

Valorizzare le competenze nel mercato del lavoro digitale: ESCO, EQF, EUROPASS



Methods and Techniques for improve Labor Market Knowledge through the Online-Job-Vacancies

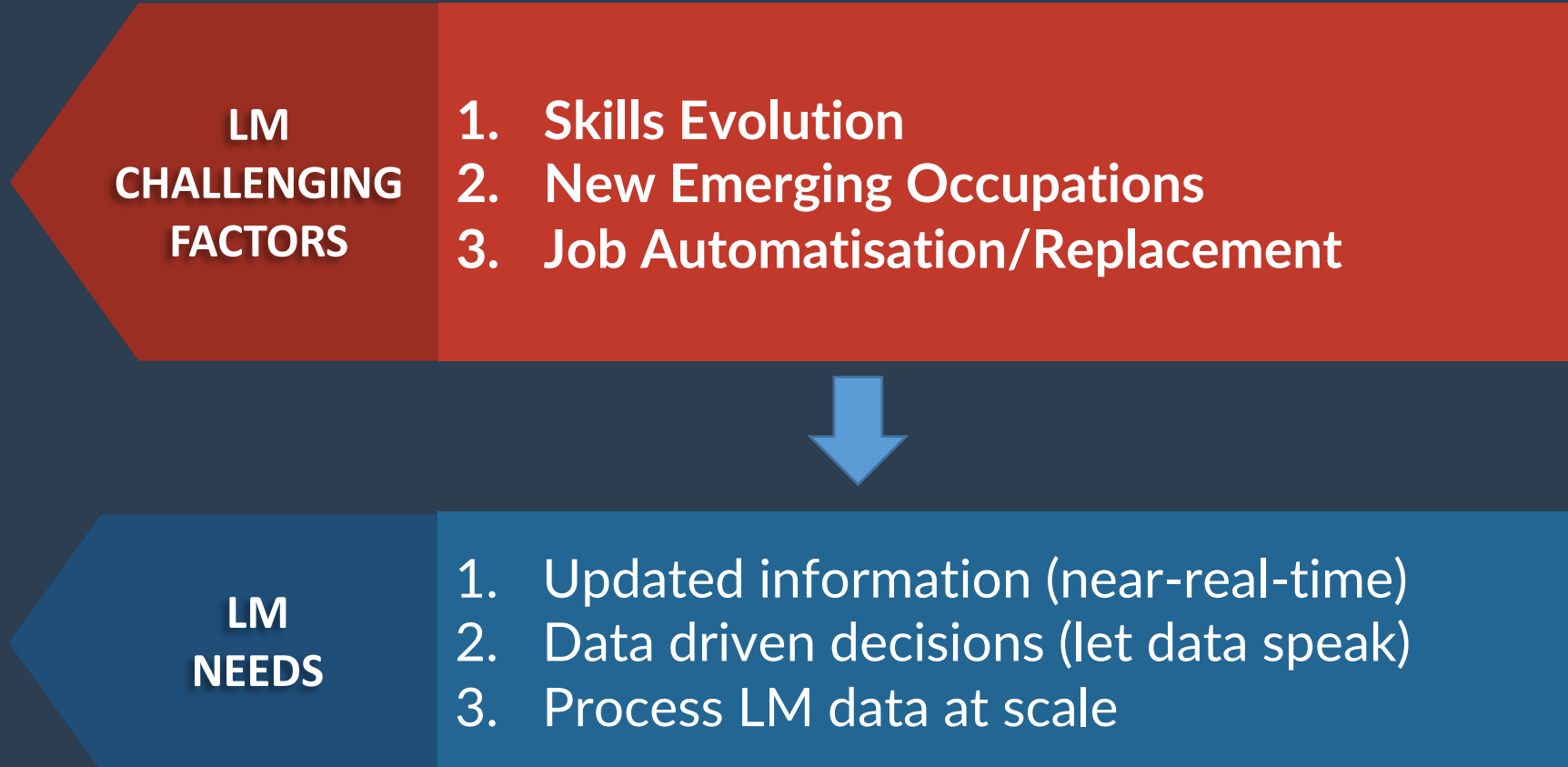
Mario Mezzanzanica

University of Milano-Bicocca

Roma, 24 Ottobre, 2019



Labour Market Challenging Factors

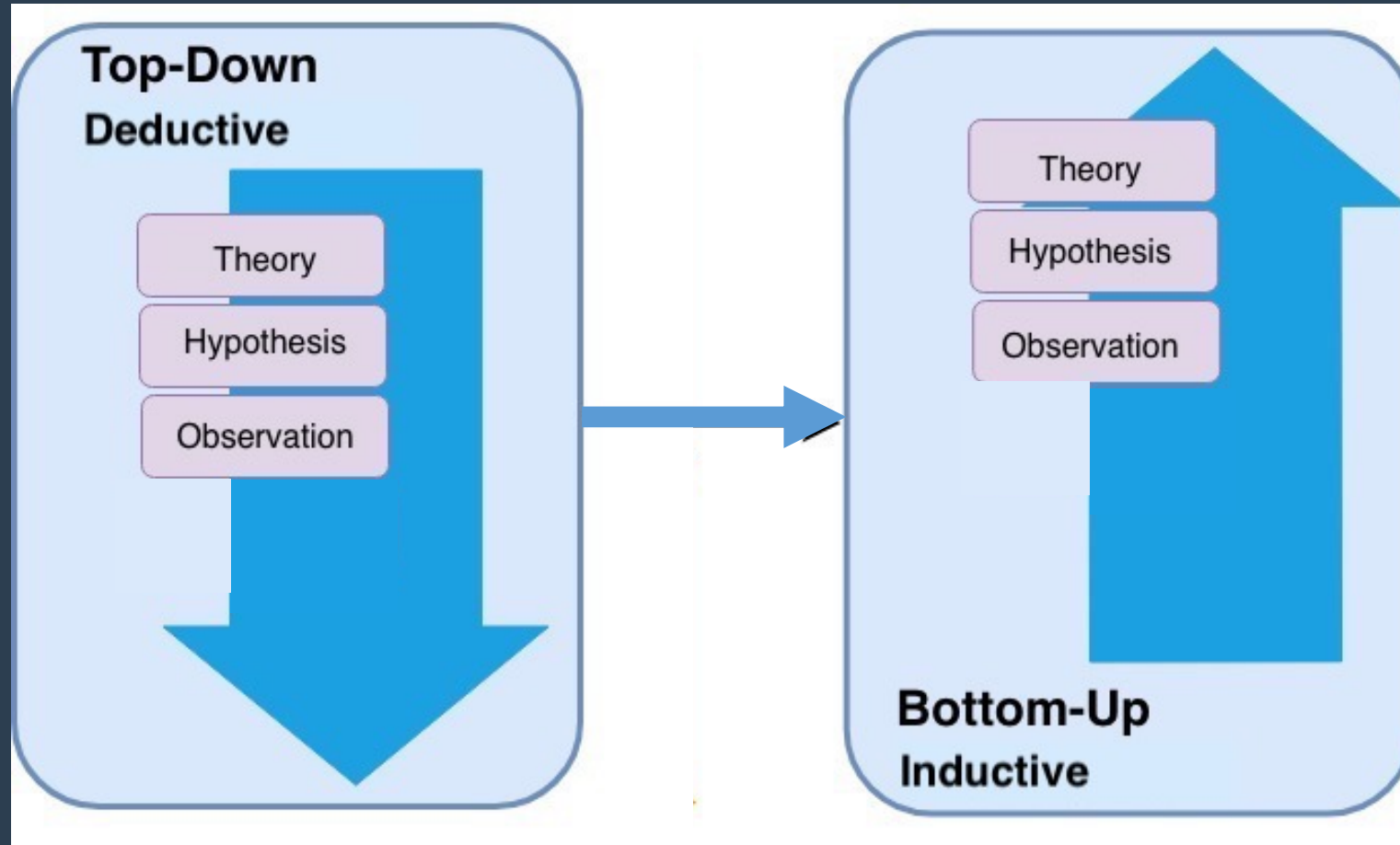


Labour Market Intelligence (LMI): Design, define and implement AI-based frameworks and algorithms to derive knowledge from labour market information

Three main Labour Market Sources can support LM Intelligence

- (1) Statistical sources
- (2) Administrative sources
- (3) Web Sources (Big Data 4 LMI)

How Big Data changed the way of doing LMI?



Let's see some examples

Web Job Vacancy example

Job Title: Data Scientist.

