

New Tools, New World, New Thinking: The SKEMA AI Initiative

Globalization: Think Forward

1 New geographies

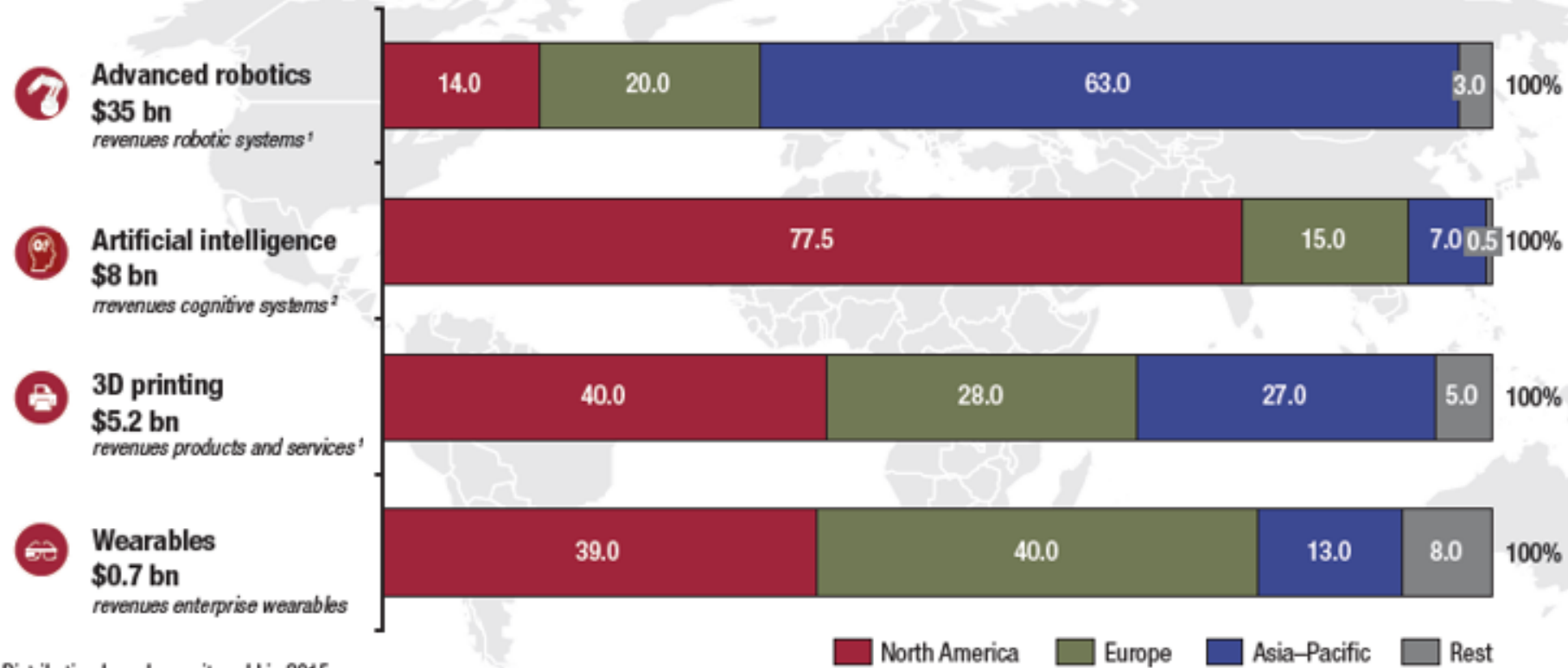
2 New Technologies: Industrial Revolution 4.0

Building up the IR4.0 infrastructure

Eric Schmidt compared the momentum of AI development to the moon race

Interview at GS (2018). Eric Schmidt: “The Artificial Intelligence Revolution”.

Market size
(\$ bn, 2015 or latest available)



1. Distribution based on units sold in 2015.

2. Estimates for Asia-Pacific and Rest based on International Data Corporation (IDC) data;

Source: International Federation of Robotics, Wohlers Associates, Technavio, IDC, expert interviews, A.T. Kearney



The Augmented Age

- **Maurice Conti, CEO Applied Intelligence**
[ted.com](https://www.ted.com)

My interests

From International Finance and Monetary Economics with Game Theory and Econometrics to “Data Science for International Business”

From the study of a field with a methodology to the study of “how a new methodology that may help foster our understanding of social dynamics”

STEM versus Managers?

Open Science

Birth of a new field

Table of Content

1.
**Why Data Science in a
Management School
(Research and Teaching)?**

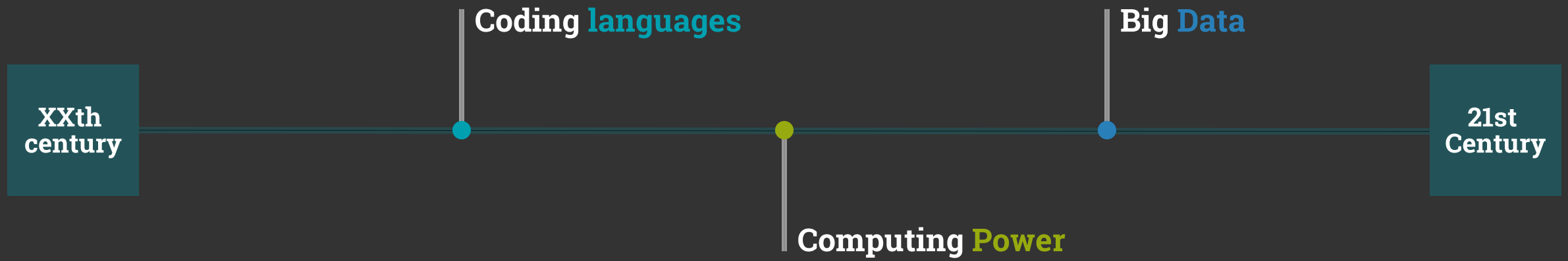
2.
**What the Lab in Augmented
Intelligence will do**

3.
**Some Research Projects
Examples**

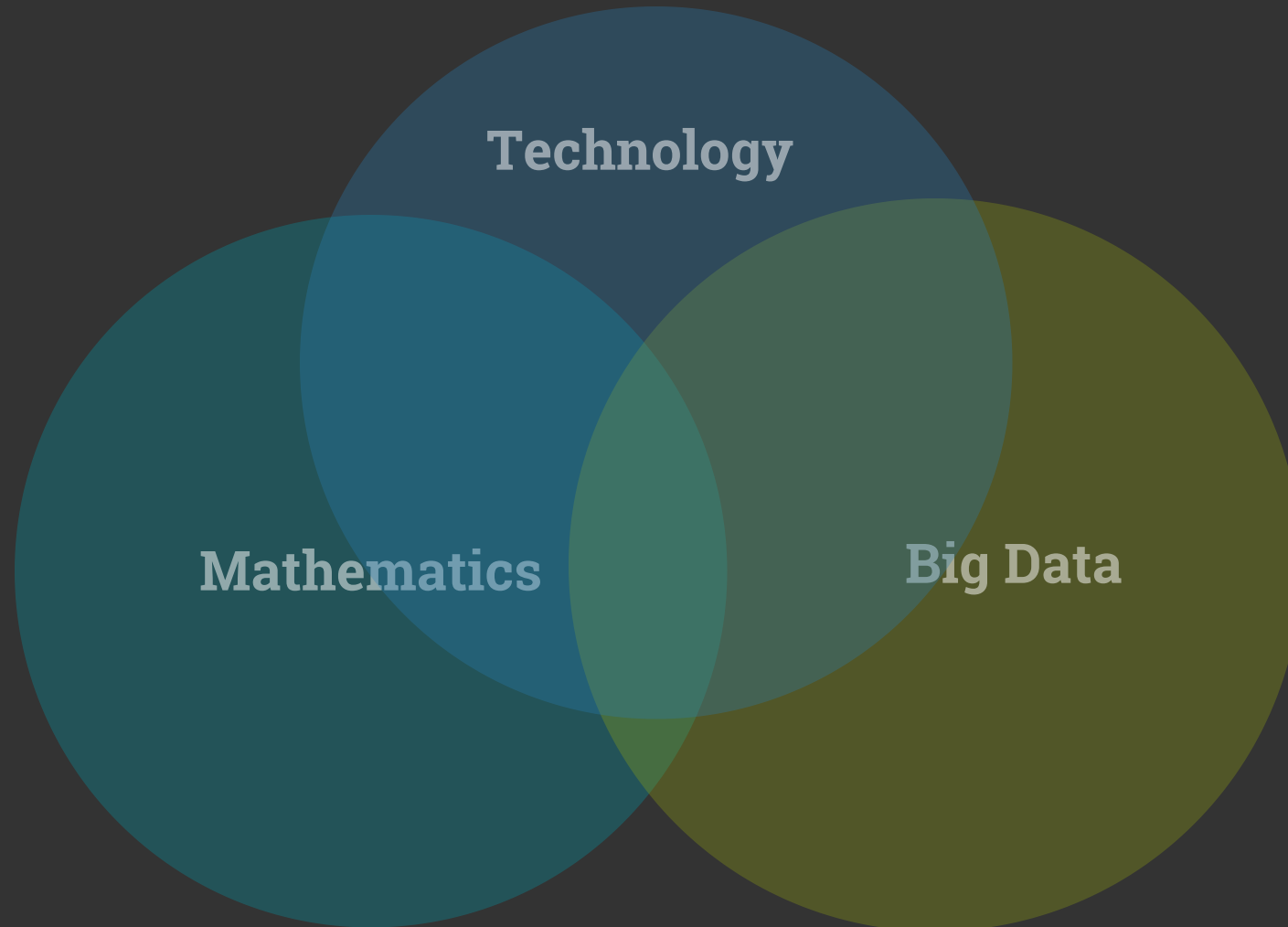
Section 1

Why Data Science in a Management School?

From the 4th Industrial Revolution to Society 5.0*



Data Science



Data Science

1

Technology

Computer Science Departments

Engineering Schools

Sub-fields:

- AI
- Data Mining

2

Mathematics

Applied Mathematics

Statistics

Operations Research

3

Big Data

Internet of Things

Smart Mobility

Health Sector

(Finance, Insurance, Smart Life, etc.)

