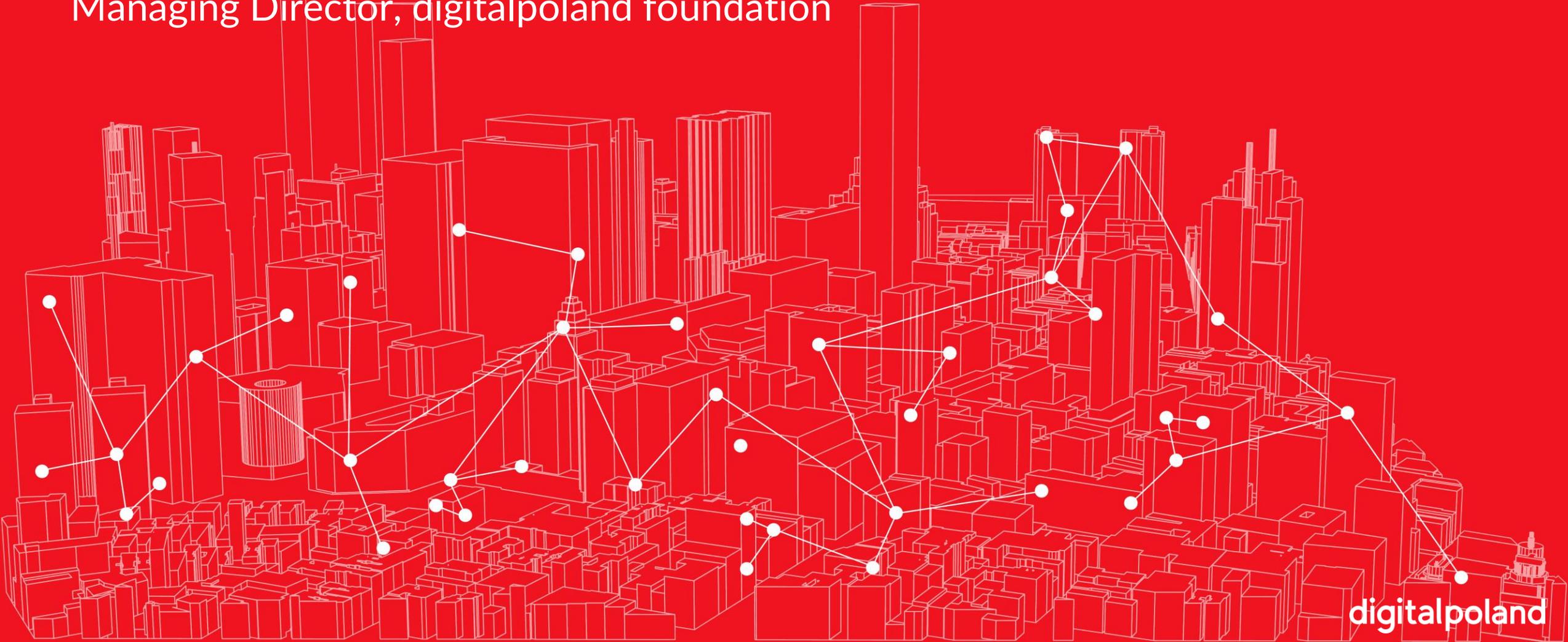


Do we have AI specialists and who needs them

Piotr Mieczkowski

Managing Director, digitalpoland foundation



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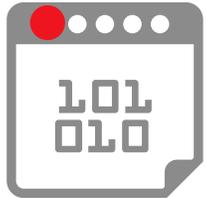
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- AI Experts in Europe and Poland
- Experience, Mobility, Skills
- Demand
- Women in AI



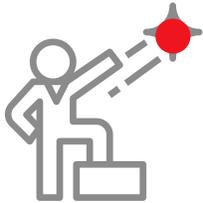
OUR DREAM

Poland is one of the leading
digital innovation centres in the world

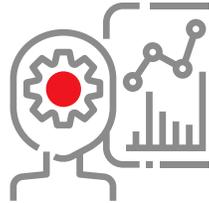
Example of our cross-industries initiatives



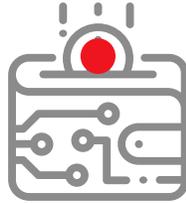
Digital Festival



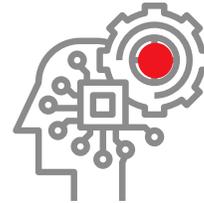
Digital Shapers



Digital Policies



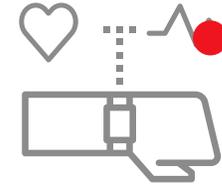
FinTech incubator



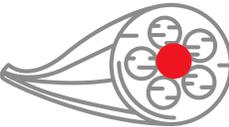
AI Hub
aipoland



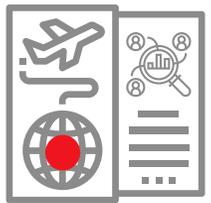
Smart Cities & buildings



eHealth



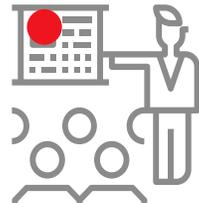
Digital Connectivity



Study Tours



Digital Marketing Hub



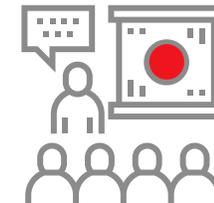
Digital CEO



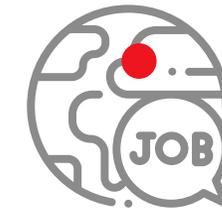
Startup Ecosystem



Digital Fitness



Digital Summit



Poland as a R&D Hub



Digital education

AI HUB | aipoland | Our experience

Support key policy-makers



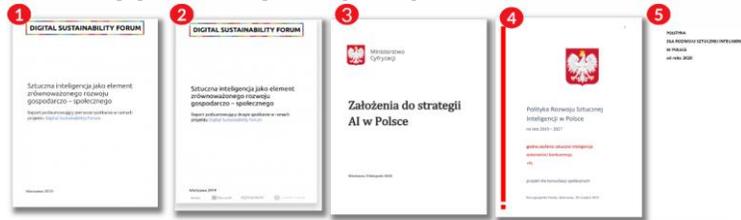
Think Tank | AI Research



AI Academy for managers



Support AI policy key documents



Co-creation of Applied AI grants



Support Polish AI Roadmap



Roundtables | digital policies

DIGITAL SUSTAINABILITY FORUM

ROUNDTABLE #1:
Sztuczna inteligencja jako element zrównoważonego rozwoju gospodarczo - społecznego

14 Grudzień 2018
digitalpoland | Microsoft |



E-learning

Witaj na internetowym kursie „Elements of AI”!

Dołącz do ponad 620,000 osób uczących się podstaw sztucznej inteligencji.

Wybierz kraj:  Polska

Rozpocznij kurs →



OTWARTA
Brak ograniczeń odnośnie rodzaju sztuki, metody pracy, czy stylu. Pełna kreatywność dozwolona!

NOWA
Nowe, unikalne dzieła stworzone z wykorzystaniem Sztucznej Inteligencji. Wykorzystał algorytmy i stworzył zupełnie niepowtarzalne dzieło sztuki.

METAMORFOZY / TRANSFORMACJE
Artystyczna interpretacja znanych utworów i obrazów. Nadaj známym dziełom swojego niepowtarzalnego charakteru.

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- AI Experts in Europe and Poland
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- Demand
- Women in AI



AI experts in Poland | publications

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PARTNERZY:

accenture

Microsoft

SZTUCZNA INTELIGENCJA W POLSCE

Kompetencje
ekspertów **AI**

Published in 2020



12th April 2021
New!

