PILLARS

WP 5
Analysing Skills Demand through AI for predicting new trends

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Figure 1.1: PILLARS concept and structure: from past evidence to policies for future labour markets

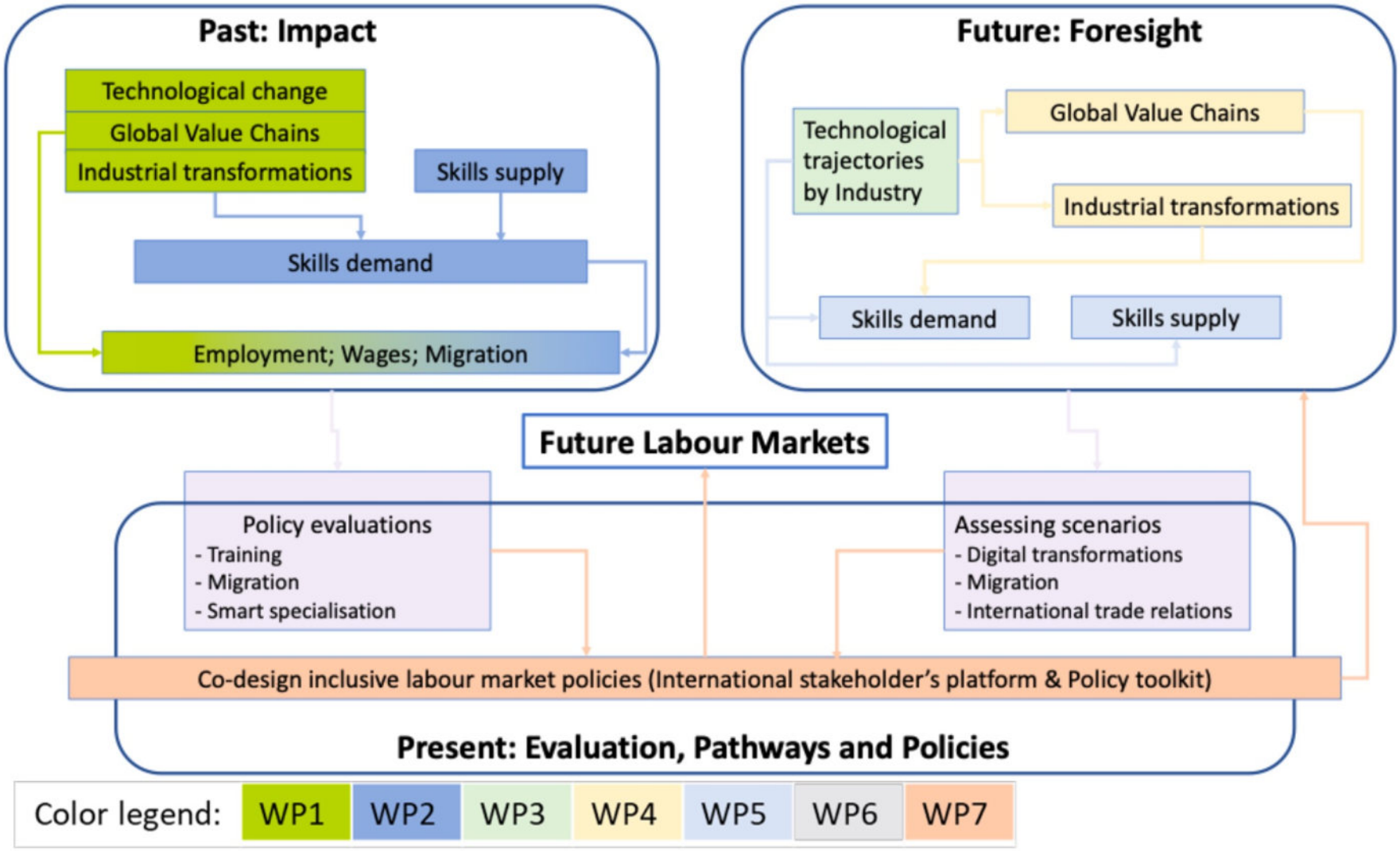
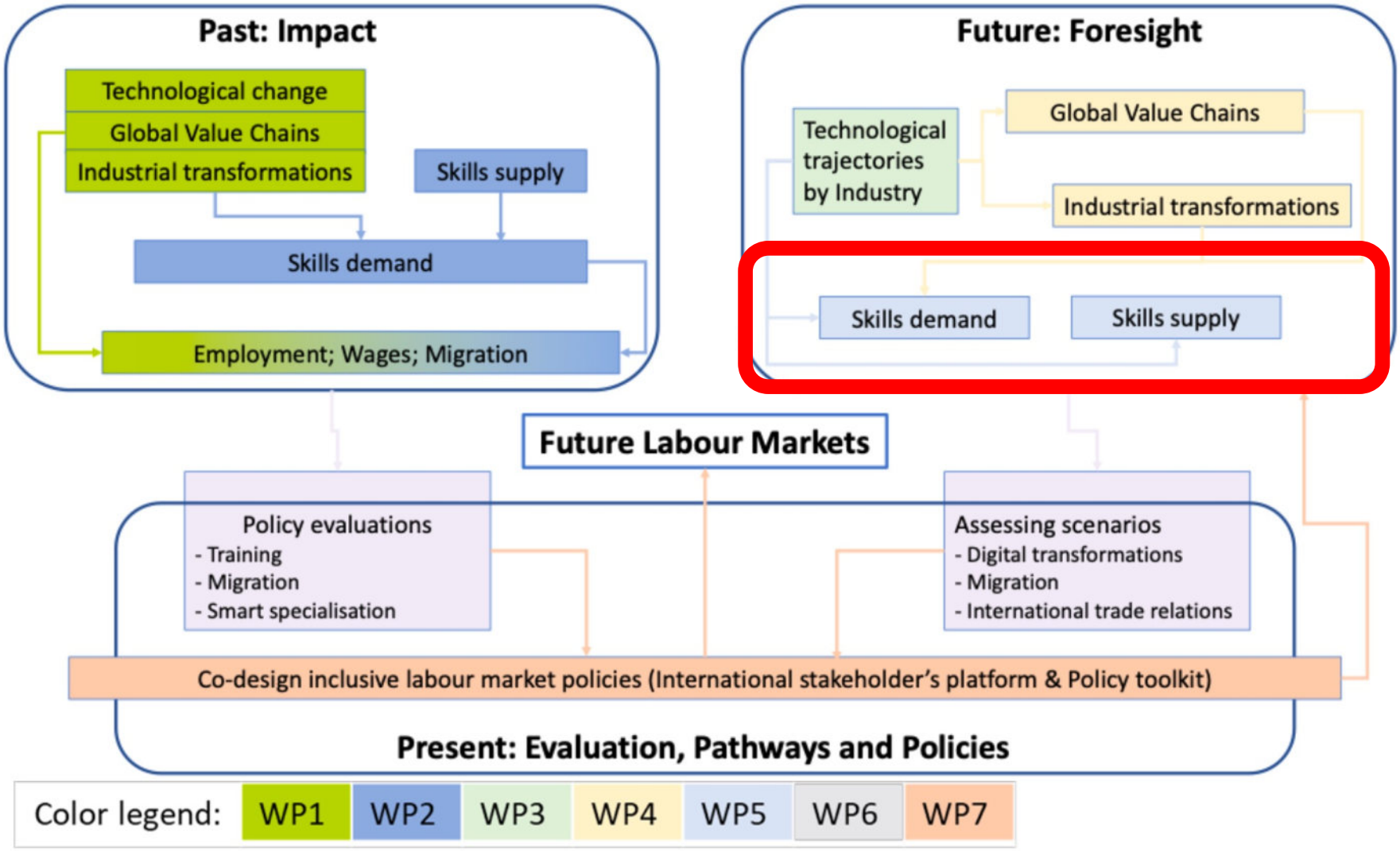