Trends in Departments

Computational Social Science

**A New
Interface**

**Social Data
Science**

IPE,
Experimental
Economics

Section 2

SKEMA Global Lab in Augmented Intelligence

SKEMA Lab in Augmented Intelligence

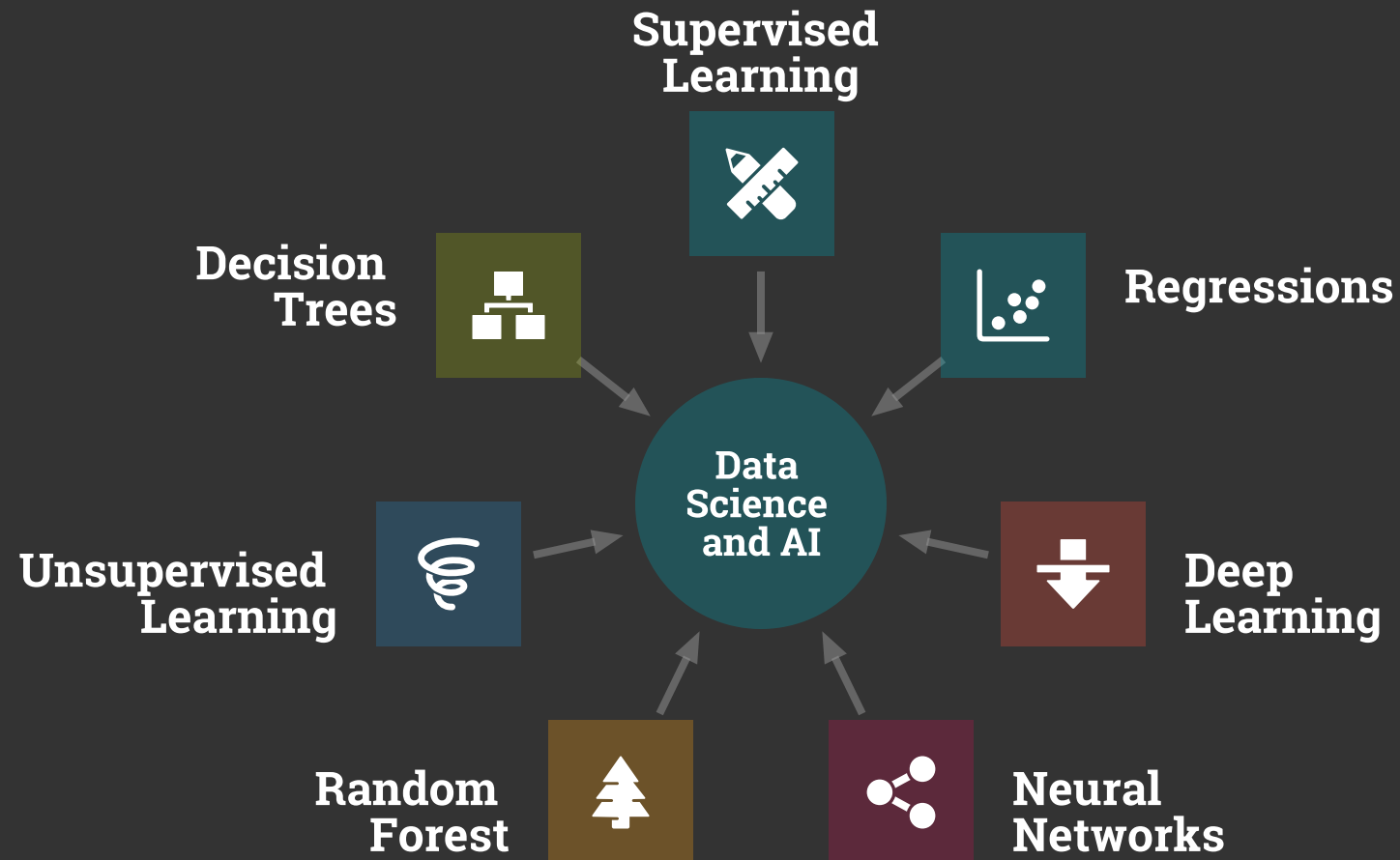
1 Augmented Intelligence (Augmented Reality, Business Intelligence, NextAI, explAIned)

2 A driving force for the AI Initiative at SKEMA

3 Across the world... and beyond (The Analytics Factory in Montreal...)

UNSTRUCTURED
STRUCTURED
DATA
ANALYSIS
BLOOD
HEARTRATES
EMAILS
STILLS
TEXT
DNA
WEALTH
GEOLOCATION
STEPS
SPATIAL

AI Methodologies



Interdisciplinary Methodologies

**Geographic Information
Systems**

Sentiment Analysis

Social Media Analysis

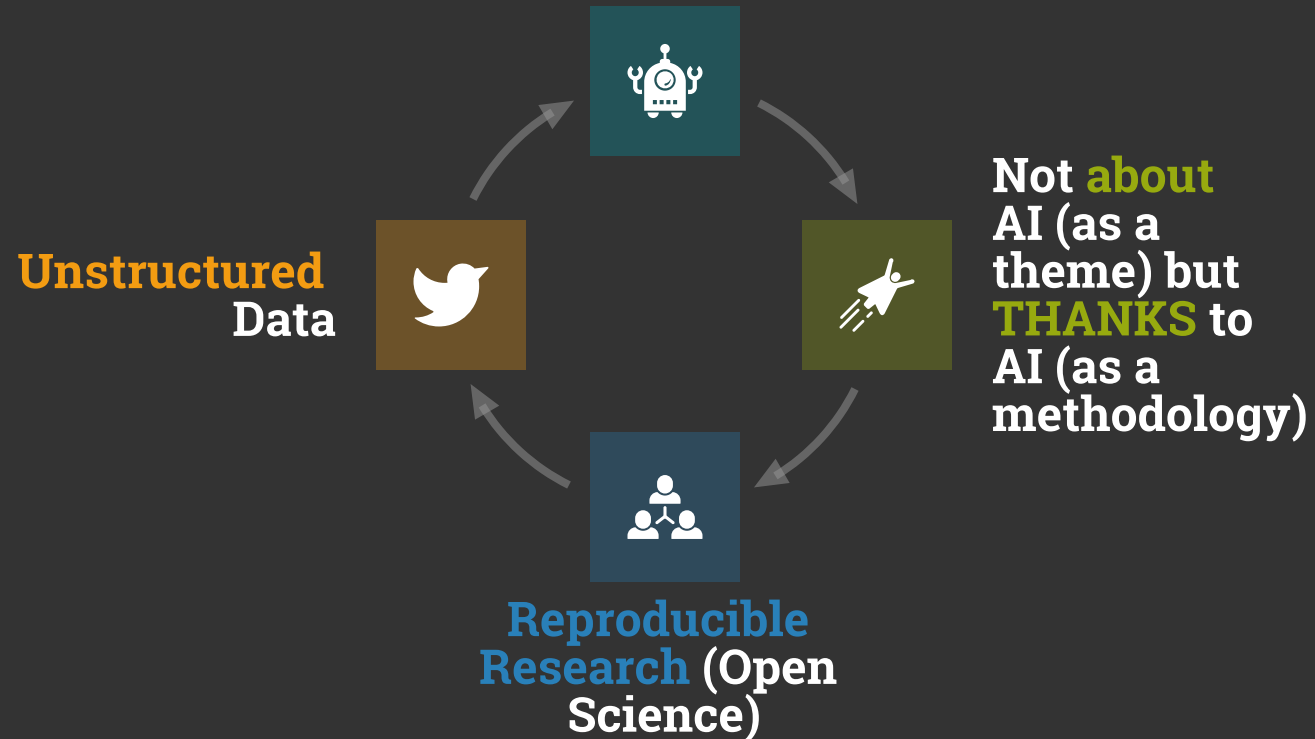
Bibliometrics

Econometrics

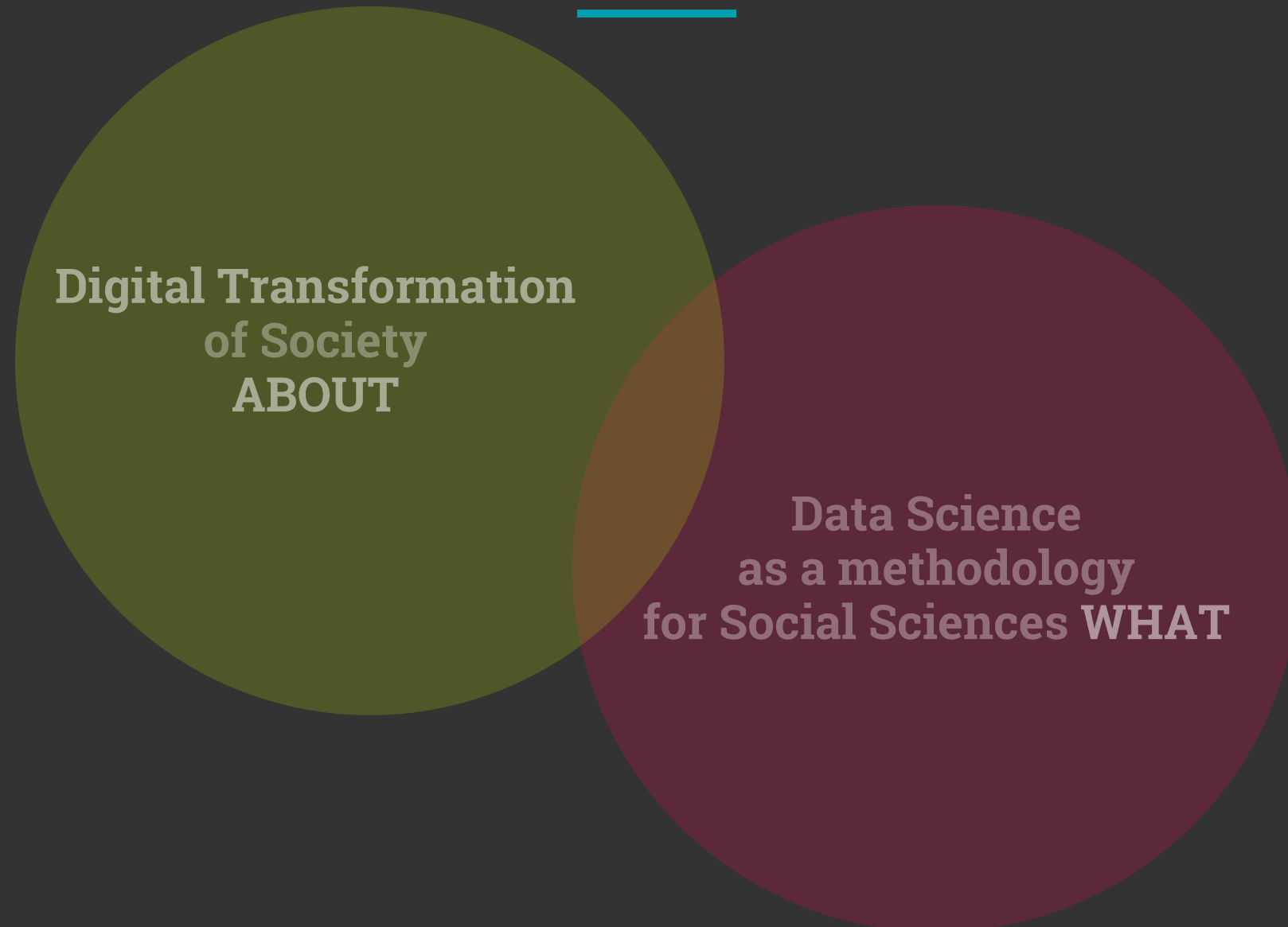
**Natural Language
Processing**

My interests

“What a researcher
cannot do in her
whole life”



