Are we ready for the Fourth Industrial Revolution? Insights from the Italian Labour markets

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The DEBATE about the Fourth Industrial Revolution

The Optimists
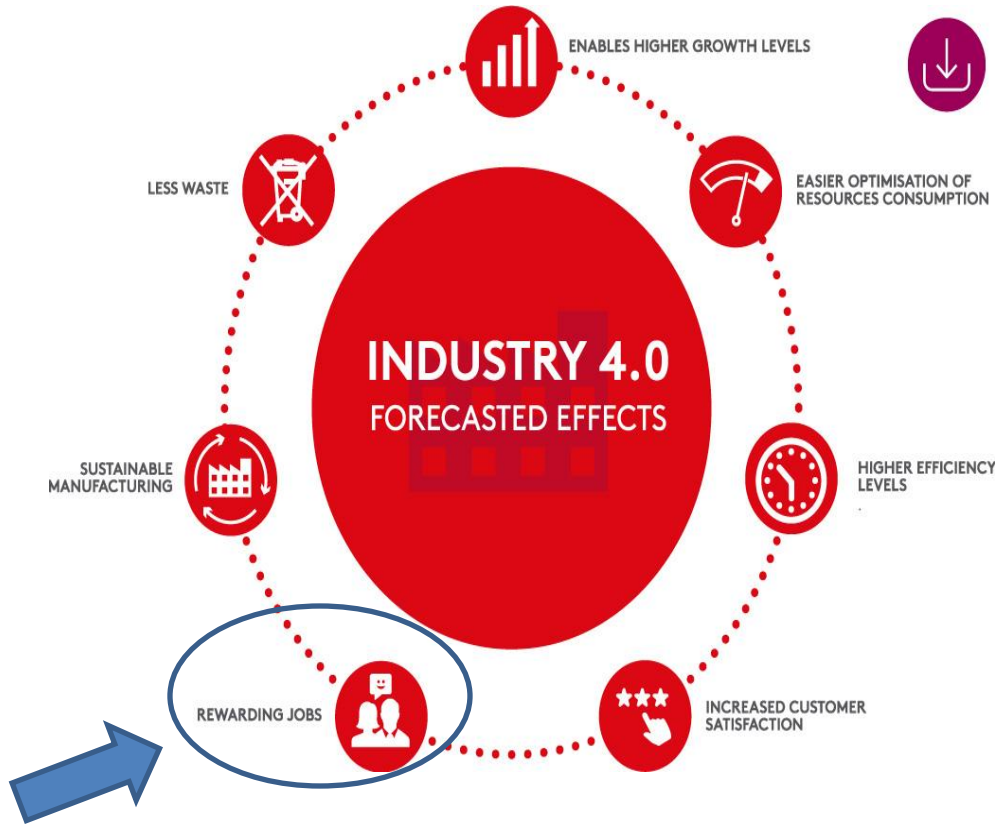
The Pessimists

Some statistics …

Frey and Osborne: 47 % of jobs in the US are "at risk" of being automated in the next 20 years

OECD: 9% of jobs "at risk" in the US and 10% in Italy

World Economic Forum: about 5 million jobs to be lost by 2020

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Are we ready for the Fourth Industrial Revolution?

First

Will the fourth industrial revolution only destroy jobs or will it create new jobs? And what may be the balance?

Second

Is it a question of jobs or is it a question of obsolete skills in every job?

Third

How can we measure "the rate of obsolescence" of a job or of a skill?

And finally

Industry 4.0 is a work in progress. So, the institutions can influence this process.

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Definitions and Method

The 4th Industrial Revolution is a **Digital Revolution**: a fusion of technologies blurring the lines between the physical, digital, and biological spheres

→

Digital technologies can affect **occupations**.

Every occupation requires a different mix of **knowledge, skills, abilities (competences)** and **tasks**.

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Research Questions

(1) How can we measure **competences** and **tasks** in every job?

(2) What kind of **competences** and **tasks** matters in a **digital labour market**?

(3) How is **Italian human capital** going?

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Descriptors

1.
Degree of Automation

2.
**Degree of Adherence
to 4.0 Paradigm**

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1. Degree of Automation (or Substitution)

describes the **level of codification of tasks** in a job. If a job can be decompose in simple steps is more prone to technological substitution and outsourcing. Automation can be mechanical or digital.

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2. Degree of Adherence to "4.0 Paradigm" (or degree of Digitalization)

At the first stage. When we talk about "Adherence to 4.0 Paradigm" we refer to **skills** and **tasks** in a job which are **digital** . Digitalization is a proxy of 4.0 Paradigm.

