

Sharing experiences in combining big data with other methods

ILO, Skills and Employability Branch 20 September, 2019



Outline

- Challenges in Big Data for developing countries
- Some examples of the current ILO efforts
 - 1. Combining different data sources: Skills for a greener future
 - 2. Validating of results of qualitative studies on skills and trade
 - 3. Adding granularity and "realtimeliness" by combining LFS and big data
- Way forward on big data use for skills analysis



Challenges for developing countries and beyond

- Multiple issues with the quality and coverage of big data even in advanced economies
- In developing countries:
 - Weak statistical systems
 - Irregular Labour Force Surveys (LFS), poor LMI
 - Insufficient coverage
 - High costs
 - Poor governance mechanisms
- Vacancies Big Data offers opportunities
 - Outputs that are easily understood, and accessible and relevant to policy-makers, providers
 of education and training, and industry
 - Reasonable cost, and not dependent on collaboration between organizations
- Technical challenges to vacancies Big Data greater than for industrialized countries how do we overcome?



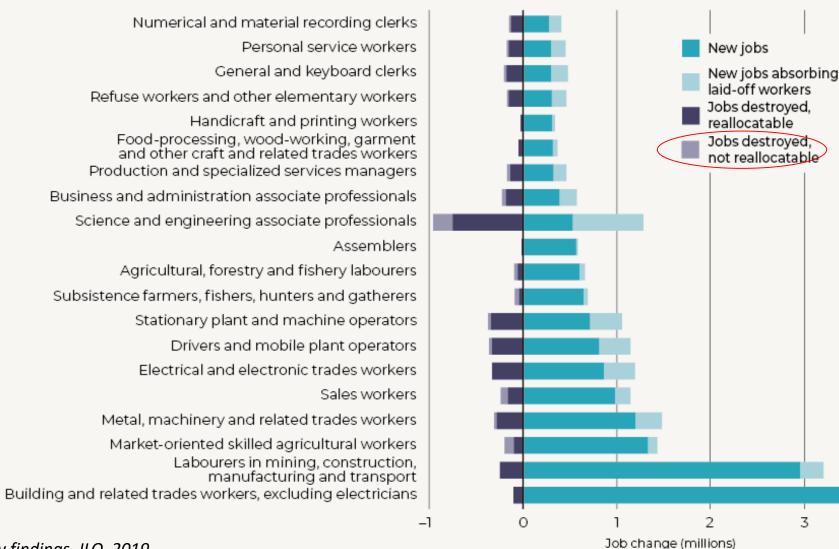
1. Complementing different data sources: Skills for a greener future

- Input/Output modelling (Exiobase V3) for 163 industries across 44 countries
- Weighting the results by the use of LFS to produce global employment scenarios: energy transition and circular economy scenario





