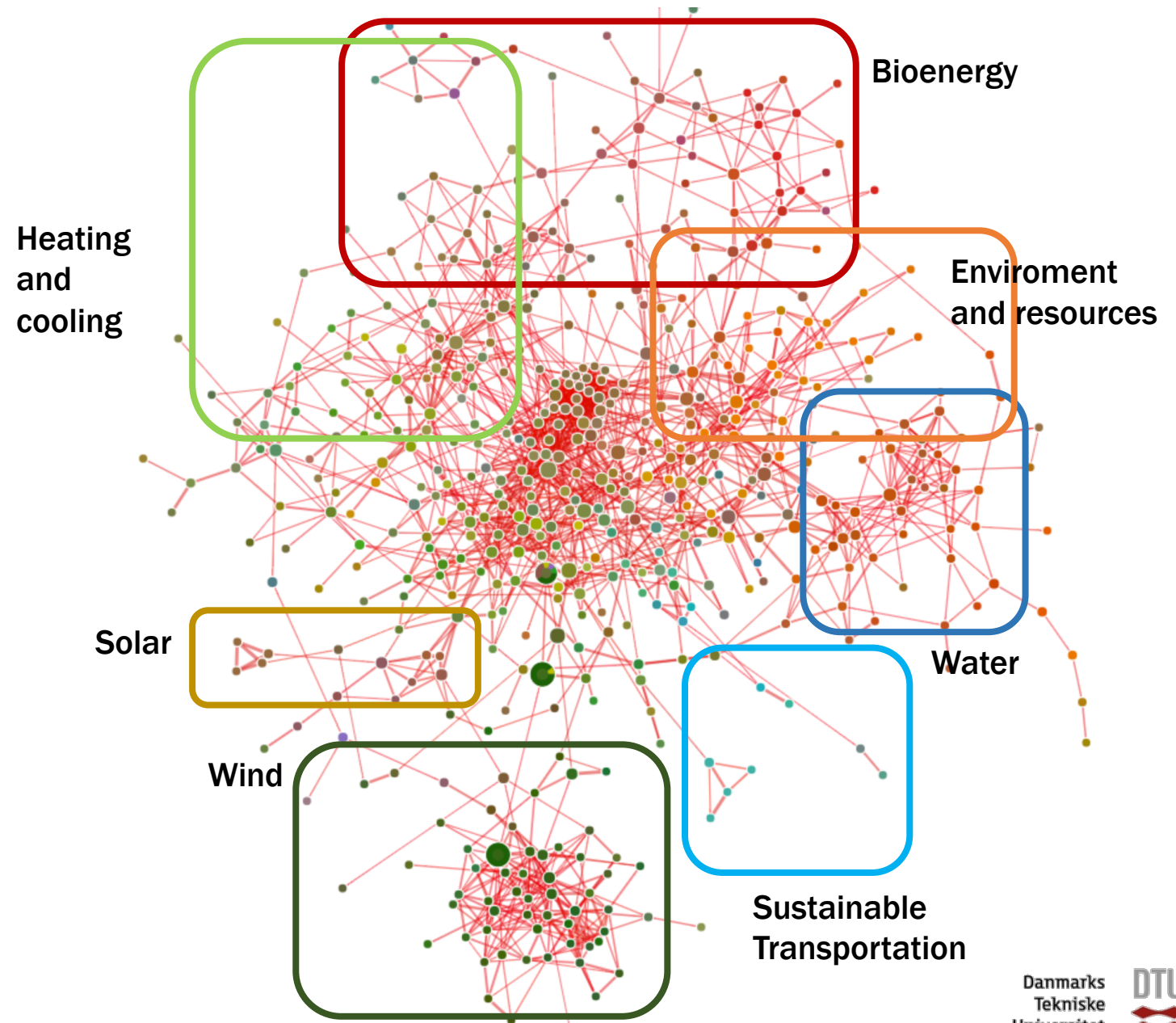
**Technology**



**Relations**



**Geography**





## Current Project: Advanced Mapping of Industrial Capabilities for Climate (AMICa)

Support the design and development of next generation biofuels as sustainable production systems

Faster

Cheaper

More  
Sustainable





## AMICa: Advanced Mapping of Industrial Capabilities for Climate

AMICa is a not-for-profit [Climate-KIC](#) Pathfinder project developing an advanced, data-driven and system-oriented industrial capability mapping platform. AMICa's objective is to map worldwide industrial capabilities to support the development of new technologies, products and services with positive climate change impact, starting with biofuels.

This project is led and executed by the [Engineering Systems Division at DTU Management Engineering](#) (Denmark), funded by [Climate-KIC](#) and has as project members [Chalmers University](#), [MASH-Biotech](#), [The Nordic Initiative for Sustainable Aviation \(NISA\)](#) and [Novozymes](#).

LEARN MORE IN OUR LATEST TECHNICAL BRIEF



# Project Consortium



## Project Lead

The Engineering Systems Division at DTU provides its expertise in mapping complex engineering systems with responsibilities on project leadership, implementation and stakeholder coordination.



## Funding and Support

Climate-KIC is Europe's largest public-private innovation partnership focused on climate change, consisting of dynamic companies, the best academic institutions and the public sector.



## Scientific Advisory

Chalmers University provides complementary scientific knowledge that expands the solution space with their experience in the aerospace sector, knowledge-based models and concept selection methods for early system design.



## Project partner, cluster input lead

The Nordic Initiative for Sustainable Aviation (NISA) is an active Nordic association working to promote and develop a more sustainable aviation industry with members that include Nordic airports, airlines, aviation authorities and the support of Airbus and Boeing.



## Project partner, SME input lead

MASH Biotech is an innovative SME developing affordable next-generation biofuels. Its role will be to provide valuable feedback about the needs that SMEs in this area have and will help us in the validation of use cases suitable for small and medium-sized companies.



## Project partner, corporate input lead

Novozymes is a large company and world-leading developer of biological and bioenergy solutions for sustainable industrial manufacturing processes. Its role is to provide valuable feedback about the needs that corporate players have.



