Assessing the social impact of AI and robotics

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General Secretary

What future for European Robotics?
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What is a robot, what is AI, and where is the connection?

Robots = physical systems

“Actuated mechanism programmable in two or more axes with a **degree of autonomy**, moving within its environment, to perform **intended tasks.**”

- Industrial robots
- Service robots

Embodied AI
Smart, advanced robots

AI = software/algorithms

“Artificial intelligence (AI) systems are software systems designed by humans that, given a complex goal, act in the physical or digital dimension [...] to achieve the **given goal.**”

ISO 8373:2012 Robots and robotics devices - Vocabulary
Robots are tools to help and serve humans.

Robots are not autonomous like humans - programmed for a certain task and purpose.

AI technologies enable robots to sense and respond to the real environment.

AI technologies help companies optimise robot and process performance.

Companies, esp. SMEs, want robots that are easy to install, use and re-program.
Main benefits of robots

- **Industrial robots**
  - improved resilience
  - energy and resource efficiency
  - workplace quality

- **Professional service robots**
  - improved, more reliable services
  - better quality of work

- **Service robots for private use**
  - convenience
  - entertainment

⇒ quality of life
How many industrial robots are in use worldwide?

![Operational stock of industrial robots](image)

Source: International Federation of Robotics
Smart connected robots in manufacturing support the competitiveness

AUTOMATED PRODUCTION
Digitization of the entire process

OPTIMIZING PERFORMANCE
Connecting robots and other machines to a central computing server or the cloud

VIRTUAL SIMULATION AND DIGITAL TWIN
Simulate operations before installation and predict impacts during use

ROBOT AS A SERVICE
New business model allows for better predictability of expenditures

SENSE AND RESPOND
Enables robots to respond to external environment
Europe strong in professional service robots

![Pie chart for service robots by region of origin: Europe 55.2%, Americas 11.2%, Asia/Australia 33.6%]

Source: International Federation of Robotics

![Pie chart for service robots for personal/domestic use by origin: Europe 66%, Americas 24%, Asia/Australia 10%]

Source: International Federation of Robotics
Service robots

Service robots for professional use by application

Source: International Federation of Robotics
World Robotics 2020
“AI has the potential to rehumanize work, giving us more time to be human, rather than using our time to work like machines”

Paul R. Daugherty and H. James Wilson
Reimagining work processes

Humans complement machines
- Train
- Explain
- Sustain

Fusion skills
- Not just speeding up work tasks, but allowing workers, managers and executives to completely reimagine processes
- Human and machine skills combined create better outcomes than working independently
- Human and machine hybrid activities

AI gives humans superpowers
- Amplify
- Interact
- Embody

Be aware of the risks

The risk of discrimination

- Who gets into the universities?
- Who can climb the property ladder?
- Which teachers are fired?

Let's not forget:
Machine learning systems are set up by people!
Don’t overestimate the technology

Moravec’s Paradox*

What is simple even for children (e.g. sensorimotor and perception skills) is difficult for machines. And vice versa.

* after roboticist, AI researcher and futurist Hans Moravec
Europe is very concerned about the Future of Work

The Good Work Charter of the European Robotics Industry
10 Focus Areas to Shape the Future of Work

- Working like Humans, Not like Machines
- Humans in Command!
- Human-Robot Collaboration and Fusion Skills
- Ease of Use
- Creating Opportunities
- Inspire Young People for STEM
- Development of Skills
- Inclusion and Participation
- Sustainability
- Tackling Demographic Change

Source: EUUnited Robotics – Good Work Charter
Cultural and national differences in the attitude towards robots and AI

Europe
Trustability
Explainable AI
- strong competences in hardware engineering
- high ethical standards
  very concerned, critical, fearful society

America
Data driven SR start-ups
Strong VC support
- advantages in data collection and AI
- de-regulated, liberal economy

Asia
Financial support
Technology enthusiasts
- strong competences in CE and hardware engineering
- Embracing new technology
  ELSE issues not a concern
Take home messages

Robots and AI can help in decision making

Responsibility stays with humans/organizations developing and using the systems

Be aware of the risks, but also seize the opportunities

Use your competences and address real market needs

Education and skills are most important elements to build trust