WORKSHOP

How to use open data for your research?

data europa academy

25 October 2024

10:00 – 11:30 CEST

Rules of the game

The webinar will be recorded and published on the data.europa academy

For questions, please use the ClickMeeting chat.

Please reserve 3 min after the webinar to help us improve by filling in our feedback form

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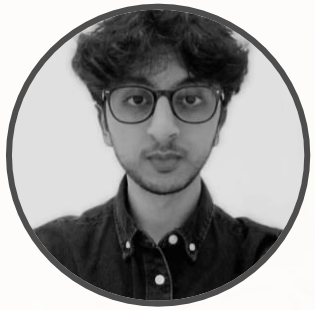
Introduction

Flora Kopelou
Data.europa.eu Publications Office of the EU

Jim Rovekamp,
Senior Consultant Data Strategy, Capgemini Invent

Calum Inverarity
Senior researcher, Open Data Institute



Neil Majithia
Researcher, Open Data Institute

Maria Ioanna Maratsi
PhD Researcher, University of the Aegean

Mohsan Ali
PhD Researcher, University of the Aegean

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Agenda

10.00 - 10.10	Opening and introduction – *Flora Kopelou*
10.10 - 10.20	Search data.europa.eu like a pro – *Flora Kopelou*
10.20 - 10.40	A case with open data from data.europa.eu – *Jim Rovekamp*
10.40 – 10.45	The State of UK Open Data: from big bang open data to responsibly stewarding data with a purpose – *Calum Inverarity*
10.45 – 11.00	Using open data for genuinely interesting research projects - *Neil Majithia*
11.00 – 11:20	Open Data for Research & Research for Open Data – *Maria Ioanna Maratsi & Mohsan Ali*
11.20 – 11.30	Q&A and closing remarks – *Flora Kopelou*

Search data.europa.eu like a pro

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What is open data

What is open data?

Data that can be **freely accessed**, **used**, **re-used**, and **shared** by anyone for any purpose, without restrictions from copyright, patents, or other mechanisms of control.

Availability and access

Reuse and distribution

Universal participation

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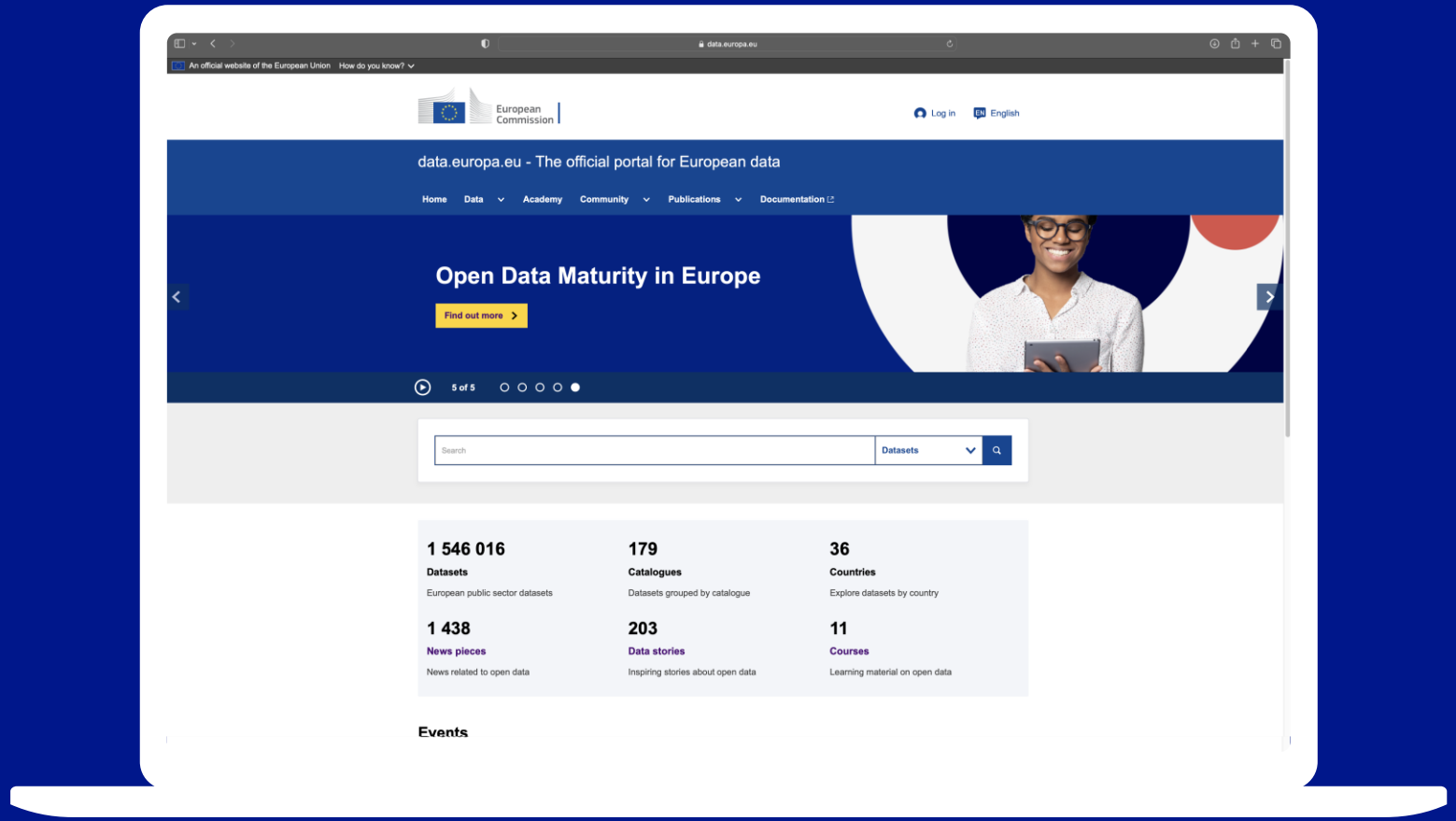
Source: Open Data Handbook, Open Knowledge Foundation.

What is data.europa.eu

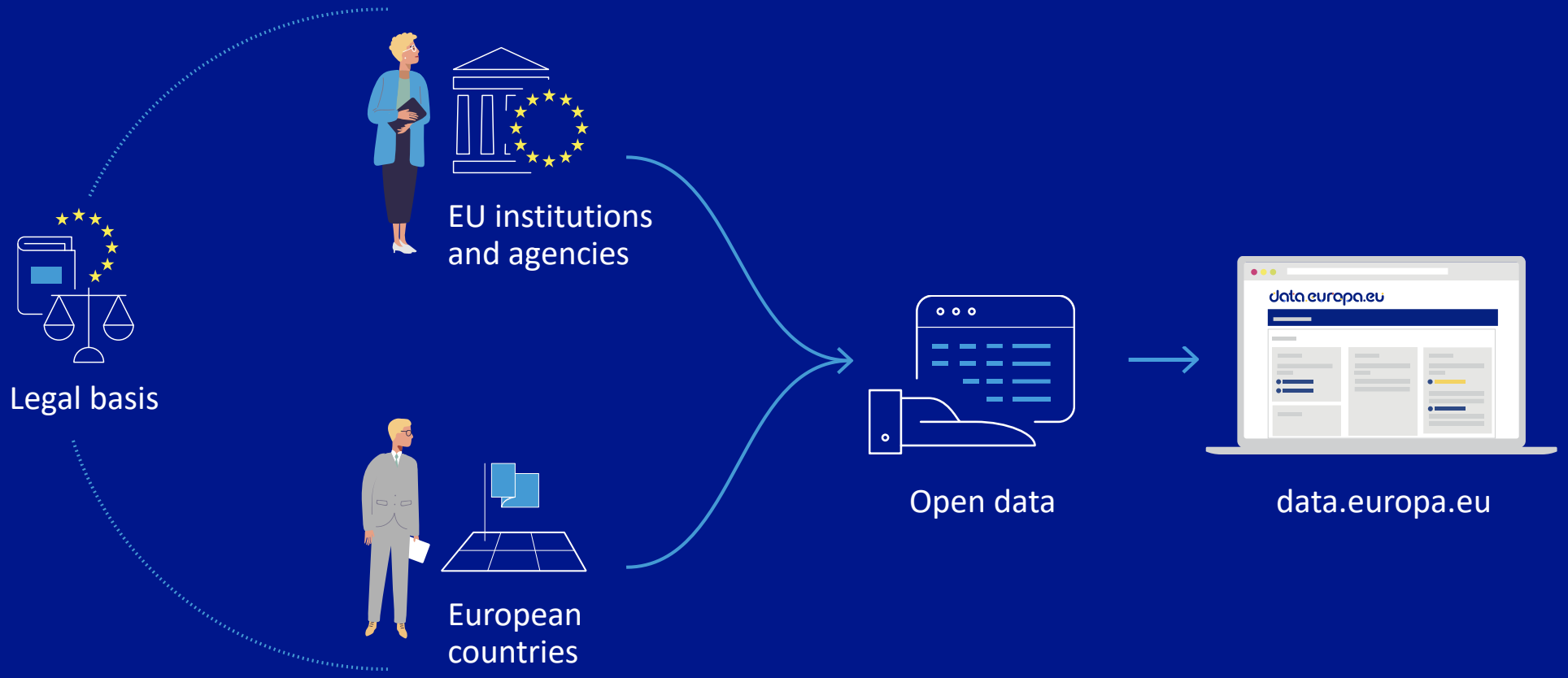
data.europa.eu

A platform providing central point of access to **European open data** from international, European Union, national, regional, local and geodata portals.



data.europa.eu

The platform was set up by the European Commission to implement EU open data and reuse policies. It is managed by the Publications Office of the EU.



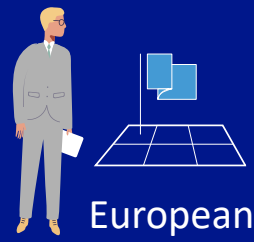
data.europa.eu

The portal is a bridge between the data providers and data users

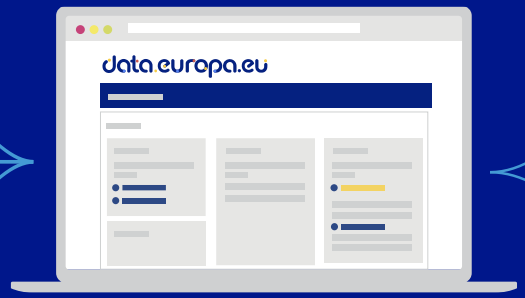
Data providers

EU institutions and agencies

Geoportals



European countries



data.europa.eu

Data users

Developers

Researchers

Public administrations

General public

Others

Private companies

Fact journalism

data.europa.eu

Our services in a nutshell

Data

Providing access to free public data resources across Europe via a single platform (the portal).

Academy

Improving data literacy with thematic courses designed according to users' needs.

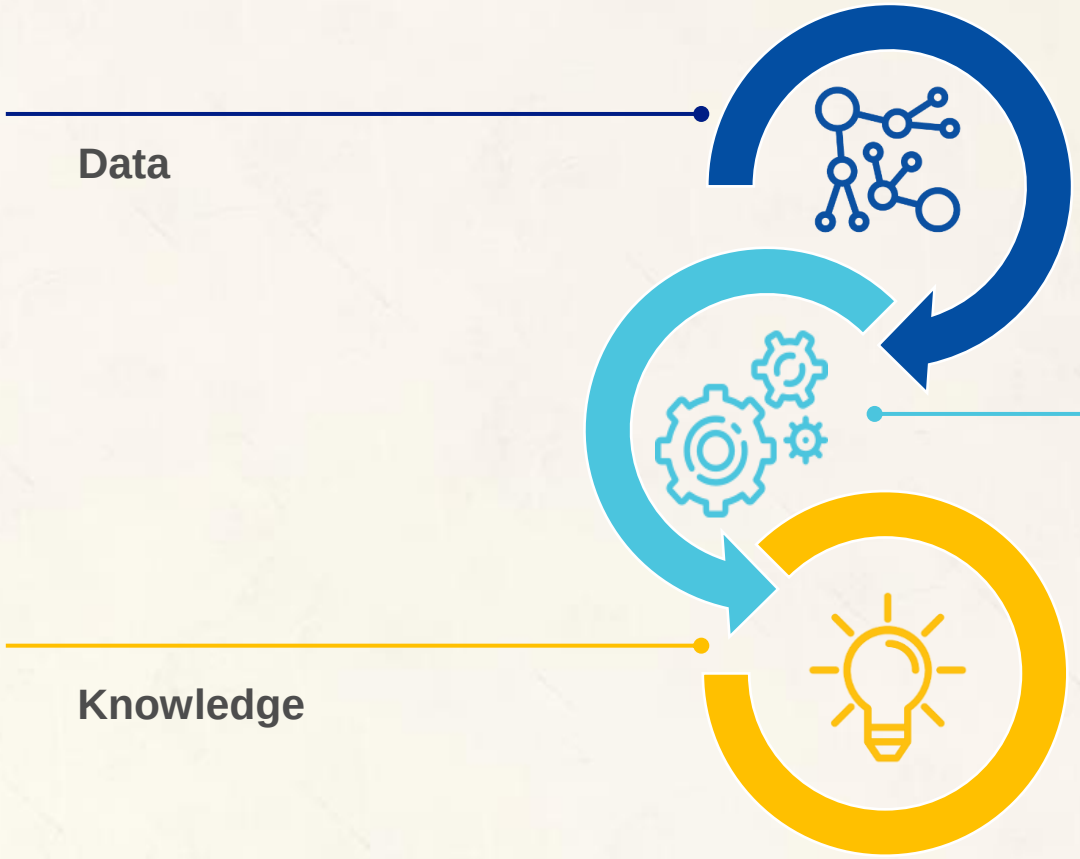
Community

Organising conferences; communicating via social media and newsletters.

Publications

Assessing open data maturity in Europe; providing reports, studies and training via data.europa academy.

Data.europa.eu connects...



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Data.europa.eu as **data hub**

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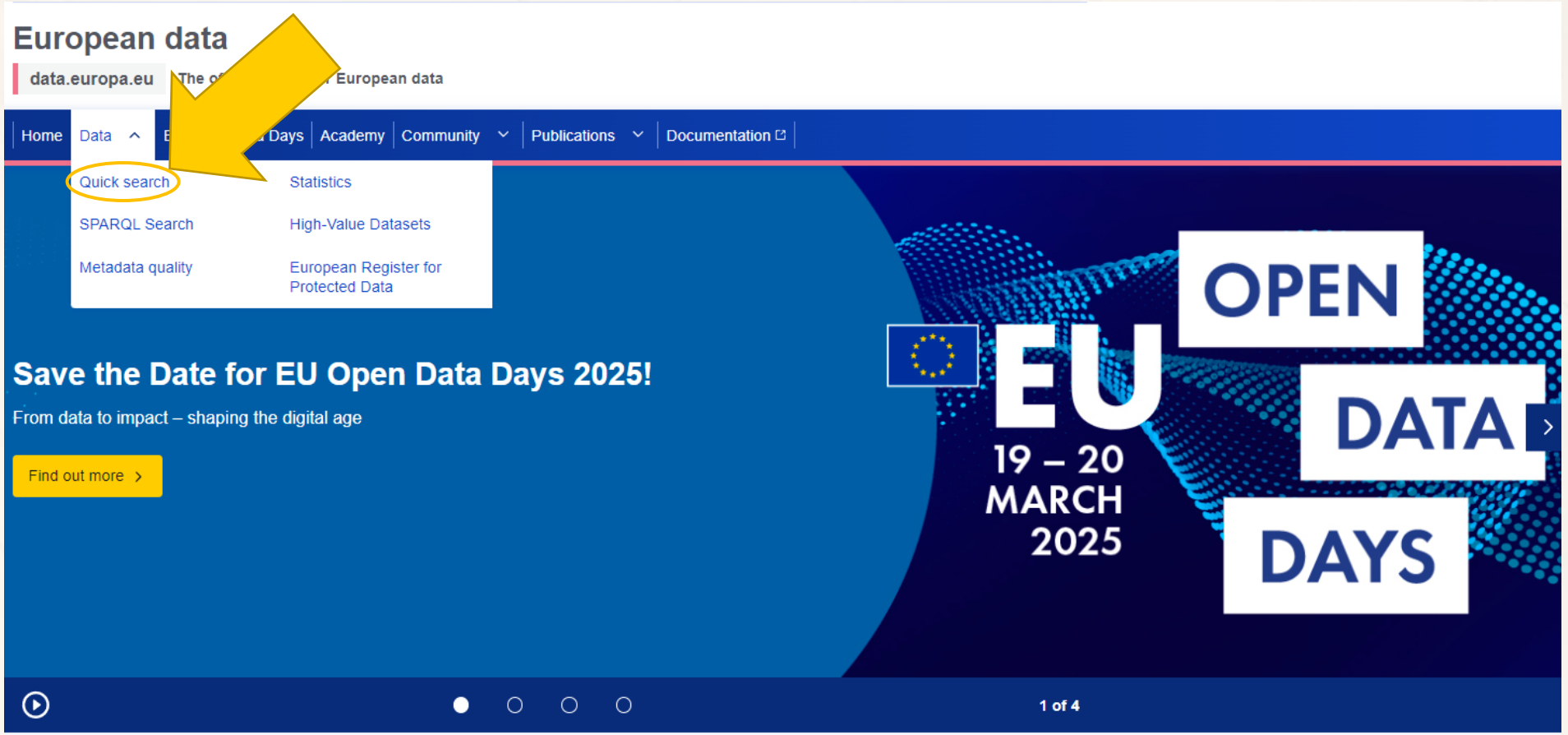
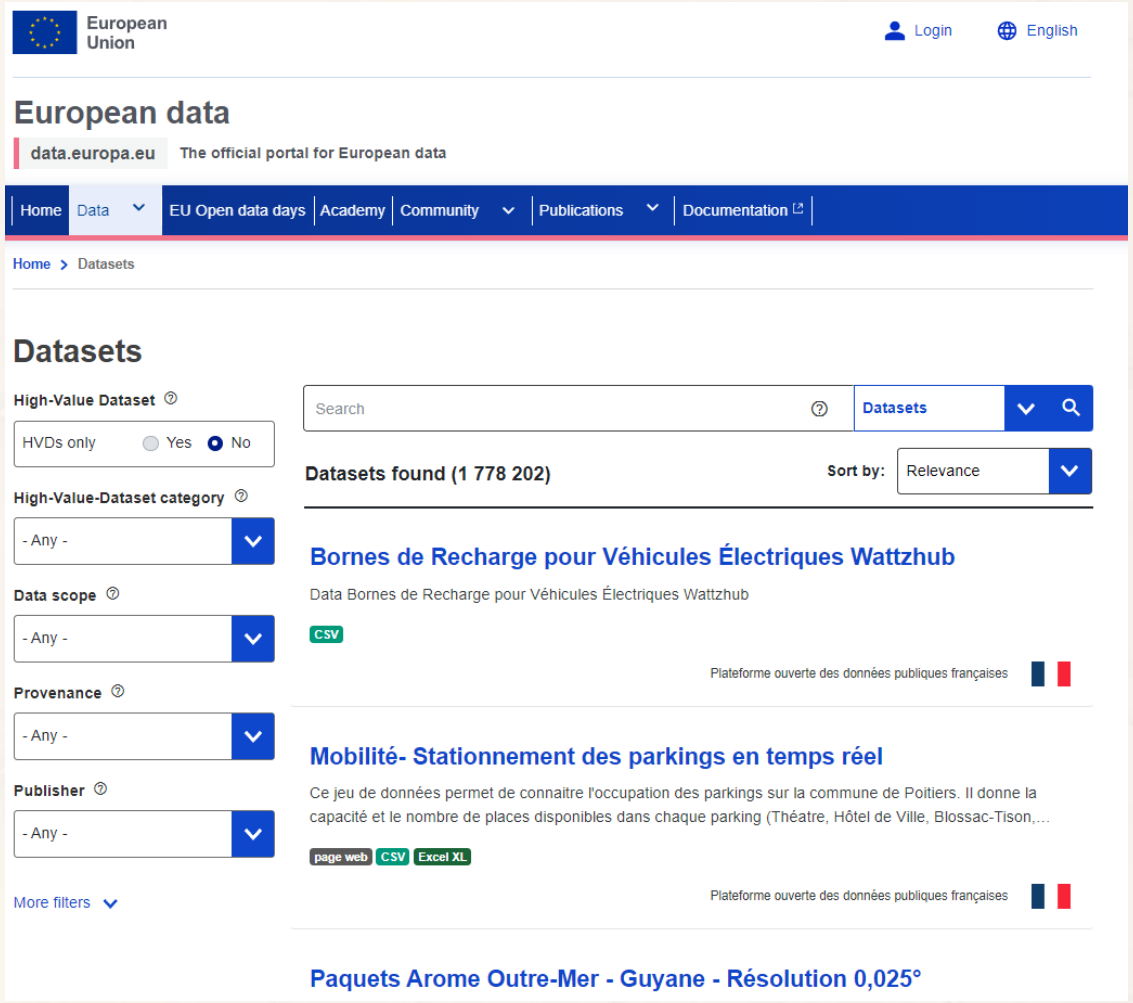
Data.europa.eu as data hub