Figure 1.1: PILLARS concept and structure: from past evidence to policies for future labour markets

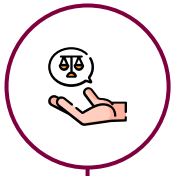


Forecast scenario(s) of demand for skills and occupations processing OJAs through AI techniques

Forecast

5.1

Forecasting skill relevance within occupations



Speed of change

5.2

Speed and direction of changes of skills demand, within occupations, across European countries

Emerging Jobs

5.3

Exploiting AI to study the impact of technology in reshaping jobs

Skill Supply

5.4

Predict future skill supply using survey data (ETER, PIAAC) and OJAs

Goal

Forecast scenario(s) of demand for skills and occupations processing OJAs through AI techniques

A Predictive Model to Estimate the Relevance of Skill Rates within Occupations

1. A model to quarterly predict the pervasiveness of Soft, Hard-Non-Digital and Digital skills across occupations in five European countries.
2. Model trained on 43+ million of OJAs* collected from the web for IT, DE, NL, FR, DE, and UK
3. Time series 2019-2021 with 98% prediction accuracy in estimating the relevance of Soft, Hard-Non-Digital and Digital skills
4. The model can predict both (i) the expected relevance of the skill type and (ii) whether the skill is expected to grow every quarter, distinguishing between digital, non-digital and soft skills for each ESCO II digit occupation.

* Source: Cedefop/ESTAT

Outcomes to EU

Ability to forescast skill relevance across occupations and countries according to companies expectations at anytime with high accuracy

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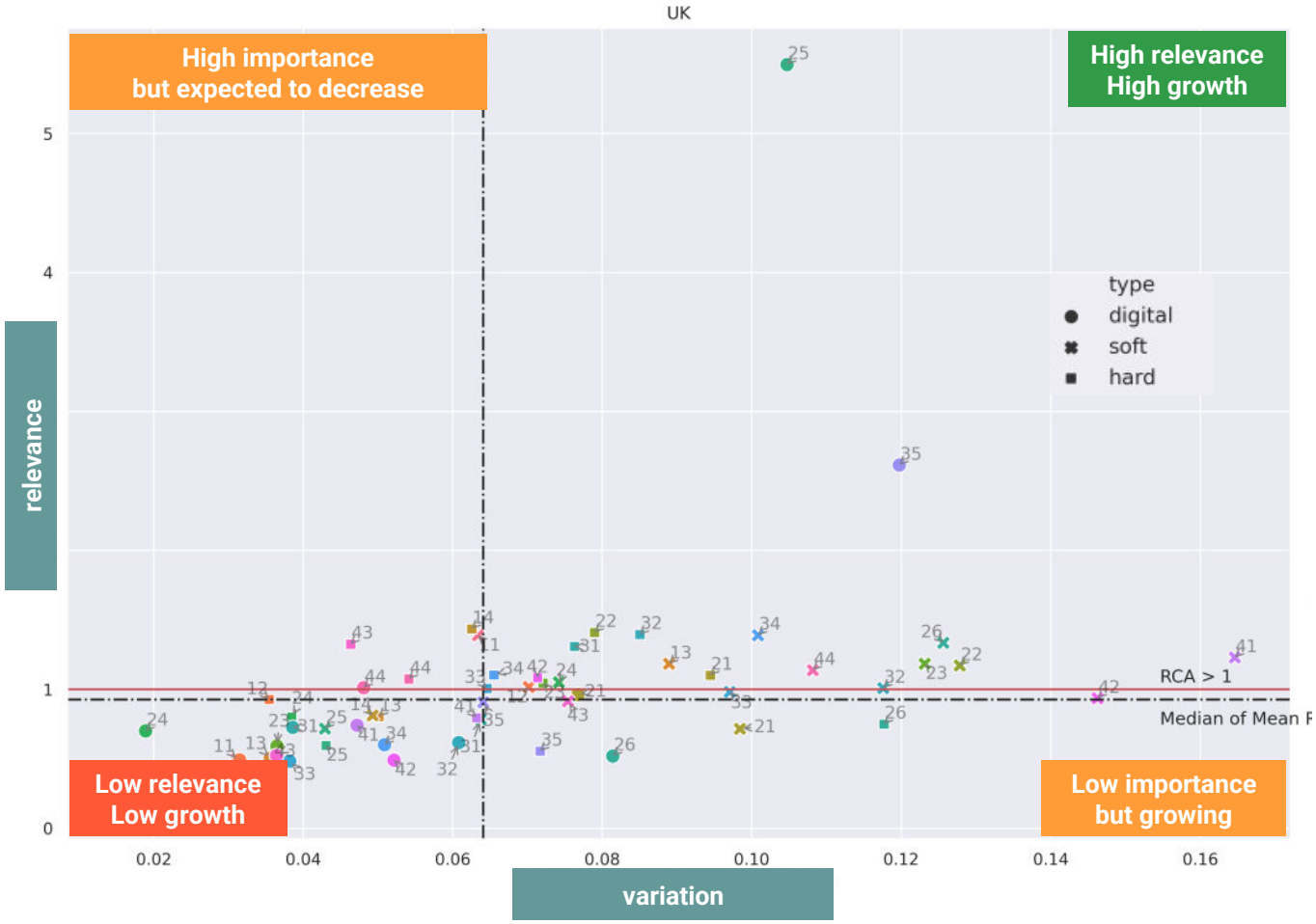