[Link to event](#)

State of Polish AI 2021
aipoland digitalpoland i0SENSES

ZOOM
EVENT
12.04.2021

AGENDA

- 11:00 – 11:05 | OPENING | PIOTR MIECZKOWSKI | DIGITAL POLAND FOUNDATION
- 11:05 – 11:25 | STATE OF POLISH AI 2021 RESULTS | ŁUKASZ BOROWIECKI, PIOTR MIECZKOWSKI | 10 SENSES, DIGITAL POLAND FOUNDATION
- 11:25 – 11:35 | AI POLICY | JUSTYNA ORŁOWSKA | KPRM
- 11:35 – 11:45 | AI GRANTS & SCIENCE | PROF. PIOTR SANKOWSKI | NCBR
- 11:45 – 11:55 | AI TECH | PIOTR LEWALSKI | NVIDIA
- 11:55 – 12:05 | USES OF AI IN EUROPEAN ECONOMIES | ŁUKASZ MARC | WORLD BANK
- 12:05 – 12:15 | FINDINGS FROM GERMAN AI ECOSYSTEM | ANDREAS LIEBL | APPLIED AI
- 12:15 – 12:25 | AI R&D | ARTUR WUJICKI | TOMTOM
- 12:25 – 12:35 | AI OBSERVATORY | WERONIKA KUNA, ZBIGNIEW GAJEWSKI | MICROSOFT, THINK TANK

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- AI experts in Poland | publications

- **AI Experts in Europe and Poland**

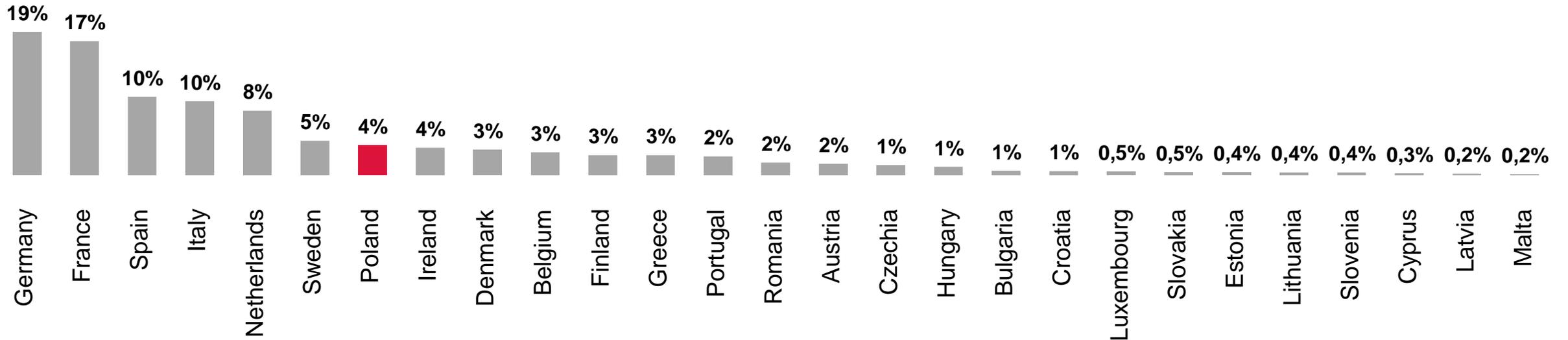
- Experience, Mobility, Skills
- Demand
- Women in AI



AI specialists by country

- Germany and France are two countries most abundant with AI specialists. Together, they have over a third of all specialists working in the EU.
- Poland comes in 7th place with a 4% share of AI talent pool and at the same time the 1st place in the entire CEE region

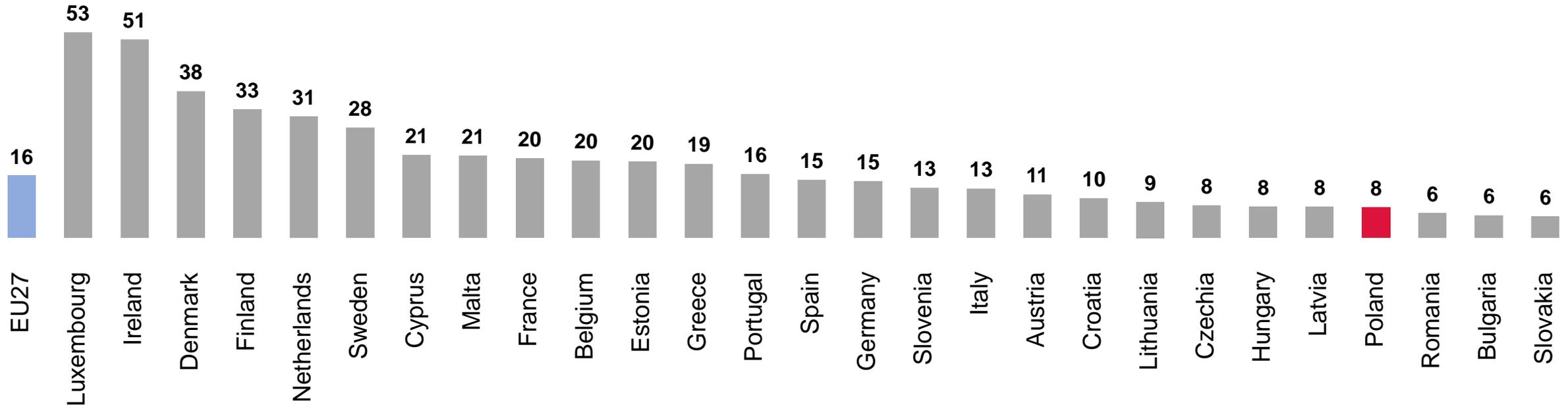
AI specialists – split by country



AI intensity in workforce

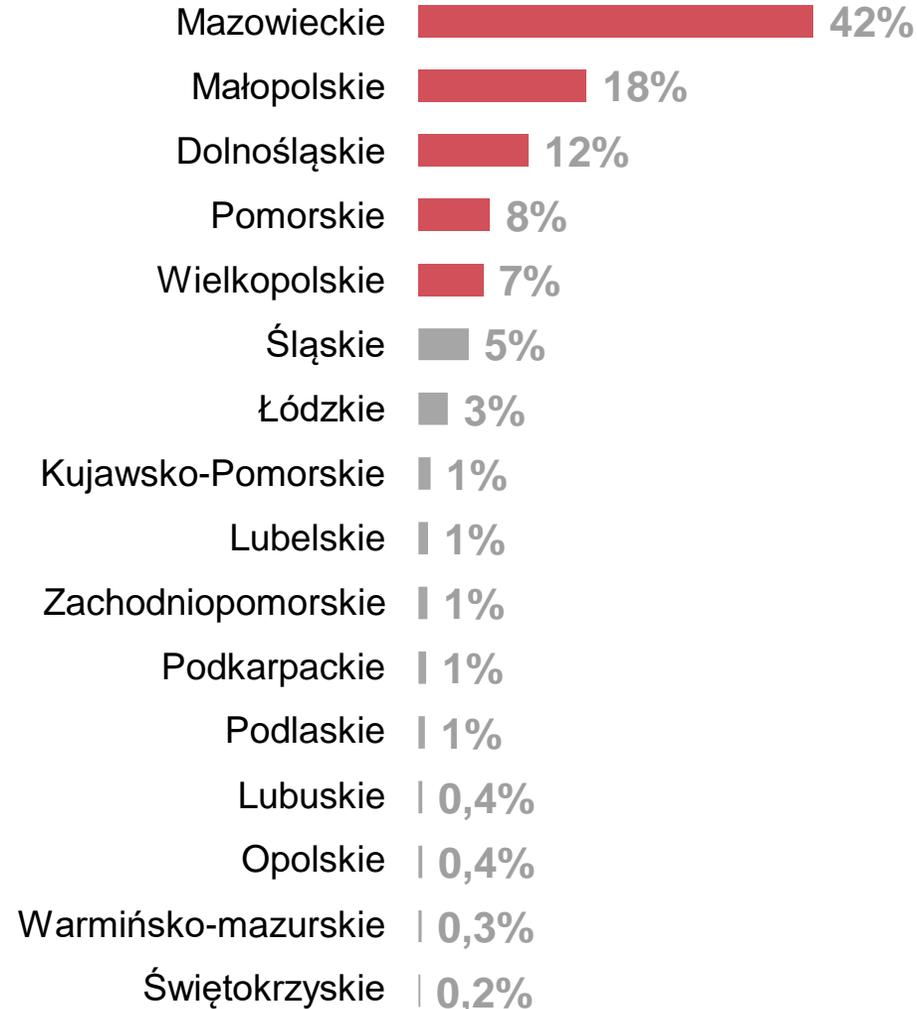
- Countries with the highest rate of AI specialists in the workforce are Luxembourg and Ireland. Both these countries have over 50 AI specialists per 10 000 economically active people in the population.
- Poland with 8 AI specialists per 10 000 workers fares pretty poorly compared to other EU countries. However, comparable countries such as Czechia, Hungary or Slovakia have a similar outcome. Poland has 40% AI intensity of Estonia, the digital leader of our region.

