



Industry 4.0

Implications for an EU industrial policy

Policies for the work of the future: new jobs and new competences

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Industry 4.0

- **4th industrial revolution (digitalisation of economy)**
 - Broader application of ICT and new digital technologies: IoT, AI, big data, cloud computing, robotisation, automation ...
 - Transforming production, distribution and consumption
 - Initially focused on manufacturing, now a much wider debate
- **What will the impact on the labour market be?**
 - Massive job losses, substitution and displacement ↔ New jobs, improved working conditions, higher productivity
 - Effects on work organisation, job content, labour relations
 - Lessons from **previous industrial revolutions**: net job creation after an initial phase of job destruction

Industry 4.0 and employment

- Digitalisation will **both create and destroy jobs, its net impact is unknown:**
 - Job destruction:
 - Large variation in the estimations (9% - 85%)
 - Depending on the assumptions made in the estimations (timeframe, sector, rates of technology adoption)
 - Still, certain sectors and occupations are more affected than others (e.g. production versus IT sector)
 - Job creation:
 - Difficult to estimate; potential of new technologies?
 - Conceptualisation of new jobs

Industry 4.0 and employment

- **Job polarisation** is likely:
 - Manual and routine tasks traditionally most affected -> low- and medium-skilled jobs
 - Yet, digitalisation also affects non-routine and cognitive tasks -> medium- and high-skilled jobs
 - Social and creative skills are the hardest to automate
- Labour markets are likely to **adjust through price and quantity adaptations**

Industry 4.0 and employment

- Significant **transformation of existing jobs:**
 - Jobs will not be fully automated (only 9% can be automated for over 70%; see Arntz et al., 2016), it's about tasks
 - Not all automatable tasks will (immediately) be automated, this depends on difficulty, costs of labour and technologies ...
 - Not necessarily labour substitution, do tasks in collaboration with robots (e.g. Audi Brussels), oversee what is automated and specialise in the activities machines cannot do
 - Changes in terms of content and work organisation (flexibility, autonomy, new forms of management, monitoring, telework)
 - Changing skills demand

Industry 4.0 and skills

- **Skills gaps and mismatches** are a cause for concern:
 - Shortage of digital skills on labour market (high demand from employers, but many workers lack even basic digital skills)
 - New jobs are likely to require more and new / different skills: e.g. data scientist, blue collar jobs becoming more technical
 - Skills that are needed in labour market may not be known yet
 - How to make sure that skills are future proof?
- **Education, upskilling, re-skilling, lifelong learning, on-the-job training for current and future workforce**
 - Role for the education system, government, businesses and other stakeholders -> Collaboration between these actors

Industry 4.0 and skills

- **Some results from our work on the US labour market:**
 - Analysis of about 2 million vacancies published on Burning Glass for the 30 most frequently advertised occupations
 - Low-, medium- and high-skilled jobs in different sectors
 - Requirements: formal education, experience, skills ..
- **What did we find (in general):**
 - Employers are very demanding, even for low-skilled occupations
 - Positive correlation with the complexity of an occupation, but there is considerable variation
 - Top 3: formal education (67% of vacancies), service skills (49%), experience (38%)
 - Non-cognitive skills generally more important than cognitive skills

Industry 4.0 and skills

- **Digital skills:** basic, intermediate, advanced
 - Basic: computer skills (35%), e-mail (22%), internet (19%)
 - Prevalent for occupations of all skill levels, complexity matters
 - Intermediate: word (13%), spreadsheets (14%), office (9%)
 - Prevalent for all skill levels, higher prevalence if more complex, yet order of importance reverses
 - Advanced: hardly any prevalence
 - Programming, databases, cloud computing ...
 - But relevant for a handful of medium- and high-skilled jobs
 - Here, job-specific skills come into play
 - Still, our sample had only one IT-related profession