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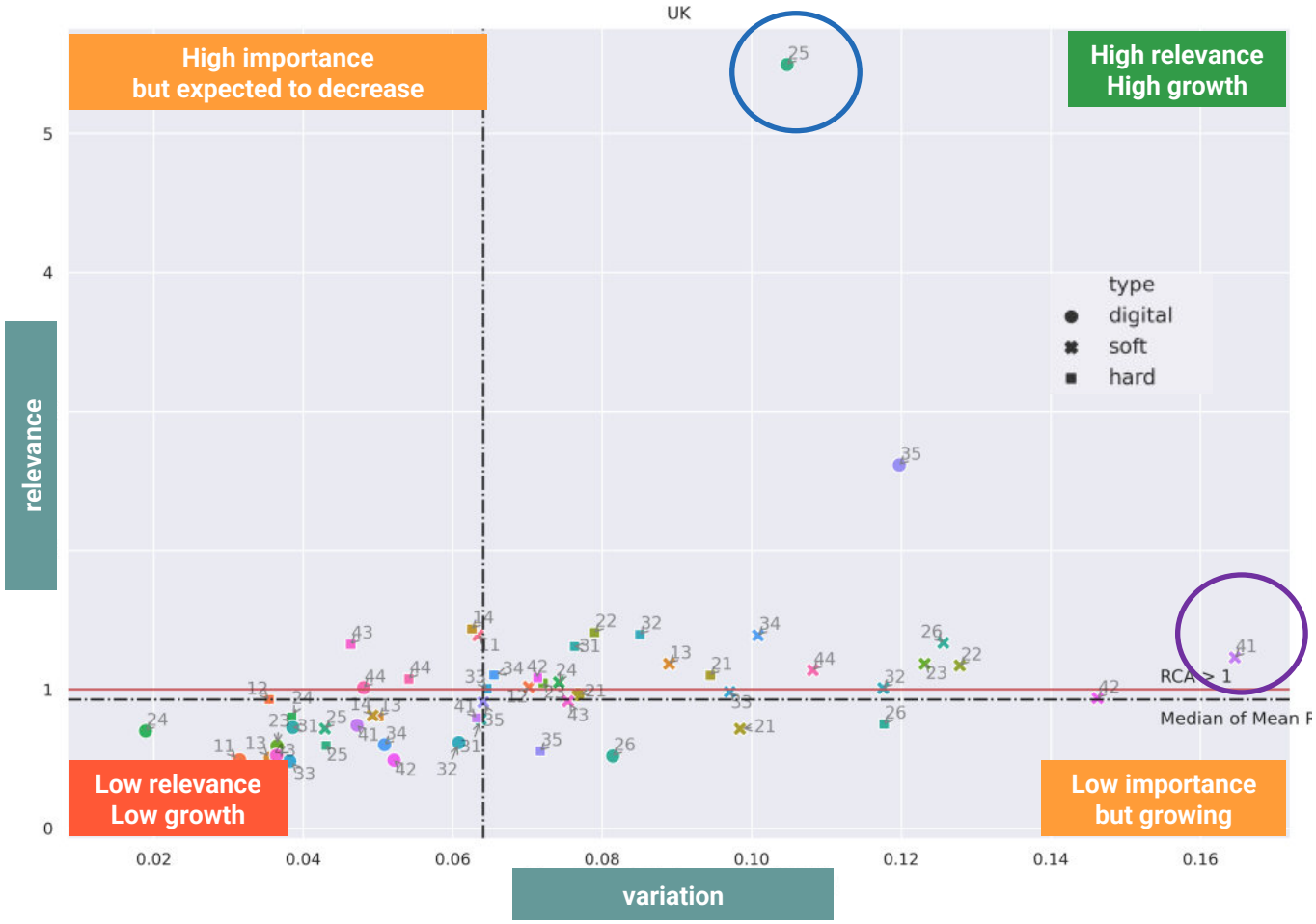

