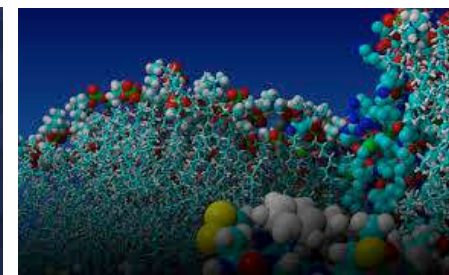
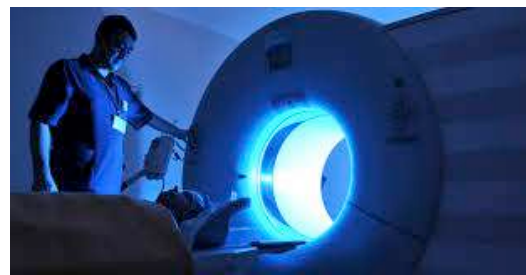


Industry 4.0: challenges for regions and workers

Prof. Dr. Emanuele Carpanzano

Director of the Department of Innovative Technologies

University of Applied Sciences and Arts of Southern Switzerland



Introduction

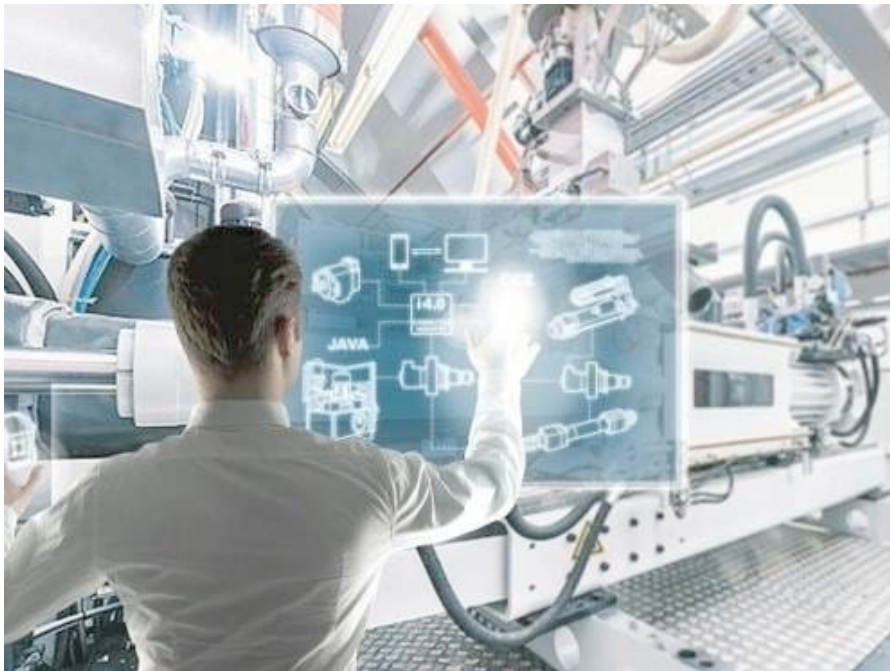
Digitalization

Innovation based on
digital technologies

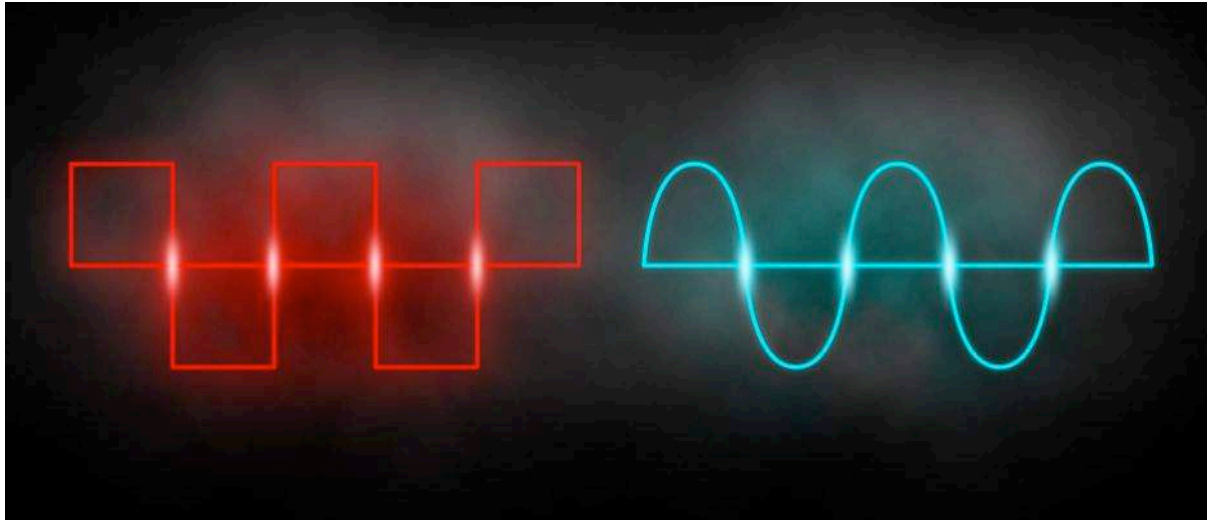


Industry 4.0

Innovation based on
digital technologies
in industry



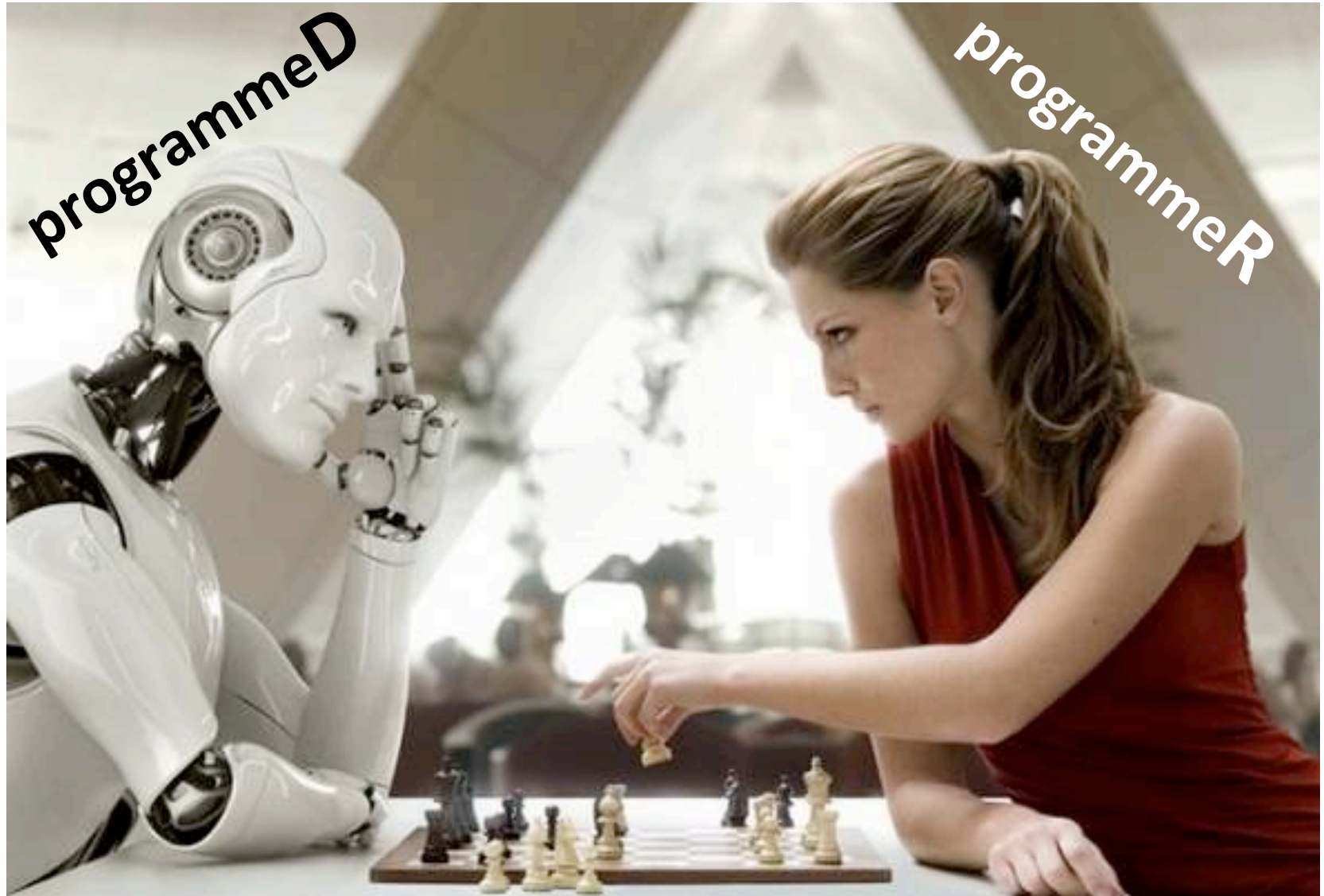
Digital vs Real



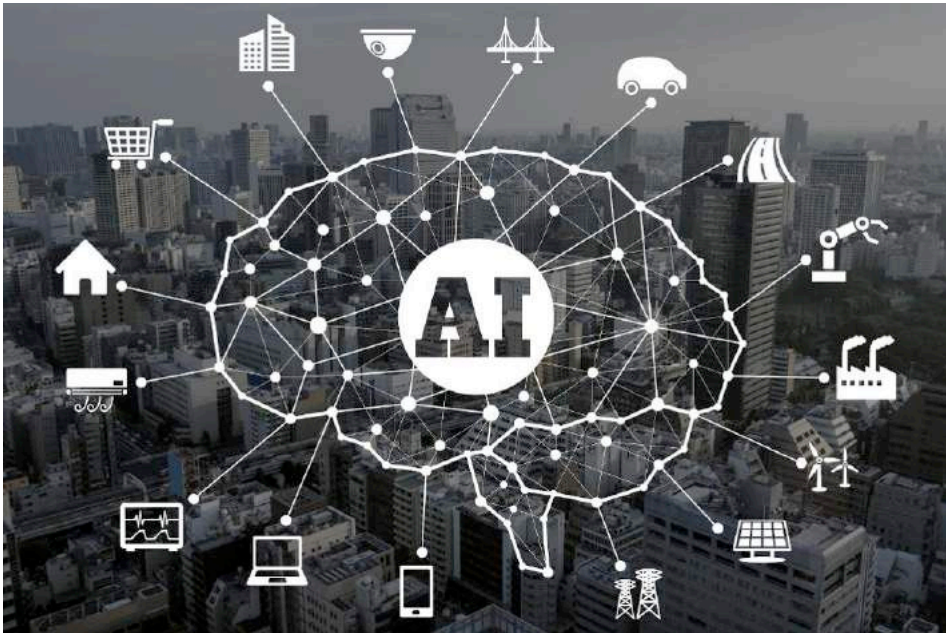
Binary model vs unexplored complexity



