

Unlocking the Power of Big Data to Inform Labour Market and Education Policies

Skills, qualifications and labour market information: innovative data and methods.

Mauro Pelucchi
Head of Global Data Science
Lightcast

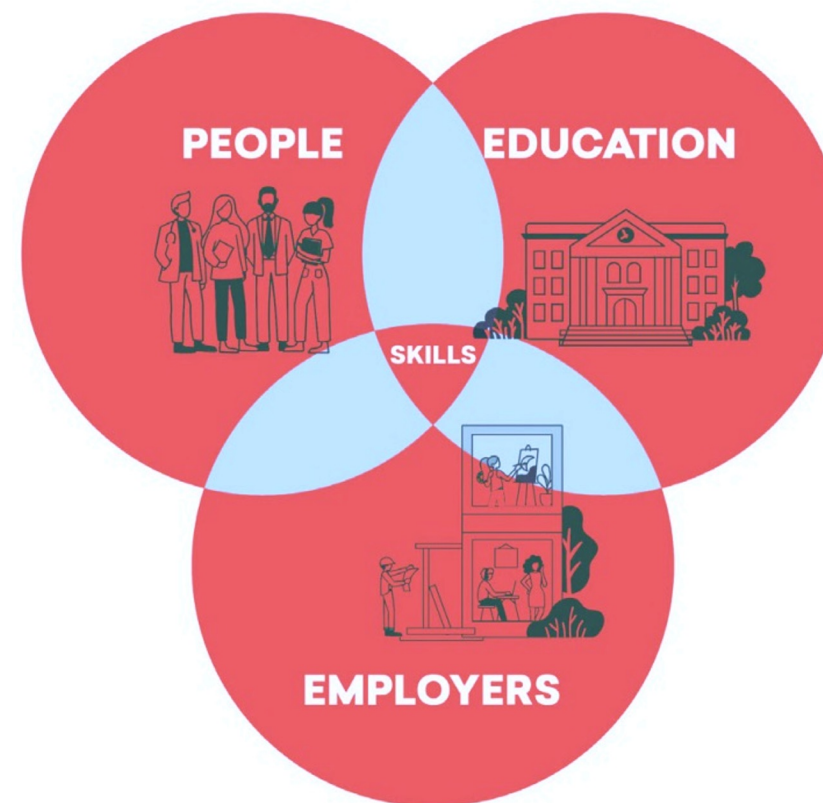


Session 13
ACQF Training week 5-9 September 2022

Lightcast!



Our mission is to use labour market and skills data to inform and connect people, education, and employers, within the context of regional economies.





Topics

- What is Labour Market Intelligence?
- New sources, why?
- Big data for LMI
- Methodology
- Results from real projects and examples



Q: Do You Know the Emerging Skills In Your Labor Market?



Q: Do You Know Your Local *Skill* Gaps and What To Do About Them?





Continuously evolving Labour Market

Context

Digitalization of professions

Relevance of Soft skills

Internationalisation

New professions and skills emerging

Smart and Remote working

Impact of Covid-19 pandemic

Green transition





The changing world of work

A shared language between employers and job seekers:

- Employers post job openings with increasingly specific skill requirements to attract talent they need
- Job seekers create online profiles and resumes with increasingly skill descriptions to market themselves to potential employers

We're in a **skill-based** economy



What is a skill?

- Anything that defines or describes someone's knowledge and experience
 - Hard Skills
 - Soft (or Essential) Skills
 - Certifications





Human + Skills
For The Future of Work

ROB T-R ADY
R OT-READ
R BOT-R ADY
RO OT-RE DY
OB T- EA
ROB T-REA Y
R BO -READY
RO OT-READY
OBO EADY
R BOT- A Y
ROBOT-READY
OB T-REA Y
ROB T-READ
R BOT- ADY
RO O -R

 Strada Institute
FOR THE FUTURE OF WORK +  Emsi

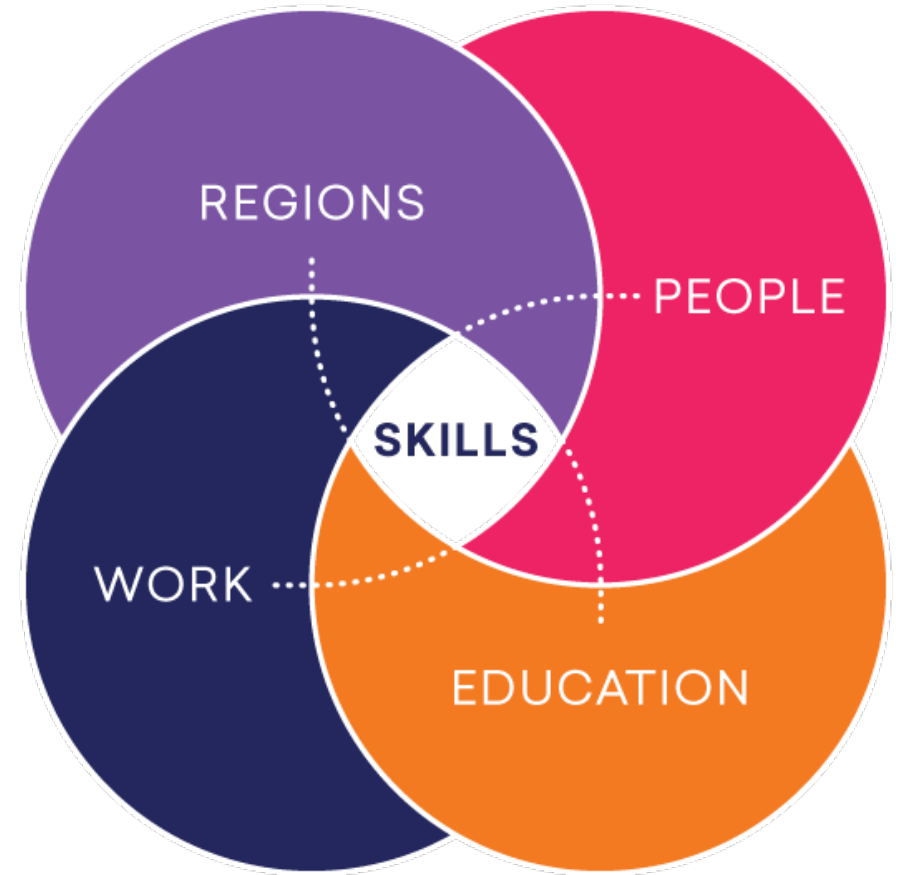
“The skills needed now and for the future combine the technical with the human:

**Programming + ethics
AI + emotional intelligence
Logic + values or judgment**


While employers are scrambling for this new talent, postsecondary education is falling behind.”

Why Skills?

- Common language
- Equity
- Agile and precise
- Better understand talent supply & demand regionally
- Market & match talent to companies



New questions



is santa claus real?

ALL

VIDEOS

IMAGES

NEWS

MAPS

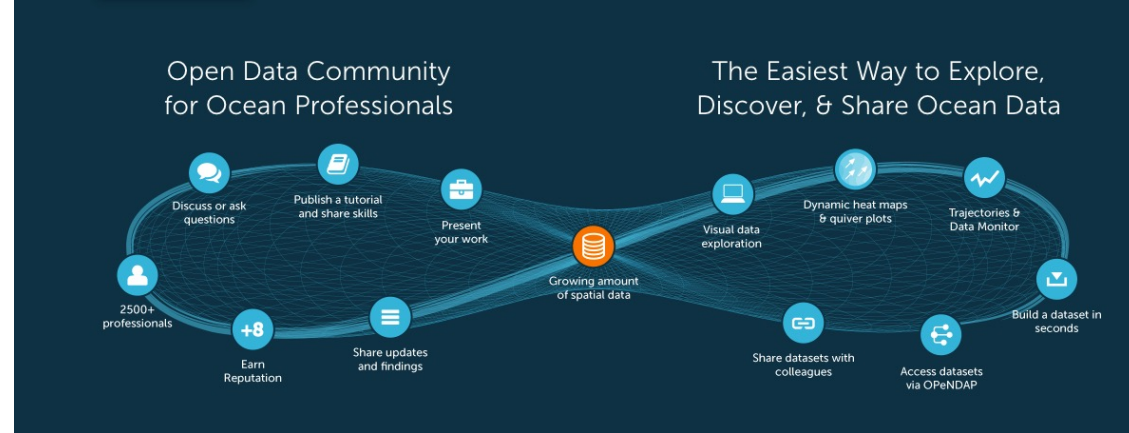
“It is time to make everyone believe in **Santa Claus**, as Father Christmas is in fact a **real** person, but he doesn't reside in the North Pole – he lives on Long Island. Mr. **Claus**, who was born Frank, legally changed his name to **Santa Claus** over 20 years ago and his wife of 23 years is perfectly fine with it.” Dec 22, 2015

Santa Claus Is Real and He Lives on Long Island - Inside Edition

[Inside Edition](#) › [headlines](#) › [13751-santa-...](#)

[About this result](#) • [Feedback](#)

New sources



New questions? We need new sources...

- Official statistics are representative and robust, but can lack detail and timeliness
- They don't give us the detailed picture, we need:
 - More frequently updated - to track what's happening now (e.g. Covid-19 Impact analysis)
 - More granular and adherent to real and current market terms - capture emerging trends analyzing what companies are actually looking for

The solution?

**Using data derived from online job
postings**

While structural data define skills related to job titles and occupations, skill shapes define roles based on skills that cluster together as they evolve in the job market.

Taxonomic Approach

Related by category

19-0000 Life, Physical, and Social Science Occupations

19-1000 Life Scientists

19-1011 Animal Scientists

19-1012 Food Scientists and Technologists

19-1013 Soil and Plant Scientists

19-1021 Biochemists and Biophysicists

19-1022 Microbiologists

19-1023 Zoologists and Wildlife Biologists

19-1029 Biological Scientists, All Other

19-2000 Physical Scientists

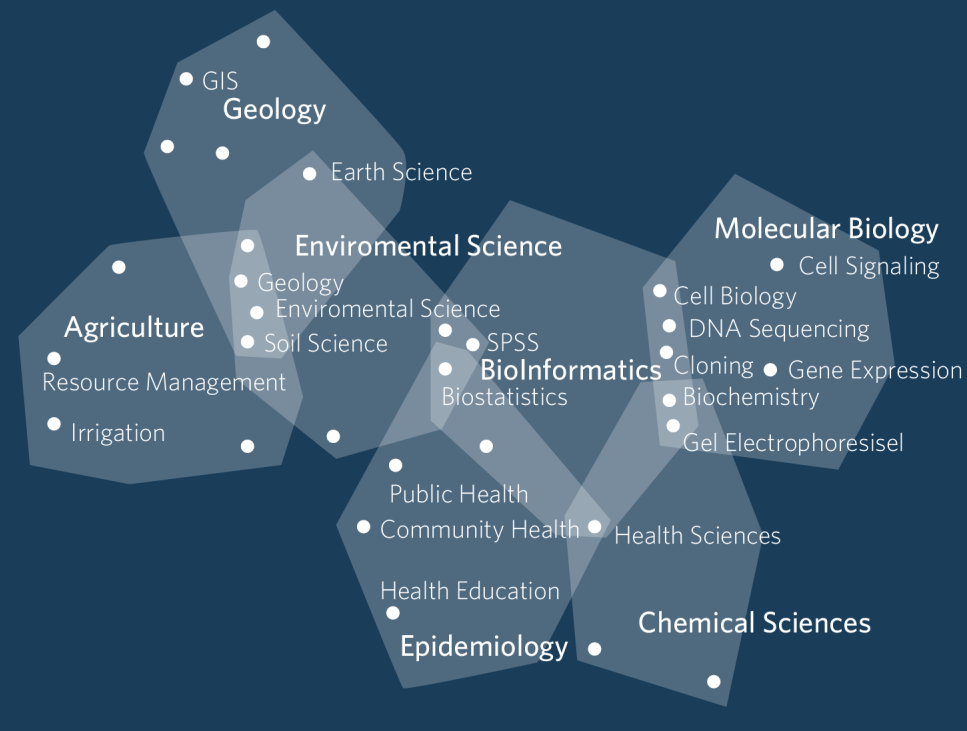
19-2011 Astronomers

19-2012 Physicists

19-2021 Atmospheric and Space Scientists

Skill Shape Approach

Categorized by relationship



Ukrainian Interpreter - Remote

Lingoland
London
Remote
£1,000 - £2,000 a month - Freelance

Apply now

Job details

Salary
£1,000 - £2,000 a month

Job type
Freelance

Benefits
Pulled from the full job description

- Flexitime
- Work from home

Full Job Description

We are hiring UKRAINIAN - ENGLISH INTERPRETERS!

We are looking for experienced interpreters who want to join an international company and be a great help to the community.

Do you have one year of experience working as an Interpreter/translator? Do you enjoy what you do? Would you like to be part of a dynamic team with solid possibilities of professional growth? While making extra cash in your spare time? If so, we want to hear from you!

Job Overview:

The Interpreter provides interpretation for Limited English Proficient (LEP) patients, their families, providers, and staff. The Interpreter advocates for LEP patients' access to the full range of health care services providing intercultural mediation to assist providers in delivering culturally sensitive patient care. A commitment to provide exceptional customer experience, patient privacy & safety, and teamwork spirit is required for this position.

Company Info

Follow

Get job updates from Lingoland

After you familiarize yourself with the following description of the position, you can click "Apply now" and send us your resume and certificate in PDF or Word files.

Job Type: Freelance
Salary: £1,000.00-£2,000.00 per month

Additional pay:

- Commission pay

Benefits:

- Flexitime
- Work from home

Schedule:

- Monday to Friday

Application deadline: 18/08/2022
Reference ID: UKR984

Hiring Insights

Hiring 5 candidates for this role

Job activity

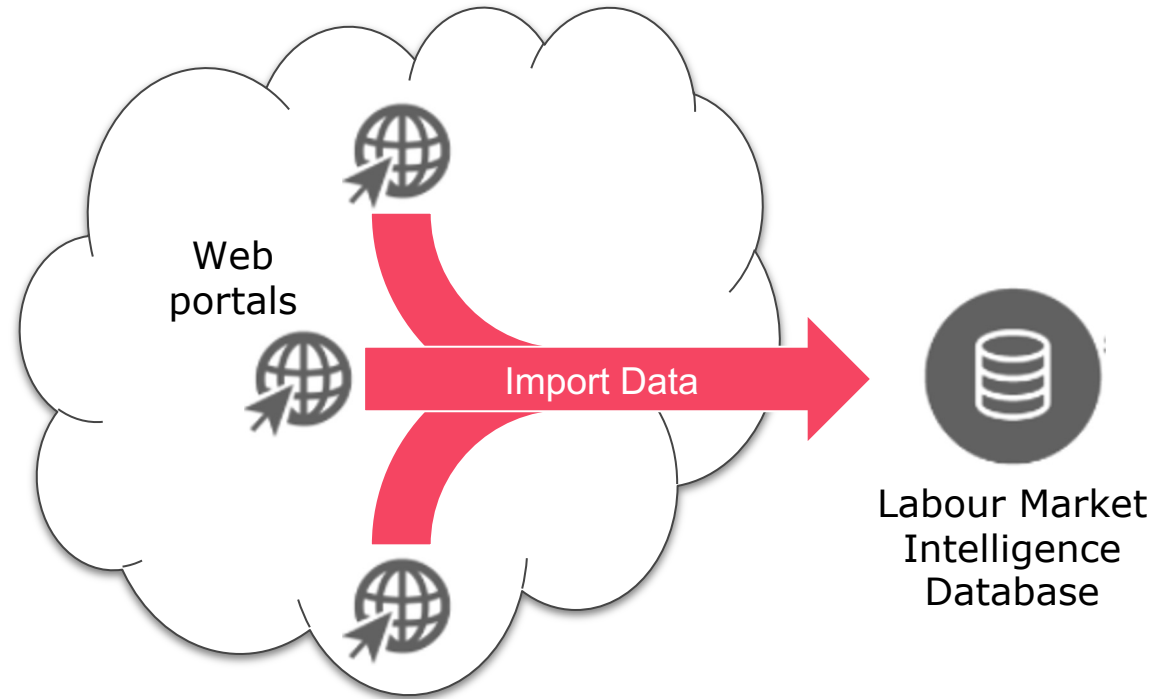
- Employer reviewed job 8 days ago
- |
- Posted 15 days ago

15 days ago



New source of data

Web Data ingestion is the process of obtaining and importing **data** from **web portals** and storing in a **database**



What is LMI

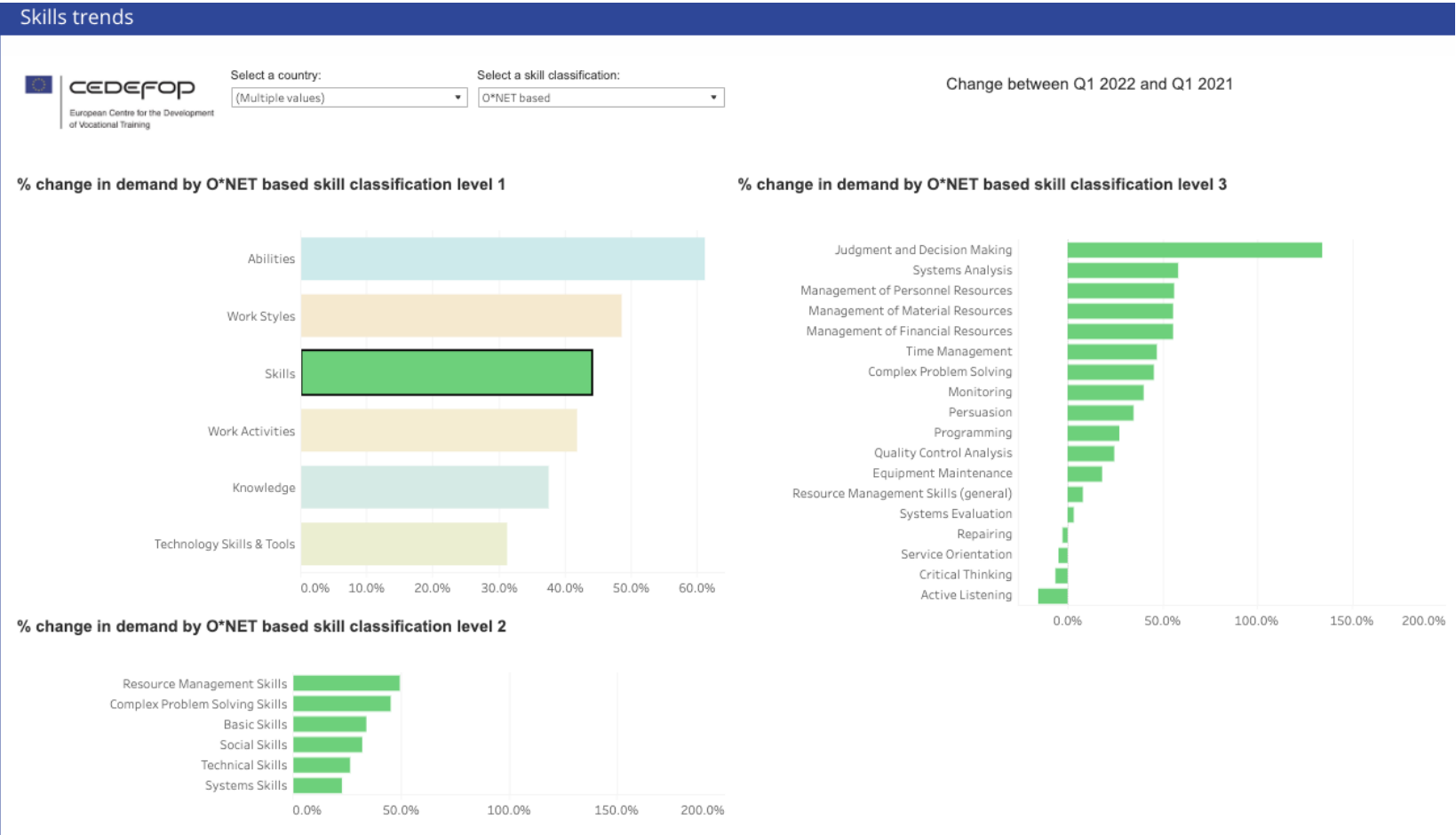
Labour Market Intelligence (LMI) is simply insight, information and intelligence about labour markets.

Information on:

- occupations
- industries
- educational levels for occupations
- workforce demographics

Giving your organisation the peace of mind that its decisions are being made on a basis of **solid evidence, rather than assumptions or guesswork**





Why Job Posting Labour Market data?

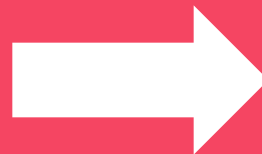
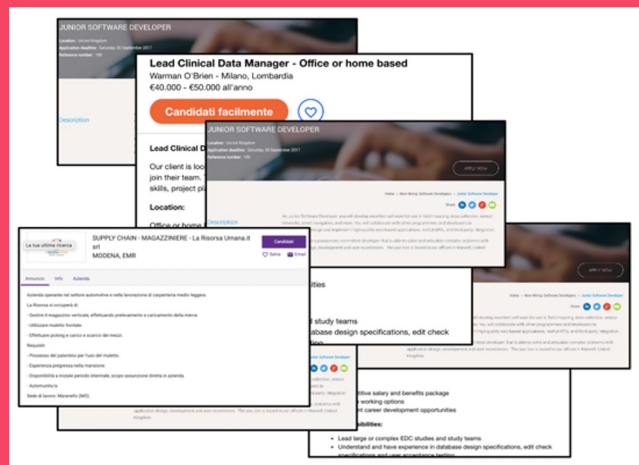
It's the exact representation of what companies are looking in a given period:

Up to date: companies publish an announcement when they actually need to hire

Detailed: an announcement describes as well as possible the specific need, in terms of:

- Occupation needed
- Requirements (skills, experience, educational level,...)
- Working context (place, contract, sector, working hours,...)