Social Data Science: The Missing Link

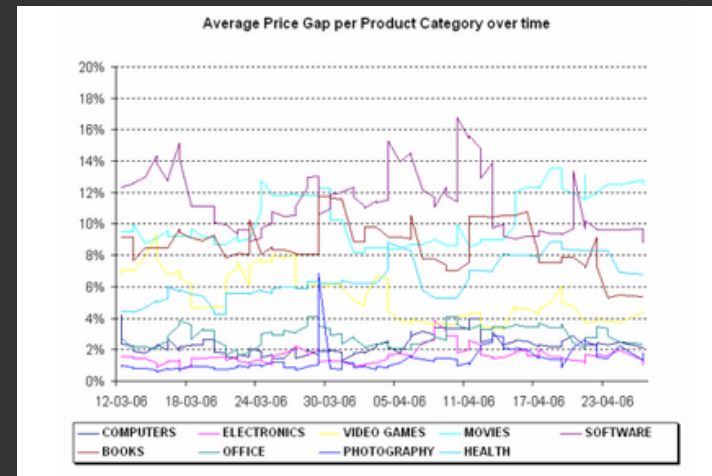
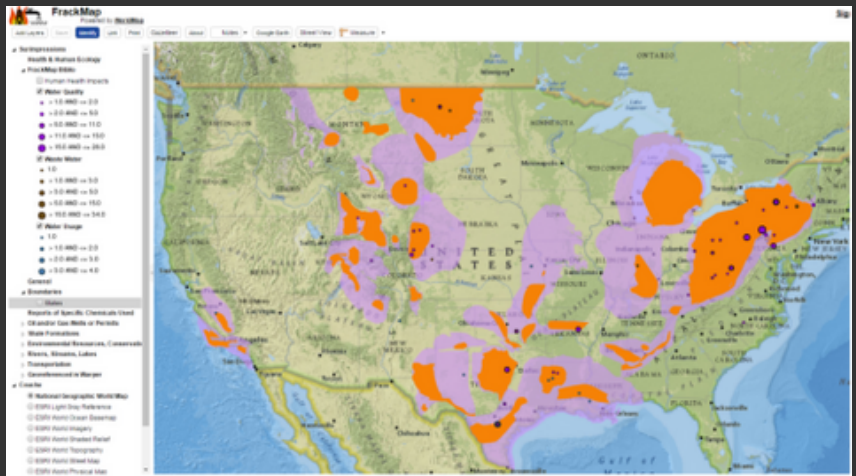
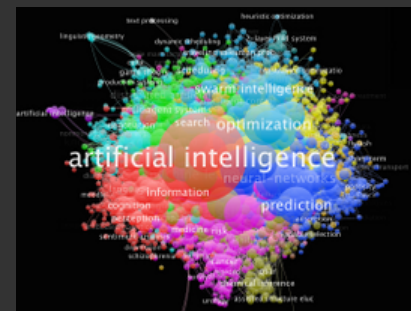
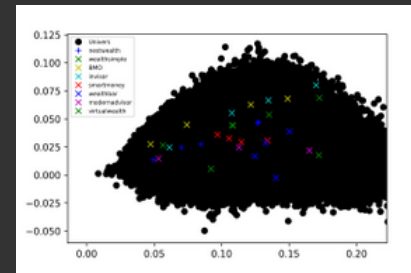
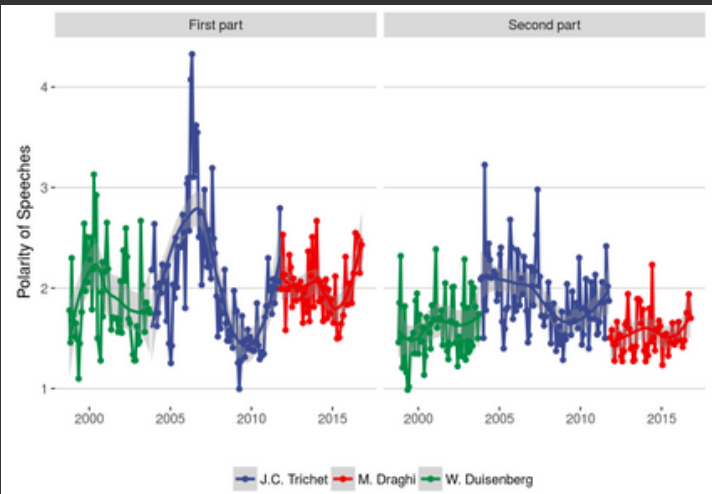
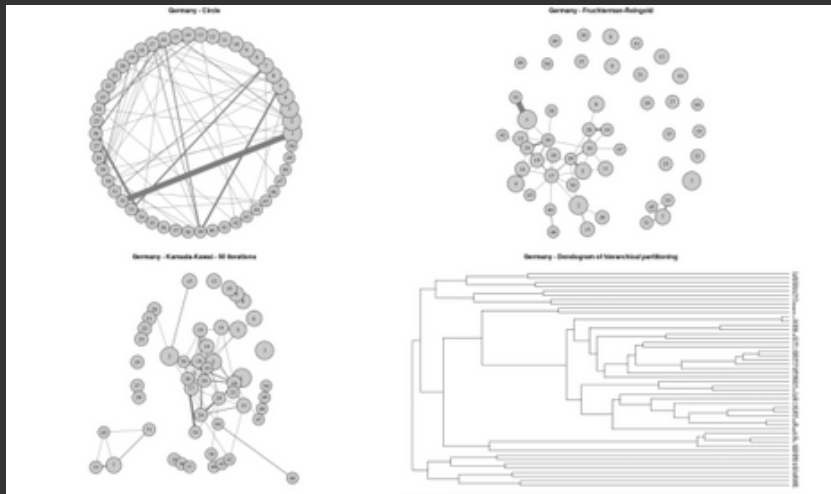


