

Anvur, Symposium
"Beyond literacy and numeracy: Advancement in the
assessment of adult competences"

Scuola Democratica
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Education and Post-Democracy

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Skills for future work and life

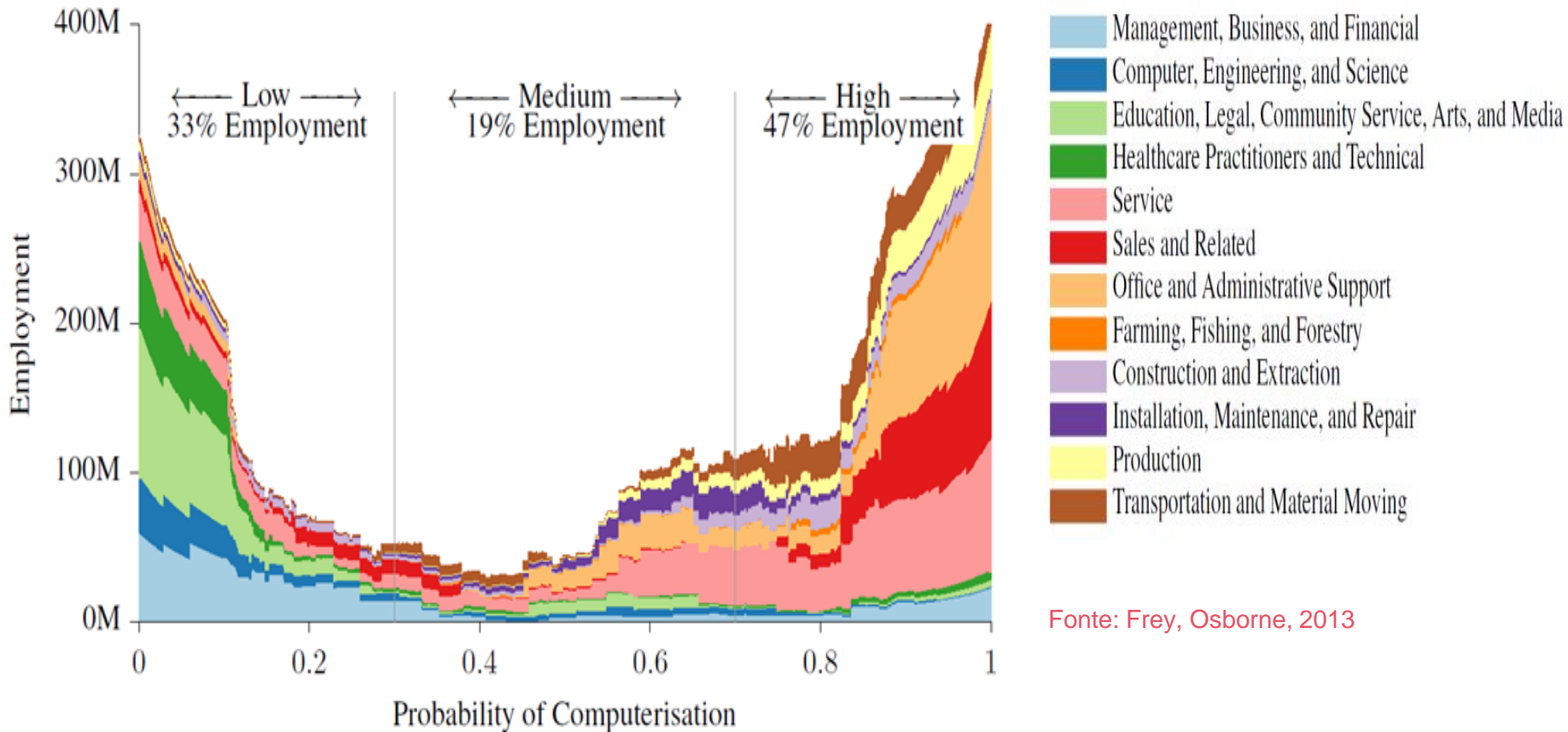