# Data Sources

The AMICa-Pathfinder project has curated and integrated one of the largest worldwide collections of biofuel-related records

- › Patents
- › Biofuel facilities
- › Organisations supporting the development of bioenergy projects
- › EU Research and Innovation Projects
- › Scientific Publications

# BIOFUELS...

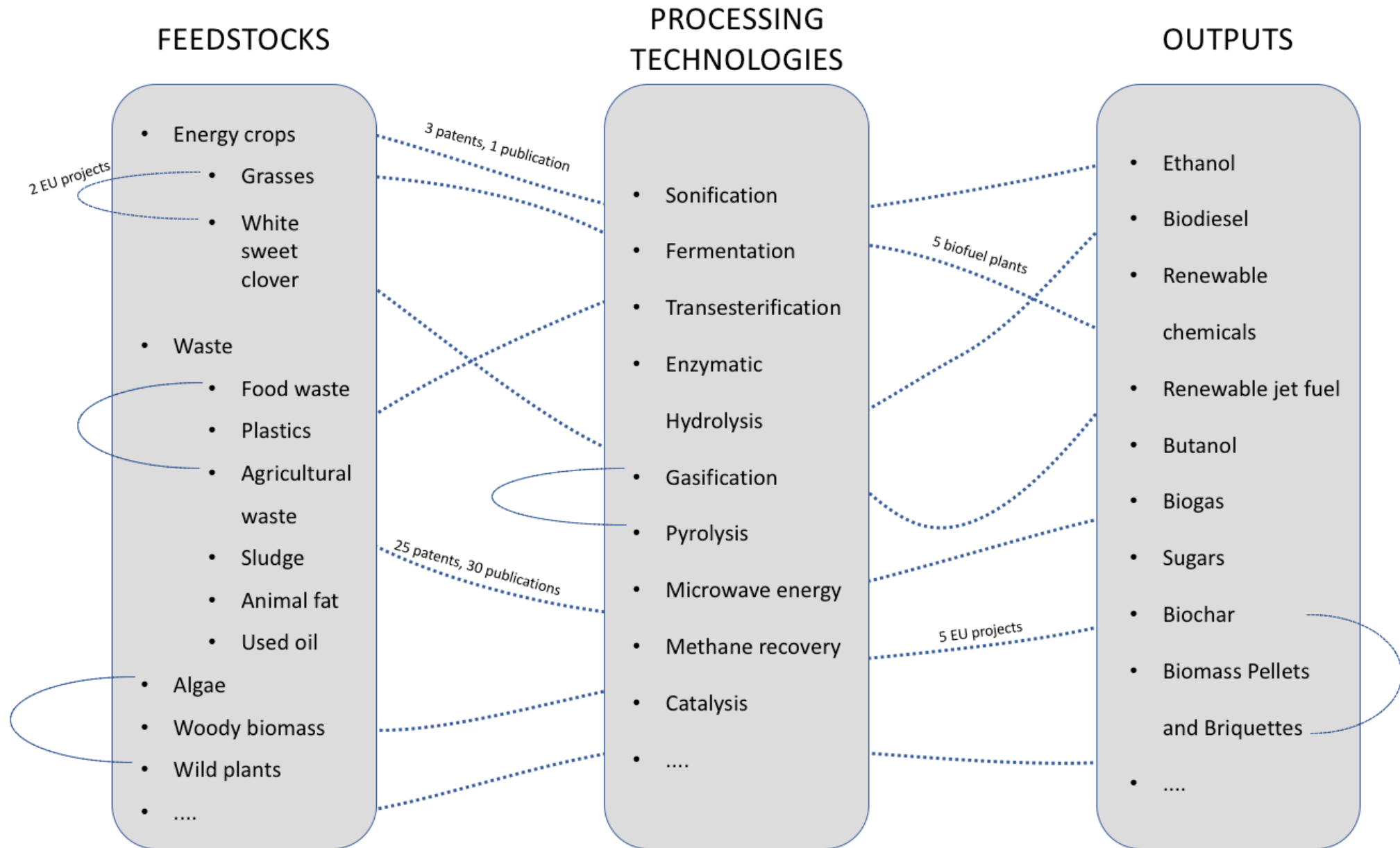
5,000 +  
patents

46,000 +  
scientific  
publications

1.000 +  
projects in  
EU  
CORDIS

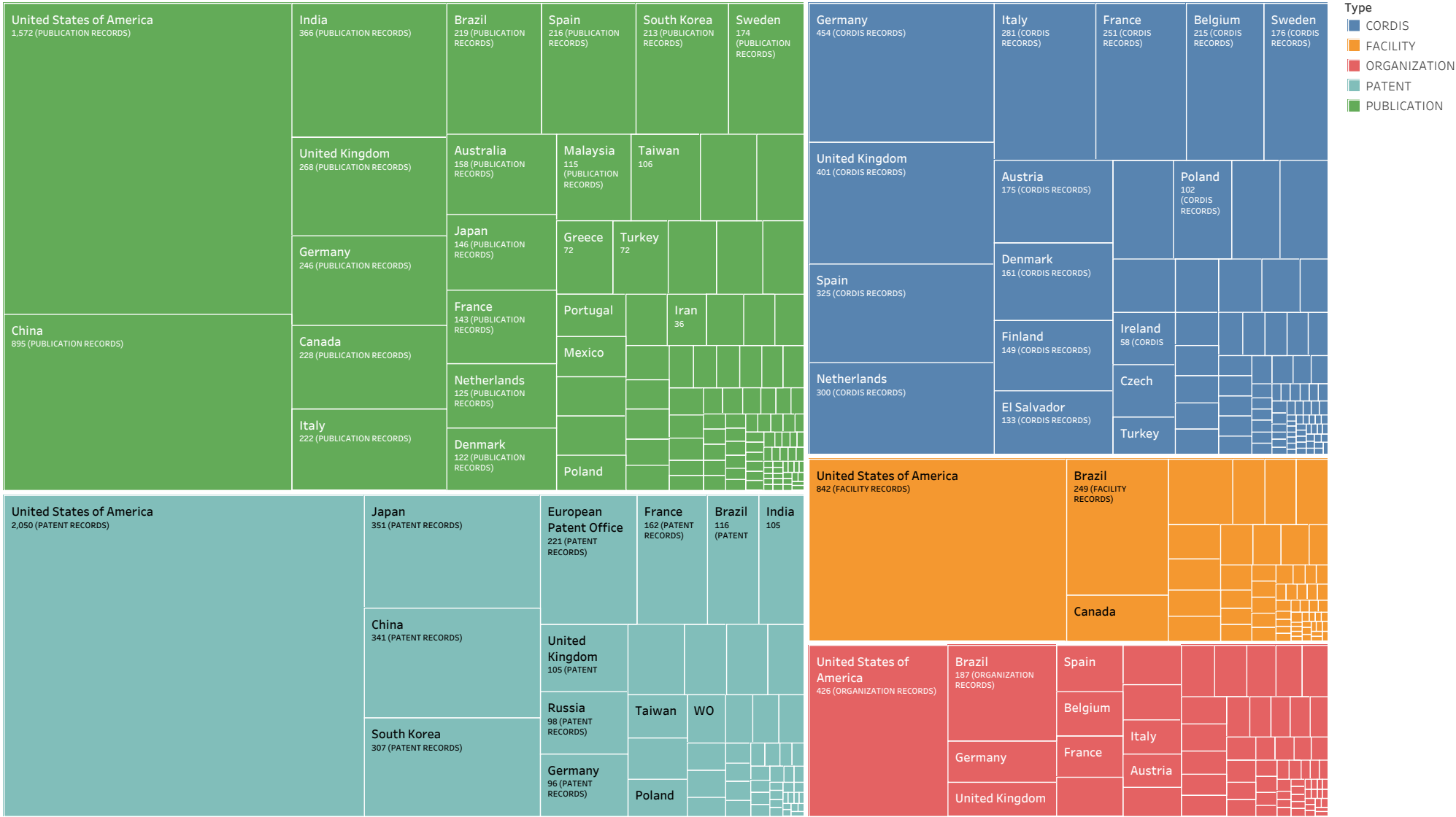
Thousands of  
organisations