AI specialists – per 10 000 active population



AI specialists in Poland by region

AI specialists in Poland – split by region



- The regions with highest number of AI specialists are the ones with large agglomerations.
- Nearly a half of AI specialists in Poland live in mazowieckie region (capital of the region is Warsaw).
- Other regions are małopolskie (Kraków), dolnośląskie (Wrocław), pomorskie (Gdańsk, Gdynia, Sopot), wielkopolskie (Poznań).

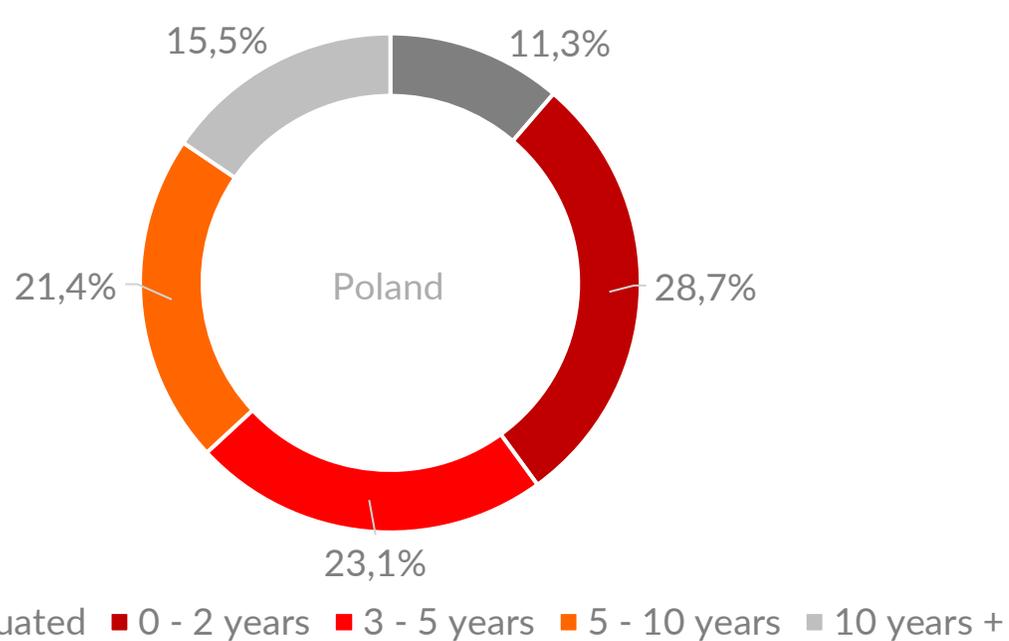
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- **Experience, Mobility, Skills**

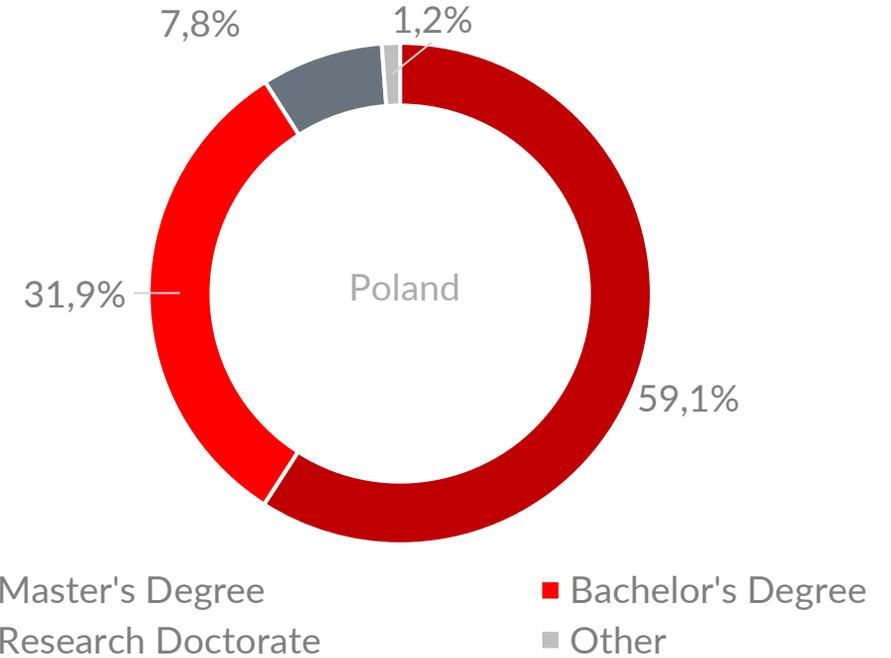
- Demand
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AI in Poland is based on young professionals

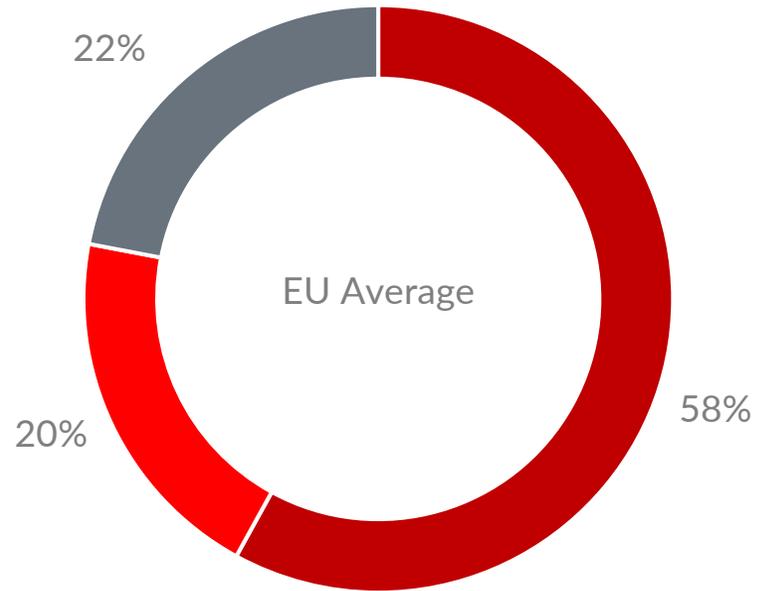


- 63.1% of AI specialists have a maximum of 5 years of professional experience, while only 15.5% of specialists - over 10 years.
- For some of the more experienced professionals, this may mean the need (and a chance) to learn AI or even start a new career path.

