

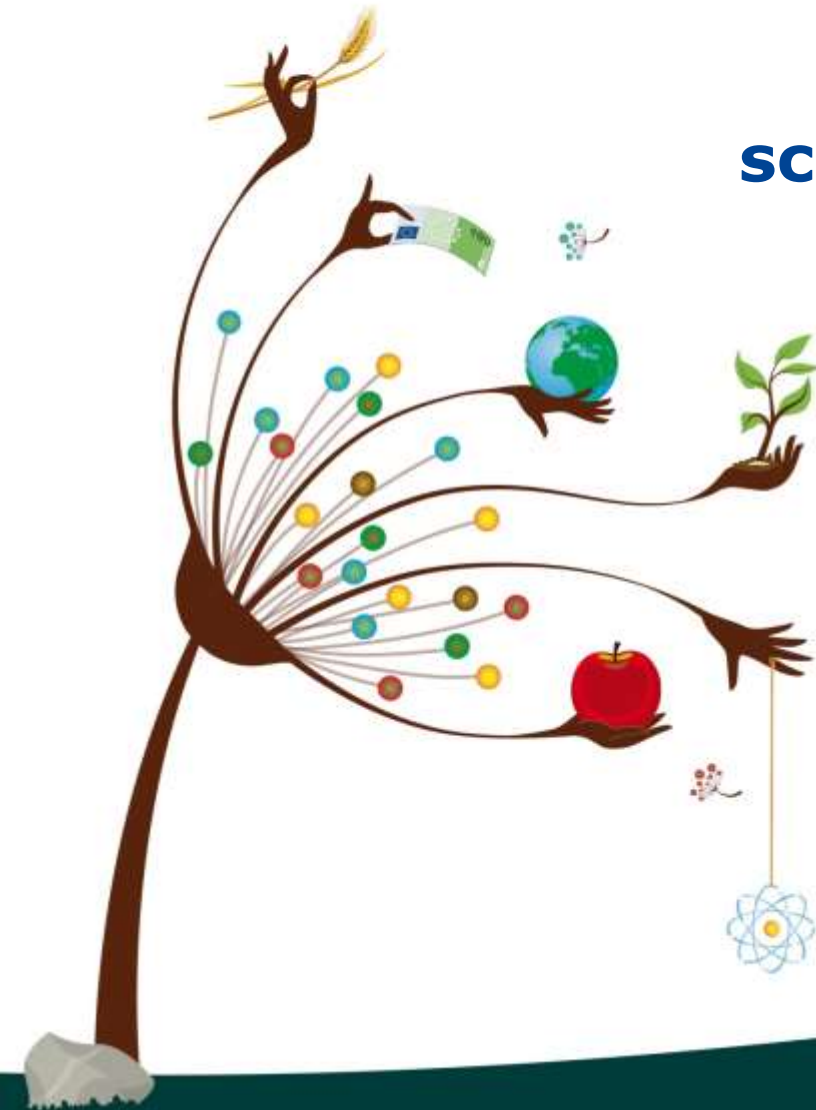
The European Commission's science and knowledge service

Joint Research Centre

**Strengthening Human Rights
in Employment in Slovakia
Kosice, 24 November 2016**

**Changing nature of work:
digitalization implications**

*Ioannis Maghiros,
JRC/B4 Human Capital and Employment*



Agenda

- **Introduction**
- **Digitalization process**
- **Digitalization and employment**
- **Changing nature of work challenges**
- **Steps towards addressing the challenges**

Summary

- There are many EU2020 challenges; i.e. digital transformation;
- The digitalization process is transforming the world with at times disrupting effects in the economy & society;
- Automation in industrial sectors, big data analytics and creation of online / mobile platforms disrupt labour markets;
- While employment is in general growing, robotization and routinization are changing the nature of work raising challenges;
- Among many changing nature of work challenges, the polarisation effects, the collaborative economy, the skills mismatch and human capital talent are those JRC is addressing;
- Work on skills and education, inequalities and the welfare state are among the JRC research priorities;
- Progress is slow but some results already emerge.



European Commission - Joint Research Centre (JRC)

The in-house scientific service of the European Commission.

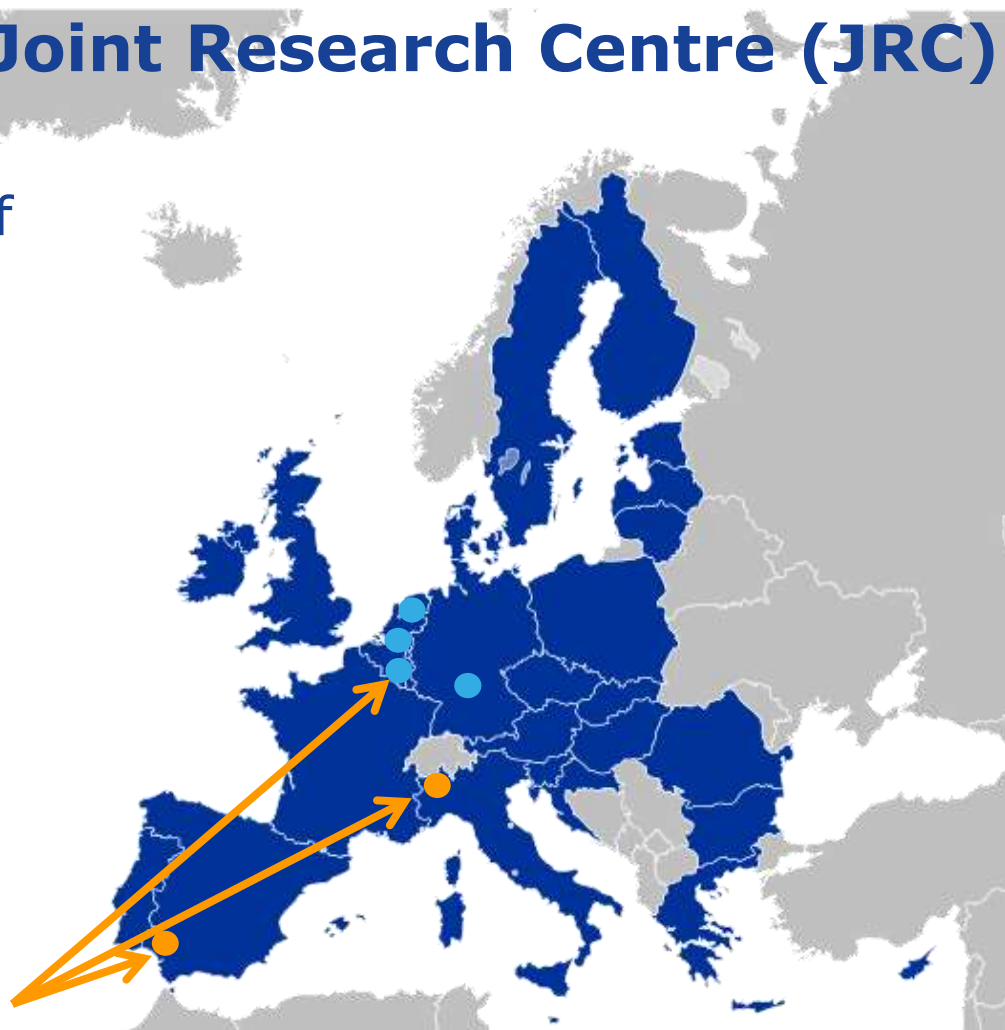
Six operational research directorates in 5 sites