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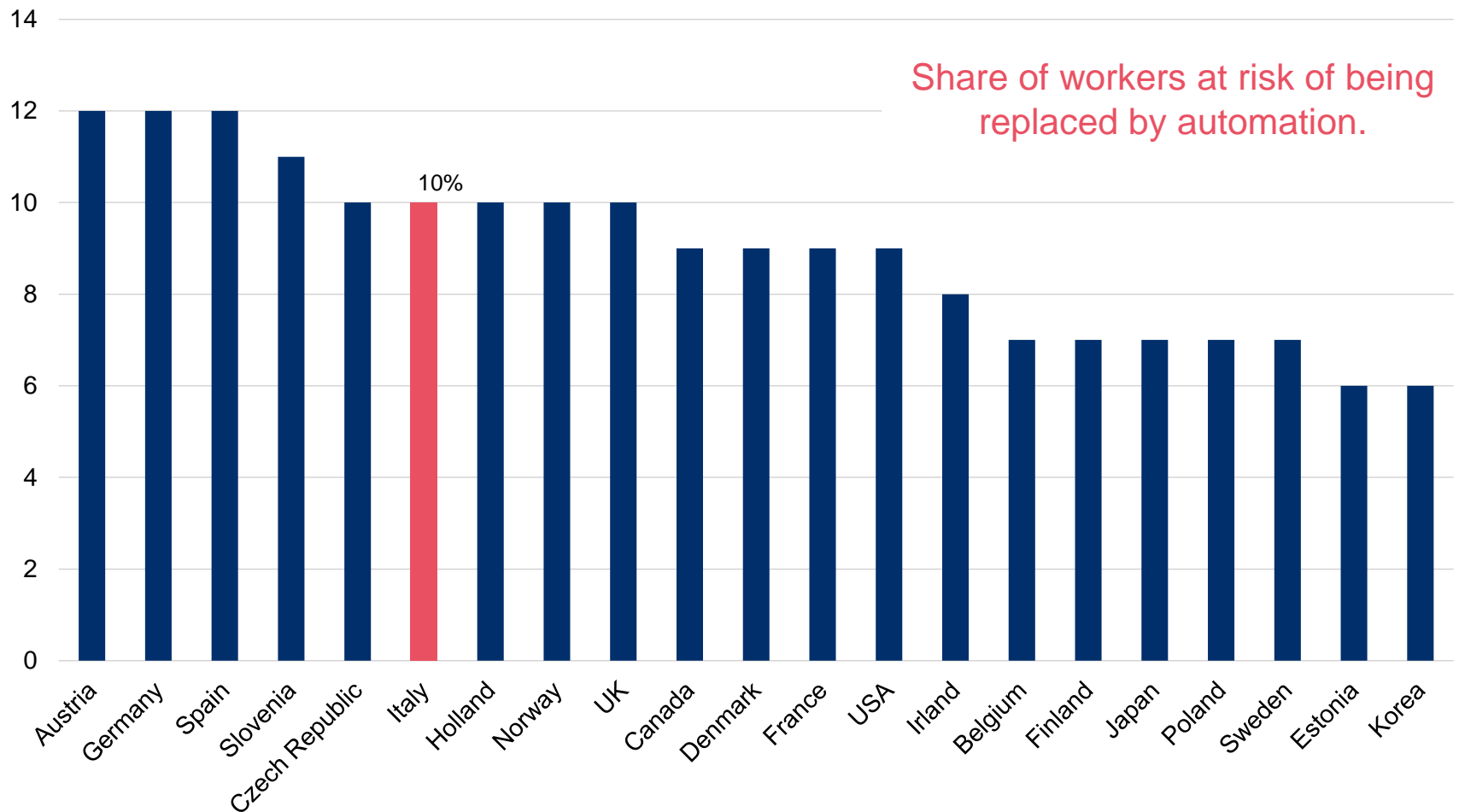


Robocalypse



In 2013 Frey e Osborne estimated that 47% of jobs in United States have a high likelihood to disappear in the next two decades, due to the substitution by robots and artificial intelligence. This has spurred a heated debate on the risks of **technological unemployment** and the skills needed to prevent it.