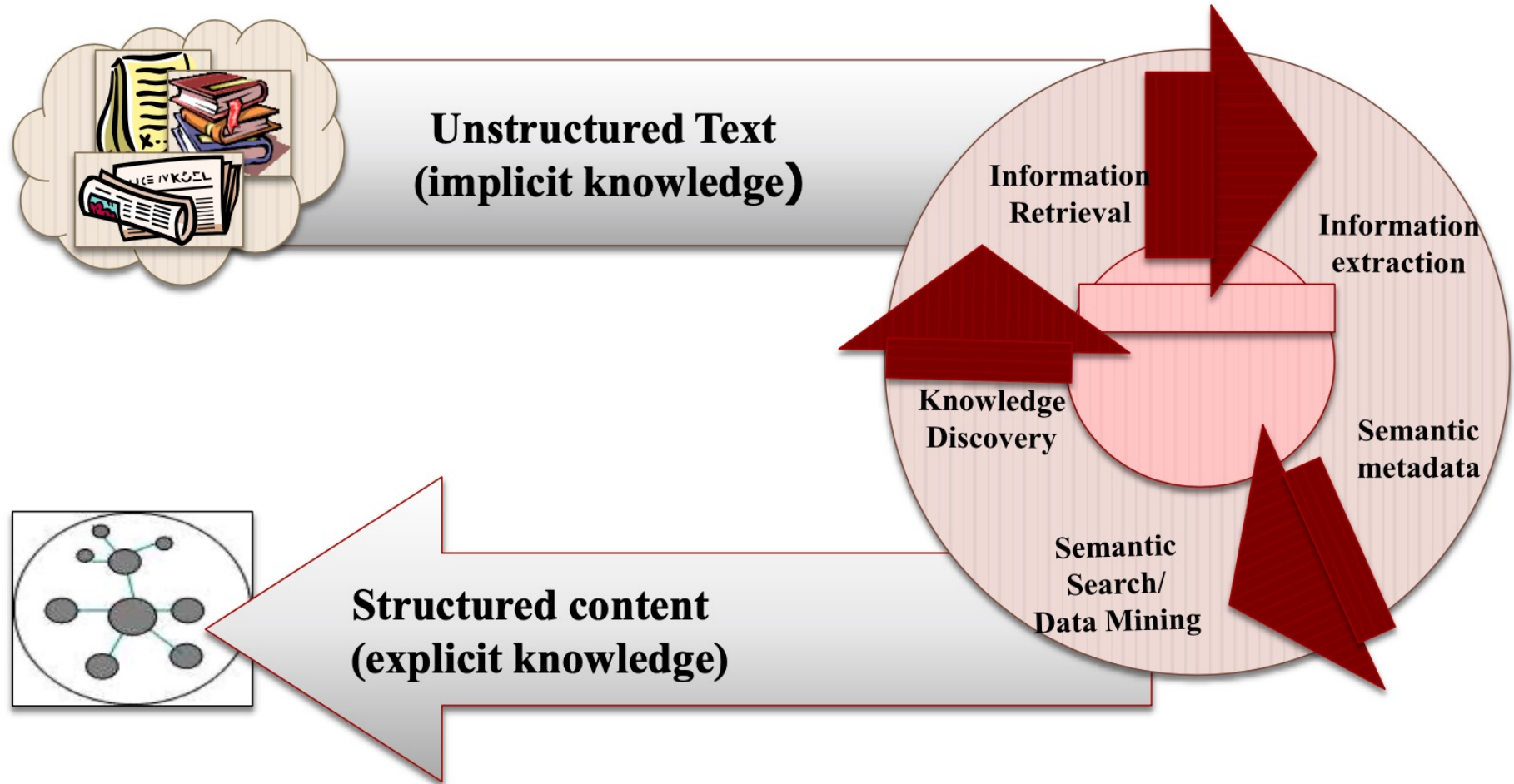
Adherent to reality: market terms are used, both for occupation and skills. This helps identify emerging terminology adopted by Market



Challenges

- Handle a **huge amount** of near real time data
- Data coming from web → Need to detect and **reduce noise**
- **Multi language** environment
- Need to relate to **classification standards**
- Find a way to **summarize and present** a wide and complex scenario



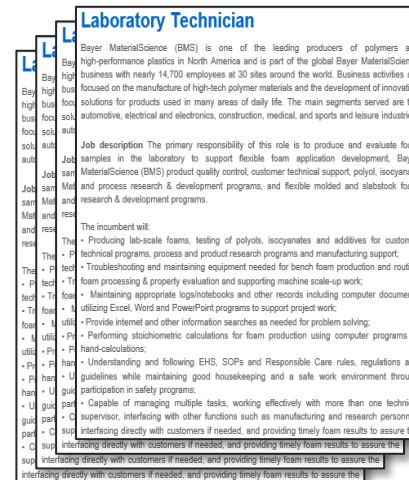


Collecting Real-Time Labour Market Data

Visit Online
Job Sites



Collect &
Deduplicate
Job Postings



Tagging & Normalising
Postings to Generate
Detailed Data

- Job Title & Occupation
- Employer & Industry
- Technical Skills
- Foundational Skills
- Certifications
- Educational Requirements
- Experience Levels
- Salaries

Skills, qualifications and labour market information: innovative data and methods.



How do you classify a job posting in an occupation?

Data Scientist

★★★★☆ 20,445 reviews - Schaumburg, IL 60173

[Apply On Company Site](#)

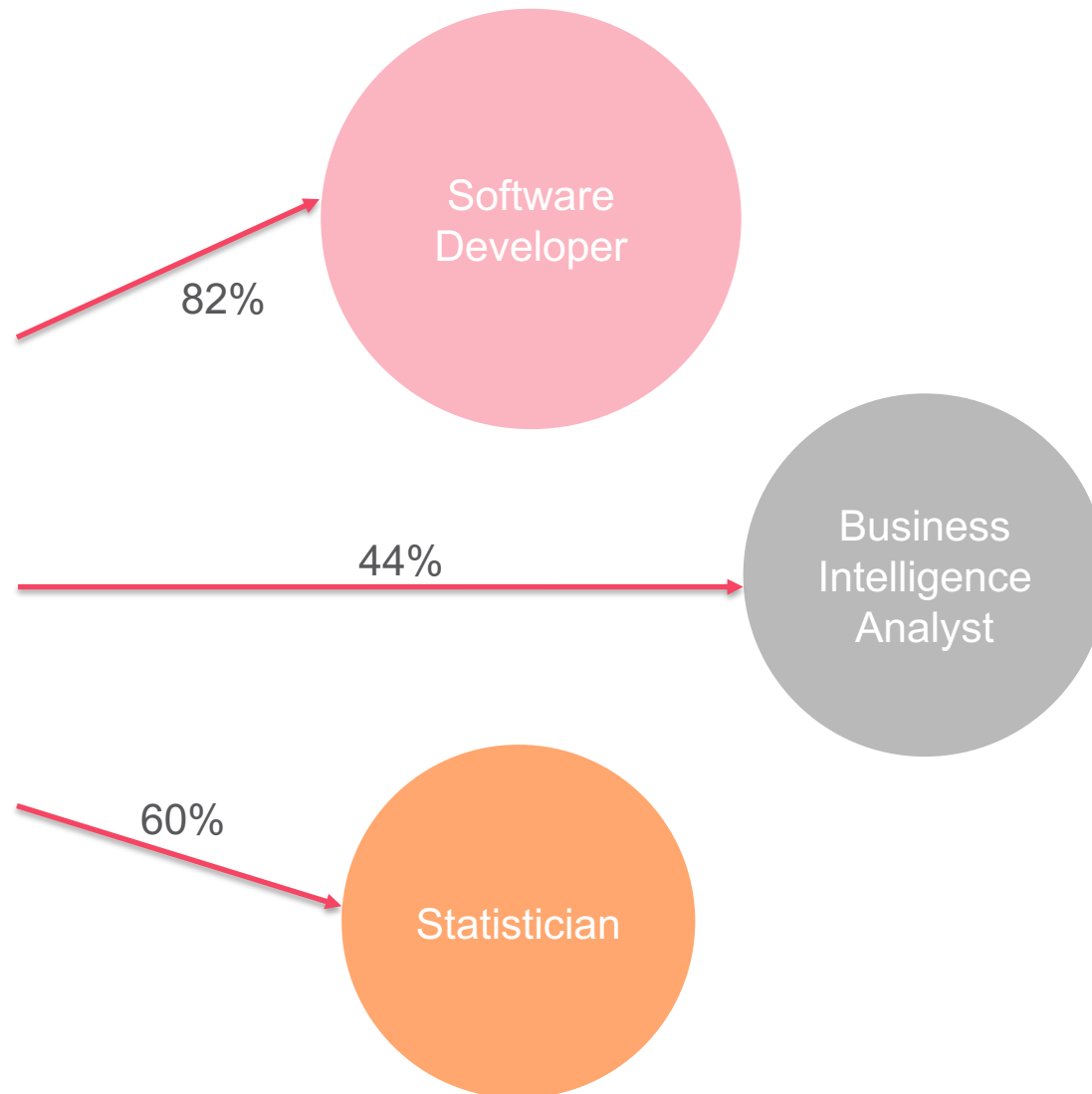
Desired:

Microsoft SQL Server Data Management Data Warehouse Microsoft Powerpoint Microsoft Office SQL
Teradata

What you'll be doing...

We're looking for someone who can partner with the business to provide business intelligence from understanding what's going on, identifying the right data, conducting research and doing analyses, to coming up with insights and making recommendations. You'll be the expert for your product group by providing the valuable data insights and reporting to guide their decision making. Plus, you'll come up with the best ways to share the data in dashboards, presentations, and written reports-to suit the need and the audience. The business insights you provide will help your product team run better and make better decisions.

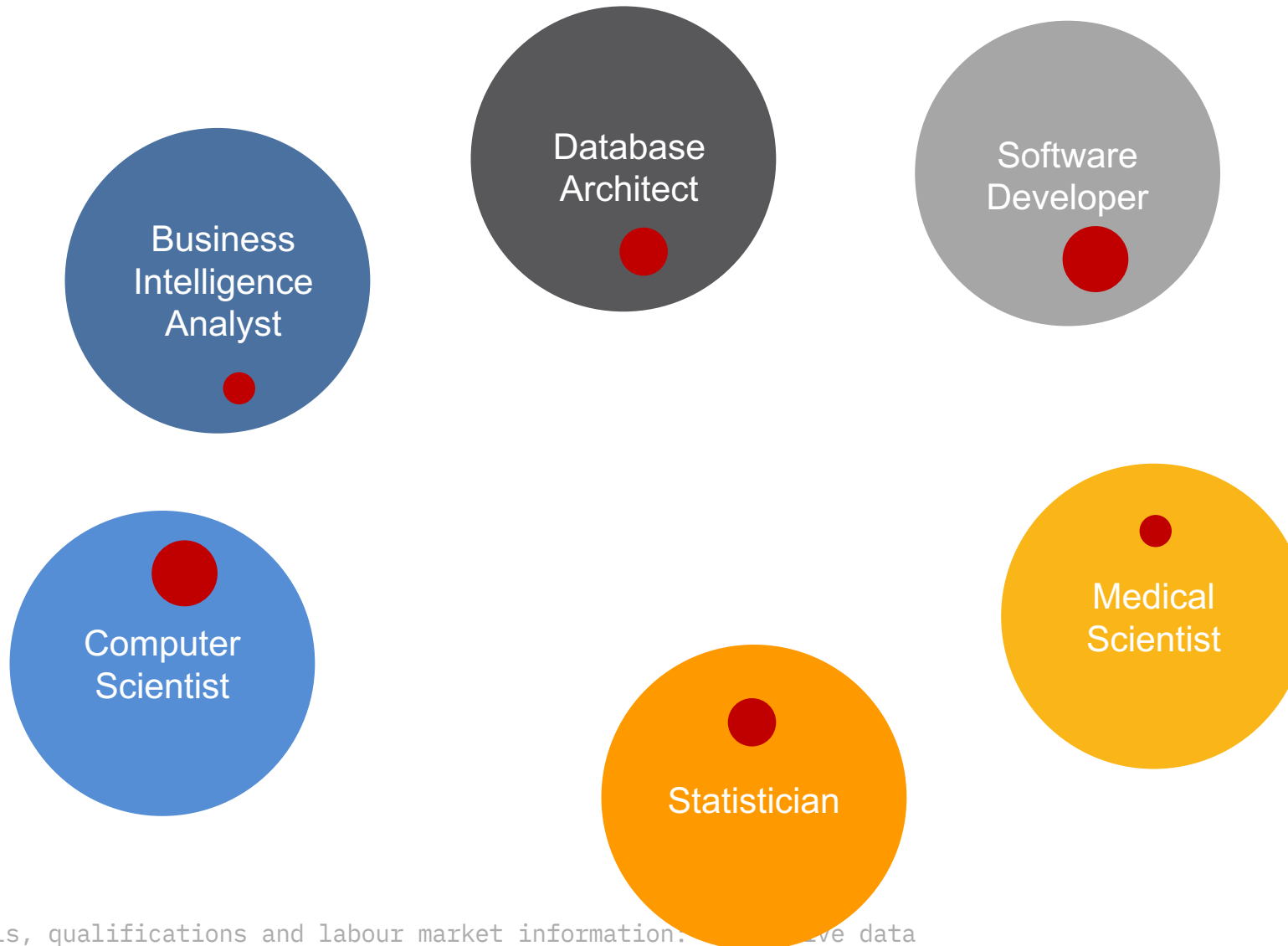
- Leading the development and implementation of advanced recurring automated report and dashboard solutions in support of business objectives.
- Making strategic business decisions and recommendations on the appropriate data sources, tools, and visualization and delivery methods to leverage the information.
- Analyzing data and clearly communicating findings to stakeholders.
- Identifying and recommending modifications to improve process efficiency for report and dashboard delivery methods and automation.
- Partnering with internal stakeholders on reports and dashboards for enhancements and modifications.
- Creating new business intelligence services and support to address emerging needs.



Skills, qualifications and labour market information: innovative data and methods.



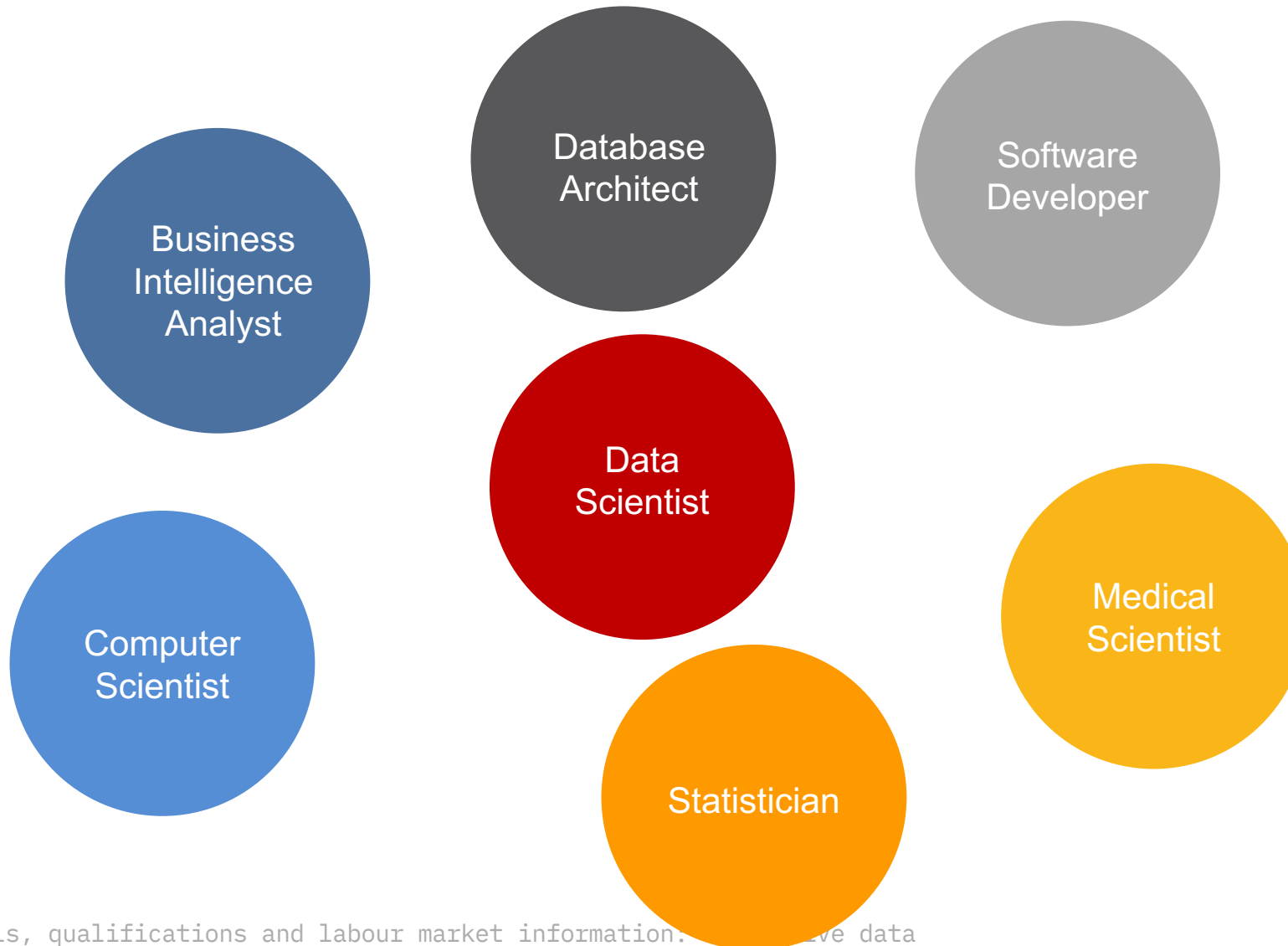
Occupations as clusters of jobs



Skills, qualifications and labour market information. ... data and methods.



Occupations as clusters of jobs

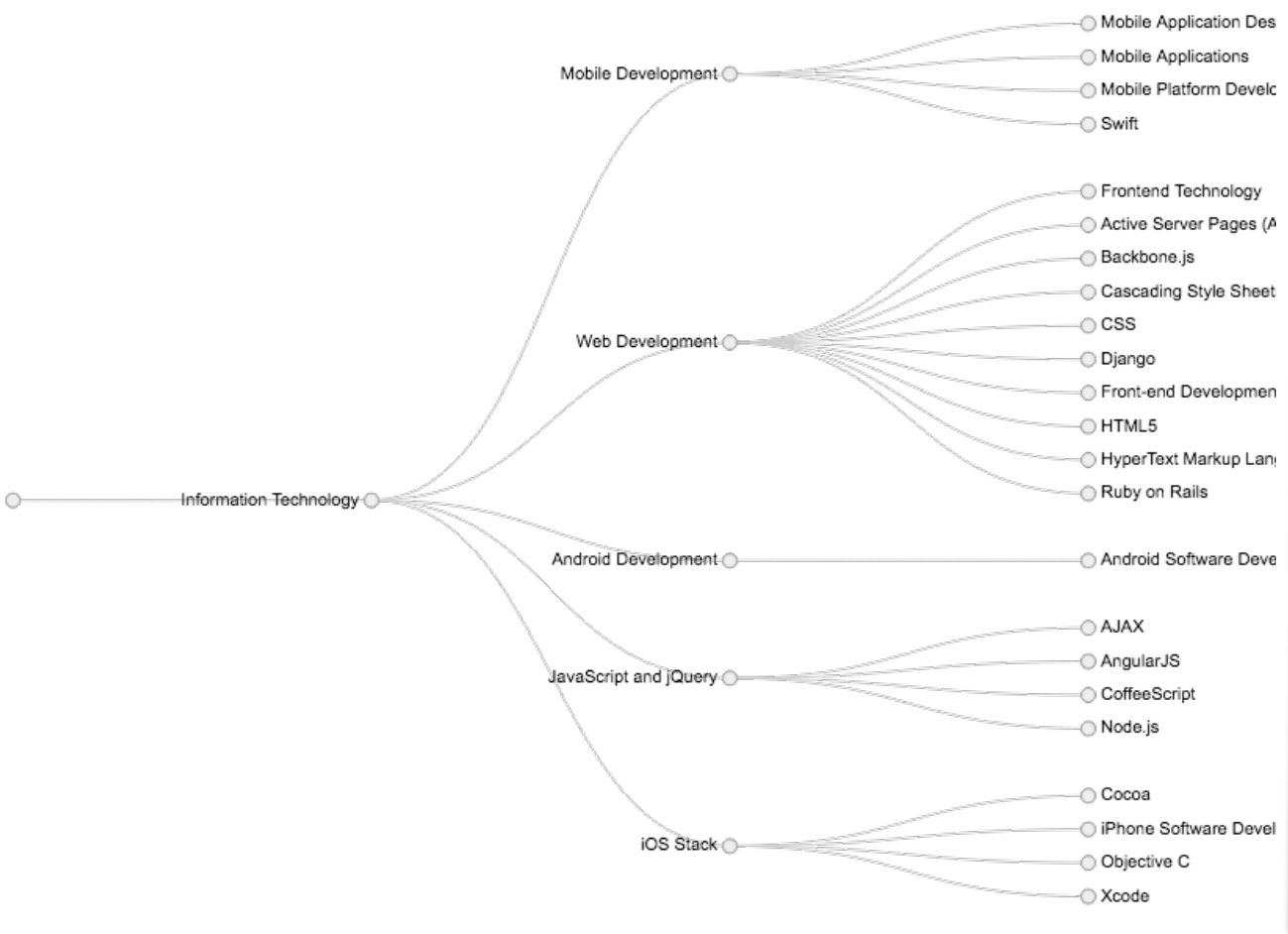


Skills, qualifications and labour market information. ...ive data and methods.