Focus on the policy priorities of the EC; partner with policy DGs

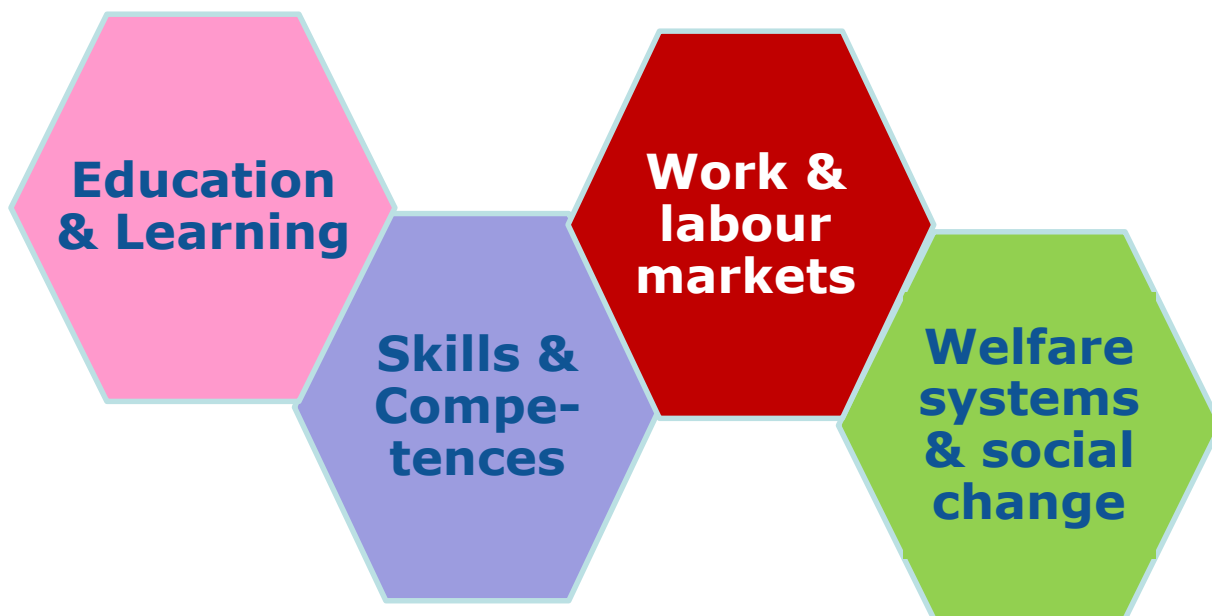
Independent of private, commercial or national interests

Has no policy agenda of its own

Brussels, Ispra, Seville
Dir.B on Growth & Innovation



Human Capital and Employment Unit

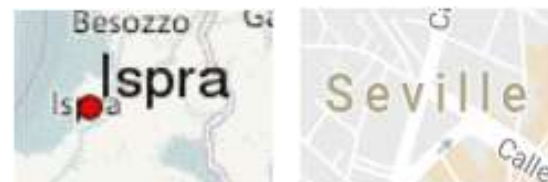


Inter-related Research Areas

UNIT MISSION

Carry-out research to:

- contribute to innovation, growth and social cohesion;
- address the evidence needs of EU policy makers;
- in cooperation with scholars and practitioners.

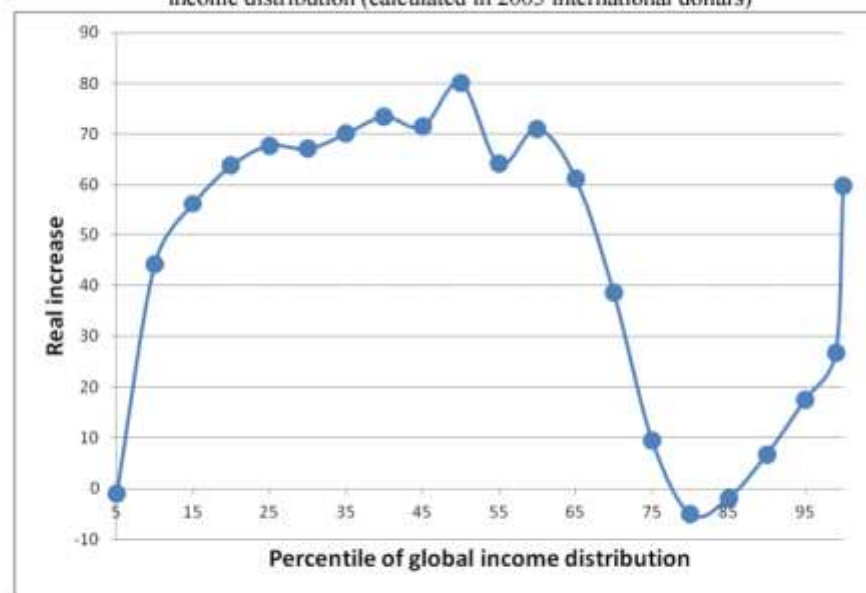




EU2020 challenges

- Consumer and Government debt, slow economic growth
- Demographic pressure, globalisation
- Innovation, Entrepreneurship
- Technological Transformation
- Employability, skills gaps;
- High unemployment, poverty, inequalities, exclusion;
- Changing world of work, need to reform the welfare state;

Figure 4. Change in real income between 1988 and 2008 at various percentiles of global income distribution (calculated in 2005 international dollars)

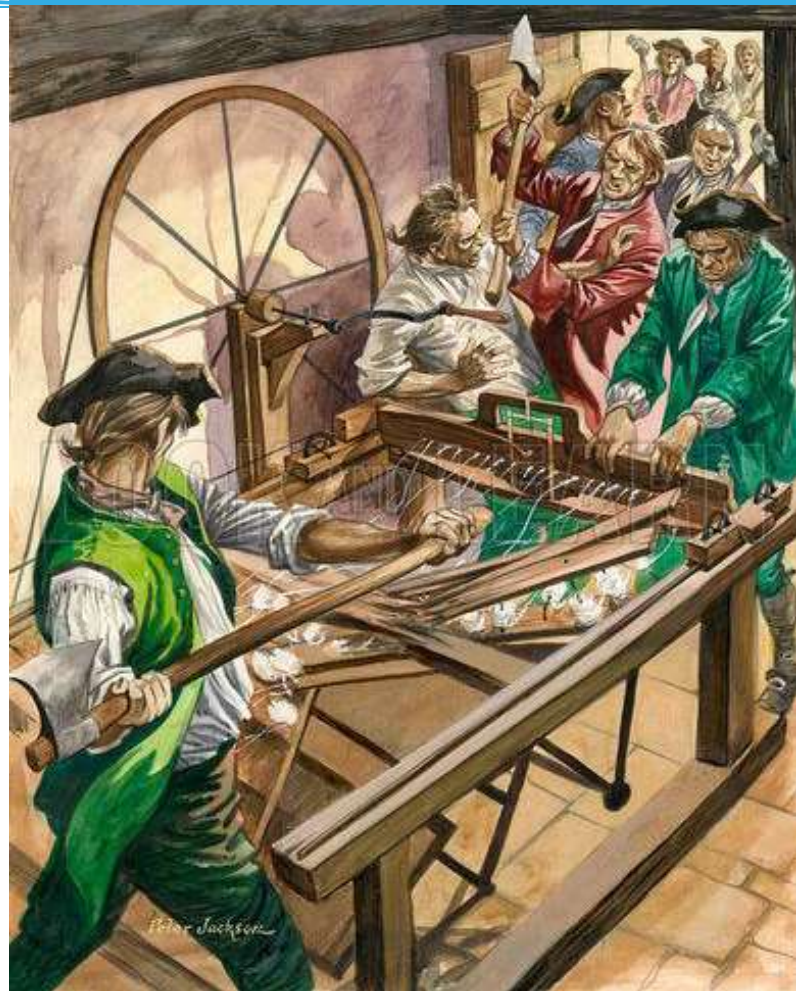


Note: The vertical axis shows the percentage change in real income, measured in constant international dollars. The horizontal axis shows the percentile position in the global income distribution. The percentile positions run from 5 to 95, in increments of five, while the top 5% are divided into two groups: the top 1%, and those between 95th and 99th percentiles.