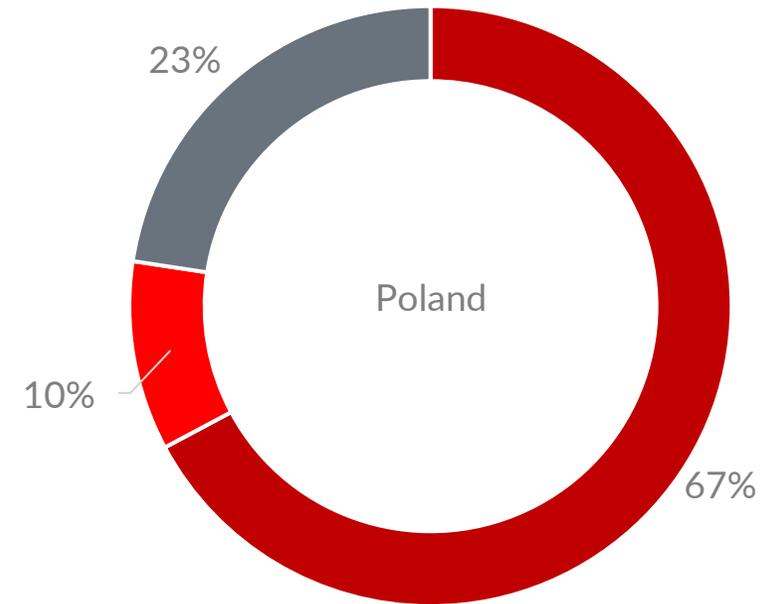


- Most specialists (almost 60%) have a master's degree, and 8% - a doctoral degree.**
- AI is demanding in terms of competences - almost half of the companies participating in the "Map of the Polish AI" survey employed at least one person with a PhD degree.

Open to work outside the country of study



The labor market for AI practitioners is inherently **international**: almost half (42%) of AI experts in the European Union have studied at a university that is not in the same country where they currently work.

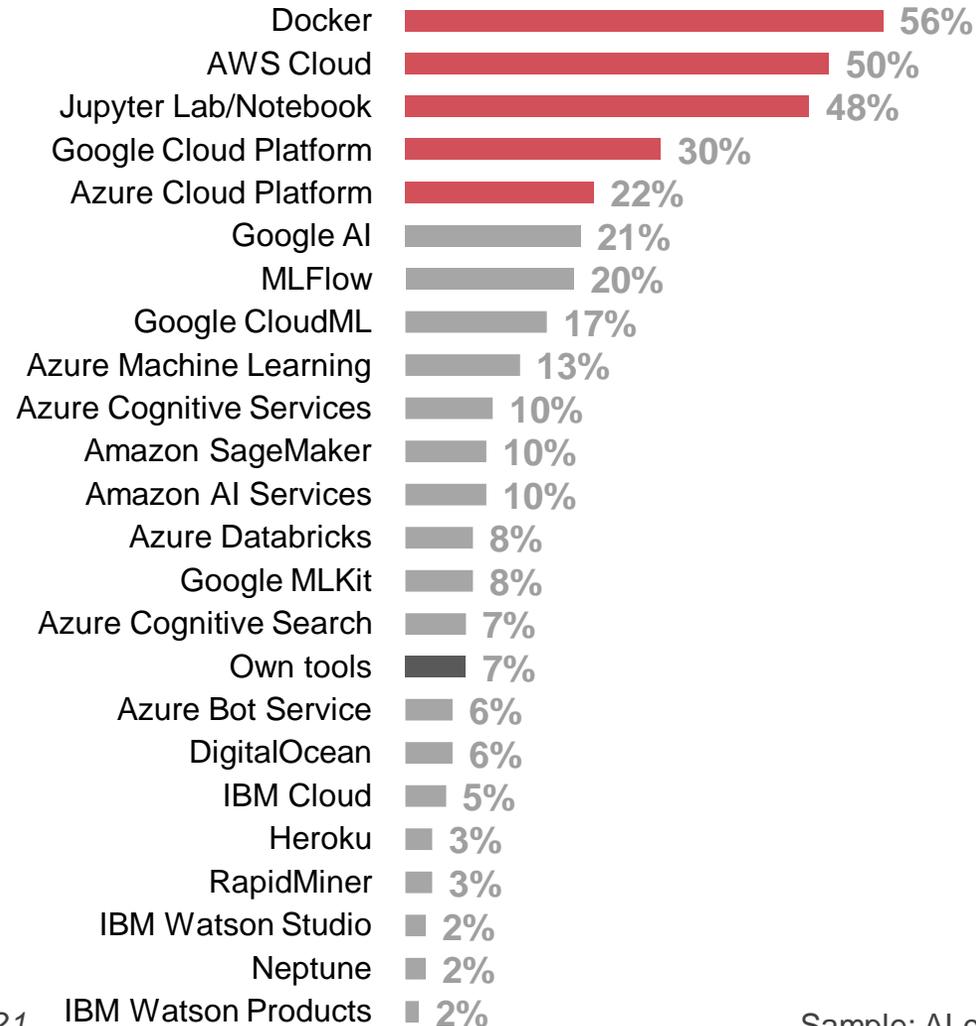


In Poland, more AI practitioners than the European Union average work and study locally (over 67.2%).

AI tools and products used

Which of the following tools and products do you use?

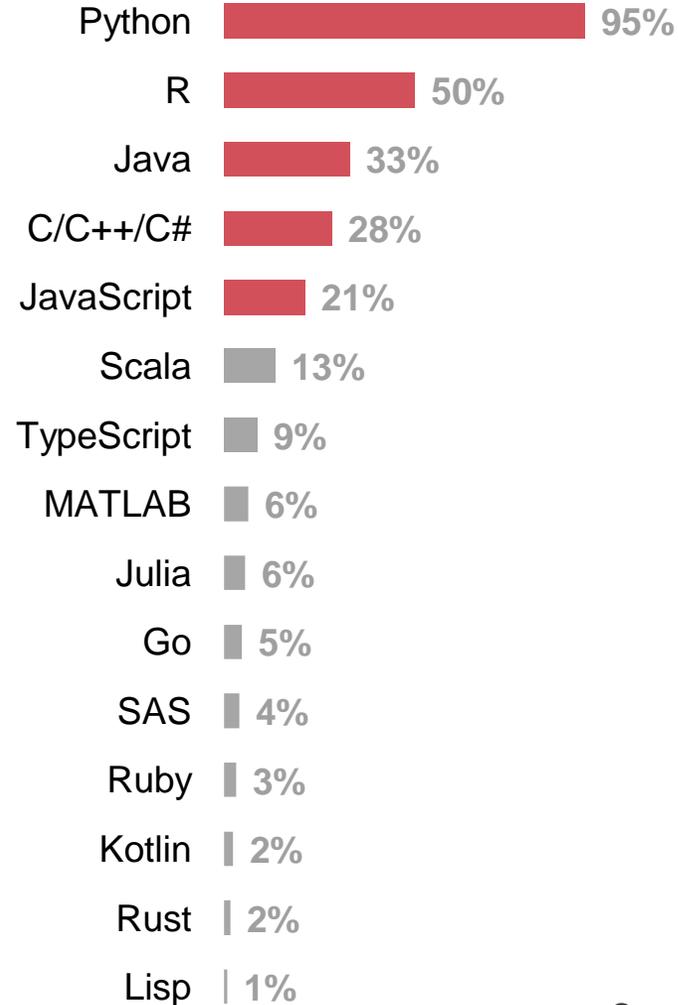
Select each correct answer



- The toolkit of AI developers relies on Docker virtual environment (56% of AI teams use it) and Jupyter notebooks (48%).
- Among cloud platforms Amazon's AWS is the leader with 50% of AI teams. Platforms from competitors trail behind with 30% of developers using Google platform and 22% using Azure.
- Among pre-packaged AI tools Google leads with Google AI (21%) and CloudML (17%).