Deep, Multi-Tiered Ontologies for Data Analysis

Skill Hierarchy Sample: Web and Mobile



Metadata Elements

- Skill Type
- Description
- Demand
- Projected Growth
- Occupations Hiring
- Average Salary
- Industries Hiring
- Employers Hiring
- Similar Skills

Skills, qualifications and labour market information: innovative data and methods.



Big Data for LMI Summary

New sources

- Official statistics are representative and robust, but can lack detail and timeliness
- We need more or frequently updated, fresh data
- We need more granular data to capture the real demand

Big Data For LMI

- Data derived from web job postings is the answer
- Up to date, detailed, adherent to reality
- Unstructured data, we can decode the DNA of the occupations by observing the skills required

4x4 Traction to explore the labour market



**STRUCTURAL
LMI**



**JOB POSTINGS
ANALYTICS**



**PROFILE
ANALYTICS**



**LIBRARIES AND
TAXONOMIES**



Do job vacancies variations anticipate employment variations by sector?

Some preliminary evidence from Italy

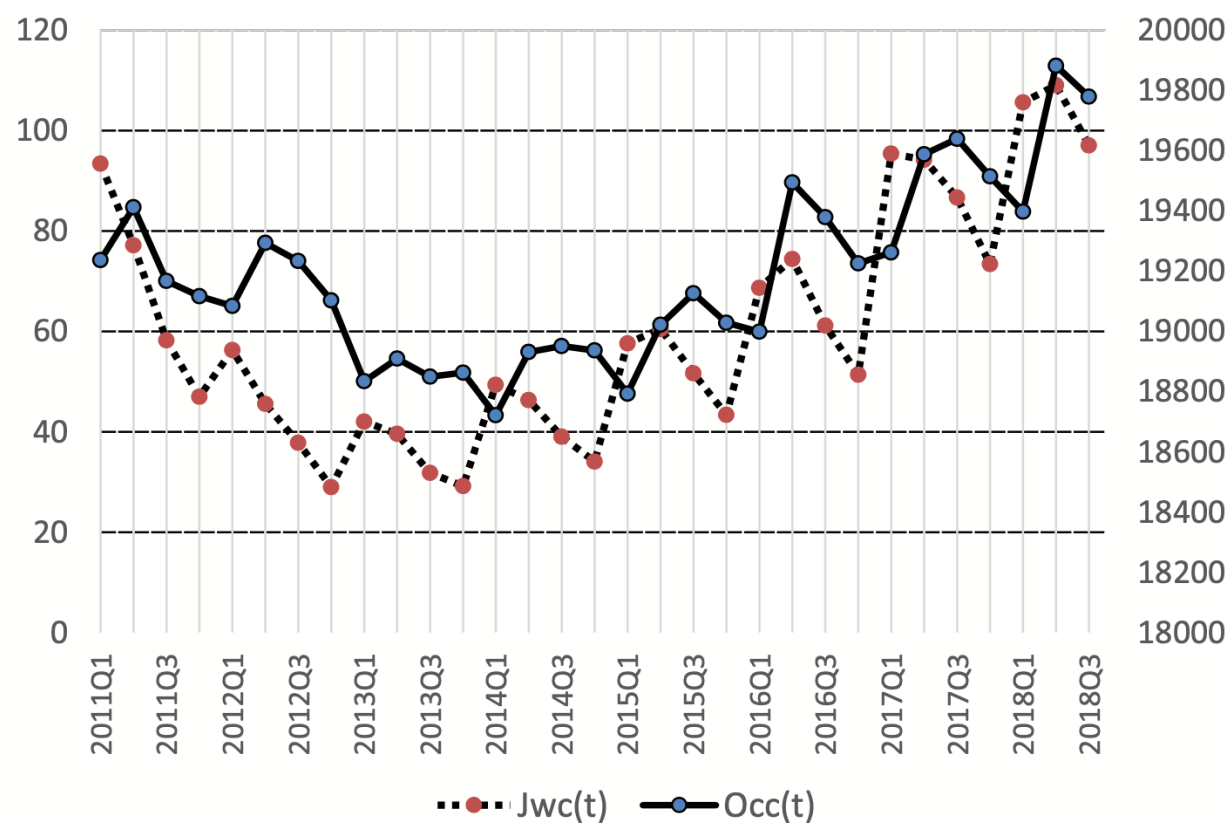
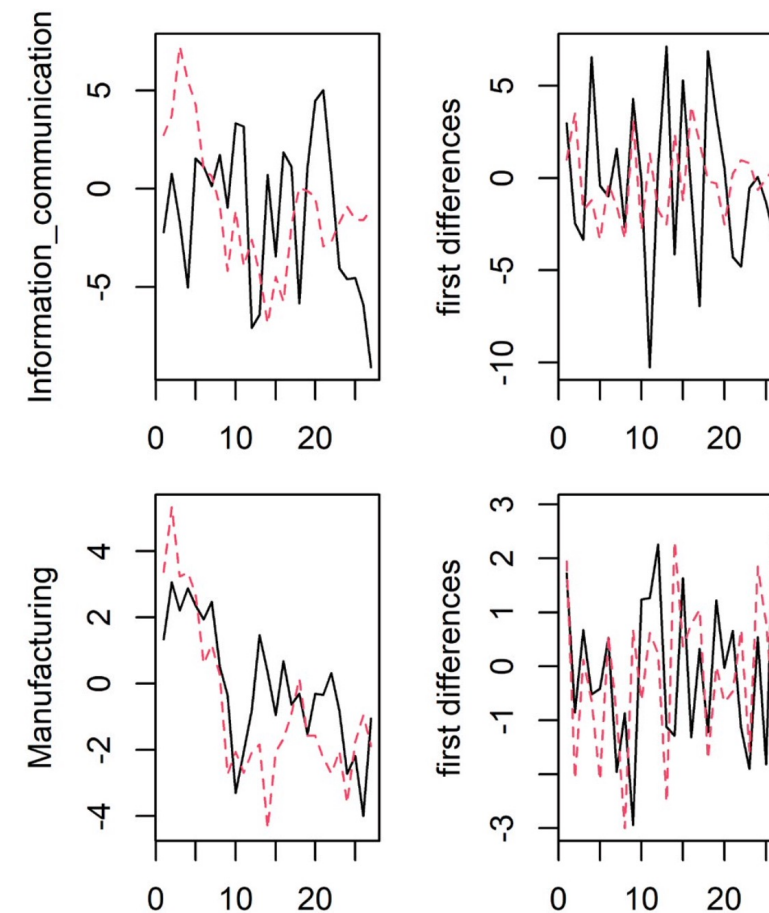


FIGURE 1 Quarterly LFS occupied counts (Occ) and job vacancies counts (Jwc), 2011Q1–2018Q3 (thousands).



Understand & Control for Variances

Job Postings vs. Employment Distribution by Occupation – Germany

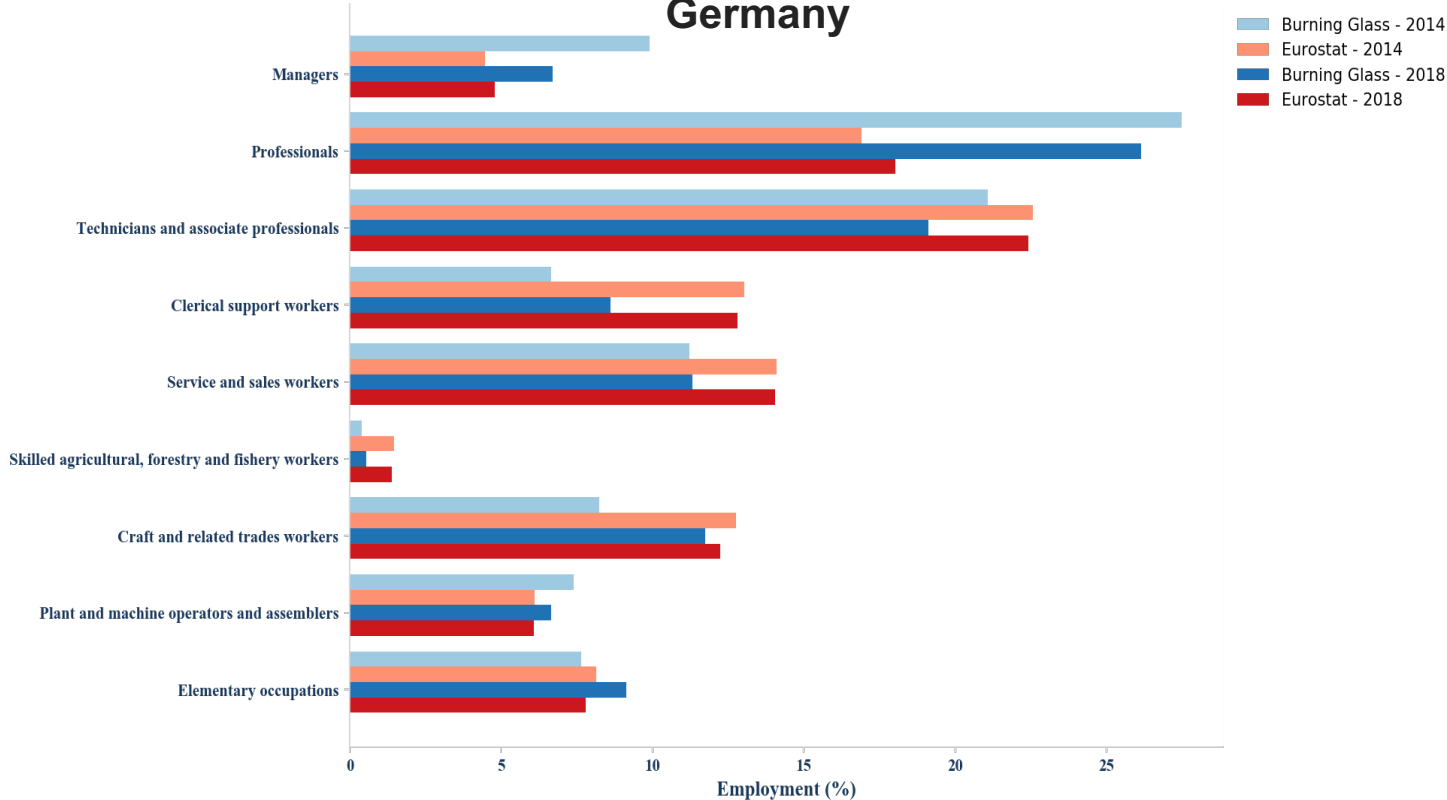
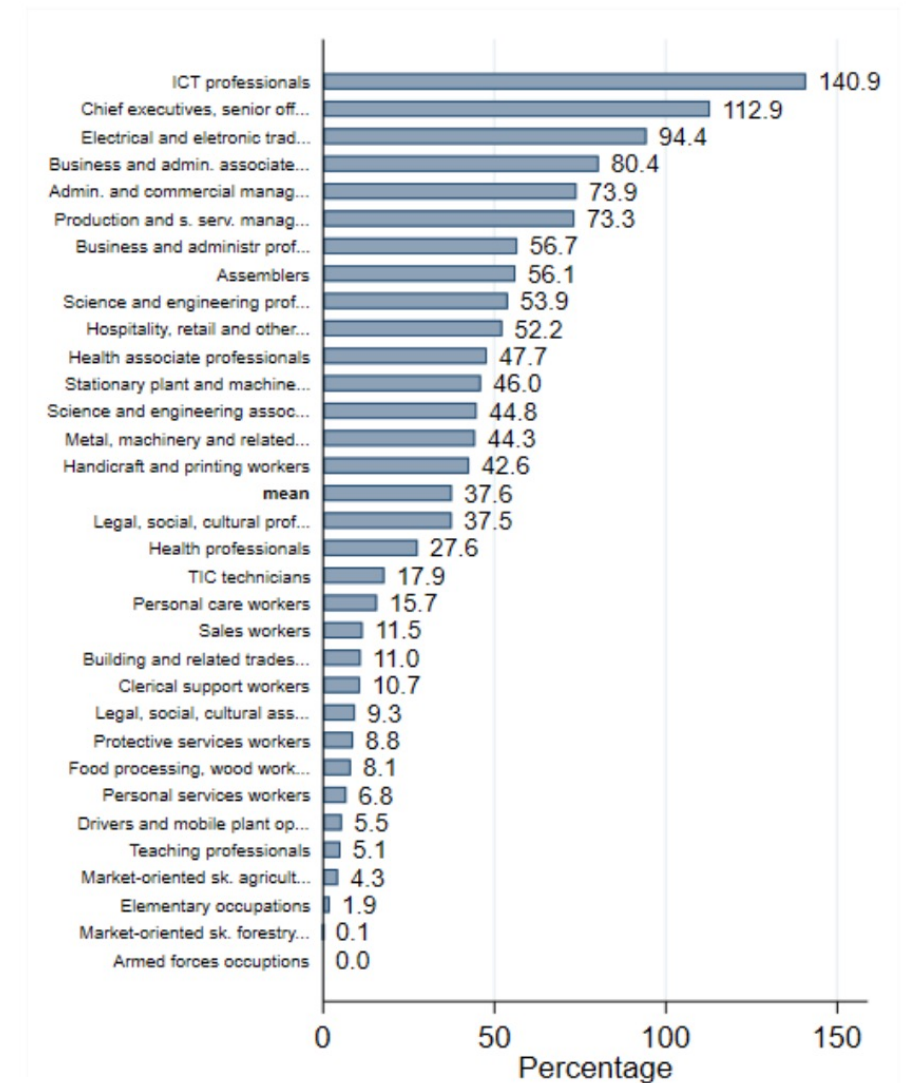


Figure 5. Ratio between vacancies (BGT) and employment contracts (SPES) by occupation. 2018 – 2021 **NEW DATA**

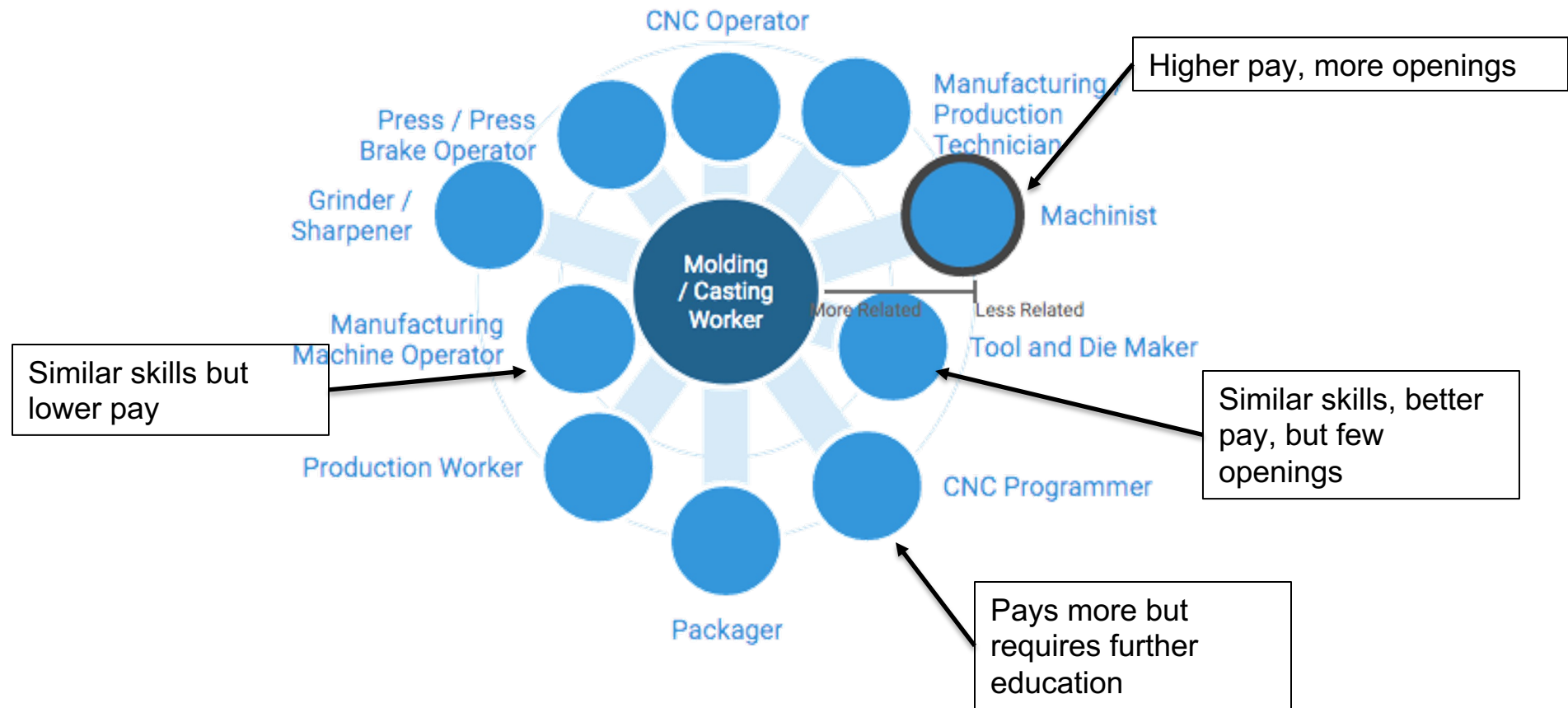


BertelsmannStiftung

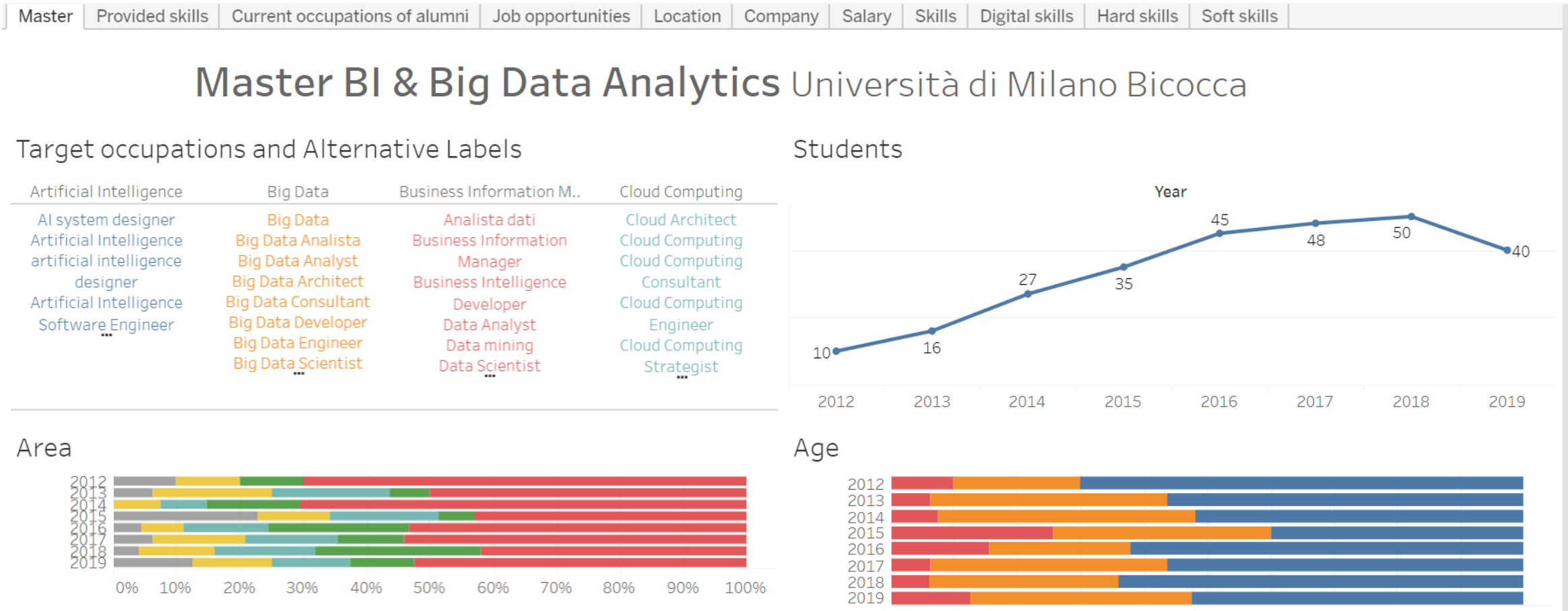
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What Is the Best Transition?



Education



Skills, qualifications and labour market information: innovative data and methods.