Description: We're looking for a talented Computer Scientist to join our growing development team. Your expertise in data will help us take this to the next level. You will be responsible for identifying opportunities to further improve how we connect recruiters with jobseekers, and designing and implementing solutions. [...] Required skills and experience:

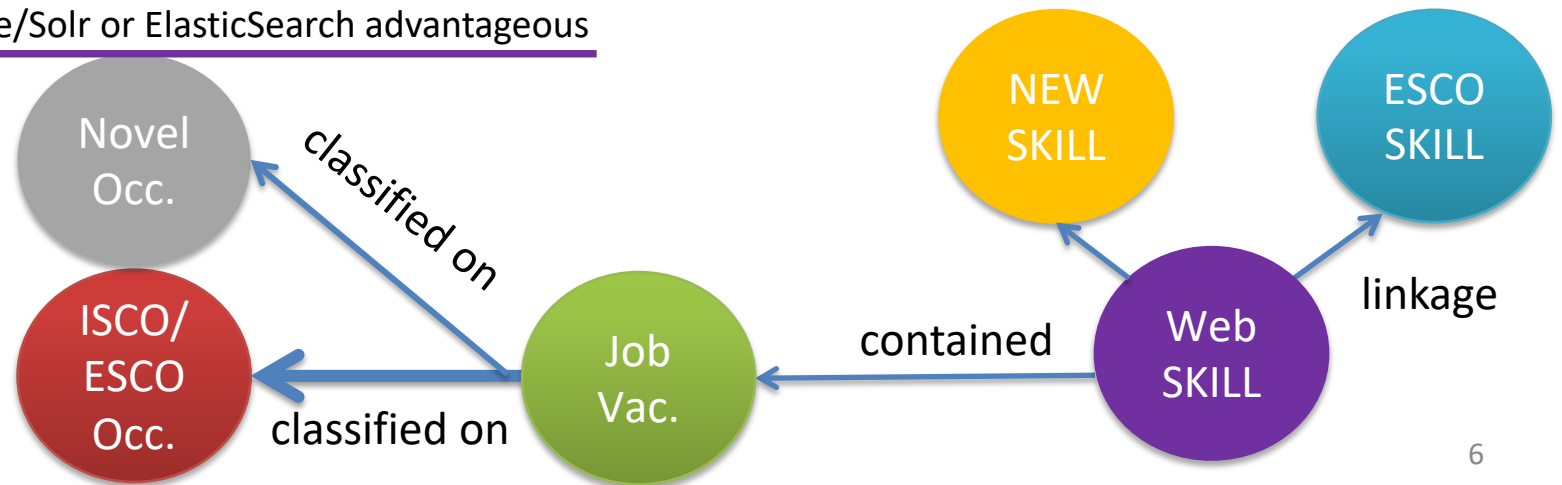
- SQL and relational databases;
- Data analysis with R (or Matlab);
- Processing large data sets with MapReduce and Hadoop);
- Real time analytics with Spark, Storm or similar;
- Machine Learning;
- Natural Language Processing (NLP) and text mining;
- Development in C++, Python, Perl;
- Experience with search engines e.g. Lucene/Solr or ElasticSearch advantageous

