



**Pre-Conference Engagement Day**

6 FEBRUARY 2024

**Data on TVET and skills development**

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CONFERENCE ON  
**EDUCATION DATA  
AND STATISTICS**

CONFERENCIA SOBRE  
**DATOS Y ESTADÍSTICAS  
DE EDUCACIÓN**

CONFÉRENCE SUR LES  
**DONNÉES ET STATISTIQUES  
DE L'ÉDUCATION**

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7 - 9 FEBRUARY 2024

UNESCO HEADQUARTERS, PARIS, FRANCE



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International Centre for  
Technical and Vocational  
Education and Training

# Data on TVET and skills development: Current state and options for future development

Monitoring TVET

in the SDG 4 agenda

and beyond

Friedrich Huebler  
UNESCO-UNEVOC International Centre for TVET  
6 February 2024



# Why are TVET data important?

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- **Technical and vocational education and training (TVET)** is an essential component of lifelong learning and skills development.
- TVET can contribute **solutions to many of today's global challenges**, including climate change, hunger and poverty, skills shortages, unemployment.
- **TVET contributes to the achievement of the SDGs:** education (SDG 4), gender equality (SDG 5), decent work and economic growth (SDG 8), climate action (SDG 13).
- UNESCO Strategy for TVET 2022-2029 emphasises role of TVET for equitable, sustainable and peaceful **individual, social and economic development**.
- For policy design, monitoring and evaluation, we need **current, comprehensive and reliable data on TVET and skills development**.



# SDG indicator 4.3.3: Definition



Target  
**4.3**

By 2030, ensure equal access for all women and men to affordable and quality technical, vocational and tertiary education, including university

## TVET only monitored by one thematic indicator: SDG indicator 4.3.3

*“Participation rate in technical-vocational programmes (15- to 24-year-olds) by sex”*

Last technical discussion happened in 2018 at the fifth meeting of the Technical Cooperation Group on SDG 4 indicators (Mexico City).

The number of young people aged 15-24 years participating in technical and vocational education at secondary, post-secondary non-tertiary or tertiary levels of education is expressed as a percentage of the population of the same age group.

$$PR_{V,15t24} = \frac{E_{V,15t24}}{P_{15t24}}$$

where:

$PR_{V,15t24}$  = participation rate of young people aged 15-24 years in technical and vocational education and training.

$E_{V,15t24}$  = enrolment in technical and vocational education and training of young people aged 15-24 years.

$P_{15t24}$  = population aged 15-24 years.



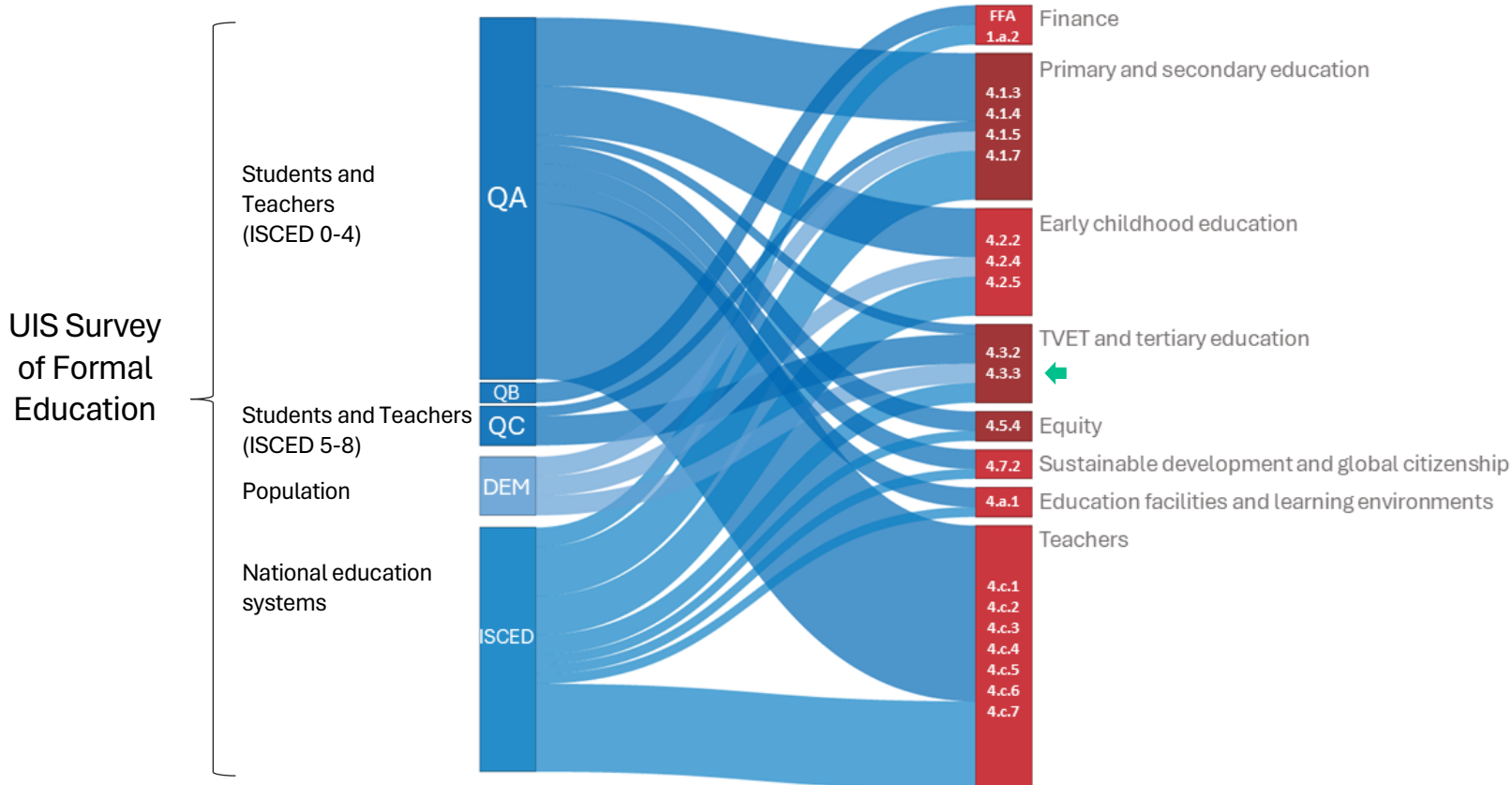
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# SDG indicator 4.3.3: Data sources

SDG 4 indicators that use administrative data

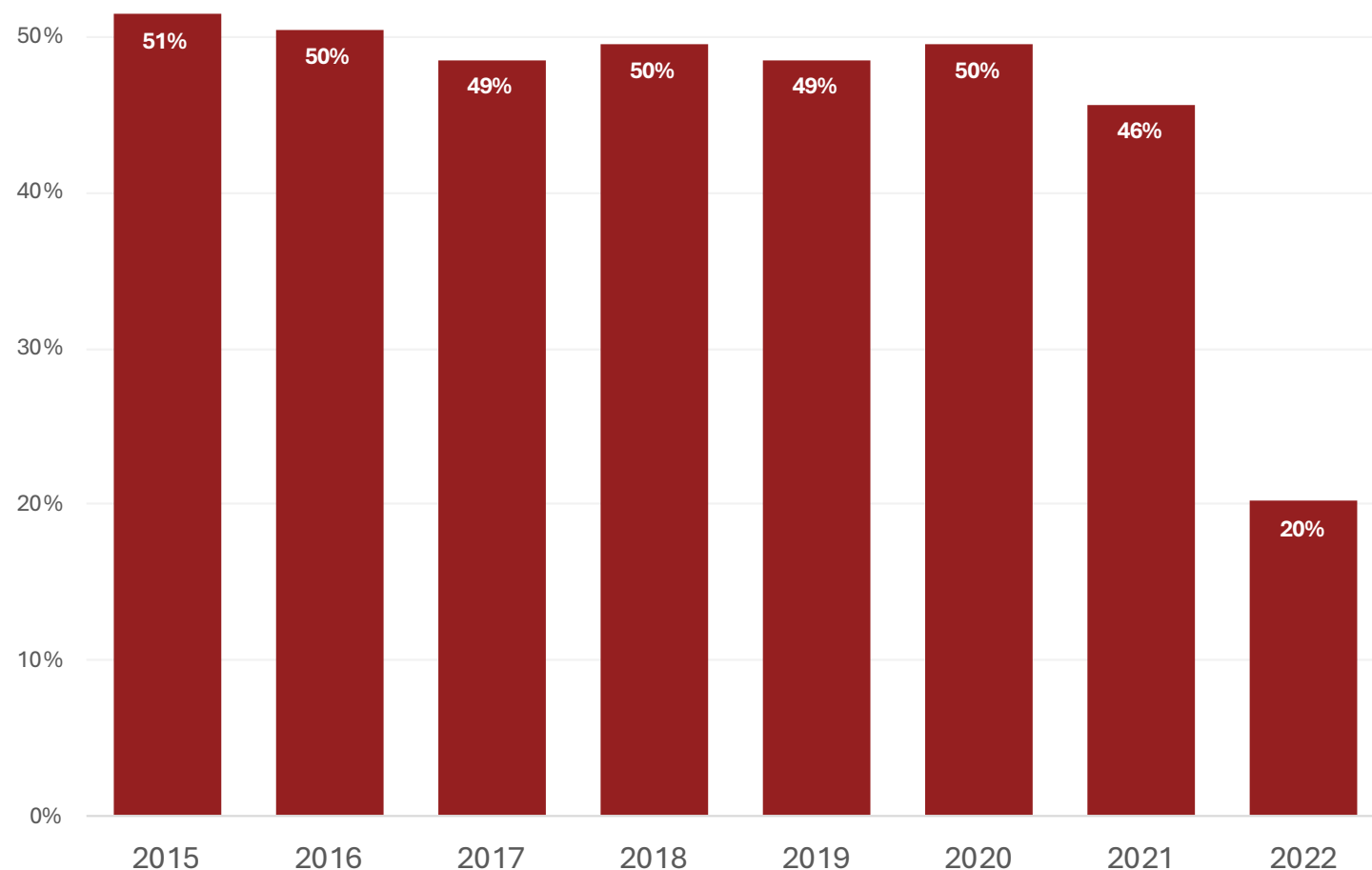


Data to calculate the indicator comes from the **UIS annual Survey of Formal Education**.

**Numerator:** Data on enrollment in secondary (ISCED 2 and 3), post-secondary non-tertiary (ISCED 4), and short-cycle tertiary education (ISCED 5).

**Denominator:** Population from national sources or UNPD.

# SDG indicator 4.3.3: Availability



Typically, around **half of Member States** have an indicator value in any given year.

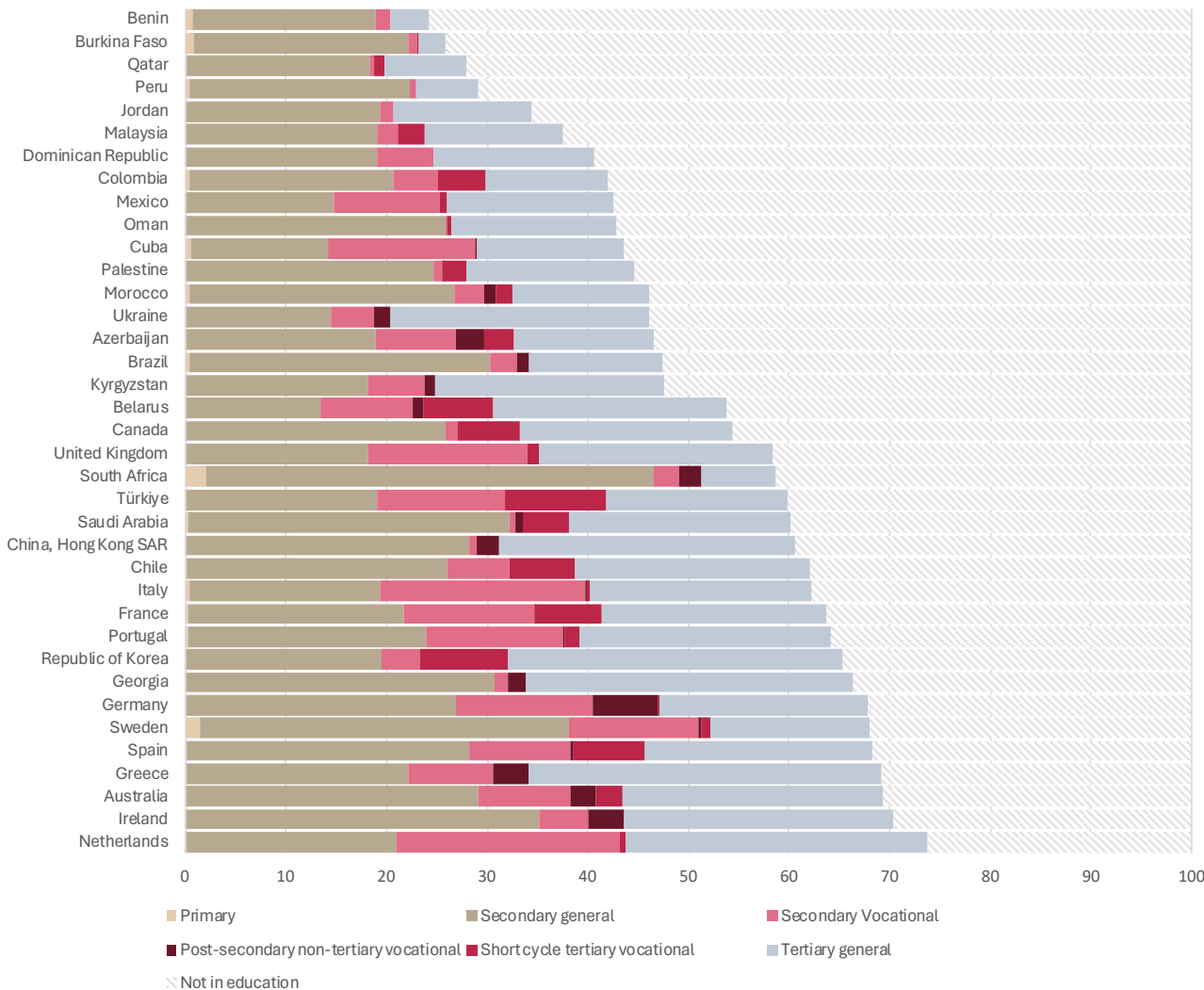
**Europe and North America:** 9 out of 10 countries have reported data on indicator 4.3.3.

