



NexTech 2023



Manufacturing is becoming digital: challenges and opportunities

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Keynote / interactive lecture
PORTO, PORTUGAL, 29 SEPTEMBER 2023

About me



Assistant Professor at FEUP and a researcher at SYSTEC.

Principal researcher (PI) in several European and Portuguese R&D projects

More than 25 years of experience in systems development, specialised in systems engineering, control architectures and design of software for industrial applications.

Coordinator of the Digital and Intelligent Industry Research Lab.





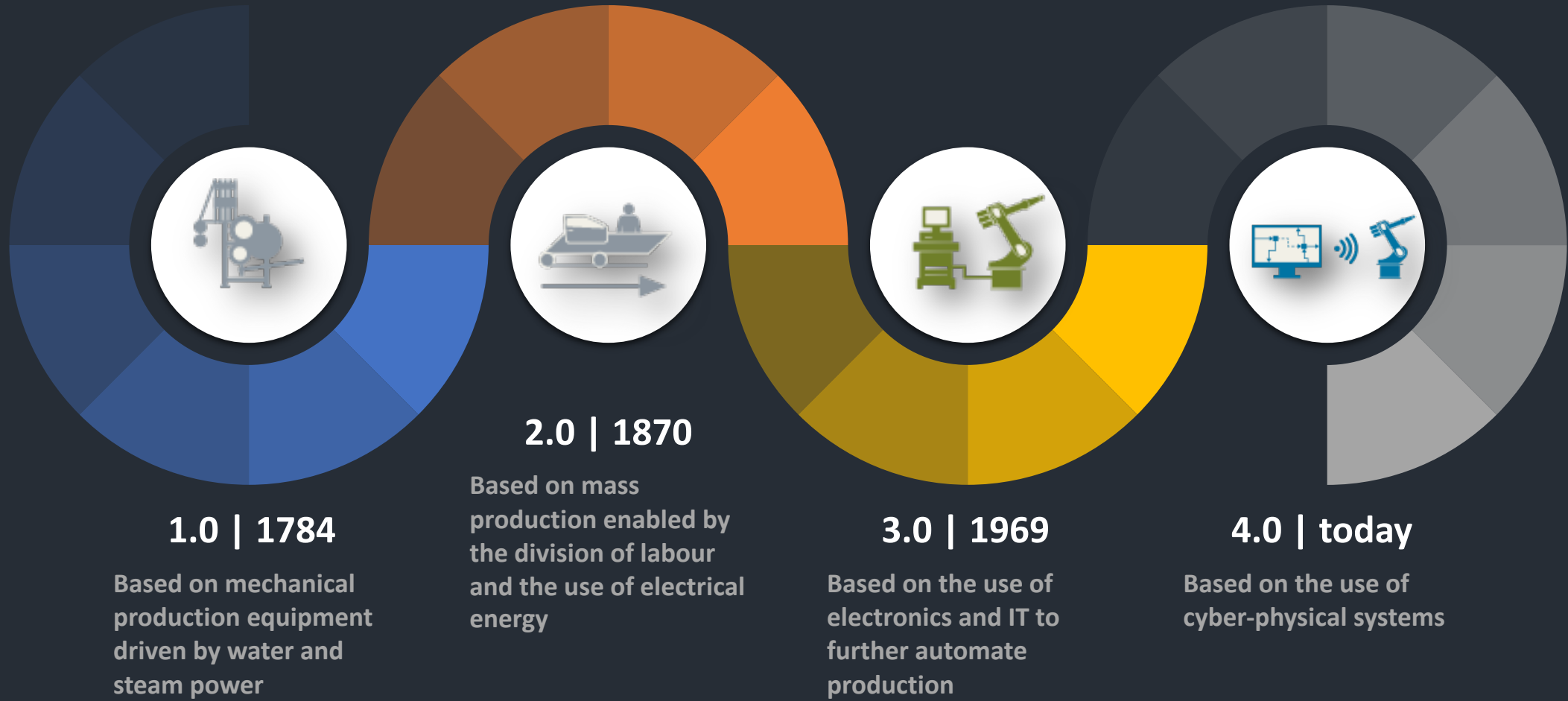


38%

Share ↗

The automotive industry employs 38% of existing industrial robots.

industrial revolutions



A close-up photograph of a yellow Cognex machine vision camera. The camera is mounted on a black robotic arm or bracket. It has a black lens assembly at the front and a yellow body with the 'COGNEX' logo. Two black cables are connected to the back of the camera. The background is a blurred industrial environment with metal structures and machinery.