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Data Science as a Service

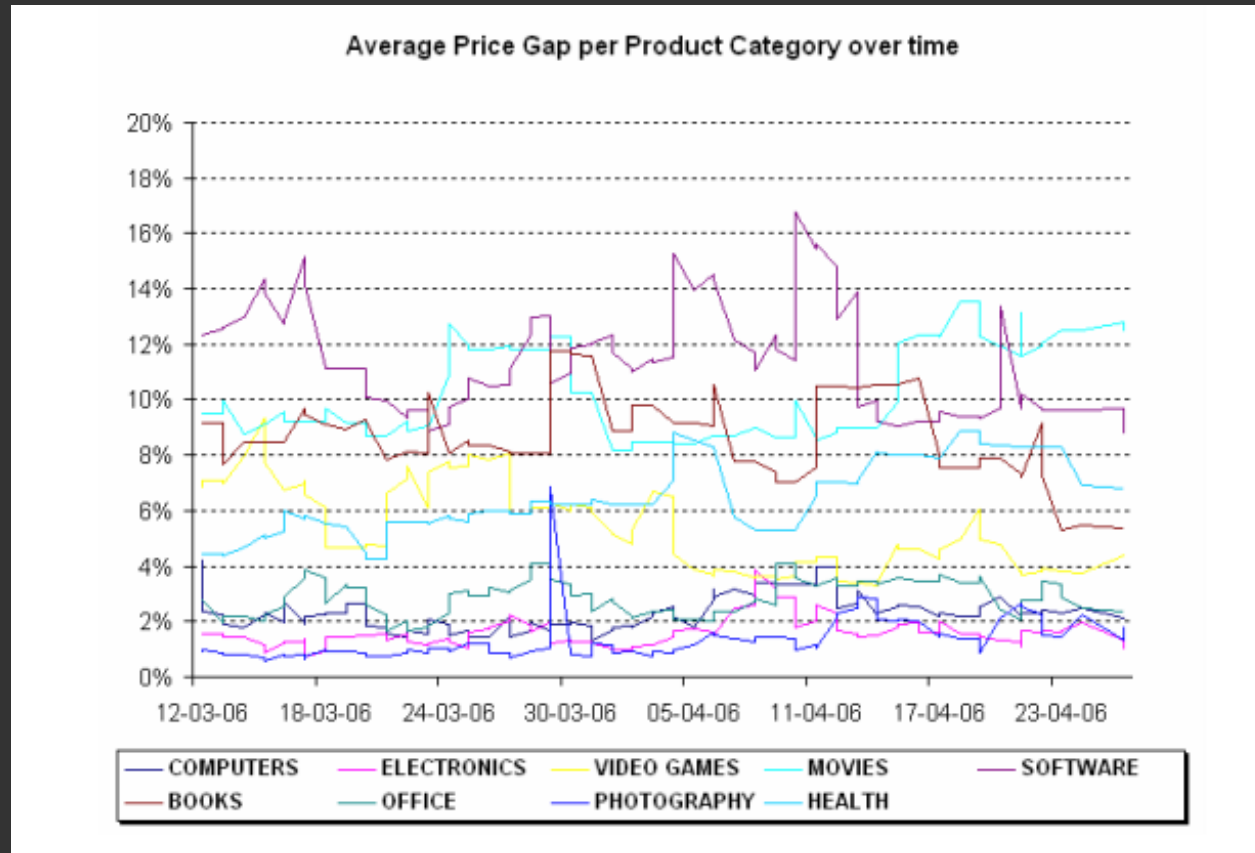
Section 3

Research Projects Using Data Science



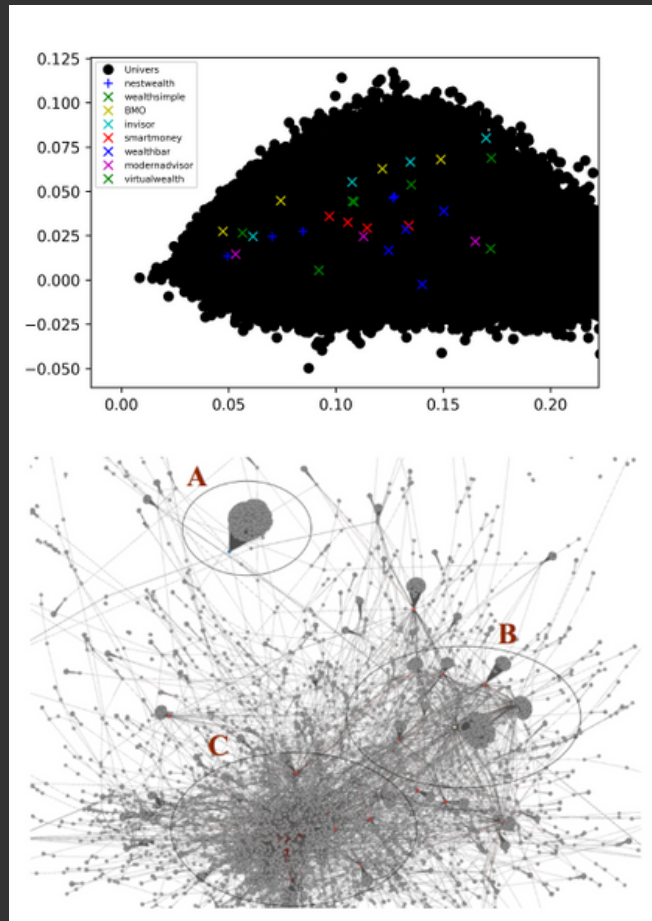
Structured Data

Industrial Organization / Monetary Policy



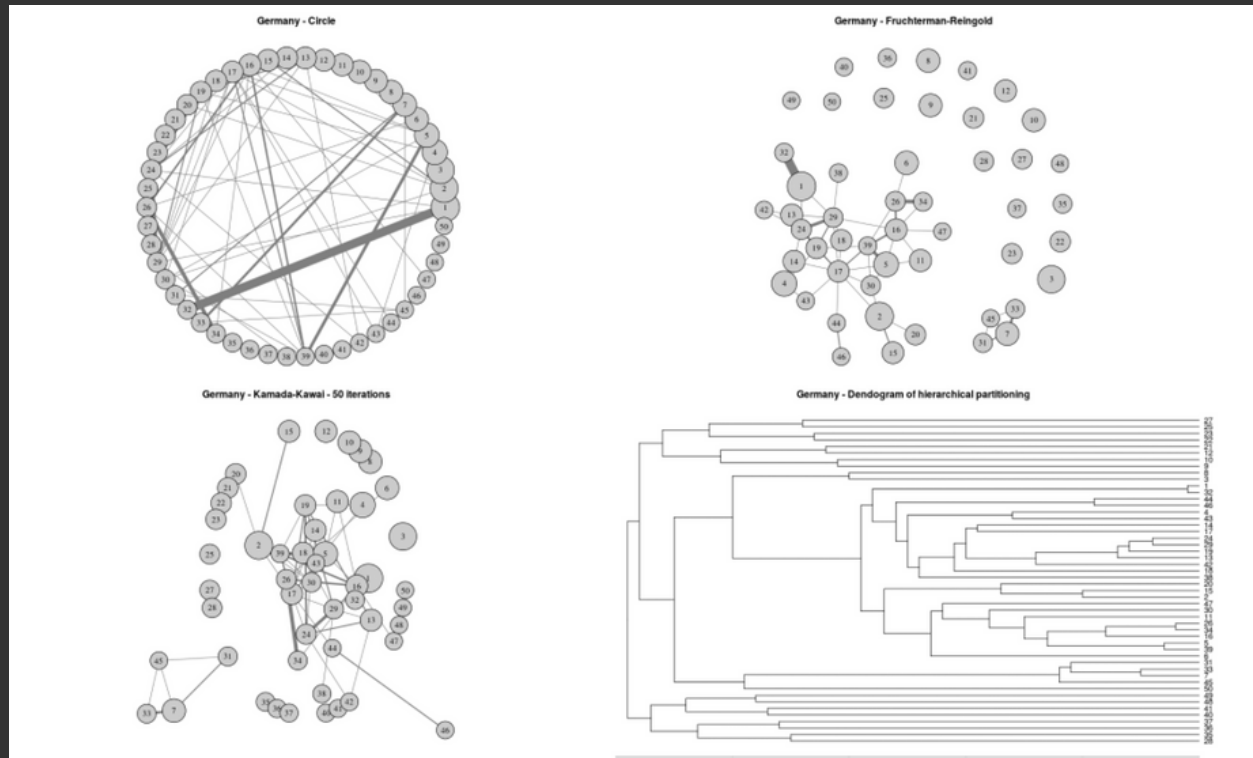
- RQ: How to detect systematic differences in **price dispersion** across **sectors**? What are the reasons of such differences?
- Methodology: Econometrics, Web Scraping
- Category: Nowcasting, Inflation, Price dispersion
- The Wow Effect: From millions of prices about 30'000 products, real-time measures of **Market Thickness** and the **Value of Information**
- Literature:
 - “Are Online and Offline Prices Similar? Evidence from Large Multi-Channel Retailers”, Alberto Cavallo, American Economic Review, January 2017, Vol 107 (1)
 - “The Noisy Monopolist: Imperfect Information, Price Dispersion and Price Discrimination”, Steven Salop, Review of Economic Studies, 1977, vol. 44, issue 3, 393-406

Finance



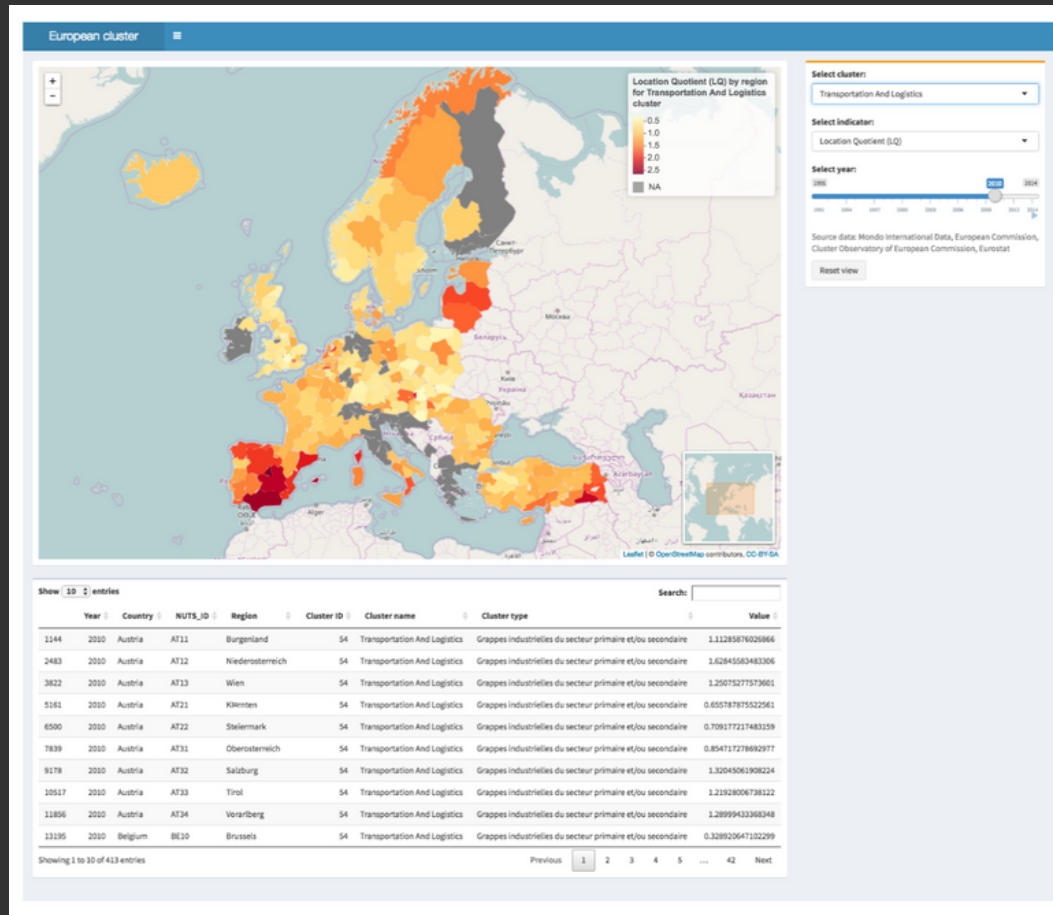
- RQ: To develop **low cost** solutions for **middle class investors**
- Methodology: Monte Carlo, Bayesian Networks
- Partner Authors and Institutions: CIRANO, HEC Montreal, AMF (Financial Markets Regulator)
- The Wow Effect: Use of **robots** to provide a **dynamic** and **tailored portfolio allocation** to each customer instead of a generic risk profile
- Category: Risk Portfolio

Finance



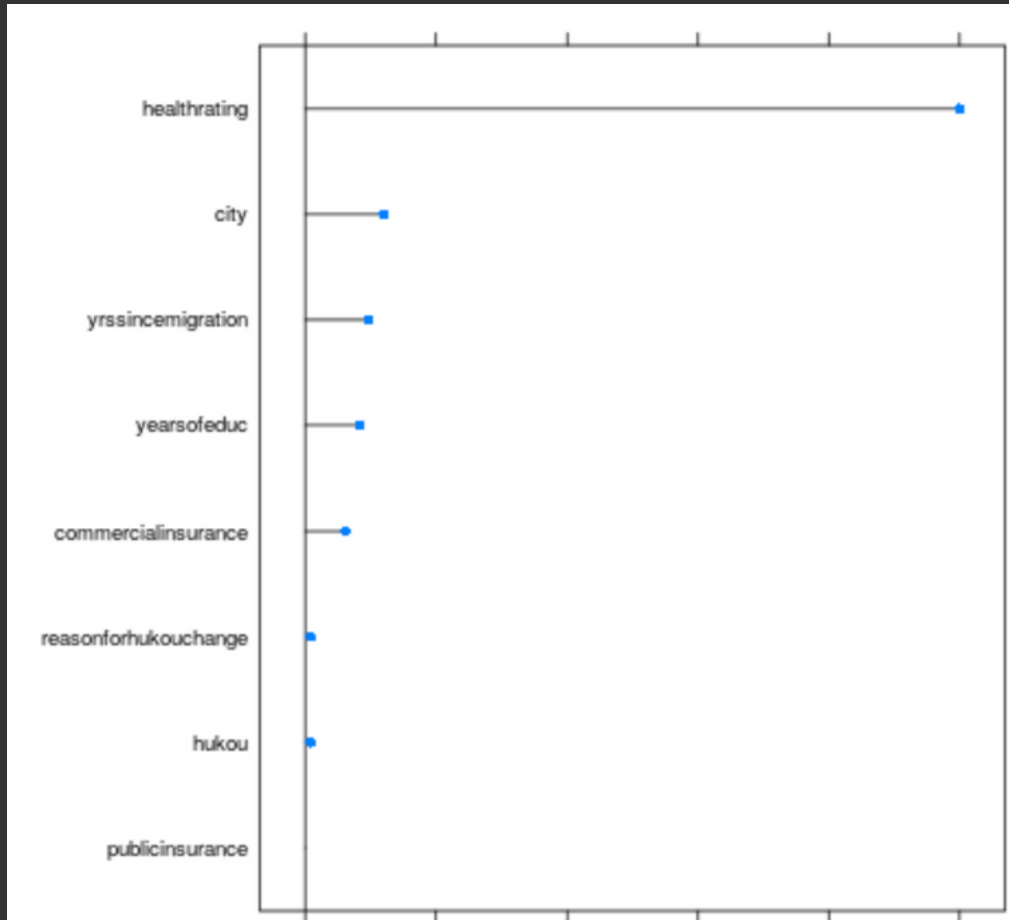
- **RQ: Using boards of directors as a proxy for knowledge pipelines between financial firms, how can proxy systemic risk in the financial industry?**
- **Methodology: Network Analysis**
- **Partner Authors and Institutions: CIRANO, HEC Montreal, AMF (Financial Markets Regulator)**
- **The Wow Effect: 43,499 directors; 2,209 financial firms; 52 countries can be visualized to revealed social ties across countries**
- **Category: Systemic Risk, Financial Industry, Governance**
- **Literature:**
Kogut, B. and Colomer, J. (2012) 'Is there a global small world of owners and directors?', in Kogut, B. (Ed.): The Small Worlds of Corporate Governance, pp.259–299, The MIT Press, Cambridge.