AI languages used

What languages do you use in developing artificial intelligence?
Select each correct answer

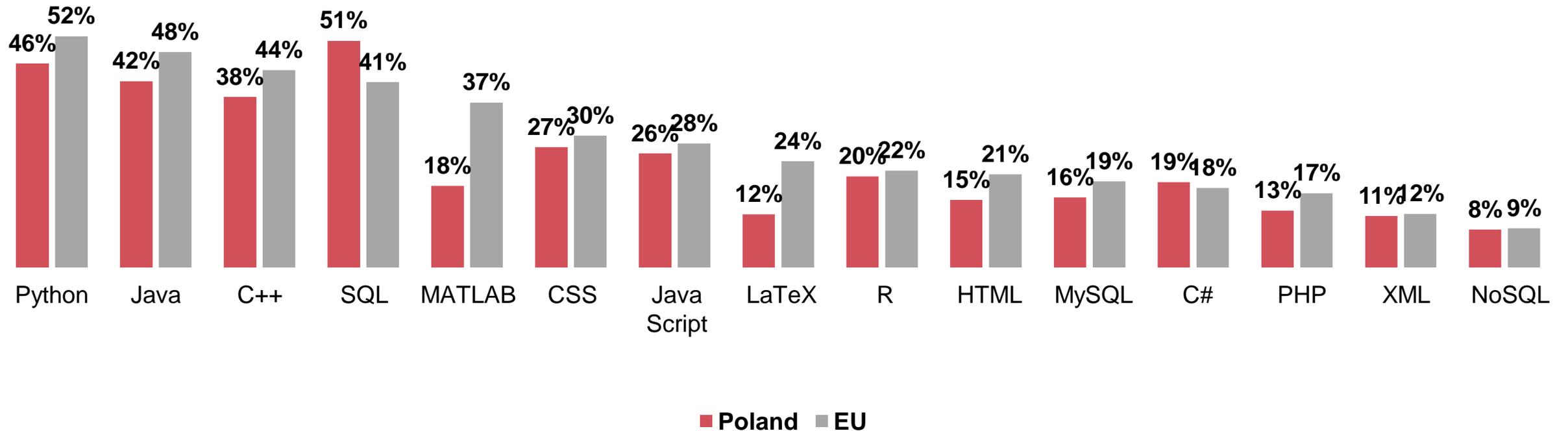


- Python is the dominant language when it comes to developing AI – 95% of companies use it. R comes second with 50%.
- Other languages are also being used, e.g. for building frontend, backend or embedding services on devices. As such, Java is used by 33% of companies, C/C++/C# by 28% and JavaScript by 21%.
- Low usage of Swift and Kotlin suggests that AI is still not often embedded in smartphones.

AI languages used | LinkedIn profile

- Looking onto linkedin profiles, there seems to be not much of a difference between a Polish AI specialist and an EU-average.
- However, a significantly smaller share of specialists in Poland declare skills in MATLAB or LaTeX.

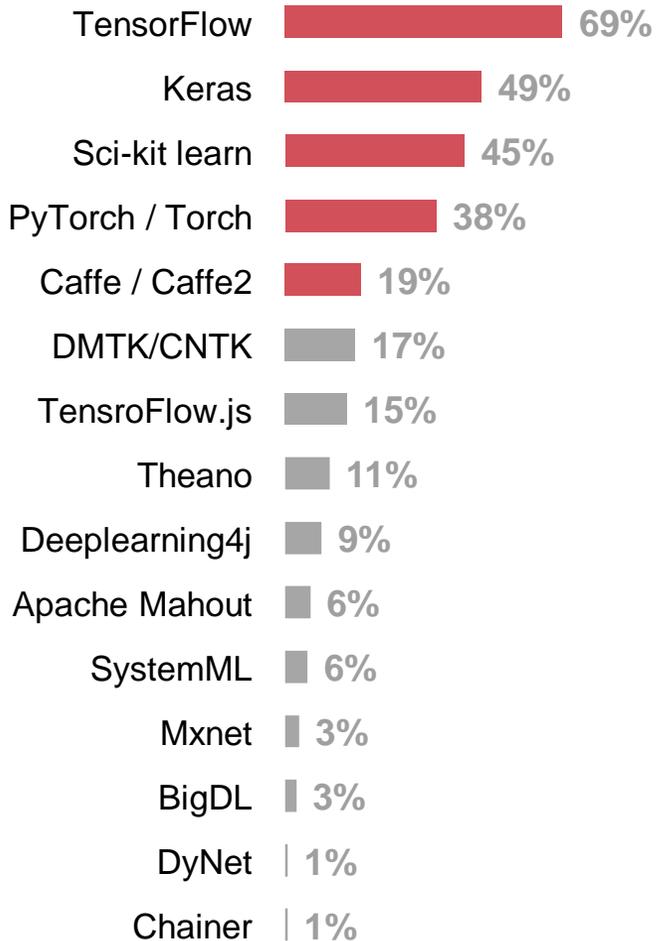
Skillset owned by AI specialists (self declared in linkedin profile)



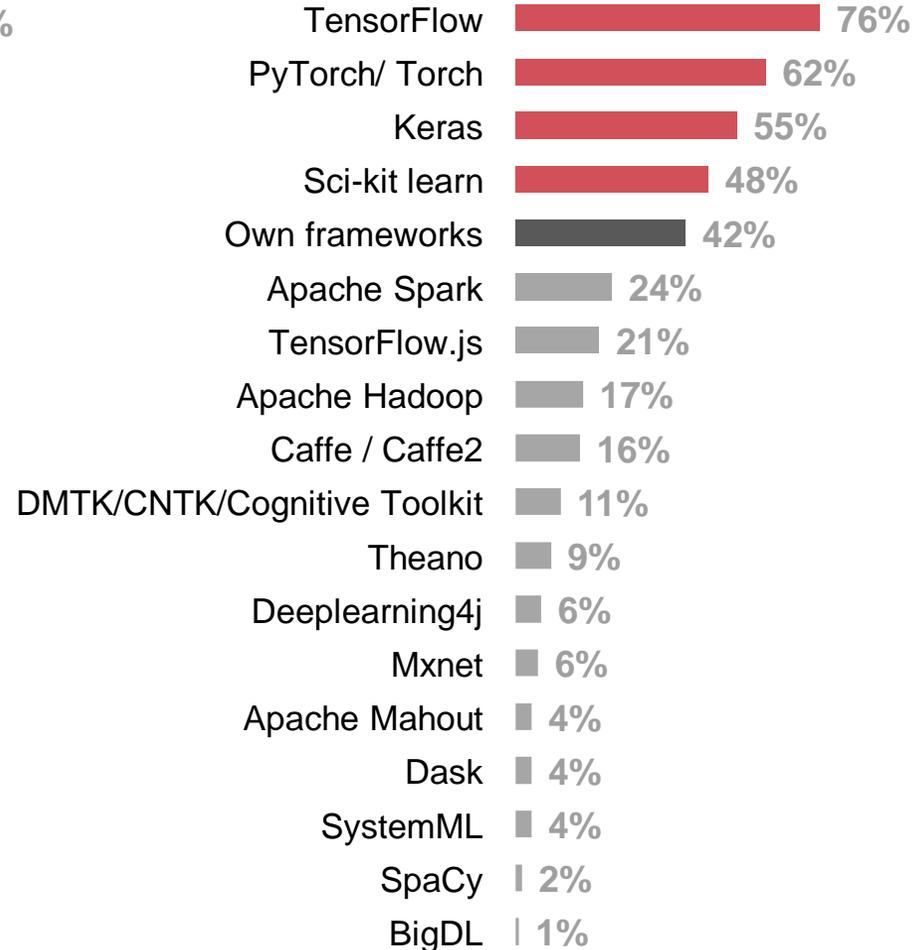
AI frameworks used

What frameworks/libraries do you use for artificial intelligence?
Select each correct answer