Meaning: Digital skills for ICT Professionals in UK have high importance, and they are expected to grow in the next quarter

Meaning: The relevance for Soft skills for *General and Keyboard clerks* in UK are slightly above the median but expected to grow a lot in the next quarter

Goal

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The impact of digital skills in reshaping jobs and defining emerging new jobs through AI

Why? Digital skills and jobs are reshaping the labour market; Real-time monitoring is crucial to support policy making promptly
Excellence: The 2023 is the EU Year of Skills

1. Identify emerging jobs from OJAs for IT,DE,NL,FR,DE, and UK
2. A novel ensamble learning model to classify OJAs titles* on CEN (the European Committee of Standardisation)
3. Analyse trends and emerging skills

* Source: Cedefop/ESTAT.

Outcomes to EU

1. A classification pipeline to bridge ESCO professions to CEN standards
2. A way to identify novel digital occupations and Skill relevance

Goal

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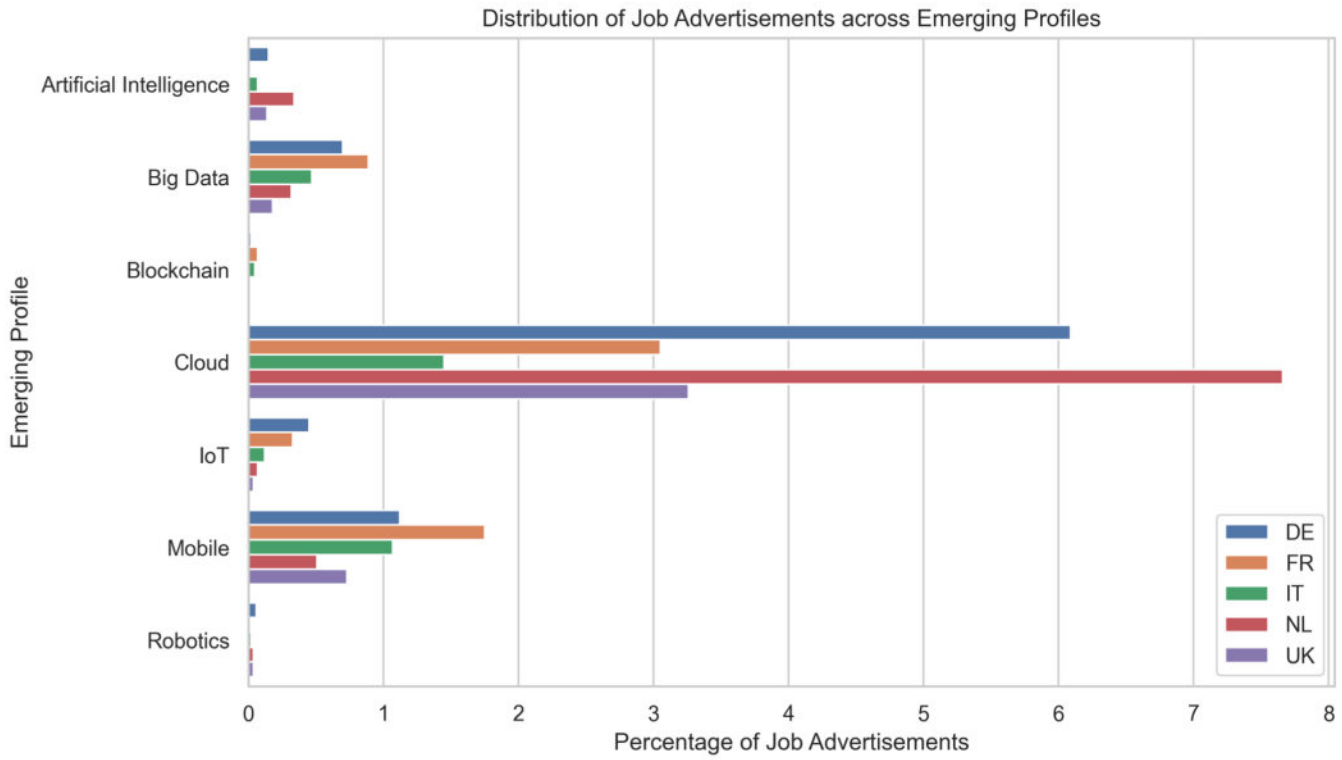