Economic Integration



- Can we observe a regional specialisation - or convergence - dynamic in Europe through cluster life cycle?
- The Wow Effect: **+5M clusters** data collected; **553'007** European observations used (67 clusters, 279 regions, 36 countries, 20 years, 6 indicators) ; over **10'000 maps** created ; regional specialisation dynamic in developed economies (Western Europe) ; convergence dynamic in developing economies (Eastern Europe) due to a catching-up effect
- Category: Regional Integration, Clusters, Convergence, Geographical Economy, Data Science
- Literature
Sala-i-Martin, Xavier. 1996a. "Regional Cohesion: Evidence and Theories of Regional Growth and Convergence." *European Economic Review* 40:1325-1352.

Hukou system in China

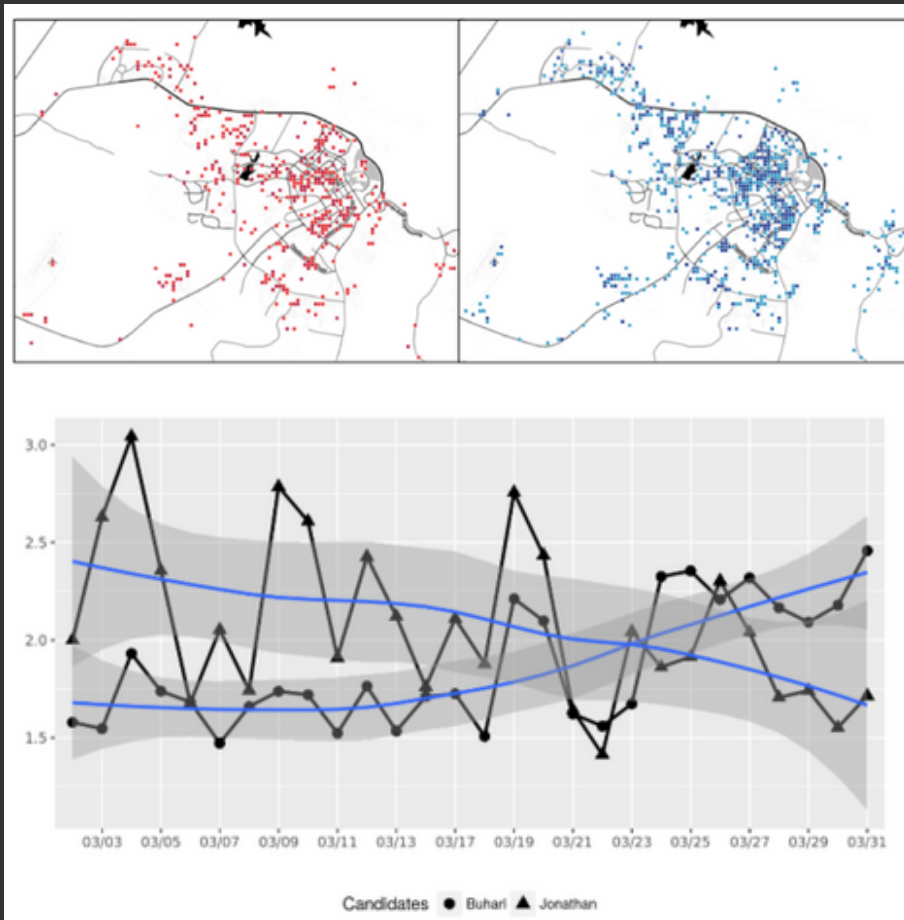


- **How to design better policy decisions**
- **The Wow Effect: Using machine learning techniques to dig through 27,000 observations and 27 features**
- **Category: policymaking, internal migration flows**
- **Literature**

Marta Bengoa and Thierry Warin

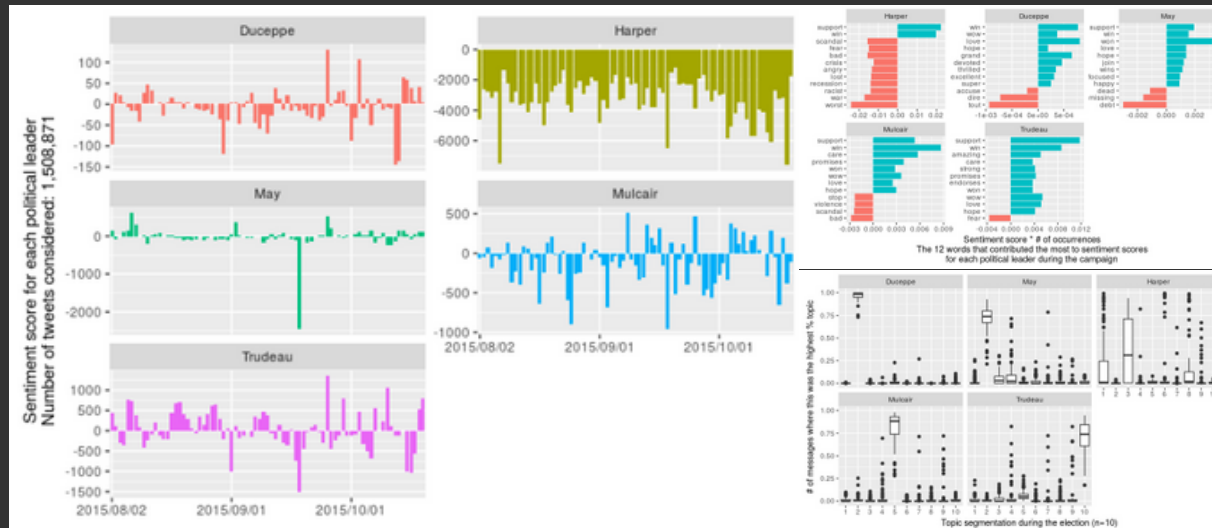
Unstructured Data

Political Science



- RQ: In countries where institutions do not have the highest level of standards, can we use social media to gather information on an incoming election?
- Methodology: Econometrics, Text mining, **3.8 million tweets**
- The Wow Effect: **2 days before the election**, a change in the electoral dynamics has been noticed, which at the end was anticipating the results of the election
- Category: Political Risk
- Literature:
KHEMANI, S. (2015): "Buying Votes vs. Supplying Public Services: Political Incentives to Under-Invest in Pro-Poor Policies," *Journal of Development Economics*, 117, 84–93.

Political Science



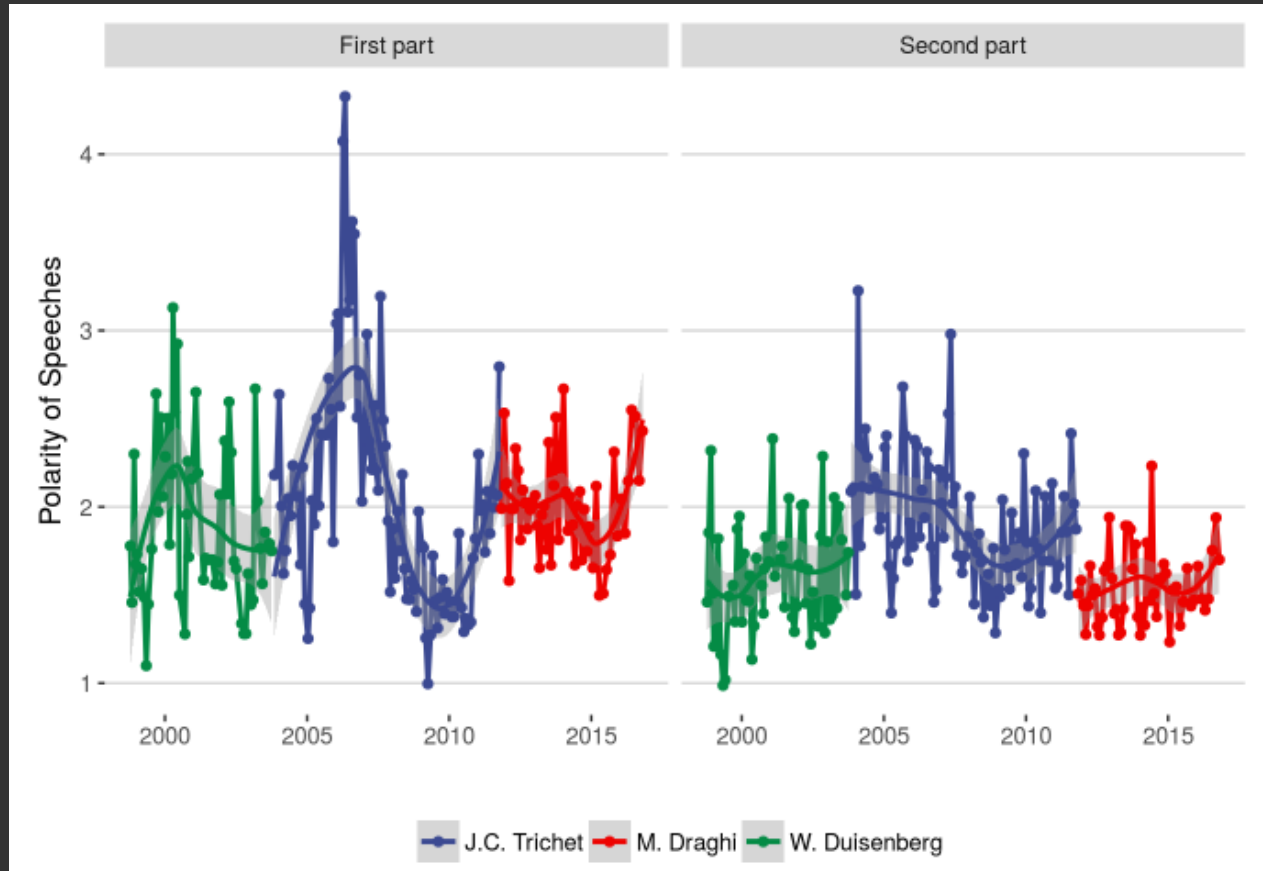
- RQ: Despite being third in vote intention at the start of the campaign, Justin Trudeau won a majority victory. During the 2015 General Election in Canada, how were each political leader perceived?
- Methodology: Unsupervised Learning, Social Media Analysis, Linguistics
- The Wow Effect: Scandals at the start of the campaign lasted for a month and were constantly associated to the incumbent candidate
- Category: Political Risk, Reputational Risk
- What about **corporate reputation**?