**Sub-Saharan Africa:** less than one third of countries have data since 2017.

Availability in recent years is decreasing.

# SDG indicator 4.3.3: Interpretation

Distribution of the population aged 15-24 in the formal education system, 2021



## How relevant is the indicator for policy recommendations?

- Interpretation not straightforward.
- In many countries most 15- to 24-year-olds are **outside of the formal education system**.
- At the moment, there is **no distinction between general/academic and vocational/ professional education beyond ISCED level 5**. This could make a difference in countries where large proportion of 15- to 24-year-olds are considered enrolled in general/academic tertiary education.

# TVET data beyond SDG indicator 4.3.3

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- Review of **UNEVOC TVET country profiles** (<https://unevoc.unesco.org/home/TVET+Country+Profiles>)
- **TVET policy reviews** by UNESCO Headquarters and Field Offices (Grenada, Jordan, Mauritania)
- **Survey of UNESCO-UNEVOC community** in November 2023 and January 2024:
  - Usage of TVET country profiles and importance of statistical data
  - Satisfaction with the available information
  - Overall use of TVET-related statistics
  - Key international indicators on TVET
  - Key data sources for international indicators on TVET
  - Key challenges/needs with data user



# Key findings of UNESCO-UNEVOC survey

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- Users of UNEVOC TVET country profiles mostly need data for **cross-country comparisons** (disaggregated time series)
- **Main domains** of interest:
  - TVET participation (SDG indicator 4.3.3), enrollment
  - TVET financing
  - Employment outcomes (employment, placement, income) and other labour market data (e.g. skills supply and demand)
  - Other: quality/relevance, teachers/trainers, drop-out, etc.
- **Main challenges:**
  - Variety of sources: UIS, ILO, World Bank, OECD, Eurostat, ADB, others
  - Difficulties identifying relevant data

# The path towards better TVET data

- **SDG indicator 4.3.3:**
  - Encourage and support Member States to respond to **UIS Survey of Formal Education** (<https://uis.unesco.org/uis-questionnaires>).
  - **Improve ISCED** to better distinguish between population 15-24 years enrolled in general/academic and vocational/professional tertiary education (ISCED levels 6, 7, 8).
  - Improve collection and reporting of data on **non-formal TVET**.
- **UNESCO Strategy for TVET:**
  - Collect and analyse **data from different sources, on various aspects of TVET** to better capture the linkages between TVET and the labour market: access and participation; qualifications, skills and competencies; school-to-work transition; employment; teachers and trainers; financing.
  - Develop **framework of key TVET indicators** for monitoring of skills development; develop **tools such as a global skills tracker**.
  - Support ethical and effective **use of TVET data by Member States** for governance, management and delivery of education.

# Contact information

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# The status and frontiers of TVET monitoring

UNESCO conference on Education Data and Statistics  
2024.02.06, Paris



Mantas Sekmokas, Expert



# The evolution of TVET monitoring from European perspective

- The concept covers both initial (formal) and continuous (non-formal) VET
- Extended history of VET data collection and analysis the in EU
- Dedicated statistics as of early 1990s (CVTS, VET data collection, AES...)
- A key development - implementation of ISCED 2011 from mid-2010s
- Further mainstreaming of variables capturing VET as of 2020s
- Adoption of formal monitoring framework (indicators and targets) within the “Council Recommendation of the 24 November 2020 on vocational education and training”
  - the share of employed graduates from VET should be at least 82 %
  - 60 % of recent graduates from VET benefit from exposure to work-based learning <...>
  - 8 % of learners in VET benefit from a learning mobility abroad
- Multiple monitoring instruments deployed by CEDEFOP ([see Appendix](#))

# Current data availability in the key domains of TVET monitoring

## ■ **Formal TVET**

- Stock of learners (e.g. enrolment) – available globally
- Inflows and outflows of learners – mostly restricted to EU/OECD datasets
- Finance – available globally, but with multiple gaps

## ■ **Non-formal TVET, including training in public & private companies**

- General participation covered in SDG indicator, but no formal/non-formal breakdown (?)
- Other data mostly limited to EU datasets, with gaps (e.g. excluding public sector training)

## ■ **TVET on the labour market**

- Number of TVET graduates at all ages – mostly restricted to EU datasets
- Employment situation of TVET graduates – mostly restricted to EU datasets
- Only general employment, educational and occupational data available globally (ILOSTAT)

## ■ **TVET within demographic (census) and economic (national account) data (?)**

# Frontiers for TVET monitoring

- **Standard-setting**
  - Developing concepts and measurement of TVET at higher levels (ISCED5+)
  - Classifying non-formal education/TVET (ref. 2022 G7 communiqué) – ISCED, CLA...
  - More precision in measuring the purpose and occupational linkage of TVET programmes
  - Developing statistically sound international skills classification (ref. 2023 G20 declaration)
- **Exploiting and improving data availability**
  - Capturing TVET in the labour market, government finance (i.e. COFOG) statistics
  - Education and training statistics (with TVET breakdown) aligned with national accounts
- **More focus on the demand side (including TVET - industry/employers links)**
  - Quantifying supply and demand imbalances (still largely not feasible?)
- **Monitoring data use & users' needs, esp. in developing economies**
  - International reference point/support service for TVET data/statistics...

# Thank you



[www.cedefop.europa.eu](http://www.cedefop.europa.eu)

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**CEDEFOP**

European Centre for the Development  
of Vocational Training



# Appendix:

## Key references:

- EU Council Recommendation on VET: <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32020H1202%2801%29>
- Classification of learning activities (CLA), 2016, Eurostat: <https://ec.europa.eu/eurostat/web/products-manuals-and-guidelines/-/ks-gq-15-011>
- G7 Elmau communiqué, 2022: <https://www.g7germany.de/g7-en/g7-documents>
- G20 New Delhi Leaders' declaration, 2023: <https://www.mea.gov.in/Images/CPV/G20-New-Delhi-Leaders-Declaration.pdf>
- Improving evidence on VET: Comparative data and indicators, OECD, 2020: <https://www.oecd.org/education/improving-evidence-on-vet-d43dbf09-en.htm>
- Eurostat data sources on VET, 2009, CEDEFOP: <https://www.cedefop.europa.eu/en/publications/5185>

## CEDEFOP VET monitoring tools:

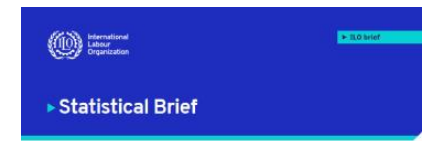
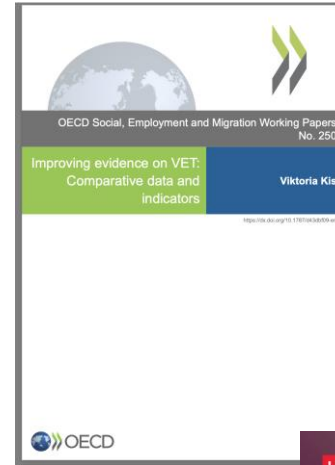
- VET policy dashboard: <https://www.cedefop.europa.eu/en/tools/european-vet-policy-dashboard?year=2021#1>
- Statistics, indicators, surveys, job vacancy analysis: <https://www.cedefop.europa.eu/en/themes/statistics>
- Publications and events on VET statistics: <https://www.cedefop.europa.eu/en/projects/statistics-and-indicators>

Workbased learning and apprenticeships  
in international TVET statistics

Contribution to the UNESCO conference on Education Data and  
Statistics, Tuesday, 6 February, Paris

# Workbased learning and apprenticeships in international TVET statistics

- Clearly established need for better comparative TVET statistics
- VET policy arena needs better data for mutual learning and in order to draw conclusions for future actions and priorities
- New challenge: modern TVET concepts overcome the boundaries between education and the world of work
- Apprenticeships, WBL and Informal sector
- Spanning different responsibilities and also SDGs



Key points

The aim of this statistical brief is to compare country-level data on apprenticeships with an interest in countries with large informal economies.

- There are close to 6 million apprentices in the 14 countries that clearly identify apprentices in their labour force surveys (LFS). Countries with an apprenticeship tradition have shares of apprentices comparable to those of apprenticeship countries in Europe, yet administrative records often do not capture them.
- Countries' LFS identify apprentices among the employed, unemployed, and those considered out of the labour force.
- Most apprentices are in informal employment, according to ILO definitions, regardless of whether they are paid or unpaid.
- Child labour remains a concern.
- Male apprentices constitute the majority, yet in some countries, female apprentices outnumber male.
- Apprenticeship is also a viable pathway for adults.

Apprenticeships train for the world of work - in both formal and informal economies

Around the world, apprenticeships are considered an effective means of facilitating the school-to-work transition for young people, and at times also the re-skilling or upskilling of workers. In fact, this practice has been the traditional 'rout' of passing on skills from one generation to

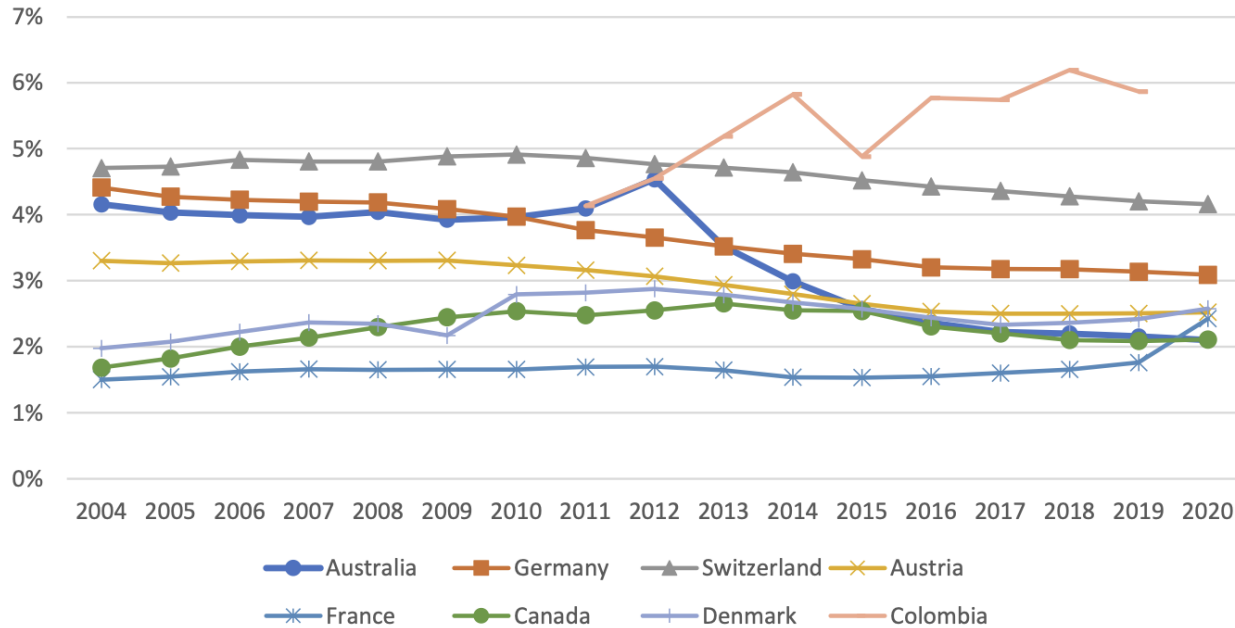
developed apprenticeship systems with their own specifications, but all following the same training logic. Apprentices learn the skills for an occupation in an enterprise from an experienced worker, based on an agreement or contract and should follow certain agreed standards. The apprentice contributes to the work of the enterprise throughout the duration of the apprenticeship. After a certain amount of time, the apprentice typically 'graduates' and becomes a skilled worker either in the same business, leaves to work for another employer, or



## Example indicators desired on an international scale

- Amount/share of companies offering workbased learning
- Amount/share of learners (apprentices) among workers
- Occupations/Programmes according to their popularity (schoolbased – workbased)
- Figures/Data on work as the context of learning – quality
- Development over time, share of different types of companies...
- ....





### Training rate (AQint)

number of people in employment (denominator). The information on the employed comes from the ILO (International Labor Organization 2020)

company-based apprenticeships (numerator) is based on national training statistics

apprenticeships mentioned conceal very different specific regulations and arrangements regarding content and form but are all based on contractual relationships between the learner and the company

Source: BIBB 2021 (adapted)

- (International) Apprenticeship Training Rate

## Example Challenge: company size and apprenticeships

Size class	Distribution of apprentices (in %)			
	Austria (2020)	Germany (2019)	France (2021)	Australia (Q2/2021)
1-9 employees	15.5%	15.1%	66%	Size not known 3.0%
10-49 employees	26.8%	22.8%		1-99 employees 64.3%
50-249 employees	19.3%	27.9%	11%	100-499 employees 16.0%
<b>SMEs in total (1-249 employees)</b>	<b>61.6%</b>	<b>69.8%</b>	<b>77%</b>	<b>SMEs in total (1-499 employees) 80.3%</b>
250 and more employees	38.4%	30.2%	23%	500 and more employees 16.6%

Sources: BIBB 2021; Dormayr 2021; Ministère du Travail, de l'Emploi et de l'Insertion 2022; NCVET 2022

# Outlook

- Emerging international convergence of concepts and structures of TVET
- Increasingly including WBL
- Requires better statistical indicators
- Existing national and international data (workers and company statistics) could be explored in their potential to inform TVET reporting
- Could draw on recent work of ILO and OECD (informal economies, VET statistics)
- Some model indicators could be developed
- UNESCO Unevoc would be an excellent address for this work, since it can integrate conceptual and statistical expertise