2019



2021

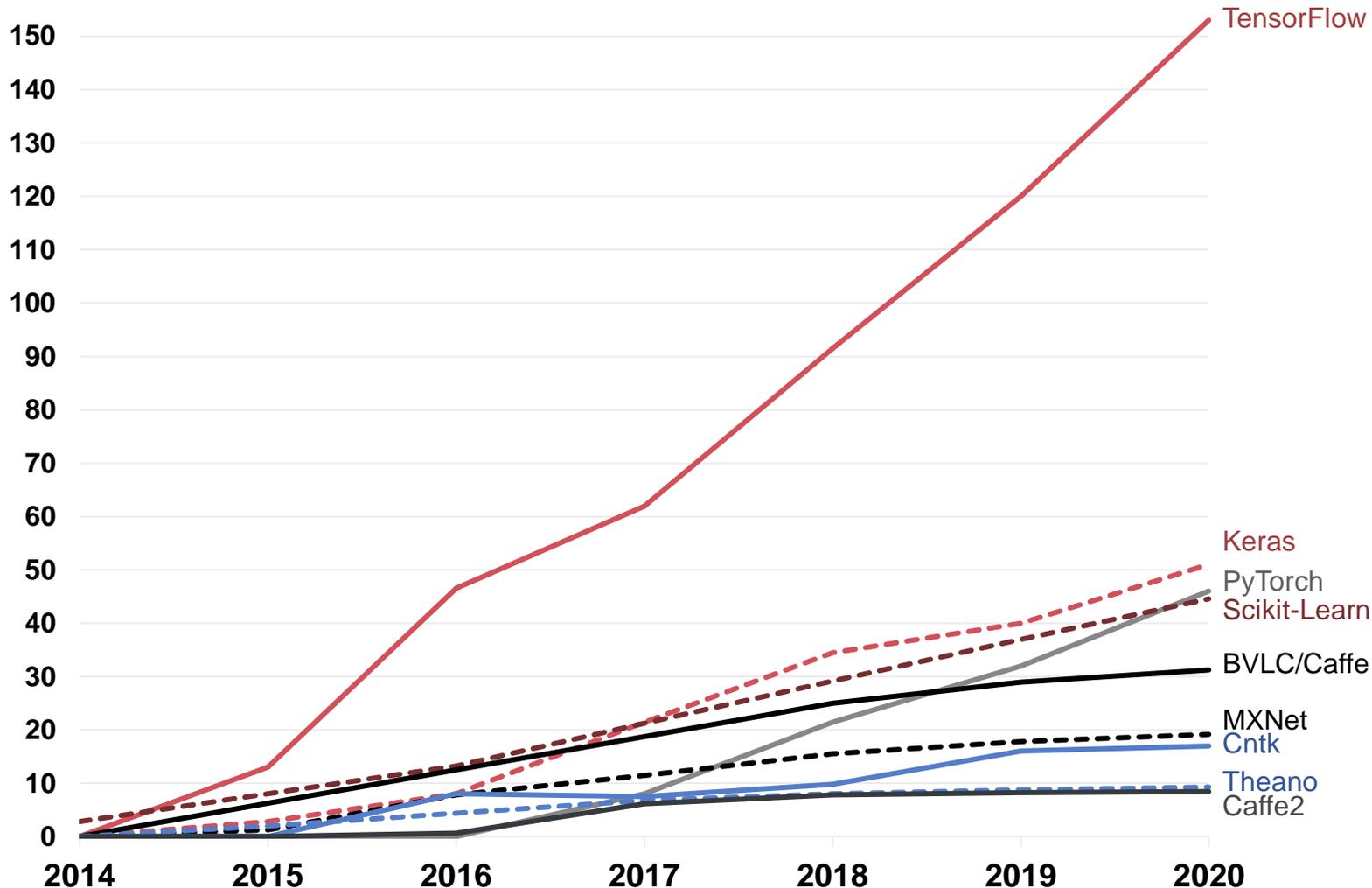


- TensorFlow is still the most popular framework.
- Compared with the 2019 edition of the report, PyTorch gained in popularity closing some gap to Tensorflow and overcoming Keras.
- Importantly, 42% of AI teams declare using their own frameworks.

Sample: AI companies,
corporations & academic teams

AI frameworks popularity | GitHub

Number of GitHub stars (in thousand)



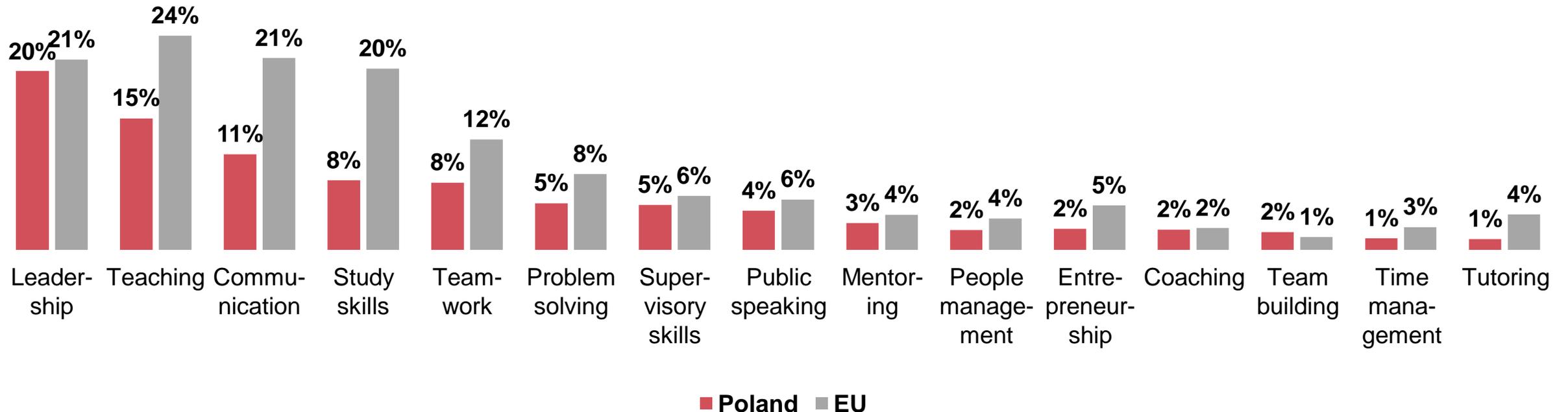
- GitHub users can use stars to mark projects they find valuable or which they are interested in. For this reasons stars can be used as a measure of popularity of different AI frameworks.
- The results show that TensorFlow is the main framework currently used.
- Among other frameworks PyTorch received popularity in the recent years.