We need to actively expand the solution space!



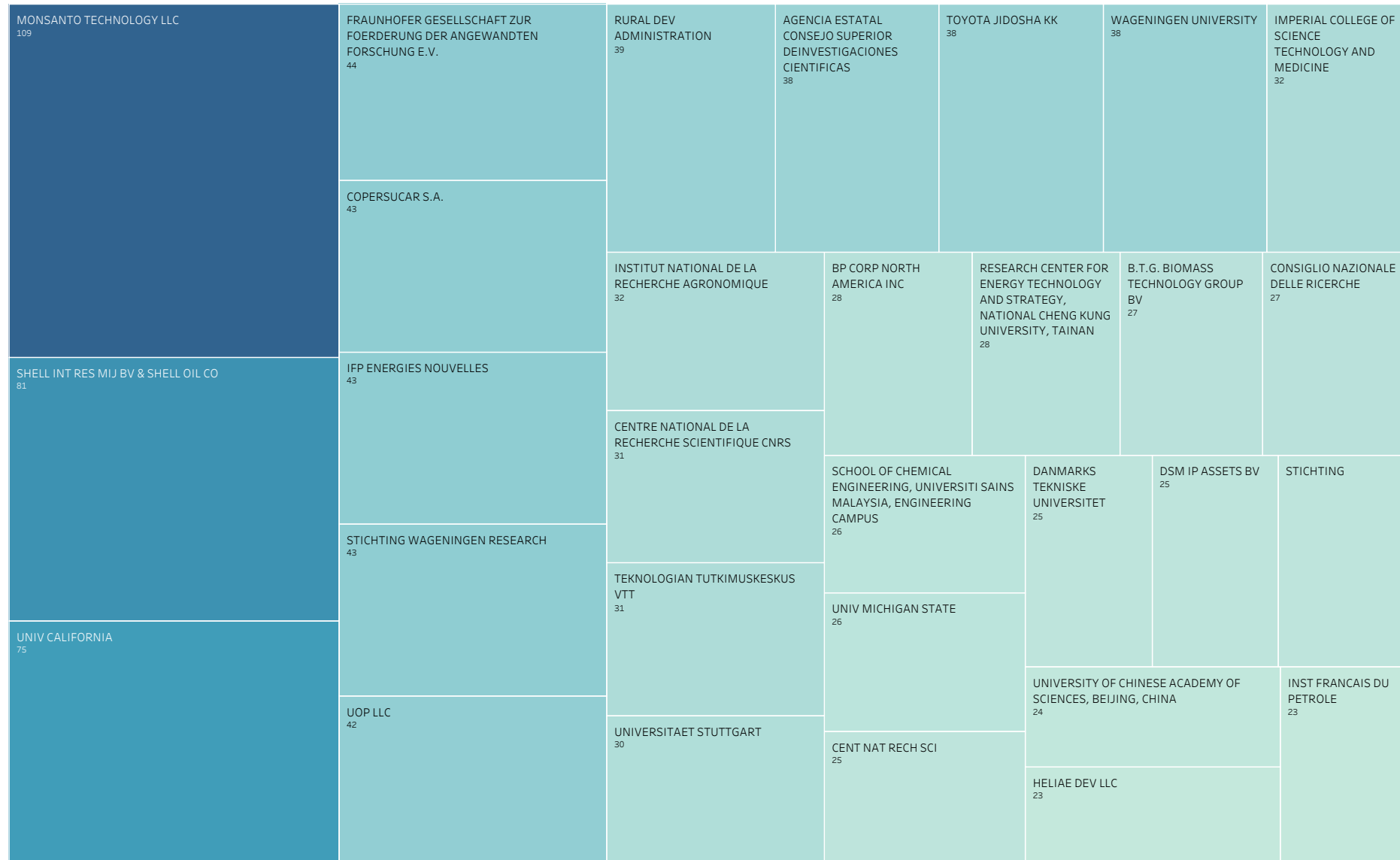


Knowledge assets per country and type



Type, Country Rec and distinct count of ID. Color shows details about Type. Size shows distinct count of ID. The marks are labeled by Type, Country Rec and distinct count of ID. The data is filtered on Abstract, which keeps multiple members. The view is filtered on Country Rec, which excludes Null.

Treemap with top 30 world organisations per production volume of knowledge assets.