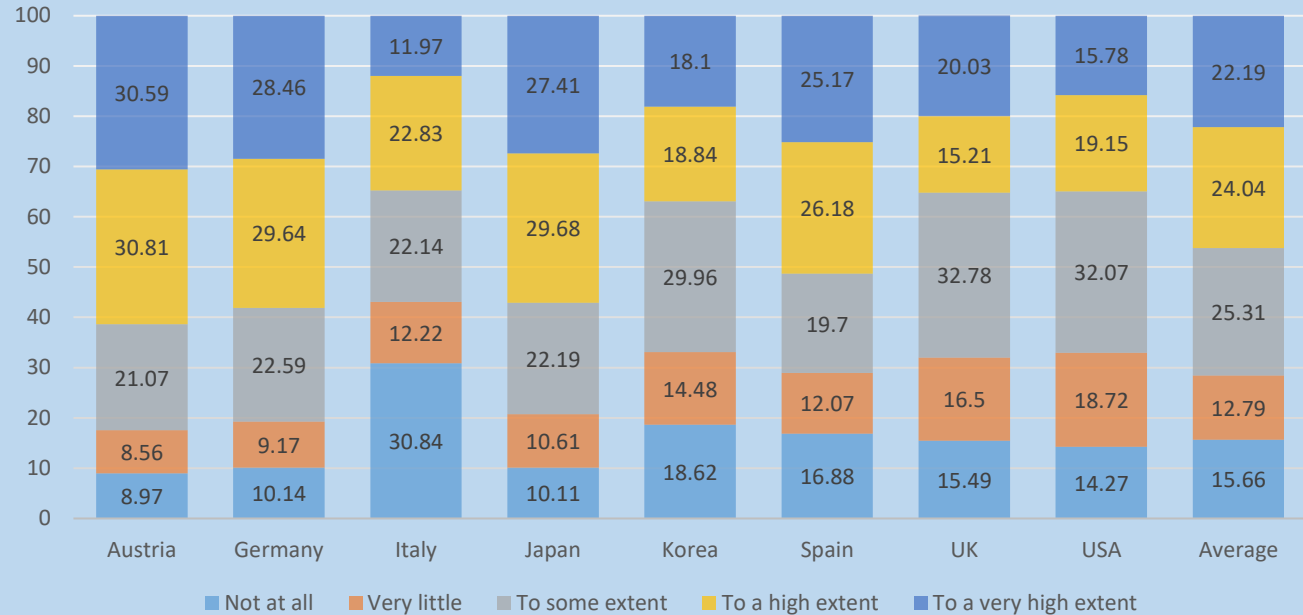
Interdisciplinary and intersectoral co-operation will be required

# Thank you for your attention

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## FLEXIBILITY, HOW TO DO WORK - BLUE COLLAR



Sample size (n) = 5.983

- Work as a context for learning – Example PIAAC 2012 Data, Job requirements approach

# Unlocking Insights: Leveraging Web Job Postings Data for Skills Intelligence in TVET



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# Motivations

## Labour market changes

### Constantly changing labour market:

- Skills Evolution
- New Emerging Occupations
- Job Automatisatation
- Mobility
- Remote Working
- Artificial Intelligence

### Improving skills needs analysis: the foundation of skills development

- Up-to-date information
- Information aligned with market demands
- Prediction can be done to anticipate trends



# What a Billion Jobs Can Tell Us

vs. Traditional Labour Market Information



## JUNIOR DATA SCIENTIST & ANALYST PLACEMENT

London • Hybrid remote

Internship

You must create an Indeed account before continuing to the company website to apply

[Apply on company site](#)



As at Data Scientist a [redacted] you will join the rapidly developing data team, who are responsible for measurement solutions and modelling expertise help a diverse client-set understand the true value of their media investment, create compelling data stories on how to drive growth, and automate the insights into the planning cycle through their advance and integrated tech stack.

We are looking for [inquisitive, articulate, numerate and above-all, enthusiastic] placement students to support the wider team in delivering these critical insights and building on the capabilities of our product.

You will be part of a close-knit and friendly team who share results and celebrate success together.

[redacted] is a media agency that's made differently. We're purpose-led, data-driven and proudly independent. Our independence means we can focus 100% on doing the right thing to secure success for our clients and our brilliant people. We are trusted to deliver that success for some of the UK's most ambitious and complex organisations, including SunLife, Guide Dogs, RNLI, Laithwaites and National Trust.

WHAT YOU'LL BE DOING

✕ Work closely with business to identify issues that can be resolved using data solutions effectively for decision making

Machine learning tools and statistical methods to solve complex problems

Build algorithms and design experiments to merge, manage, interrogate, and extract data to supply tailored reports to colleagues, clients and wider areas in company

Support the account management and planning teams across all facets of campaign measurement across media channels

Develop automated data processes using Python/R

Ability to organise a variety of large data sets

Undertake regular analysis and reporting for retained clients

Maintain clear and coherent communication, both verbal and written, to understand data needs and report results

Working with the Datalab team and other senior business stakeholders to develop analytical propositions

### THE SKILLS YOU WILL BRING

Highly numerate undergraduate studying a relevant degree in mathematics, statistics, econometrics or computer science

Pre-requisite skills: Strong Excel and MS Office usage

Experience of coding in Python, R or SQL

Experience of data visualisation tools like Tableau/Qlik/Power-BI/Google Data Studio would be useful but not essential

Theoretical understanding of statistical techniques such as regression and developing confidence measures.

Strong data manipulation skills and a keen eye for detail.

# Challenges

## High interest

- Observe **micro-level labour demand** (with some caveats)

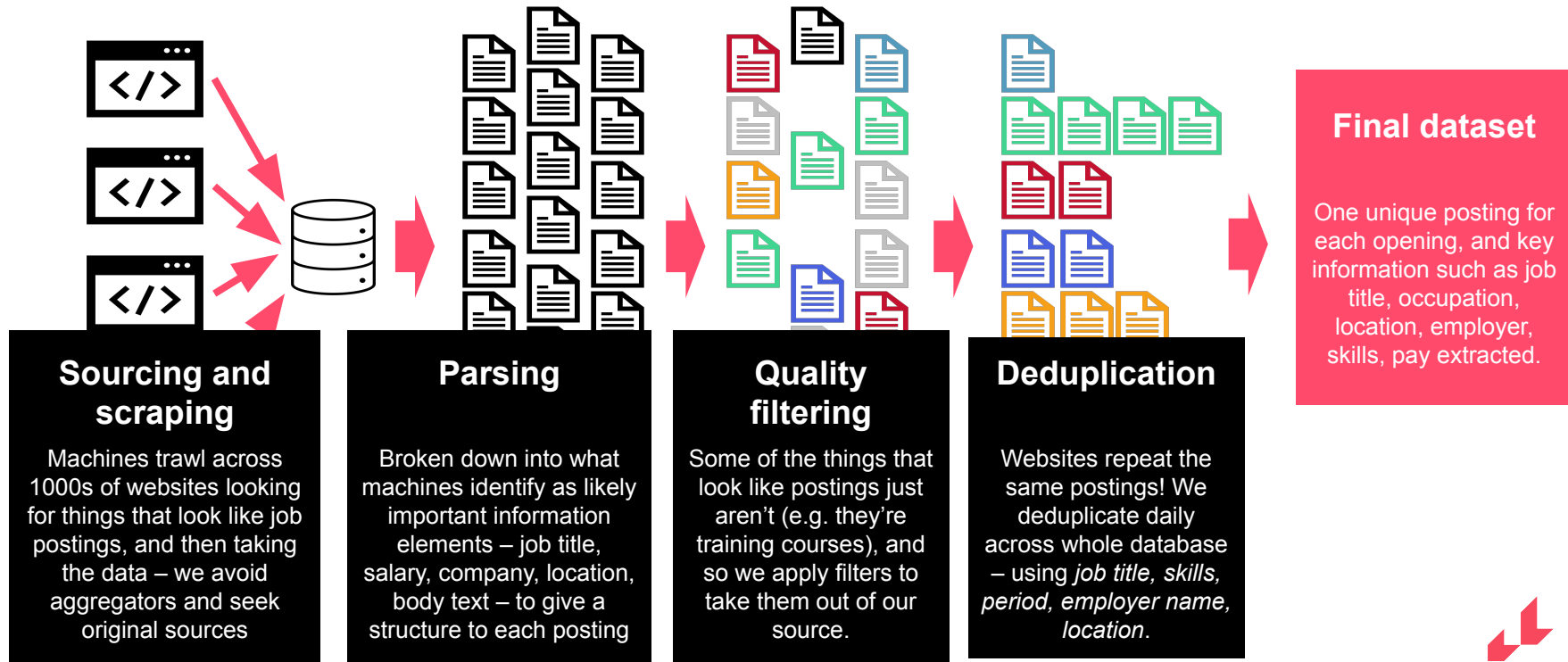
## Retrieval and analytics

- High **volume**
- High frequency **velocity**
- Many formats **variety, noise**
- **Duplications**
- No control over reference population **veracity**

The image shows two screenshots of job listings. The left screenshot is from Indeed, showing a job listing for 'مطلوب فوراً شباب و بنات للعمل كـول سنتر و مكاتبه العمل من المنزل' (Urgently needed young men and women for home-based work as call center agents and office staff) at 'NEW FUTURE COMPANY'. The listing includes details like salary (4,000\$ - 4,500\$), job type (Full-time), and location (Cairo, Egypt). The right screenshot is from Wuzzuf, showing a detailed view of a similar job titled 'Translator Editor -Remotely'. It lists requirements such as 3 to 5 years of experience, a career level of 'Experienced (Non-Manager)', and skills in Arabic, Editorial, media, Social Media, Translation, Writing, English, and Editing. The Wuzzuf listing also includes a job description and requirements for a professional translator with experience in News and Journalism.

# How draw meaningful insights

Turning big noisy data on job postings into clear and actionable data points

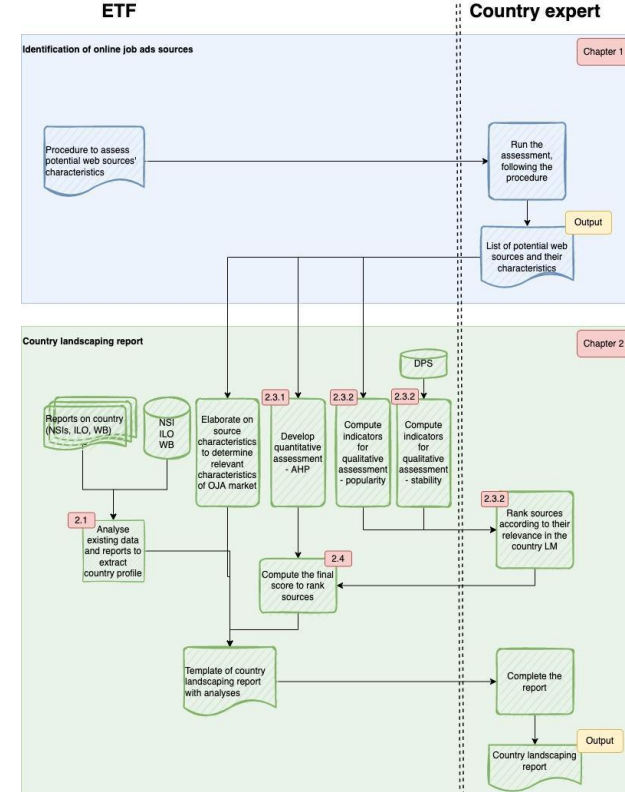
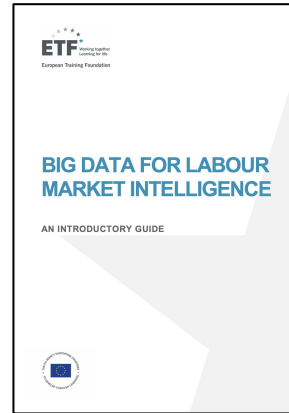


# Identifying reliable online job boards

A data-driven approach of more relevant job posting sources

A **Landscaping activity** is performed to produce a list of **sources** (web portals) that are relevant for the Web Labour Market in a given country.

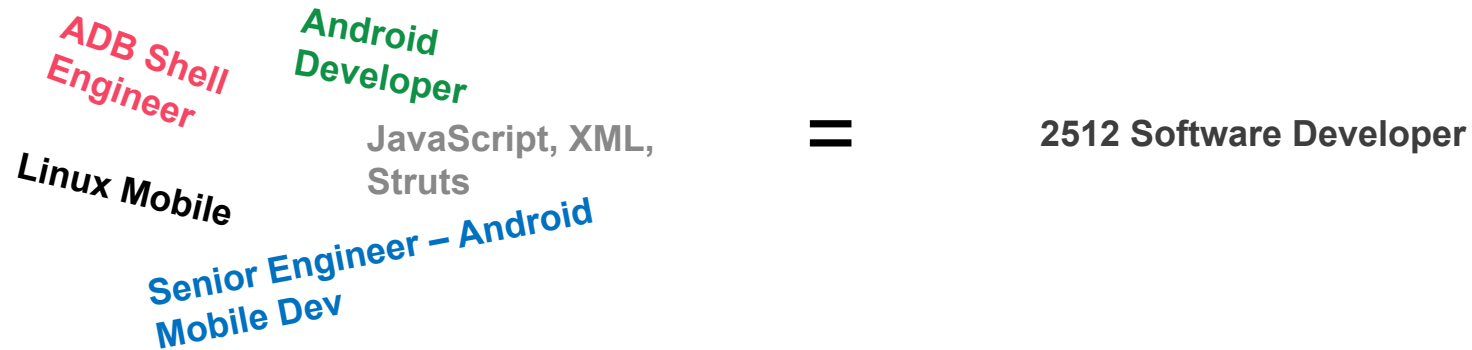
International Labour Market Experts **validate** this list, that will become the initial step of the LMI System





# Conventional and New data: speaking the same language

## Data classification using AI and Taxonomy

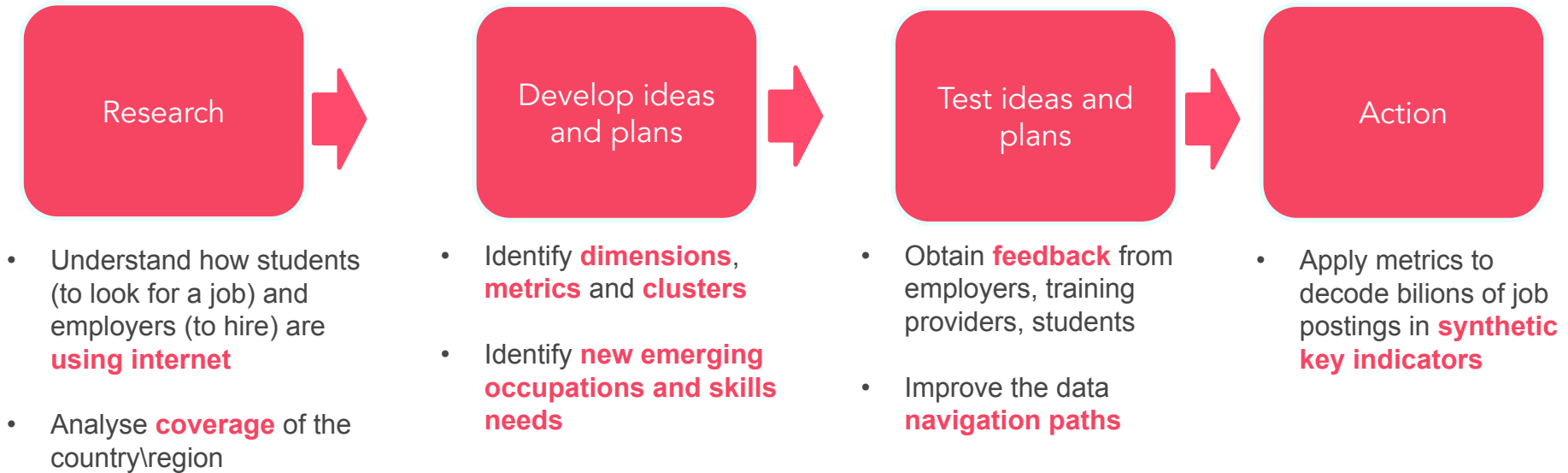


- **Occupations:** ISCO - International Standard Classification of Occupations
- **Skills:** ESCO - European Skills, Competences, Qualifications and Occupation
- **Location:** NUTS and ISO
- **Educational Level:** ISCED 2011 - International Standard Classification of Education
- **Sector:** NACE - Statistical classification of economic activities