machine vision

embedded electronics





industrial internet of things

The illustration depicts a futuristic industrial environment. On the left, a worker wearing a yellow hard hat and a blue long-sleeved shirt is holding a tablet computer. The worker's head and shoulders are visible in profile. In the center and right, a series of yellow robotic arms are positioned along a blue conveyor belt. Each arm is equipped with a black gripper and a yellow wireless signal icon above its base. The conveyor belt is moving several green circuit boards, which also feature yellow wireless signal icons. The background shows a grey industrial floor and walls with vertical lines, suggesting a factory setting. The overall style is a clean, modern illustration with a muted color palette.

cyber physical systems



Virtual emulation:

this will enable automatic start-up and reconfiguration.

Plug and produce components:

facilitate the exchange of defective production units and the reuse of individual units for new products.

"I am finished"

cyber-physical production systems

"I continue on to station 2."

Condition Monitoring
the filter reports a contamination level





RECLAIM

Refurbishment and re-manufacturing
of large industrial equipment

Assessing the health
status of machinery
and proposing:



methods,



tools and



services

for appropriate life time extension
strategies by the creation of a
Decision Support Framework.



Increased
production efficiency



Re-use of production
equipment



Environmental
recovery efficiency



Life time extension

RECLAIM's Core Technical Elements



Refurbishment and Re-manufacturing process

User Layer



Visualization



DSS Files

Real Time
Decision-Making
Layer



Cost Modelling



Prognostic
& Health



Prediction
Failures



Optimization
Plan

Physical Layer



Circular economy
strategies

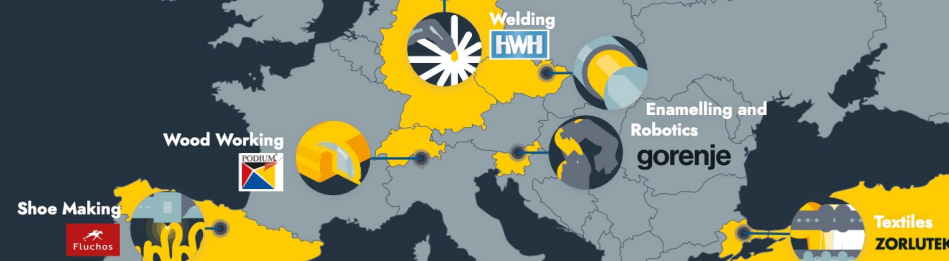


Repository
information



Digital Retrofitting
Infrastructure (IoT)

Demonstration cases in multiple industries across Europe



Follow our journey



@reclaim_FoF



Reclaim project



www.reclaim-project.eu





Open platform for realizing zero defects in cyber-physical manufacturing

The openZDM solution will allow manufacturers to increase the capacity for cost savings through waste reduction, while increasing company's productivity and competitive leverage.



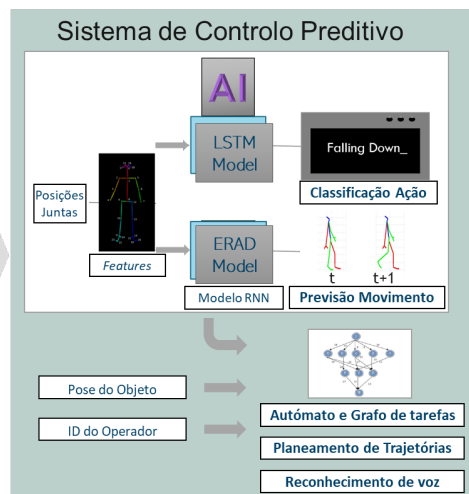
openZDM is an initiative that aims to provide an open platform to support production networks' **zero-defect processes**, bringing together existing R&D and creating an **innovative state-of-the-art integrated solution.**