Energy Sustainability Scenario



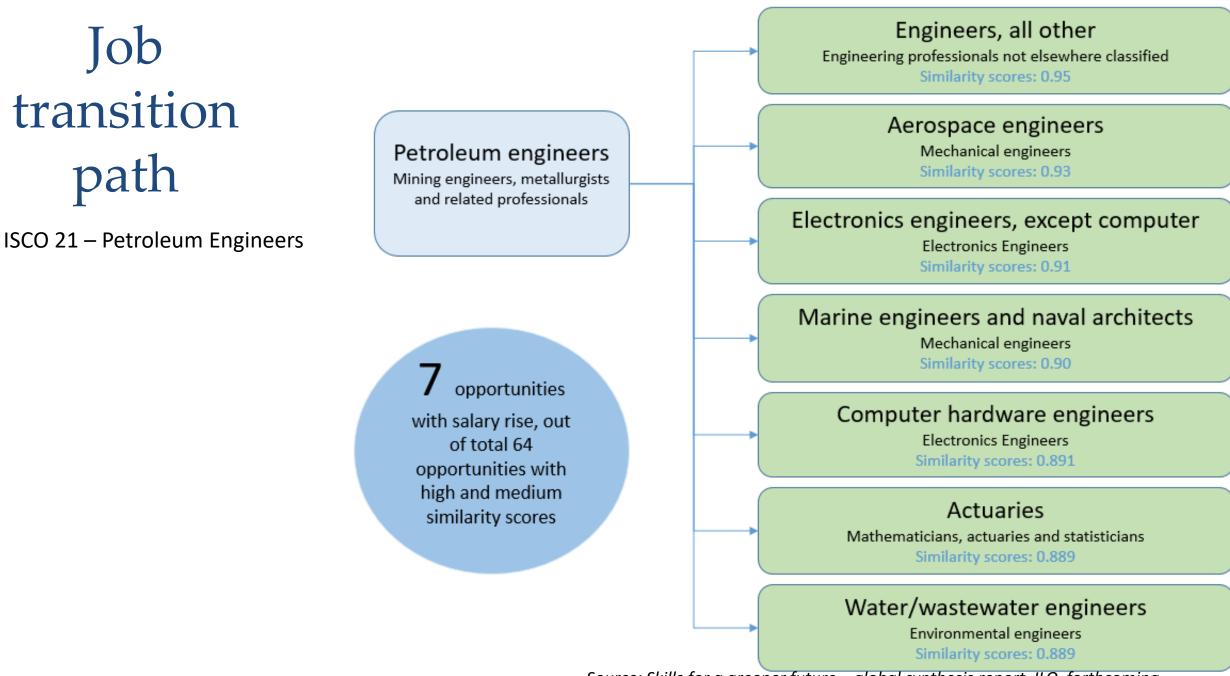
Source: Skills for a greener future – Key findings, ILO, 2019

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Overlap of core and technical skills

for Science and Engineering Professionals (ISCO 21)

Energy sustainability Lower demand Higher demand ical, Electrical, and Plembing MEP¹ Desica irganizational skills Drafting and engineering design Mechanical engineering nfor softwar Instrument design Structural geology Transportation security Creativity nercial construction Planning Store management Hydraulic fracturing Store merchandising Customer handling Petrel software Design-build Geosteering Vehicle systems Petrophysics Shop drawings Wireline **Connected home** Project management Nuclear plant design Design for Six Sigma Geophysics Well testing Lead follow-up Teamwork / Collaboration Infotainment Research Reservoir simulations Automotive engineering and evaluations Mechatronics Gas prospecting Schematic design Knowledge of meridium system roject architectu Sales and marketing skills atía V5 B jayout and desire uter literacī INT DECRESS



Source: Skills for a greener future – global synthesis report, ILO, forthcoming

Energy Sustainability scenario Top skills wanted in top demanded occupations

Occupational health and safety Supervisory skills Knowledge of retail industry Quality assurance and control Scheduling Budgeting Attention to detail Physical abilities Organizational skills Estimating Problem solving Commercial construction Writing Leadership Construction management Microsoft Office Cost control Project management Time management **Procurement** Logistics Planning Staff management Computer literacy Quality management Tearnwork/Collaboration Customer handling Sales and marketing skills Communication Building effective relationships

Microsoft Office Troubleshooting Communication Problem solving Physical abilities Packaging Carpentry Knowledge of retail industry Scheduling Building effective relationships Lifting ability Customer handling Heating, ventilation and air conditioning Food preparation Cleaning Repair Numeracy Plumbing Writing Multitasking Power tools Sales and marketing skills Organizational skills Food safety Hand tools Product knowledge and handling Forklift operation. Work area maintenance Teamwork/Collaboration Attention to detail

Work area maintenance

Tearnwork/Collaboration Attention to detail Lifting ability Knowledge of furniture industry Problem solving Scanners: Machinery English Handeook: Computer literacy Repair Cleaning Scheduling Microsoft Office Physical abilities Customer handling Writing Organizational skills Numeracy: Communication Product knowledge and handling Hand trucks Knowledge of retail industry Manual Dexterity Sorting Sales and marketing skills Material handling skills Forklift operation Order picking skills