Web Job Vacancy example

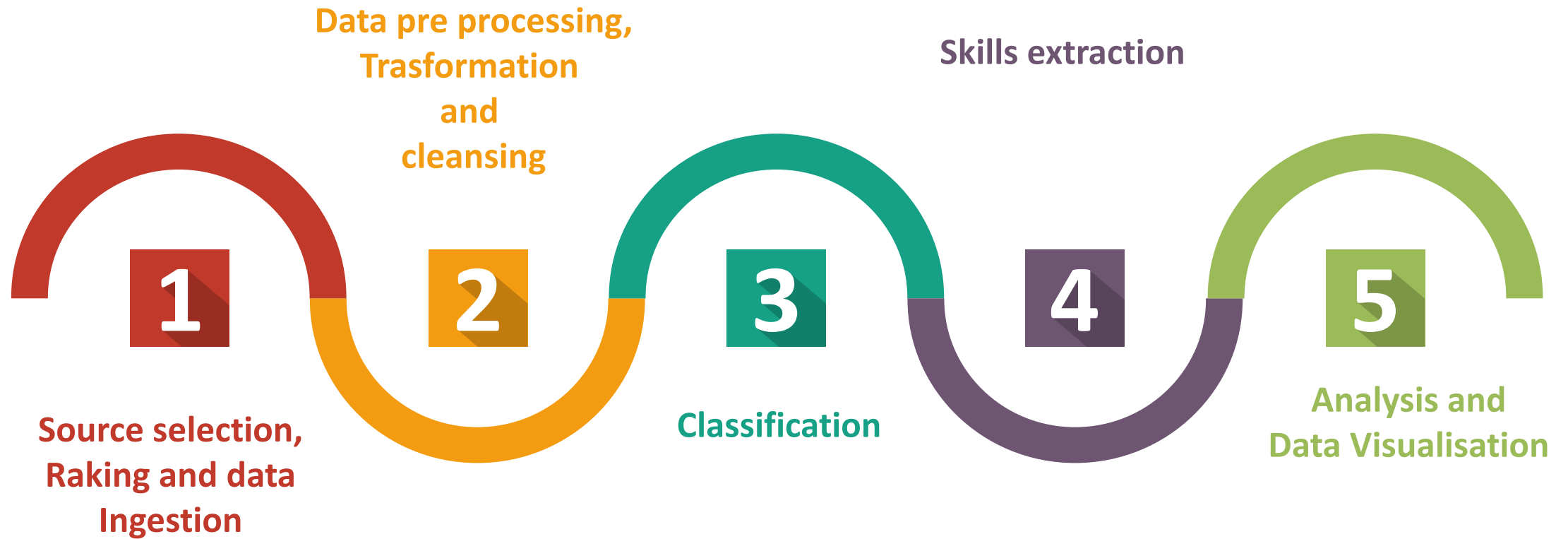
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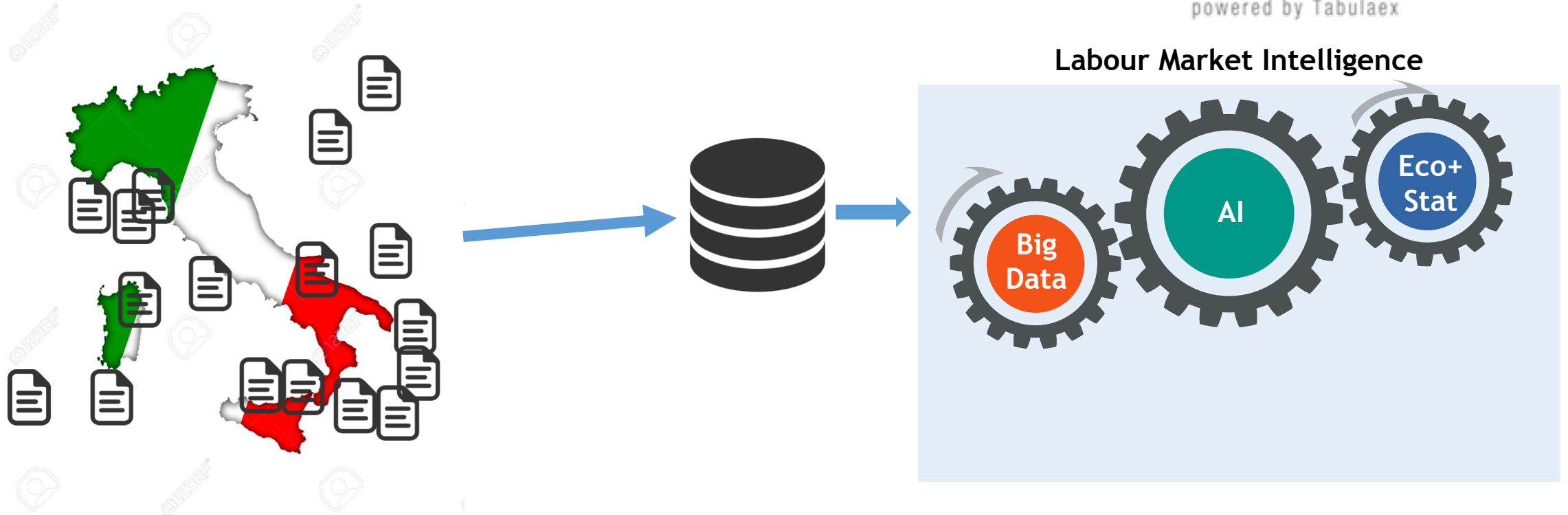
The Methodological path