Industry 4.0 and skills

- **Soft ('non-cognitive') and transversal skills:**
 - Creativity, problem-solving, critical thinking, adaptability ...
 - Go hand-in-hand with cognitive skills, are complementary
 - Increasing body of evidence on their importance
 - Yet, difficult to measure (unclear conceptualisation), difficult to teach, difficult to certify:
 - Capabilities > Qualifications?
 - Yet, certification remains important in labour market

Industry 4.0 and skills

- Role for **companies**: start-ups, SMEs, larger organisations
- Role for **education and training system**:
 - Broaden the skills sets covered, with an interdisciplinary approach: digital skills, soft skills, STEM
 - But also: teacher training, infrastructure, equipment
 - New ways of teaching and learning: e.g. MOOCs
- **Skills monitoring and anticipation tools**:
 - To identify current and future skills needs
 - Use real-time labour market information: Cedefop tool based on online vacancies, CEPS Occupations Observatory, potential of big data and social media
 - Other initiatives: e.g. EURES, Skills Panorama

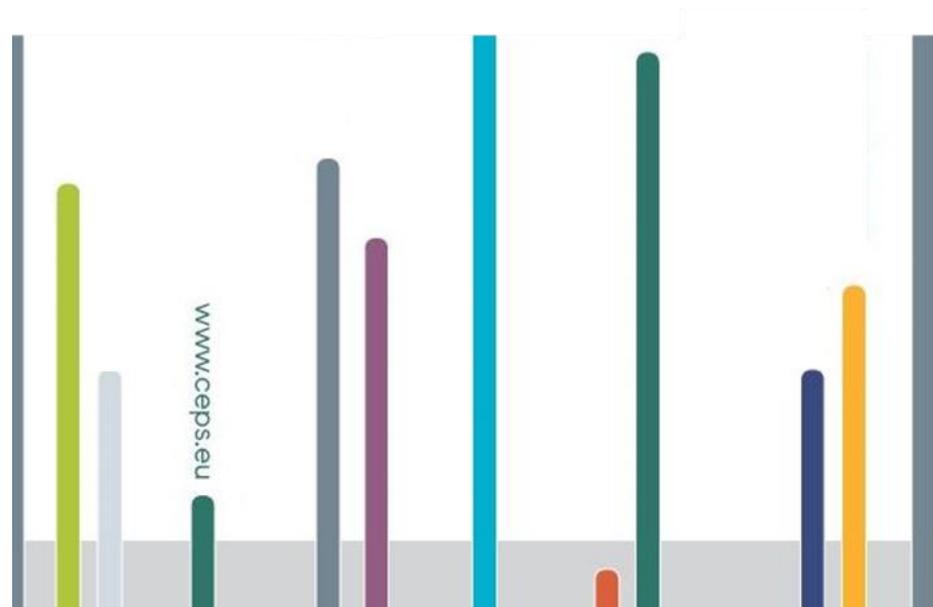
Work in the platform economy

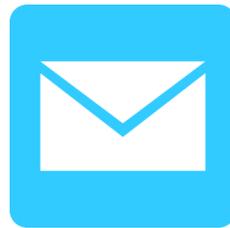
- New employment forms, new business models
- **State-of-play:**
 - Small in scale but rapid growth, strong impact on sectors in which platforms are concentrated, large variation in participation rates
 - High level of heterogeneity in platforms, workers, activities
 - Online versus offline; high-skilled versus medium- or low-skilled
- **Opportunities and risks:**
 - Source of additional income, flexibility, access to labour market ...
 - Payment risk, lack of social protection, isolation, stress, work-life imbalance ...
- Platforms are being integrated into global value chains and taken up into companies' internal structure



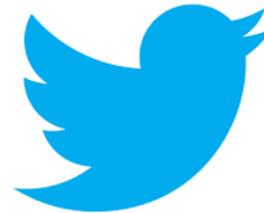
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Contact information:
karolien.lenaerts@ceps.eu





info@ceps.eu



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