Branko Milanovic, 2012 World Bank paper

Stages of Digitalization process

- Main drivers: increase in efficiency, productivity, knowledge & innovation and individual empowerment
- 3 step approach:
 - Connect / Networking the world;
 - Convert / computing-programming;
 - Change nature / re-organise
- Banking/Financial services, services (insurance, travel, hotel, ...), Industry, Government, Health, Education, etc ...
- Disruptive, pervasive, ultra-fast, complex changes which raise challenges



Using machines to increase efficiency is ubiquitous in the history of mankind as is fear of the implications of machines: i.e. hand-loom weavers destroy cotton spinning machine



Examples

(copied photos courtesy of Google images)

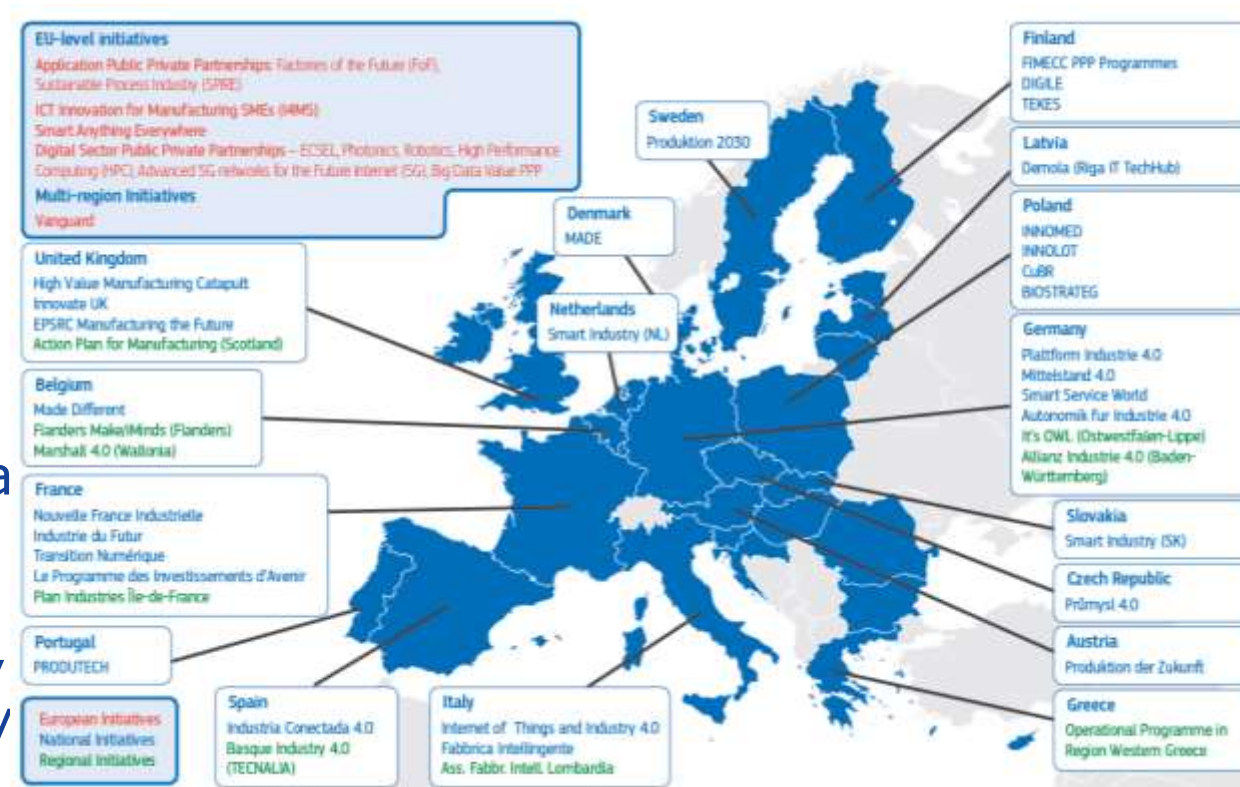


- Replace humans in dangerous or impossible jobs (i.e. Mars colonization)
- Premium on safety (driving, operations)
- Efficiency and effectiveness towards a European Knowledge and Skills economy



Digital Transformation: European Industry

~ 30 national/regional digitising industry initiatives



- Industrial package part of the Digital Single Market COM:
 - innovation in digital products, processes;
 - business models;
 - new value chains;
 - better services and lower costs;
- IoT, A.I. and Big Data driving change
- Still to do: standards, skills gaps, regulatory issues and innovation challenges



Digital platforms

- Two- or multi-sided markets to facilitate exchange:
 - Improve matching;
 - Search costs ~ 0 but likely bias in ranking;
 - Benefits for users and platform owner.
- Raises concern over potential market failure:
 - Transaction risks;
 - Lack of transparency and accountability;
 - Data collected may be re-used against the will of the data owner;
 - Need for regulation?

Investing in future growth

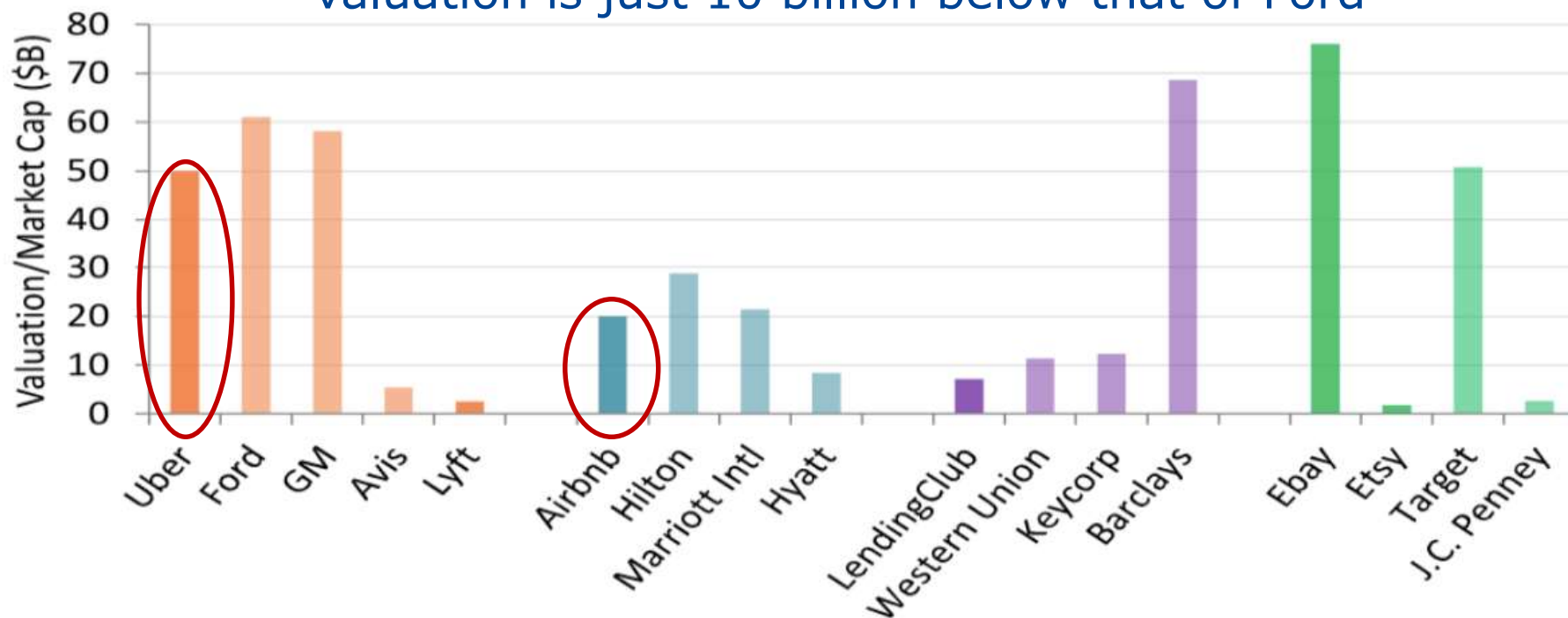
The big 4 have acquired or invested in all these famous start-ups



¹ Part of an investment round with other investors, ² Jeff Bezos Personal & Bezos expeditions investments
Source: CrunchBase

Digital platforms: examples of valuations

Airbnb is worth more than the Hyatt chain, while **Uber** valuation is just 10 billion below that of Ford