You can search for datasets via the Data section

Data.europa.eu as data hub

- **More than 1.7 million datasets,** from 183 data providers
- **Navigate or search to get to the data** you are looking for
- Benefit from **many filters**
- **Metadata translations** in all EU languages
- **Export citation** in several formats



Data.europa.eu as information hub

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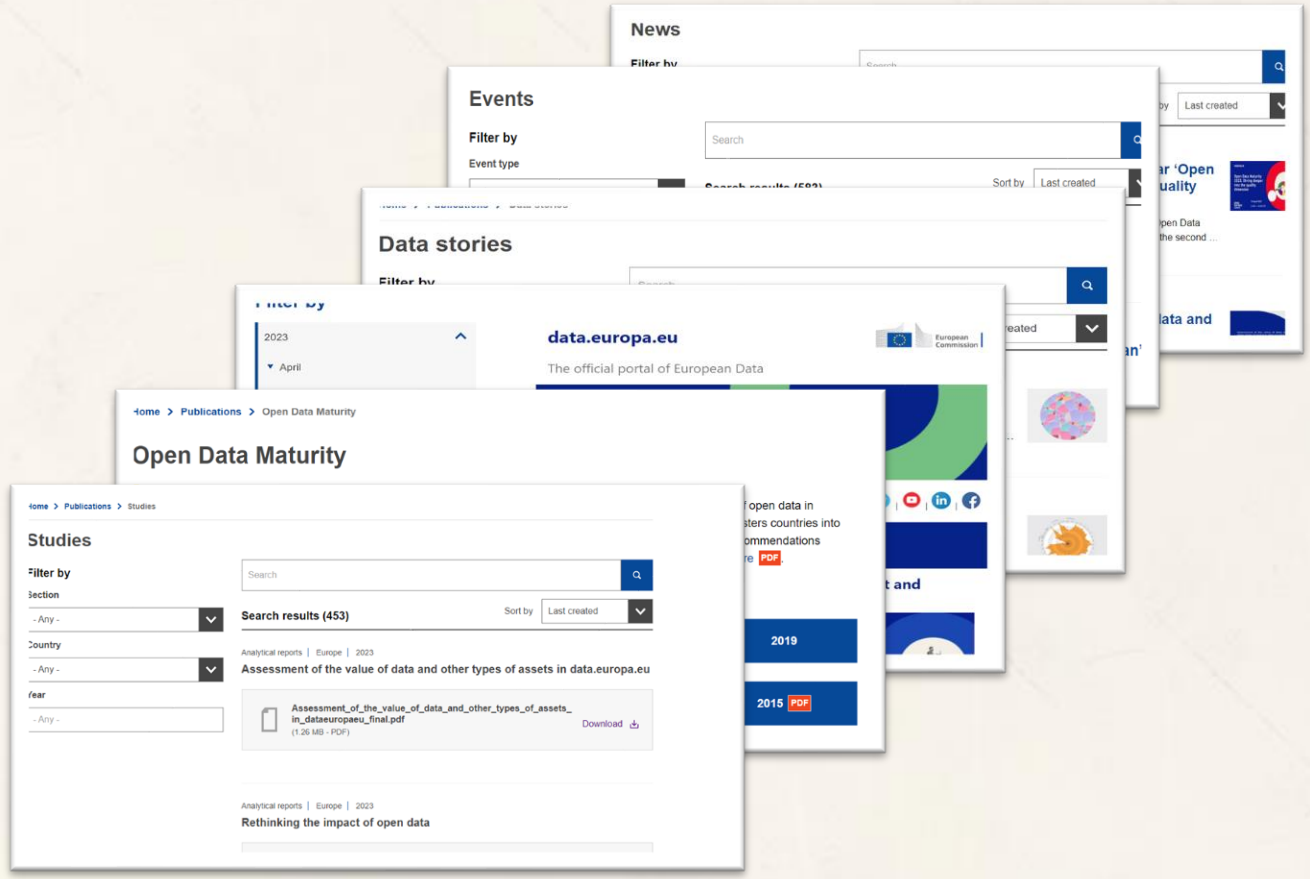
Information around open data

- Data stories
- Studies
- News
- Newsletter
- Events
- Podcast



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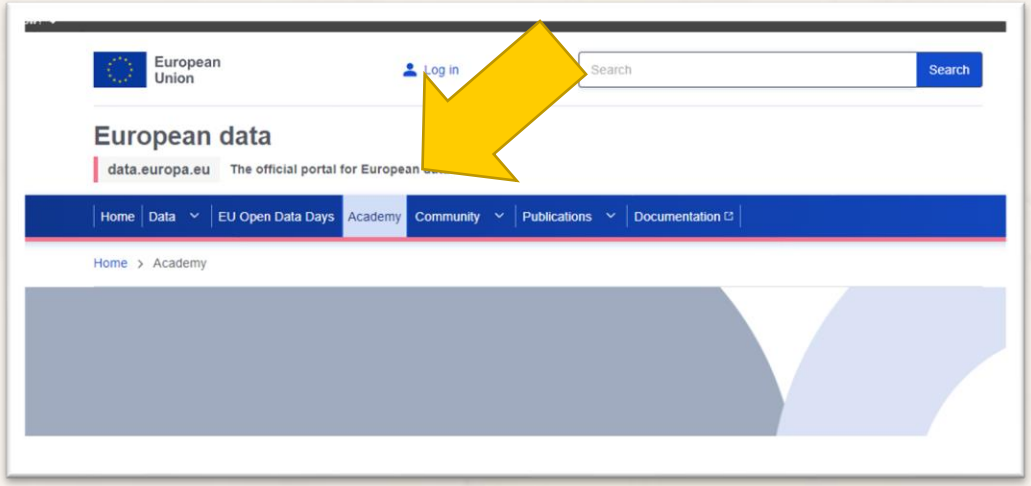
Data.europa.eu as **knowledge hub**

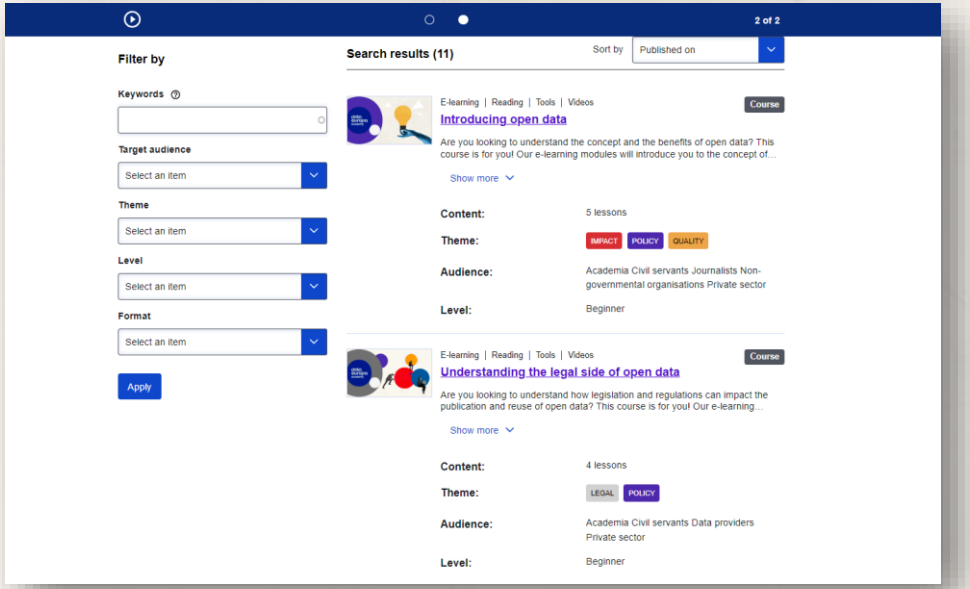
data.
europa
academy

Data.europa academy

your open data knowledge hub

- Improving data literacy with 11 thematic courses (legal, technical, business, data visualisation...)
- Designing according to users' needs
- Offering training material for public sector, private companies, students, researchers, etc.
- Soon: Working on creating learning paths for our users





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Case with open data

Electricity prices by user type

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Case study

Imagine yourself as part of a team of data analysts working closely with the EU to evaluate electricity prices by user type over the period from 2013-2023. Your role is to utilize datasets from Eurostat, the official statistical office of the EU, to perform a thorough data analysis and provide actionable insights.

Task 1: Finding the Dataset

Your first task will be to source the necessary dataset using data.europa.eu. Specifically, you need to locate the dataset that contains information on electricity prices in the EU for the given period. Use the access link to download the dataset in csv format. Then convert the csv to Excel.

Task 2: Understanding the Data

Now that you have the dataset, let's see if it contains the data you expected for our analysis. To check this, you need to understand what data is inside the dataset and how you can interpret data. Use the landing page link to guide you to the source website to find metadata.

Task 3: Answering the Questions

Now that you understand the data you have at hand, you have been given the task to answer three questions. Check if the dataset contains what you need to start your analysis for the following questions.

1. How did electricity prices for medium sized household in Germany develop from 2013-2020?
2. Which country had the highest average electricity price for medium sized households in 2023?
3. Is there a correlation between the average electricity price and a countries' GDP?

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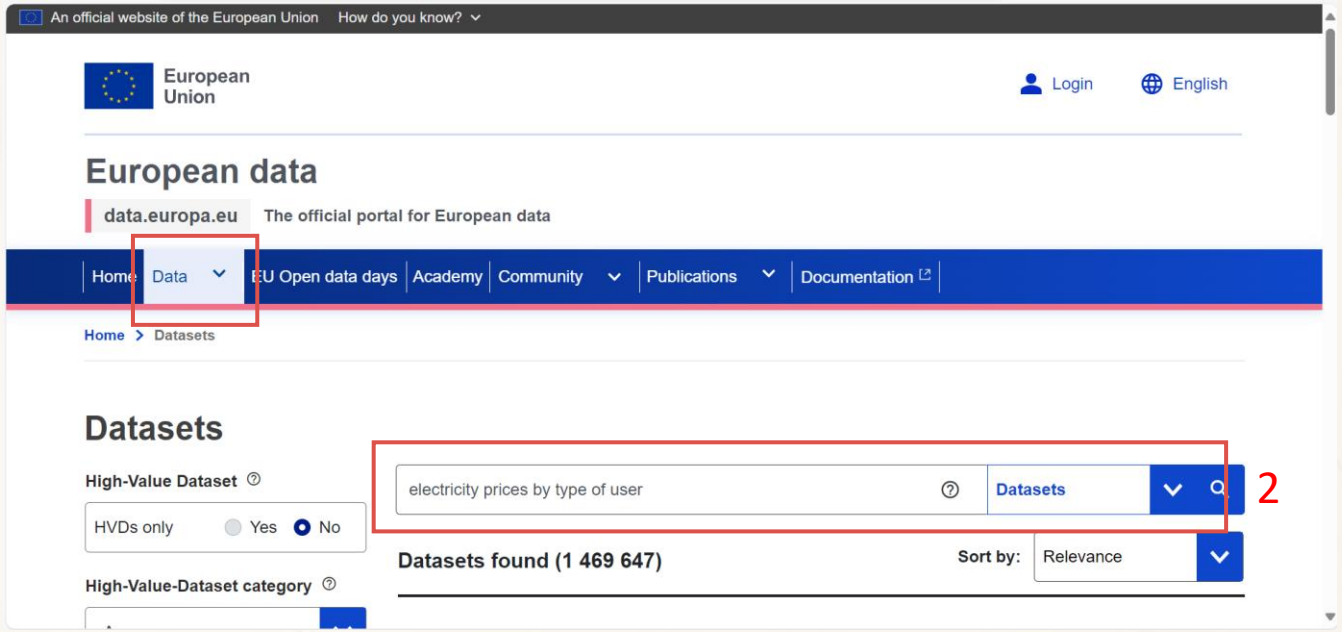
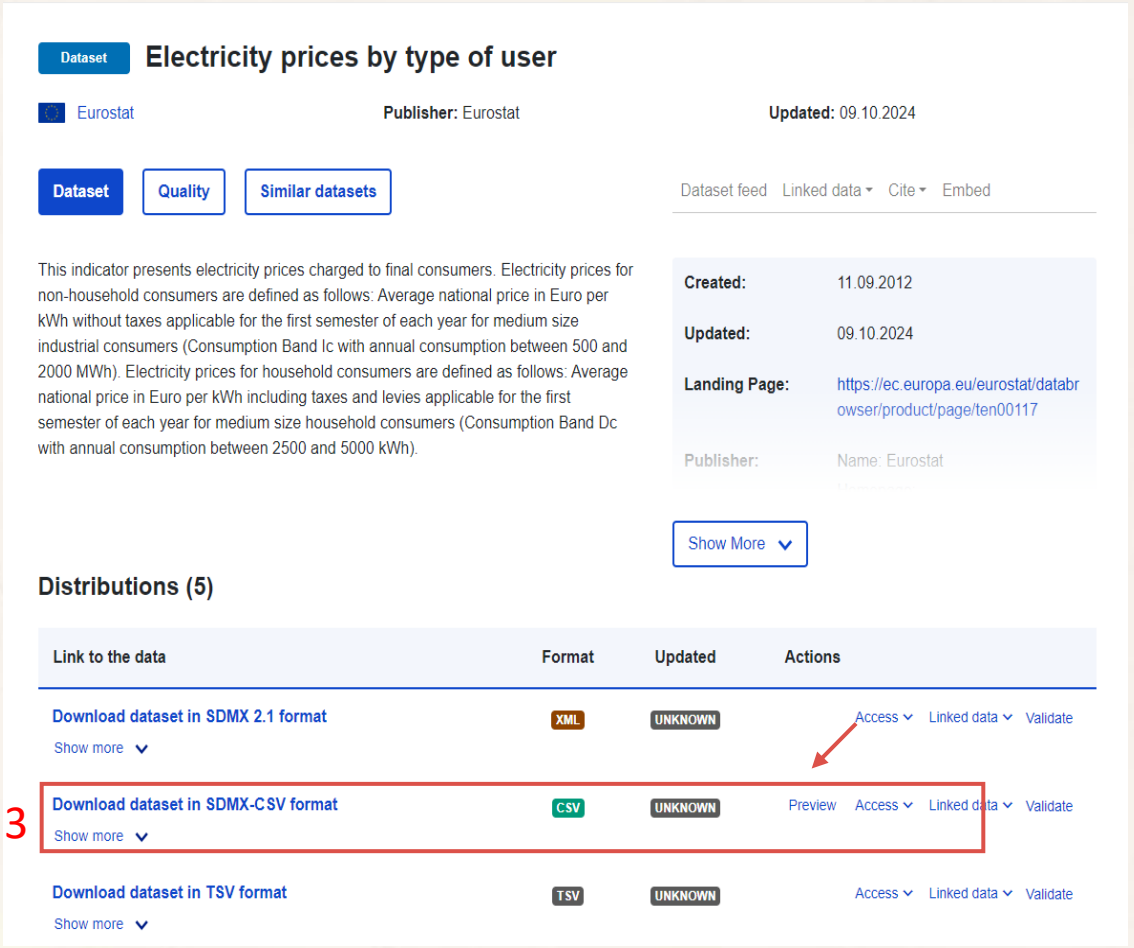
20 minutes