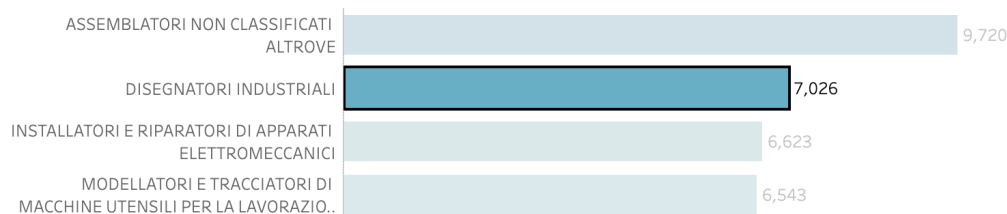


Skills Intelligence



FOCUS COMPETENZE

TOP 10 PROFESSIONI (ESCO LIVELLO 4)



ANNUNCI PUBBLICATI NEGLI ULTIMI 12 MESI

7,026

VARIAZIONE RISPETTO A 1 ANNO PRIMA

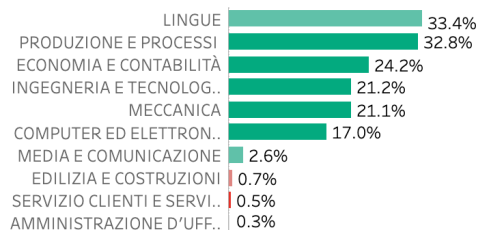
41.6%

VARIAZIONE RISPETTO A 5 ANNI PRIMA

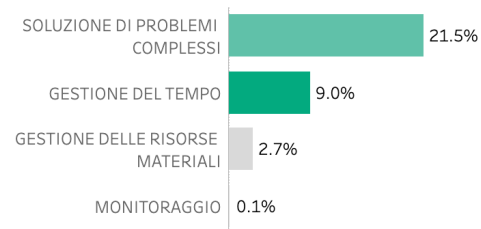
24.1%

TOP 10 COMPETENZE PER TIPOLOGIA

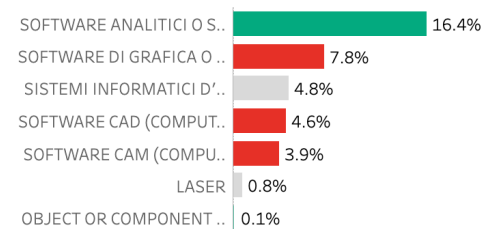
CONOSCENZE



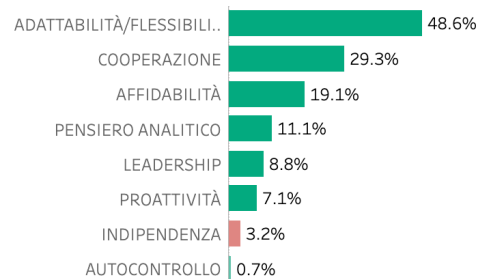
COMPETENZE SPECIFICHE



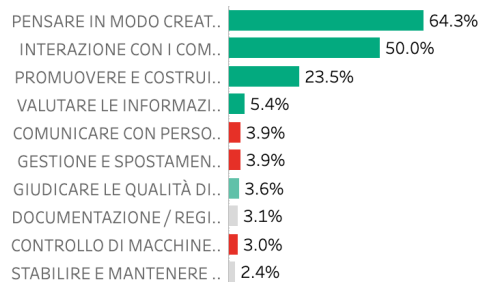
STRUMENTI E TECNOLOGIE



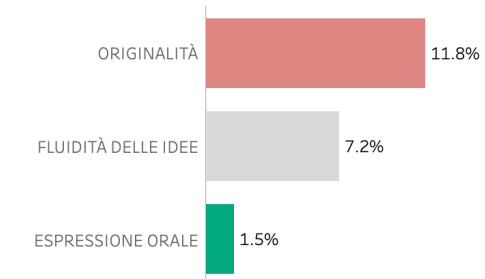
STILI DI LAVORO



ATTIVITÀ LAVORATIVE



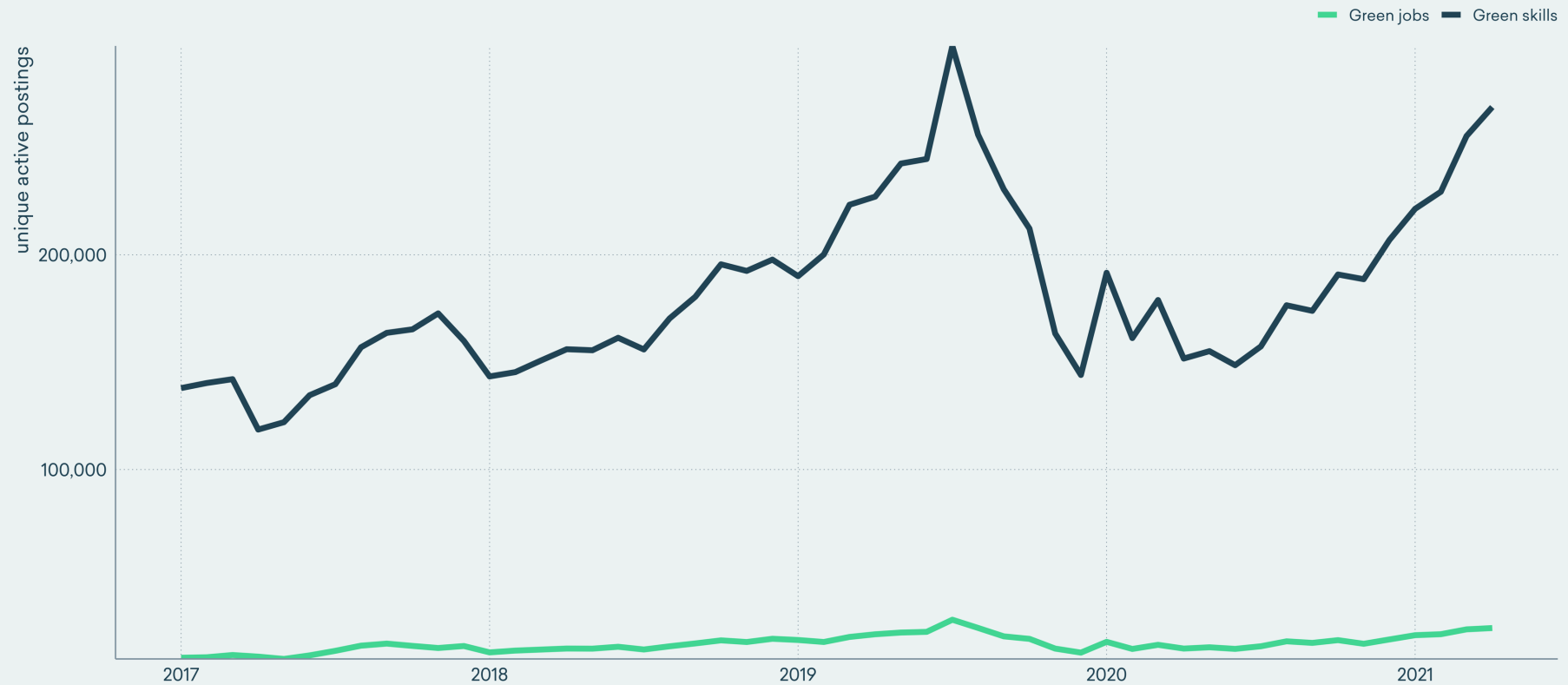
ABILITÀ



The Green Economy

Green jobs are only a small share of rising green demand

Title-based and skills-based volumes of job postings for 'green' demands



Data: Emsi Job Posting Analytics

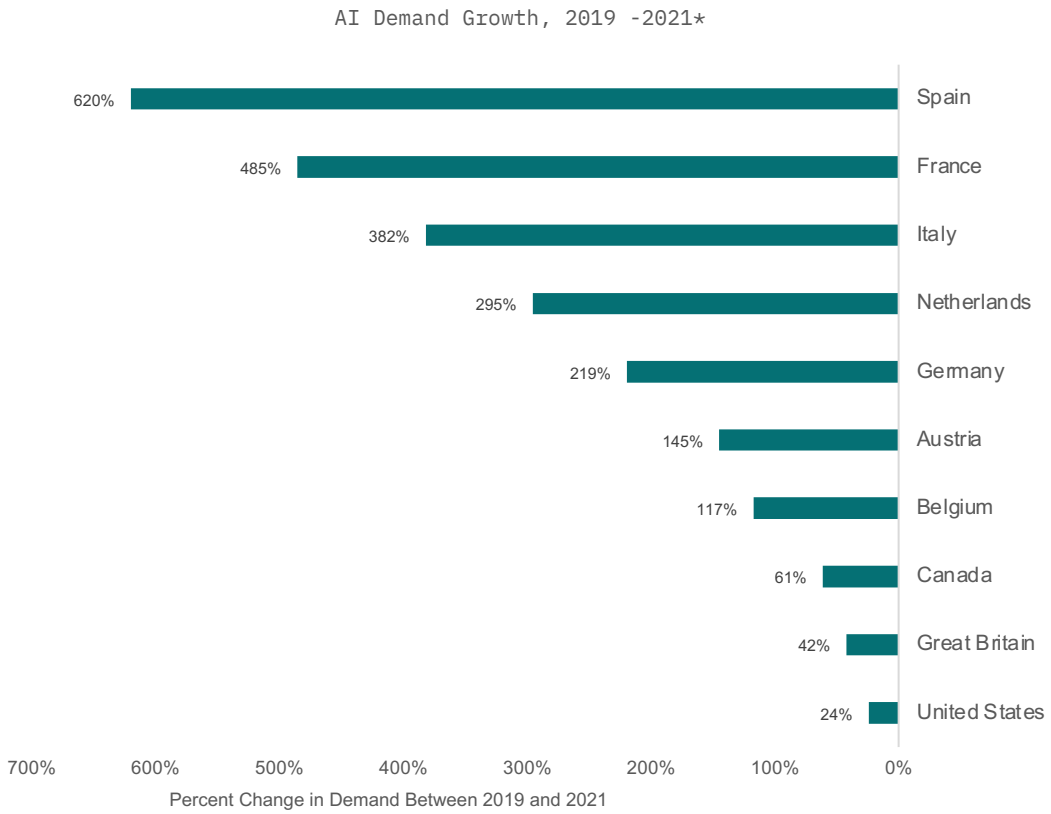
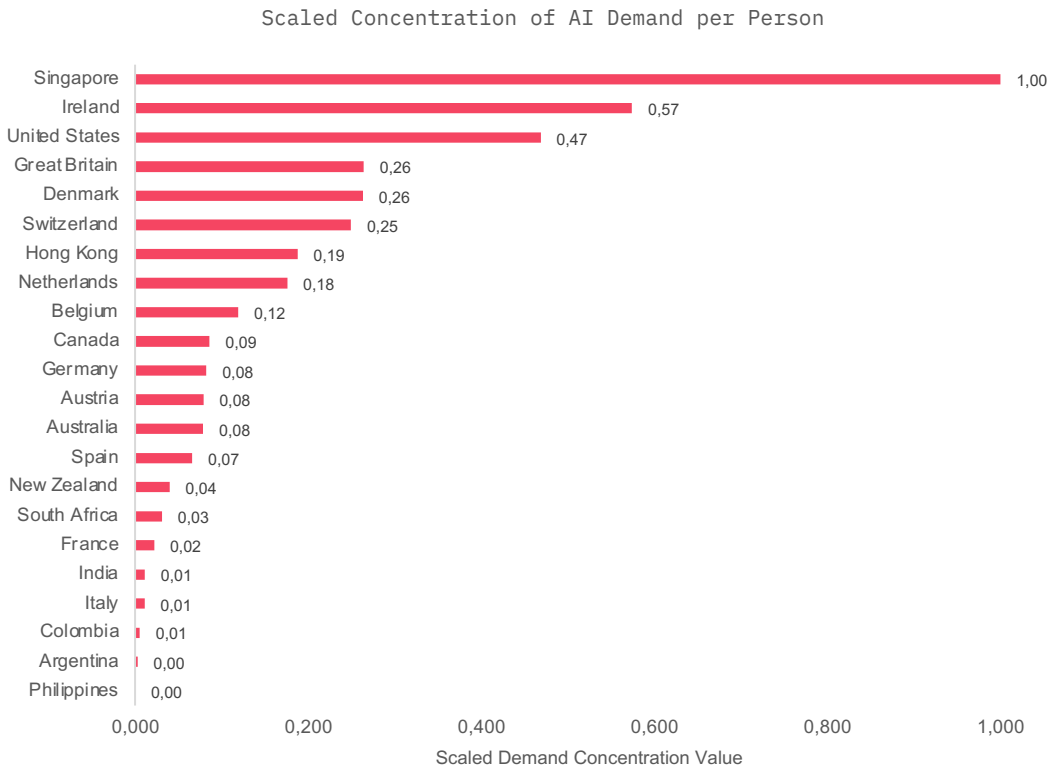
Skills, qualifications and labour market information: innovative data and methods.



COVID-19 Shock Tunisia



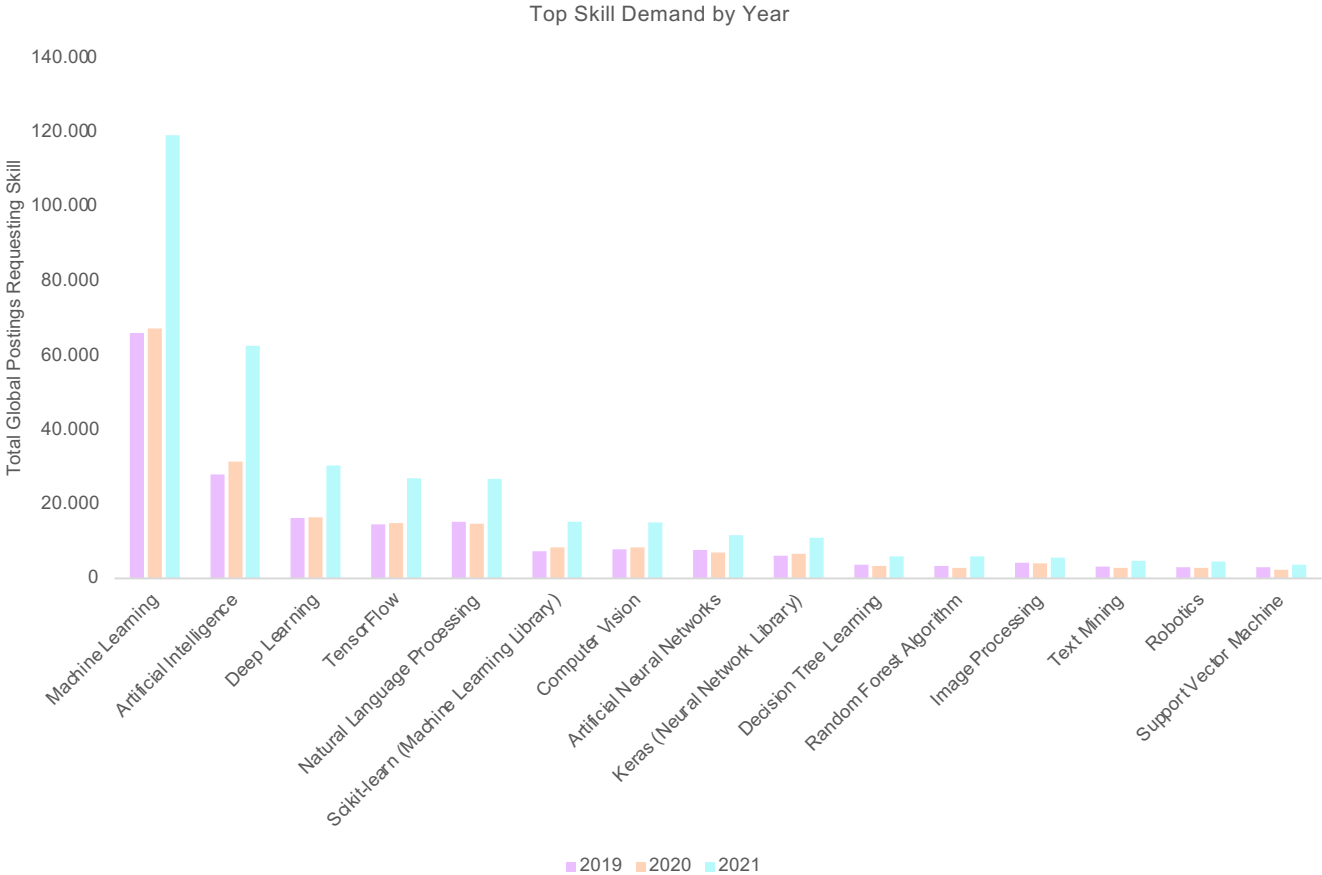
Historical Trends and Demand Concentration Rates Indicate Singapore, Ireland, France and Spain are Countries to Keep on the Radar



* Note that there are only 10 countries for which this data is available



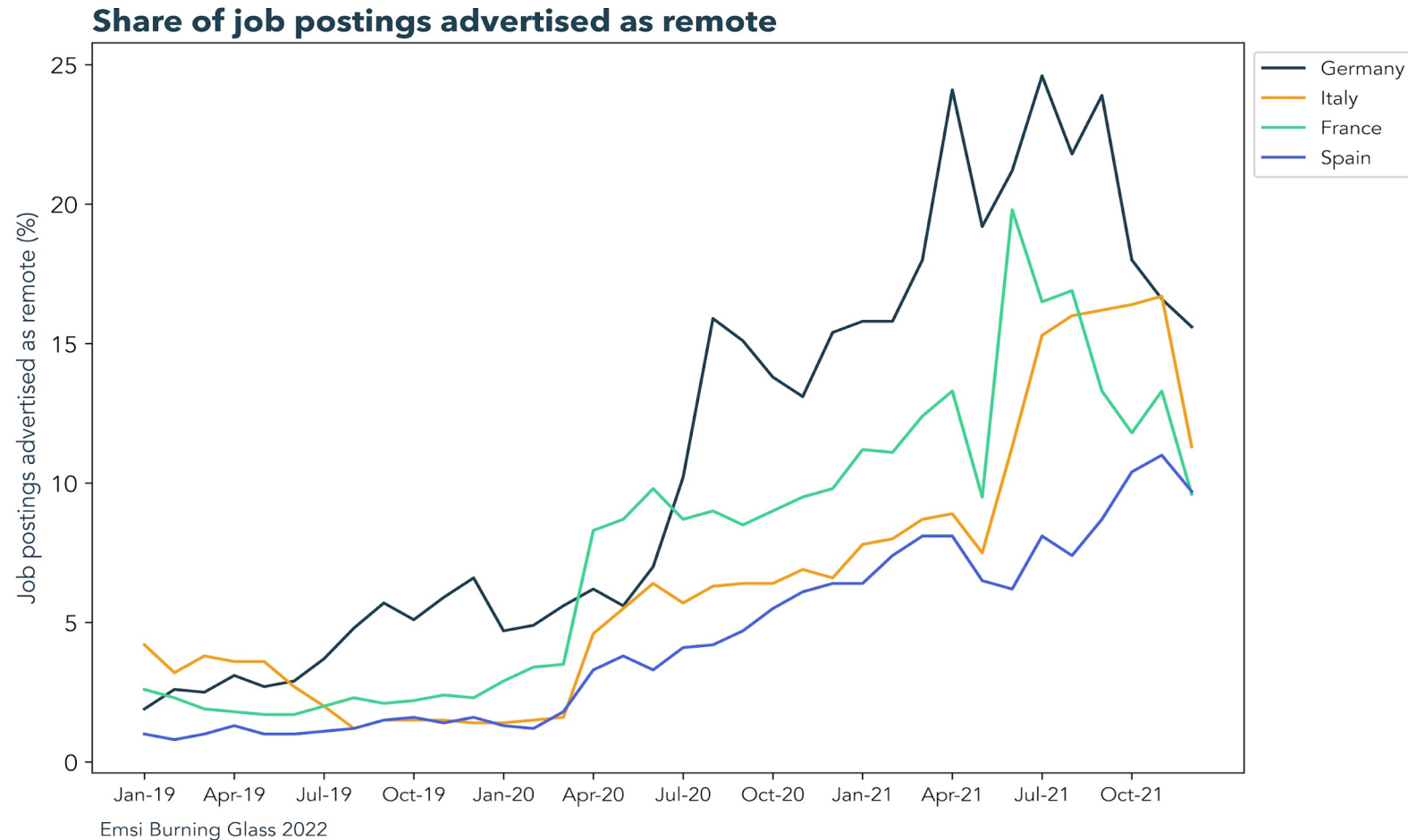
Top AI Skills are Here to Stay



All of the **top demanded AI skills** have experience **positive growth rates since 2019**



The rise of remote working has been accelerated by the pandemic – and it appears it is here to stay



Yet, a lot of the jobs currently most in demand continue to be jobs that require in-person presence

Most popular occupations in job postings in the past year

Remote
In person

	United Kingdom	Germany	France	Spain	Italy
1.	Software developers	Manufacturing labourers not elsewhere classified	Shop sales assistants	Software developers	Freight handlers
2.	Engineering professionals not elsewhere classified	Freight handlers	Bartenders	Business services agents not elsewhere classified	Cleaners and helpers in offices, hotels and other establishments
3.	Research and development managers	Systems analysts	Clerical support workers not elsewhere classified	Stationary plant and machine operators not elsewhere classified	Administrative and executive secretaries
4.	Advertising and marketing professionals	Shop sales assistants	Manufacturing labourers not elsewhere classified	Commercial sales representatives	Shop sales assistants
5.	Social work associate professionals	Software developers	Engineering professionals not elsewhere classified	Systems analysts	Manufacturing labourers not elsewhere classified
6.	General office clerks	Administrative and executive secretaries	Accounting associate professionals	Shop sales assistants	Software developers
7.	Sales and marketing managers	Engineering professionals not elsewhere classified	Business services agents not elsewhere classified	Contact centre salespersons	Draughtspersons
8.	Systems analysts	Bartenders	Research and development managers	General office clerks	Engineering professionals not elsewhere classified
9.	Nursing professionals	Advertising and marketing professionals	Systems analysts	Administrative and executive secretaries	Advertising and marketing professionals
10.	Personnel and careers professionals	Systems administrators	Physical and engineering science technicians not elsewhere classified	Motor vehicle mechanics and repairers	Assemblers not elsewhere classified



Demand and supply analysis



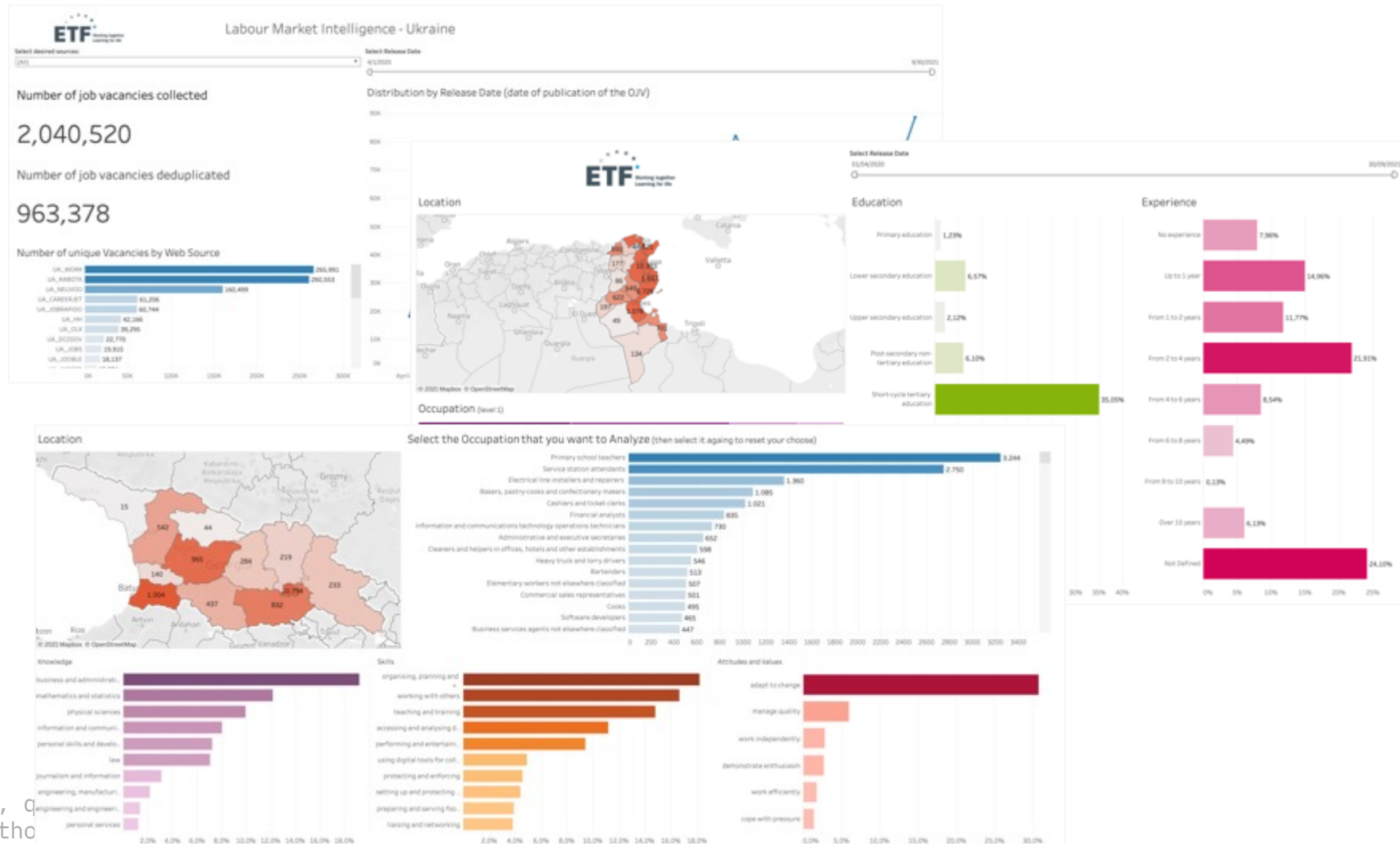


Topics

- Demand and supply analysis
- Methodology and new sources
- Social Profiles Analysis
- LMI for Education



Our starting point...