High-skills occupations

Medium-skills occupations



Source: Skills for a greener future – Key findings, ILO, 2019

2. Validating of results of qualitative studies on **Skills for Trade and Economic Diversification (STED)**

STED experience

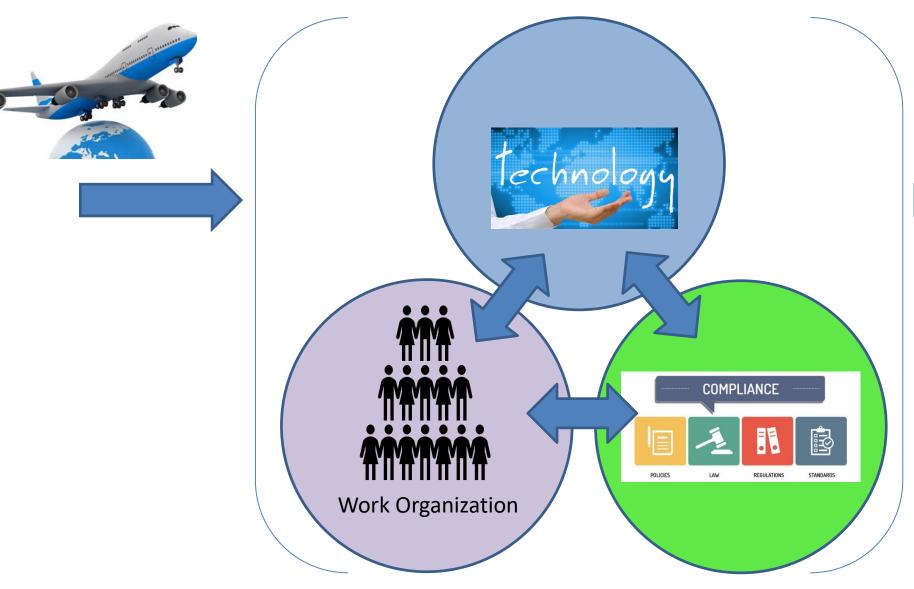
- Close to 20 countries, over 30 sectors
- Qualitative sector diagnostic skills studies
- ILO-WTO joint study (2017)

Case study on skills needs

- US Manufacturing Industry
- focuses on recovers from trade shock to employment
- aiming to bridge theory and qualitative findings with data analysis from big data (BGT)



Trade and skills



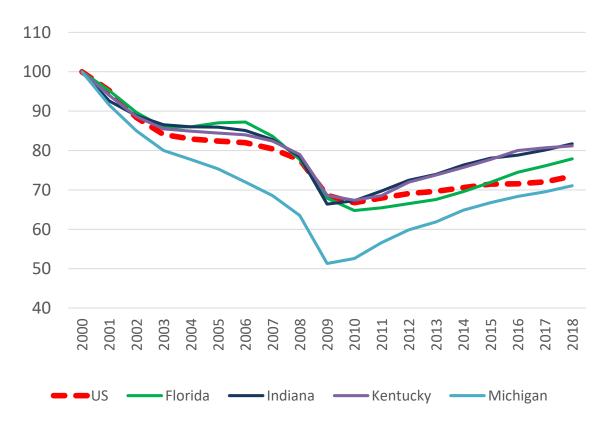
Skills requirements:

- Core employability
- Transferable
- Specialized technical skills



Case Study on Skills Needed When Manufacturing Employment Recovering

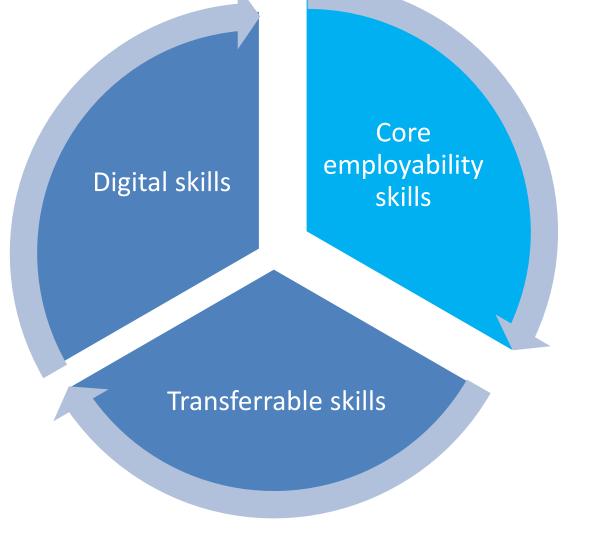
Manufacturing Employment Indexed to 100 in Year 2000