Discover more at openzdm.eu

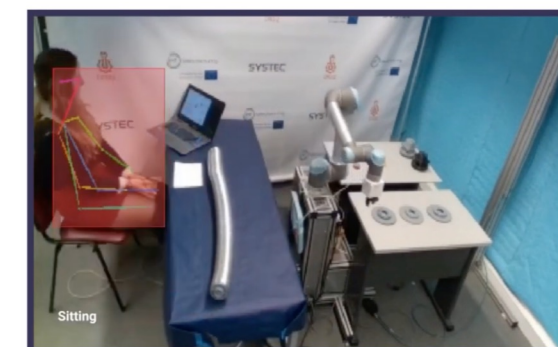


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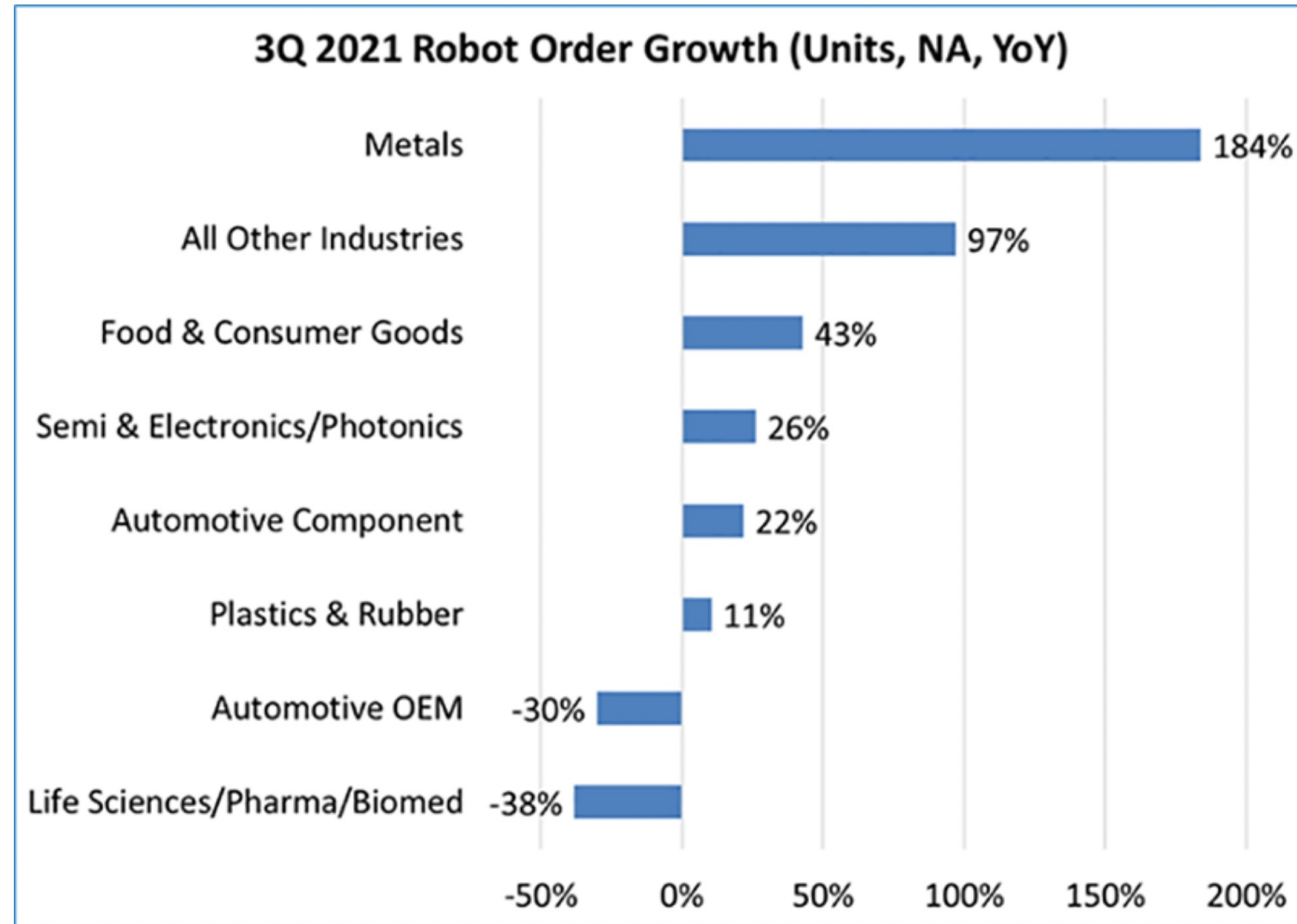


OR



Process Adaptation to Human Movement Prediction





Use of AI and automation is increasing rapidly in the workplace, across different sectors. Image: Association for Advancing Automation