Skills, knowledge and methods



... and now?

- This is a starting point
- Big Data can provide us a gold mine of information
- What we've seen together is just a starting point, the description of what's happening
- One defined a methodology and a system able to collect and classify Big Data, we can extend our view and approach novel analyses

Skills, qualifications and labour market information: innovative data and methods.



Why?

- Demand analysis is one of the points of view of Labour Market
- We can obtain additional and complementary information analyzing supply side
- Offered skills
- Matching demand-supply
- Evolution of professional profiles



Supply side data source

- Resumes
 - Detailed
 - Adherent to reality
 - Up-to-date
 - **Unstructured**
- Social profiles (e.g. LinkedIn, Xing, ...)
 - Detailed
 - Adherent to reality
 - Up-to-date
 - **Semi-structured**
 - Private source (data ingestion needed)



New data analysis paths

- Supply analysis
 - Most offered professions
 - Top trending skills
 - Geographies with the highest professional availability
 - Careers analysis
 - ...
- *See it in action, with an Spain Students Outcomes example*

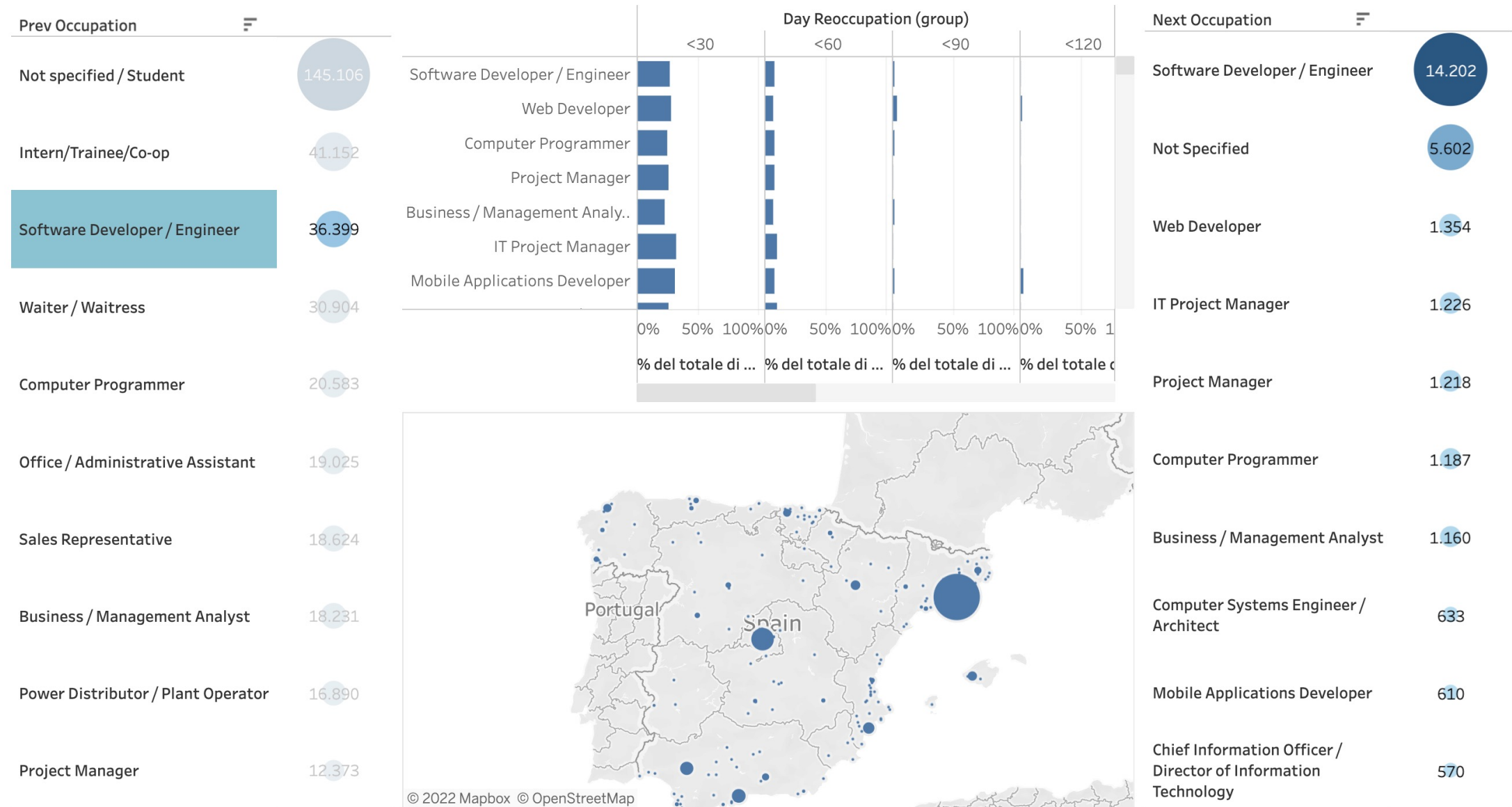


Spain Students Carrers

Previous Occupation

Current Occupation

Next Occupation



LMI for education – Employability Explorer

Goal:

Use Job Posting Labour Market data to support Universities in placement and course reviews

How:

1. Map courses' official document using AI techniques to extract the most proper market terms associated to the course itself
2. Use extracted market terms to connect courses with labour market trends via “Employability Explorer” interface



Methodological path

STEP 1

DATA SOURCE COLLECTION



A

Analysis of the courses description module, directly collected from the universities, which include and describe all the HEIs educational offers in terms of objectives and quality assurance systems

STEP 2

DATA EXTRACTION



B

Data Extraction of job profiles and skills from the courses description

STEP 3

AI AND ESCO CLASSIFICATION



C

Data cross-references with the Lightcast BG OJV Database, which collects millions of Job Vacancies published by companies on the Web, classified according to ESCO and Lightcast legacy taxonomies using AI techniques

STEP 4

DATA VISUALISATION



D

Elaboration of dashboards aimed to compare labour market needs with HEIs educational offers



Choose your course of interest



UNIVERSITÀ DI TRENTO

Select an analysis path

By study programme

Artificial Intelligence Systems

Artificial Intelligence Systems
Cellular and Molecular Biotechnology
Energy Engineering
International Management
Materials and Production Engineering
Organization, society and technology
Philosophy and languages of modernity
Psychology

By occupation

account manager

Go to analysis

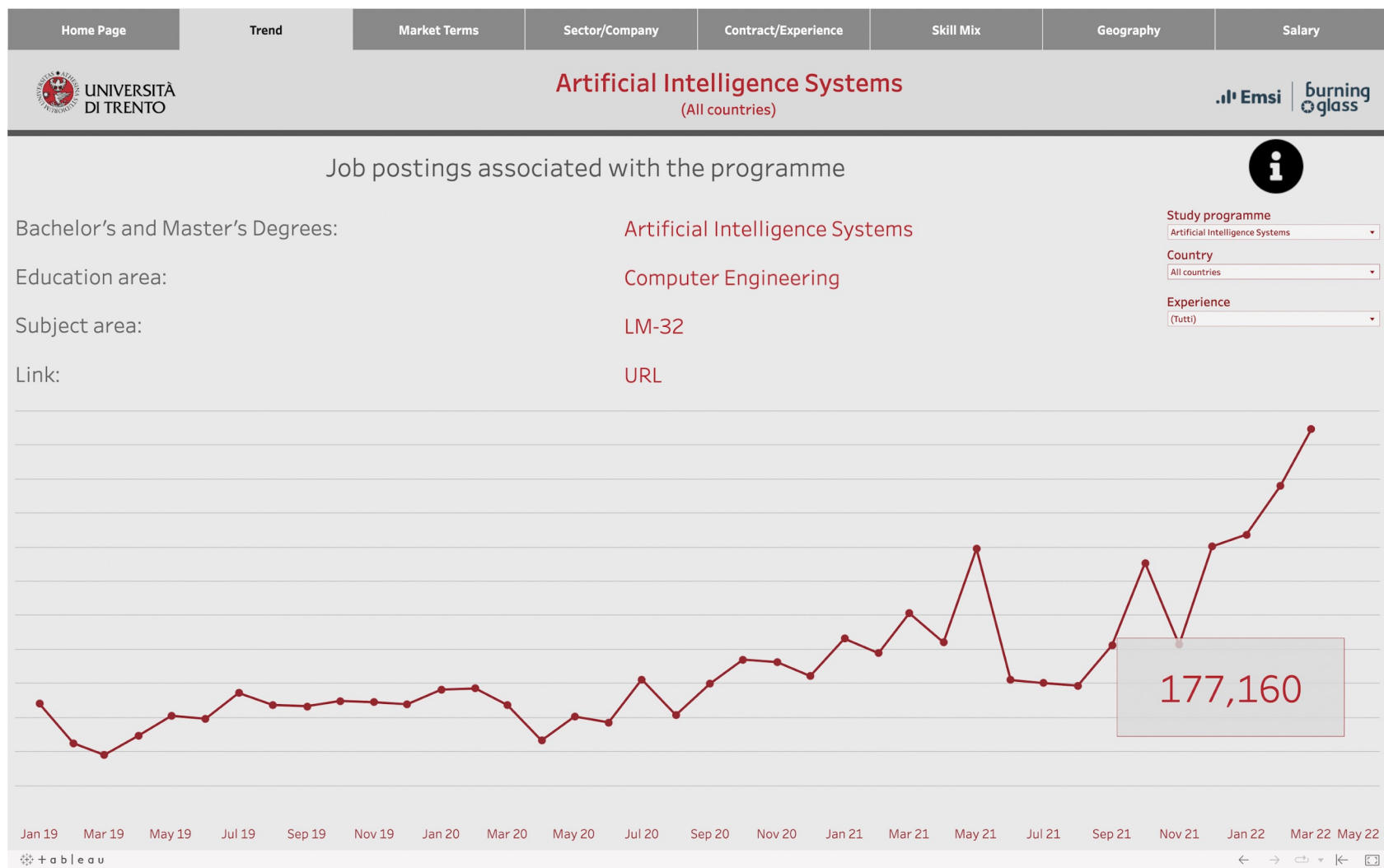
Powered by Emsi Burning Glass

tableau

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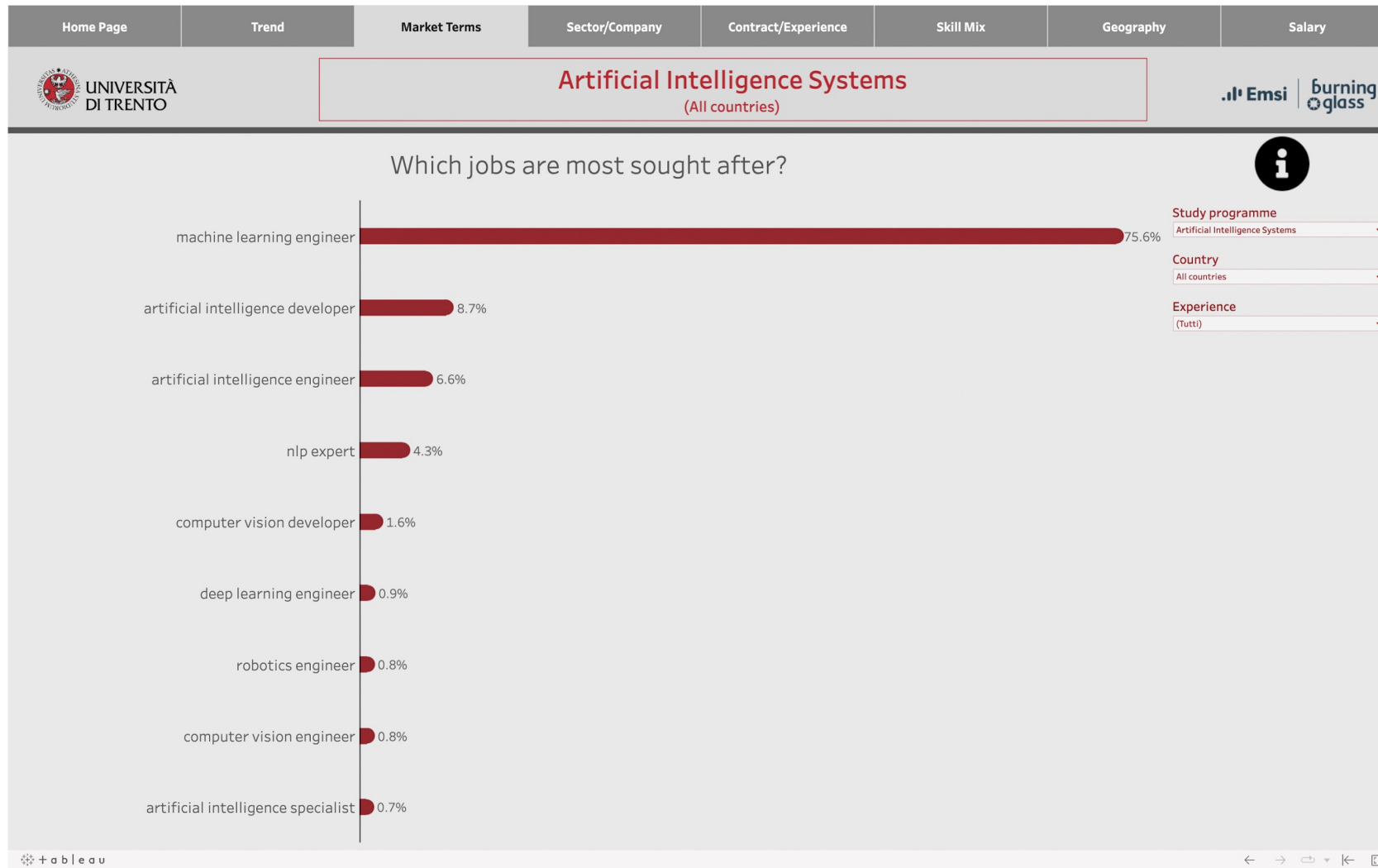
Job postings trend



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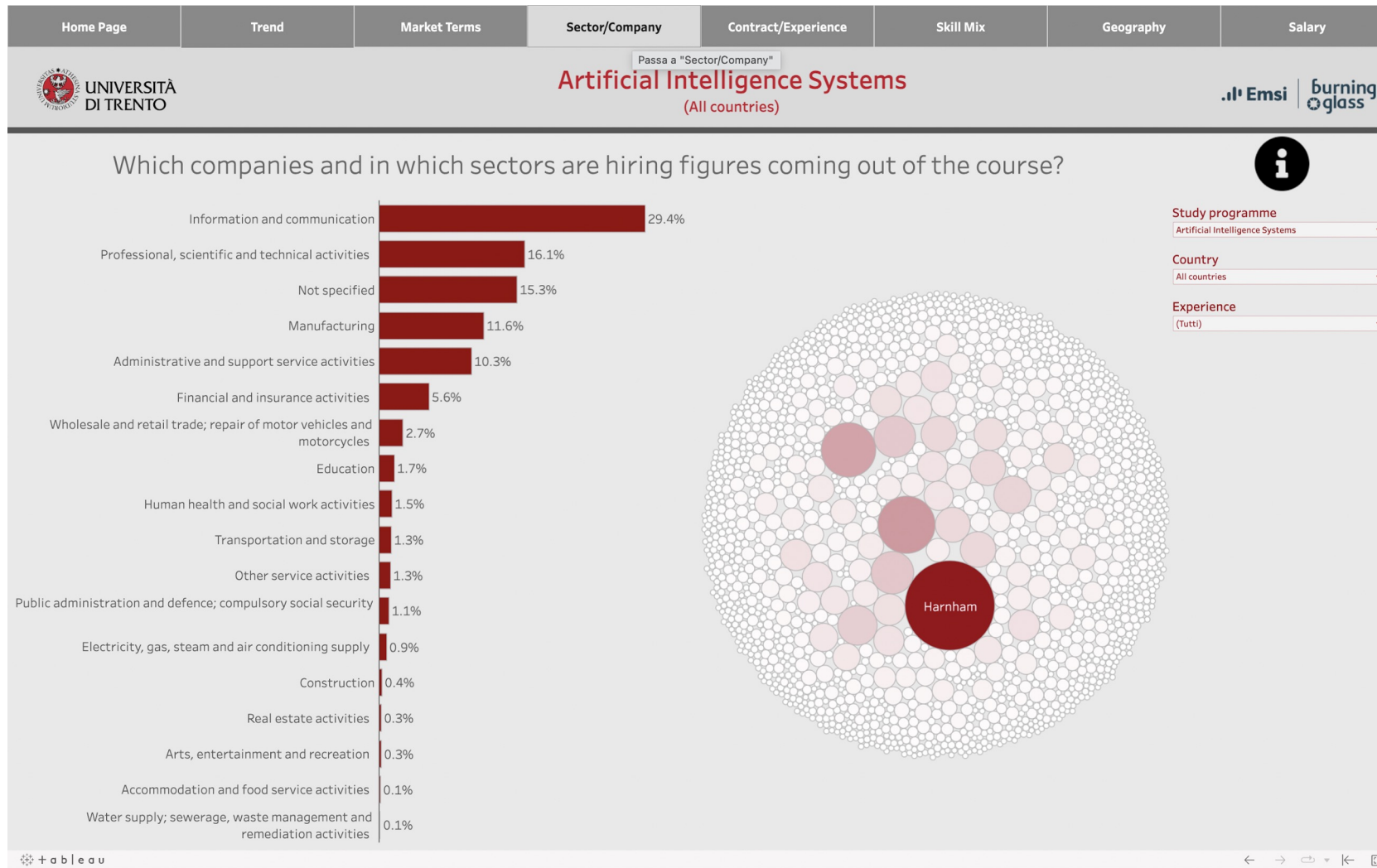
Market terms



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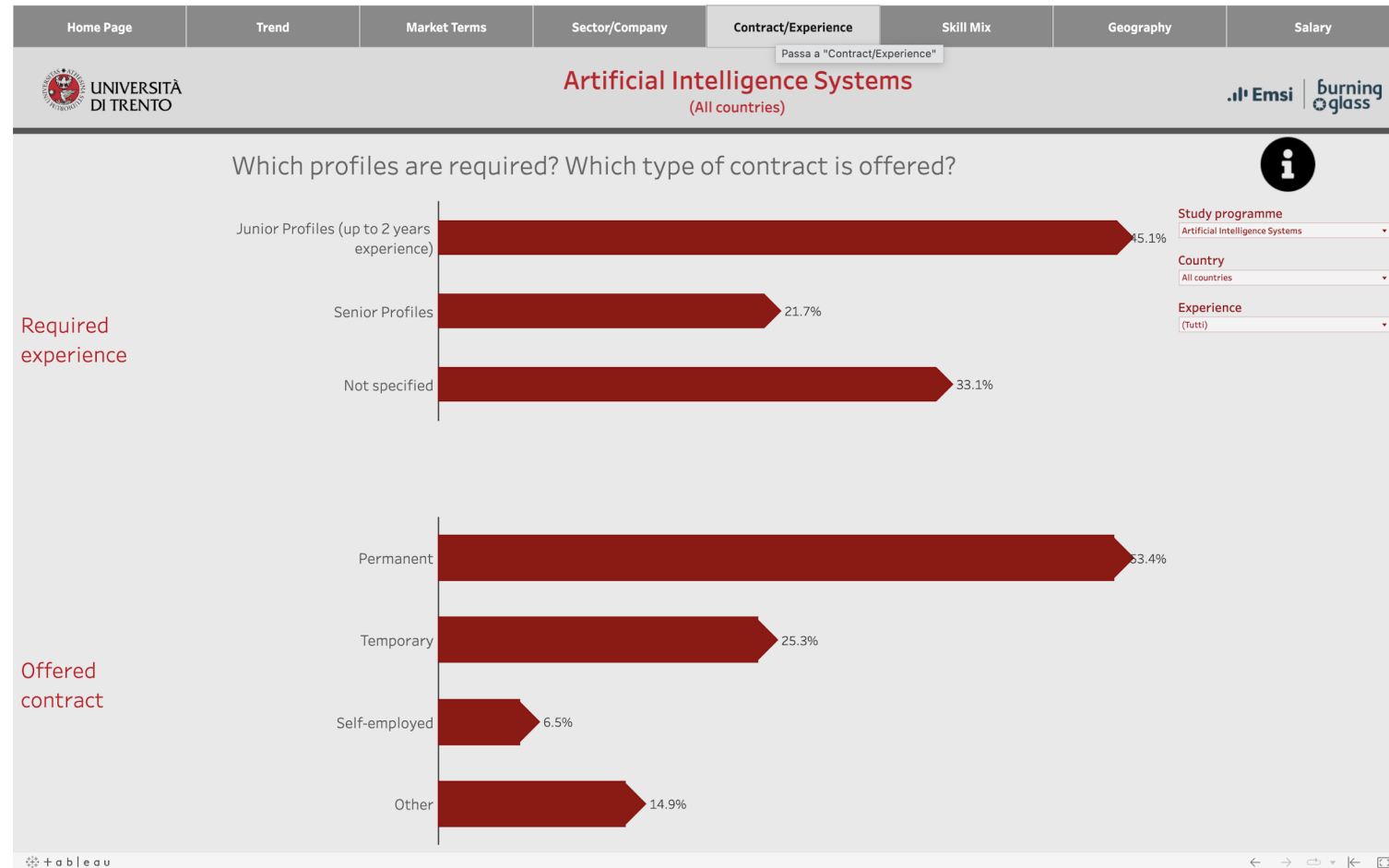
Sectors / Companies



Skills, qualifications and labour market information: innovative data and methods.