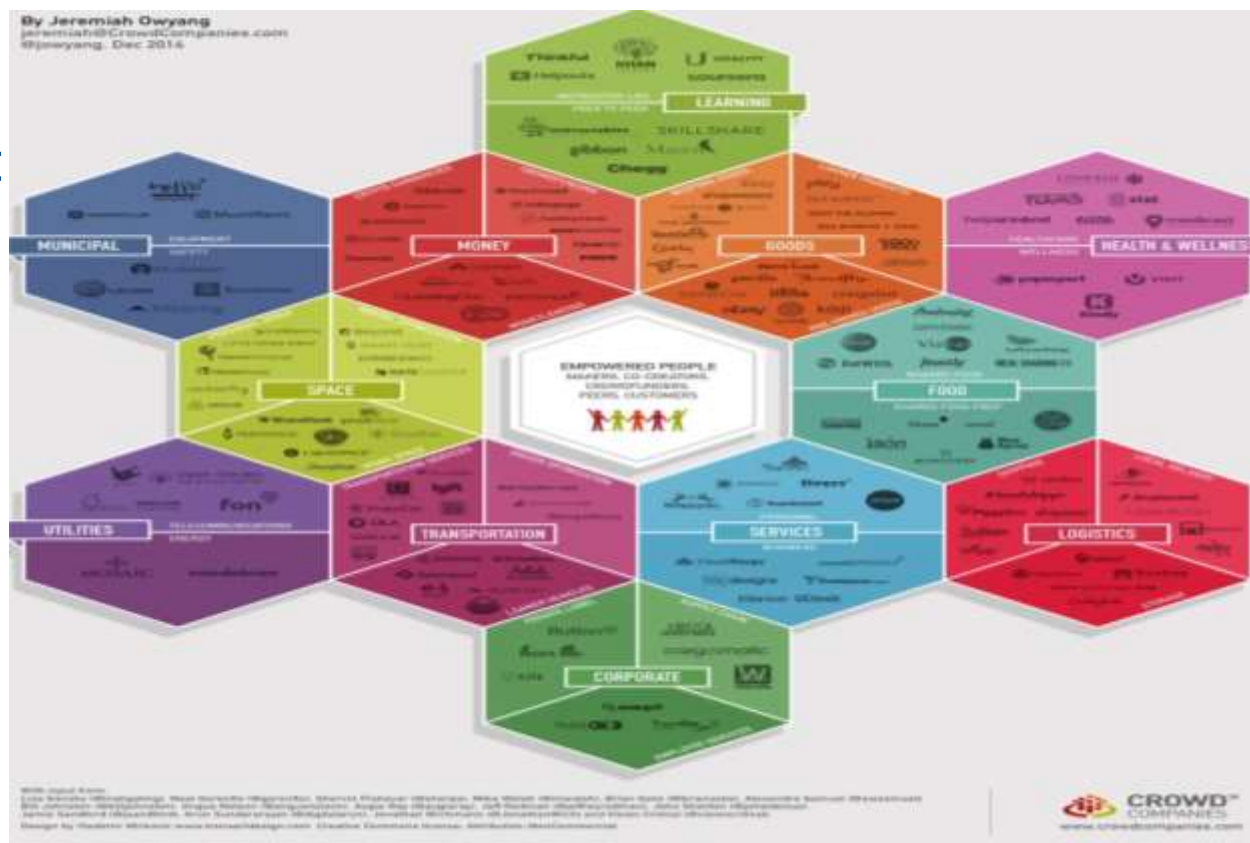


Source: *BloombergBriefs.com* (June 2015)

<https://newsletters.briefs.bloomberg.com/document/4vz1acbgfrxz8uwan9/economic-impact-of-airbnb>

"Platformisation" of the economy

- Challenge 1 – use of new data sources to measure and forecast overall trends in Digital Economy;
- Challenge 2 – access to critical data;
- The paradox of the digital economy is that never before have so much data been collected and never before has it been so difficult to access these data.



Empowered people co-create platforms in all sectors
Source: www.crowdcompanies.com (2014)

Big Data is the new oil of the economy

- Information, based on access to data, is an asset which requires optimization to add more value;
- Availability of Big Data is an opportunity to exploit;
- Improved control of big data requires managing: volume, velocity, variety, veracity, value;
- Benefits include: process automation, insight discovery, decision making;
- Sources of Big Data include: search information, mobile data, social media analysis, business data;
- Infrastructure, investments, skills availability are among the main challenges for big data use;
- There are many challenges as a result of the use of big data: social issues are the most difficult to address.



Further likely challenges

- Rising unemployment, increasing inequalities and growing exclusion
- Cybersecurity, privacy, trust, reputation, ownership of data, right to access, liability re-use of data, data portability, data localisation, reliability, dependency,
- Market volatility, competition, stagnation, complexity, agile entrants, legal barriers / uncertainties,
- Ethical issues: algorithmic governance

Top 10 Global Business Risks for 2016



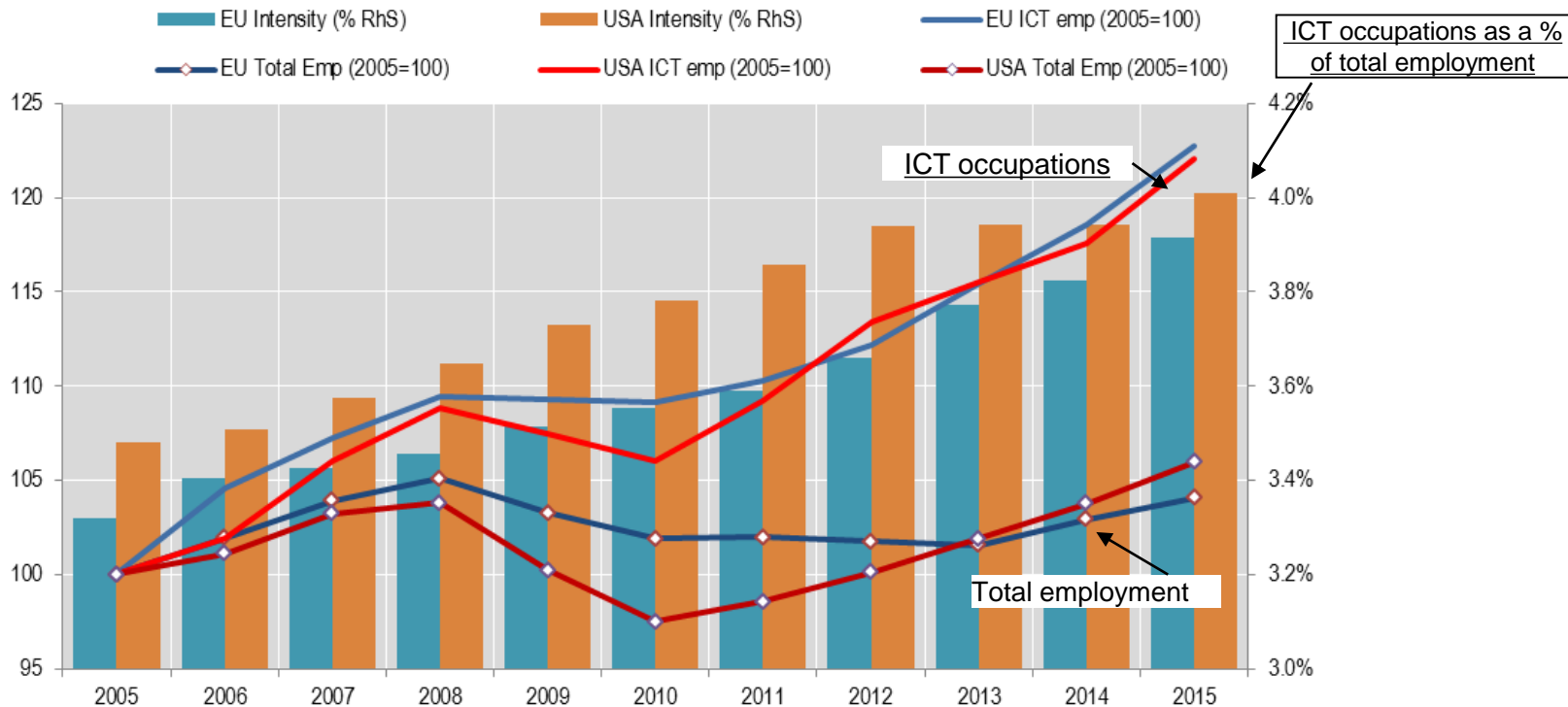
Source: Wiersma Global Economic & Specialty

Digitalization and Employment



The EU and USA economies intensive in ICT employment

- Employment in ICT occupations was resilient to the crisis and increased 22% in 10 years, approaching 4% of total in 2015 (from 3.3% in 2005)
- More than half of these persons work outside the ICT sector itself



Digitalization and Employment



and in general employment is recovering



EUROPEAN SEMESTER 2016/2017



Youth Guarantee measures and reforms have made a difference in the lives of more than 9 million young people.



The number of people in jobs in Europe is the highest it has ever been. We are witnessing an increasingly job-rich recovery thanks to recent structural reforms in Member States. To keep up these positive results, reform efforts need to continue.