Source: GitHub (2020), in: Daniel Zhang, Saurabh Mishra, Erik Brynjolfsson, John Etchemendy, Deep Ganguli, Barbara Grosz, Terah Lyons, James Manyika, Juan Carlos Niebles, Michael Sellitto, Yoav Shoham, Jack Clark, and Raymond Perrault, "The AI Index 2021 Annual Report," AI Index Steering Committee, Human-Centered AI Institute, Stanford University, Stanford, CA, March 2021.

Soft skills | LinkedIn profile

- Polish AI specialists potentially exhibit a gap in certain soft skills. These are teaching, communication studying or teamwork.
- The numbers are based on linkedin profiles so are self-declared. However, may show a perceived lower importance of soft skills among AI specialists in Poland. This would not be surprising given that many are subcontractors tasked with developing solutions.

Skillset owned by AI specialists (self declared in linkedin profile)



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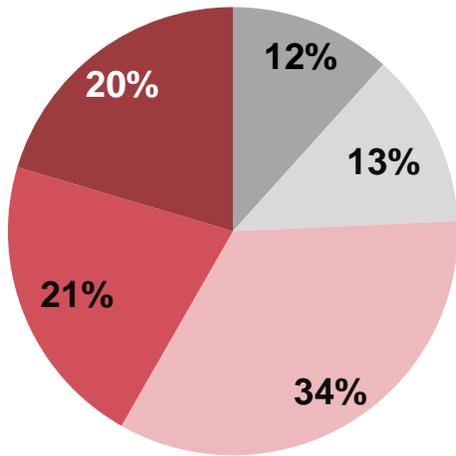
- **Women in AI**



Company size & number of AI specialists

How many people does your company employ?

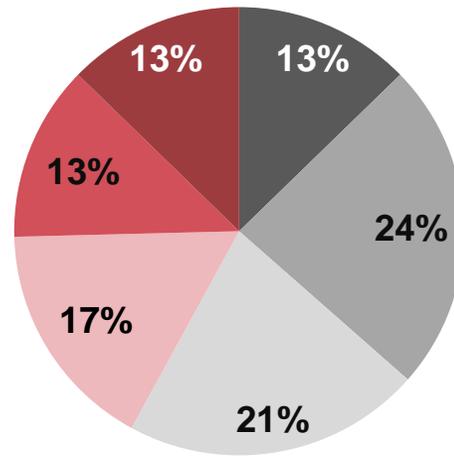
Number of employees*



- 1-5 employees
- 6-10 employees
- 11-50 employees
- 51-250 employees
- Over 250 employees

What is the size of your AI team?

Number of AI specialists**



- 1-2 AI specialists
- 3-5 AI specialists
- 6-10 AI specialists
- 11-20 AI specialists
- 21-40 AI specialists
- Over 40 AI specialists

- Companies doing AI differ when it comes to their size. However, most have up to 50 employees.
- Size of AI team varies too (in either companies, corporations or academia). Many teams are of considerable size. 13% employ over 40 AI specialists. Intotal, 43% have over 10 people doing AI on board.

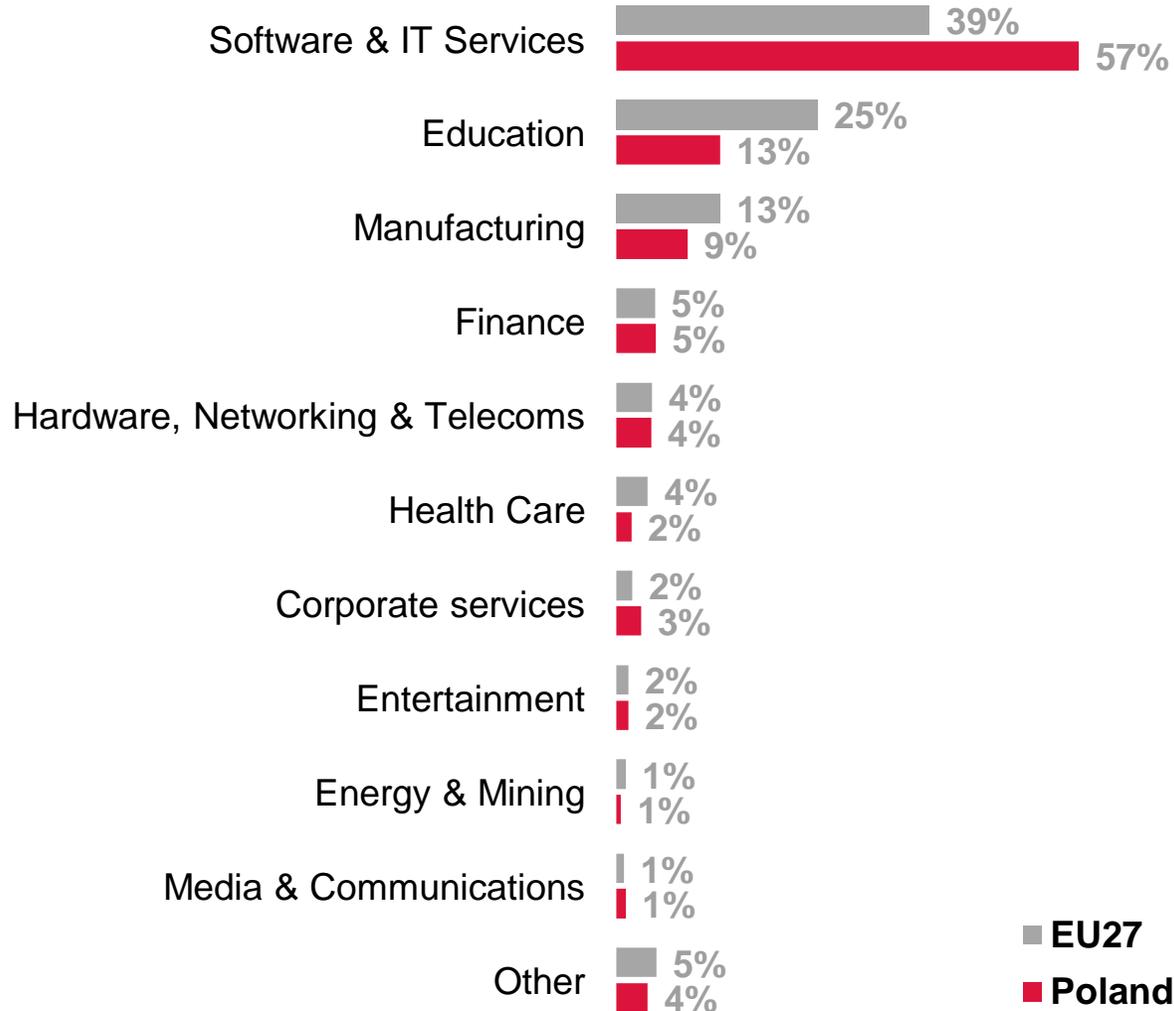
Sample:

*only AI companies & corporations
| excluding academic teams

**AI companies, corporations &
academic teams

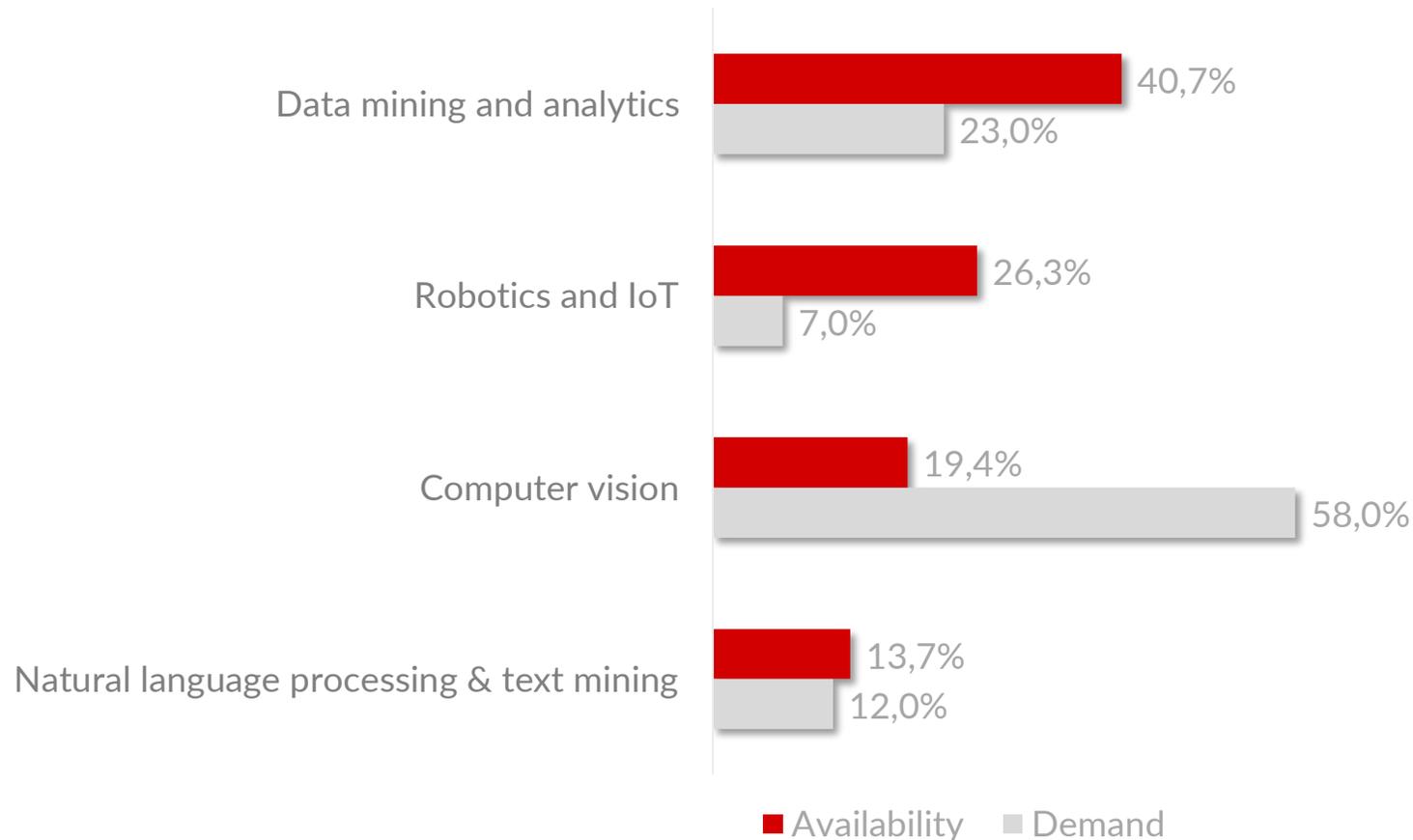
AI specialists by sector

AI specialists – distribution by sector of the economy



- In Poland, software houses play a much bigger role in the IT ecosystem. This translates into distribution of AI specialists across the economy. The low share of other industries may indicate that AI products are present in business as B2B services and enterprises do not develop such solutions internally. Moreover, many specialists work in Global Delivery Services centers.
- 57% of Polish AI specialists work in software and IT services while in the EU it is only 39%.
- On the other hand, only 13% of AI specialists in Poland work in education while in the EU this number is two times higher at 25%.

A visible mismatch between AI competencies and market needs



- The **largest availability** of specialists in the field of **Data mining and analytics**.
- However, the greatest demand on the market based on available job offers is in the area of **Computer Vision** and there is a **visible competency gap** in this area.
- The **low demand for Robotics and IoT** area also draws attention and may indicate a still small number of implementations in this area in business.

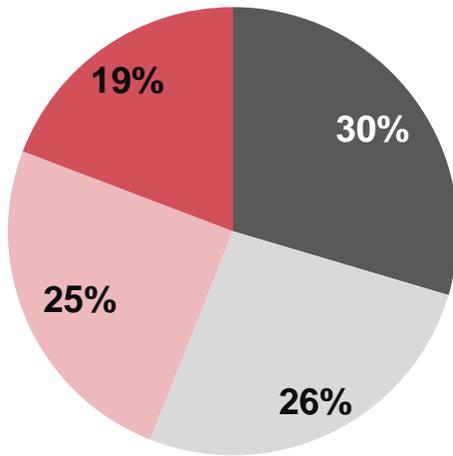
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AI team | Gender

What is the proportion of women on your AI team?

Share of women*



- None
- Up to 10% women in the AI team
- 10%-30% women in the AI team
- Over 30% women in the AI team

- Women are strongly under-represented in AI teams. A third of companies have an all-male team. Only one in five companies have more than 30% of women in their AI team.
- Over a half of companies or corporations have at least one PhD in the AI team.
- 10% have a strong scientific background with at least 6 PhDs.

Sample:

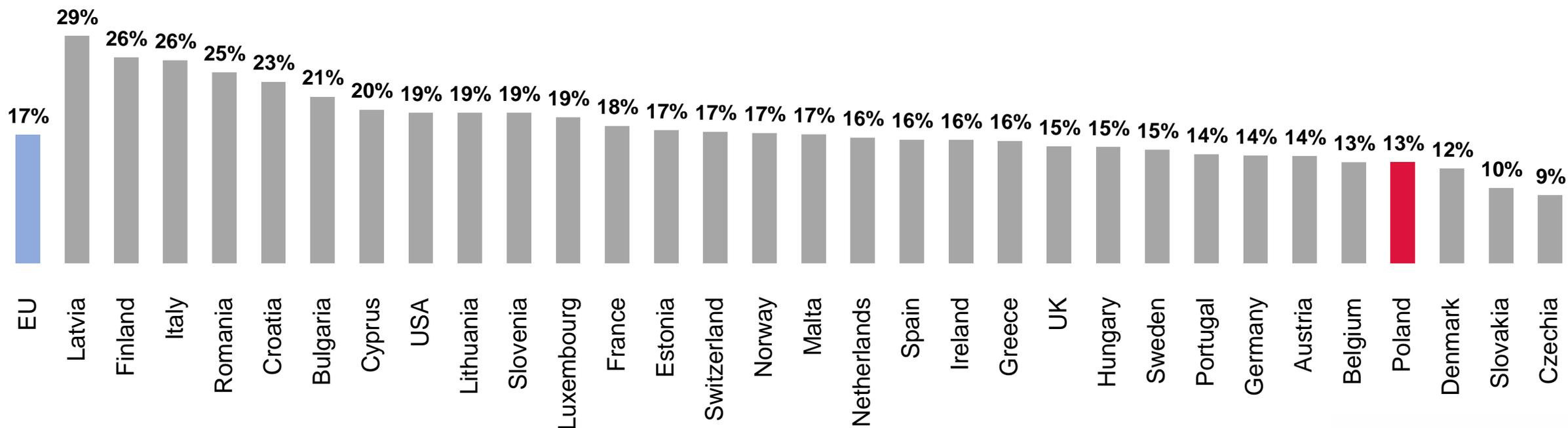
*AI companies, corporations & academic teams

**only AI companies & corporations | excluding academic teams

Gender among AI specialists

- Women are a minority among AI specialists. On the EU level they constitute 17% of people working in the domain. In some countries, such as Latvia, Finland or Italy, this share is higher, in the 25%-30% range.
- Poland has a very low share of women in the AI workforce. Only 13% of AI specialists are female.

Share of women among AI specialists





digitalpoland

THANK YOU!

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