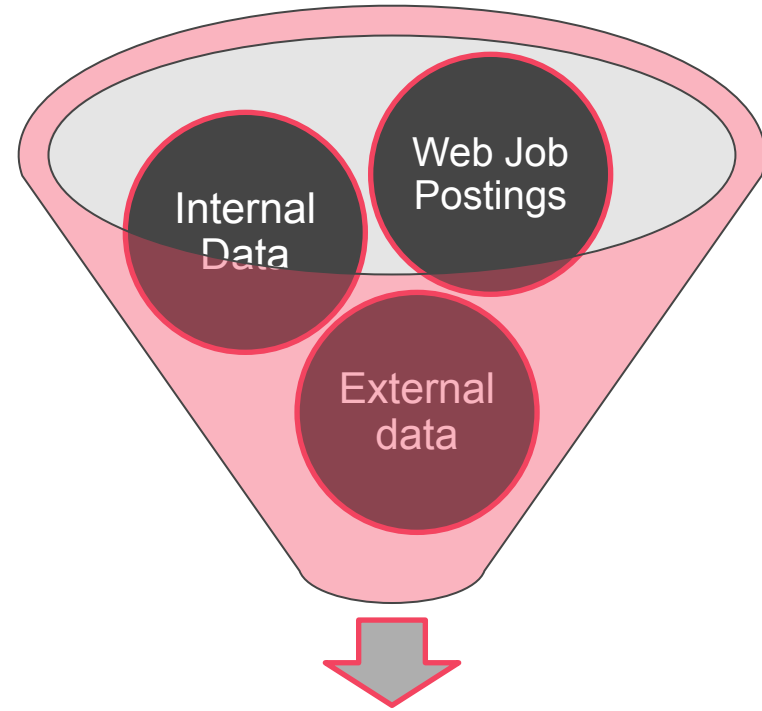
# Inform decision makers and practitioners

Use billion job postings to inform on VET and skills development



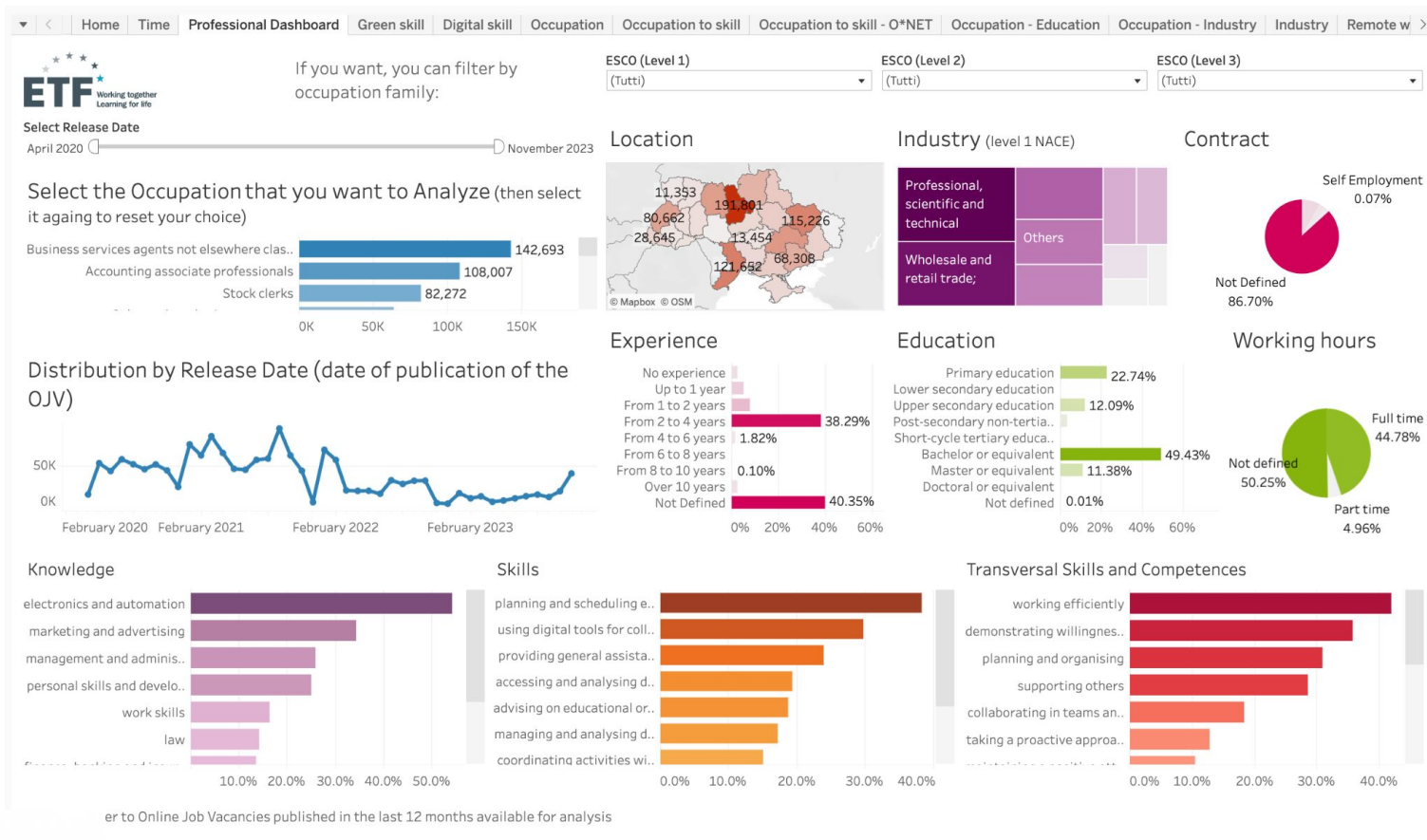
## Possible use cases

Education and Training / Human Capital development	The trends help decision makers to identify potential areas early and make the right decision in education and training of their populations.
Better Planning and Policy formulation	The LMI therein work as management information and informs economic planning for the future and policy formulation in education, labour, trade and social services
Benchmarking and Comparisons	Job postings provide common parameters between countries\regions. This makes it easier to compare the labour markets in different countries and create opportunities for learning and benchmarking.



Skills  
development





# Skills Intelligence - ART-ER Emilia-Romagna (Italy)

## Skills Intelligence & Talent Manifesto

- New models for **skills projections** and **difficulty to fill occupations**

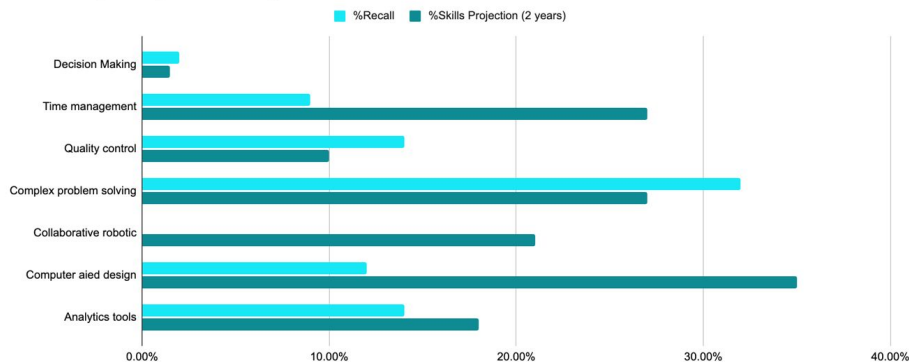
- The **future skill gaps** in the local market

- Talent Manifesto, a **public policy**, to attract talented individuals

- **Enhance the region's workforce** by bridging the gap between demand and supply of skills

ISCO08 Occupations	Recall%	Difficulty to Fill	ESCO Occupations	Recall%
Mechanical technicians	6.81%	MEDIUM	Mechanical technician	7.37%
			Production technician	3.31%
			Mechatronic engineer technician	1.96%
Specialized engineers	4.45%	HIGH	Quality engineer	8.23%
			Test engineer	5.17%
			Project engineer	3.74%
			Mechanical engineer	17.90%
Mechanical engineers	5.82%	HIGH	Automotive engineer	16.97%
			Equipment designer engineer	0.40%

Skills Analysis - Specialised Engineers





# Thanks !

**Mauro Pelucchi** - Head of Data Science -  
[mauro.pelucchi@lightcast.io](mailto:mauro.pelucchi@lightcast.io)



UNESCO Education Data and Statistics  
Conference, Paris, 06/02/2034

## Big Data adding value to Skills Intelligence

### Online Job Vacancy Analysis

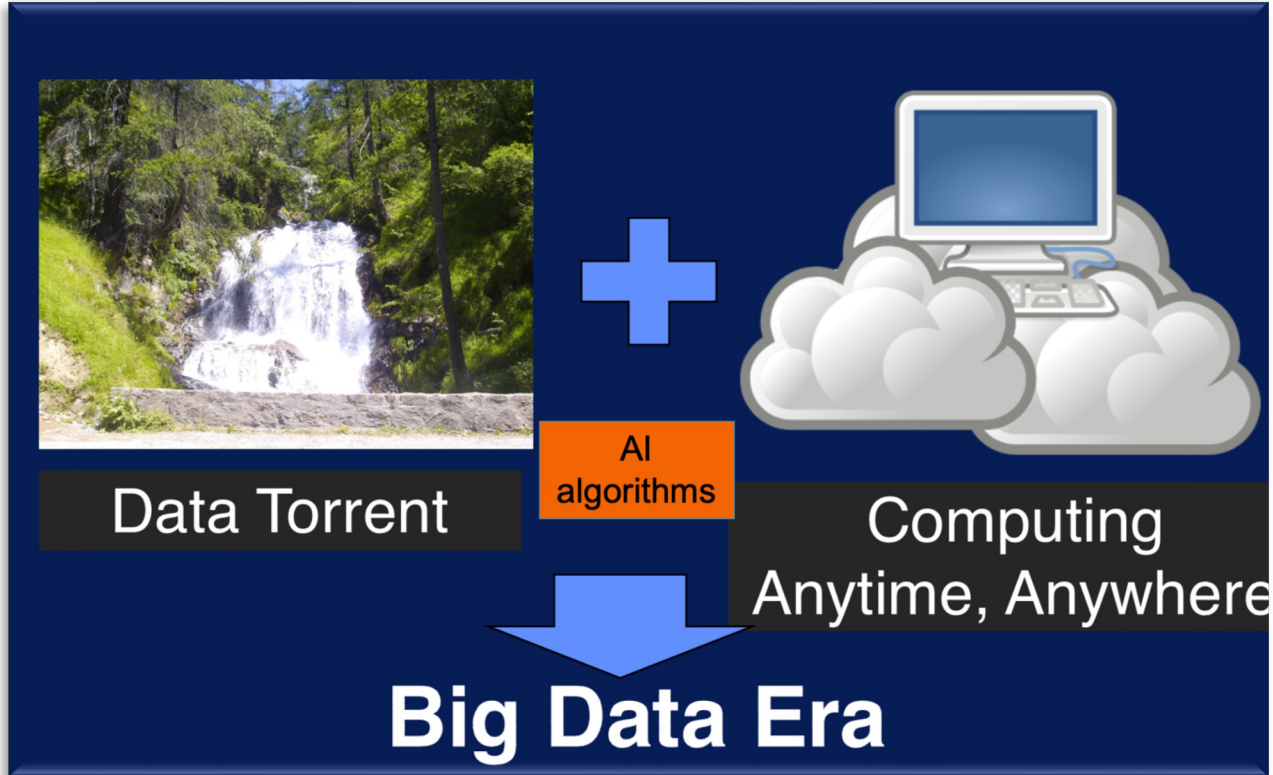
Occupations, Skills,  
Green and Digital Skills

Eduarda Castel-Branco  
Coordinator ETF Big Data LMIS project

[ecb@etf.europa.eu](mailto:ecb@etf.europa.eu)



# Big Data for Labour Market and Skills Intelligence





# Large volumes of data from employers' job vacancies online: new source for Labour Market and Skills Intelligence

Online Job  
advertisements /  
vacancies

(OJV)



# THE GOAL OF Online Job Vacancy ANALYSIS IS...

To transform this...



...into **value**

The collage shows several job listings with details such as location, application deadline, and salary. Key listings include:

- Junior Software Developer**: Location: United Kingdom, Application deadline: Saturday, 30 September 2017.
- Lead Clinical Data Manager - Office or home based**: Warman O'Brien - Milano, Lombardia, €40.000 - €50.000 all'anno.
- Supply Chain - Magazziniere - La Risorsa Umana.it**: MODENA, EMR.