#EuropeanSemester





The digital transformation:

- is a major driver of firm and employment creation;
- reduces transaction costs and information asymmetries allowing trading of under-utilised assets;
- stimulates organisational change – horizontal structure;
- enables collaboration and innovation;
- permits non-standard forms of employment – stimulates self-employment

BUT ALSO

- requires human capital with digital skills thus stressing the education system;
- enables the substitution of workers by 'machines' thus inducing unemployment and inequality;
- displaces part of tasks in jobs raising risk of unemployment, but not whole occupations;
- in an ageing society ...
- prompts modernisation of the welfare state;

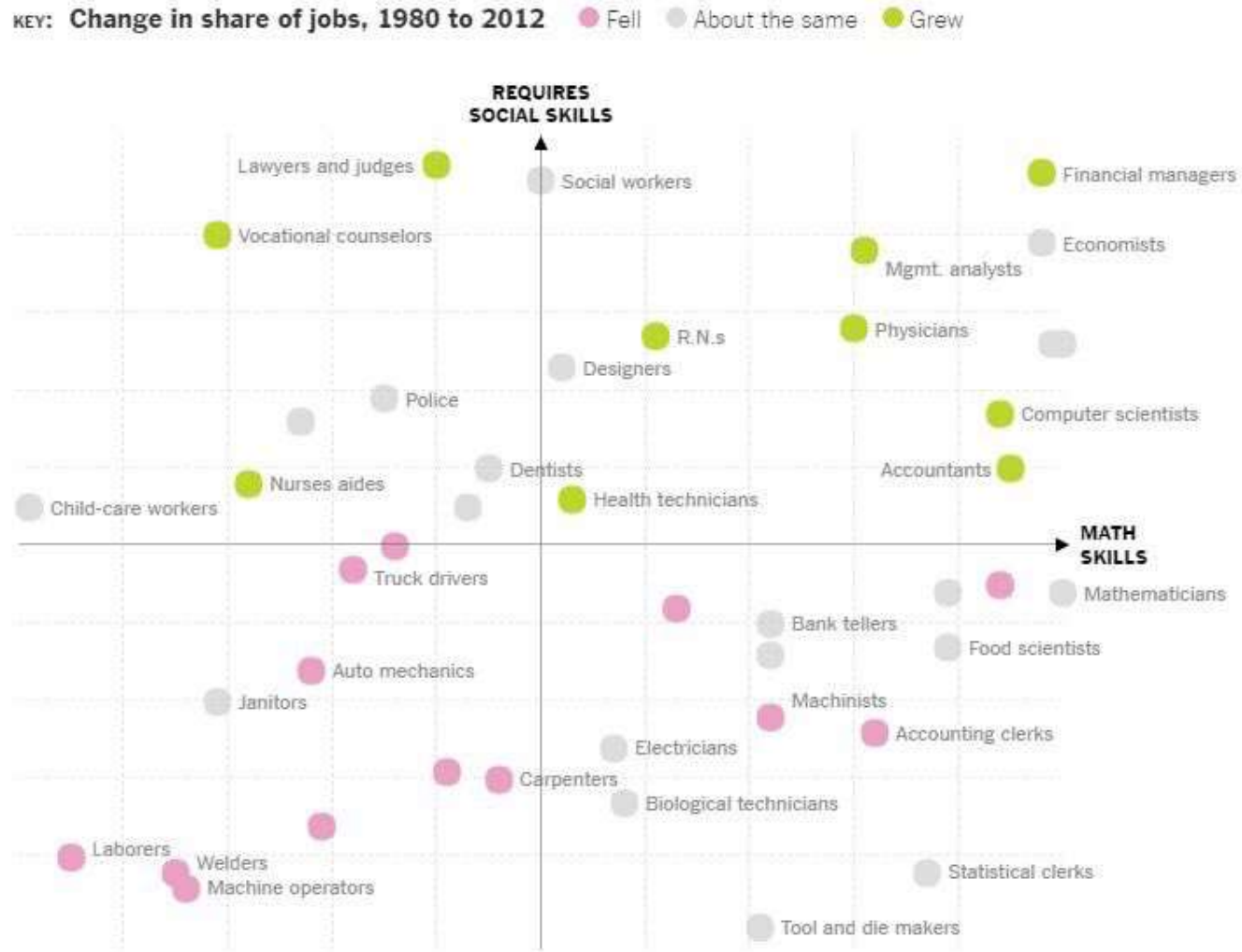
Digitalization and employment



European
Commission

Main question: which skills for which jobs

- jobs requiring only math skills have been automated;
- jobs requiring only social skills are low paid;
- workers who combine math and social skills in a knowledge-based economy get lucrative opportunities;



Source: David Deming, Harvard University

<https://www.weforum.org/agenda/2016/09/jobs-of-future-and-skills-you-need?>

Nature of work challenges



Nature & content of tasks/occupations is changing

Automation effects:

- Increase in productivity of jobs that need problem solving and interactive skills;
- Improved levels of autonomy and control to boost quality;
- Increased productivity is growth;
- Human workers are empowered when managing the robots;
- Total replacement of jobs intensive in routine tasks;
- Jobs that imply physical dexterity/adaptability tasks are not directly affected;





Routinization hypothesis

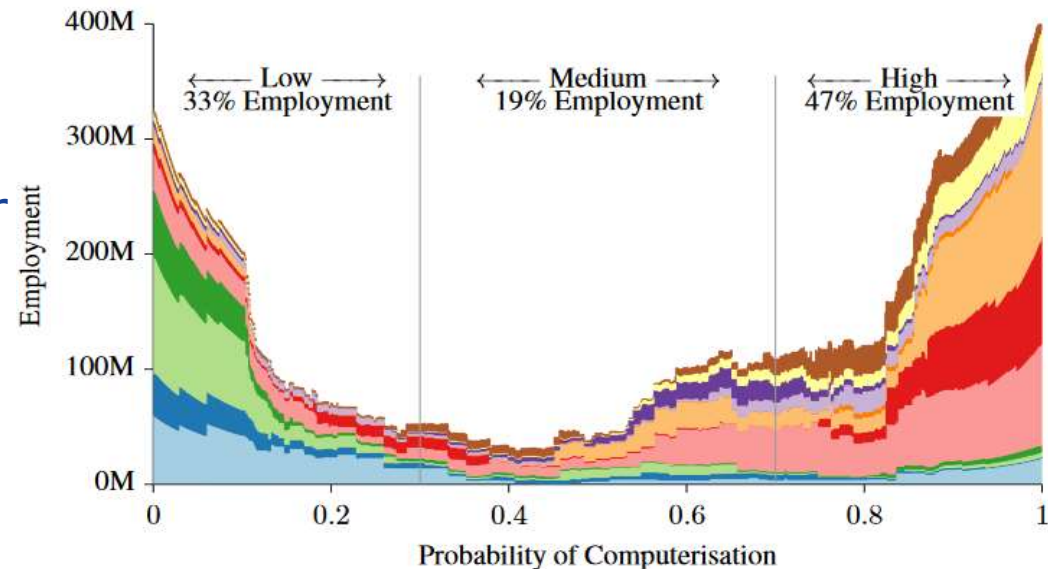
- The Routine Biased Technological Change (RBTC) hypothesis has provides a coherent framework for interpreting the potential impact of digitalization on jobs:
 - jobs that are abundant in routine (i.e. automatable) tasks are going to be substituted by "machines";
 - jobs that are rich in cognitive tasks are benefiting from digitalization;
 - jobs that imply interactive tasks are not directly affected by the digital transformation.
- However:
 - i) tasks are almost never directly observed (what we observe are jobs, which are bundles of tasks); and
 - ii) there is no unique method to empirically test the RBTC hypothesis.