Feel free to ask your questions in the chat

Task 1: Find the Dataset

2 minutes





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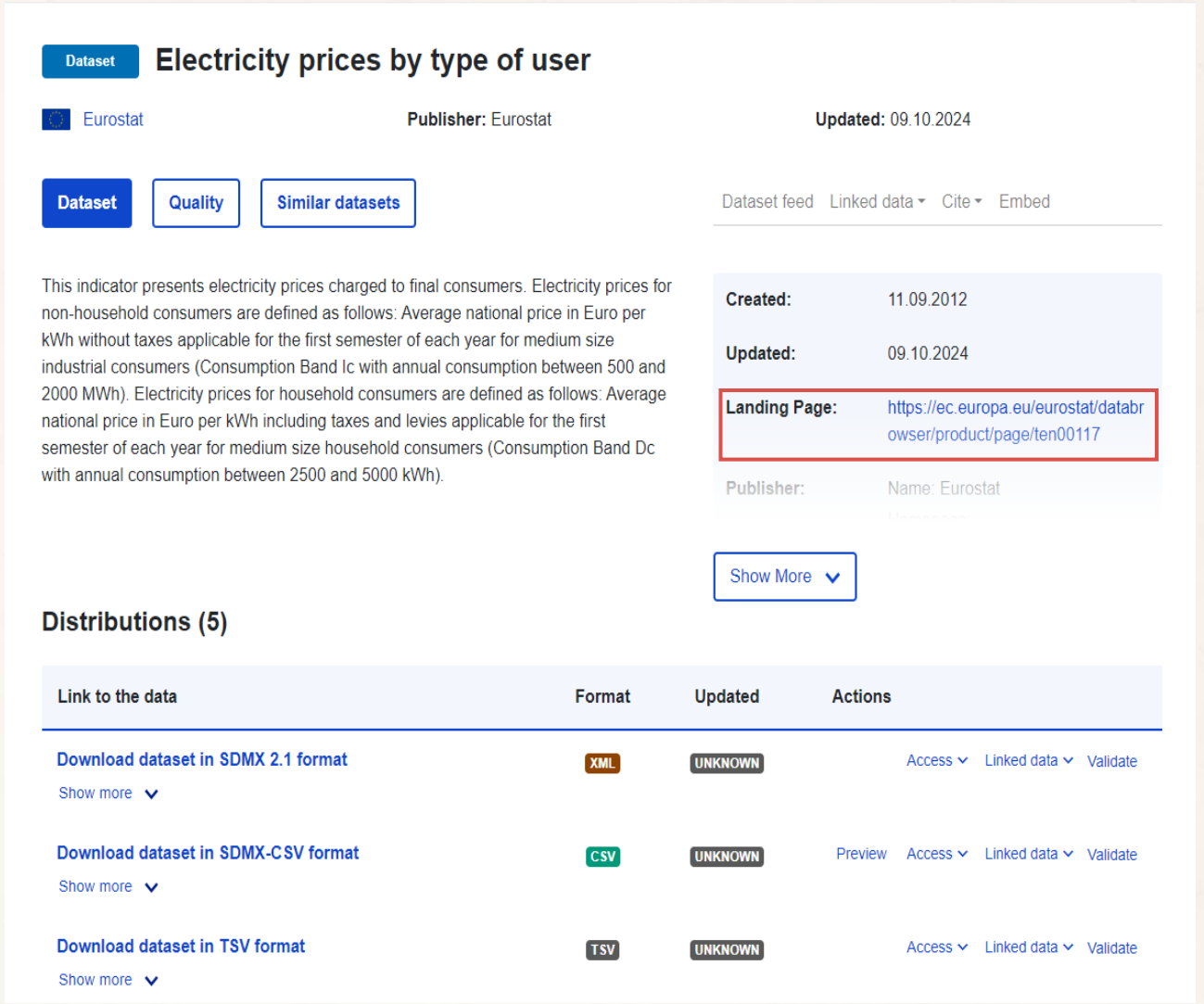
How to convert a CSV file to Excel → YouTube: *'How to Convert CSV to Excel (Simple and Quick)'*

Task 2: Understand the Data

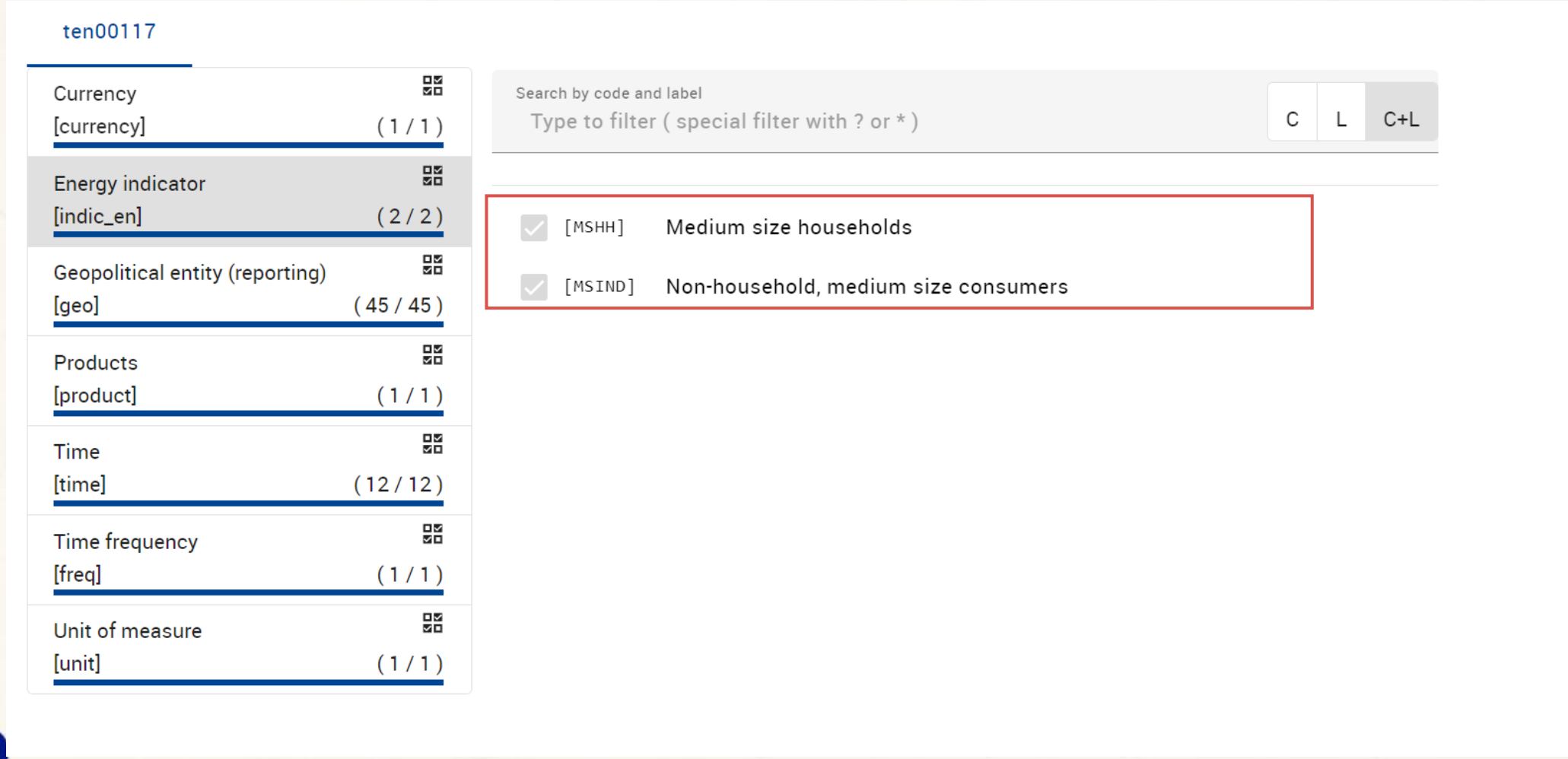
3 minutes

Task 2: Understanding the Data

Now that you have the dataset, let's see if it contains the data you expected for our analysis. To check this, you need to understand what data is inside the dataset and how you can interpret data. Use the landing page link to guide you to the source website to find metadata.



Task 2: Understand the Data



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Task 3: Answer the Questions

Based on the data provided in the attached CSV file, please determine if you can answer the following research statements. For each statement, indicate whether the information in the CSV file is sufficient to answer the question.

Statement 1: I have the information to identify how electricity prices for medium sized household in Germany developed from 2013-2023?

- ❑ Yes, I have the information to answer this question
- ❑ No, I do not have the information to answer this question

Statement 2: I have the information to identify which country had the highest average electricity price for medium sized households in 2023?

- ❑ Yes, I have the information to answer this question
- ❑ No, I do not have the information to answer this question

Statement 3: I have the information to identify if there a correlation between the average electricity price and a countries' GDP?

- ❑ Yes, I have the information to answer this question
- ❑ No, I do not have the information to answer this question

Please review the data carefully and provide your answers based on the information available in the CSV file.

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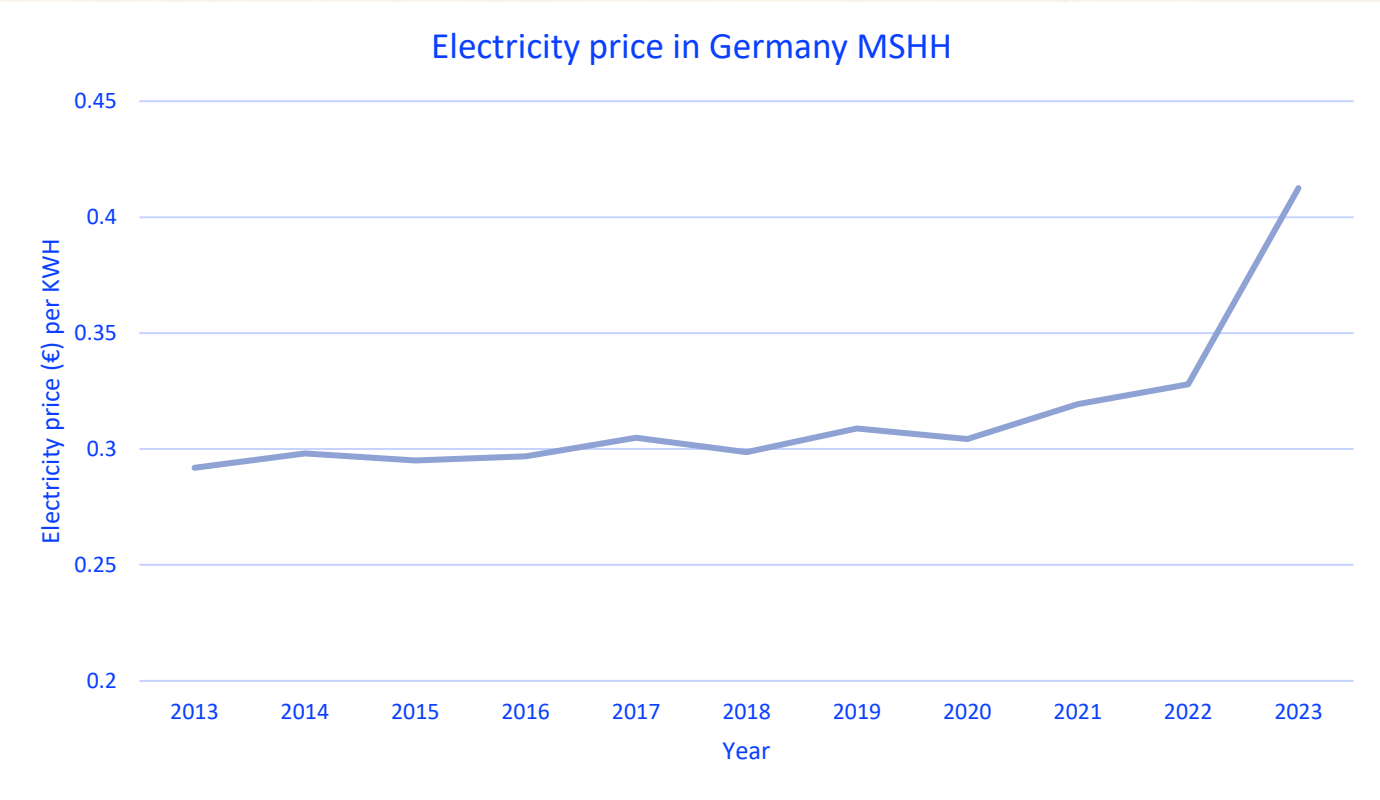
How did electricity prices for medium sized household in Germany develop from 2013-2023?



Electricity prices were relatively stable until 2020, then the prices rose quickly between 2020-2023

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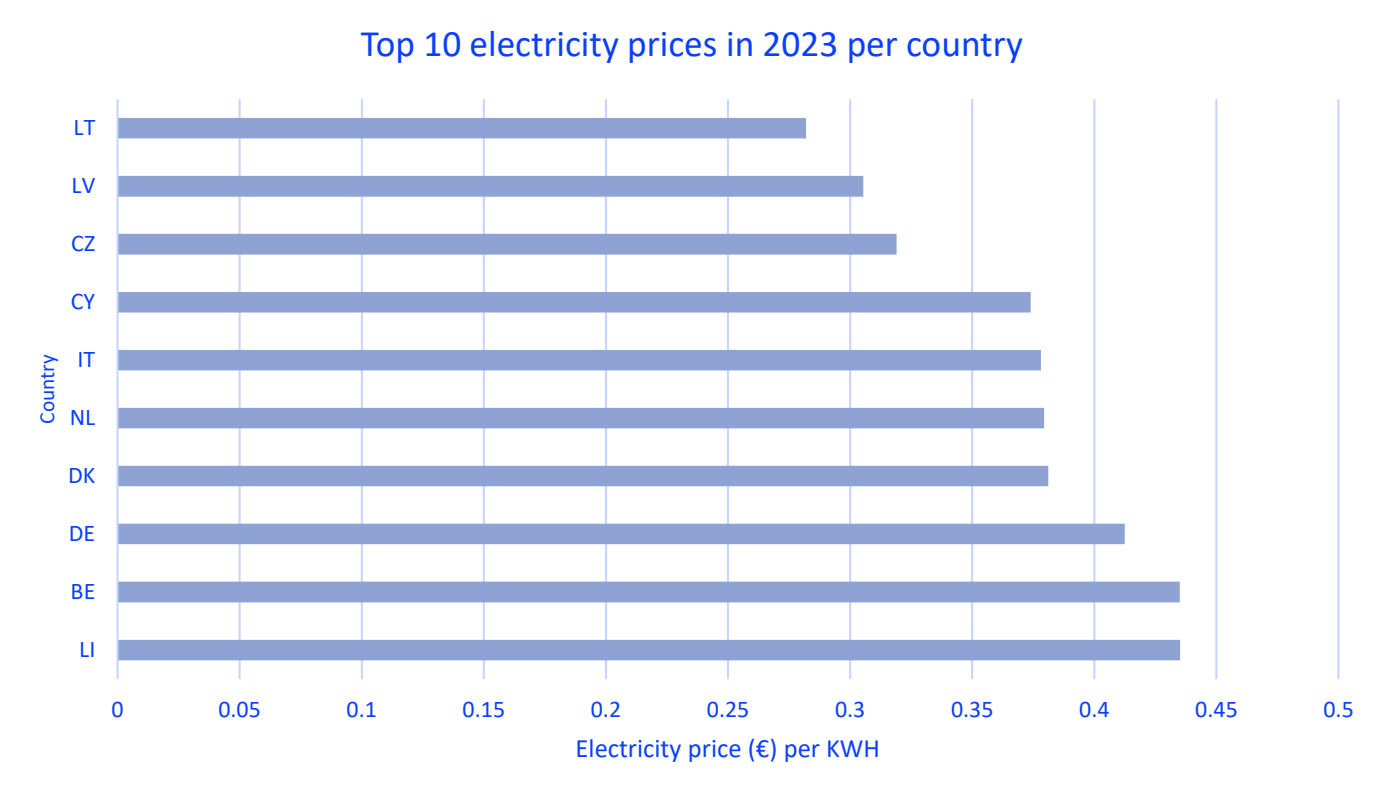
Which country had the highest average electricity price for medium sized households in 2023?



Liechtenstein had the highest average electricity price in 2023 for medium sized households, do you see any surprises?

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Is there a correlation between the average electricity price and a countries' GDP?

We are missing information to calculate any correlation between electricity prices and GDP. Therefore, we would have to enrich the data to draw meaningful conclusions.

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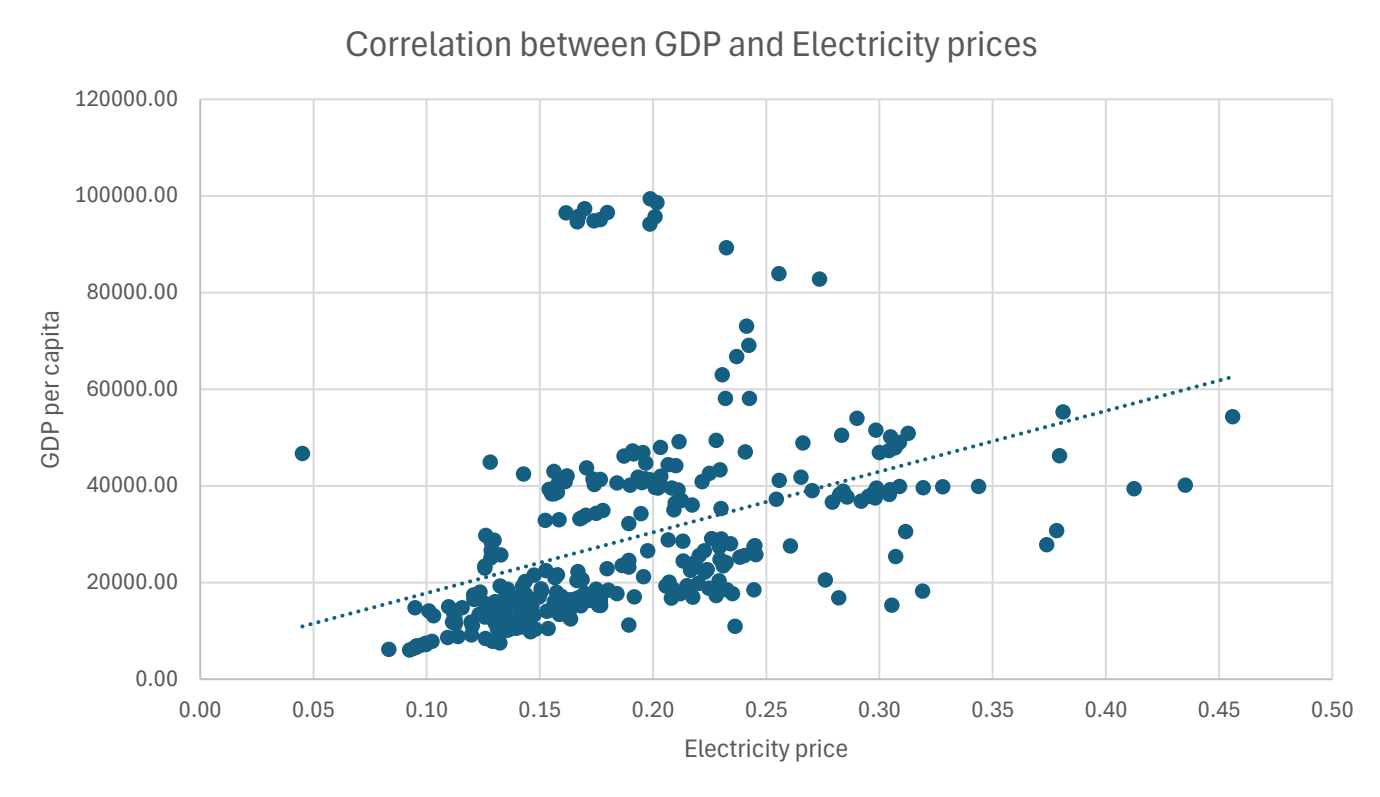
Is there a correlation between the average electricity price and a countries' GDP?