Most relevant skill in digital occupations

**WOLLYBI**  
powered by Tabular

Labour Market Intelligence - Dashboard Preview

ETF Working together Learning for life

Internal use only - Data still under processing and validation

Select desired country: [Italy] | Select desired sources: [Jobs] | Select Release Date: [30/09/2017]

Number of job vacancies collected (excluding ru and uk languages)

43.418

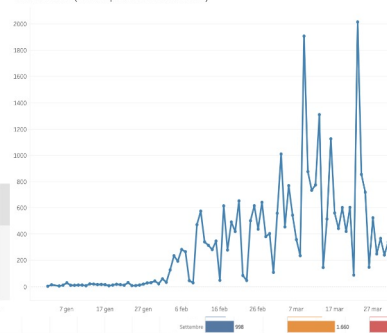
Number of job vacancies deduplicated (excluding ru and uk languages)

29.120

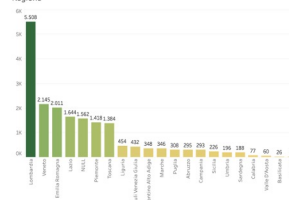
Sources



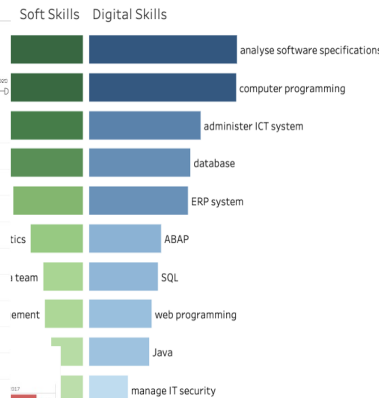
Release Date (date of publication of the OJV)



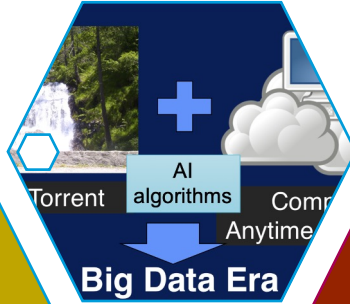
Regione



Comune



# OJV analysis system: building blocks



3.  
International  
Classifications  
ESCO, ISCO,  
NACE...



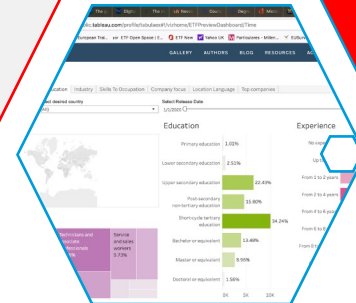
1. Data from  
OJV  
Complements  
statistics



2. AI-aided  
data system



6. Volume,  
Velocity,  
Variety,  
Veracity,  
Value



4.  
Visualisation  
Dashboard -  
variables



5. Let the data  
speak

# Big Data for LMI - OJV DATA



**All country Dashboards at:**

[https://solutions.lightcast.io/?pc=x\\$fhADtD\\*cu\\$BjY9](https://solutions.lightcast.io/?pc=x$fhADtD*cu$BjY9)

**Methodological Guide:** <https://www.etf.europa.eu/en/publications-and-resources/publications/big-data-labour-market-intelligence-introductory-guide>

- Experimental project – data production system based on internet data
- Started: 2019 (Handbook)
- Data science expertise: Lightcast.
- Data: constant inflow; updates: monthly
- 12,5 million OJV collected in the Database

Countries in ETF Database & dashboards:

- Ukraine
- Tunisia
- Georgia
- Kenya
- Egypt
- Morocco

## Standard variables on ETF dashboards - Analysis by:

- Occupation
- Occupation– education
- Occupation – industry
- Industry
- Occupation to skill (ESCO)
- Occupation to skill (O\*Net)
- Location – language
- Professional dashboard
- New: green skills, digital skills

# DATA FLOW



Landscaping and assessing OJV sources in given labour market

## Ingestion

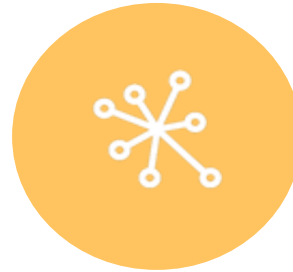


Data Ingestion

## Processing

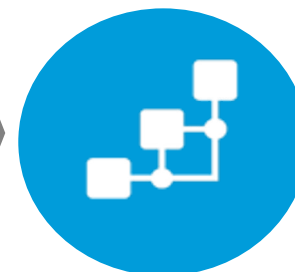


Pre-Processing



Information Extraction

## Front end



ETL



Presentation Area

## Interactive presentation of results – classified OJV data

All country Dashboards at:

[https://solutions.lightcast.io/?pc=x\\$fhADtD\\*cu\\$BjY9](https://solutions.lightcast.io/?pc=x$fhADtD*cu$BjY9)

## Examples

# Professional dashboard (all major variables) – Kenya



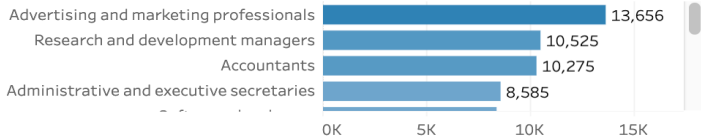
If you want, you can filter by occupation family:

ESCO (Level 1) (All) | ESCO (Level 2) (All) | ESCO (Level 3) (All)

Select Release Date



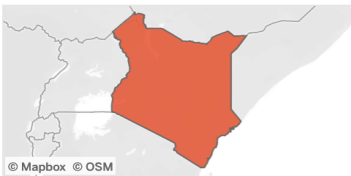
Select the Occupation that you want to Analyze (then select it again to reset your choice)



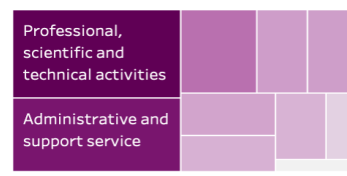
Distribution by Release Date (date of publication of the OJV)



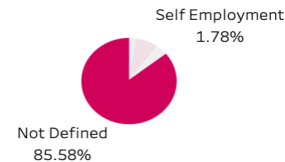
Location



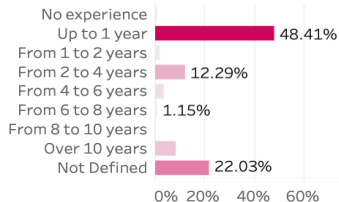
Industry (level 1 NACE)



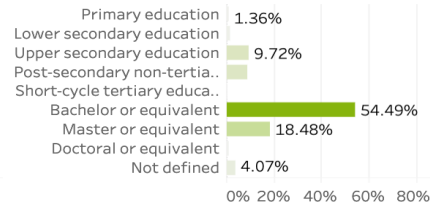
Contract



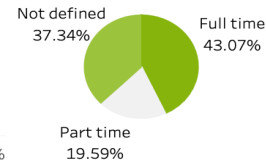
Experience



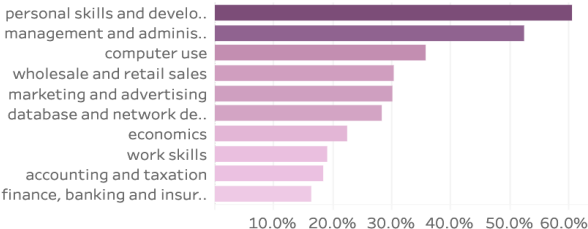
Education



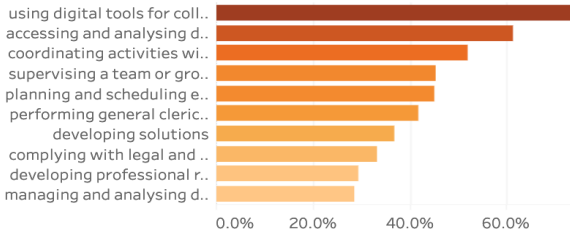
Working hours



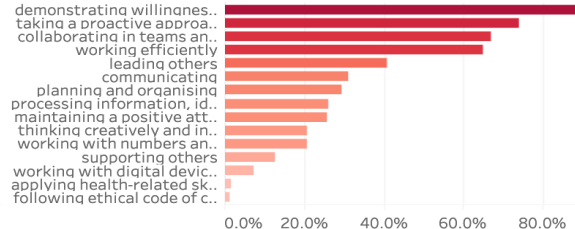
Knowledge



Skills



Transversal Skills and Competences



Skill data refer to Online Job Vacancies published in the last 12 months available for analysis

# Professional dashboard - Egypt

Home Time Professional Dashboard Green skill Digital skill Occupation Occupation to skill Occupation to skill - O\*NET Occupation - Education Occupation - Industry Industry Location Language



If you want, you can filter by occupation family:

ESCO (Level 1)

(All)

ESCO (Level 2)

(All)

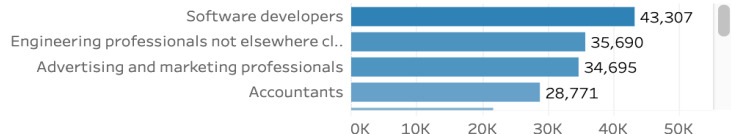
ESCO (Level 3)

(All)

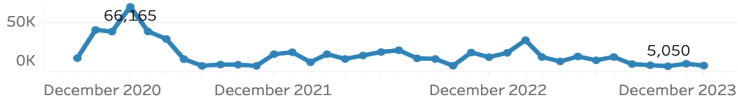
Select Release Date

January 2021 December 2023

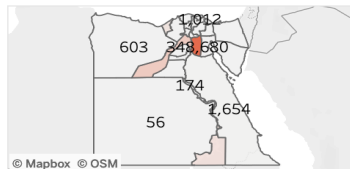
Select the Occupation that you want to Analyze (then select it again to reset your choice)



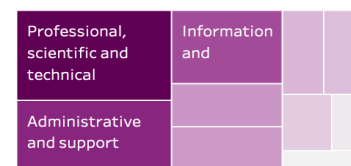
Distribution by Release Date (date of publication of the OJV)



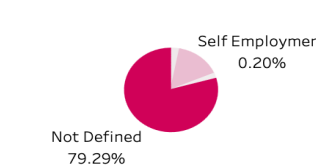
Location



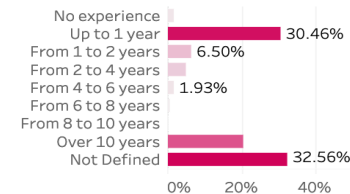
Industry (level 1 NACE)



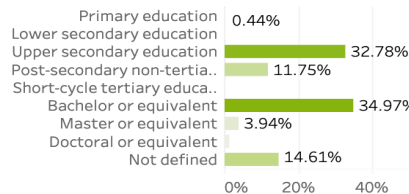
Contract



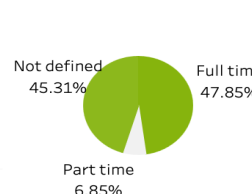
Experience



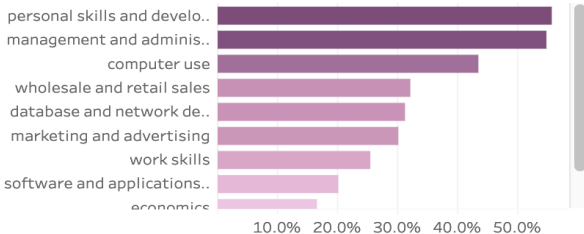
Education



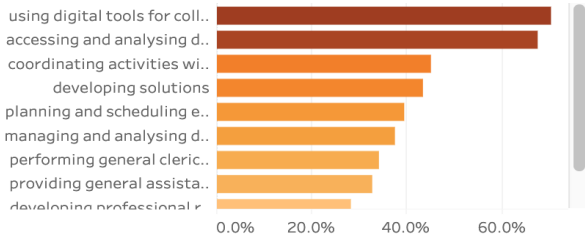
Working hours



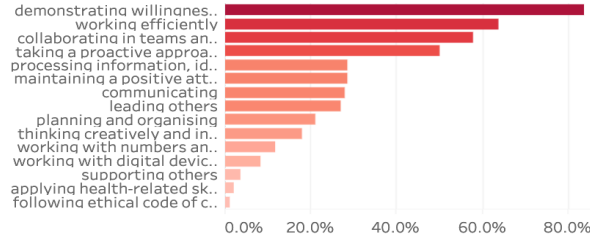
Knowledge



Skills



Transversal Skills and Competences



Skill data refer to Online Job Vacancies published in the last 12 months available for analysis



# Remote work - Ukraine



Select Release Date

April 2020

December 2023

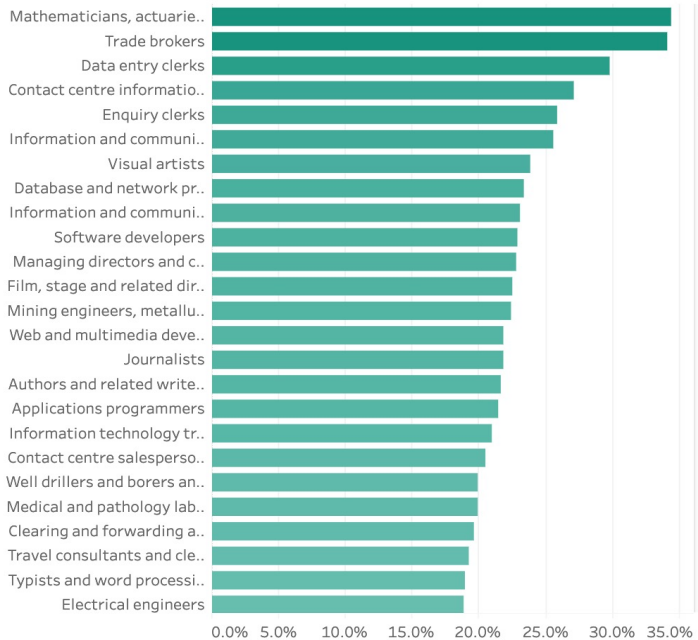
## Remote Work Share

5.41%

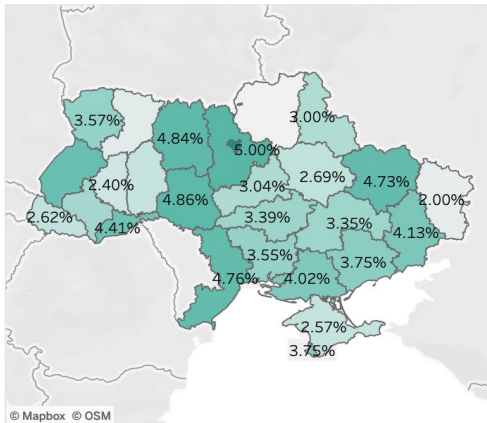
## Number of remote work OJV

161,210

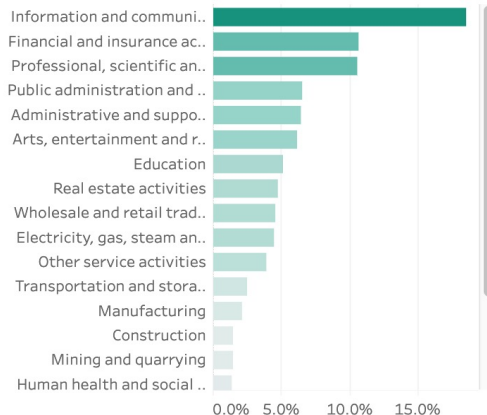
Select the Occupation that you want to Analyze (then select it again to reset your choose)