ITALIAN Real-Time Labour Market Monitor

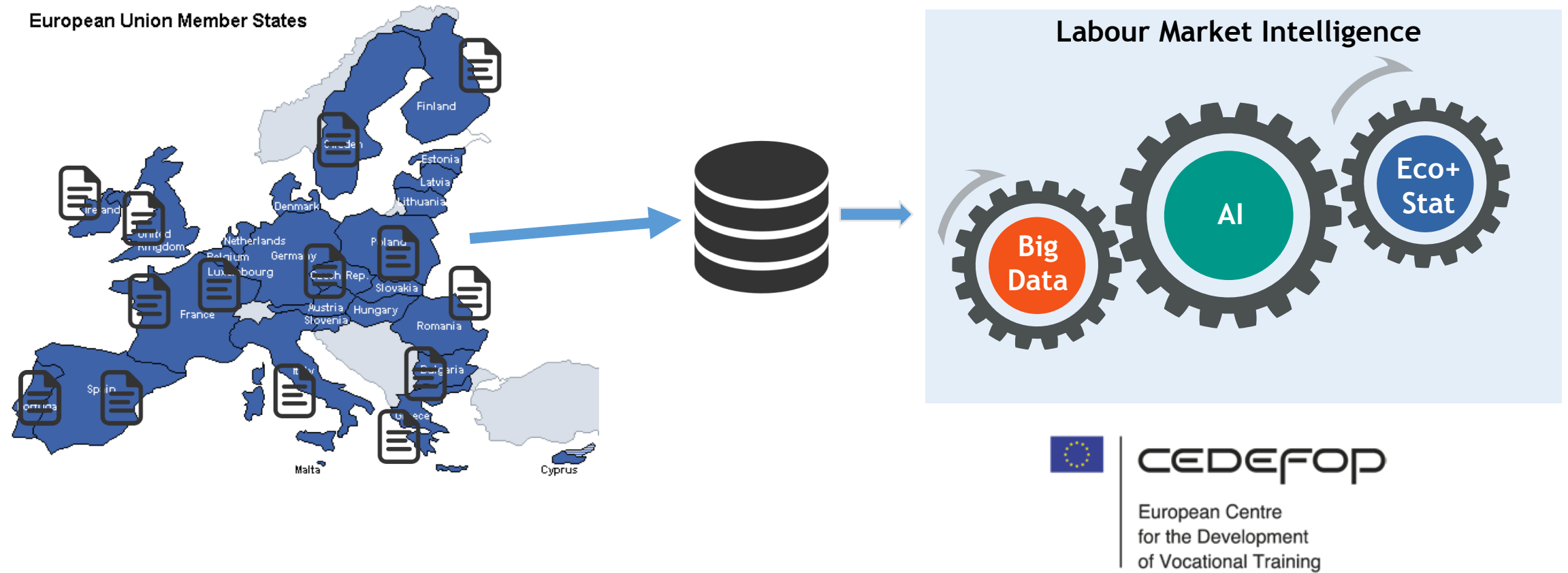


Labour Market Intelligence



OJV since 2013 – 5,8 M+ vacancies unique

EUROPEAN Real-Time Labour Market Monitor



Ongoing: 28 EU Countries – 32 Languages – more than 6M unique vacancies per month

OJV since 2013 – 5,8 M+ unique vacancies classified on Esco



2,358,739
Active job vacancies in last 12 months

5,857,334
Active job vacancies since 2/1/13

9/30/19
Update date

LOGIN

EN

Italian Labour Market Digital Monitor



AREA

Start from area to discover occupations.

Find the most searched occupations on the Web by companies, and their relative skills, in your area.

ENTER



SKILL

Start from skills to discover occupations.

Type the most relevant skills of the candidate, and discover the related most searched occupations.

ENTER



INDUSTRY

Start from industries to discover occupations.

Select one industry to find related occupations.

ENTER



OCCUPATION

Start from occupations to discover details.

Select one occupation to find details, including where is most searched.

ENTER



Workforce
Agencies



Business Association
and Unions



Government
Employment Agencies



Training
Organisations

Credits to WollyBI: a trademark of TabulaeX

1

Labour Market Knowledge Discovery

Fine—grained analysis on territory LM dimensions

SEE LIVE DEMO

Gap Analysis: Which skill one should learn to meet LM expectations?