Source: Calculations from Bureau of Labor Statistics, State and Metropolitan Area employment data

- Which skills have increased in <u>incidence</u> in job advertisements from manufacturing employers?
- For which of these skills has the increase in incidence been <u>above</u> <u>the average</u> for US manufacturing industry?
- <u>Consistently</u> across these 4 US States

Case Study continued: Core Employability Skills and Skills for Modern forms of Work Organization

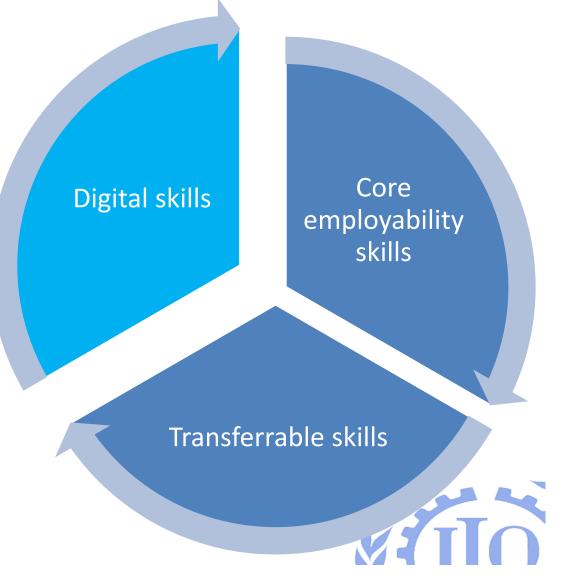


Core employability skills

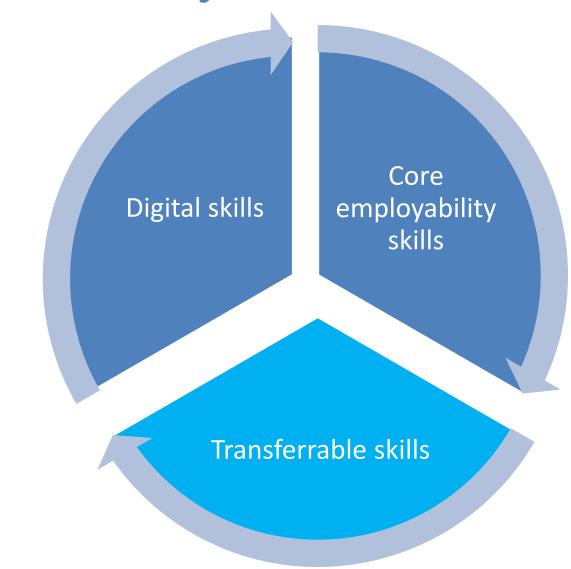
- Communication
- Customer handling
- Orientation to detail
- Positive Disposition
- > Energetic
- Modern forms of Work organization (these build especially on core employability skills)
 - Quality Management
 - > Quality assurance and control
 - Advanced product Quality Planning
 - Lean manufacturing
 - > 5S methodology
 - Root Cause Analysis
 - Preventive maintenance
 - Work Area Maintenance
 - > Troubleshooting
 - Direct Store Delivery

Case Study Continued: Digital skills

- Digital user skills
 - Microsoft office
 - > Spreadsheets
 - > Data entry
 - Computer literacy
- Specialized digital user skills
 - > ERP system
 - Graphic and Visual Design Software
 - Siemens TeamCentre
 - > SolidWorks
- Specialized digital skills
 - > Big data
 - Robotics