AUTOMATE.ORG



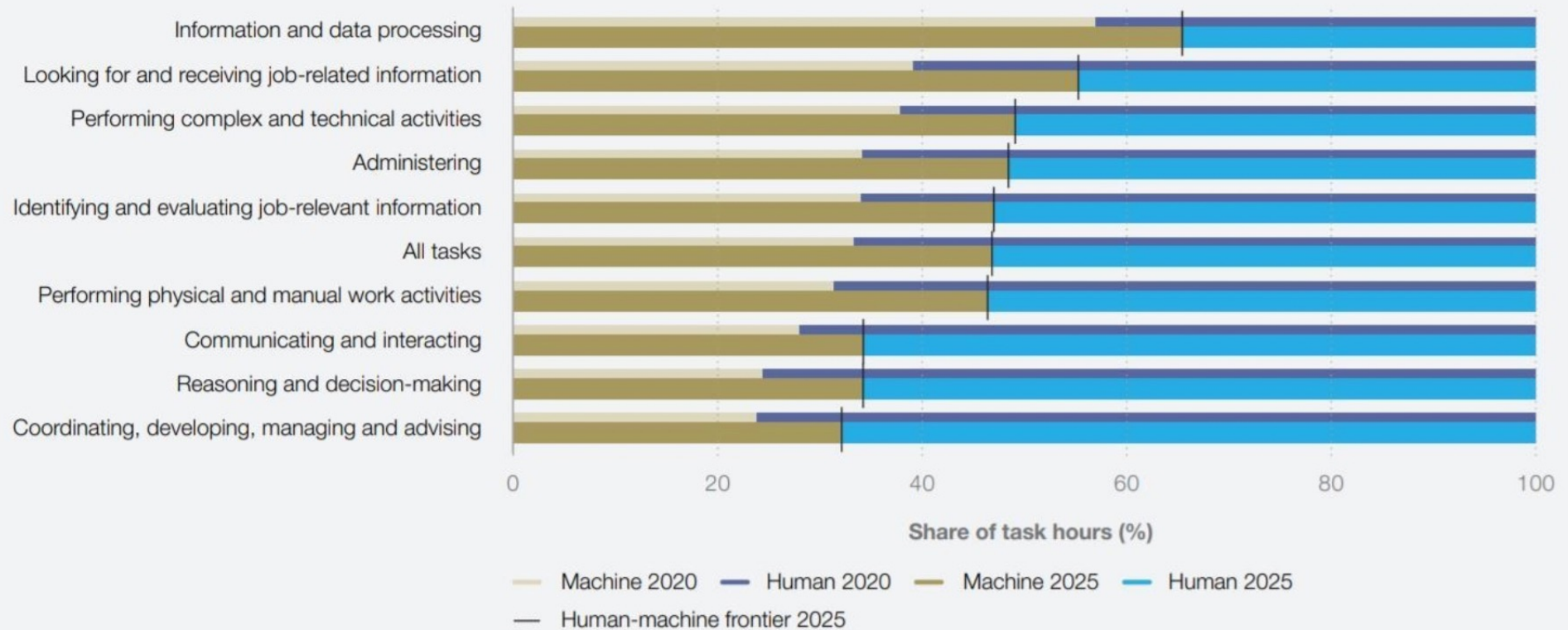
Jeff Burnstein ·

President at Association for Advancing Automation

Ann Arbor, Michigan, United States · [Contact info](#)

“BUSINESSES JUST CAN'T FIND THE PEOPLE THEY NEED,
THAT'S WHY THEY'RE RACING TO AUTOMATE!”

Humans vs robots: share of jobs



Source

Future of Jobs Survey 2020, World Economic Forum.