If we were to combine the two datasets (getting the GDP data from Eurostat), we can get insights into the relationship between GDP and electricity prices.

In this example we see a positive correlation of 0.42. We would consider this moderately positive

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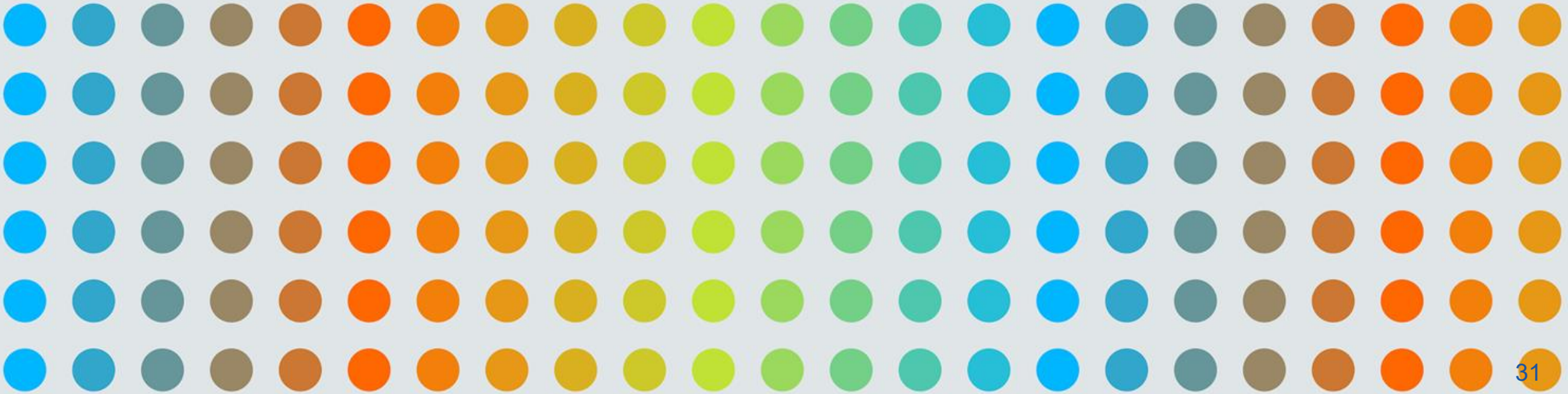
The State of UK Open Data: from big bang open data to responsibly stewarding data with a purpose

Calum Inverarity

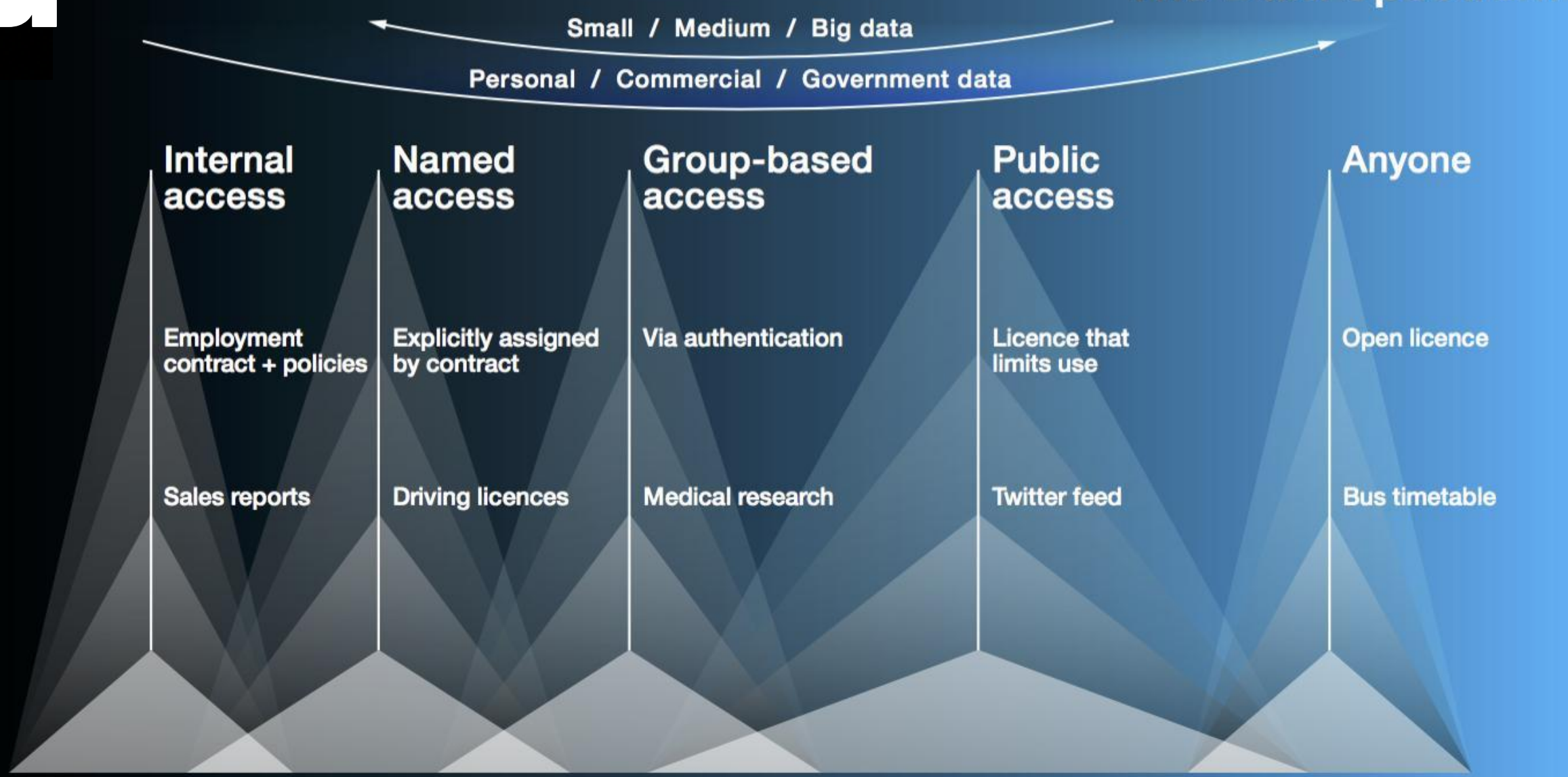
25-10-2024



Agenda

1. **Introduction: the ODI and our model for open data**
2. Part 1: Open government data
3. Part 2: Public sector / regulatory-driven data sharing
4. Part 3: Private-sector driven coalitions and data institutions
5. The future of open data

The Data Spectrum



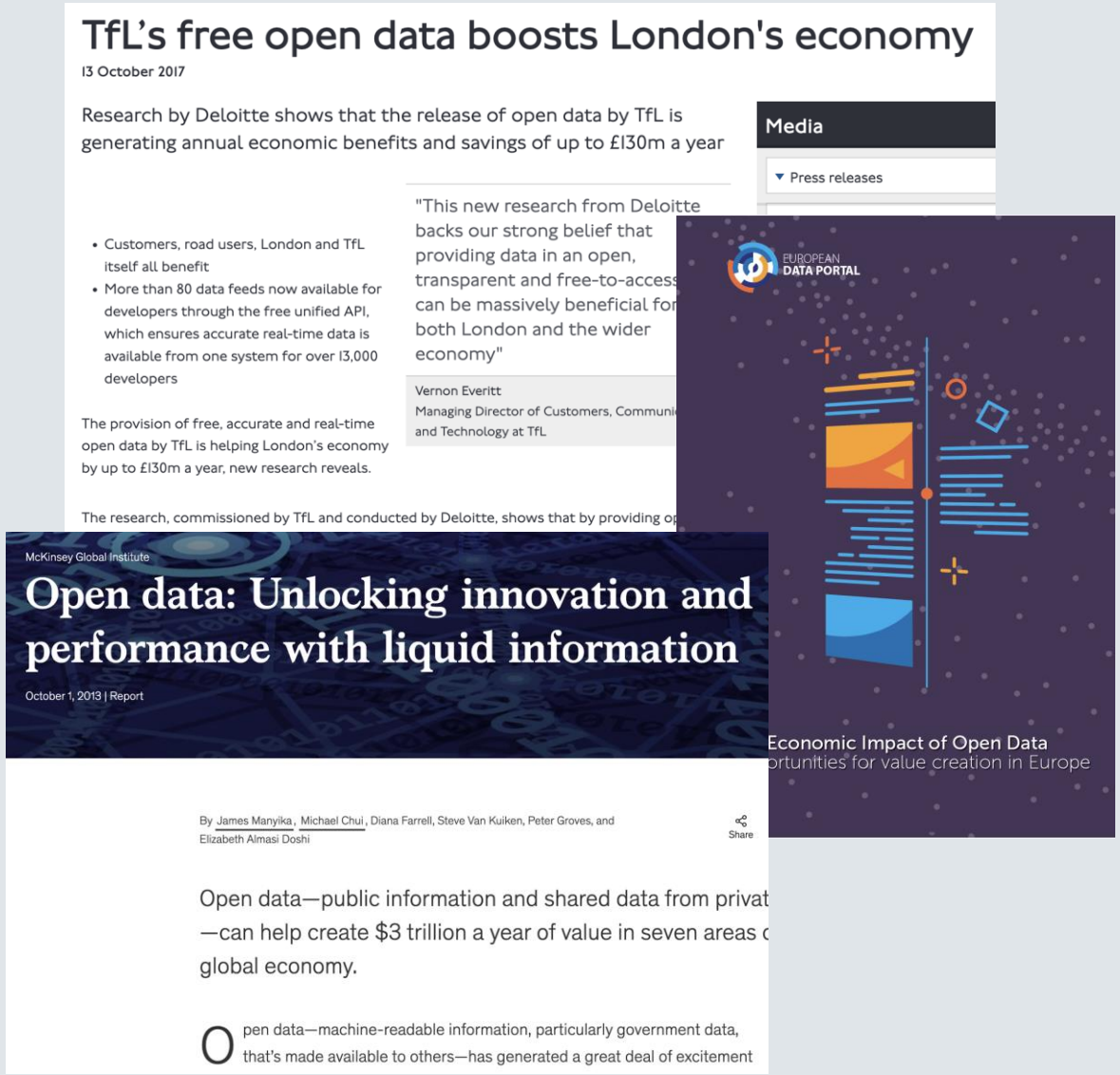
theodi.org/data-spectrum

Why open data matters?

The $3tn per year **valuation of the open data market** by McKinsey in 2013 centred on the value of combining open government data with shared data held by businesses

In 2014, Lateral Economics estimated that the **value of open data to the G20** would be around $2.6tn a year, contributing to the group's cumulative gross domestic product (GDP) of around 1.1% from 2014–2019

In 2020, the European Data Portal estimated that the **value of open data for the EU28+** was €184bn in 2019, and forecast it to reach between €199.51 and €334.21bn by 2025



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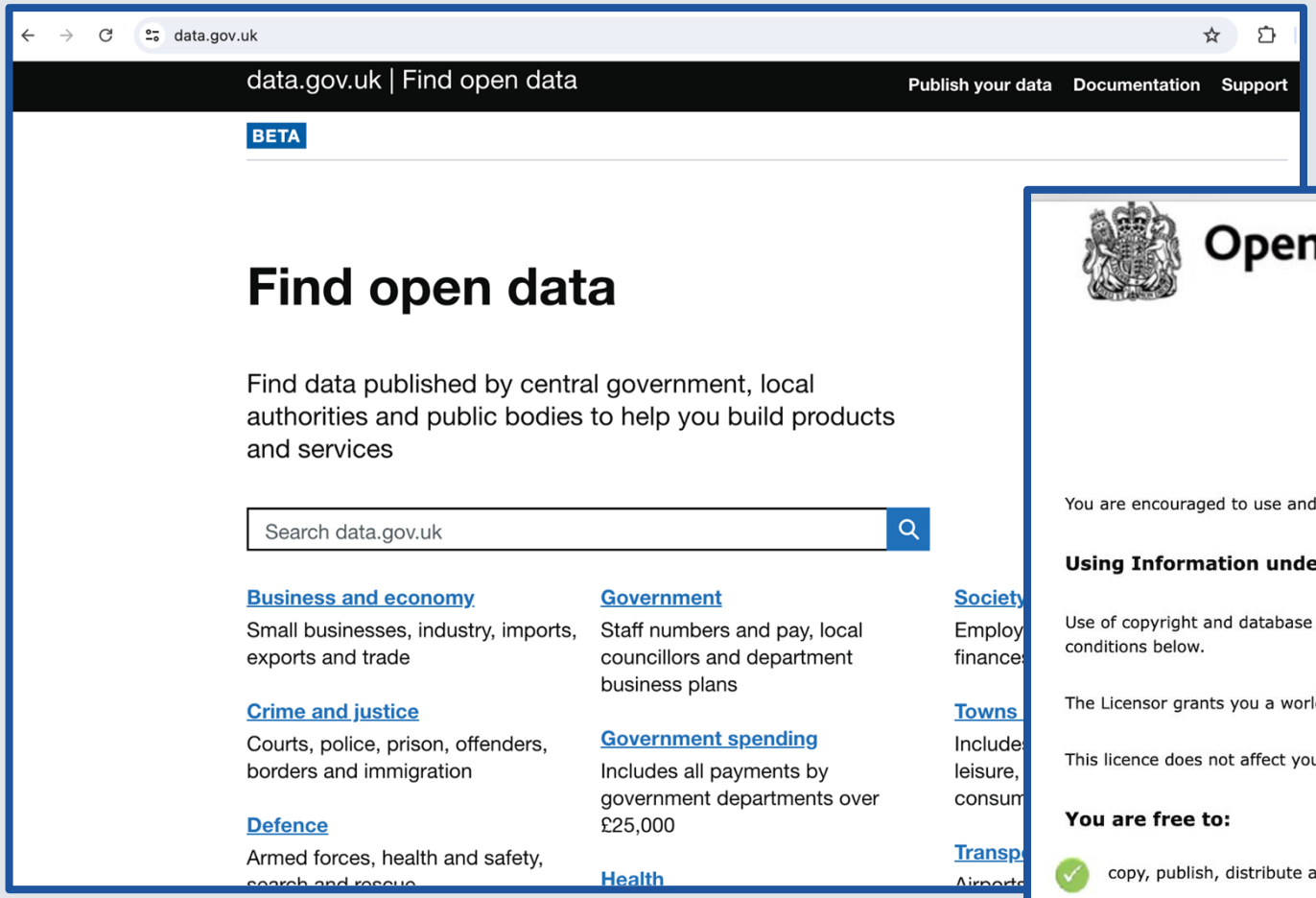
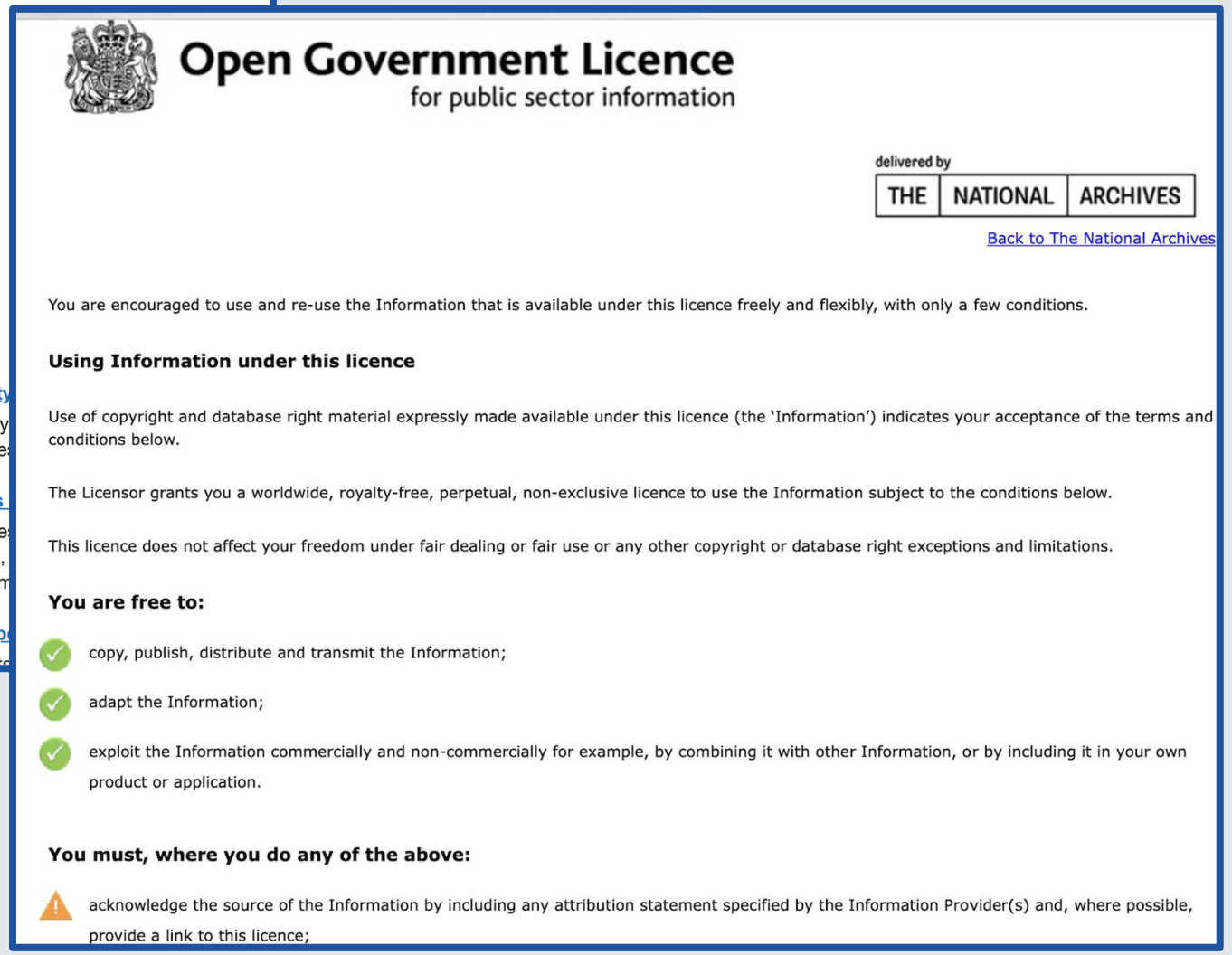
Retrospective: Open data in the UK since 2010