Figure 3: Emerging job profile distribution in each country, showing the ratio of matching job ads from Q4 2020 to Q3 2021.

Meaning: Percentage of OJAs related to new technologies by Countries

*We plan to perform this task again on the novel Eurostat NLP dataset covering 2019-2022 (released on Q1-24), then studying (i) covid-19 impact; (ii) skill-gap and (iii) skill speed of change

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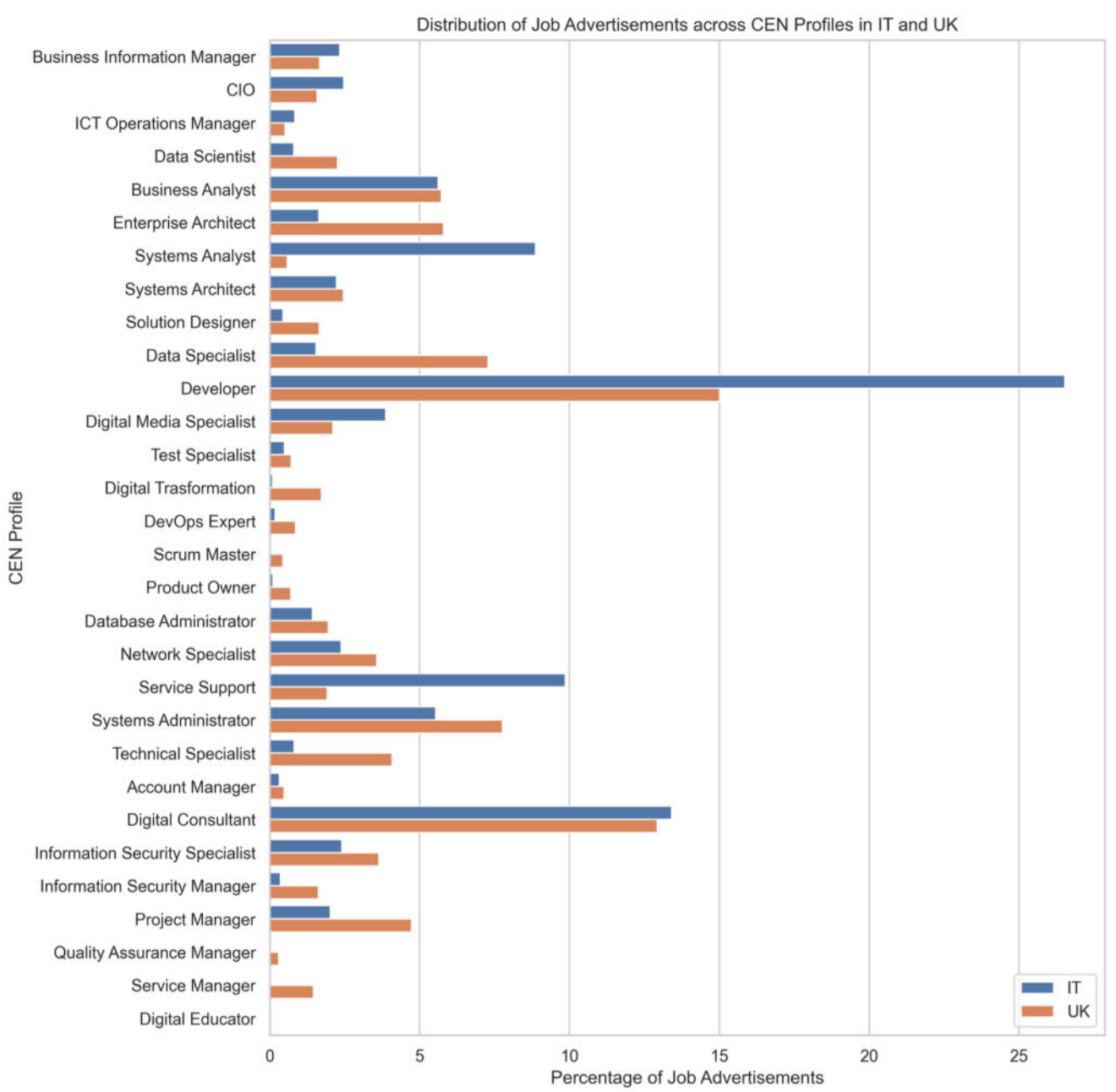