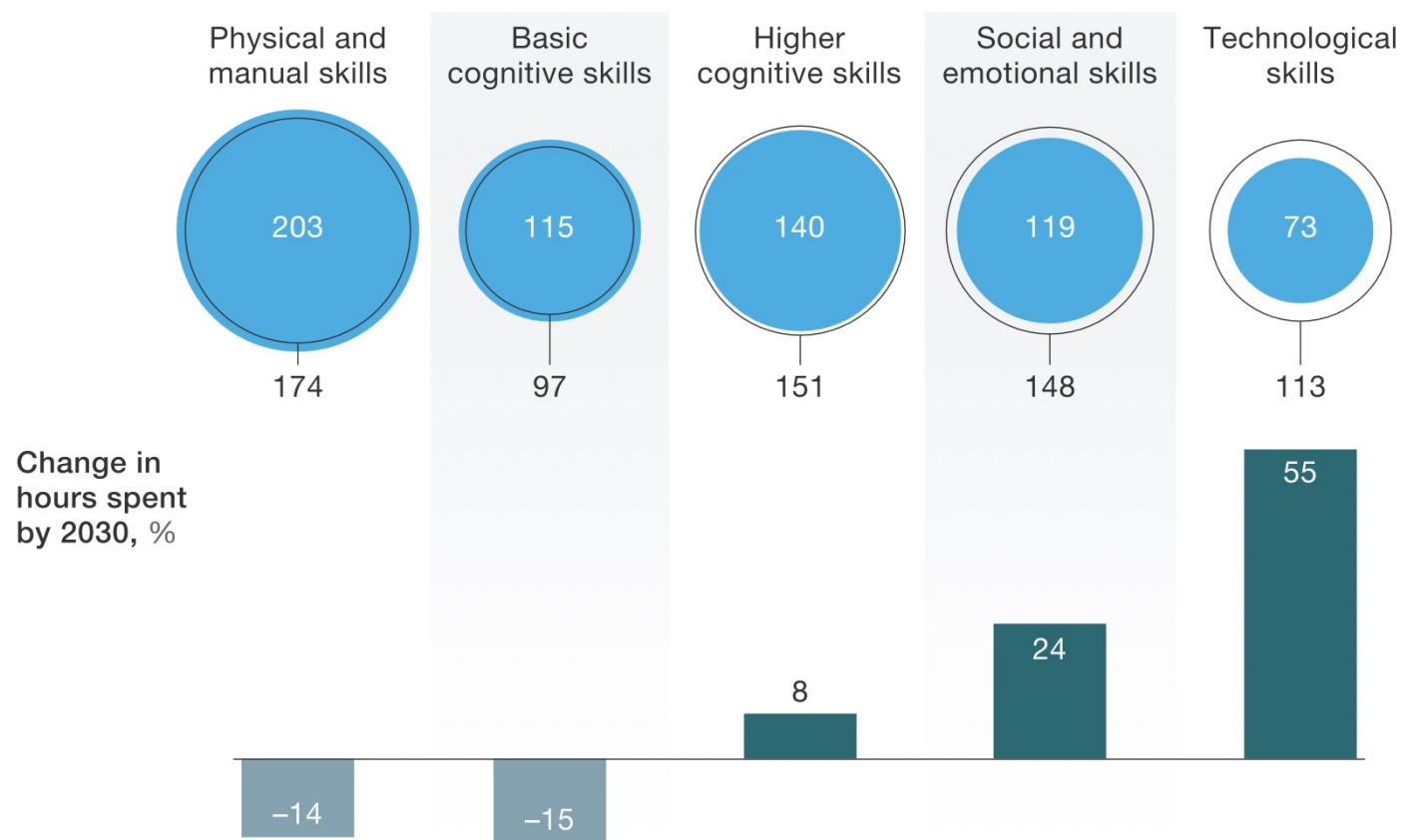
Machines are predicted to play an increasing role by 2025. Image: World Economic Forum