Robocalypse: if one considers single tasks rather than occupations, the risks of displacement are reduced



Robocalypse: which are the skills needed to prevent displacement by technology?

Interestingly, in their work Frey and Osborne assume that three kinds of competencies cannot be replaced by computerisation.

- *Perception and manipulation tasks.* Significant challenges remain for robots to identify objects in a cluttered field of view and to handle irregular objects, for which robots are yet to reach human levels of aptitude.
- *Creative intelligence tasks.* The principal obstacle to computerising creativity is not making unfamiliar combinations of familiar ideas but rather stating creative values sufficiently clearly that they can be encoded in an programme.
- *Social intelligence tasks.* Real-time recognition of natural human emotion remains a challenging problem, and so the ability to respond intelligently to such inputs.

Robocalypse: how to define the skills needed to prevent displacement by technology?

- *Employees' and companies' survey.* Born with management sciences, they tend to produce long lists of competencies, which change often. There is a risk of circularity: companies regard as important skills which they read in the literature
- *Quantitative evidence.* It links skills of different kind with educational and labour market outcomes, such as employment, growth, wages. However, one has to control for the fact that people with certain skills may self-select into specific jobs

List of required skills

Core work-related skills

Abilities

Cognitive Abilities

- Cognitive Flexibility
- Creativity
- Logical Reasoning
- Problem Sensitivity
- Mathematical Reasoning
- Visualization

Physical Abilities

- Physical Strength
- Manual Dexterity and Precision

Basic Skills

Content Skills

- Active Learning
- Oral Expression
- Reading Comprehension
- Written Expression
- ICT Literacy

Process Skills

- Active Listening
- Critical Thinking
- Monitoring Self and Others

Cross-Functional Skills

Social Skills

- Coordinating with Others
- Emotional Intelligence
- Negotiation
- Persuasion
- Service Orientation
- Training and Teaching Others

Systems Skills

- Judgement and Decision-making
- Systems Analysis

Complex Problem Solving Skills

- Complex Problem Solving

Resource

Management Skills

- Management of Financial Resources
- Management of Material Resources
- People Management
- Time Management