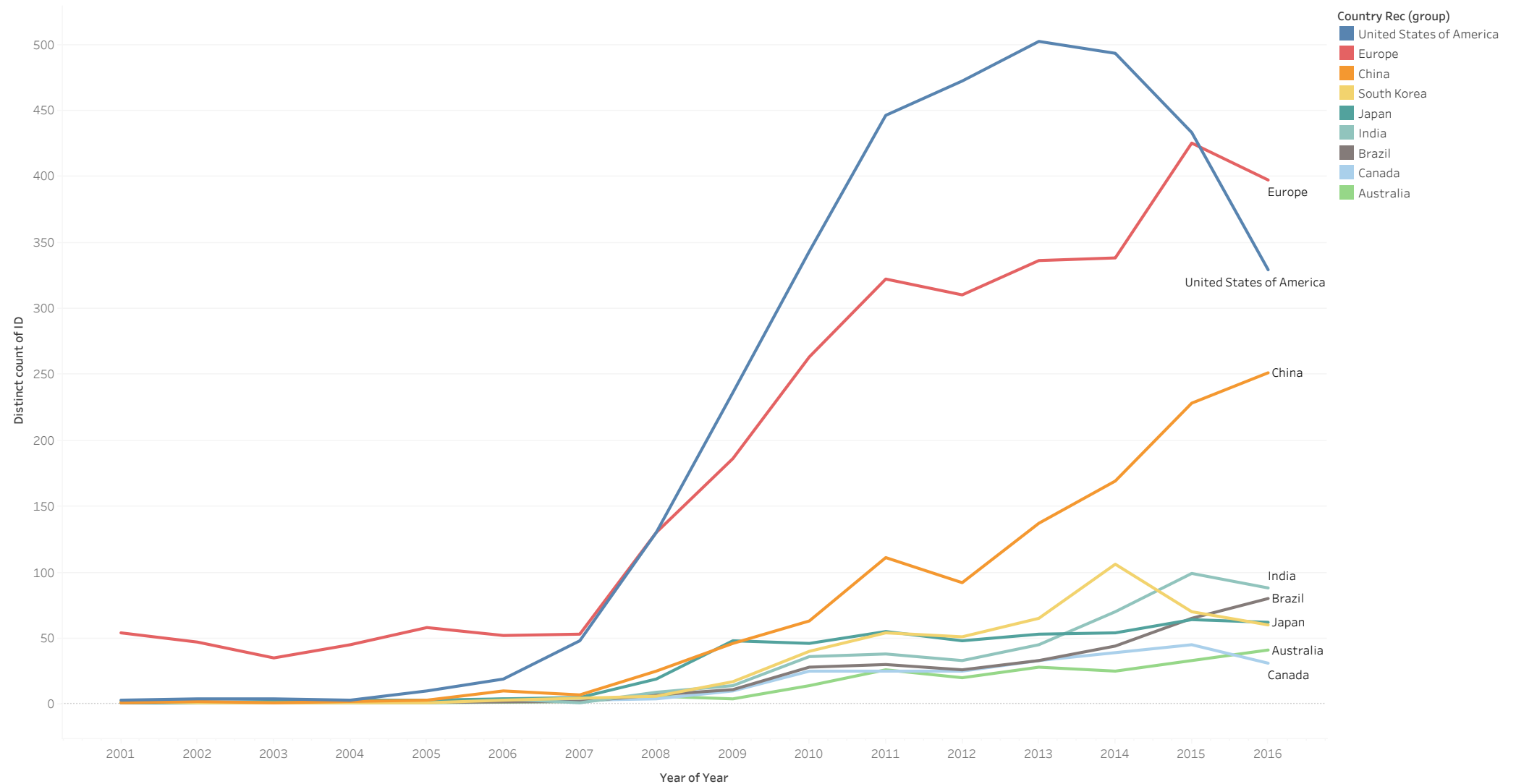


Owner Org Rec (group) and distinct count of ID. Color shows distinct count of ID. Size shows distinct count of ID. The marks are labeled by Owner Org Rec (group) and distinct count of ID. The data is filtered on Abstract and Type. The Abstract filter keeps multiple members. The Type filter keeps CORDIS, FACILITY, ORGANIZATION, PATENT and PUBLICATION. The view is filtered on Owner Org Rec (group), which keeps 30 of 21,219 members.