At the second stage. We try to find skills and abilities very consistent to "4.0 Paradigm": not only **digital** skills but also **soft skills**.

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Typology

Type 4 high level of automation and low level of adherence to Paradigm 4.0	**Type 3** high level of automation and high level of adherence to Paradigm 4.0
Type 1 low level of automation and low level of adherence to Paradigm 4.0	**Type 2** low level of automation and high level of adherence to Paradigm 4.0

Degree of Adherence to "4.0 Paradigm" (or Digitalization)

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Data

<u>At the first stage</u>:

Both indicators are calculated by using the *Sistema informativo delle Professioni* (Isfol and Istat) and O*Net (United States)

<u>At the second stage</u>:

instead of using the **degree of digitalization** as a proxy of the 4.0 Paradigm, we try to find **4.0 skills and abilities** by means of **the semantic research in international papers**, in collaboration with department of Engineering of University of Pisa (see Elena Coli's presentation)

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First stage:
Main Findings

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How we measure the first descriptor?

Variables:
- H49 "Degree of Automation"
- H51 "Importance of repeating some tasks"

-Index of Automation
(ADJUSTED MAZZIOTTA-PARETO INDEX)
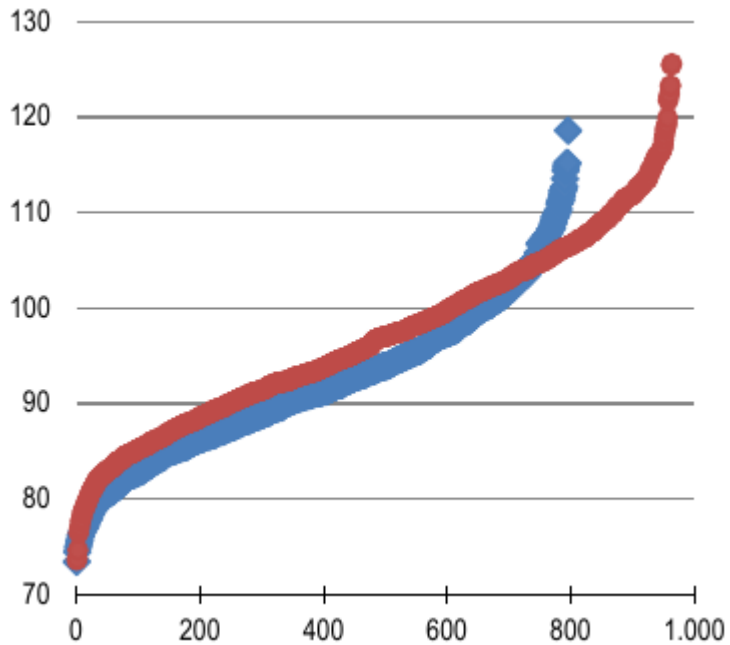
How we measure the second descriptor?

Variables:
- B9 "Computer and Elettronics"
- B31 "Telecommunication"
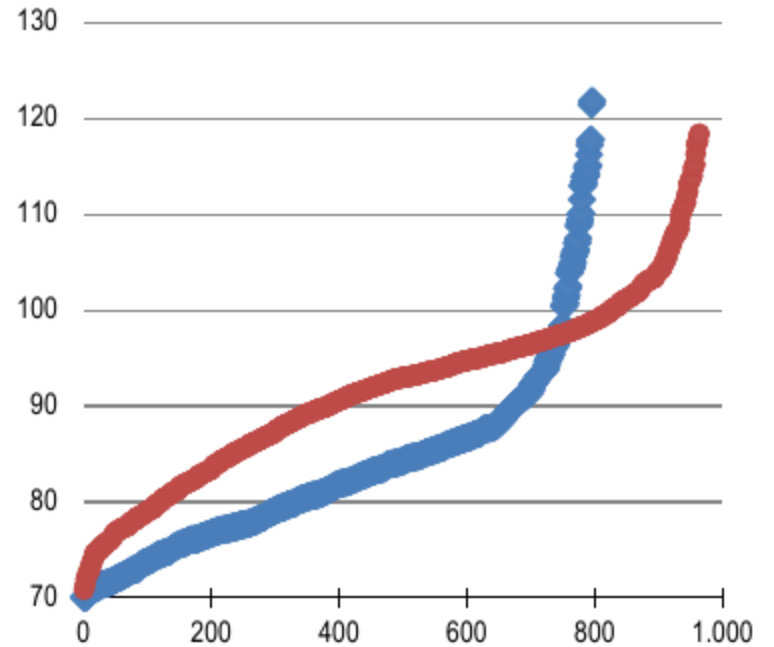- C22 "Programming"
- G19 "Interacting with Computers".