Migrations



- RQ: **Mapping** the conversation in Europe about the refugee crisis.
- Methodology: Geographic Information Systems, **Text Analysis**, Social Media Analysis
- Partner Authors and Institutions: Jeffry Frieden, Harvard University, SKEMA Business School
- The Wow Effect: Possibility to add a **spatial dimension** to the conversations (unstructured data), as well as combining with traditional data such as the number of refugees, the country of origin or the route of destination.
- Literature:
“Measuring the Reliability of Hate Speech Annotations: The Case of the European Refugee Crisis”, Ross, Michael Rist, Guillermo Carbonell, Benjamin Cabrera, Nils Kurowsky, Michael Wojatzki, Arxiv, 2017

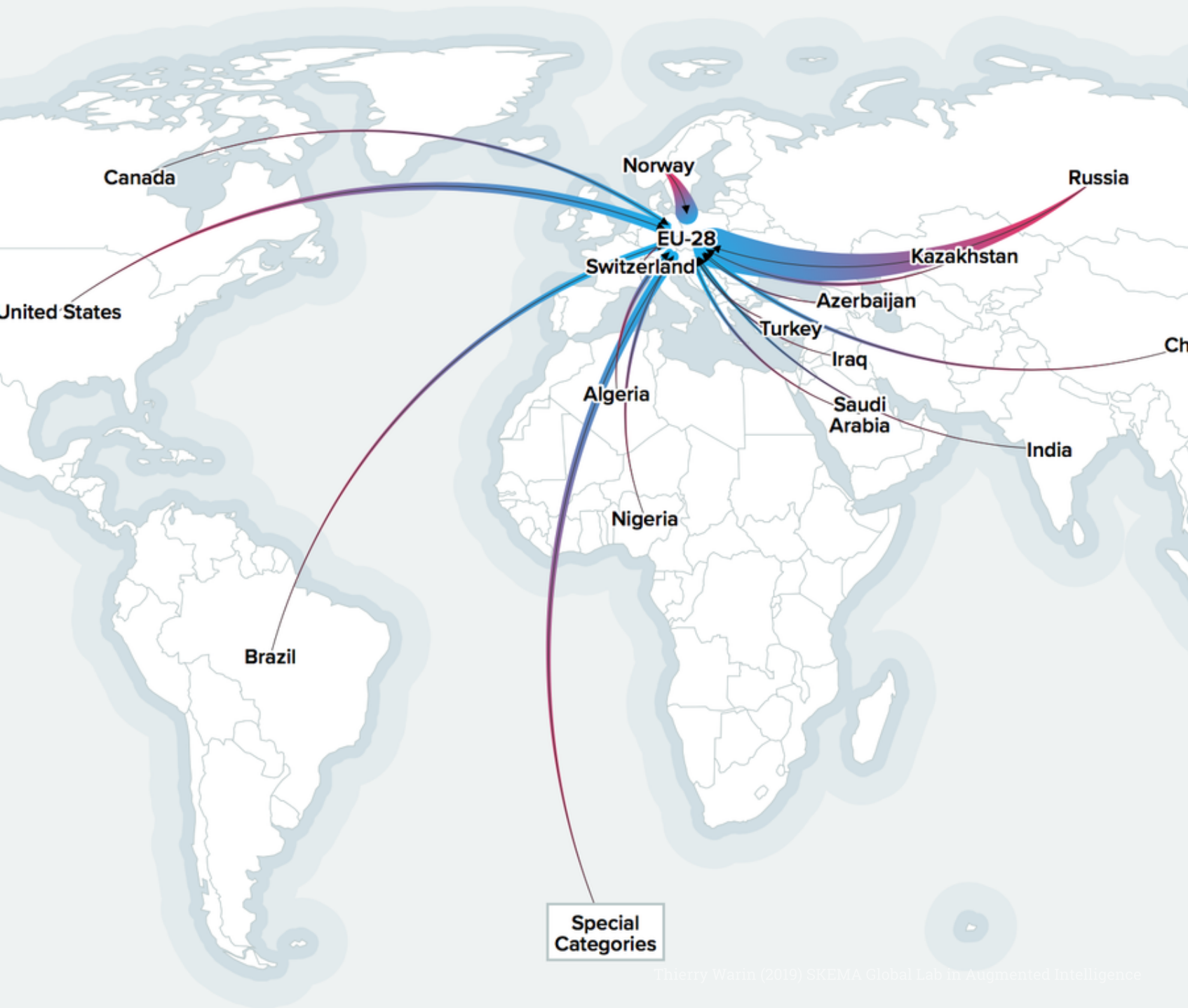
Monetary Policy



- **What is the reaction of the European Central Bank and its Presidents to the **events** occurring in the **Eurozone**?**
- **Methodology: Linguistics, Text Analysis, LDA**
- **Category: Communication of Institutions, Europe, Central Bank**
- **The Wow Effect: War and Peace + The Wealth of Nations**
- **Literature:**

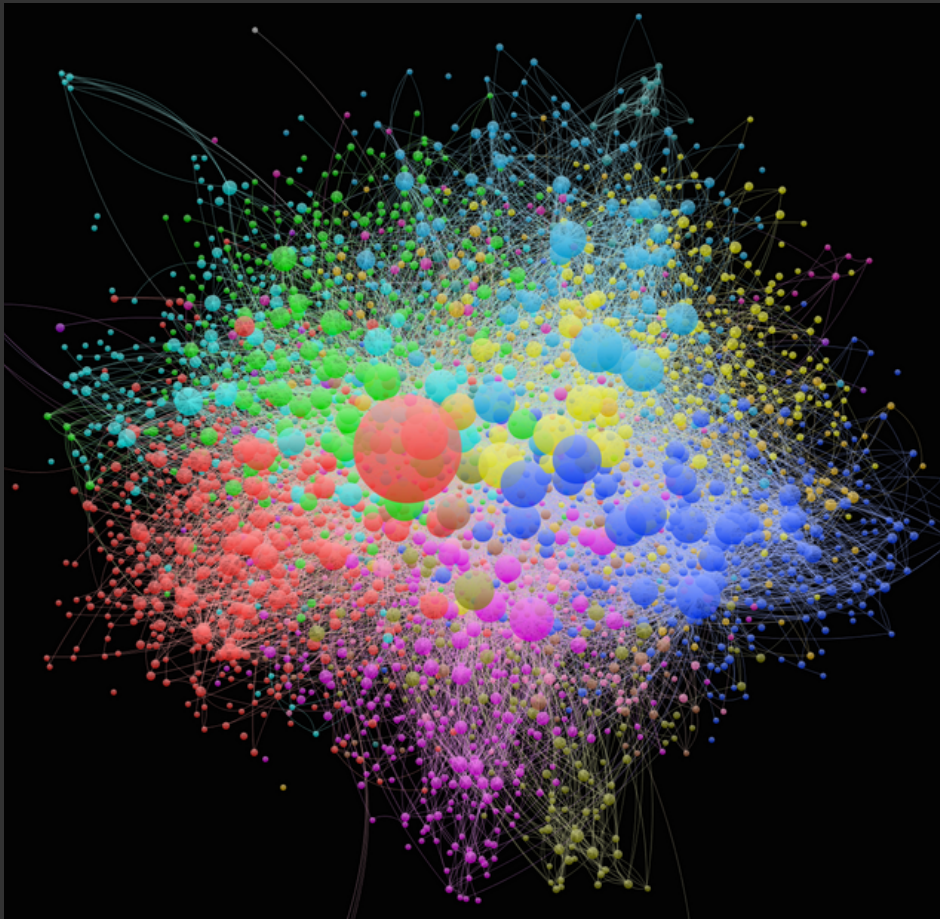
Amaya, J.-Y. Filbien "The similarity of ECB's communication" Social Science Research Network, Rochester, NY (2015)

International Trade



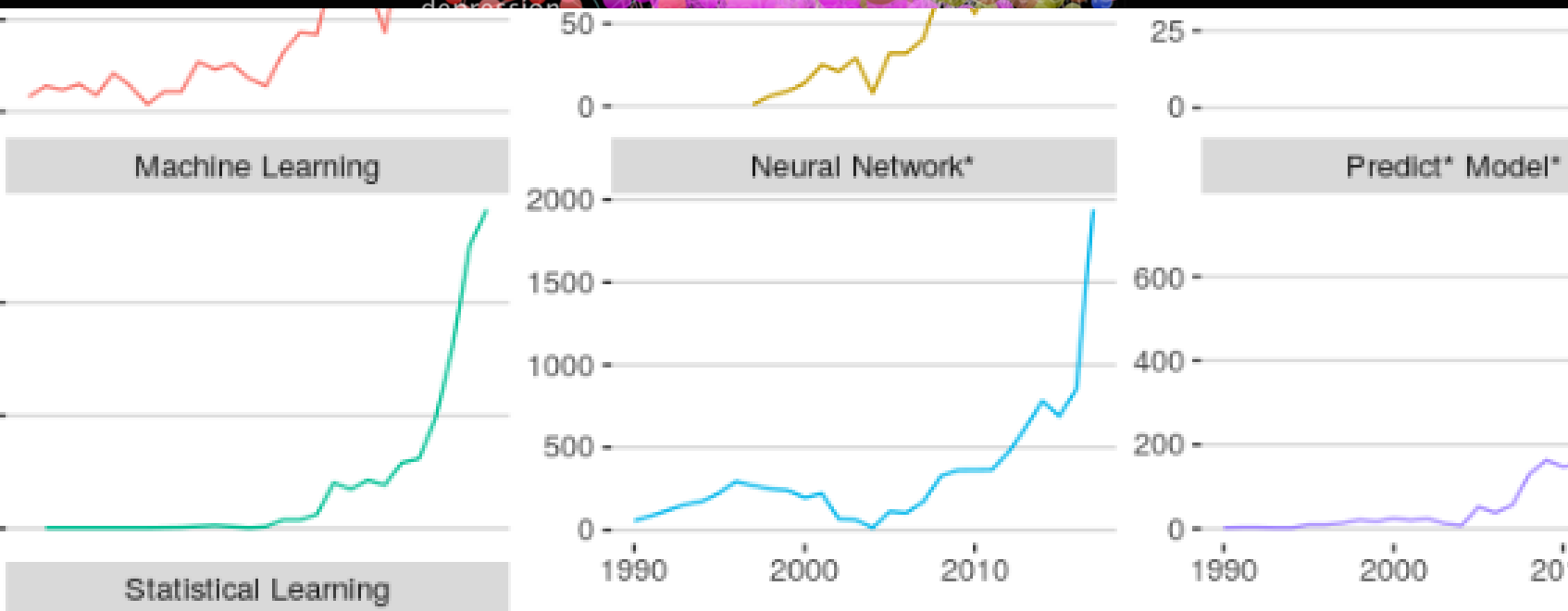
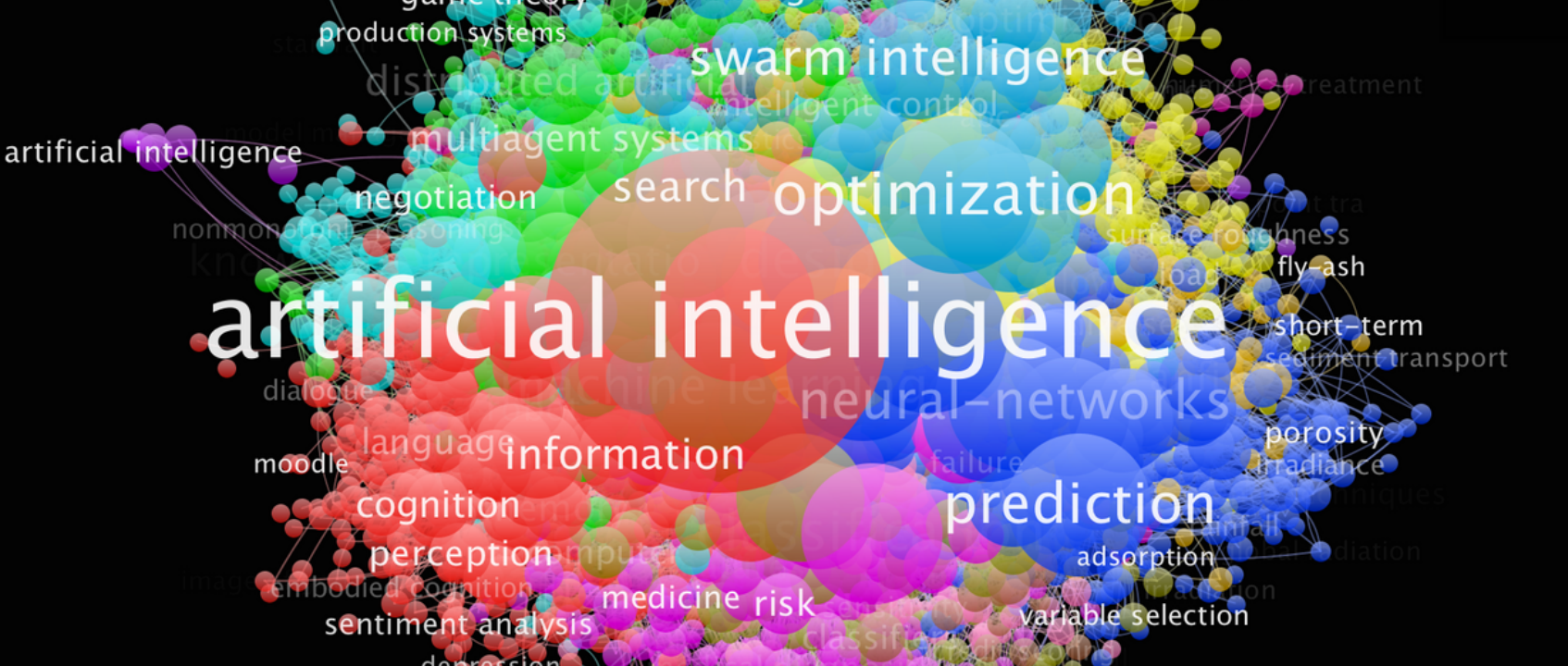
- RQ: **Regionalization** or **Globalization**?
- Methodology: Content Analysis, Network Analysis, Clustering
- The Wow Effect: All **PTA** trade deals between countries
- Category: International Trade