TFL: Benefits of open data

Annual economic benefits and savings upto:

£130 Million

The cost? £1 Million

https://content.tfl.gov.uk/deloitte-report-tfl-open-data.pdf

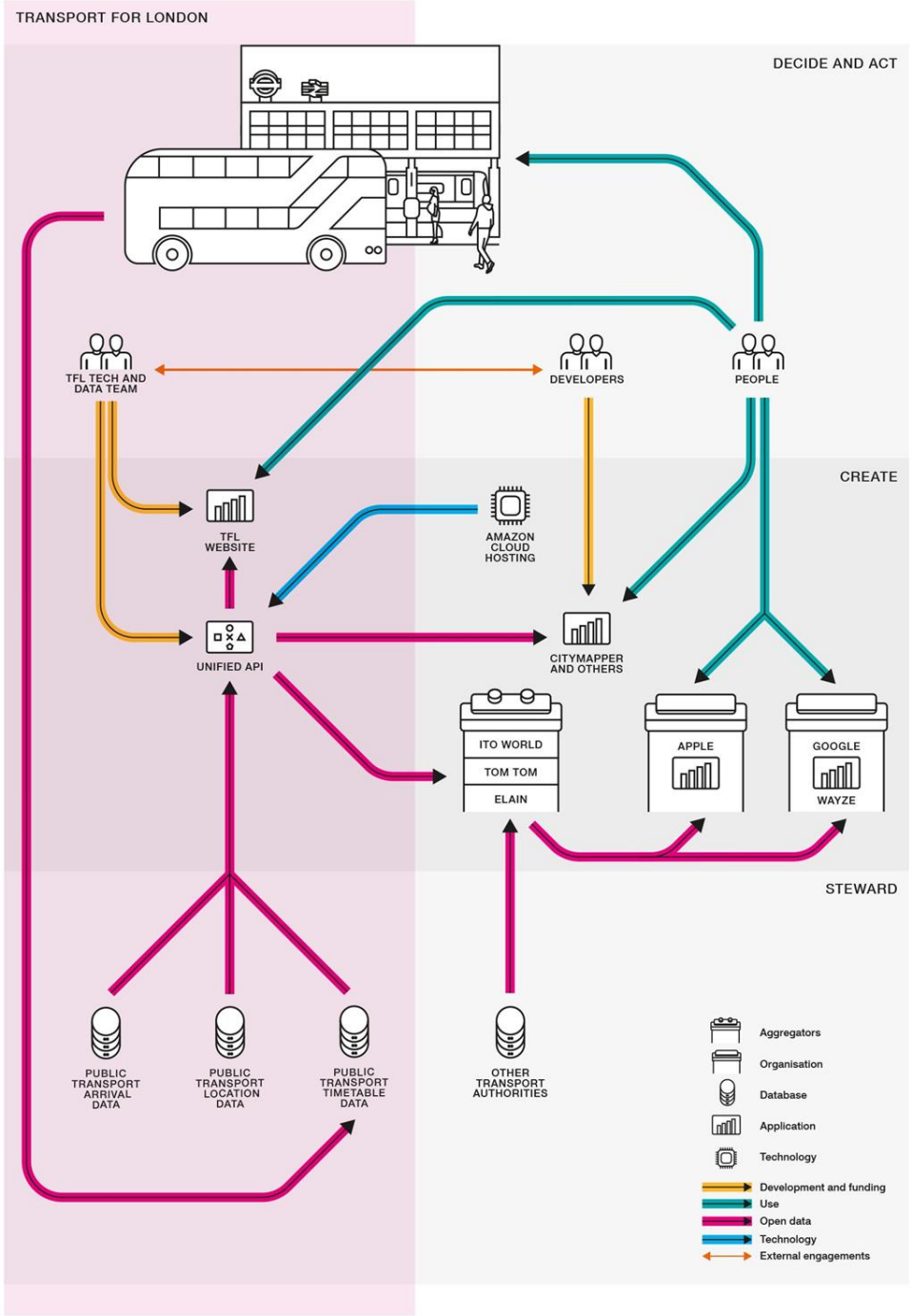
Deloitte.

Assessing the value of TfL's open data and digital partnerships

July 2017

Over 700 Apps now rely on open transport

- City Mapper (Millions of users)
- Google Maps (Millions of users)
- Real time trains (500,000 users)
- Station master (10,000’s users)



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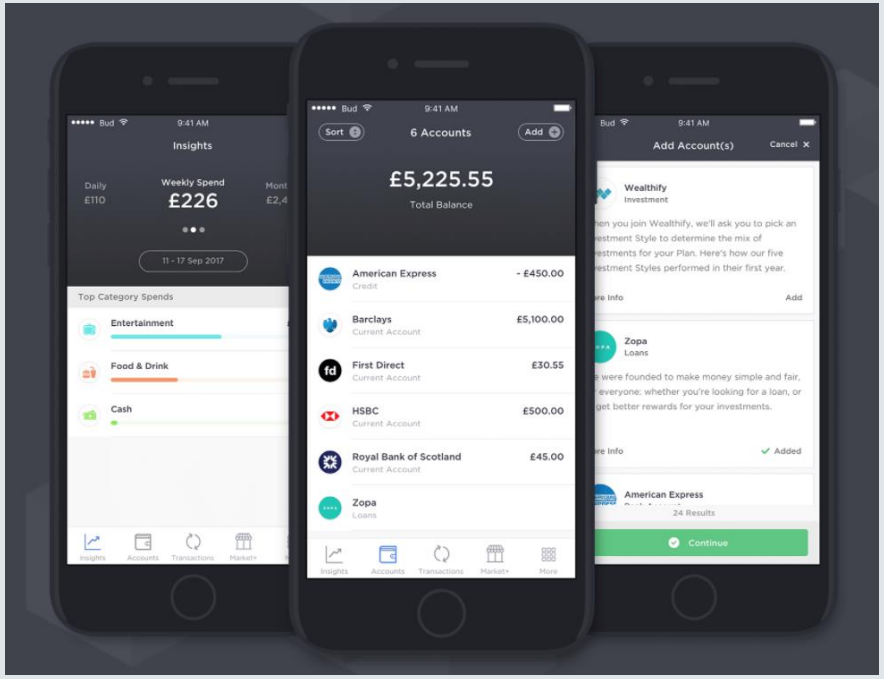
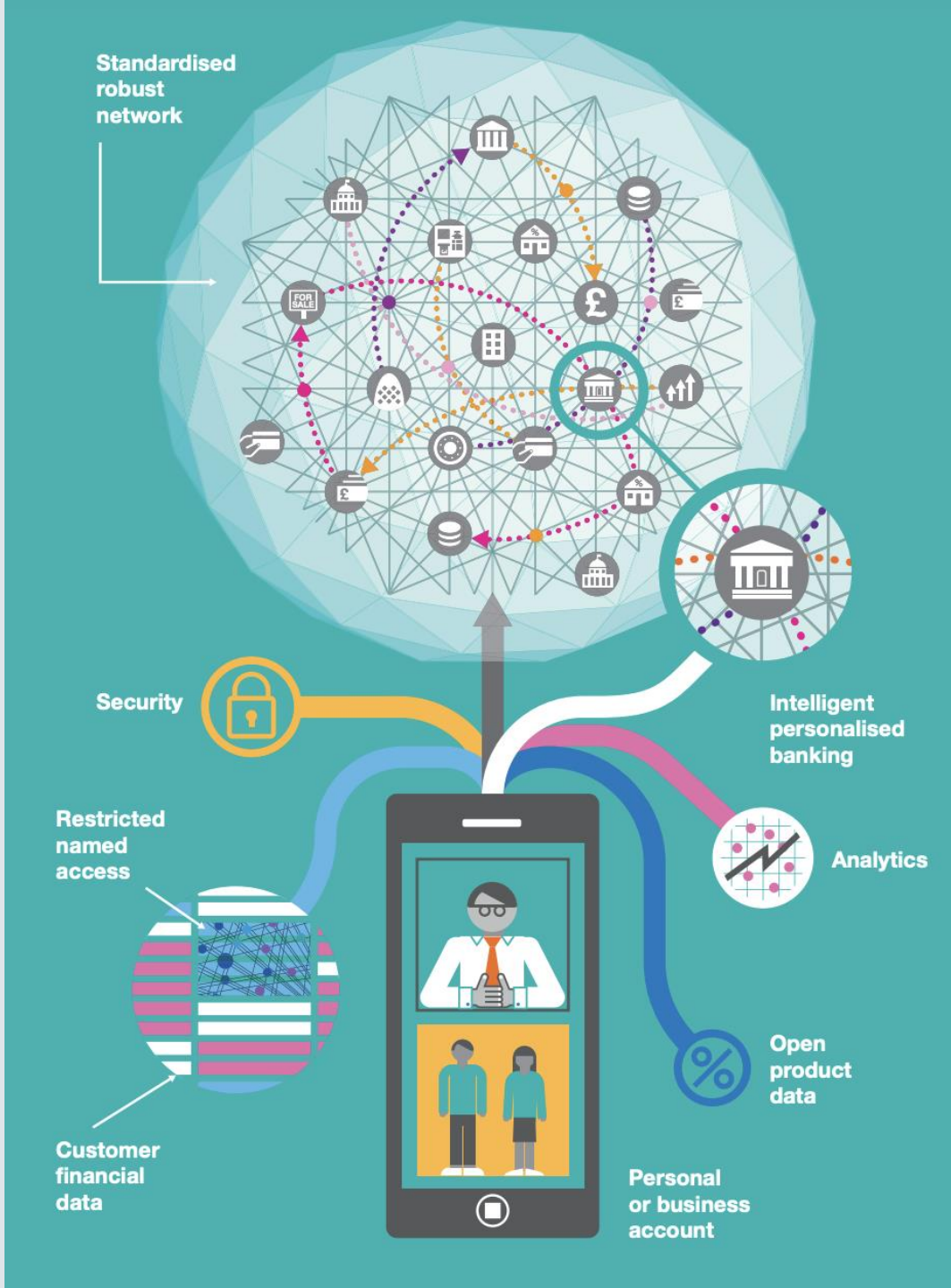
Open Banking: driven by regulation

- Open data and data-sharing ecosystem
- Focused on secure sharing of current account transaction data with trusted 3rd parties
- Provides standards for open data publishing from financial institutions





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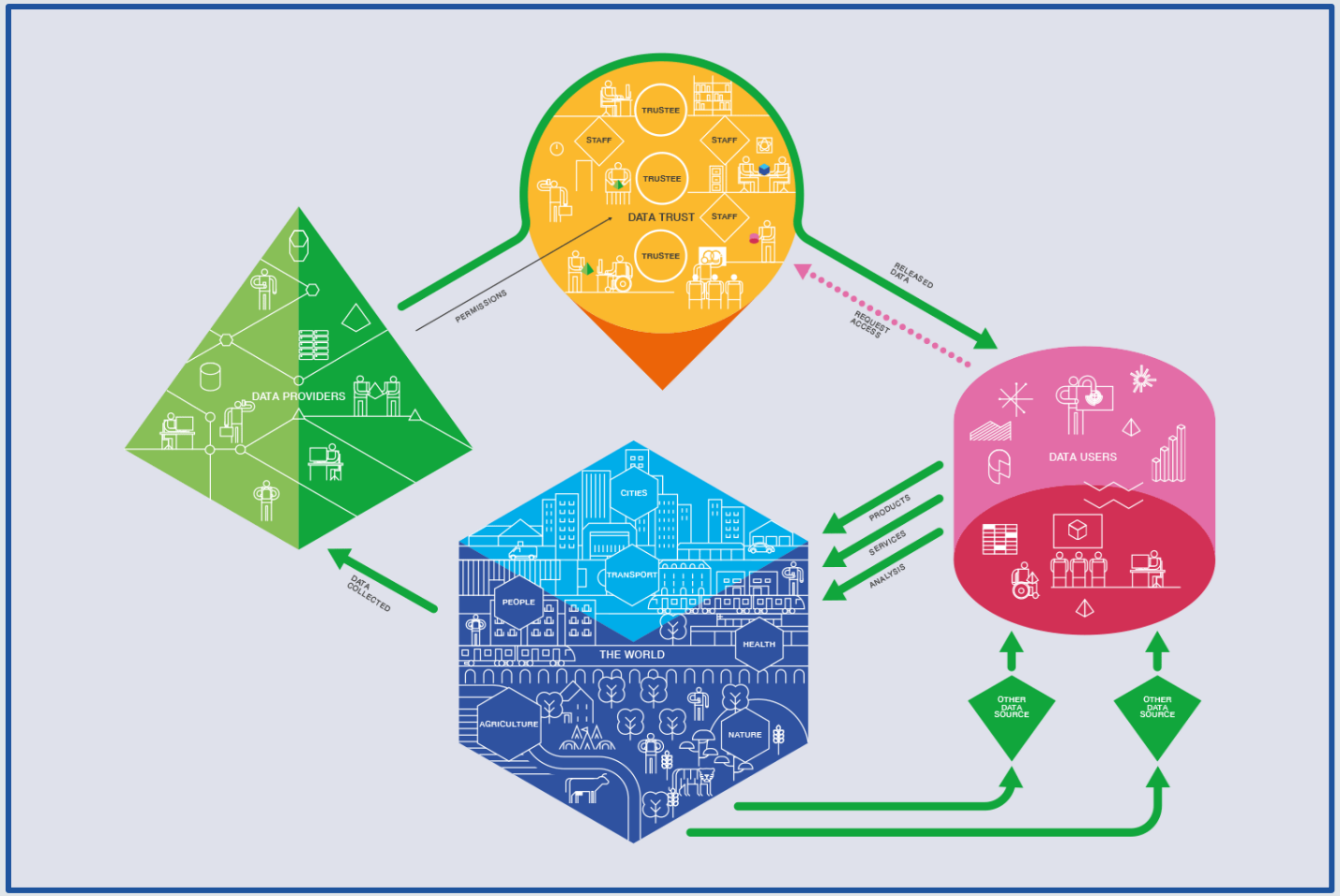
Data Institutions

Organisations whose purpose involves **stewarding data on behalf of others** to create economic and social value

- **hold data on behalf of an organisation or person**, or group of them, and share it with some of those who want to use it
- **combine or link data from different sources** and provide insights and other services back to those that have contributed data
- **maintain common data infrastructure** for a sector or domain, such as by registering identifiers or publishing open standards



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“The emergence of the latest generative AI, LLMs (large language models) and FMs (foundation models) – indeed all of modern machine learning – depends on vast amounts of data. Without data, there would be no AI.”

Sir Nigel Shadbolt

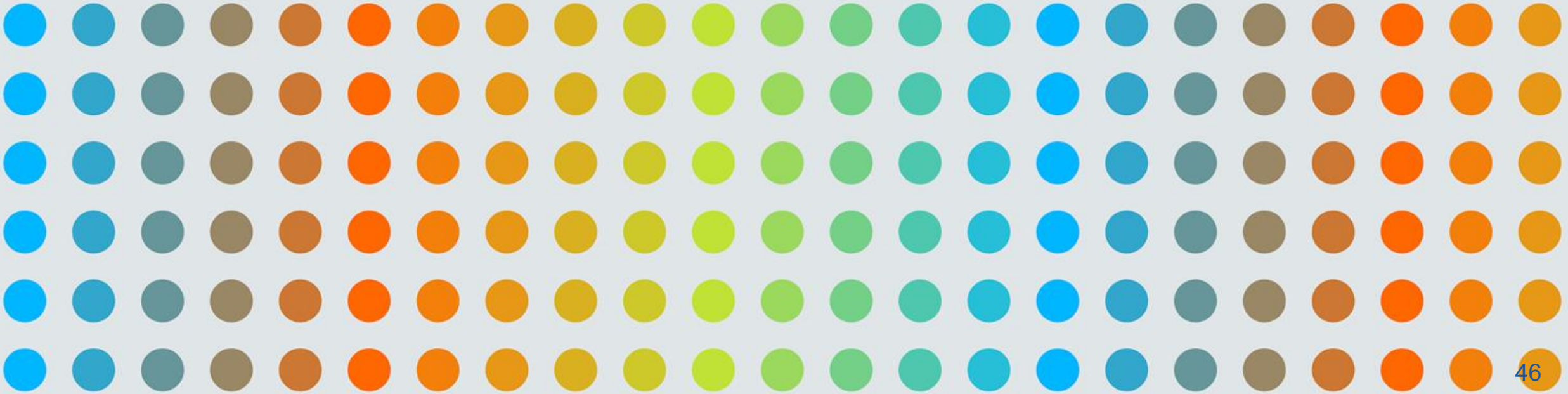
Sir Nigel Shadbolt

Executive Chair and Co-founder of the ODI

Thank you!