-Index of Digitalization
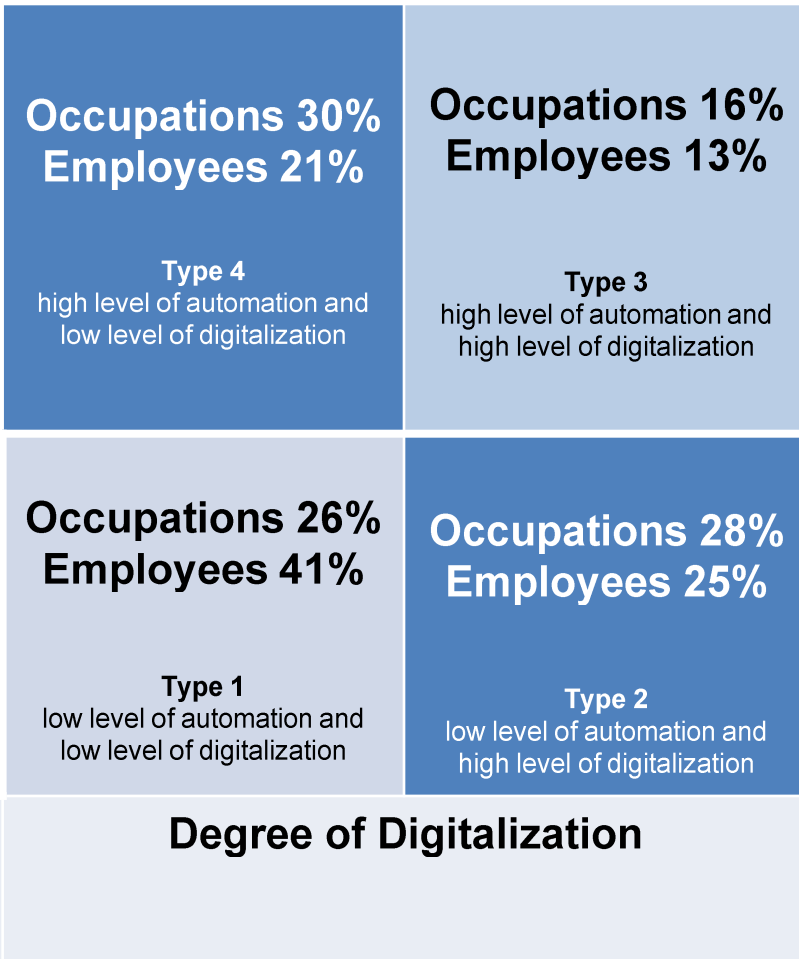(ADJUSTED MAZZIOTTA-PARETO INDEX)
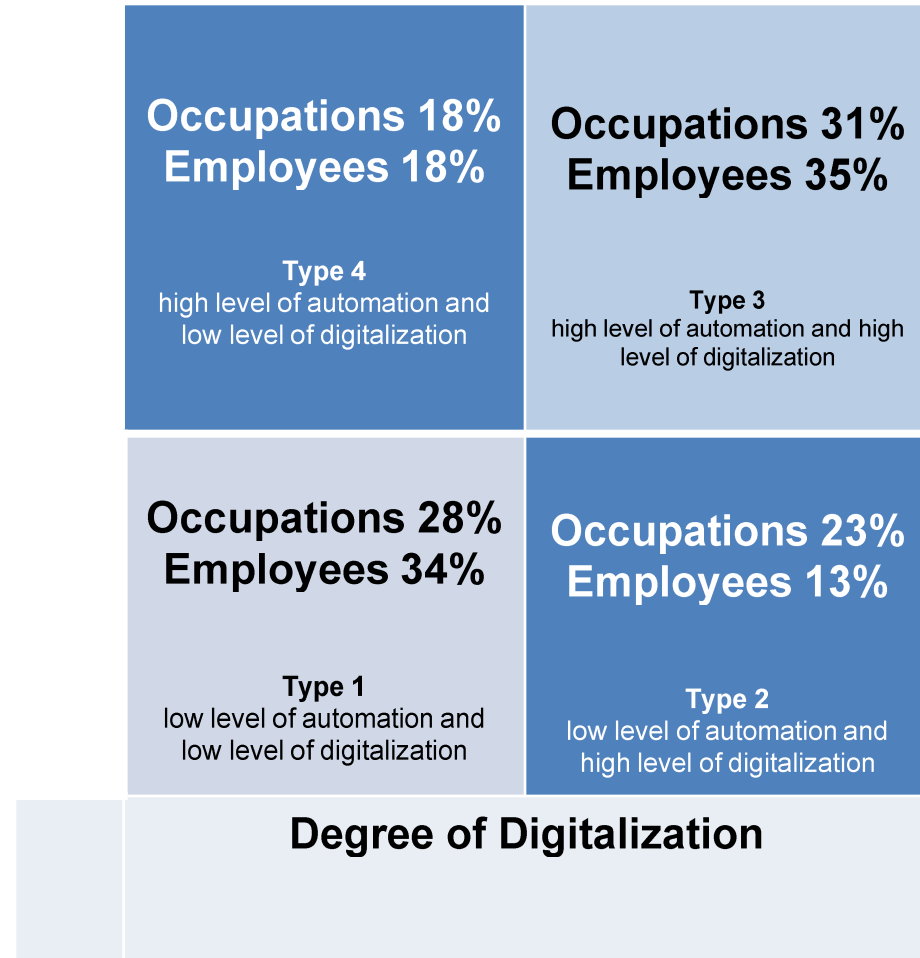
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Index of Automation