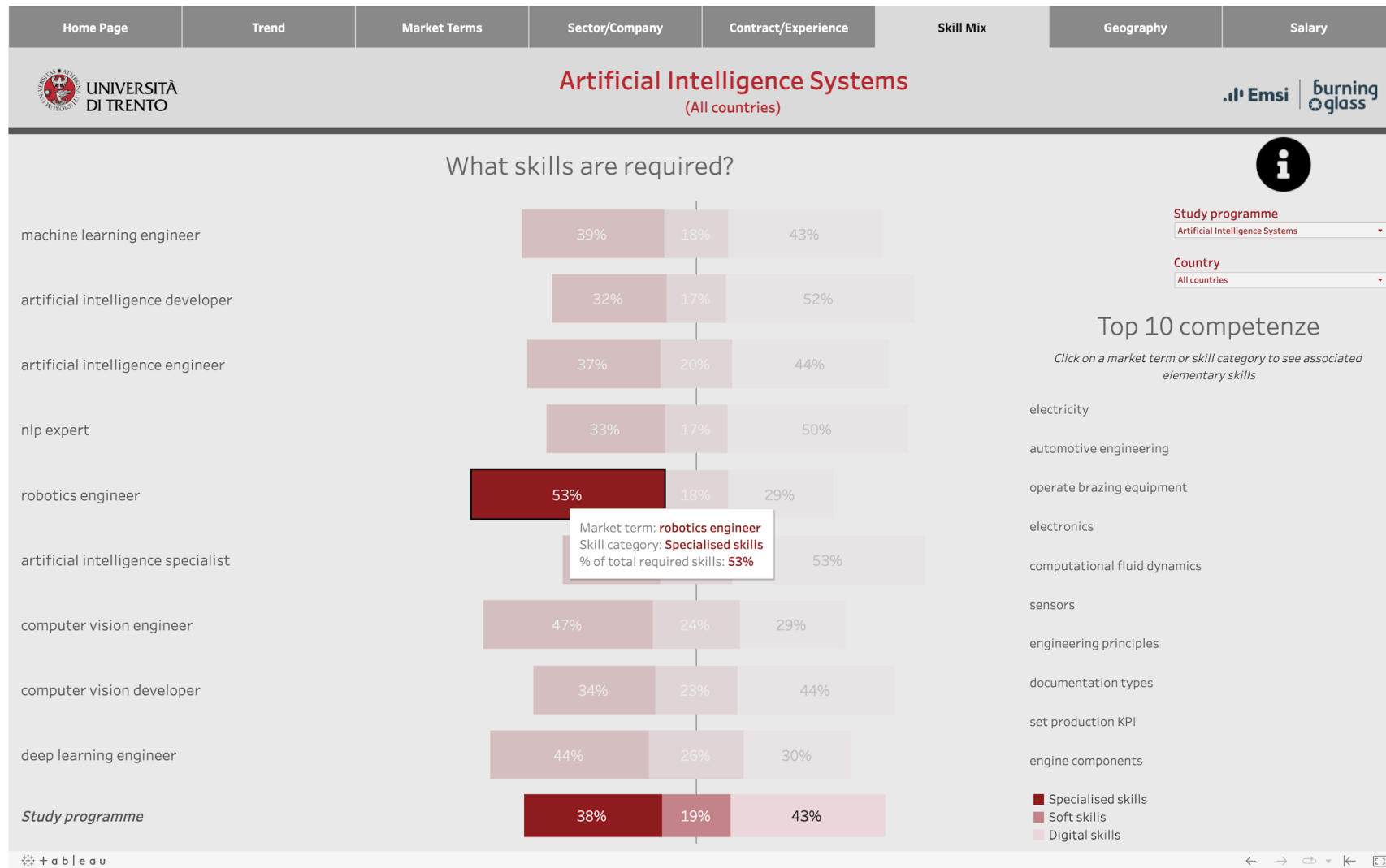
Experience / contract



Skills, qualifications and labour market information: innovative data and methods.



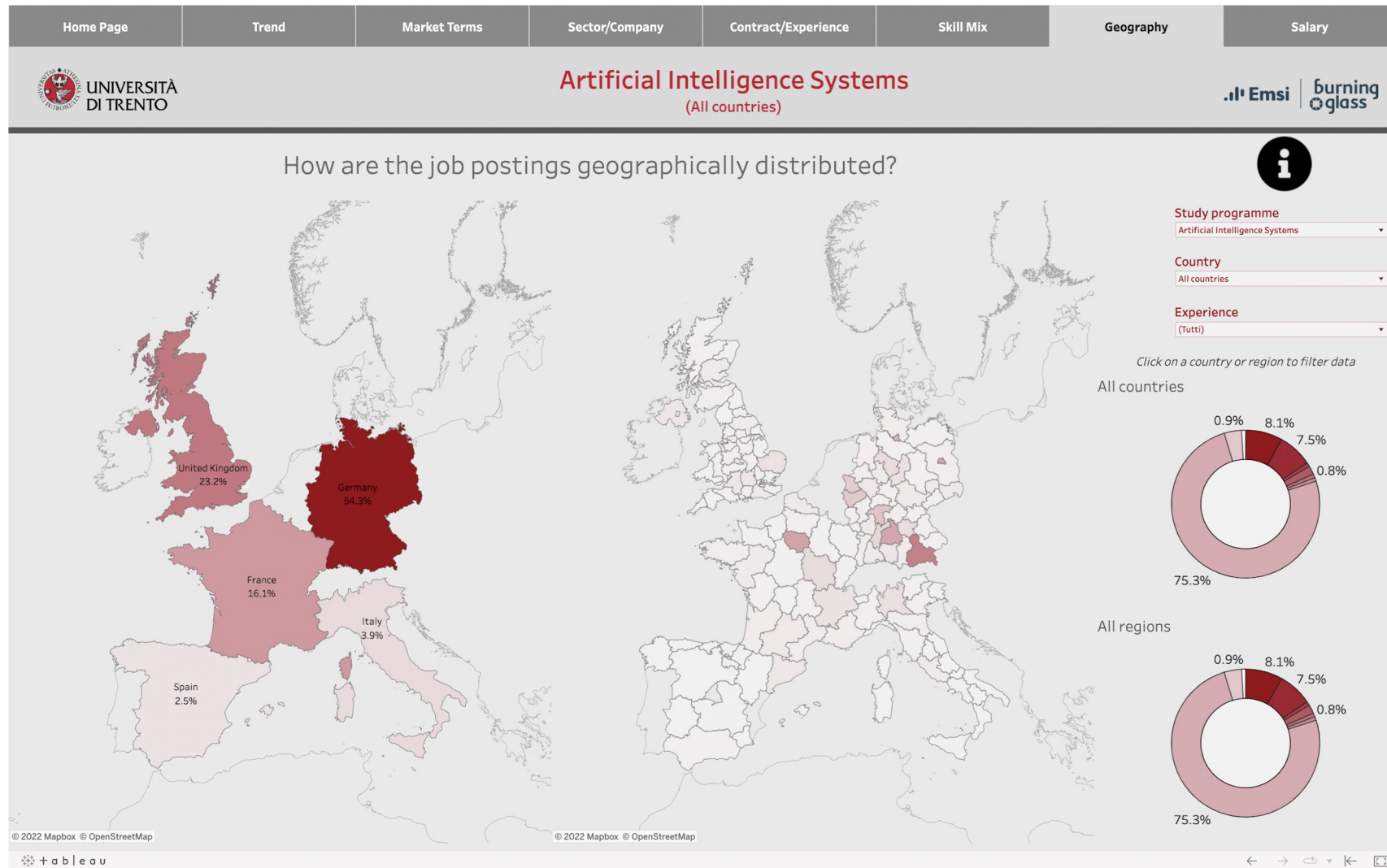
Skills



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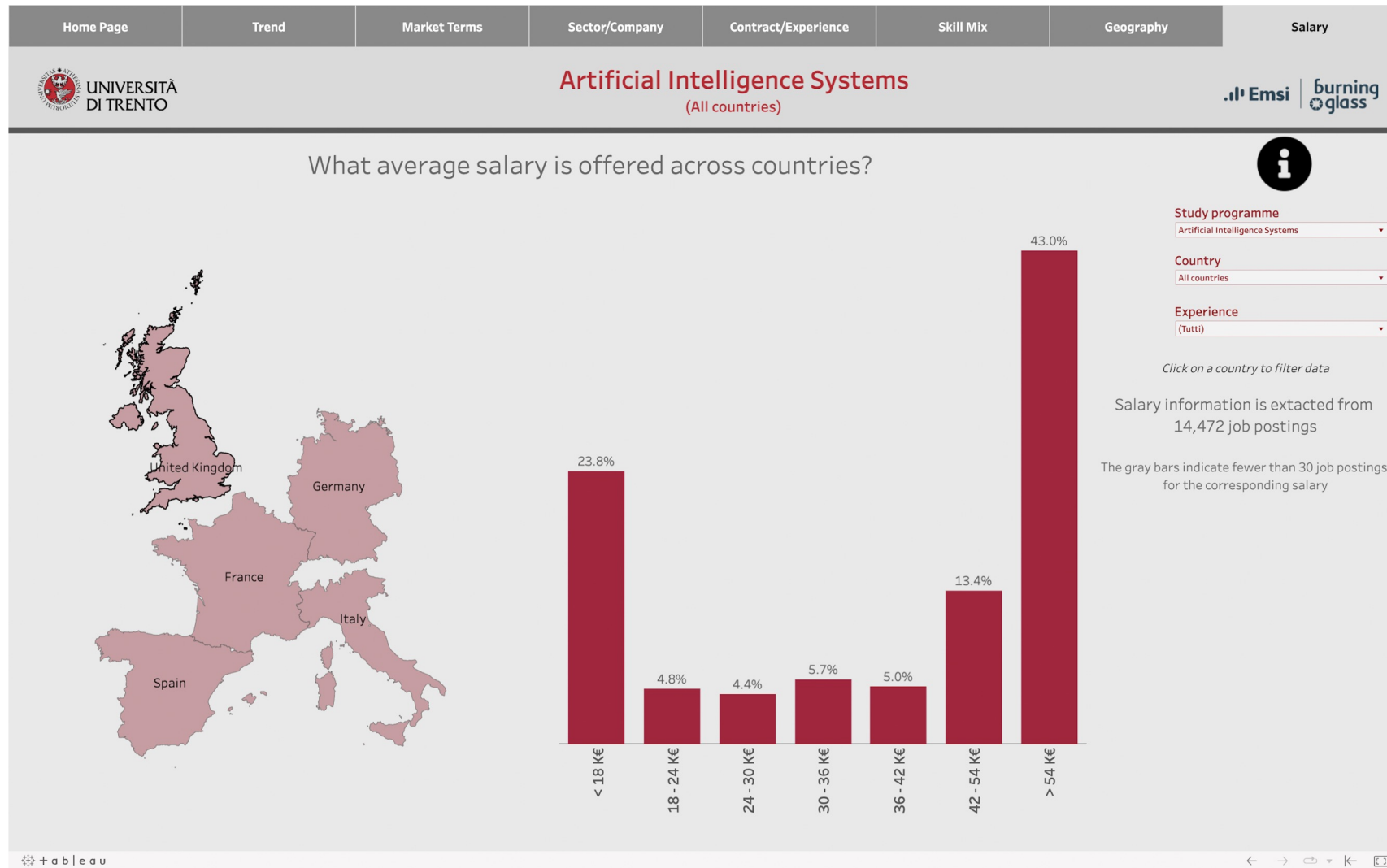
Geographical distributions



Skills, qualifications and labour market information: innovative data and methods.



Salary



Skills, qualifications and labour market information: innovative data and methods.



LMI for education – Employability Explorer Summary

PROGRAMME ALIGNMENT

- Monitor the level of employability of current HEIs courses, by highlighting skills and job profiles needed by companies;
- Provide annual update to professors responsible for the planning of HEIs courses, by revising the courses' official description document;
- Update HEIs course contents in accordance with the skills required by the labour market;
- Provide job-demand insights related to the qualification in a specific Country, in order to increase the internationalisation of the University.

CAREER SERVICE

- Provide curricula development services, according to skills and professional profiles mapped in the labour market;
- Promote guidance services to students, by highlighting geographical areas where skills/profiles are particularly in demand;
- Support students in choosing their studies, giving them a clearer view of learning outcomes and employment opportunities.

Examples of data platforms / data laboratories





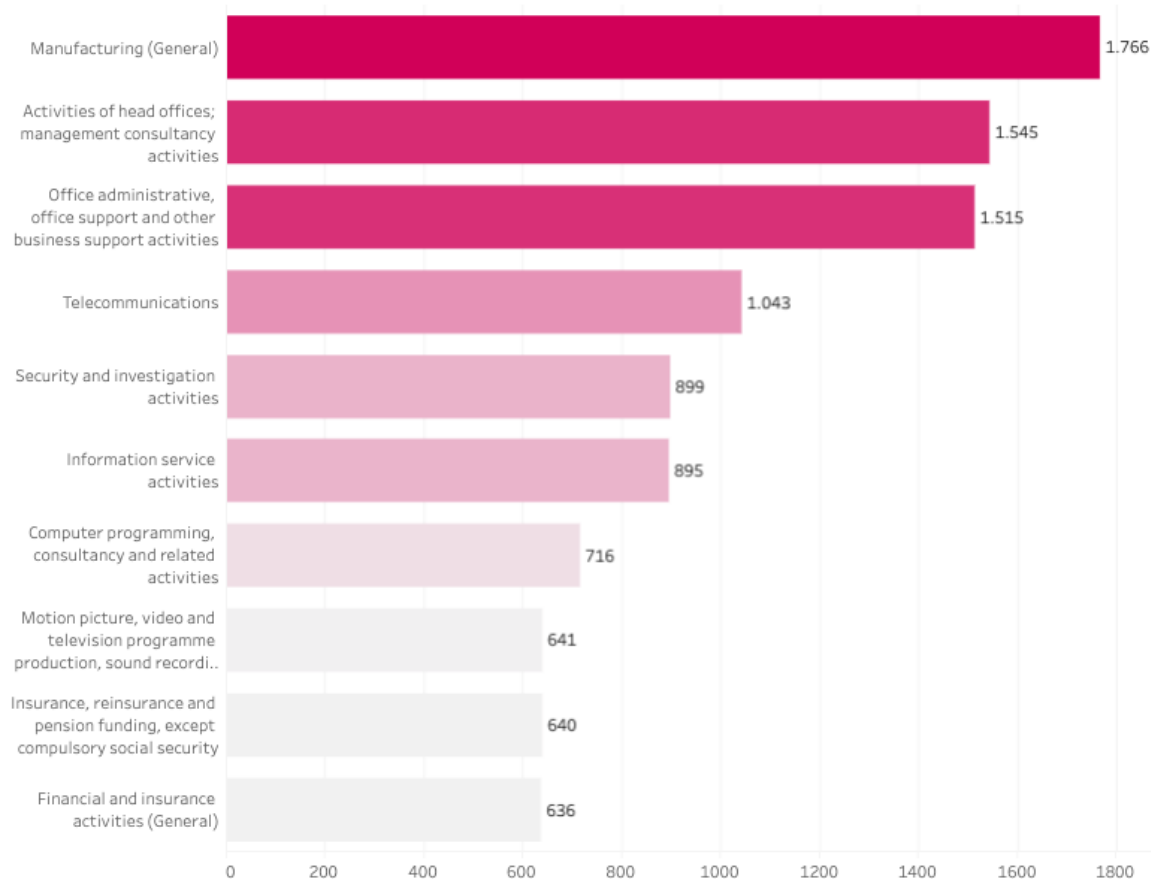
Topics

- **Big Data for LMI**
- **Snowcase of current LMI system based on Big Data**

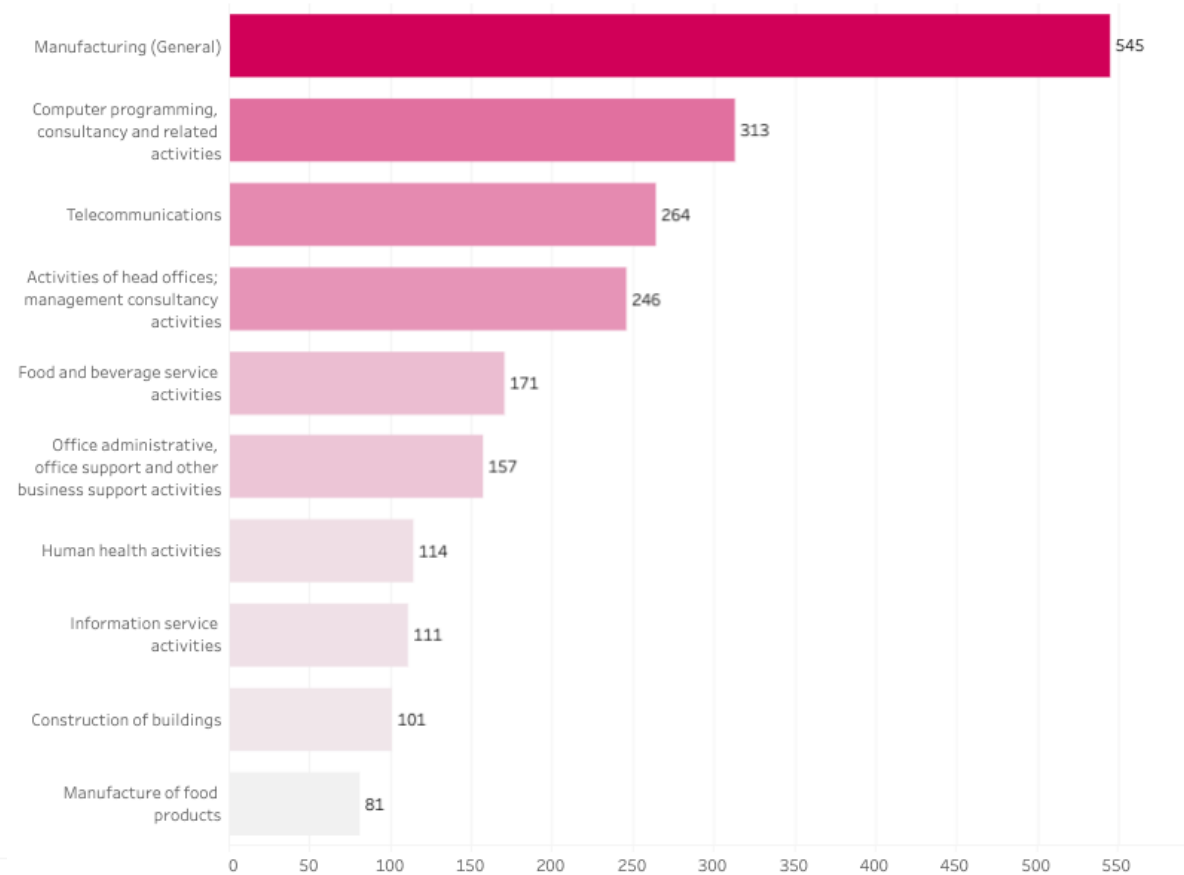


Industries Tunisia

Top 10 Industries (level 2)



Top 10 Industries (level 2)

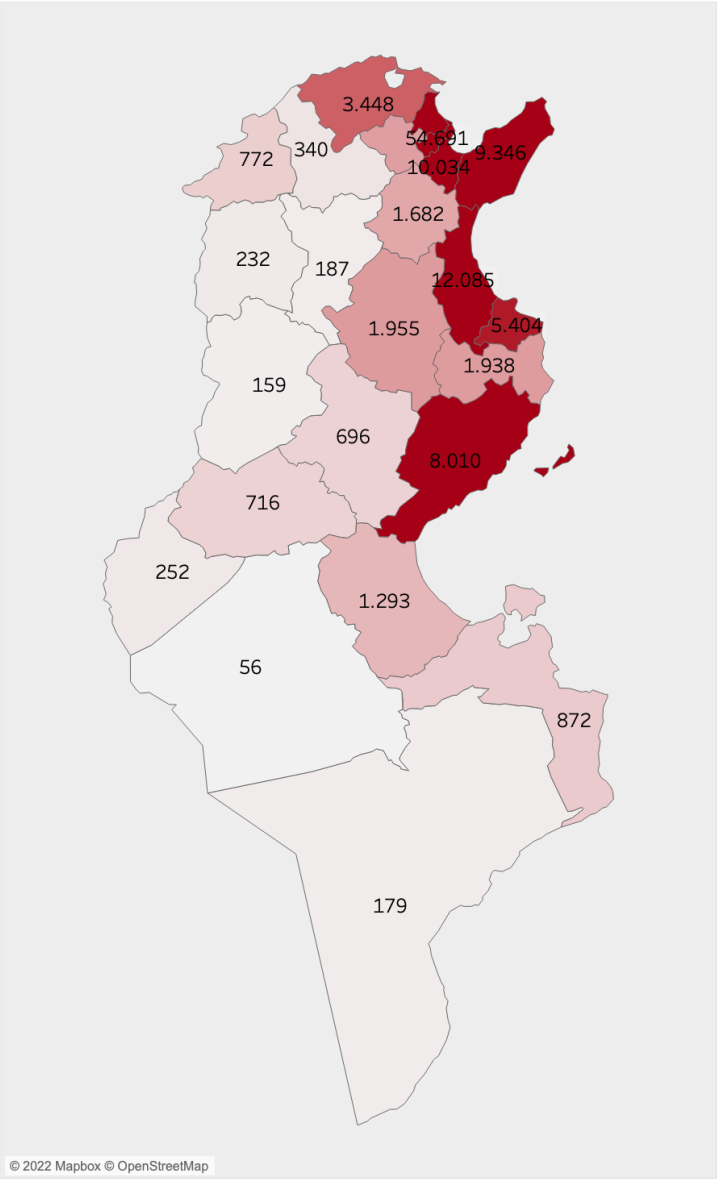


Skills, qualifications and labour market information: innovative data and methods.