Using open data for genuinely interesting research projects - my experience

Neil Majithia
25-10-2024

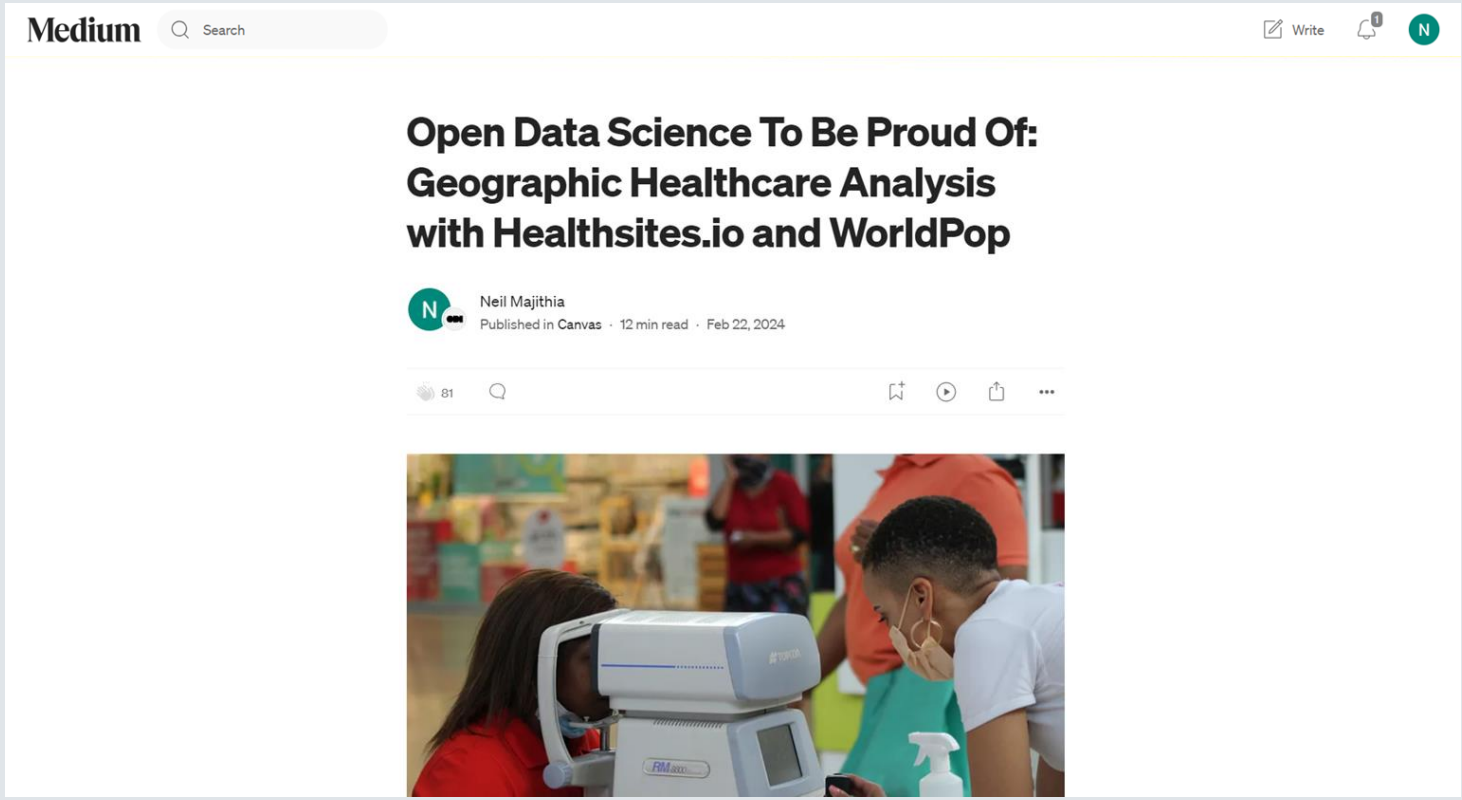


Contents

Context

- This presentation is based on an article I wrote for the ODI's Medium page, Canvas
- I'm a researcher at the ODI with an all-round skillset, but my background is more in quantitative and computational methods
- All of this research was done in Python using relatively basic libraries, albeit not commonly used in data science
- This research is actually ongoing, so any feedback is appreciated

Right: The Medium piece I wrote, accessible at



Motivations

1. I was tired of my research portfolio looking dry
2. But, generally speaking, this was because the open data sources I was using for my projects were dry in the first place
3. I wanted to change things, and do something interesting with interesting open data

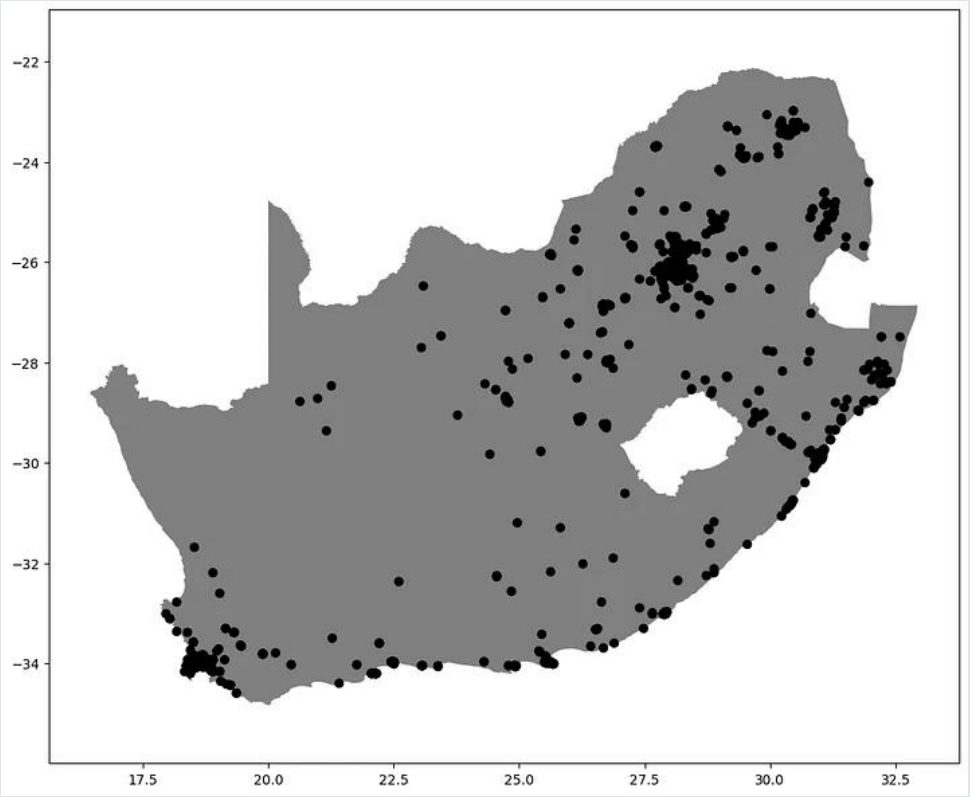
	CRIM	ZN	INDUS	CHAS	NOX	RM	AGE	DIS	RAD	TAX	PTRATIO	B	LSTAT
0	0.00632	18.0	2.31	0.0	0.538	6.575	65.2	4.0900	1.0	296.0	15.3	396.90	4.98
1	0.02731	0.0	7.07	0.0	0.469	6.421	78.9	4.9671	2.0	242.0	17.8	396.90	9.14
2	0.02729	0.0	7.07	0.0	0.469	7.185	61.1	4.9671	2.0	242.0	17.8	392.83	4.03
3	0.03237	0.0	2.18	0.0	0.458	6.998	45.8	6.0622	3.0	222.0	18.7	394.63	2.94
4	0.06905	0.0	2.18	0.0	0.458	7.147	54.2	6.0622	3.0	222.0	18.7	396.90	5.33
5	0.02985	0.0	2.18	0.0	0.458	6.430	58.7	6.0622	3.0	222.0	18.7	394.12	5.21
6	0.08829	12.5	7.87	0.0	0.524	6.012	66.6	5.5605	5.0	311.0	15.2	395.60	12.43
7	0.14455	12.5	7.87	0.0	0.524	6.172	96.1	5.9505	5.0	311.0	15.2	396.90	19.15
8	0.21124	12.5	7.87	0.0	0.524	5.631	100.0	6.0821	5.0	311.0	15.2	386.63	29.93
9	0.17004	12.5	7.87	0.0	0.524	6.004	85.9	6.5921	5.0	311.0	15.2	386.71	17.10

Part 1 - finding interesting data; healthsites.io

- I used to work with a professor of Catastrophe Risk and Disaster Reduction, and under another who worked in digital public health
- So I decided to look for data in the humanitarian sector - using the UN Humanitarian Data Exchange
- Here, I found healthsites.io
  - Healthsites.io is the result of the Global Healthsites Mapping Project, which is a participatory program aiming to put every hospital, clinic, or other medical site onto a global map
  - The resulting dataset is a list of all health sites everywhere, with some added information about them
  - On the right here is the dataset for South Africa

HDX
Humanitarian
Data Exchange

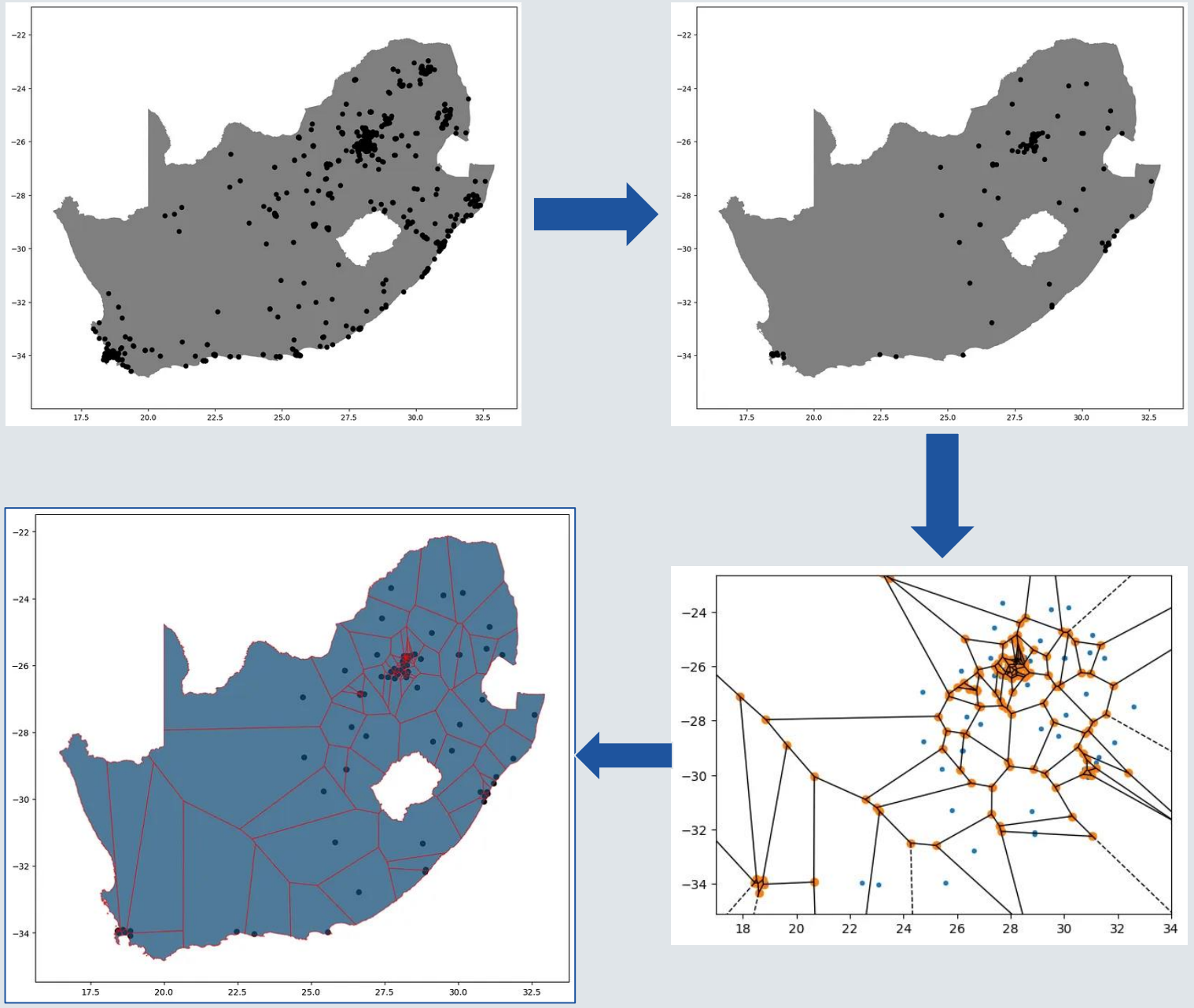
healthsites.io



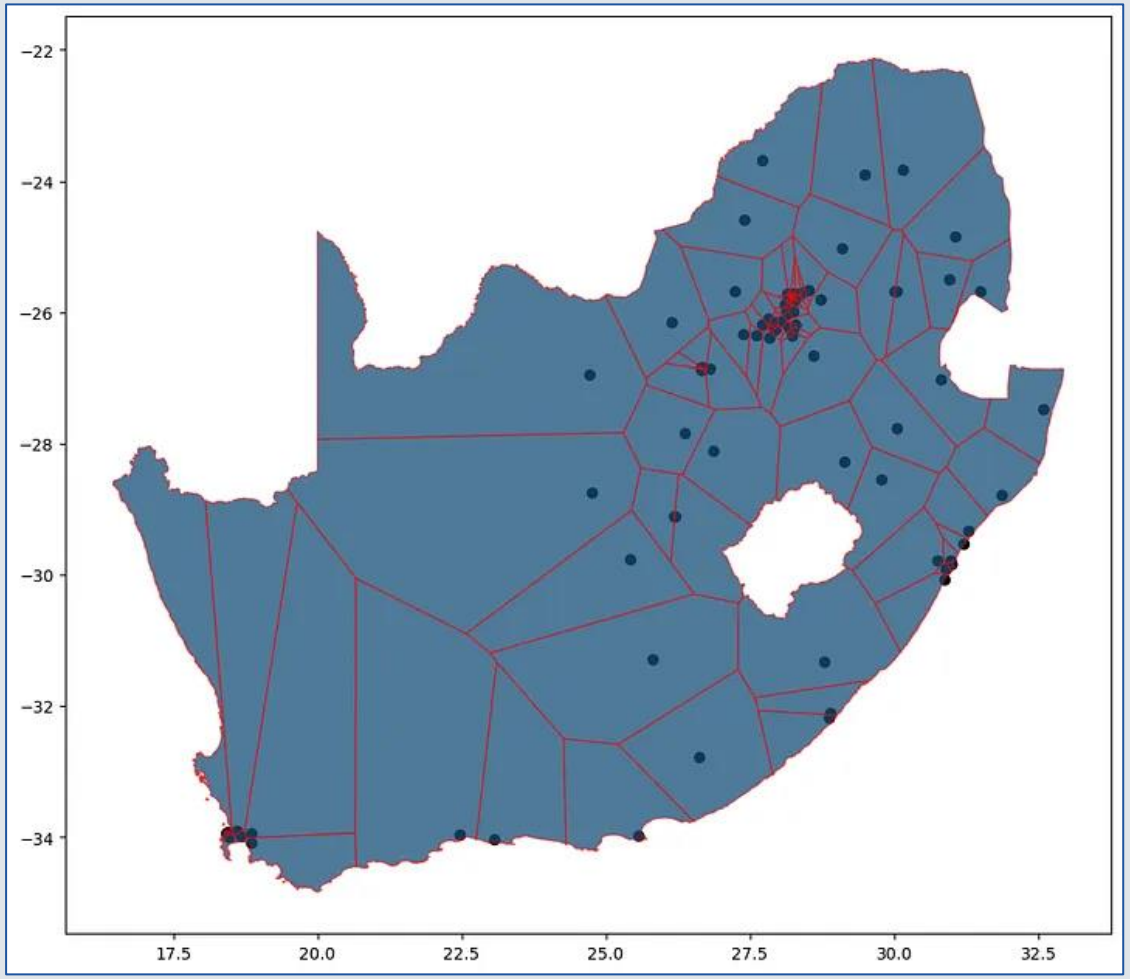
Part 2 - finding something interesting to do with the data

- A long time ago, I studied network science, which is an entire field of study dedicated to points on a map
- I could use Dijkstra's algorithm to find the most efficient paths for suppliers or blood bikers to take between hospitals
- Or I could do some cluster analysis to build an analysis of healthcare coverage

- But I decided to perform Voronoi tessellation, using the healthsites locations to create 'Voronoi regions' on the map which indicated the geographical 'catchment area' of each hospital in South Africa

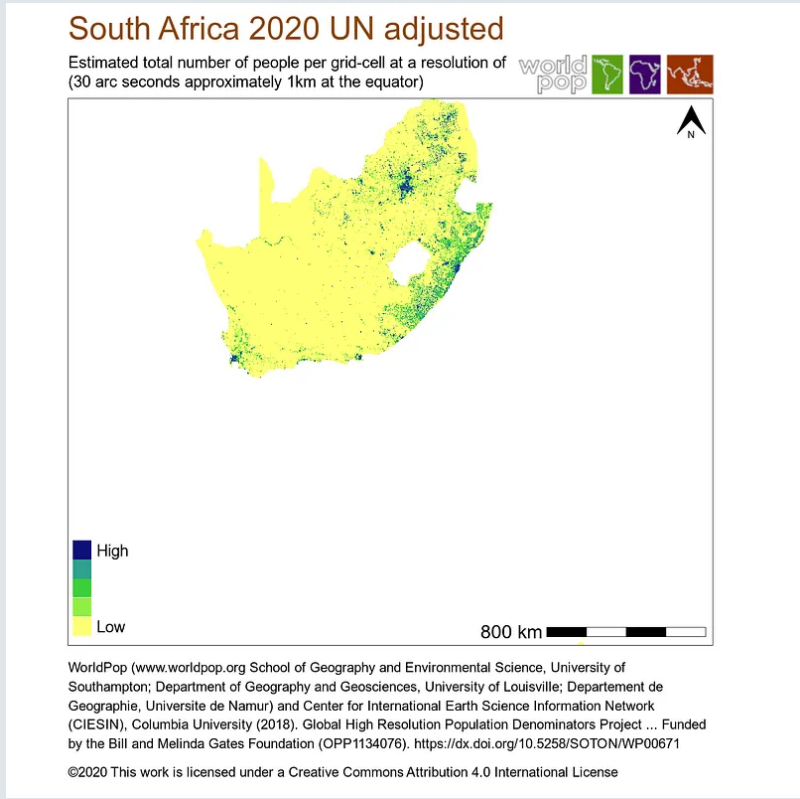


But really, is this interesting?