Index of Digitalization

ITALY   USA

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Italy

Occupations 30% Employees 21% **Type 4** high level of automation and low level of digitalization	**Occupations 16% Employees 13%** **Type 3** high level of automation and high level of digitalization
Occupations 26% Employees 41% **Type 1** low level of automation and low level of digitalization	**Occupations 28% Employees 25%** **Type 2** low level of automation and high level of digitalization

Degree of Digitalization

Usa

Occupations 18% Employees 18% **Type 4** high level of automation and low level of digitalization	**Occupations 31% Employees 35%** **Type 3** high level of automation and high level of digitalization
Occupations 28% Employees 34% **Type 1** low level of automation and low level of digitalization	**Occupations 23% Employees 13%** **Type 2** low level of automation and high level of digitalization

Degree of Digitalization

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Some examples from Italian case…

Type 1(low A low D):
Low skilled jobs; High skilled jobs in services; craftsmen and highskilled workers

Type 2 (low A high D): Intellectual and scientific occupations; Managers

Type 3 (high A high D): Office and Administrative Support Occupations; Technical Occupations

Type 4 (high A low D): Plant operators; Transportation and Material Moving Occupations

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Second stage:
Main Findings

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Limits of "Degree of Digitalization"

Soft Skills as "a combination of people skills, social skills, communication skills, character traits, attitudes, career attribute, social intelligence and emotional intelligence"
 (World Economic Forum 2016; OECD 2016)

We are looking for a more comprehensive definition

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Skills and abilities very consistent with the 4.0 Paradigm

Programming
Monitoring
Decision Making
Operation and control
Mathematics
Complex Problem solving
Quality Control Analysis
Instructing
System Analysis
Visualization
Memorization
Speech recognition
Reaction time
Originality

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Principal component Analysis

Variabile	Comp. 1	Comp. 2	Comp. 3	Comp. 4
Programming	0,22	0,23	-0,44	0,56
Monitoring	0,38	-0,12	0,08	-0,38
Decision Making	0,36	-0,05	0,00	-0,18
Operation and control	-0,01	0,58	0,16	-0,16
Mathematics	0,29	0,18	-0,33	0,24
Complex Problem solving	0,41	-0,11	-0,12	-0,12
Quality Control Analysis	0,18	0,49	0,12	-0,06
Instructing	0,35	-0,15	-0,01	-0,07
System Analysis	0,30	0,37	-0,02	-0,25
Visualization	0,12	0,14	0,76	0,40
Memorization	0,27	-0,26	0,20	-0,05
Originality	0,31	-0,24	0,17	0,43

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Some conclusions…

• The fourth industrial Revolution as another way to study the impact of innovation on the **jobs market** and **human capital**

• We can measure **human capital in jobs market**
   ✓   not only from the point of you of *education,*
   ✓   not only talking about occupations that are going to disappear or to increase
   ✓   but also studying competences and tasks in every job and their evolution

• We notice a lack of microdata and research that are able to link skills, occupations, employees and wages, particularly in Europe

• An effective transition to the Fourth Industrial Revolution requires an ability to read the path of different socio-economic systems and to give importance to human capital

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Thank you for your attention

Details will also be found on our website
http://www.irpet.it/archives/49488

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