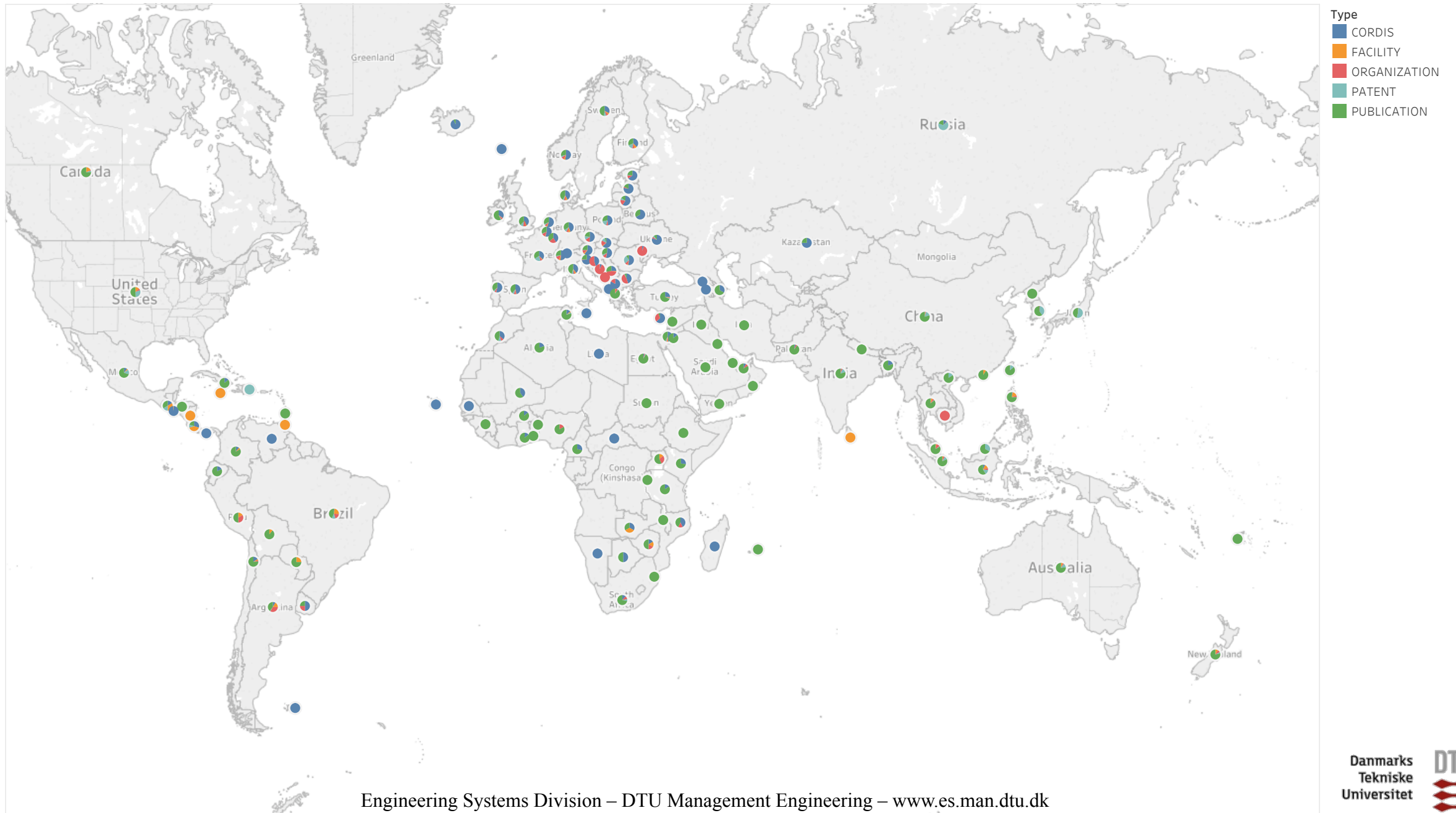
Production of knowledge assets over time.

Period 2001 - 2016. European countries including the UK grouped under "Europe". Only showing top countries per production volume.

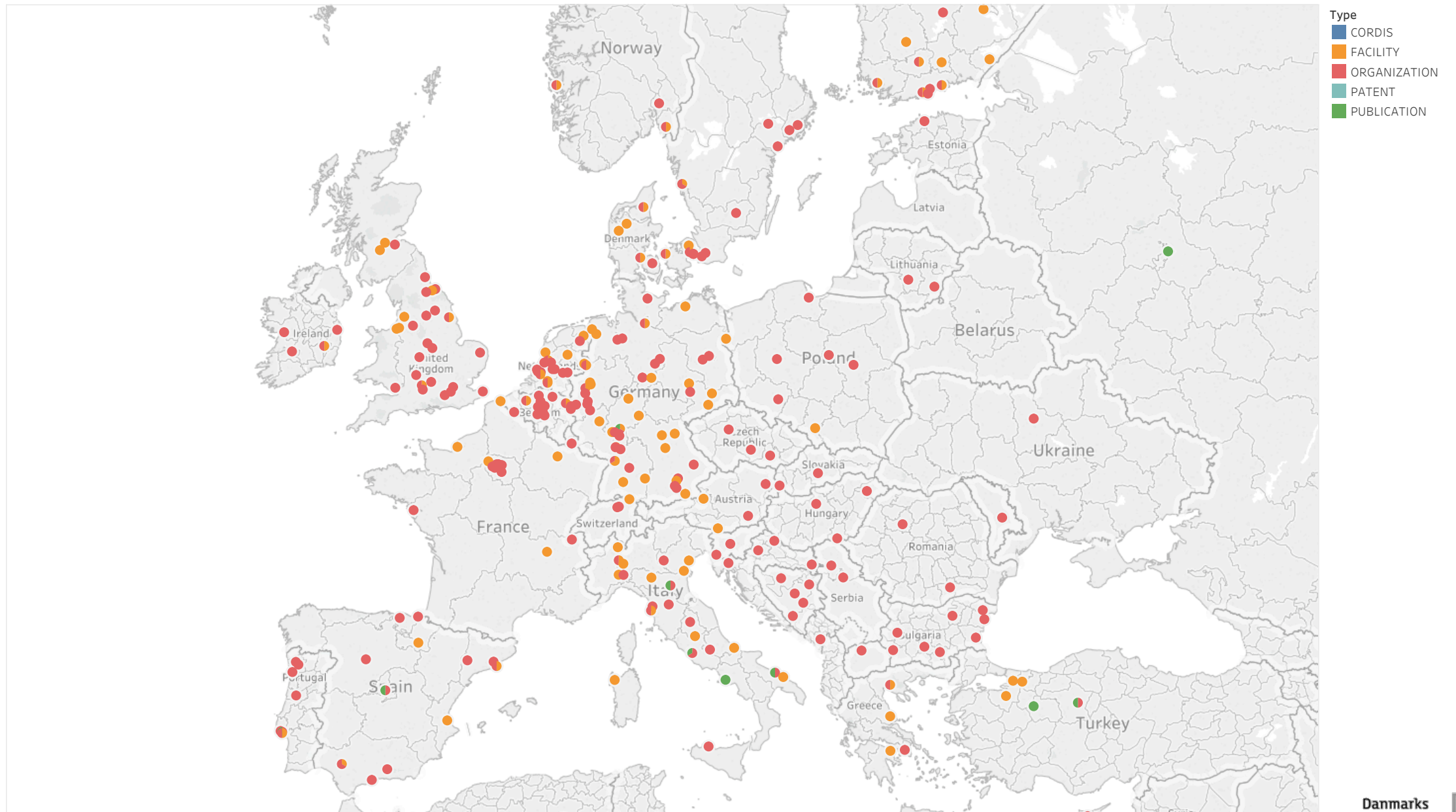


The trend of distinct count of ID for Year Year. Color shows details about Country Rec (group). The marks are labeled by Country Rec (group). Details are shown for Country Rec (group). The data is filtered on Type, Abstract, Year and Country Rec. The Type filter keeps CORDIS, FACILITY, ORGANIZATION, PATENT and PUBLICATION. The Abstract filter keeps multiple members. The Year filter ranges from 2001 to 2016. The Country Rec filter keeps 20 of 145 members.