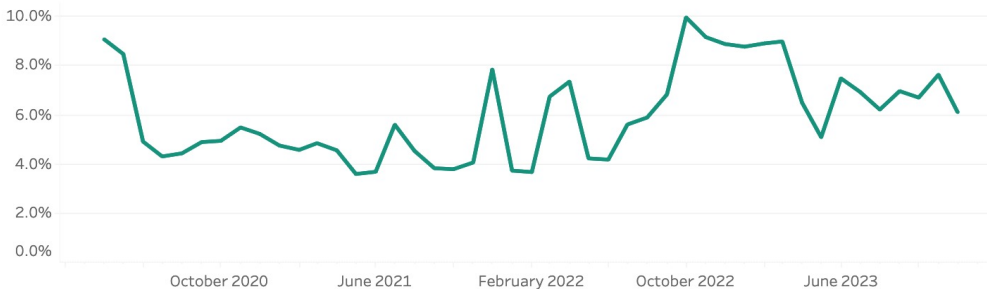
## Share of remote work by region



## Share of remote work by industry



## Share of remote work by release date





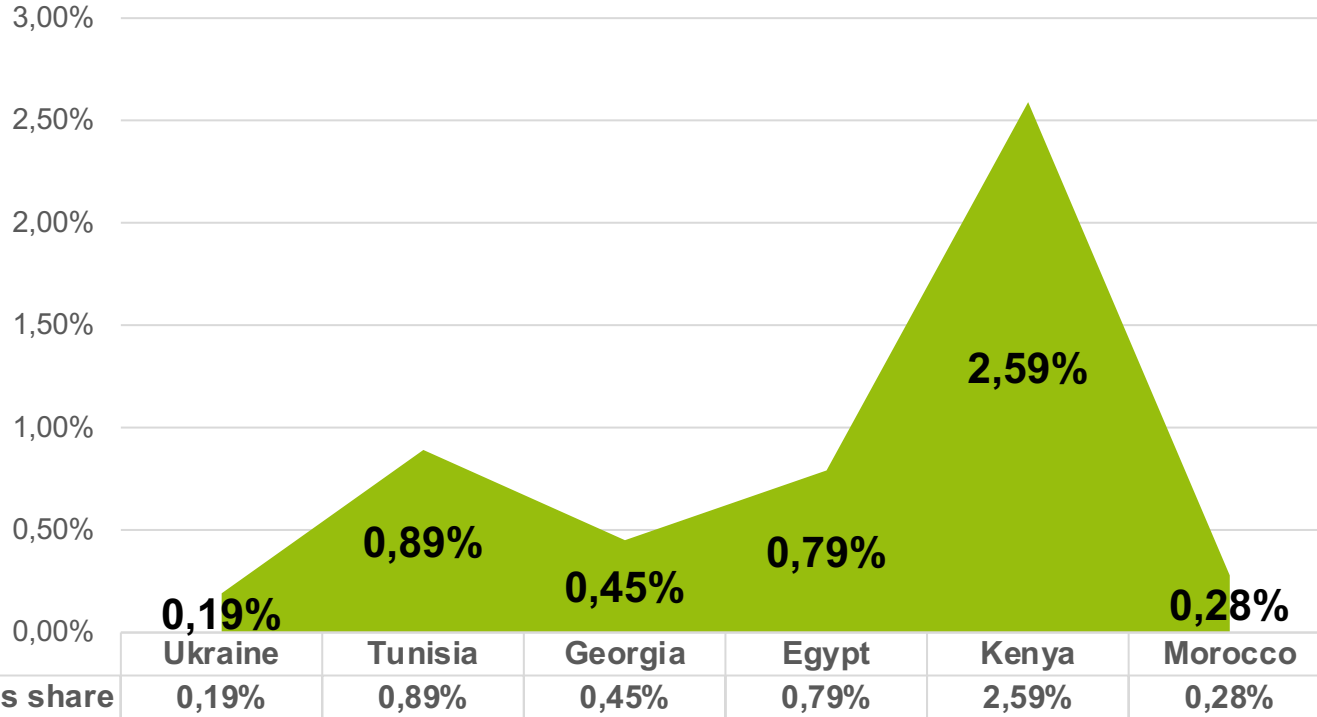
# GREEN SKILLS

IN ETF OJV DATA - EGYPT

UNESCO Education Data Conference 6/Feb 2024

# ETF project: Online job vacancy – Big data for LMI

## Green skills share - data updated until 31/07/2023



Green skills share = share of online job vacancies that required at least 1 green skill

Kenya: highest green skills share, Ukraine – the lowest

Used green skills taxonomy: ETF (225 terms)

# KENYA



Select Release Date

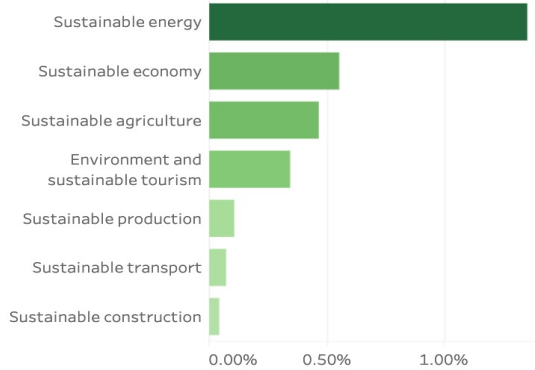
October 2022

August 2023

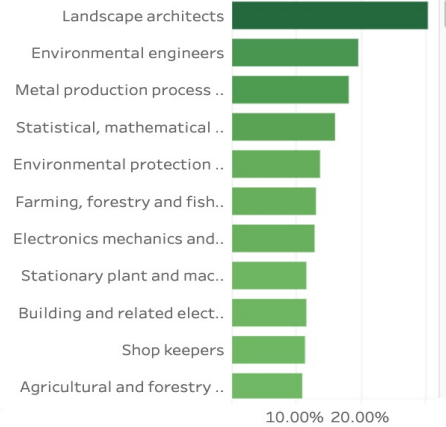
## Green Share

2.64%

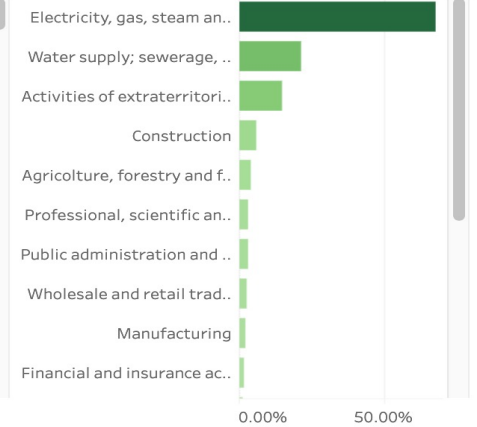
Select the Green skill family that you want to Analyze (then select it again to reset your choice)



## Share of green skill by occupation



## Share of green skill by industry



## Share of green skill by release date



## Most requested green skill



## Top 20 Green Skills Kenya

<b>Skills / skill set</b>	<b>% (from 20)</b>	<b>Nº unique job postings</b>
renewable energy	22,95%	2.598
agroforestry	9,08%	1.028
clean energy	6,54%	740
sustainable business	6,47%	732
solar energy	6,27%	710
circular economy	5,64%	638
environmental sustainability	5,48%	620
development economics	5,05%	572
biomass	4,22%	478
solar systems	3,45%	390
environmental protection	3,41%	386
energy efficiency	3,41%	386
sustainable energy	3,38%	382
sustainable agriculture	2,99%	338
climate smart agriculture	2,54%	288
green energy	2,31%	262
iso 14001	2,19%	248
agroecology	1,80%	204
solar products	1,63%	184
electric vehicle	1,18%	134

# Kenya: Green skills required for selected occupations

Occupation	Green skill	Unique Job postings (Oct 22- Jul 23)
Electronics mechanics and servicers	solar panels	7
	solar energy	2
Environmental engineers	environmental protection	2
	environmental sustainability	32
	environmental protection	19
	sustainable procurement	9
	renewable energy	9
	sustainable business	7
	energy efficiency	7
	sustainable energy	5
	circular economy	4
	development economics	3
	climate smart agriculture	3
	green energy	2
	ecotourism	2
	clean energy	2
	carbon footprint reduction	2
	sustainable agriculture	1
sustainability performance	1	
iso 14001	1	
hydroponics	1	
clean technology	1	
agroforestry	1	
Metal production process controllers	iso 14001	2
Statistical, mathematical and related associate professionals	environmental protection	18
	clean energy	18
	energy efficiency	11
	green building	9
	sustainable materials	6
	sustainable building	6
	sustainable agriculture	6
	renewable energy	5
	circular economy	5
	biomass	4
	agroforestry	4
	sustainable energy	3
	hydropower	1
biofuels	1	

# Digital skills – overview of some features of demand



**Analysis based on ETF data OJV - Egypt**

# Taxonomy

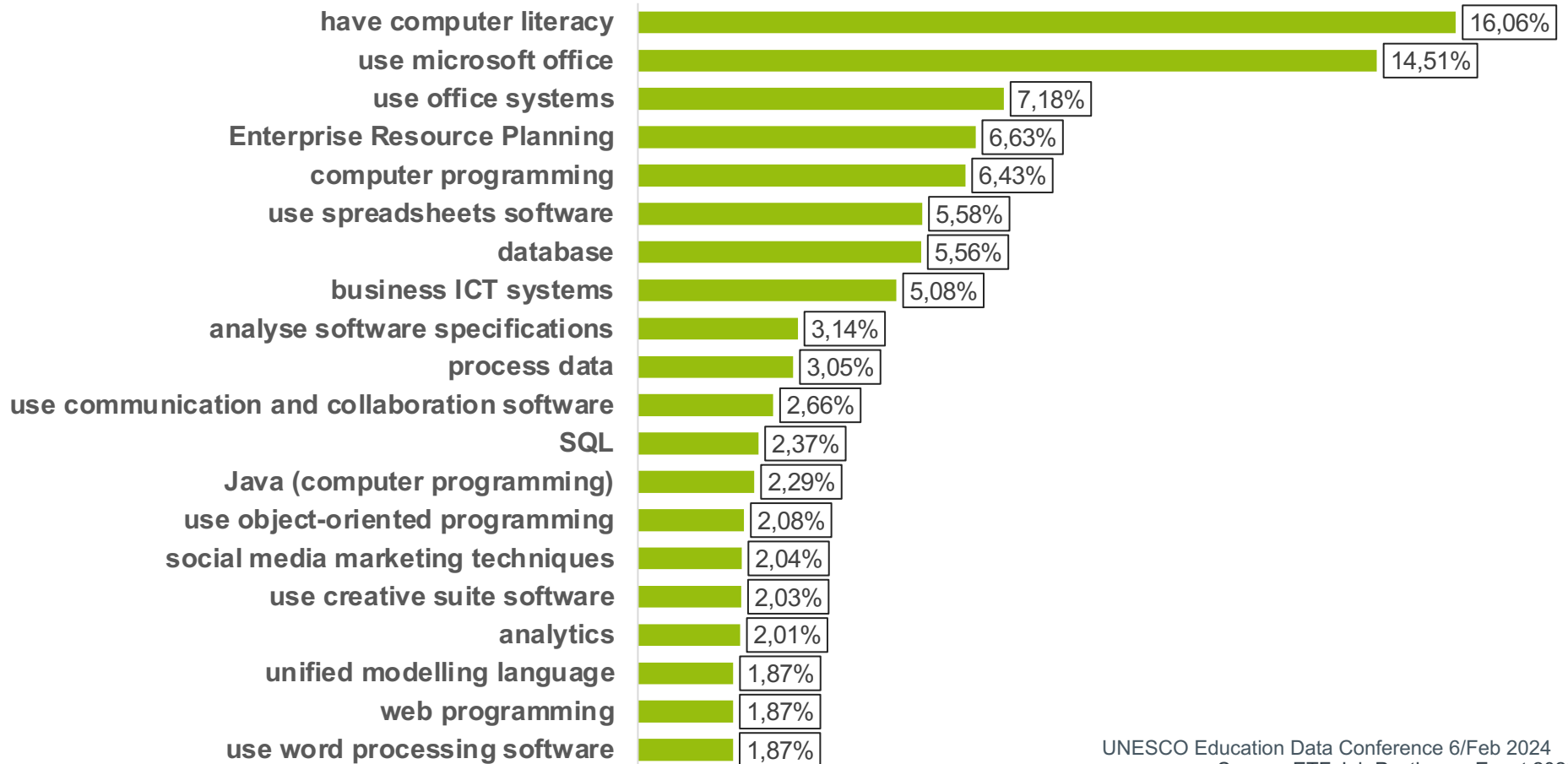


- **ESCO: 1,100 digital skills terms**
- Other sources of digital skills terms: Stackoverflow and Git-Hub – to ease classification