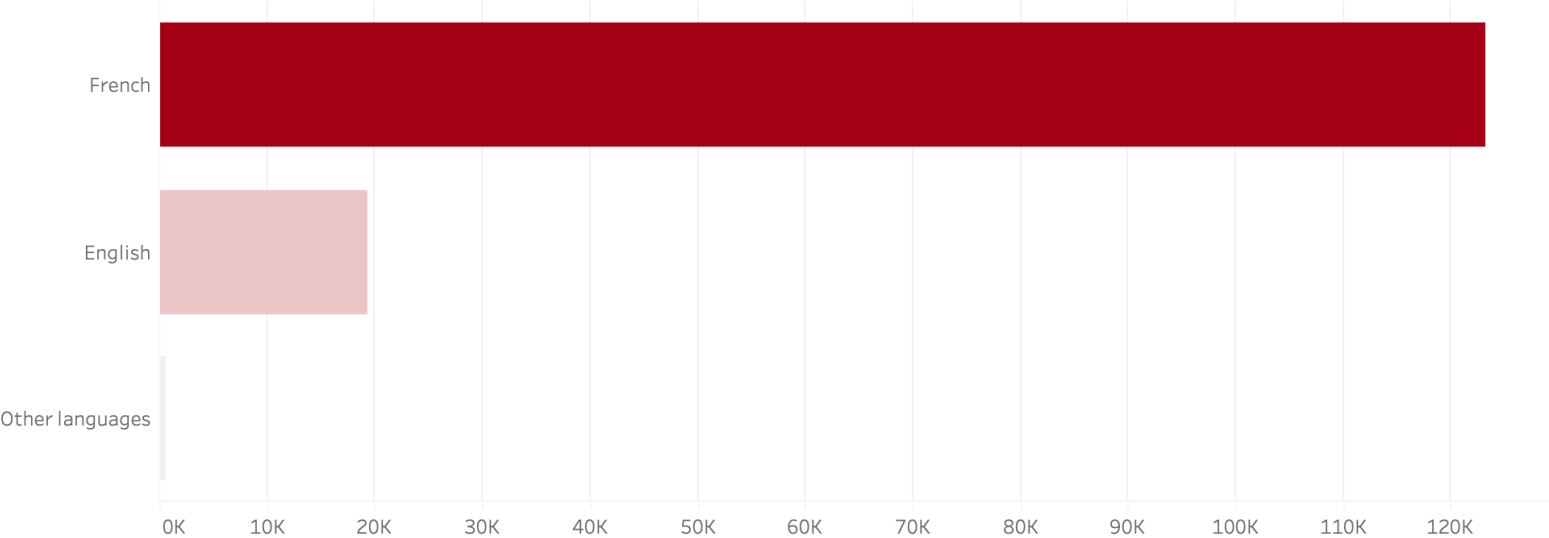


Location Analysis

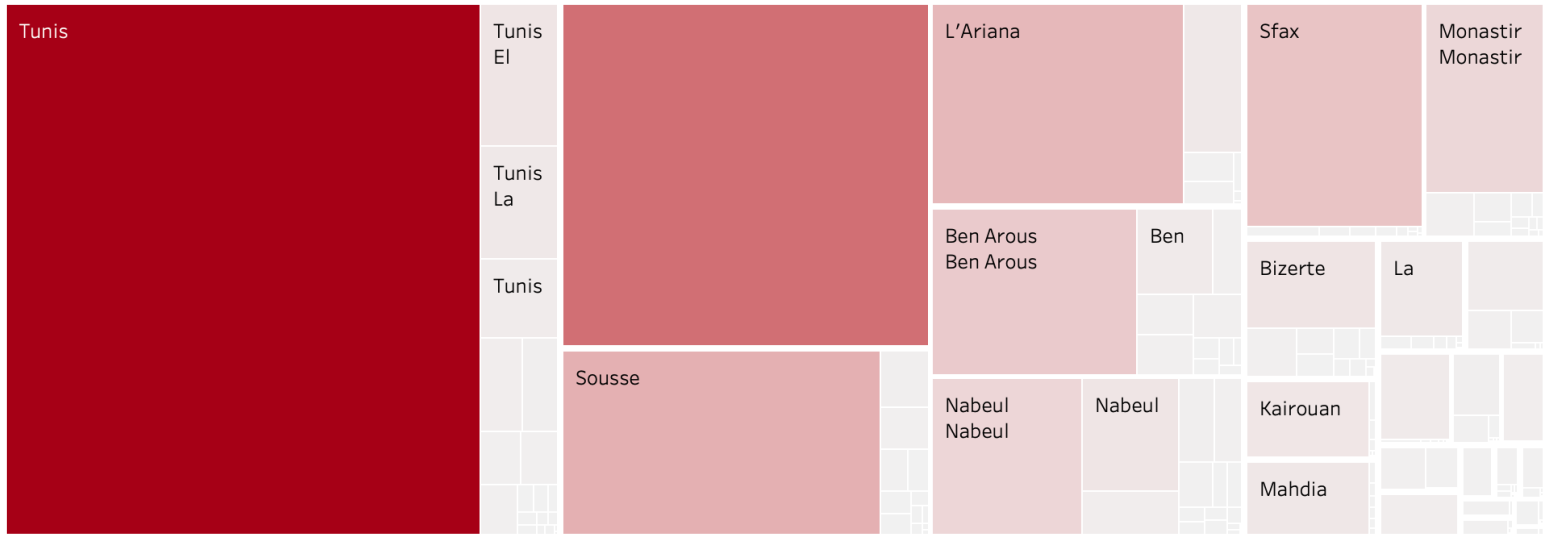
Location



Language

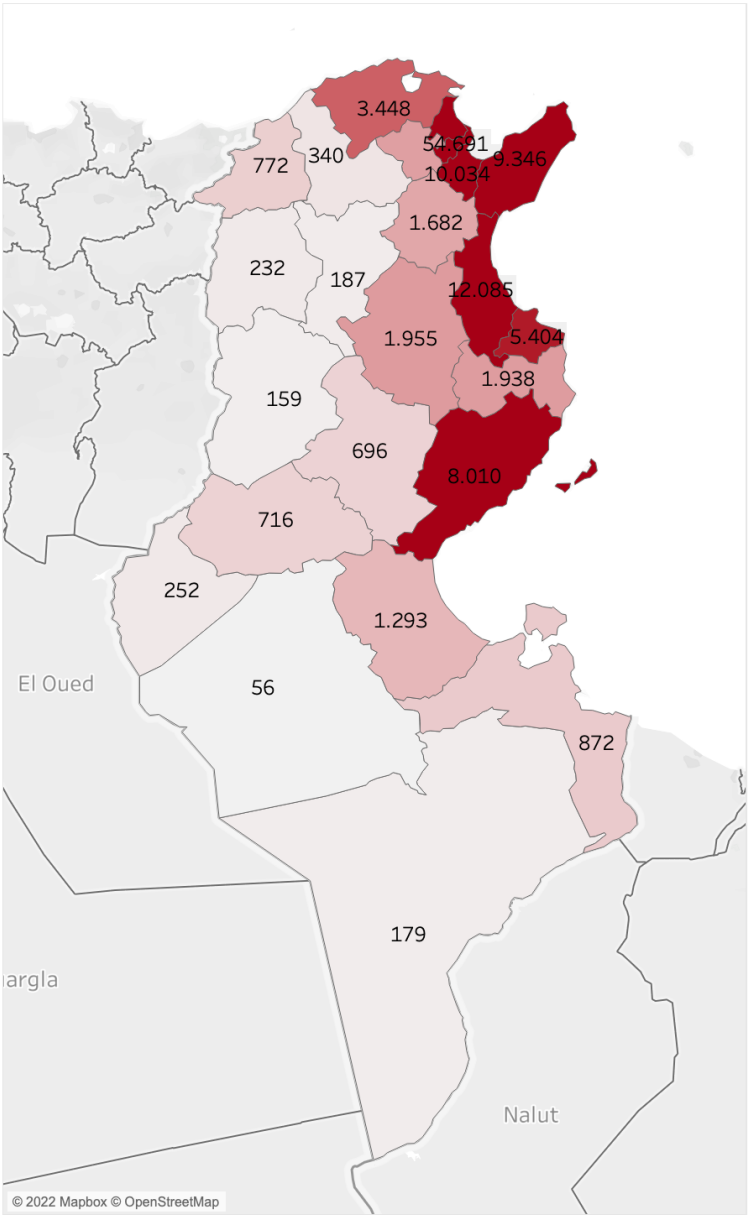


Province

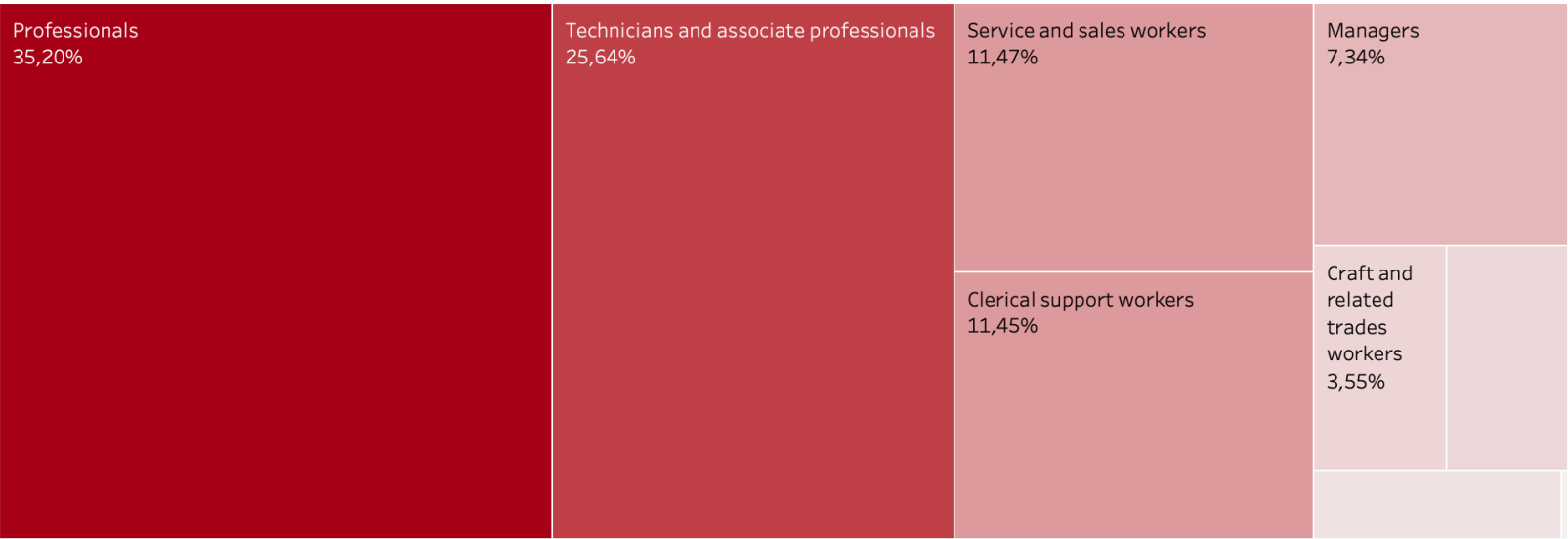


Occupation Analysis

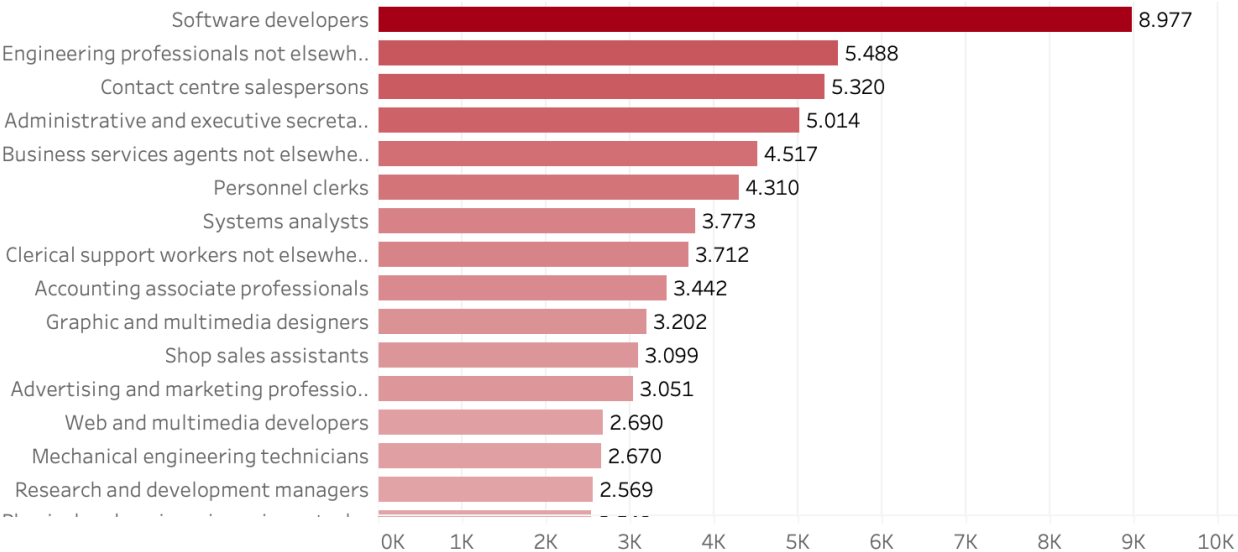
Location



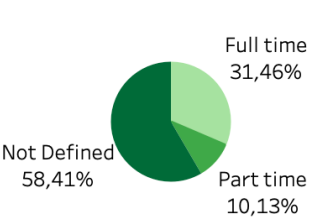
Occupation (level 1)



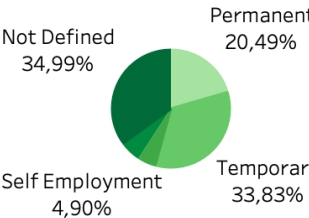
Occupation (level 4)