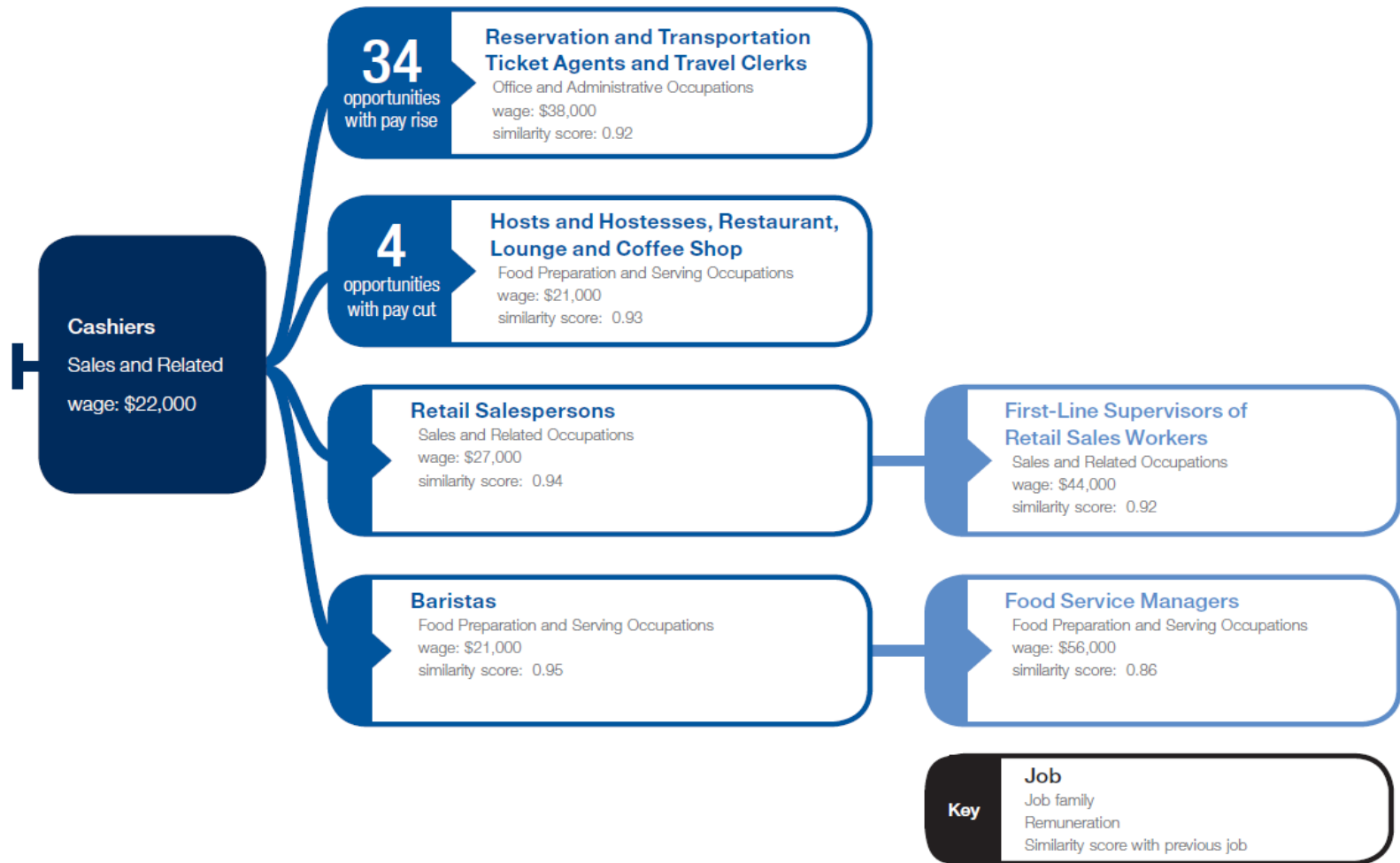
Technical Skills

- Equipment Maintenance and Repair
- Equipment Operation and Control
- Programming
- Quality Control
- Technology and User Experience Design
- Troubleshooting