Case Study Continued: Transferrable Skills



- "Middle ground" skills that lie between
 - Generic skills, soft skills, core employability skills
 - Transferrable technical skills
- **Examples**
 - Managerial skills
 - Organizational skills
 - Customer handing skills
 - Prioritizing skills
 - Administrative support skills
 - Micrometers
 - Engineering drawings

Benefits of Transferrable skills

- > Career resilience
- Relevant to workers at risk from employment shock



3. Adding granularity and "realtimeliness" by combining the LFS and big data

- OECD Skills for Jobs Indicator
- Initially constructed using LFS and O*NET taxonomy
- Work in progress:
 - Instead of using taxonomy, try to capture real-time information on skills requirements
 - Online job vacancy data
- → combine occupational shortage indicator with information from BGT data

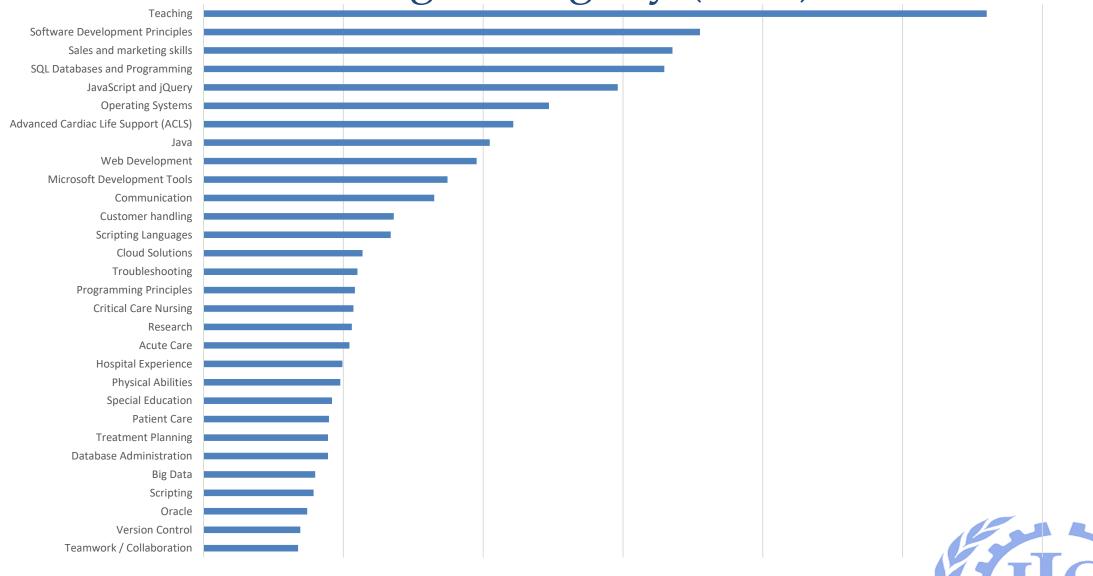


Approach

- Example: occupational shortage index used for Uruguay (2017)
- Big Data derived from Burning Glass Technologies for the US (also 2017)
 - Why US combined with Uruguay? In order to be able at a later stage to compare with the skills shortage/surplus indicator based on O*NET Taxonomy (also for the US)
- Advantages of using big data:
 - Rich information
 - Real-time
- Disadvantages
 - Some skills may be omitted as not listed in vacancies considered as implicitly required skills!
- Disaggregation by broad skill level included