Nature of work challenges



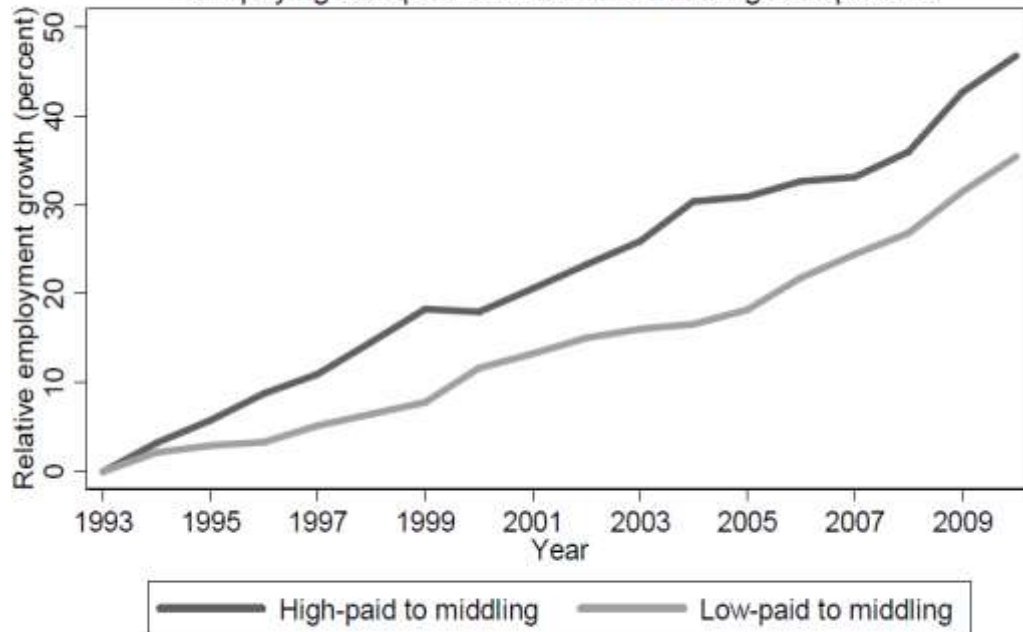
- Frey and Osborne (F&O 2013) estimated what may happen to jobs in light of robotization;
- Recent work by Arntz et al. (2016) challenges the F&O view arguing that many of the jobs potentially automatable will actually not be lost because they require a set of complementary tasks, most of which are not automatable (i.e. person-based services, such as in health care or personal care);
- While F&O estimate that 47% of US jobs are at risk of substitution (Bruegel estimates 54% for the EU), Arntz et al. (2016) estimate that about 9% of jobs are at high risk of substitution by “machines”.

Job Polarisation



Need to further study polarisation effects

Figure A1. Cumulative yearly employment growth of high- and low-paying occupations relative to middling occupations



Note: Employment growth averaged across countries, no adjustment for countries with incomplete data spans.

- Research the detailed impacts of technological change on specific job profiles in a scenario where the technology is changing rapidly;
- Identify appropriate policy responses in terms of education and training: beyond general digital and transversal skills, sector/industry precise technical developments need to be analysed to identify required specialized skills;
- However, very specific skill needs may lock-in workers to the projected technological path!

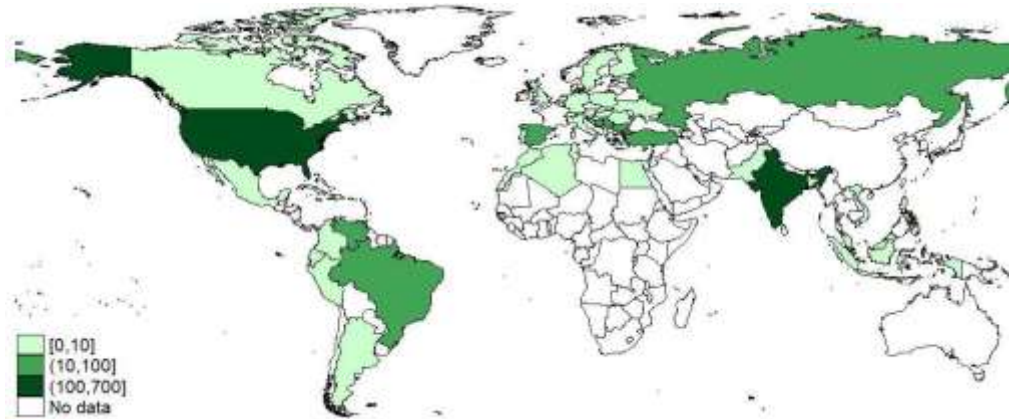
Source: Goos, Manning and Salomons, 2014

Nature of work challenges



Collaborative economy: what, who, where?

- Digital platforms that match labour demand and supply, altering work organisation;
- Empowering people to unlock value of their time and assets
- 51% crowd-workers: 16-35;
- Searching for on-line and off-line work despite disability;
- Well educated people, aiming to increase their income and their competence, reputation;

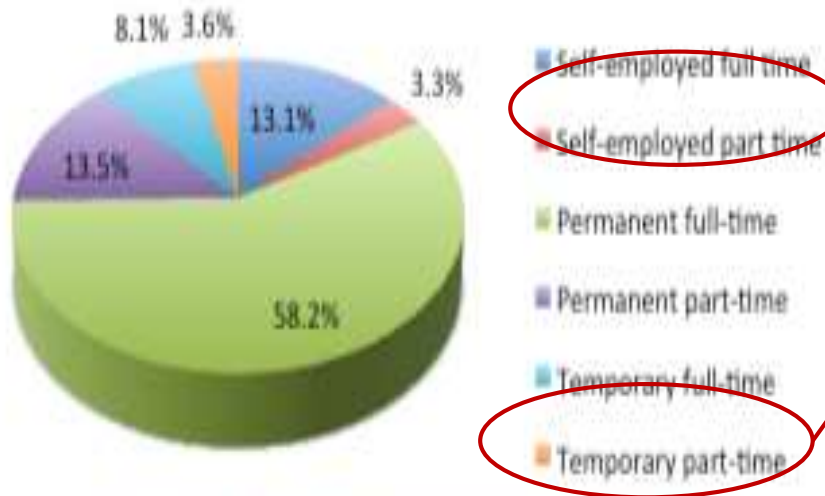


Where is the on-demand economy: ILO working paper on principles and rights of work by Valerio De Stefano



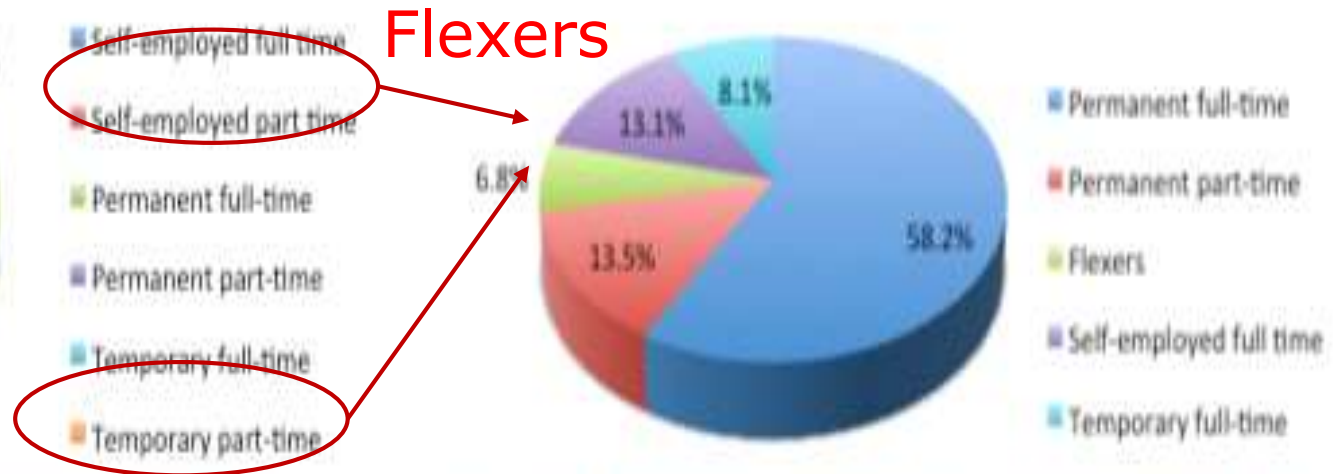
Potential supply of on-demand labour

Labour status of persons aged 15 years and older, EU-28, 2014



Source: EU Labour Force Survey 2014

Labour status of persons aged 15 years and older, EU-28, 2014: the share of flexers