SEE LIVE DEMO

2

Labour Market Intelligence Ad-Hoc studies

Compute Skill Rates



Goal: Estimate the pervasiveness of ICT in both ICT and not ICT-related jobs

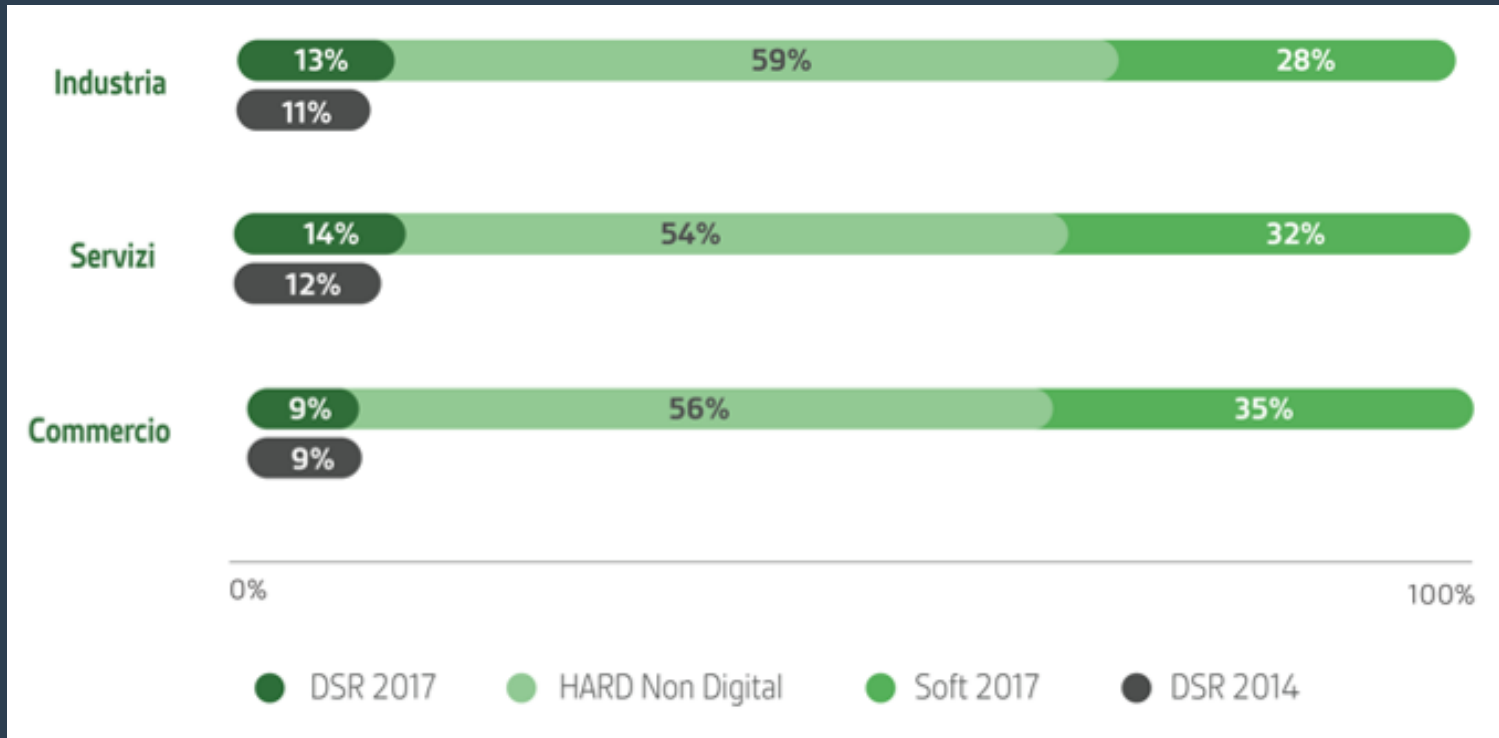
Idea: Exploit the informative power of Classified OJV for computing The Digital Skill Rate (DSR), Soft skill rate and Hard non digital Skill Rate

DSR estimates the incidence of digital skills in a single profession and comes from observing the pervasiveness of digital skills in all professions whether they are related to the ICT world or not.