CEN occupations is a standard developed by the European Committee of Standardisation to classify technology-related jobs.

Goal

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Table 4: Top digital, professional, and transversal skills for two emerging profiles in the UK: Artificial Intelligence Specialist and Cloud Computing Specialist. Score computed using RSCA.

Country	Profile	Skill Type	Skill	Score
UK	Artificial Intelligence Specialist	Digital	natural language processing	●●●●●
			Sass	●●●●●
			implement front-end website design	●●●●●
			JavaScript	●●●●●
			SQL Server Integration Services	●●●●●
		Professional	mathematics	●●●●●
			supply chain management	●●●
			information security strategy	●●●
			engineering principles	●●●
			identify customer's needs	●●●
		Transversal	identify with the company's goals	●●●
			work efficiently	●●●
			work independently	●
	Cloud Computing Specialist	Digital	TypeScript	●●●●●
			cloud technologies	●●●●●
			web application security threats	●●●●●
			use content management system software	●●●
		Professional	manage ICT virtualisation machines	●●●
			service-oriented modelling	●●●●●
			perform business analysis	●●●●●
			Lean project management	●●●●●
			Ansible	●●●●●
		Transversal	advertising techniques	●●●●●
			work efficiently	●
			work independently	●

Goal

Forecast scenario(s) of demand for skills and occupations processing OJAs through AI techniques

Predicting Future Skill Supply

- Study future skill supply, complementing the demand-side analysis shown before.
  Estimate the number of graduates by field of study necessary to meet labour demand under different scenarios.

- We linked PIAAC *(relation between workers' FoS and occupations)*, ETER *(number of graduates by FoS)* and OJA *(demand side)* to provide projections of required new workers

- Results reveal the number of expected graduates is below the expected demand for Science, Engineering and Health-related jobs, even in the optimistic scenario.

Outcomes to EU

A framework to streamline existing data to estimate the required number of graduates is useful for public institutions to design educational and training programmes and workforce development policies.

Goal

Forecast scenario(s) of demand for skills and occupations processing OJAs through AI techniques

Detecting Skill Similarities to Predict the Speed of Change and Emergence of New Skills

- Study skills lexical similarity (i.e., words companies use to advertise job positions and skills) and predict the direction of change in the occupations' skillsets in different European regions.
- Over the 2019-2021 period, the skill composition of jobs changes substantially, ~15% at the intensive margin (relevance) and ~20% at the extensive margin (variety).

- This result is driven by soft skills, which are becoming pervasive even in technical occupations, and digital skills.
- We find an increase in job complexity driven mainly by novel skills, with low-complexity countries growing faster than highly complex ones.

Outcomes to EU

A framework to study OJAs and to produce quali-quantitative evidence on changes in skill requirements at the occupational level.

So what? Take away

WP5 of PILLARS provided to the EU Community:

1. AI-based forecasting models to process a huge number of Labour market information to perform forecasting and nowcasting on (i) occupation trends; (ii) skill relevance and speed of change; (iii) impact of digital skills in reshaping existing jobs and defining new ones;

2. Evidence that data-driven policy making is effective in observing and analysing real-time labour market in terms of occupations and skills (mainly on ESCO) integrating different sources of data;

3. The possibility to iterate analyses performed at any time to generate indicators at a fine-grained level to support policies, vocational and educational training, upskilling/reskilling, gap analyses, skill-gap, etc…