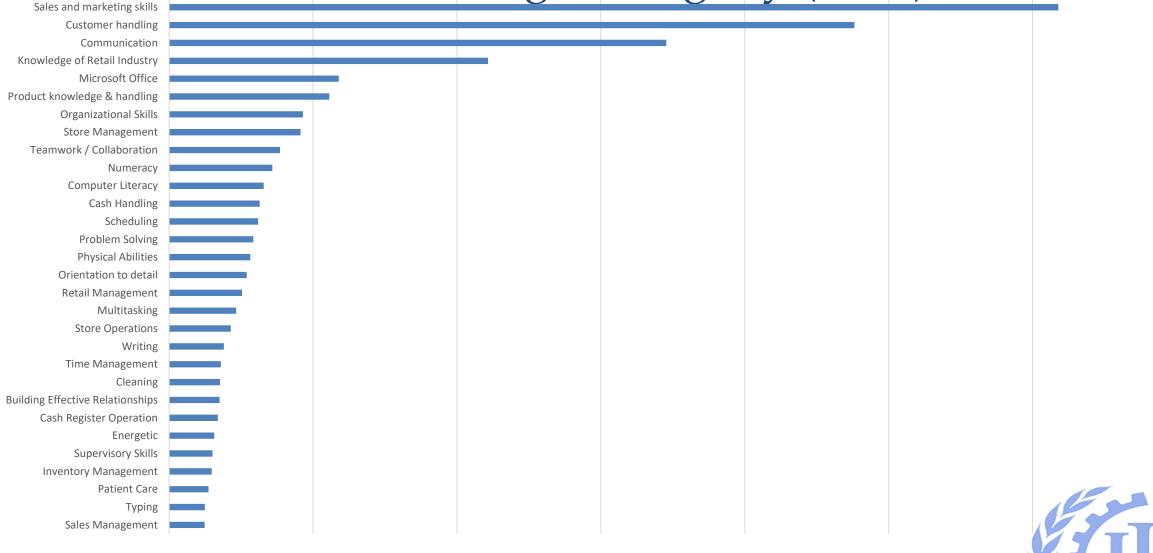


Top 30 skills related to high-skilled occupations in shortage, Uruguay (2017)



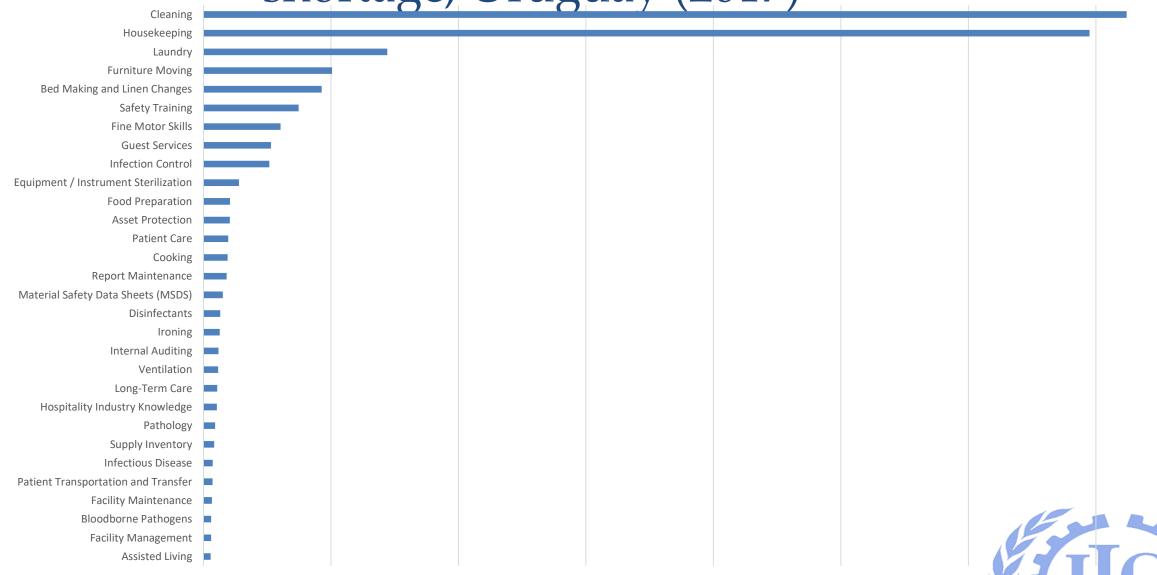
Source: Own calculations based on Uruguayan Household Survey (Encuesta Continua de Hogares) and US online vacancy data from Burning Glass Technologies

Top 30 skills related to medium-skilled occupations in shortage, Uruguay (2017)



Source: Own calculations based on Uruguayan Household Survey (Encuesta Continua de Hogares) and US online vacancy data from Burning Glass Technologies