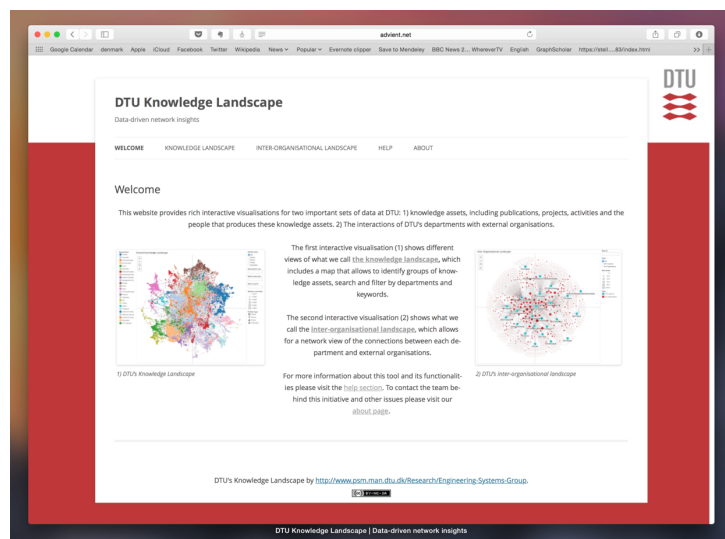
### Geographical distribution (country level) of biofuel-related knowledge assets by type



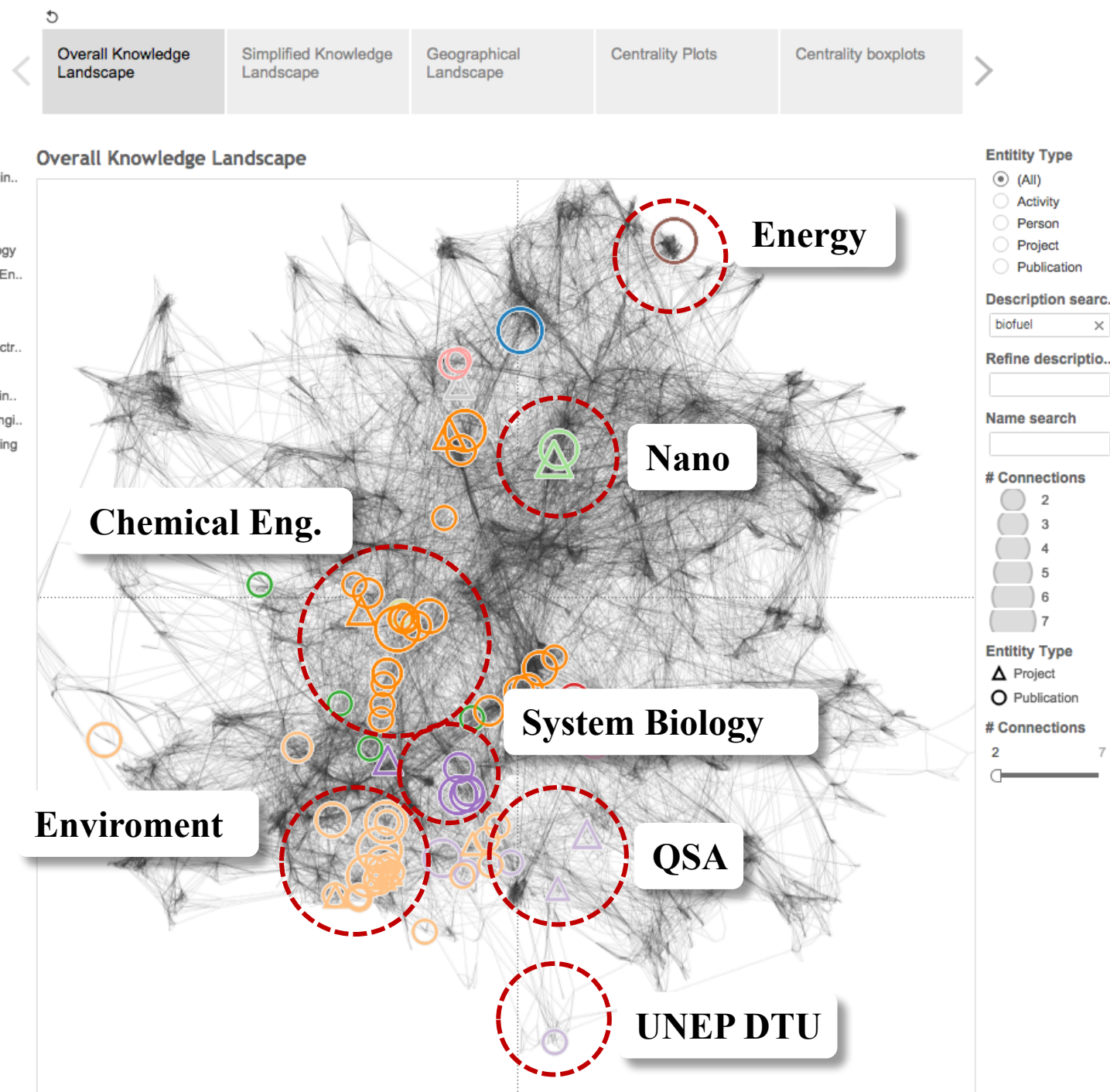
Geographical distribution (city level within northern Europe) of biofuel-related knowledge assets by type