Transformation of the workplace

Total hours worked in Europe and United States, 2016 vs 2030 estimate, billion

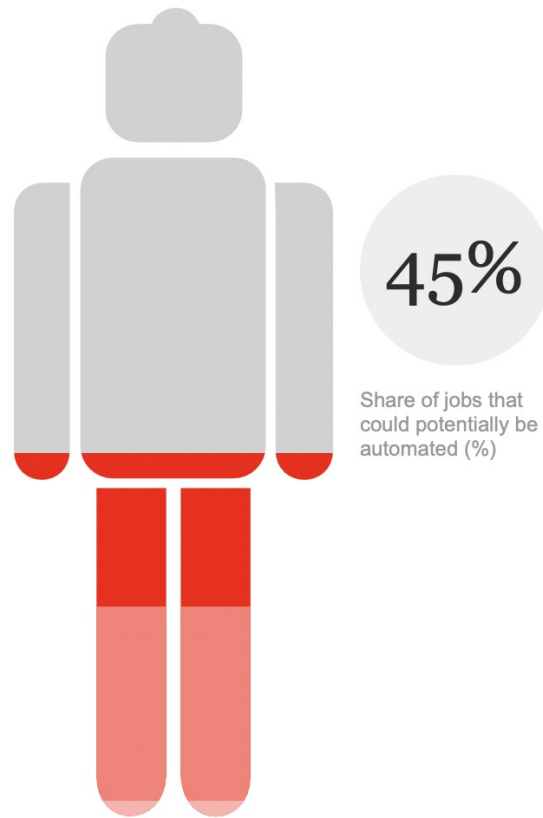
● 2016 ○ 2030



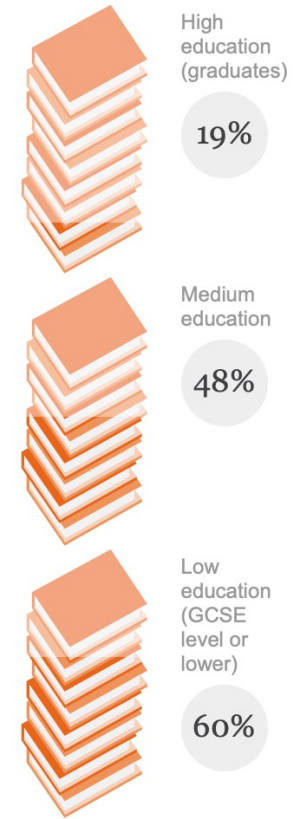
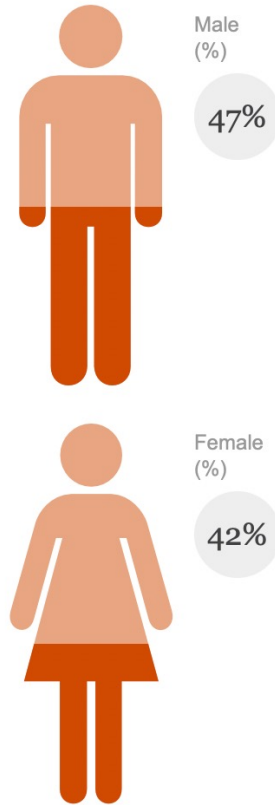
Source: McKinsey Global Institute Workforce Skills Model; McKinsey Global Institute analysis