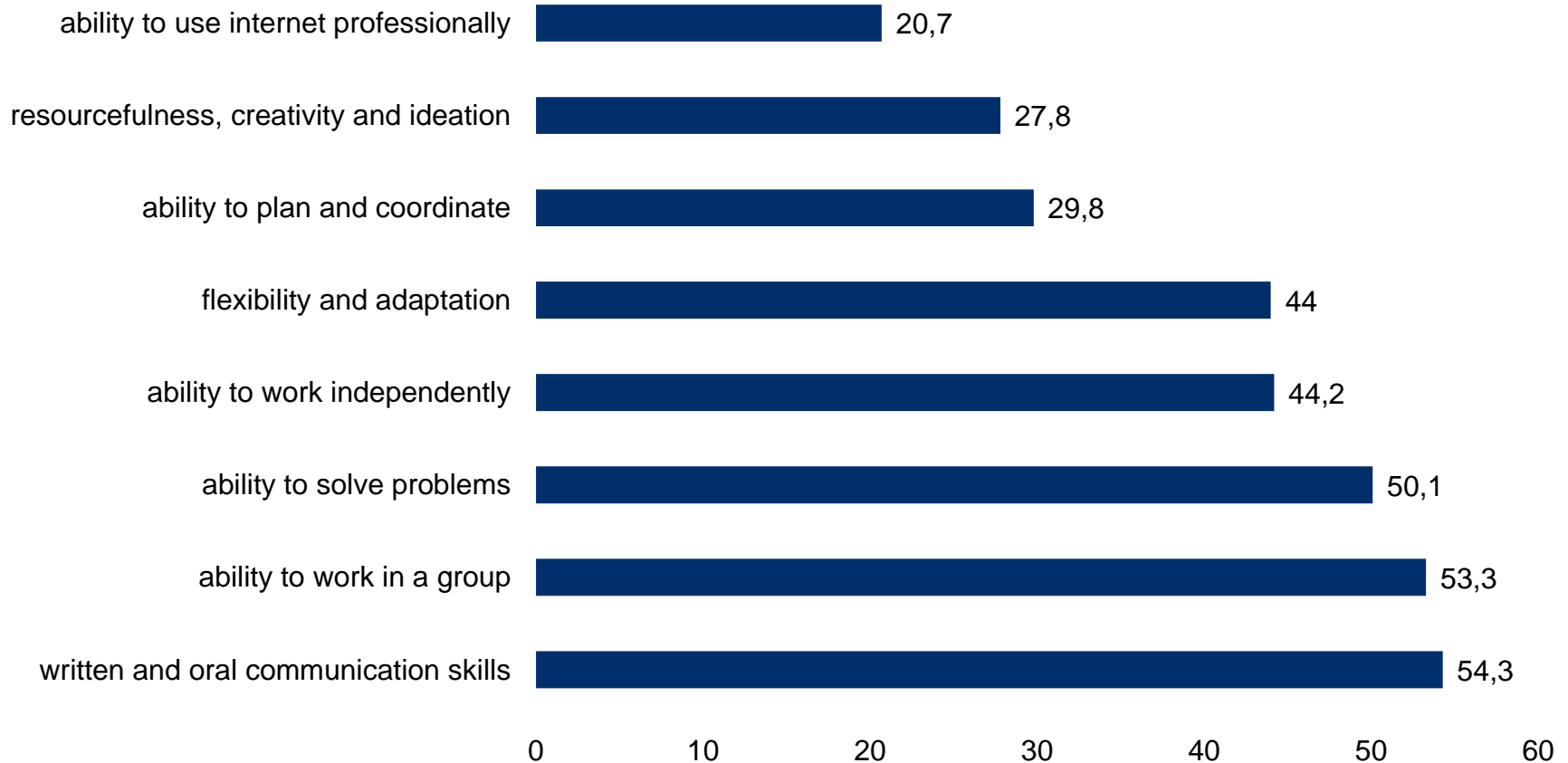


Reskilling: an example of labour market transitions based on closely related skills

Examples of Pathways for Cashiers



Cross-functional skills required by Italian firms, according to the Excelsior Survey



Fonte: Excelsior, 2015

Quantitative evidence

1. *Basic skills.* The work by Hanushek et al. on PIAAC data show that numeracy, literacy and problem solving affect economic growth, wage rates and employment.
2. *Non-cognitive/soft/socio-emotional skills.* Heckman et al. underline the complementarity of cognitive and non-cognitive skills to improve educational achievements.
3. *Personality traits.* Psychology's 'Big 5' (Openness, Conscientiousness, Extraversion, Agreeableness, and Neuroticism). According to Heckman and co-authors, conscientiousness or grit (Duckworth) is the most strongly correlated with educational and labour market attainments

Area for future research (see Burgess, 2016)

- Social (leadership, communication, cooperative problem solving) vs individual skills.
- Self-productivity and dynamic complementarity. How do different skills reinforce each other at the same time and at different stages?
- We need to have a better understanding of, and measurement system for, non-cognitive skills: initial work by OECD but strong argument over measurement of socio-emotional.
- What are the sources of the different gender gaps in attainment and skills?
- There is also little causal evidence on how cognitive and non-cognitive skills are developed in education.

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