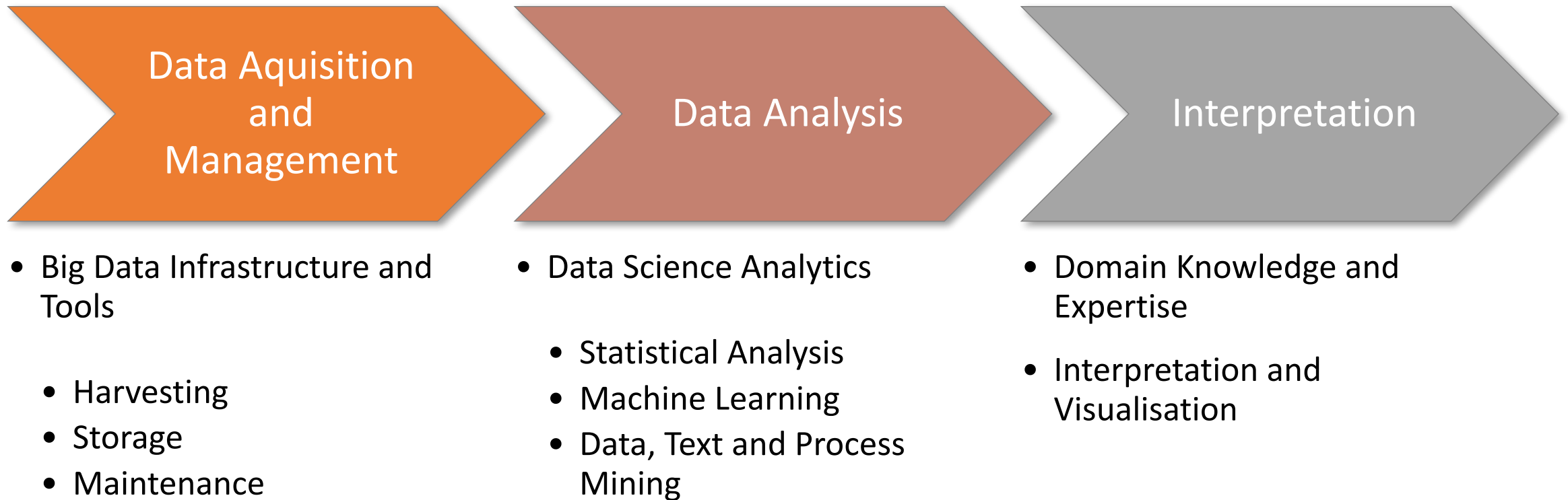


# DTU's Knowledge Landscape – Biofuels



# Underlying Infrastructure

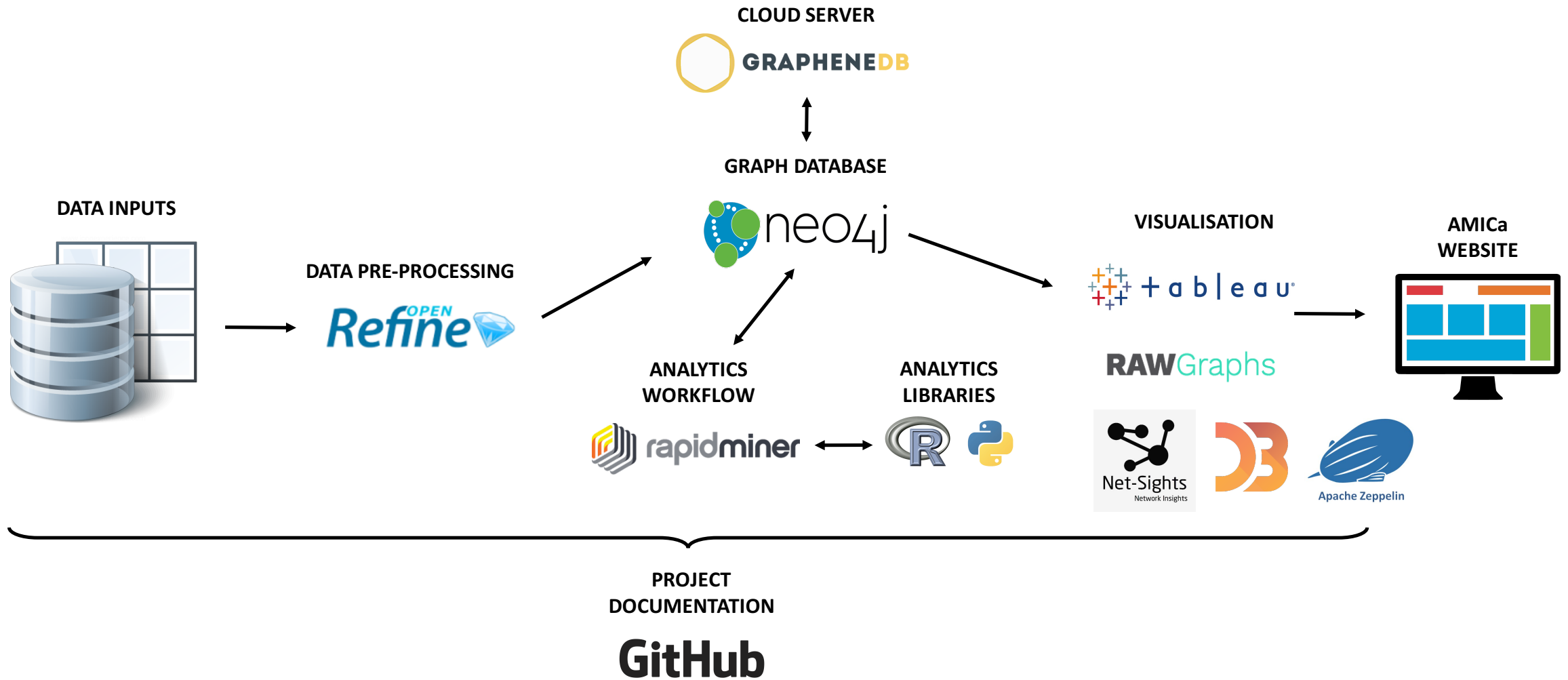
# Data Science Workflow and Required Skills