Top 30 skills related to low-skilled occupations in shortage, Uruguay (2017)



Source: Own calculations based on Uruguayan Household Survey (Encuesta Continua de Hogares) and US online vacancy data from Burning Glass Technologies

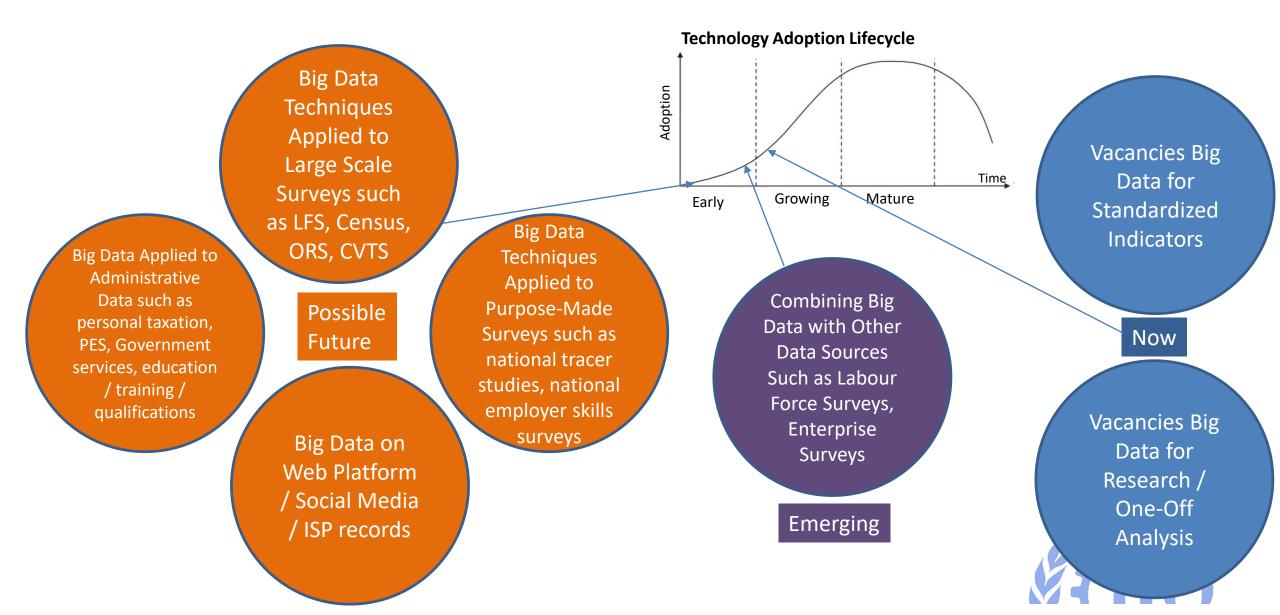
The Way Forward



Scraped vacancies data not the only type of large dataset with skills information

Platforms I	National Internet Infra- structure	Public Internet	Large-Scale Purpose-made Skills Survey microdata	National Statistical Office microdata	Wider Government microdata
Amazon N Linked-In I	Mobile/Cell Networks and ISPs - Unique identifier - Government services - Web traffic - etc.	Aggregators of public vacancies data - CEDEFOP OVATE - Burning Glass Technologies - EMSI - etc.	 National tracer studies National Employer skills surveys and Vacancies surveys etc. 	 Statistical surveys Labour Force Survey Census of Population Other household surveys Occupational Requirements Survey (US) Adult Education Survey (Eurostat) Continuing Vocational Training Survey (Eurostat) etc. 	Administrative records - Personal taxation - Education, training and qualifications systems - Public Employment Service - Social Credit (China) - etc.

Possible future directions



Issues in possible future Big data sources

- Privacy
- Information Security
- Access (National Statistical Office, web platforms, national skills analysis units, researchers)
- Policies on data integration across Government
- National strategies on big data
- Mobile/Cell unique identifier
- Resources
- Not a substitute to other LMI and analysis
- Potential for developing countries with weak statistical systems to leapfrog?
- What more can be done with big data analysis and governance?

Thank you!

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