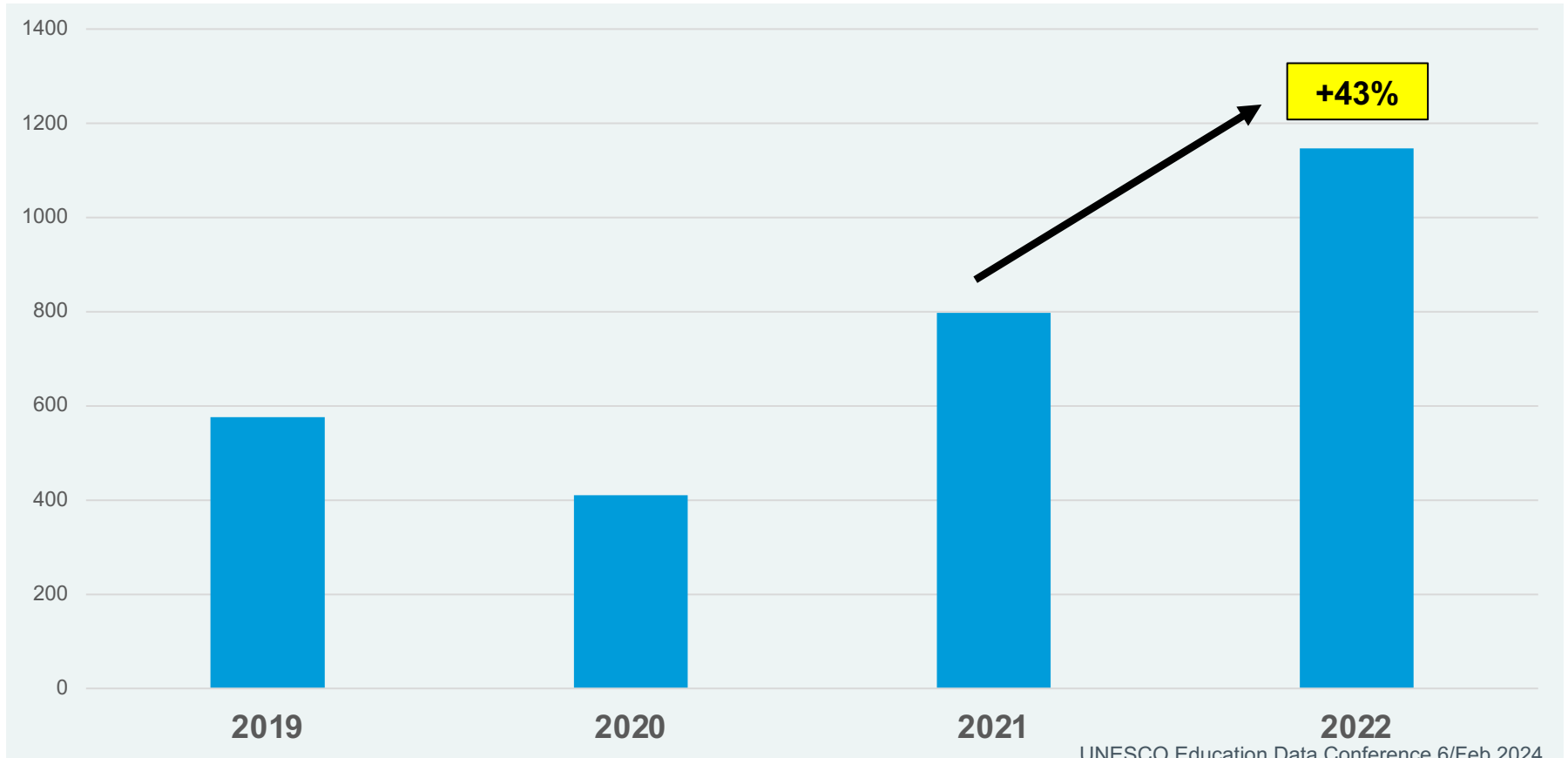


Digital skill		Unique Job postings (Oct 22-Jul 23)
use microsoft office	21,2%	133.629
have computer literacy	19,2%	121.093
office software	7,6%	47.684
database	5,7%	35.886
use spreadsheets software	5,4%	33.935
computer programming	5,4%	33.775
business ICT systems	4,0%	25.000
perform data analysis	3,8%	24.040
online analytical processing	3,5%	21.879
process data	3,2%	19.941
social media marketing techniques	3,0%	19.083
use communication and collaboration software	2,9%	18.554
use word processing software	2,6%	16.306
analyse software specifications	2,3%	14.409
digital marketing techniques	2,0%	12.549
use creative suite software	1,9%	11.825
use software design patterns	1,7%	10.686
computer science	1,7%	10.611
use object-oriented programming	1,5%	9.463
administer ICT system	1,5%	9.337

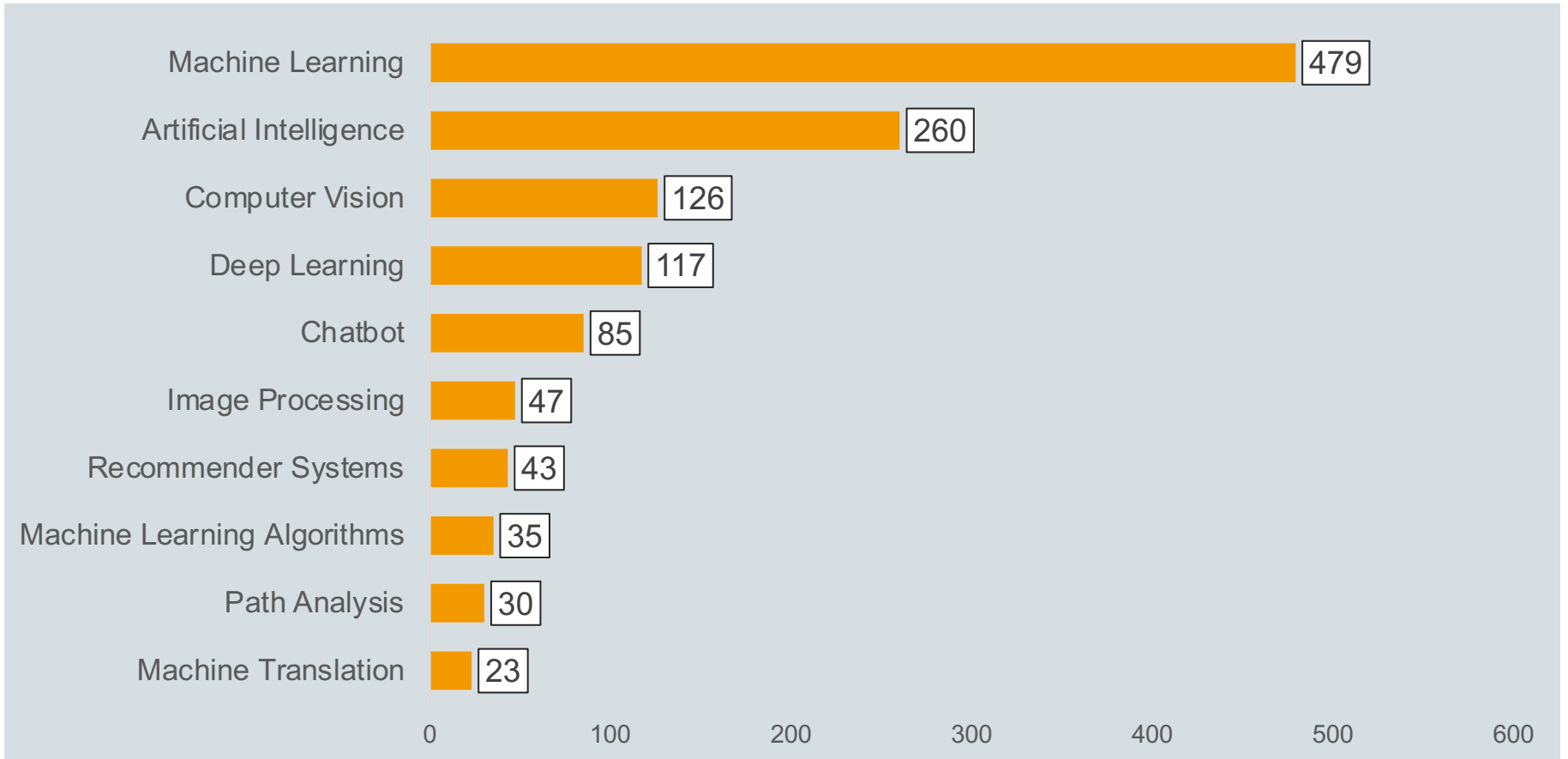
# Egypt: DIGITAL SKILLS: TOP 20



# AI SKILLS: UNIQUE JOB POSTINGS



# AI SKILLS: TOP SKILLS IN OJV

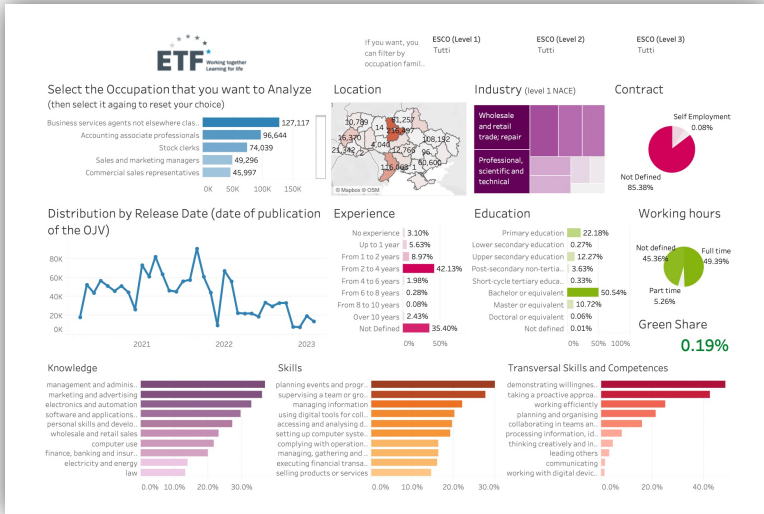


# DIGITAL SKILLS: IN DIGITAL AND NON-DIGITAL OCCUPATIONS

Occupation (ISCO 08)	Unique OJV 2022	Digital skills rate	Soft skills rate	Occupational-specific non digital skills rate
Database designers and administrators	158	54,00%	20,00%	26,00%
Web and multimedia developers	5418	48,00%	23,00%	29,00%
Systems administrators	1366	47,00%	25,00%	28,00%
Applications programmers	1343	44,00%	24,00%	32,00%
Software developers	14752	40,95%	26,32%	32,73%
Data entry clerks	351	40,13%	30,64%	29,23%
Mathematicians, actuaries and statisticians	174	39,08%	28,53%	32,38%
Database and network professionals	1780	38,77%	26,57%	34,66%
Computer network professionals	397	38,29%	29,08%	32,63%
Systems analysts	6593	28,64%	33,62%	37,74%
Graphic and multimedia designers	3686	25,39%	25,93%	48,69%
General office clerks	2022	21,92%	44,19%	33,89%
Environmental engineers	58	19,53%	36,15%	44,31%
Business services and administration managers	1785	15,78%	40,38%	43,84%
Personnel and careers professionals	4122	15,77%	39,97%	44,26%
Accounting and bookkeeping clerks	240	11,88%	33,99%	54,13%
Handicraft workers in textile, leather and related materials	2022	19,75%	31,85%	48,41%

# Big Data LMIS ETF project

## New initiatives using our database, other data sources and ESCO - 2024



- Occupational profiles – data driven, ESCO-based (ACQF-II – for common profiles of qualifications)
- Demand for green skills – data driven, ESCO-based - report
- Demand for digital skills - report
- Supply side – social profiles (ESCO Skills)
- Combination of data (OJV, conventional statistics, administrative)

# FINAL NOTES

## 1. Value of OJV data

- **Near real-time data**
- **Volume:** allows different angles of analysis on skills and occupations; granularity
- **Finder!** Early spotting of new skills / new patterns of skills mix (digital, soft, technical, green...). For further analysis in combination with conventional statistical and other data sources
- **Green and digital transition:** Identification of demanded skills; quantitative trends over time – by occupations and sectors; green and digital skills profiles of occupations; AI skills and occupations; and setting up international benchmarking / comparisons.
  - Identification of **green jobs** in high demand; lead industries and regions in green job creation; qualifications for green jobs
  - The evolution of the **digital skills** and new emerging occupations; growth in jobs requiring new knowledge & skills.
- **Value-added to LMI and skills development policies and practices:** emerging trends in LM and skills; inform policy responses;

## 2. Limitations

- Over-representation of certain occupational groups (professionals – 55%); underrepresentation (in general occupations requiring lower level of skills and qualifications).
- Classification of OJV data: robust techniques, constant evolution, taxonomies in transformation.



# Thank you

**European Training Foundation**

Eduarda Castel-Branco

[ecb@etf.europa.eu](mailto:ecb@etf.europa.eu)



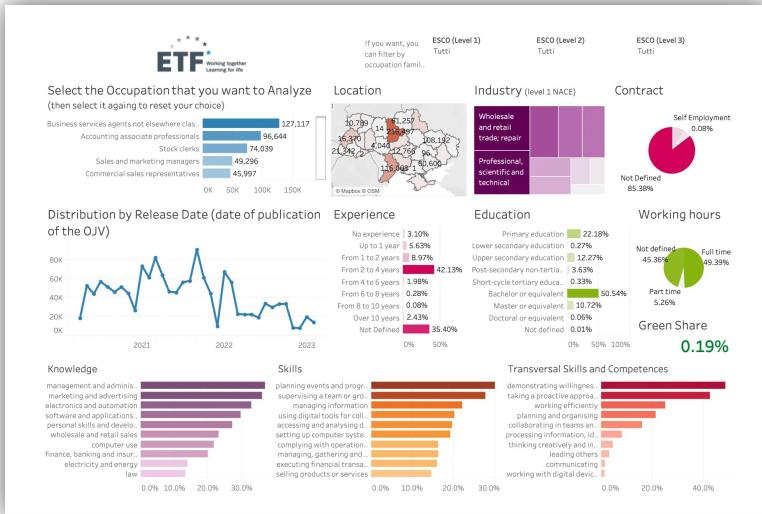


# 02

**ANNEX: for reference and further reading (not presentation)**

# ETF project

## Big Data for LMI 2018-2024



- **2018-2019: Methodology:** first step - brief methodological handbook “[Big Data for labour market intelligence: an introductory guide](#)” (published in 2019).
  - **2019: First application:** Feasibility analysis – Landscaping of Web Labour Markets Tunisia and Morocco
  - **2019-2021:** 3 main training programmes for experts of the partner countries and other regions(Asia, Africa)
  - **2020:** Creation of the complete OJV analysis system and dashboards: Tunisia and Ukraine
    - Analytical reports: LM and skills Ukraine and Tunisia
  - **2021:**
    - New country – Georgia;
    - **Green dashboard 3 countries**
  - The data system is based exclusively on **demand** – based on **job vacancies (OJV)** posted on web portals
  - Full comparability with the Real-Time data system of the EU-27 (same methodology)
  - ETF works with the data analytics specialists of **University Milano-Bicocca and LightCast**
  - **2022:** expansion new countries, new themes analysis: Egypt, Kenya; **2023:** Morocco. Selection – based on results of landscaping study.
- New themes: Supply side analysis.
- Training and capacity development programme: materials, PPTs, videos – all accessible online for free use and sharing

# ONLINE JOB ADVERTISEMENTS

The screenshot displays the Target Recruitment & HR Solutions website. At the top, there is a navigation bar with the Target logo and menu items: Executive Recruitment, Human Resources Solutions, HR Services, Global Staffing, and Vacancies. Below the navigation bar, the main heading reads "JOB SEEKERS Find a job you'll love". A search bar contains the placeholder text "Job title or Keyword" and a red "Search Job" button. Below the search bar, it states "95817 jobs found for you". Three job listings are visible, each with a category label, a date, and a "Read More" link:

- Uncategorized** (13 Oct): VMware Expert. A very good opportunity in Cairo, Egypt, for an experienced "VMware Expert." Check the full details below and apply through the attached email. Job Description: - Support VMware products deployed.
- Engineering** (28 Sep): Business Analyst. An excellent opportunity in New Cairo, Egypt, for a well-experienced and professional Business Analyst. The company operates in Electronics/Electronic Manufacturing industry. Check the full details below and apply through the
- Human Resources** (22 Aug): HR Coordinator. A multinational company is hiring an "HR Coordinator" for its office in Cairo, Egypt. Job Title: HR Coordinator Job Location: Cairo Company's Category: Multinational Company About the HR Coordinator

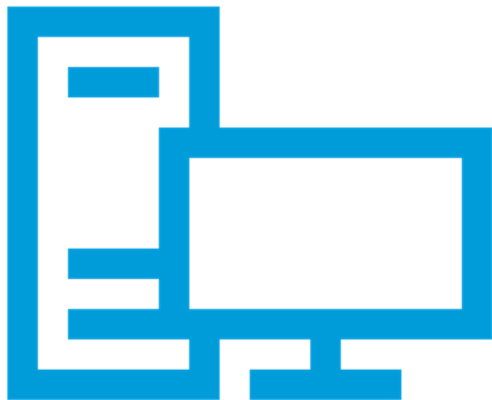
- Online job advertisements (OJAs) refer to advertisements published on the internet.
- Volume of OJAs is growing
- OJAs usually include data on the characteristics of the job (e.g. occupation and location), characteristics of the employer (e.g. economic activity) and requirements (e.g. education/skills).
- Part of this information is available only as natural language textual data.
- This type of big data requires specific methodologies for processing and analysis but also provides much more detailed information (compared to alternative data sources) and avoids pre-conceived classifications (important to identify emerging skills).