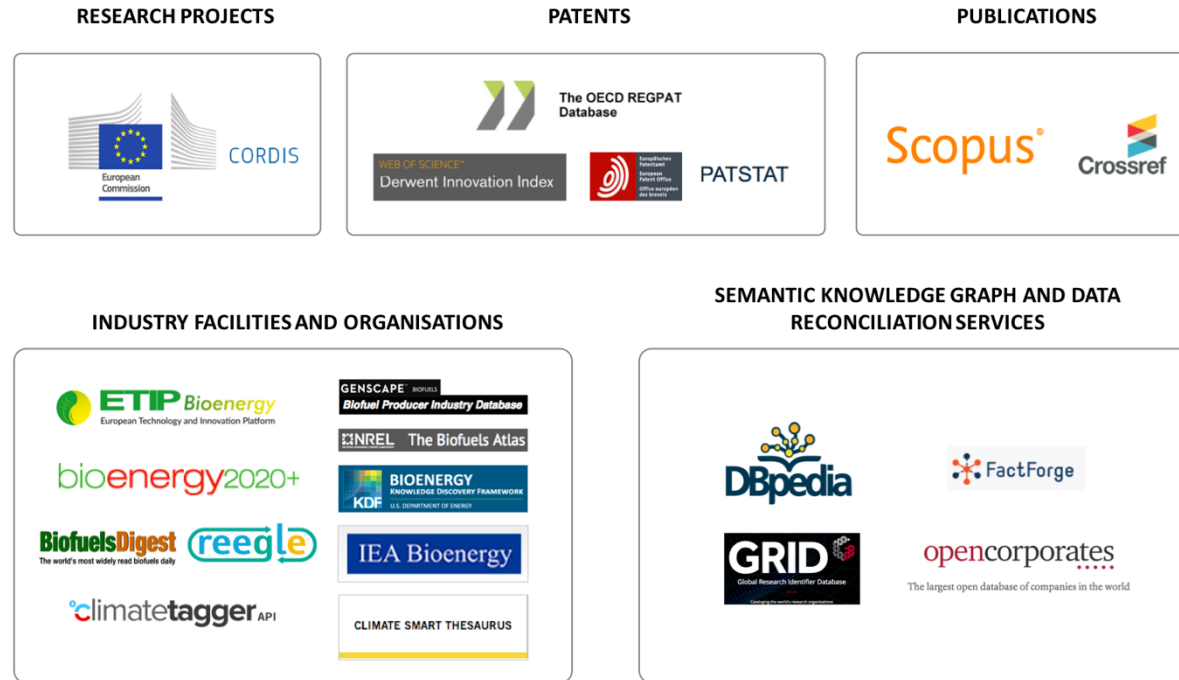
Source: Adapted from  
EDISON Data Science  
Framework



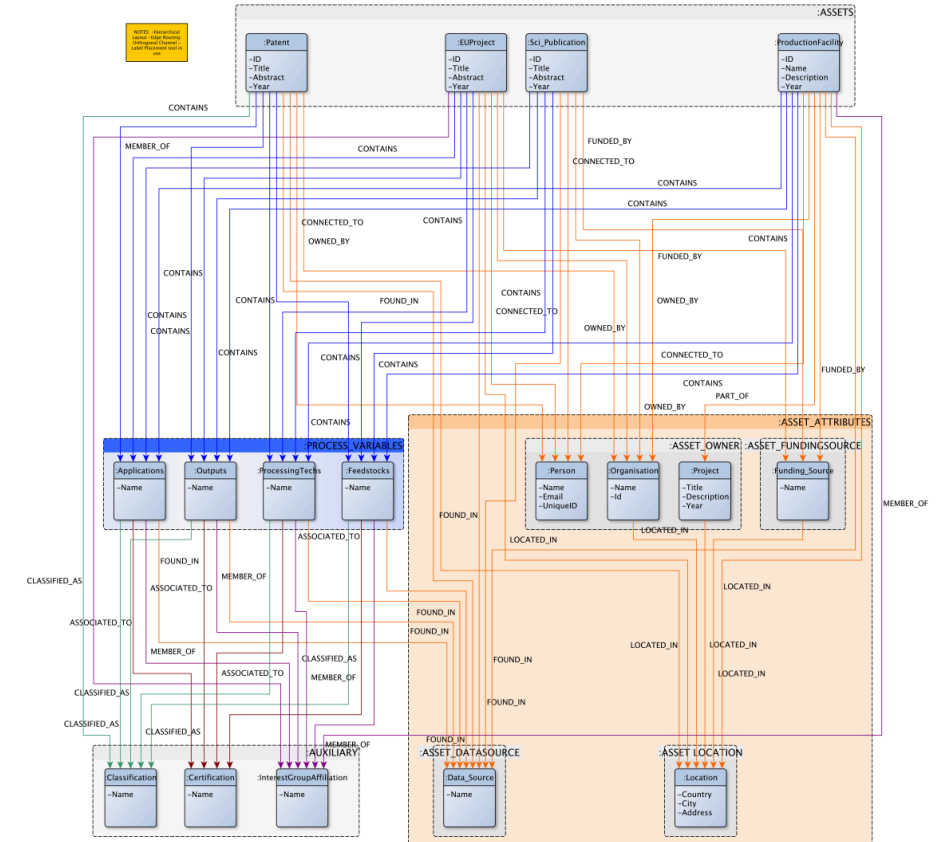
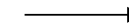
# Data Infrastructure - Example



# Data Sources and Models - Example



Open data sources



Connected data model

# Final reflections



# Interactions matter... Connections are key



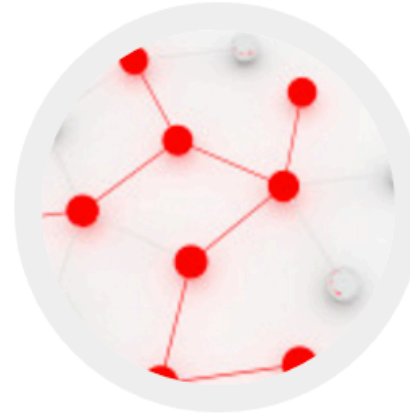
# Summary



## **DATA-DRIVEN**

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We believe in a bottom-up approach driven by large amounts of data to generate new insights



## **FROM COUNTING TO CONNECTING**

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Our goal is to reveal the hidden connections and opportunities between otherwise disconnected possibilities



## **FROM ORGANISATIONS TO ECOSYSTEMS**

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Recombinant innovation requires to shift the focus from individual organisations to industrial ecosystems

**Thanks!**

**More at [www.parraguezr.net](http://www.parraguezr.net)**

**Pedro Parraguez – [ppru@dtu.dk](mailto:ppru@dtu.dk)**

**DTU Management Engineering**

**Engineering Systems Division**

**[www.es.man.dtu.dk](http://www.es.man.dtu.dk)**