Waves of automation

Job automation potential



Automation potential by type of worker

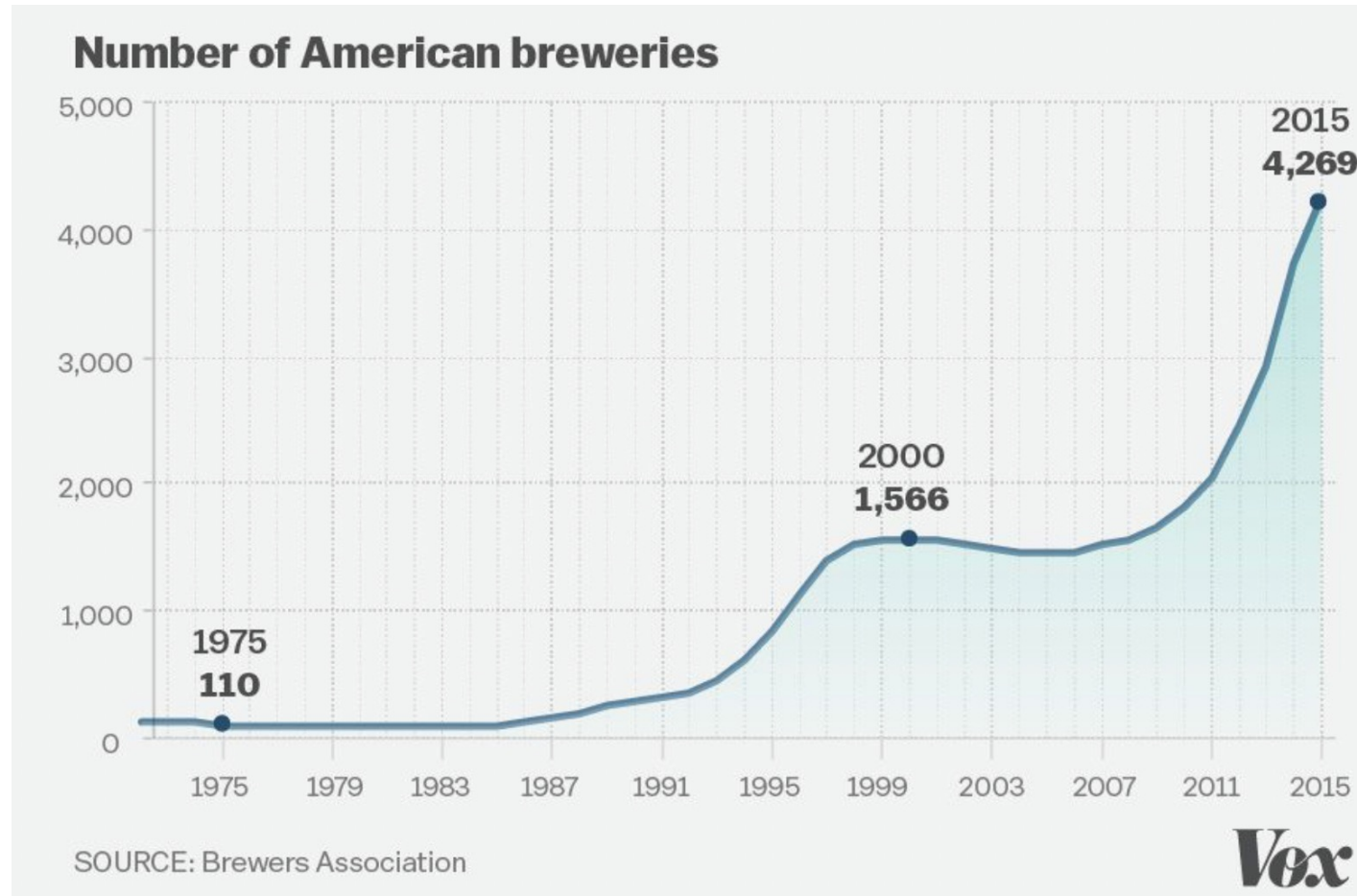


Wave 1 (by early 2020s)

Wave 2 (by late 2020s)

Wave 3 (by mid 2030s)

Automation is making human labour more valuable than ever



Manufacturing your future!

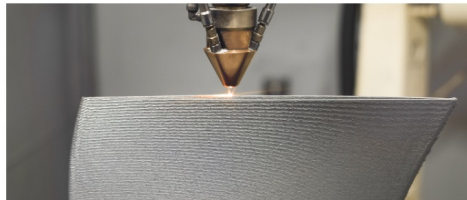
Skills.move - empowering individuals with the right skills for the future



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Additive Manufacturing

Discover the revolutionary 3D printing method and its commercial applications.



Artificial Intelligence

Explore the world of artificial intelligence and its applications across the manufacturing industry.



Augmented Reality

Learn the fundamentals of applying AR technology in production and research.



Learning Factories for Digital Transformation of SMEs

We support the digital transformation of SMEs towards Industry 4.0.

We establish and develop learning factories.

University-based facilities equipped with technology demonstrators and adapted to upskill the personnel via targeted training.






Learning Factories

digiTal Upskilling and Reskilling programme



CONTACT US

 @turing.eitm
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 <https://www.turing-eitm.eu>

WELCOME TO TURING

OUR GOALS

The challenge of labor displacement driven by technological innovation has a long and storied history...

...and is currently a strong challenge for companies digitalisation!

TURING programme will contribute to address this challenge by promoting personalised and flexible digital enhancement training programmes...

...co-created with digital technology providers, companies adopting those technologies and their mature established customers that use similar technologies.



DIGIMAN

ADVANCED STUDIES IN DIGITALISATION OF MANUFACTURING



Funded by the
European Union

<https://www.linkedin.com/company/advanced-studies-in-digitalisation-of-manufacturing-digiman/>



eitmanufacturing.eu

Course that offers a specialisation for future T-shaped professionals, combining high-tech skills in Cyber-Physical Systems, IoT and Artificial Intelligence with transversal skills across multiple domains such as creativity, innovation and entrepreneurship.



Self-Made aims to deliver innovative training courses and tailored technical consulting to manufacturing companies. This will enable the exploitation of EIT-M-supported educational assets and the deployment of disruptive technologies to support the digital transformation of such companies.



KEY TAKEAWAYS

- # of industrial robots in Europe grew 400% over the past 25 years (from around 95,000 to over 430,000)
- 14% of jobs in OECD countries are automatable | 32% of jobs could face substantial change
- Automation and AI are accelerating the demand for technological skills over the next 10-15 years
- 45%-60% of all workers in Europe could see themselves replaced by automation before 2030
- 96% of all workers at threat could find similar or better work with adequate training

While there are less new jobs created directly by technological progress, one additional technology job creates around five new, complementary jobs in the local non-tradable sector.

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