Compute Skills Rates

SOURCE WOLLYBI

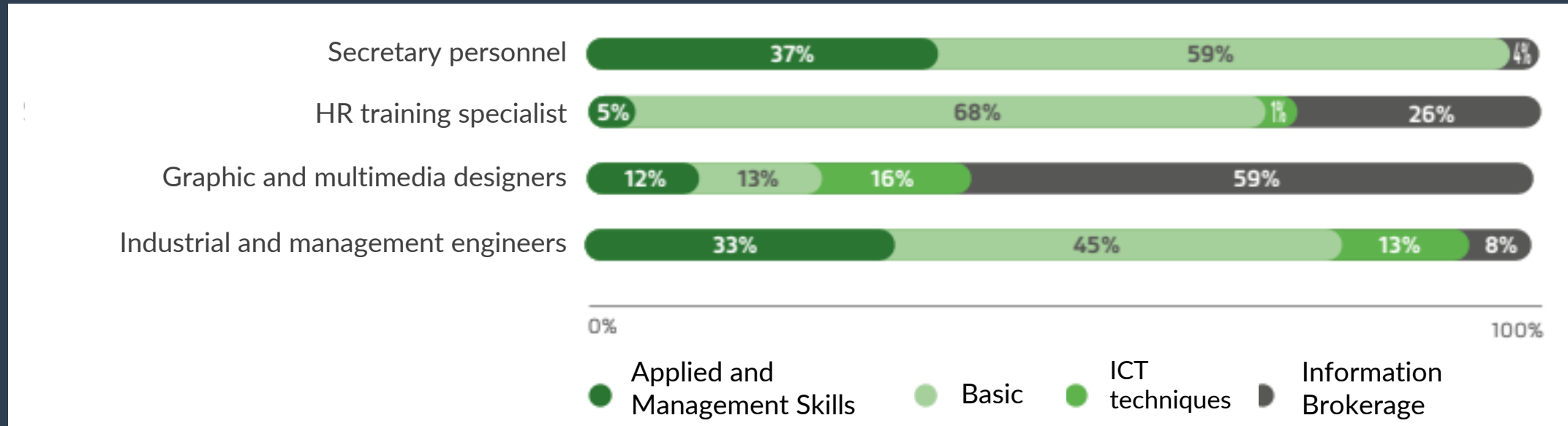
Demand of digital, specialist and soft skills - by sector



Ad hoc analyses at different level of granularity, here focusing on the «sector»....

Compute Skills Rates

SOURCE WOLLYBI










- **Applied and Management Skills** = ability to use tools and software to manage both operational and decisional processes
- **ICT Techniques Skill** = very specialized on solutions, platforms and programming languages
- **Basic Skill** = for everyday use of basic IT tools
- **Information Brokerage Skill** = for the use of IT tools aimed at corporate communication






... and more, looking at each occupation...

Credits to WollyBI: a trademark of TabulaeX

Compute Skills Rates [ESCO skills + novel]