Innovation



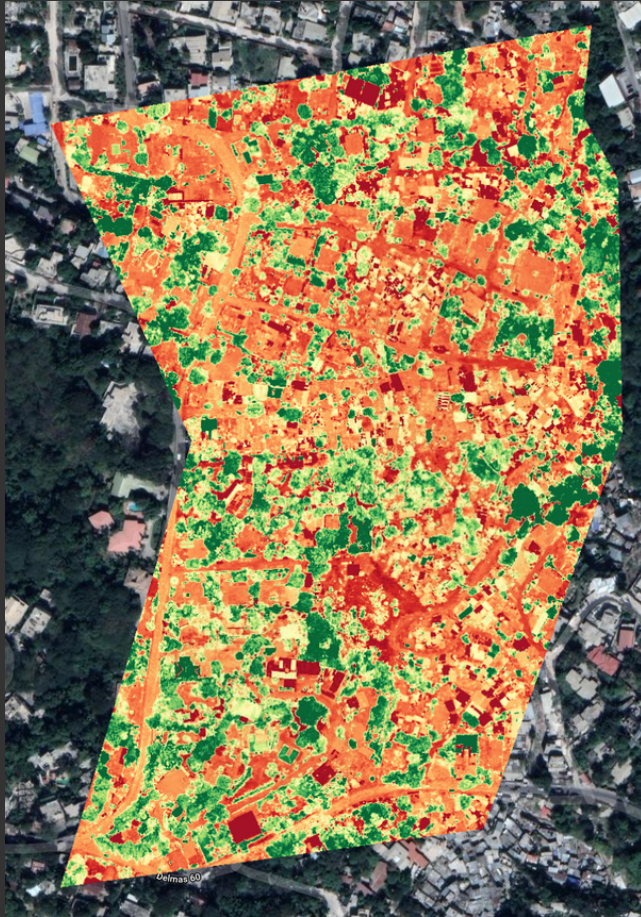
- **RQ: How to assess whether innovations of China's pharmaceutical industry differ compared to innovations elsewhere in terms of the nature and value of patents?**
- **Methodology: Text Analysis, Unsupervised Learning, LDA**
- **The Wow Effect: More than 100,000 patents are analyzed to reveal the most important firms and institutions in the pharmaceutical industry in China, as well as the nature of patents.**
- **Category: Innovation, Emerging Markets**
- **Literature:**
"Innovation assessment through patent analysis", BP Abraham, SD Moitra - Technovation, 2001

Innovation



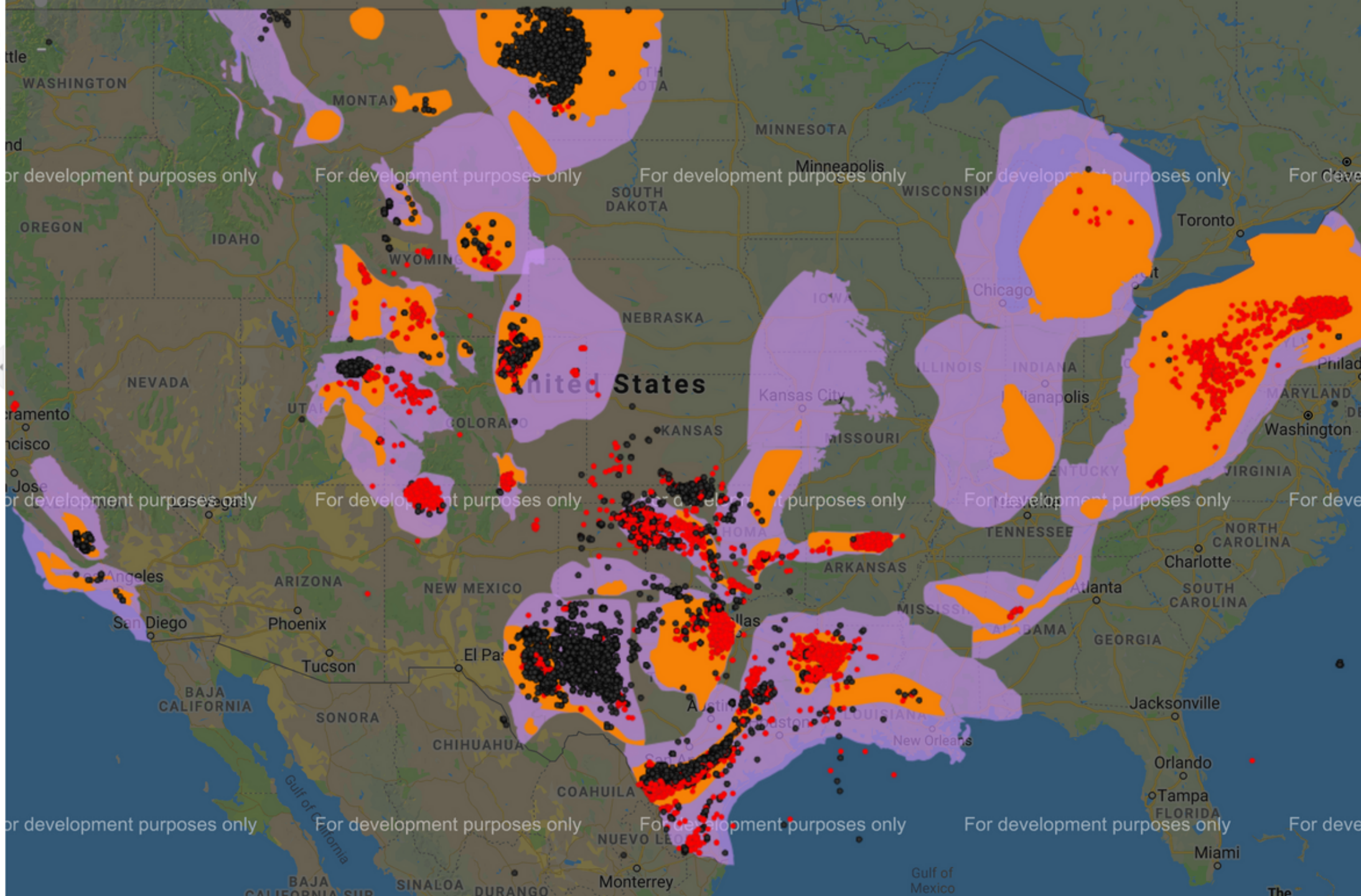
- RQ: regarding Artificial Intelligence, where is the innovation coming from? What are the new developments in a **disruptive industry**?
- Methodology: Unsupervised Learning, LDA
- The Wow Effect: **55,109 patents** related to AI were analyzed; new trends in computational intelligence were revealed; **leading firms** (IBM, Microsoft, Google) are among the main contributors of AI patents

GIS, Drones and Economic Development



- Port-au-Prince, Spring 2018

- BLM Areas of Critical Environmental C
- Principal Aquifers of the 48 Contermin
- Streams, Lakes
- :2,000,000-Scale Hydrologic Unit Bot
- ortation
- al
- s
- or development purposes only
- ngle Roadmap
- ngle Hybrid
- ngle Terrain
- ngle Satellite
- onal Geographic World Map
- RI Light Gray Reference
- RI World Ocean Basemap
- RI World Imagery
- RI World Shaded Relief
- RI World Topography
- RI World Street Map
- RI World Physical Map
- Aerial With Labels
- Quest OpenStreetMap
- nStreetMap
- background