Working hours



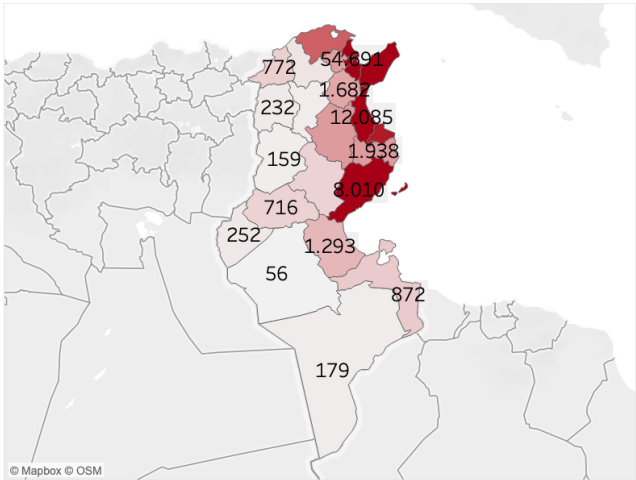
Contract



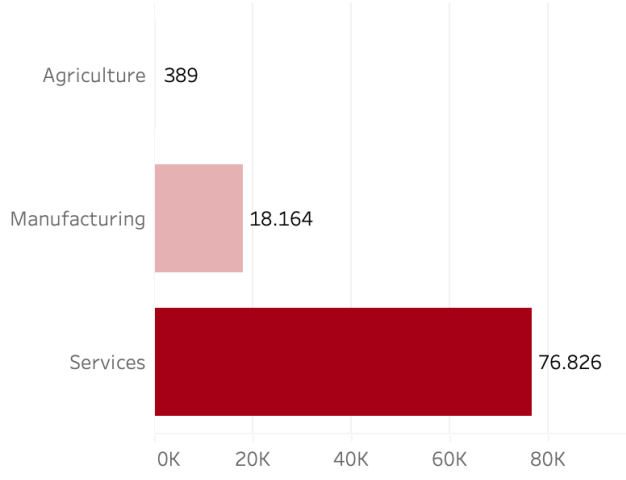
April 30, 2022

Industry Analysis

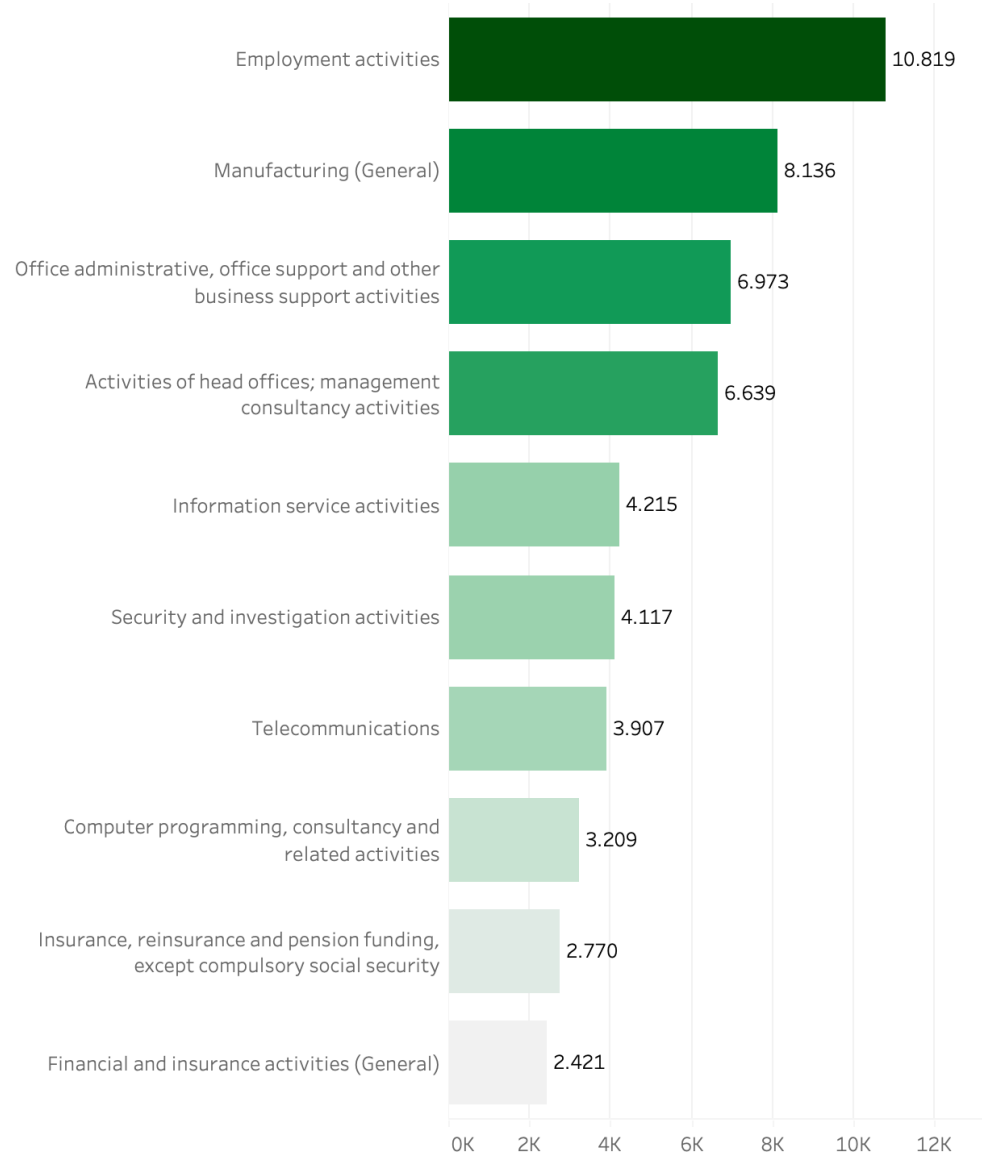
Location



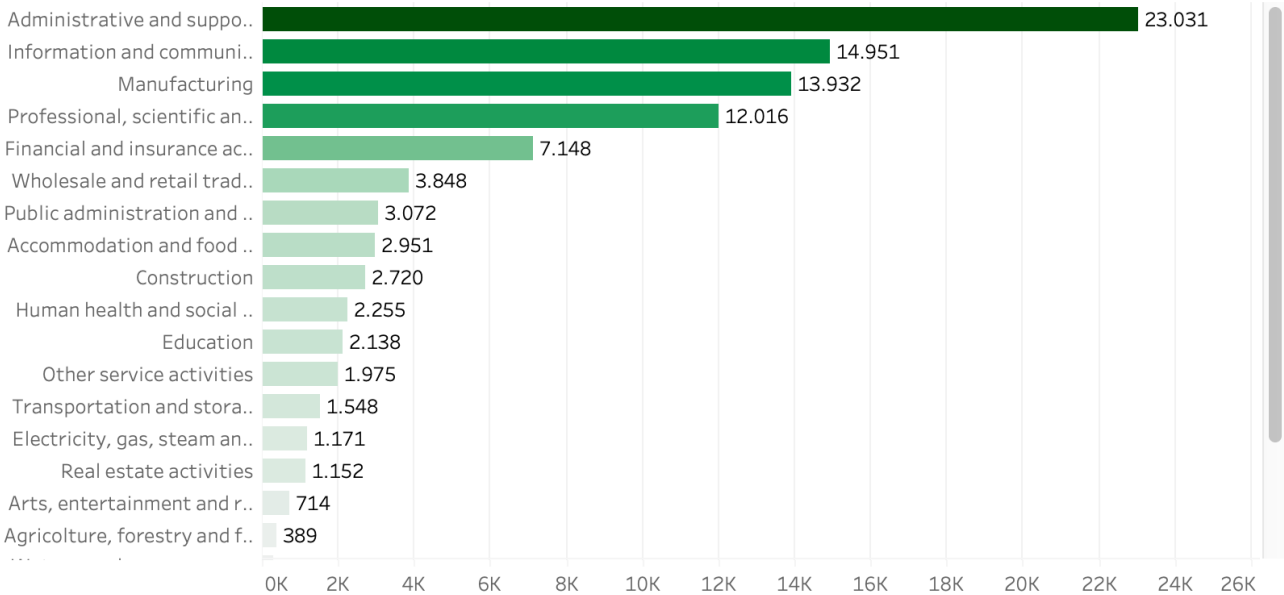
Industry (Macro level)



Top 10 Industries (level 2)

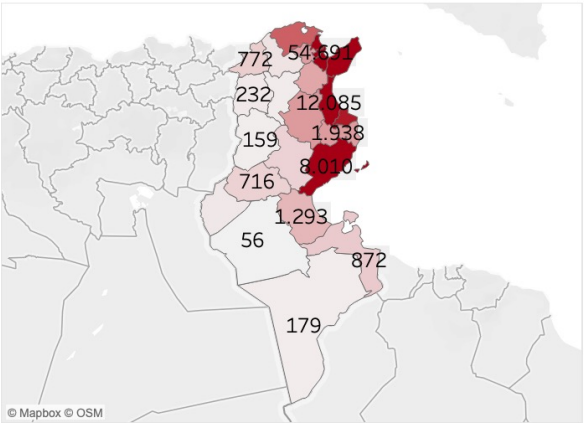


Industry (level 1)



Skills Analysis

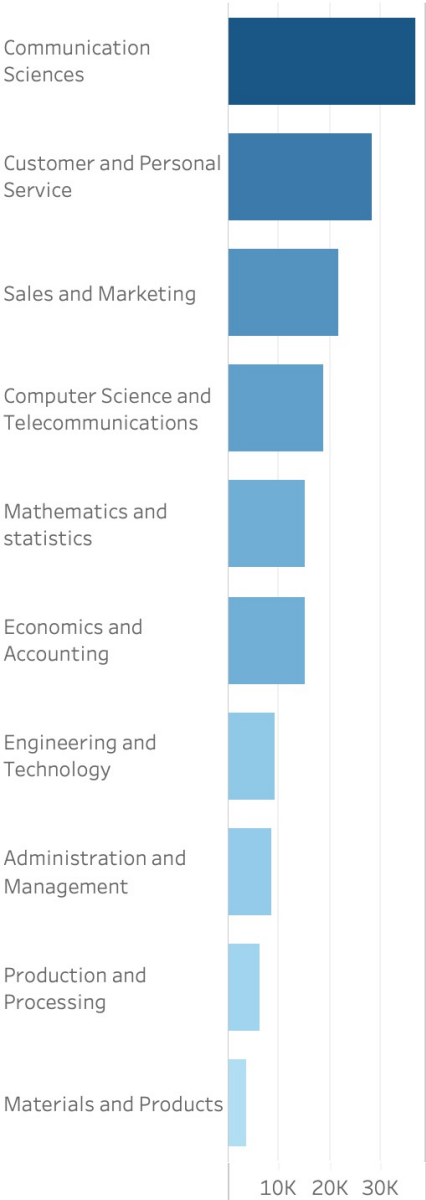
Location



Occupation (level 4)



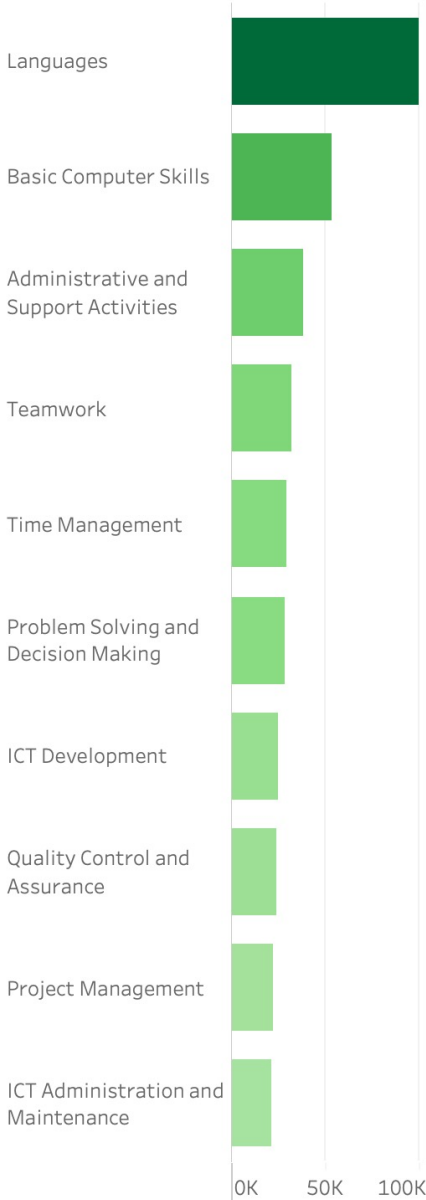
Knowledge



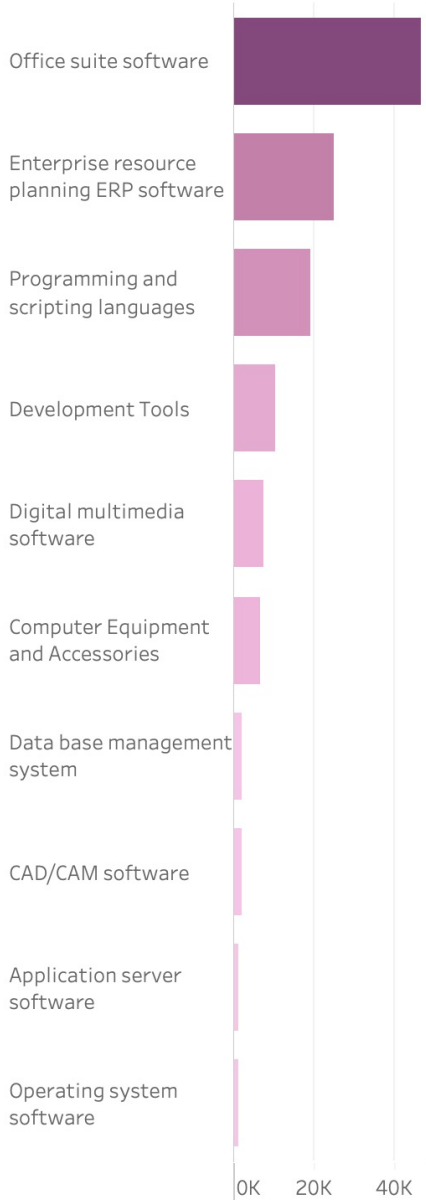
Personal qualities



Skills



Tools and technologies



Company Analysis

Source

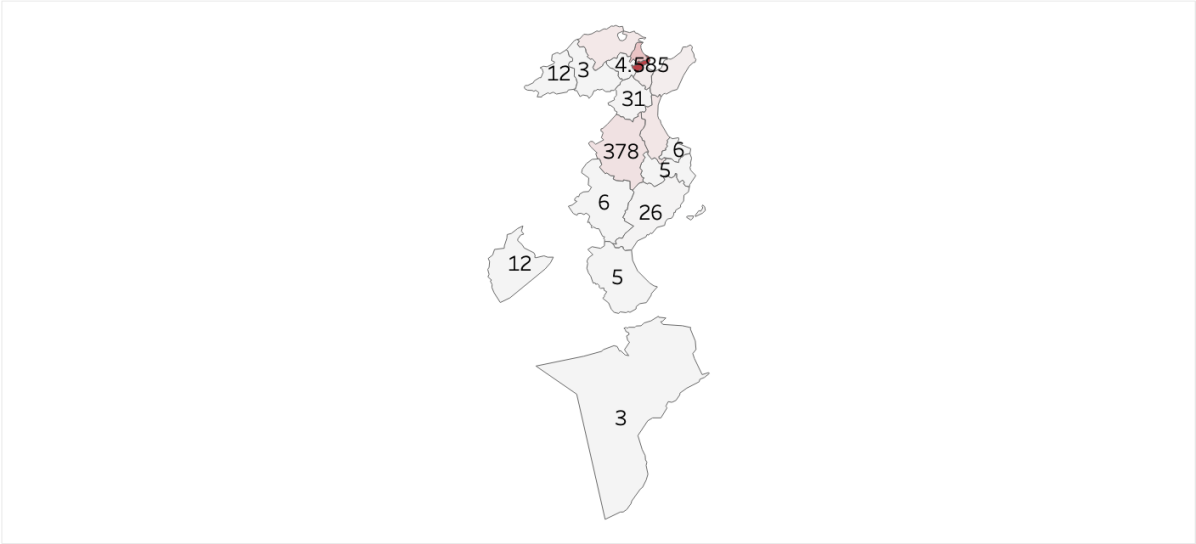
(All)

Release Date

April 1, 2020

April 30, 2022

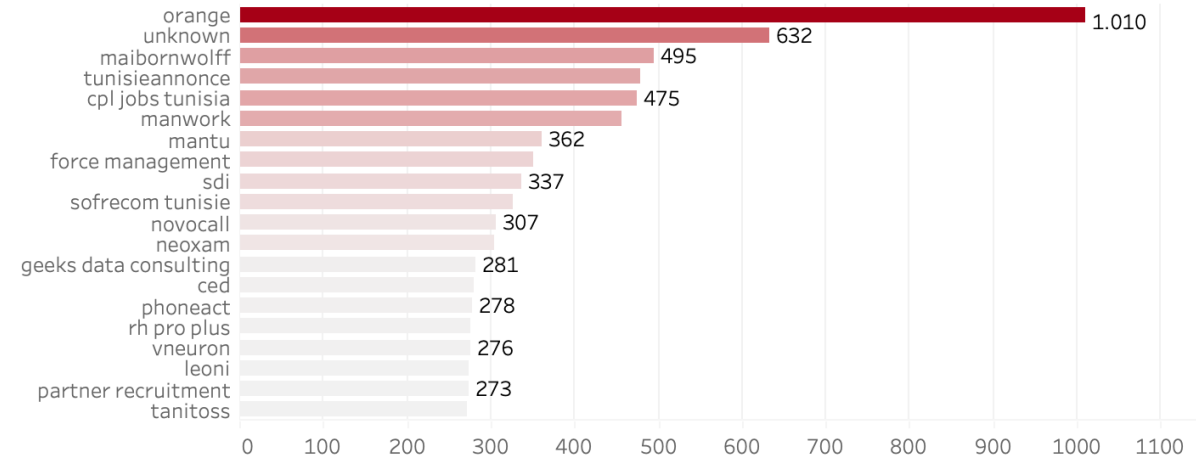
Location



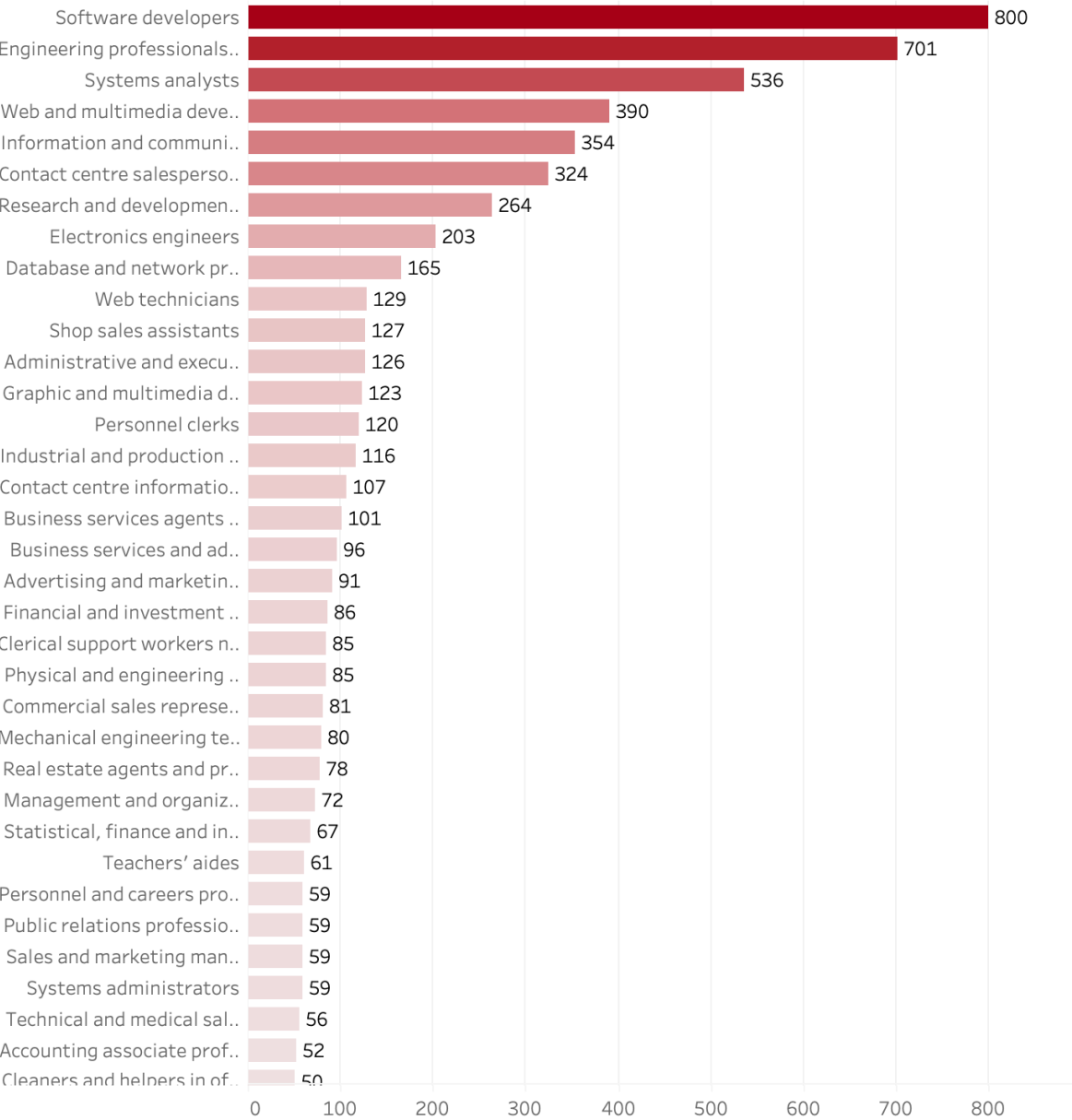
Setelct companies

(All)

Company focus



Occupation (level 4)



Microcredentials Backed by In-Demand Skills

Cloud Computing

Offer **cloud computing** skills to current workforce in data modeling and warehousing, marketing, and business applications (e.g Hadoop, Hive, Spark, Docker, Azure, MongoDB, Amazon Elastic Compute Cloud).

Data Management

Offer **data management** microcredentials targeting business professionals, particularly accountants and business/financial analysts.

Actuarial Science

Offer microcredentials in **actuarial science** to targeted bachelor's degree holders in the insurance industry.

Data Warehousing/Modeling

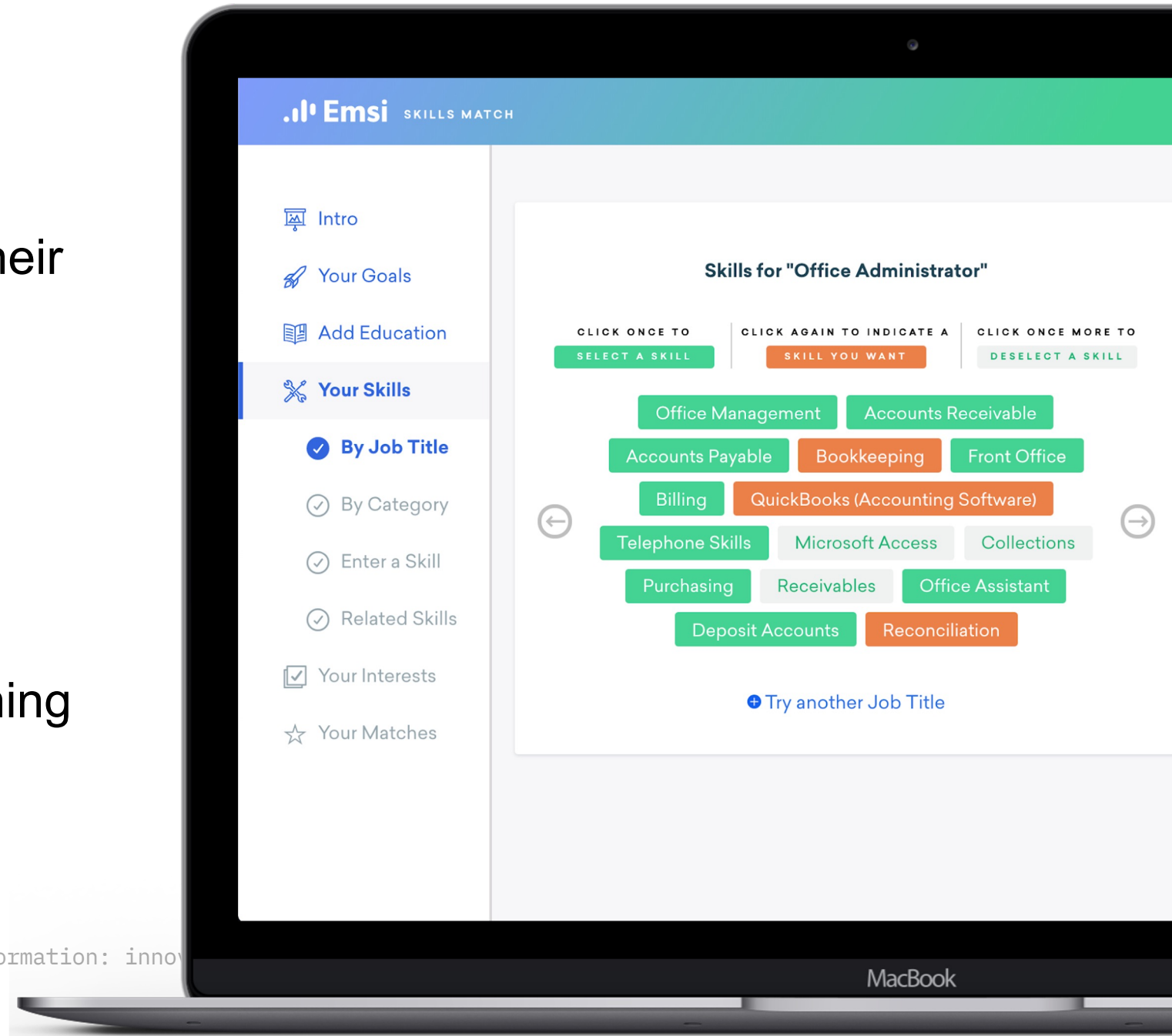
Offer specialized **data warehousing/modeling** skills to supply chain professionals.



Personalized Upskilling

- Help working adults inventory their skills
- Match them to jobs and identify skill gaps
- Recommend personalized learning paths for upskilling

Skills, qualifications and labour market information: innovation and methods.



Graduation

First Job

Second Job

Third Job