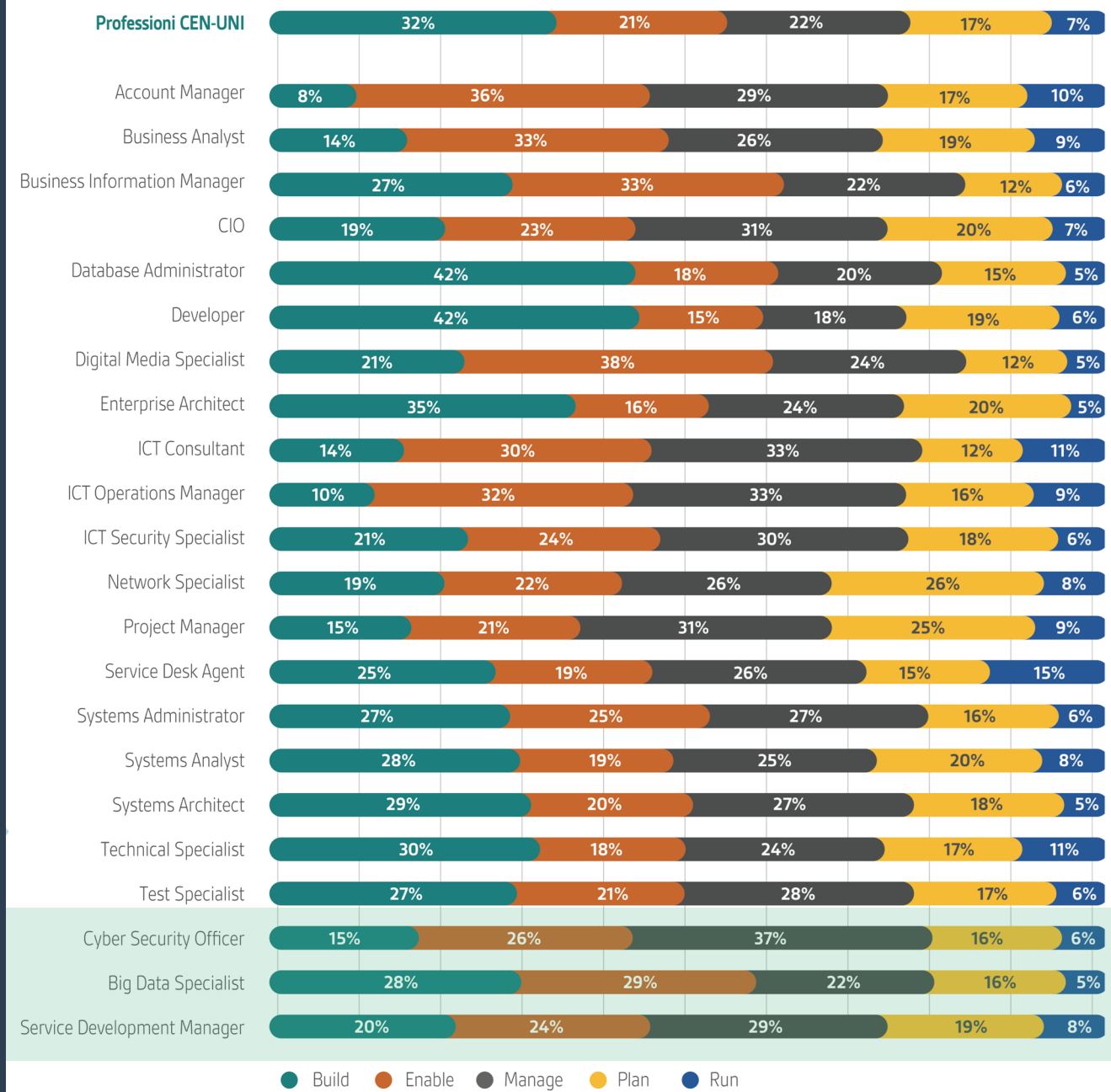
SOURCE WOLLYBI

Applied and Management Skills				ICT techniques		Information Brokerage	
Occupation	Database usage	Programs for draughtsman	3D modelling	Front-end Website implementation	Web programming	Graphic Software Usage	SW markup usage
Graphic and multimedia designers	 2.5	 3.5	 3	 4.5	 2	 5	 2

Applied and Management Skills			Information Brokerage		
Occupation	Database usage	ERP	Digital data management	SEO Search Engine Optimiz.	Social Network Usage
HR training specialist	 4.5	 4	 4.5	 4	 2.5

... and more, looking at elementary skills

Credits to WollyBI: a trademark of TabulaeX



Fonte: WollyBI



New potential Occupations derived through AI algorithms can be compared against traditional ones using a specific methodological approach

Some ongoing research activities...

H/S Skills as factor for Job Replacement: Is there a correlation between the request for hard/soft skill and the probability for a job to be replaced by computerisation?

Explainable LMI: improve the believability of the analyses provided by explaining the behaviour of black-box AI algorithms in LMI

GraphLMI: Use analytics from Web vacancies to enrich ISCO/ESCO taxonomies with analytics (job/skills relevance) and mentions from the Market

Put LMI into official statistics: Estimate the representativeness of on line job vacancies

Grazie per l'attenzione

Some references to our research

1. Colombo, Mezzanzanica & Mercorio. [AI Meets Labor Market: Exploring the Link Between Automation and Skills](#). Information Economics and Policy, 2019.
2. Mezzanzanica & Mercorio: [Big Data enables Labour Market Intelligence](#). In Encyclopedia of Big Data Technologies. Springer, 2019.
3. Mezzanzanica et al. [WoLMIS: a labor market intelligence system for classifying web job vacancies](#). Journal of Intelligent Information Systems, 2018.
4. Mezzanzanica, Mercorio et al. [Using Machine Learning for Labour Market Intelligence](#). In ECML PKDD 2017, LNCS. Springer, 2017
5. Mezzanzanica, Mercorio et al. [A Language Modelling Approach for Discovering Novel Labour Market Occupations from the Web](#). In 2017 IEEE/WIC/ACM International Conference on Web Intelligence, 2017.