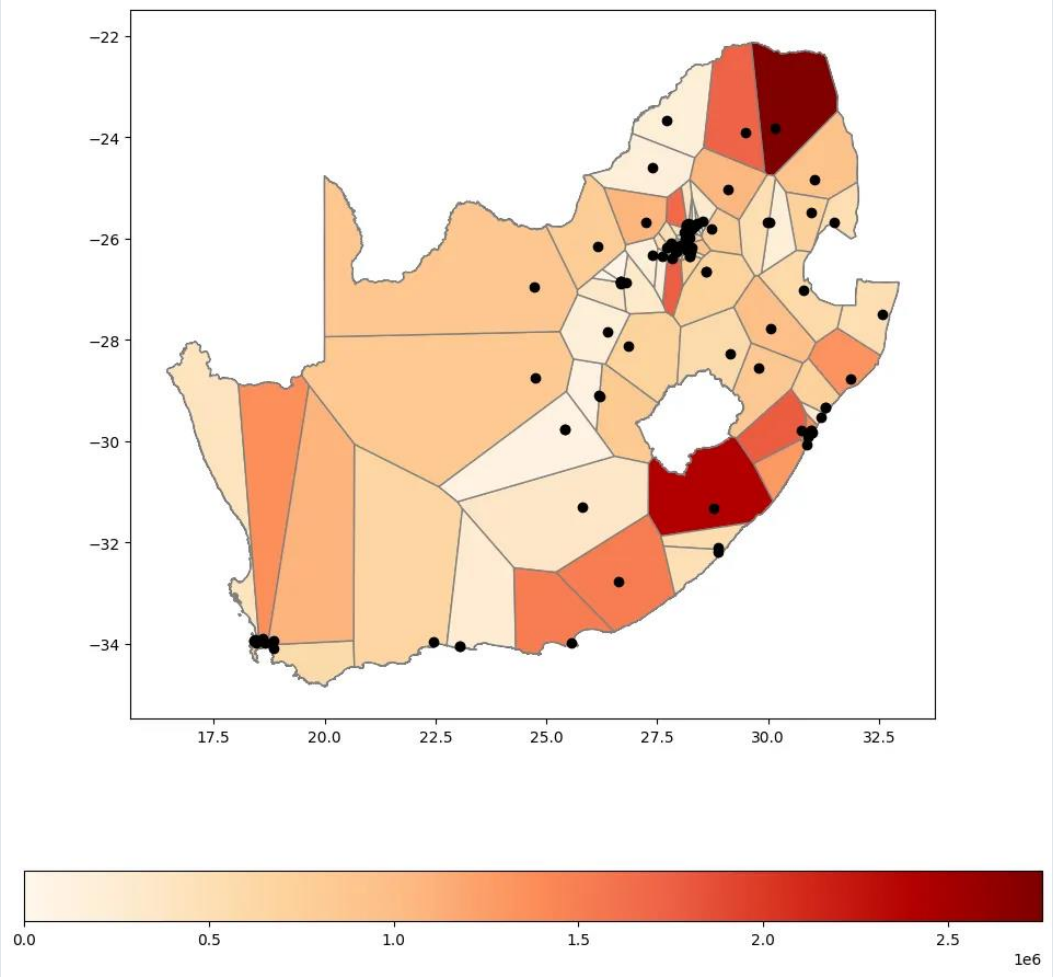
Part 3 - finding interesting data for linkage; WorldPop

- I went back to the Humanitarian Data Exchange, looking to find geospatial datasets that could enhance my Voronoi tessellation by making the polygons mean more
- Now, I found Worldpop
  - The WorldPop project's mission is to collect high spatial resolution data on human population distributions using censuses and satellite imagery.
  - A main output is gridded population estimates, which are datasets that split a country into 1km x 1km squares (or 100m x 100m) and provide the estimated population within each square.
  - On the right here is the dataset for South Africa



Part 4 - linkage and results

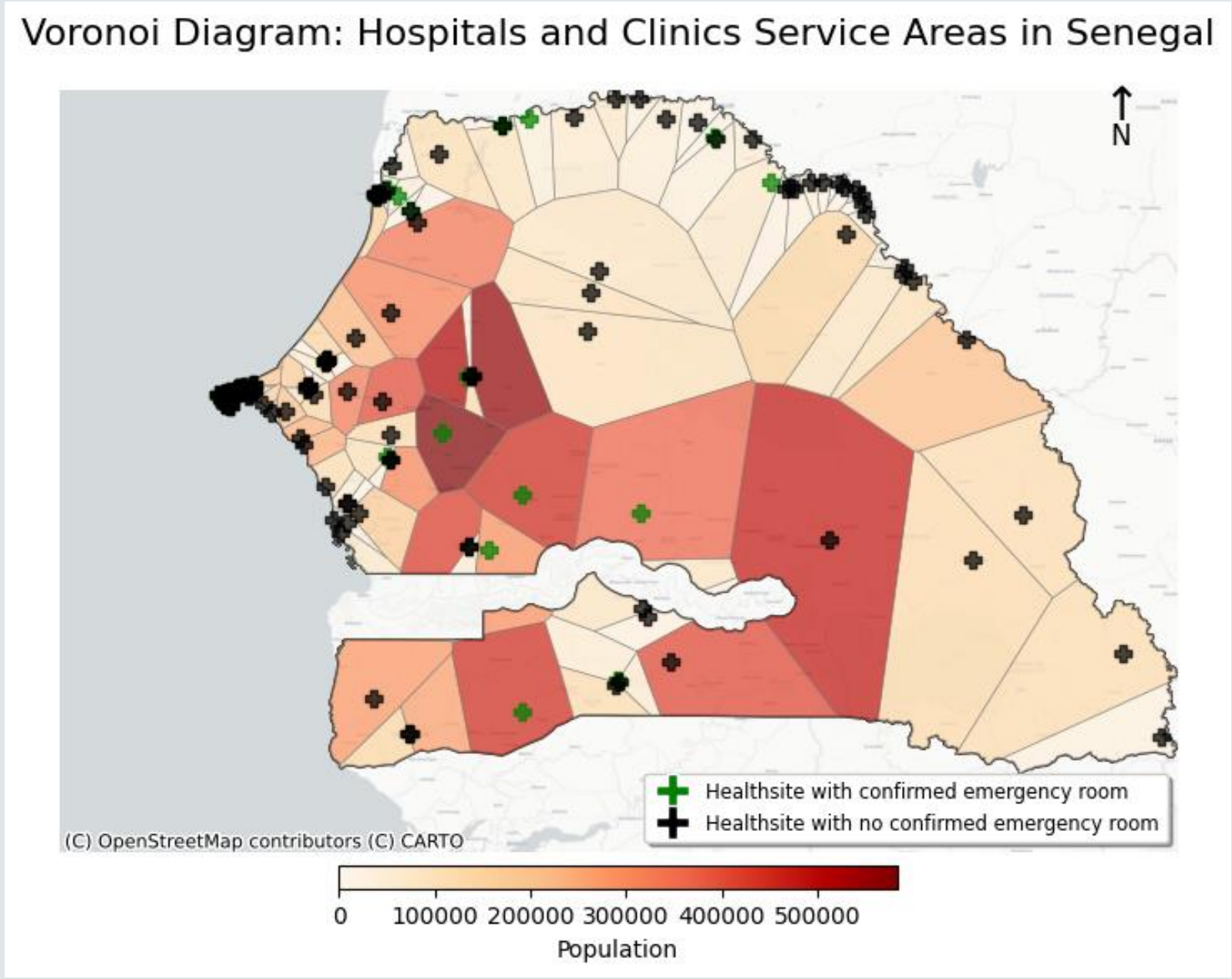
- I could use Worldpop to have an understanding of the population within each Voronoi region
- That is to say that my diagram now provides insight on **both the geographical area a hospital has to serve as well as the population burden it has**
- So analysing the diagram will provide insights on the effectiveness of healthcare planning in a subject country



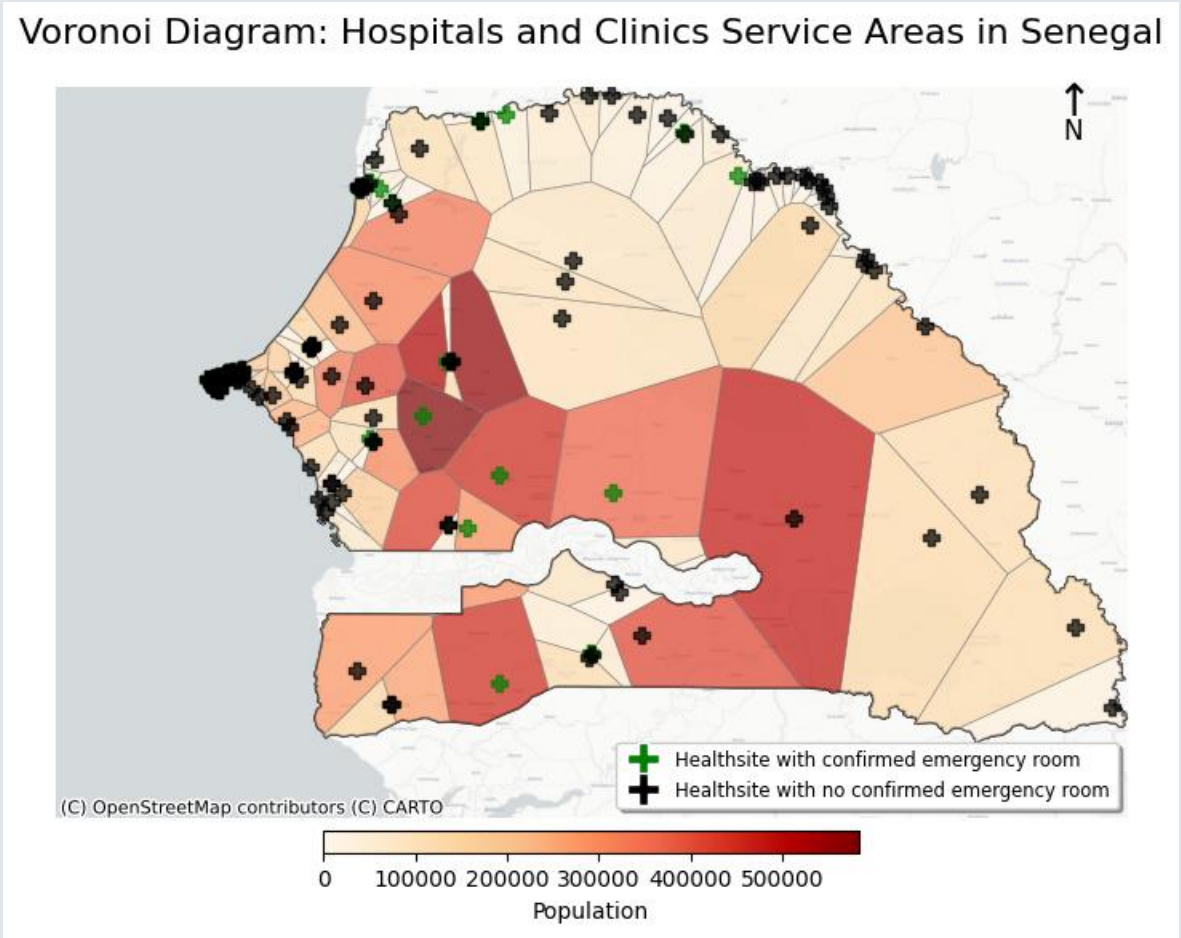
Insights and Outcomes

Final results - with Senegal

- I’m working with the creator of healthsites.io to build an implementation of this methodology for Senegal
- This is to be put in front of the Ministry of Health there, and has already been seen by the World Bank transport team, whose findings line up with findings here
- Note that healthcare planning is very good in the north of the country, in the St. Louis region, but on the inner, sub-Saharan part, hospitals are few and far between
- Improving access to these health sites and reducing their burden is therefore mandatory, especially given climate change causing increased incidence of Malaria and other disease



Open data enabled me to do some genuinely interesting and impactful research



How might you do the same?

1. Use open data portals like data.europa and HDX to **find interesting open data**
2. Then look at the fields of study you enjoy, examine the things you feel are most important, talk to friends and colleagues, to find **something interesting to do with it**

Thank you!

UNIVERSITY OF THE AEGEAN

ODECO

Open Data for Research & Research for Open Data

Maria Ioanna Maratsi

Mohsan Ali

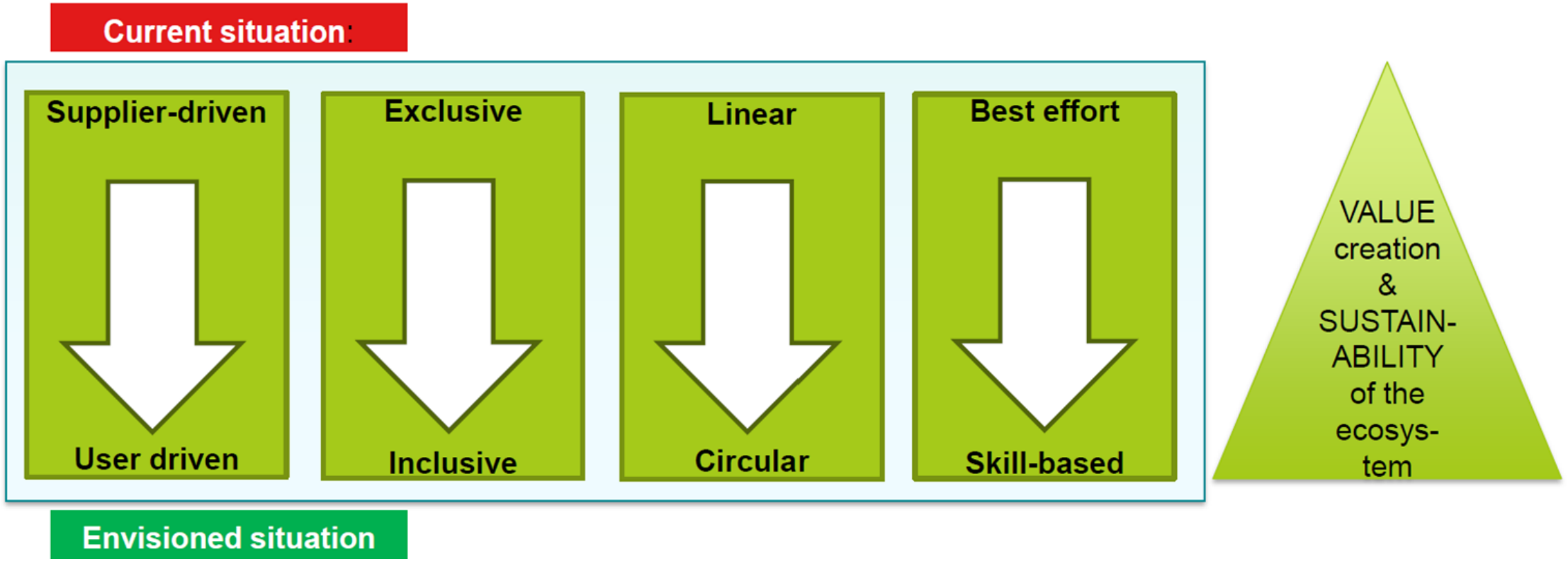
University of the Aegean, Greece

25-10-2024

This project has received funding from the European Union's Horizon 2020 research and innovation programme under the Marie Skłodowska-Curie grant agreement No 955569.

ODECO: Towards a Sustainable OD Ecosystem

- 4-year H2020-MSCA-ITN-2020 project: https://odeco-research.eu
- **Vision:** Address current and future challenges in the creation of **user driven**, **circular** and **inclusive** open data ecosystem



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Denmark

Italy

France

Netherlands

Greece

UNIVERSITY OF THE AEGEAN

Belgium

Spain

Universidad Zaragoza

Greece

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ODECO Network - Partners

ODECO

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ODECO Research Projects

These topics are the focus of 15 PhDs in ODECO

- Strategies for building data capacity
- NGOs and usability of open government data
- OD value assessment and re-distribution
- Open data intermediaries' perspective
- Open Data algorithm and intelligence
- User interface design: optimising findability
- Maximising availability and use of local open data
- Technical aspects for inclusiveness in data portals
- Open Data Usage in Elementary Schools
- Open data journalist perspective
- Open Licensing of Non-Government Data
- OD ecosystem: government as a user perspective
- Co-creation of public services

- Technical interoperability in the OD ecosystem
- Interdomain semantic interoperability

ODECO

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Open Data

- Open data is data freely available to use, reuse, and distribute.
- Various sources of open data (OGD, geospatial data, citizen-contributed data, Scientific NGOs, International Organizations, etc.).

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Open Data for Scientific Research

Open Data for Research ⇔ Research for Open Data

Research for Open Data ⇔ Open Knowledge for Research

- Interoperable and Findable data
- Publish and Use of Data (community-driven. Dual role of data user and provider).

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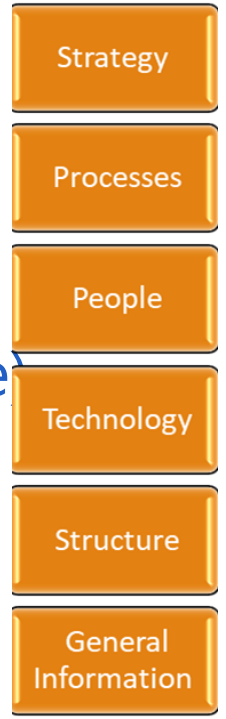
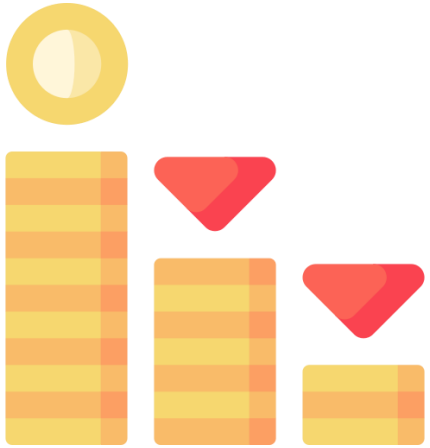
Open Data for Research (1) - Case

Case-study: Greek Economic crisis (2009-2014) and Open Data

- Greek statistical Authority collected data from firms during Economic crisis
- Released OD on request (Under specific terms and use





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Open Data for Research (2) - Case

- In market-based economies often appear significant decreases of economic activity, which lead to recessionary economic crises.

- Economic crises have negative consequences for firms, as they lead to significant decrease of sales revenues:
- Firms respond by **decreasing**:
  - their production, general operational activities and expenses, personnel employment and materials' procurement, and
  - their investments in production equipment, **digital technologies**, etc., which leads to technological obsolescence.

- The reduction of investments, (especially in **digital technologies)** can have negative impact on their future competitiveness.