Source: Elaboration on EU Labour Force Survey 2014

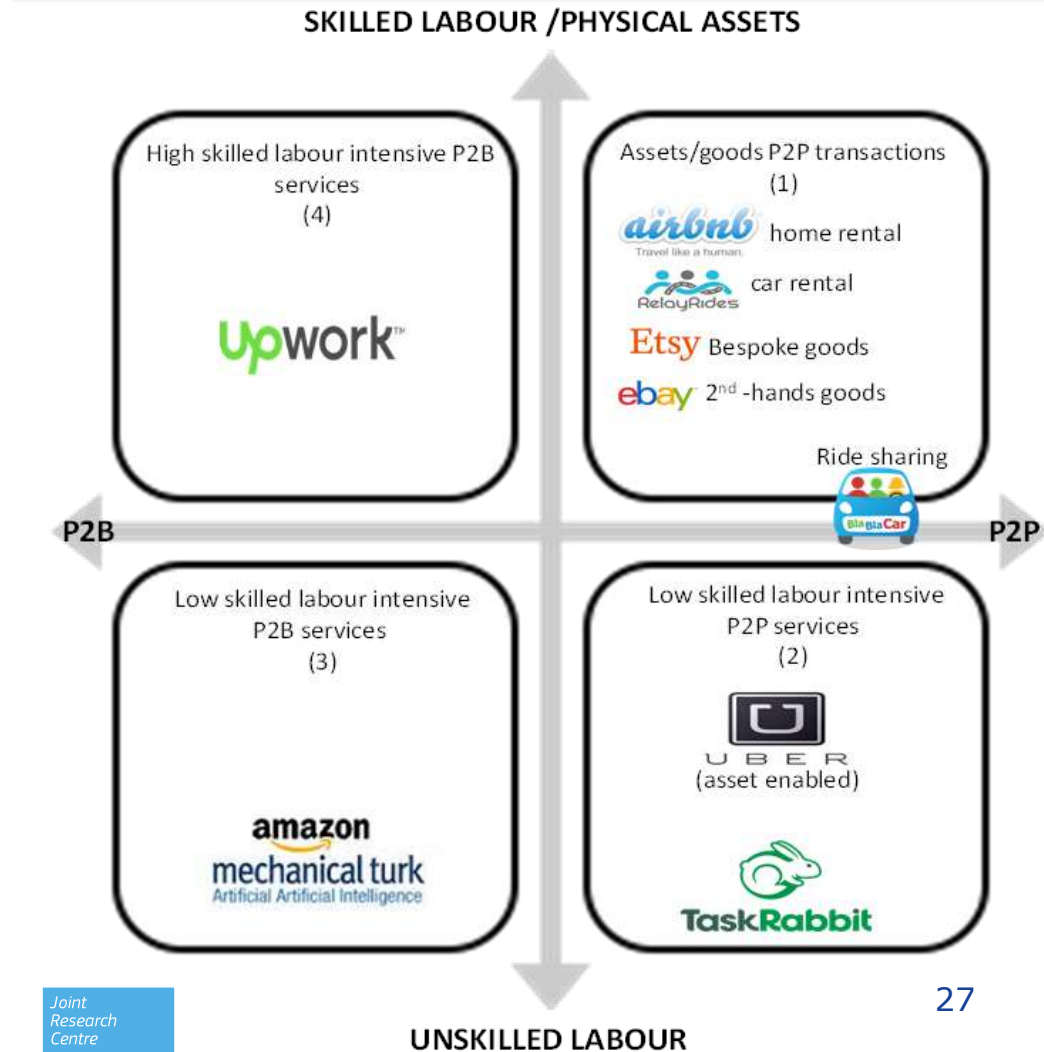
About 15 million Europeans (6.8% of the total labour force: 217.8 million) have insecure part-time jobs (self-employed part-time + temporary part-time);

Nature of work challenges



Collaborative economy: typology (P2P, P2B)

- Some sharing platforms are not of regulatory concern and do not affect labour markets;
- Many of these generate social innovation which is beneficial especially in the public sector;
- Additional social support policies may be needed;
- Data protection and liability issues and privacy are challenges to address;





New collaborative forms of employment

- Employee sharing: permanent full-time employment for several employers;
- Job sharing: two or more part-time jobs united into one full-time;
- Interim Management: Highly skilled managers hired for periods;
- Casual work: no obligation for employers, on-demand call;
- ICT-based mobile work: telework;
- Voucher-based work: payment for service with voucher purchased from authority that covers pay and social security contributions;
- Portfolio work: self-employed individual works for several clients;
- Crowd-employment: online platform matches employers and workers
- Collaborative-employment: freelancers, the self-employed or micro enterprises cooperate to overcome limitations of size and professional isolation

Nature of work challenges



Collaborative economy detriments/challenges

Economy/Markets	<ul style="list-style-type: none">• Erosion of tax revenues• Bypassing law and regulations• Unequal Access• Disruption/ Incumbents opposition• Trust issues (lack of, or too much of)
Consumers/consumption	<ul style="list-style-type: none">• Safety and liability• Quality and redress possibilities• New forms of distinction & discrimination
Contractors/work	<ul style="list-style-type: none">• Risk shifting from employers to employees• Low income /income instability• Irreversible capital investment• Less protection (no access to benefits, no social protection)• Lack of reliable dispute regulation systems• Possible privacy violation
Employers/production	<ul style="list-style-type: none">• IP rights• R&D funding• Quality• Uncertainty (frictions in matching)
Labour Market	<ul style="list-style-type: none">• Orientation on tasks rather than jobs• Potential for 'race to the bottom' as regards quality of work• Potential crowding out of standard mobility employment



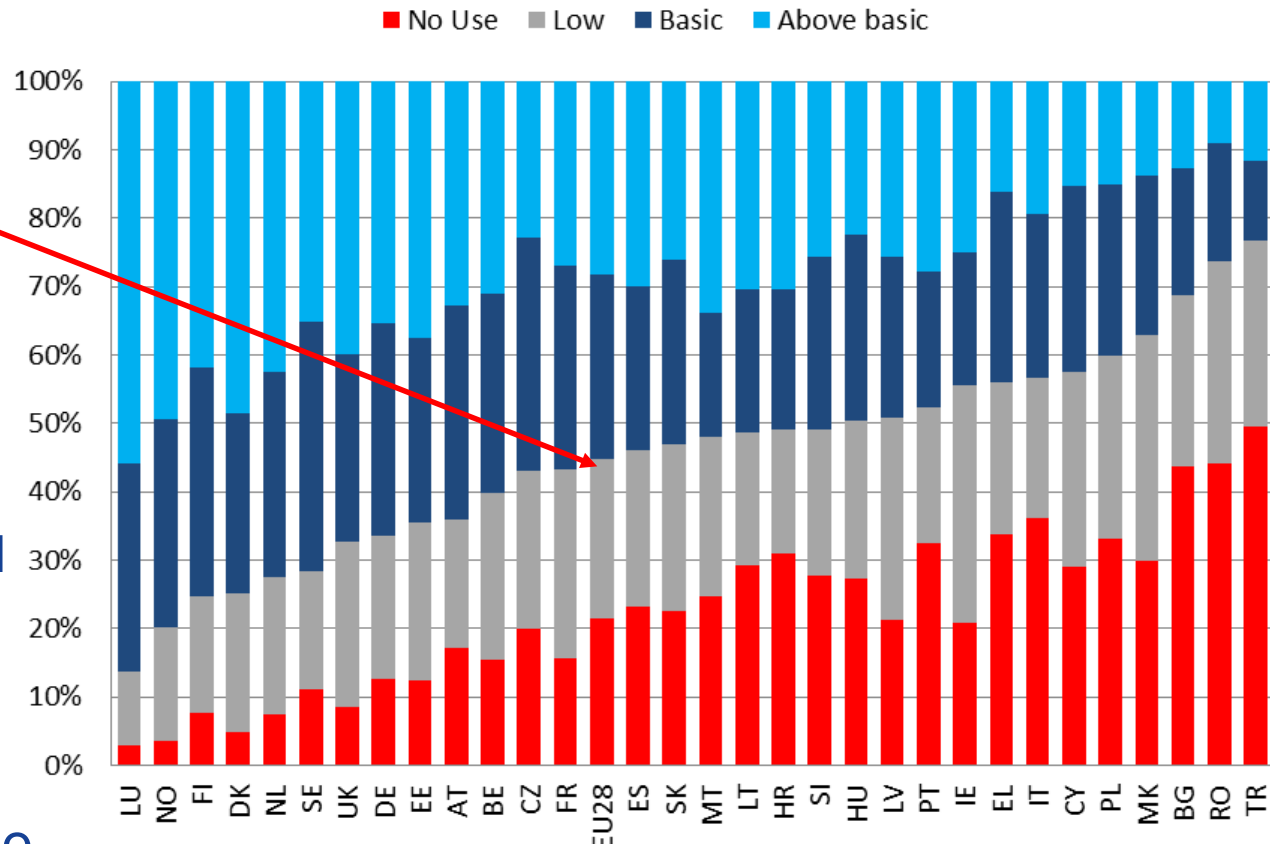
Collaborative Economy: further research

- labour market platforms: taxonomy & demographics and analysis of complementarity/substitutability of labour traded on labour platforms vs. traditional labour market channels;
- the employment relationship (dependent workers vs. self-employed vs. a-typical relationship) and the deriving contractual obligations and the implications on workers' welfare
- The status of workers' job control vs. autonomy;

However, empowerment through digital skills

Everyone needs to be digitally competent

- 45% EU population lacks basic digital skills, 21% has no skills at all
 - 37 % of the EU labour force has an insufficient level of digital skills.
 - 13 % has no digital skills at all, as they do not use the internet.
- 42% of those with no digital skills are unemployed



Digital Skills of EU population: DESI 2016, by country
<http://ec.europa.eu/digital-agenda/news-redirect/16547>

New Skills Agenda: special focus on Digital Skills

MS are invited to develop **concrete measures** to bring **digital skills and competences** to all levels of education and training, supporting teachers and educators and promoting active involvement of business and other organisations



Digital Competence for 21st Century Skills

What?