Authors and Partner Institutions



**Ann Backus, Harvard T.H.
Chan School of Public Health,
Harvard Center of Risk
Analysis**



**Nathalie de Marcellis, CEO
CIRANO (Montreal) and
Visiting Scholar Harvard
University**

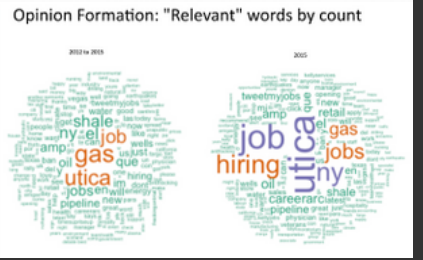
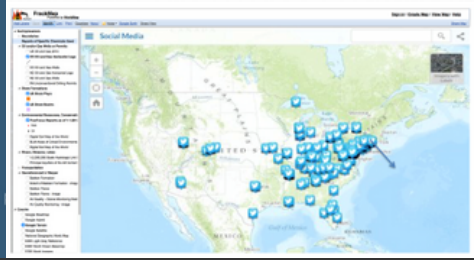
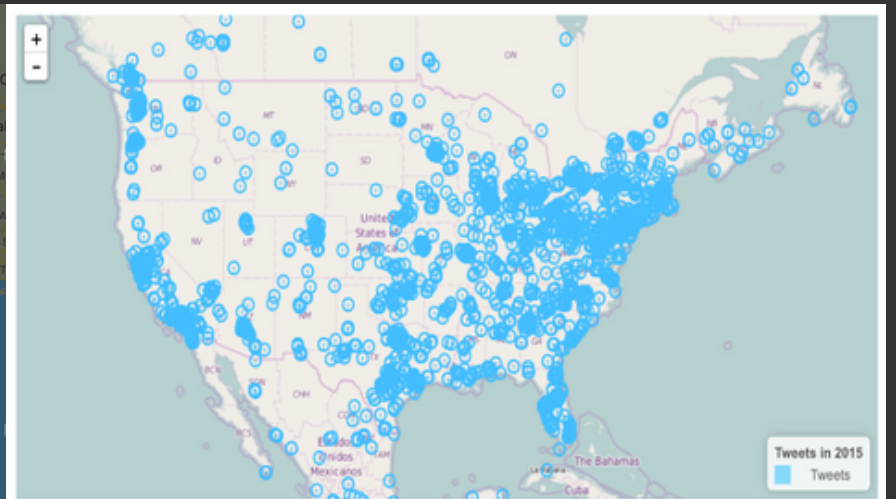
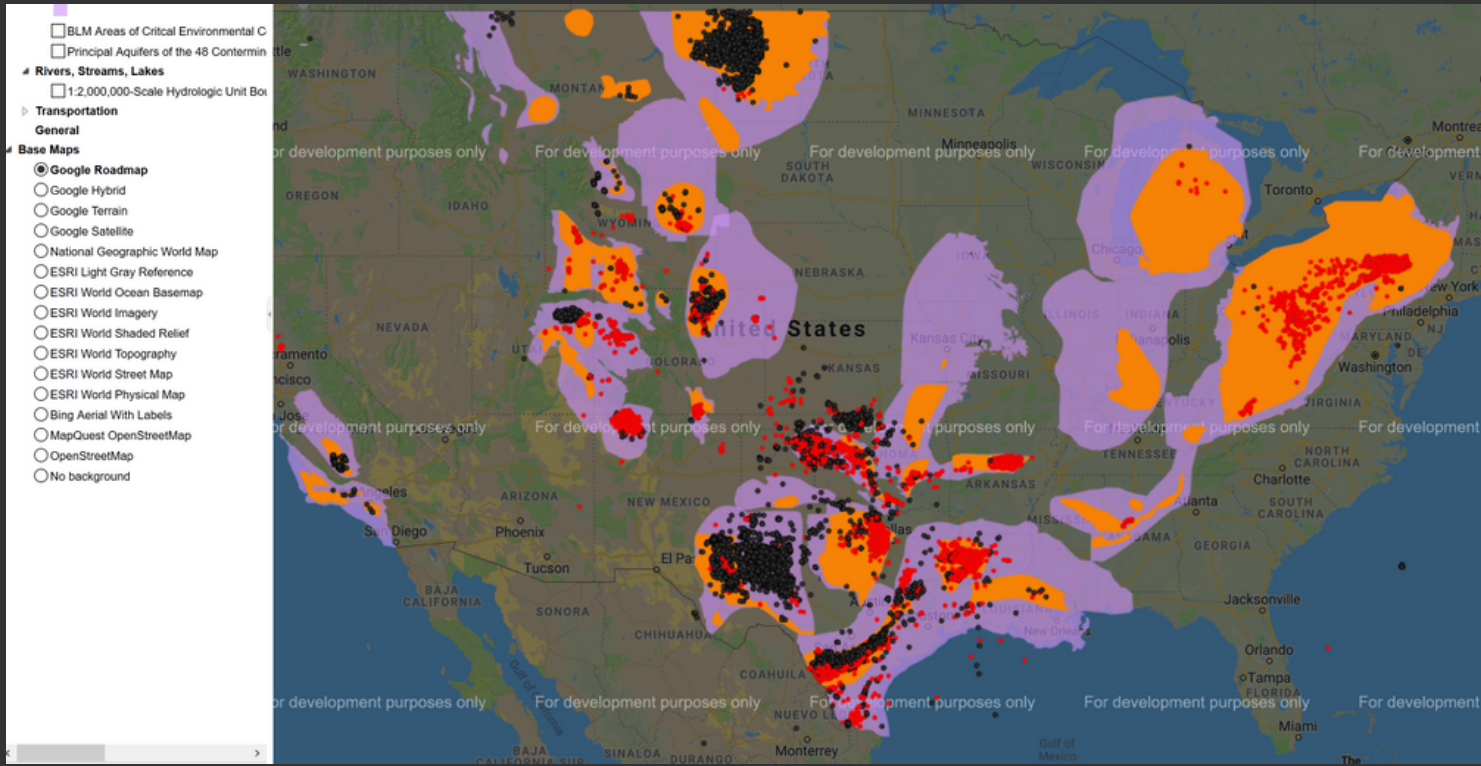


**Thierry Warin, SKEMA
Business School**

Frackmap Project

1 **Research Question:** In countries embracing a booming controversial industry (fracking), is there **resonance** or **dissonance** between the **public's risk perception** and the state of **academic research**?

2 **Category:** **Industrial Risks**, **Risk Perception**, **Public Health**



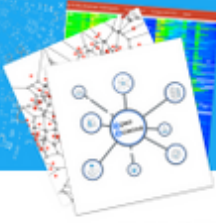
Frackmap Project

- **The Wow Effect: Analysing 60,000 geo-located tweets and (10,000; 600) peer-reviewed articles revealed a very high acceptability despite the major concerns of the scientific community (seismicity, health & environmental impacts, occupational health)**

Section 4

Conclusion

Open Science @ HEC Montreal



HEC Montreal's Data Science Initiative in International Business
 A NEW "ODI" FOR DATA SCIENCE. This website is dedicated to the International Business field of research with Data Science as the core methodology. We also value reproducible research, and open source developments.

Open Science Toolkit

CIRANO
 Allier savoir et décision

LOGIN | KNOWLEDGE BASE | DASHBOARDS | MONDO'S APP STORE | MORE INFO | CONTACT

MONDO SEARCH

- 5 million+ observations -
- 7500+ economic indicators -
- 65 industries, 67 industrial clusters and 245 geographic units -
- Visualizations with econometrics to analyze data -
- Databases: WDI, OECD, IRL, UNIDO, etc. -

Pays/Country and/or indicateur/indicator...

Query examples: "argentina trade GDP"; "canada tariff"


Université de Montréal | Observatoire de la Francophonie Économique



UN CENTRE D'ÉTUDES ET DE DONNÉES SUR LA FRANCOPHONIE ÉCONOMIQUE

L'Observatoire de la Francophonie Économique (OFE) a été créé en juin 2017 par l'Université de Montréal en partenariat avec le ministère des Relations Internationales et de la Francophonie (MRF) du gouvernement du Québec, l'Organisation Internationale de la Francophonie (OIF) et l'Université Concordia de la Francophonie (UCF).

BlackFin




A cutting-edge technological platform designed for DATA SCIENCE IN FINTECH

Social Data Science Lab

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503.06 Unstructured Data



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CIRANO
 Allier savoir et décision

Knowledge Transfer Vehicles

SKEMA's AI Initiative

Research

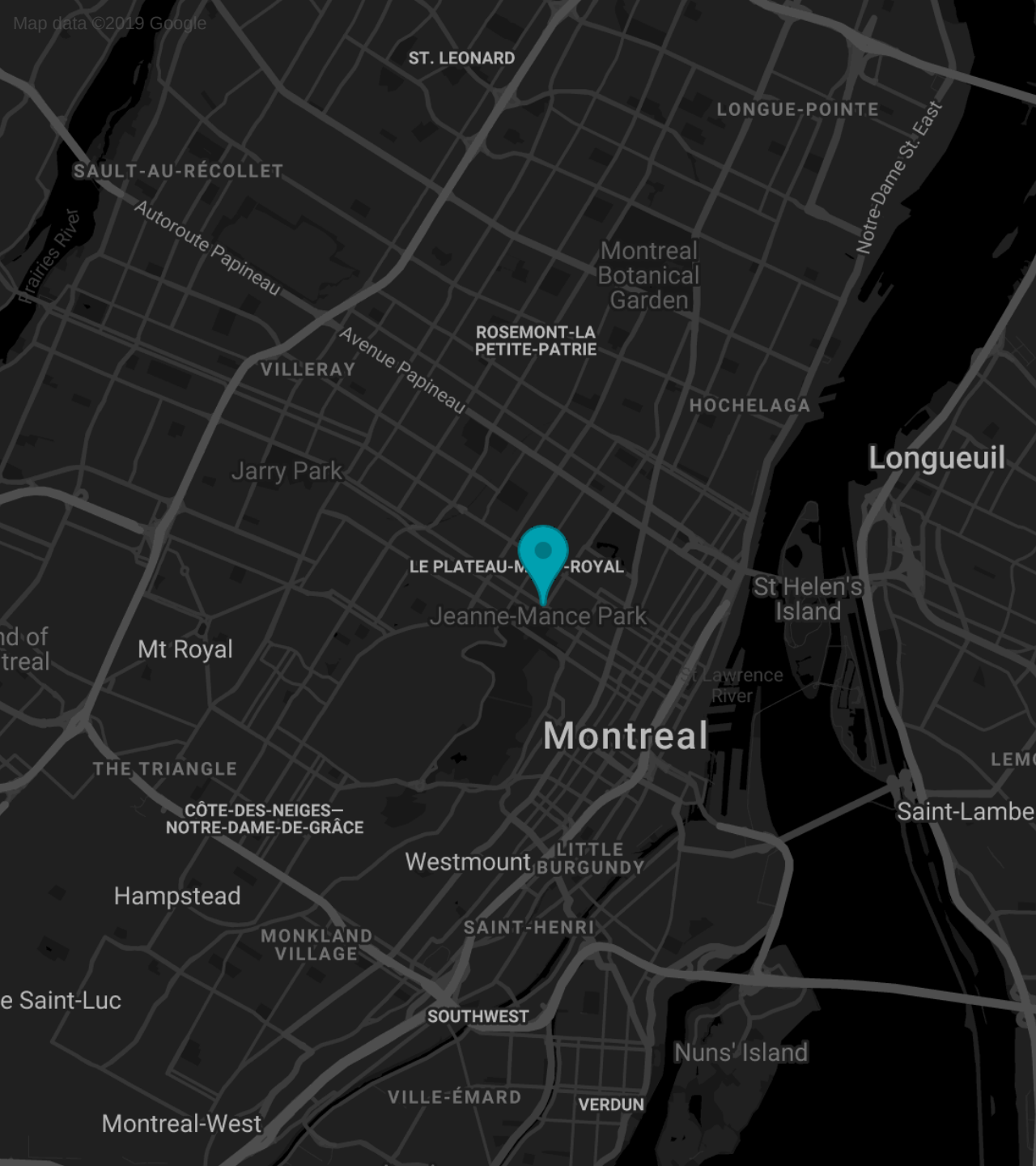
- Ideas for **research collaboration** (articles, grants)
 - Research **partnerships**
 - World Scientific Press
 - ASSA Meetings in San Diego
 - etc.

Transfer

- integration of the lab with the **PGE**, Msc, etc.
- Creation of a **technological** platform
- Knowledge Transfer Vehicles

Valorisation

- SKEMA Ventures
- **"Untapped innovations"**
- Patents, licenses



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