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Open Data for Research (3) - Case

- These negative consequences differ significantly among firms:
  - Some exhibit a **lower vulnerability** to the crisis, so they have fewer negative consequences,
  - Other firms exhibit a **higher vulnerability**, and have more negative consequences;
  - The competitive position of the former is significantly strengthened with respect to the latter, and finally the former are the **'winners'** of the crisis, while the latter are the **'losers'.**

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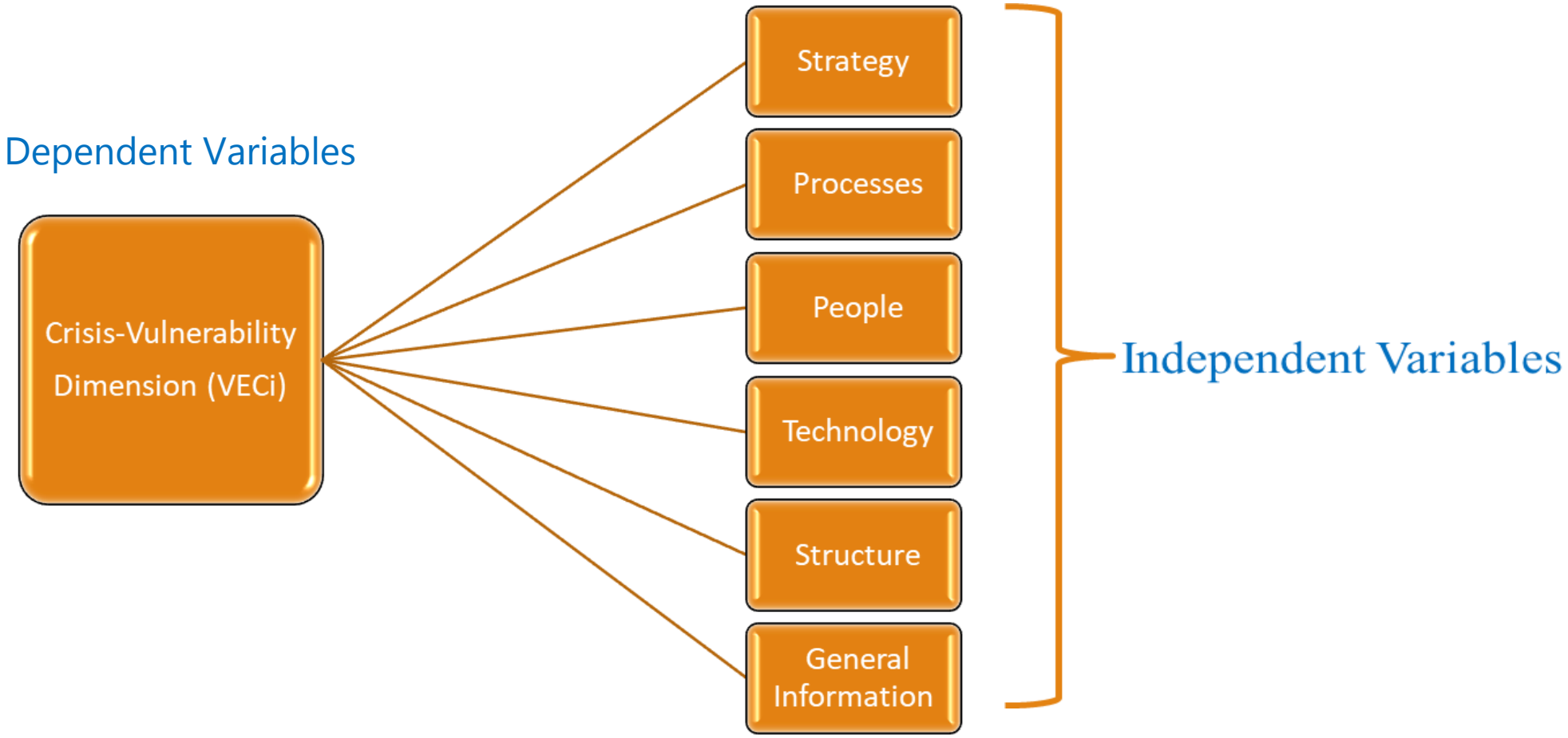
Open Data for Research (4) - Case



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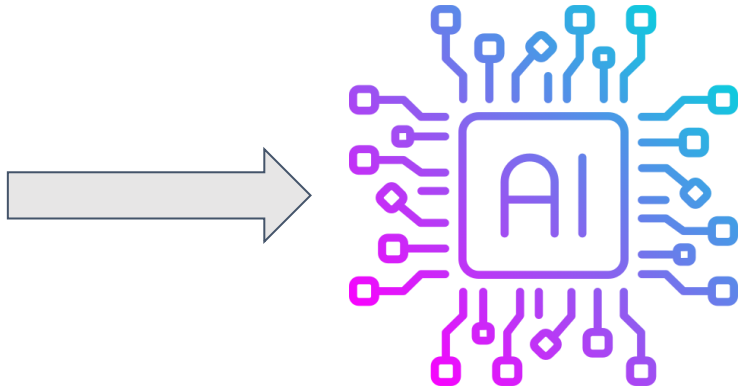
Open Data for Research (5) - Case

- Strategy
- Processes
- People
- Technology
- Structure
- General Information



Supervised and Unsupervised ML

Dimension of Digital Crisis Vulnerability

Five of them concerned digital investment: reduction of the

- Total hard investment
- Total soft ICT investment
- ICT software
- ICT training of staff
- and ICT consulting

Four of them Digital operating expenses: degree of reduction

- Total ICT operating expenses ((for ICT personnel and ICT services)
- ICT staff expenses
- ICT outsourcing expenses
- Cloud computing services' expenses

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Conclusions

- Implications for research and practice, mainly to 2 research streams:
  - The growing research stream concerning the use of AI in government, by developing a novel approach for a highly beneficial use of AI/ML for support and enhancement of government critical activity.
  - The OGD research stream, by providing an approach for increasing the economic/social value generation from OGD through advanced AI/ML.

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The Role of Good Research Data Management

- **Good research data management** is essential for research collaborations. ***[ERUA, 2024]***
- Research data should be published to encourage collaboration among varying scientific domains, while re-using existing research data.
- **Data Re-use:** research data discoverability identified as a big issue. ***[ERUA, 2024]*** Several researchers not aware of the advantages of reusing existing data.
- All universities should work on conveying the benefits and possibilities of sharing research data. The value of sharing and re-using research data needs to be made clearer.

Open science practices become pivotal.

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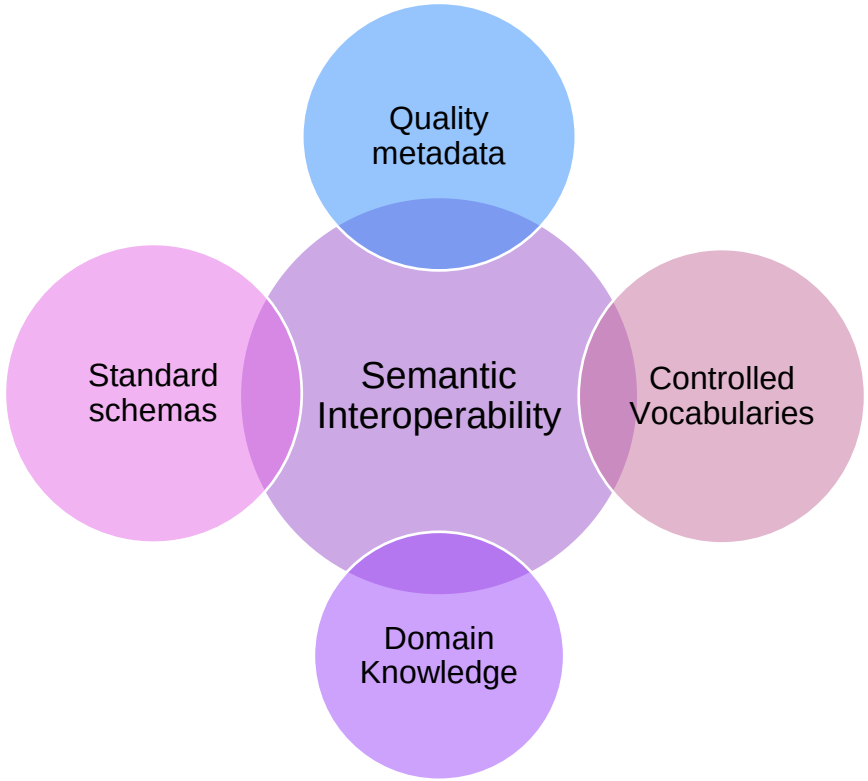
Semantically Interoperable and Linked Data

"Semantically interoperable schemas allow information to be automatically exchanged by sharing common meanings through the use of universally accepted standards."

Key aspects of semantic interoperability:

- Standard schemas
- Domain-specific knowledge representation
- Controlled Vocabularies
- Good metadata



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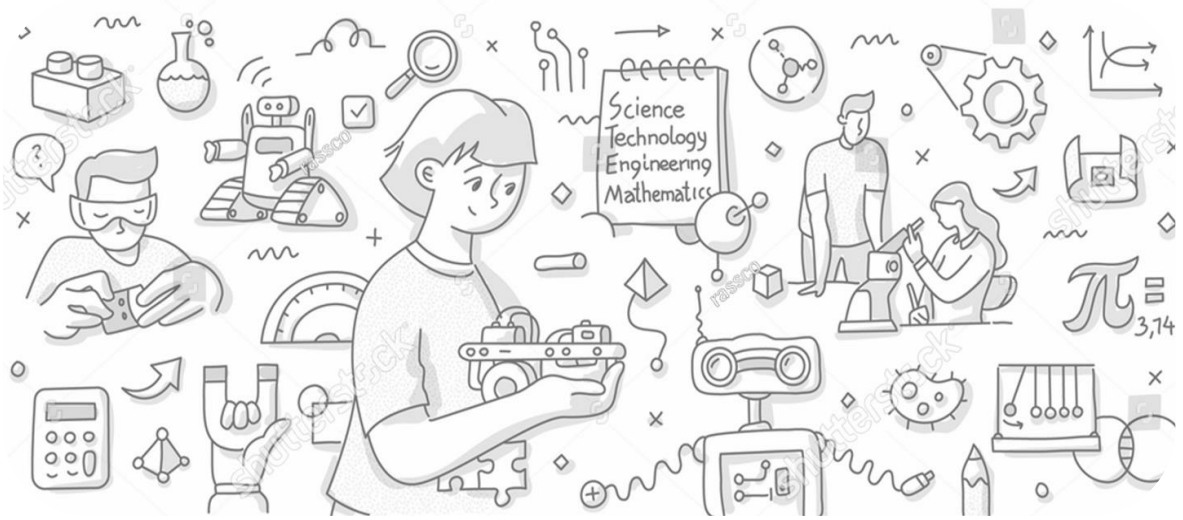
Linked Sources for Scientific Data Discovery

- Linked data important for semantic search capabilities within large data collections.

- A lot of scientific research remains undiscovered due to poor linking to its respective scientific domain.

Research articles can be retrieved by keyword searches of the respective domain; difficult when:

i) Domain not explicitly mentioned in the article's metadata
ii) Multidisciplinary research
iii) Use of shared scientific methodological tools of more than one domain.



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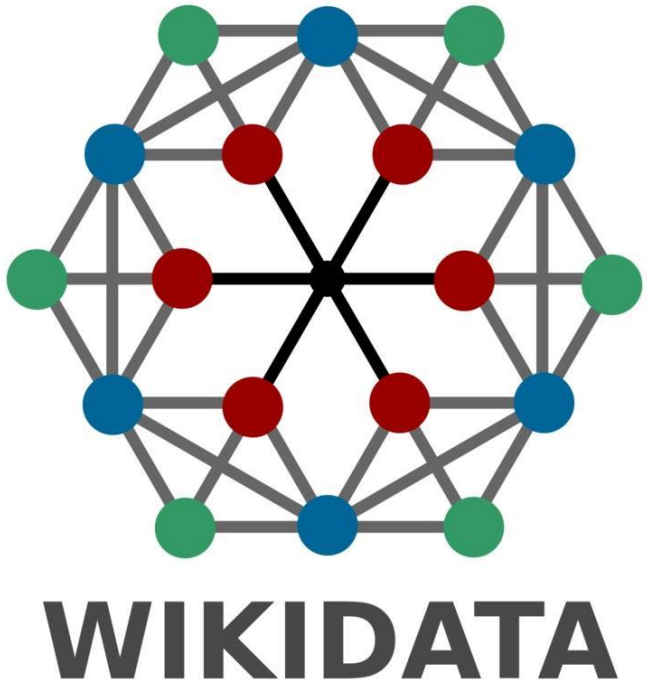
Case: Scientific Data Discovery on Wikidata



- Experiment with the Greek Open Technologies Alliance (GFOSS)
- Employing ChatGPT and GPT-4, on how to facilitate the process of identifying and enriching data relationships to make scientific data discoverable.

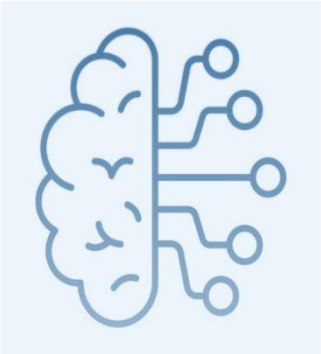
An initial analysis revealed several issues:

- Inability to retrieve all (or most) relevant results using only simple SPARQL queries.
- Scholarly publications contain knowledge not captured sufficiently by the existing Wikidata codes.
- The search was made more difficult due to the lack of intermediate and semantically meaningful Wikidata codes.

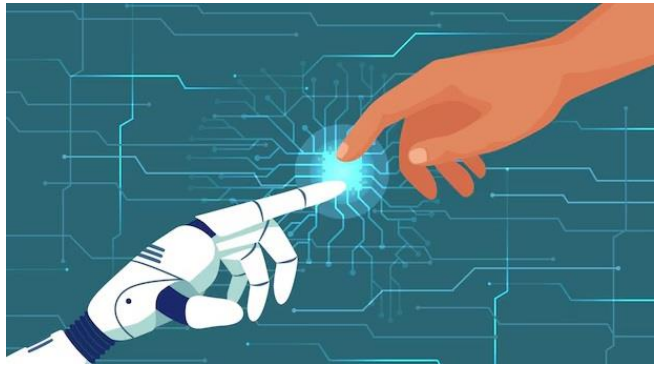
Technology for Linked Knowledge and Open Science (1)

How can Large Language Models facilitate the process of linking knowledge?

- How to improve open data provision and enhance open data repositories? How can scientific data become easier to find (discoverable) and have higher semantic value?
- A proposed technologically-facilitated methodology taking the best of machine intelligence and human expertise to improve knowledge linking in open data repositories.



The future of semantics?



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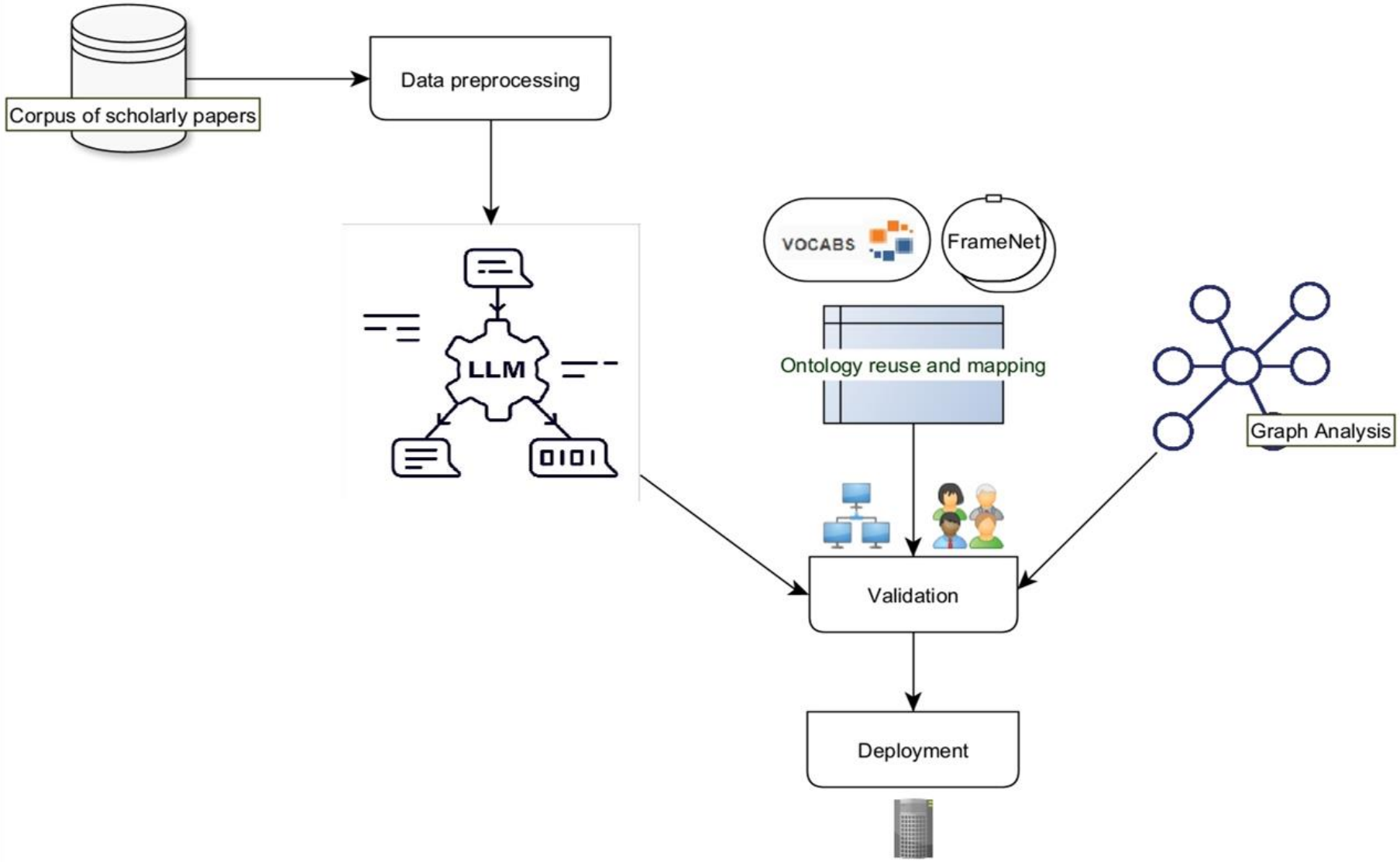
Technology for Linked Knowledge and Open Science (2)



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Conclusions

- Findable scientific information improved conceptual and hierarchical structure of represented knowledge.

- Improve retrievability of available scientific work, independent of discipline, allowing for cross-domain discoverability and the identification of common areas and linking points of different scientific disciplines.

- Interlinked knowledge sources are essential for the promotion of social development, scientific research, and innovation.

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Questions?

mohsan@aegean.gr

ioanna.m@aegean.gr

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Q&A

Flora Kopelou
Data.europa.eu Publications Office of the EU

Jim Rovekamp,
Senior Consultant Data Strategy, Capgemini Invent

Calum Inverarity
Senior researcher, Open Data Institute

Neil Majithia
Researcher, Open Data Institute

Maria Ioanna Maratsi
PhD Researcher, University of the Aegean

Mohsan Ali
PhD Researcher, University of the Aegean

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Thank you!