- A reference framework including conceptual model & self-assessment, self-evaluation tool

Why?

- Differences between and within MS and need for further harmonisation

How?

- Strong scientific underpinning (Identifying – Analysing – Mapping – Piloting/Testing)
- Consensus building with multiple stakeholders

Currently Implemented:

- EUROPASS CV
- DESI index (Digital Economy and Society Index)
- Digital Competence Framework used in 14 MS



The Digital Competence Framework



Competence areas

Competences

1. Information and data literacy

- 1.1 Browsing, searching and filtering data, information and digital content
- 1.2 Evaluating data, information and digital content
- 1.3 Managing data, information and digital content

2. Communication and collaboration

- 2.1 Interacting through digital technologies
- 2.2 Sharing through digital technologies
- 2.3 Engaging in citizenship through digital technologies
- 2.4 Collaborating through digital technologies
- 2.5 Netiquette
- 2.6 Managing digital identity

DigComp 2.0

3. Digital content creation

- 3.1 Developing digital content
- 3.2 Integrating and re-elaborating digital content
- 3.3 Copyright and licences
- 3.4 Programming

4. Safety

- 4.1 Protecting devices
- 4.2 Protecting personal data and privacy
- 4.3 Protecting health and well-being
- 4.4 Protecting the environment

5. Problem solving

- 5.1 Solving technical problems
- 5.2 Identifying needs and technological responses

... and on entrepreneurial skills

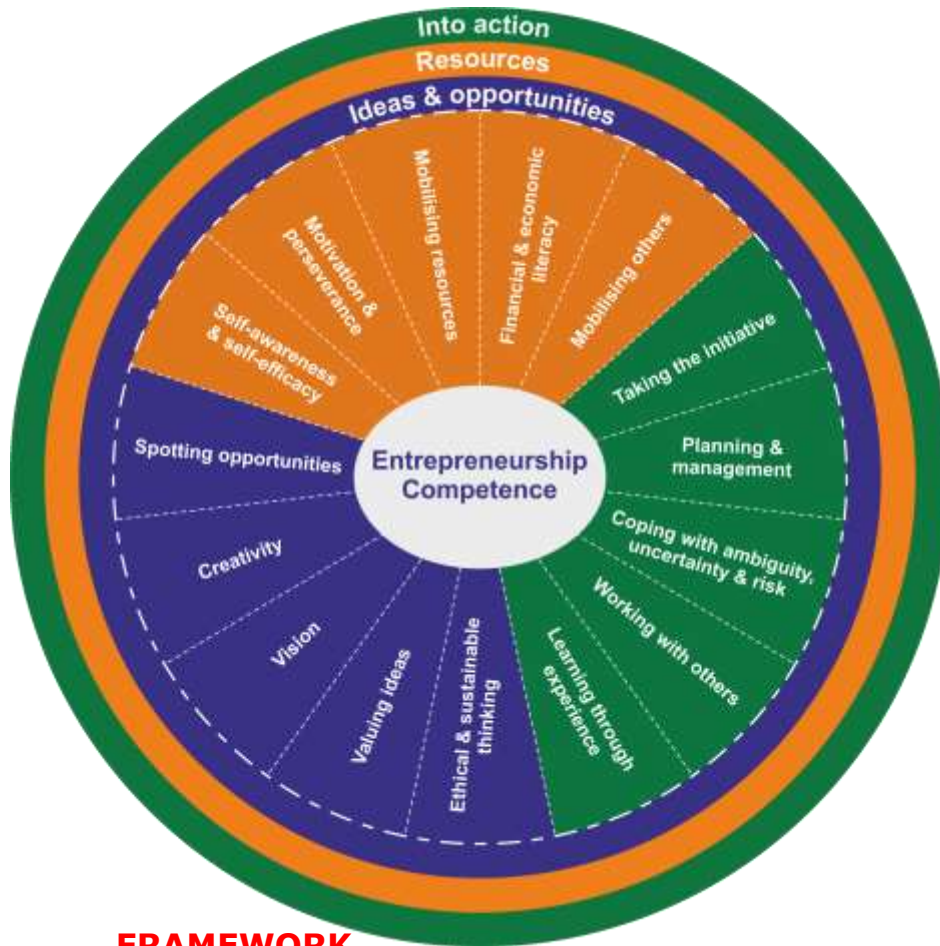
Europe needs citizens to be entrepreneurial in all realms of life: *special attention will be paid to promoting entrepreneurial and innovation-oriented mindsets:*

only 50% of the EU aged 15+ agree that their school education helped them to develop a sense of initiative and a sort of entrepreneurial attitude.

2012 Flash Eurobarometer (354)
Entrepreneurship in the EU



Entrepreneurship Competence Framework



JRC is also supporting MS harmonisation in relation to entrepreneurship competence



FRAMEWORK

3 areas 15 competences

8 levels of proficiency 442 LO



Modernising EU Social Protection Systems

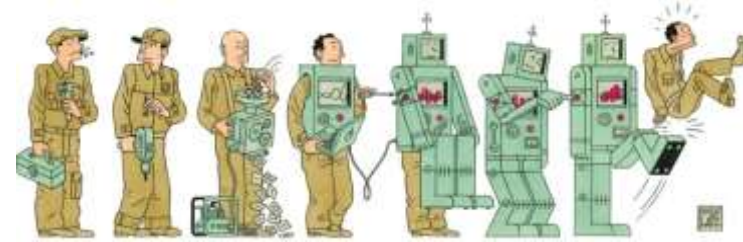
*IESI project: Misuraca G., et al.
– 2016 forthcoming*



1. EU Welfare State in crisis:
 - Demographics (ageing, migration, ...)
 - Fiscal tidying, recovery poor in jobs
 - Ideological issues emerging
2. In need of new approach to welfare goals; Social (Policy) Innovation comes to the rescue with new actors/tech/Bus. Models;
3. Case Studies in different welfare systems – 14 MS in 2015-16
4. Crucial role of ICTs in enabling integration and enhancing impact of services delivery
5. Contribute to the EU consultation on the future of welfare systems for euro-zone MS towards a deeper and fairer EMU

Technology and Employment issues

1. Job creation:
 - Innovation + human capital (E&T policy);
 - Industrial policy;
 - Public investment, financing;
2. Everything platform-based;
 - Create digital spaces of resistance;
 - Strengthen ethics governance;
3. Skills and jobs:
 - Skills & competence recognition system;
 - Competences for employability-STEM/social;
 - Foster youth with E&T and transition to LM;
 - Focus on human-machine symbiosis skills ;
 - Life-long Learning training in job deal;
4. Address unfair practices in new economy as part of new '*collective*' bargaining:
 - Rights adapted to new digital work settings;
 - Control/autonomy in self-employed role;
 - Protect precariousness at work;
 - Address inequalities of all types;



**Ensure Technology
is used for society's
wellbeing**

Towards a
European Pillar
of **Social Rights**



Prospective Next steps for JRC/B4

- Further research on open education and the digital transformation of education;
- Estimate empirically what would be a right balance between cognitive /non-cognitive skills to learning for specific professions/occupations;
- Study the mechanism for transitions from H-E to work, so that H-E would deliver the knowledge, skills and attitudes that are required;
- A survey to improve understanding of labour market platforms, the employment link and welfare options.

Questions?



<http://is.jrc.ec.europa.eu/pages/EAP/eLearningPublications.htm>
<https://crell.jrc.ec.europa.eu/?q=publications/year>