# BIG DATA LMI: FOCUS ON OJV

## KEY FEATURES

- Data collected from the web, based on feasibility analysis (landscaping)
- 5 Vs of Big Data
- Data management flow: landscaping, ingestion, processing, extraction, ETL, presentation
- Several data quality steps and tools
- Data classification: a) AI-aided – with human in the loop; b) International classifications & taxonomies
- ISCED, ISCO, ESCO, NACE; CEN-CENELEC, Stackoverflow, GitHub; ETF green skills
- Big Data: complements conventional statistics (“*Trusted Smart Statistics*”) – points topics and issues for further / wider analysis





## Digital skills

Ability to use digital technologies confidently, critically and responsibly and engage with them for learning, at work and for participation in society.

It includes information and data literacy, communication and collaboration, media literacy, digital content creation (including coding), security (including digital wellbeing and cybersecurity-related skills), intellectual property issues, problem-solving and critical thinking.

# Definitions



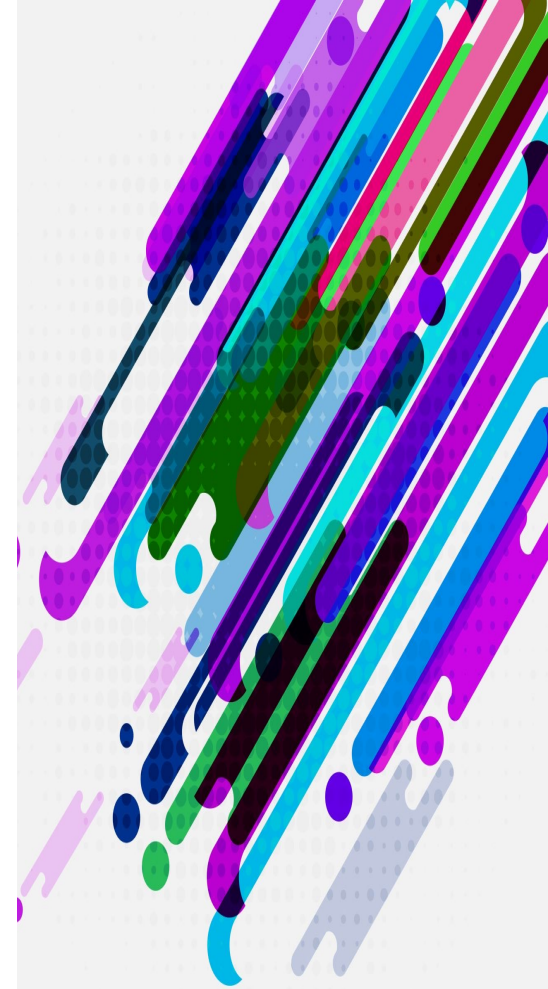
Green skills – an important area of debate and policy action and which has become a priority in research (quantitative and qualitative) and social communication. Several international organisations are working on the analysis and taxonomies related to green competences.

Cedefop defines green skills as "the knowledge, skills, values and attitudes needed to live, work and act in economies and societies that seek to reduce the impact of human activity on the environment".

## Skills for the green economy consist of:

- **transversal skills**, linked to sustainable thinking and acting, relevant to all economic sectors and professions;
- **specific skills** needed to adapt or implement standards, processes and services to protect ecosystems and biodiversity and reduce energy, materials and water consumption;
- **highly specialised skills** needed to develop and implement green technologies such as renewable energy, wastewater treatment or recycling;

Skills for the green economy are also referred to as skills for green jobs, skills for the green transition or green skills.



# Taxonomy



- ETF green skills list
- 225 terms (data-driven identification) – now integrated in ESCO
- 7 clusters of sustainable activity (inspired by the European Green Deal)



# THANK YOU

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**European Training Foundation**

Eduarda Castel-Branco

[ecb@etf.europa.eu](mailto:ecb@etf.europa.eu)





PISA



OECD

» Education & Skills

# PISA-Vocational Education and Training (VET)

The first international large-scale assessment of VET





6<sup>th</sup> February 2024



# What is the **VET** **problem** that needs to be solved?

VET has fueled phenomenal economic growth in some countries and fallen short of expectations in others. Yet, currently, it is **impossible to compare the achievements of VET programmes** in one country with those in another. Moreover, the digital and green transition asks many countries to modernise their VET provision in a competitive environment.

# Why PISA-VET? The data gap it is designed to fill

 Current VET data	 PISA-VET fills the data gap	 Benefits for policymakers	 Benefits for employers
Enrolments	Compare skill levels in VET programmes across countries	Gain insights for improving initial VET programs, making these more attractive to potential students and informing the practice of VET teachers and trainers	Improve alignment between education and employer needs and <b>promote participation in VET</b>
Qualifications	Analyze differences in learner characteristics	Analyze differences between countries and programs, considering design and learner backgrounds	Provide data <b>for employer planning and investments</b>
Labour market outcomes	Explore VET program features and contexts and their impact on outcomes to identify characteristics of successful VET provision	Facilitate peer learning through outcome analysis and promote participation in VET	Evaluate national vocational programs against <b>international standards</b> and assess skill evaluation methods



# Assessment design



A computer-based and practical skills test taken by groups of learners on the premises of their VET institution or in their work-based learning environment



Assessment of professional skills and employability skills



Background questionnaire for student



Background questionnaires for teachers, trainers, institutions and work-based learning trainers

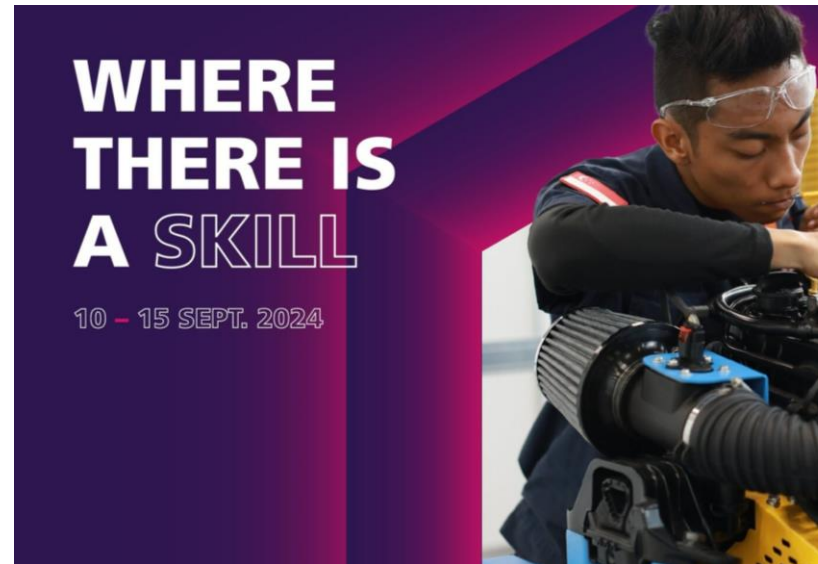


The assessment is designed to take place within a three-to-four-hour test window



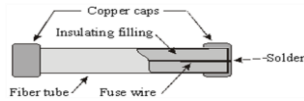
# Not a paper and pencil test of knowledge

Building on the experiences of ASCOT and ASCOT + in Germany and WorldSkills International, PISA-VET will measure applied skills in realistic workplace environments



# Three assessment types to demonstrate professional skills

The band saw where you work will not start. This saw uses 240 volts, draws 25 amps, and has 30-amp cartridge fuses. These fuses (see diagram shown) are designed to protect an electrical circuit. Your supervisor has told you to check the fuses in the band saw. By looking at the fuses, you cannot tell if they are good or bad.



You have turned off the power to the saw and removed one of the fuses. You check this fuse with a volt-ohmmeter (a device that measures resistance to the flow of electrical current).

- If the fuse is good, the resistance (measured in ohms) for the fuse will be:
- A. 0
  - B. 10
  - C. 50
  - D. 100

**Type #1**  
Knowledge assessment



**Type #2**  
Interactive simulations of workplace tasks



**Type #3**  
Demonstration tasks to efficiently generate insights about learners' practical skills



Data on comparative skill levels of learners across countries within specific VET programmes.

# A 10-year+ project implemented in three phases



**Development  
Phase**

2023-2026

- Methodological study in four countries
- Data analysis and report
- Prepare for pilot phase
- Feasibility and affordability of the assessment confirmed



**Pilot  
Phase**

2026-2030

- Field Trial in 10-15 countries
- Main Survey in 10-15 countries
- Data analysis and international comparisons
- Plan for International Large Scale Assessment Phase



**Large Scale Assessment  
Phase**

2030-2034

- Instrument development for additional occupational areas
- Field Trial in 15-25 countries
- Main Survey in 15-25 countries
- Data analysis and results of international comparisons
- On-going International Large-Scale Assessment in 3-4-year cycles

# Core Team & Key Partners

 <p>Participating countries</p>	 <p>Working Party on International VET Assessment</p>	 <p>Expert Group and sub-groups with lead experts</p>	 <p>Social Partners</p>	 <p>Partners</p>	 <p>Employers</p>
<p>Australia Brazil Belgium (Flemish) Germany Greece Ireland Mongolia Netherlands Portugal Türkiye UAE UK US</p>	<p>Chair Luis Santos (Portugal) and 26 members</p>	<p>Chair Erik Hess (Germany) and more than 100 experts, <i>including many from countries that have apprenticeship systems, such as Germany, Luxembourg and Switzerland</i></p>	<p>TUAC Trade unions Associations BIAC Employer federations</p>	<p>ASCOT+ WorldSkills UNESCO ILO World Bank ESCO Cedefop Foundations</p>	<p>Corporations Industries Businesses &amp; enterprises</p>





# The draft framework: to be launched on 19/3/2024



Intended to guide the work of the instrument developers, help policy makers understand the purpose and the appropriate use of the International VET Assessment results, and inform researchers and educators about methodological choices



Overview

Chapter 1  
+ Annex A



Five  
Occupational  
Areas

Chapter 2-6



Employability  
Skills

Chapter 7



Background  
Questionnaires  
for students,  
teachers,  
institutions and  
work-based  
learning  
trainers

Chapter 8  
+ Annex B



System  
Level Data

Chapter 9



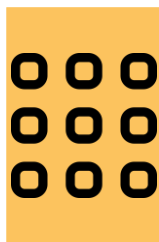
List of  
experts  
contributing  
to  
the  
framework

Annex C

# Criteria for selecting occupational areas



The occupational area is important in VET and in the labour market.



The occupational area comprises a student population which is large enough to come to reliable and valid judgments on important parts of VET and the labour market.



The occupational area is of significant economic and societal importance and is likely to remain so.



The occupational area requires mainly professional (VET) skills.



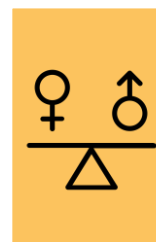
The occupational area is sufficiently comparable at the international level.



Resources are available to support measurement of skills in the occupational area (e.g.internationally validated task inventories and simulation environments).



The occupational area has strategic importance in relation to the digital and/or green transformation.



The occupational area represents both male and female learners.

# For each occupational area, the framework:

- ✓ **DEFINES** the domain/occupation for the assessment *in broad and holistic terms*
- ✓ **DESCRIBES** the context for the occupation.
- ✓ **PRESENTS** the processes involved in the occupation from the *first contact with the client to the delivery of the product*
- ✓ **SETS OUT** the underlying *capabilities, skills and competences* required to complete the processes for the occupation
- ✓ **ELABORATES** the *knowledge content* required for the occupation



PISA



FTS USA confidential and proprietary



## Target Population

Students, apprentices and trainees training to be:

- **Automotive technicians**
- **Electricians**
- **Healthcare/nursing assistants**
- **Business administrators**
- **Hotel receptionists**

In the last six months of their initial VET programmes corresponding to *ISCED levels 3-4 and EQF levels 3-4, or equivalents.*

# Example: Automotive Technicians

## Framework & Reporting Results

<b>Definition</b>	Servicing, overhauling and troubleshooting light vehicles
<b>Context</b>	Workshop
<b>Processes</b>	Investigate and rectify – from first contact with the client to delivery of the product
<b>Underlying capabilities</b>	Investigation capability and skills and rectification capability and skills
<b>Knowledge Content</b>	Light vehicles systems



### Reporting Results

Three proficiency levels that will be based on a numeric scale.



# In addition to occupational-specific skills, VET graduates also need employability skills that are relevant for all occupations

PISA-VET will measure key transversal employability skills using existing OECD frameworks and instruments



**Literacy**



**Problem Solving**



**Task performance**  
(conscientiousness)



**Collaboration**



# Reporting of results - employability skills



**Literacy** proficiency scales used to report the OECD's PIAAC Literacy results.



**Adaptive problem-solving** scales used to report results in the OECD's PIAAC Cycle 2.



**Task performance (conscientiousness) and collaboration with others** based on reporting scales used in Round 1 of the OECD's Survey on Social and Emotional Skills (SSES)



# Vision

PISA-VET becomes  
**the world's premier yardstick**  
for comparing quality, equity,  
and efficiency in VET learning  
outcomes across countries



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Thank you!



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