Robot vs Human



Artificial vs Real Intelligence



**Data structures and
algorithms for specific
applications ...**

**... vs biocognitive,
creative and knowledge
development capacities**

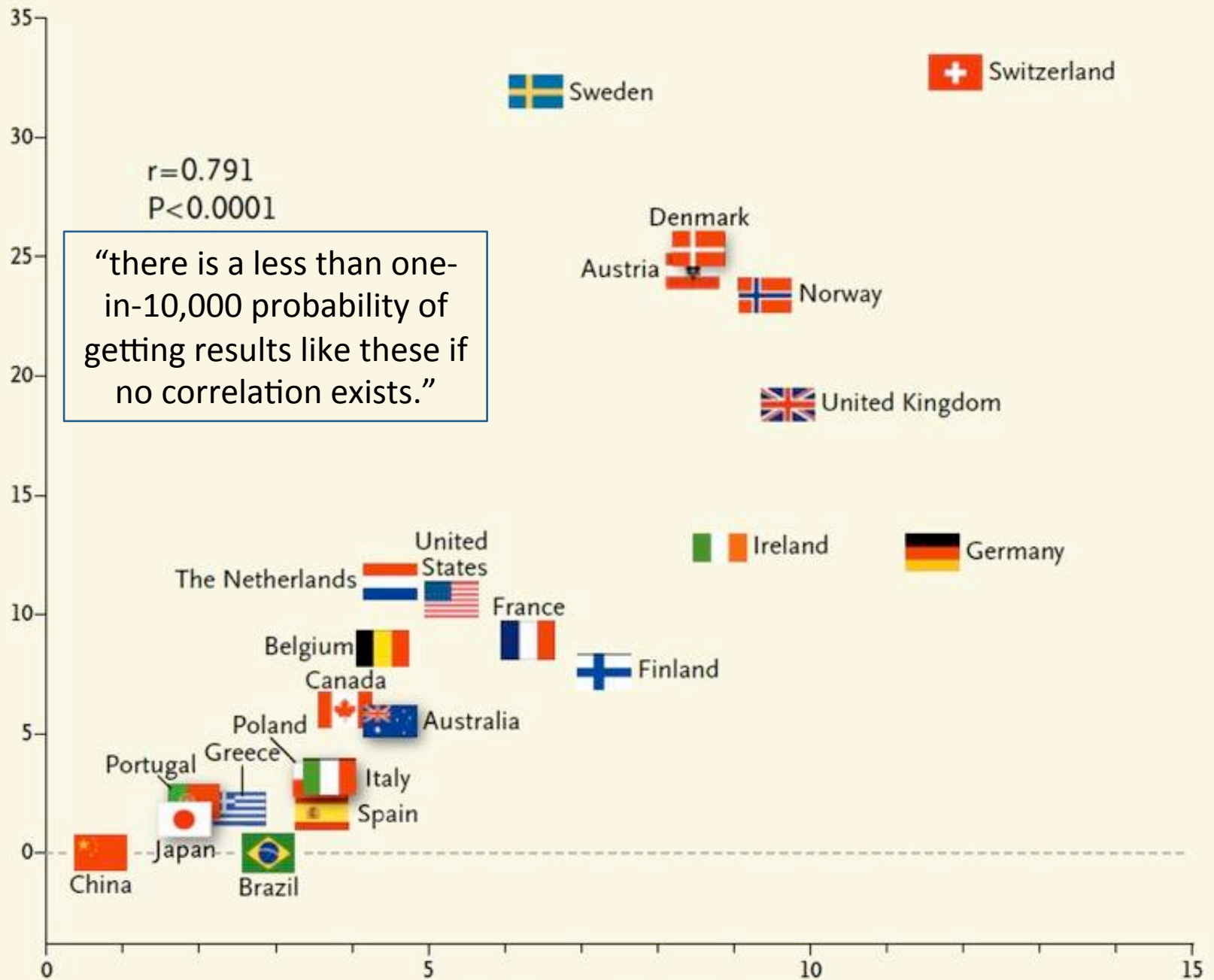


Nobel Laureates per 10 Million Population

$r=0.791$
 $P<0.0001$

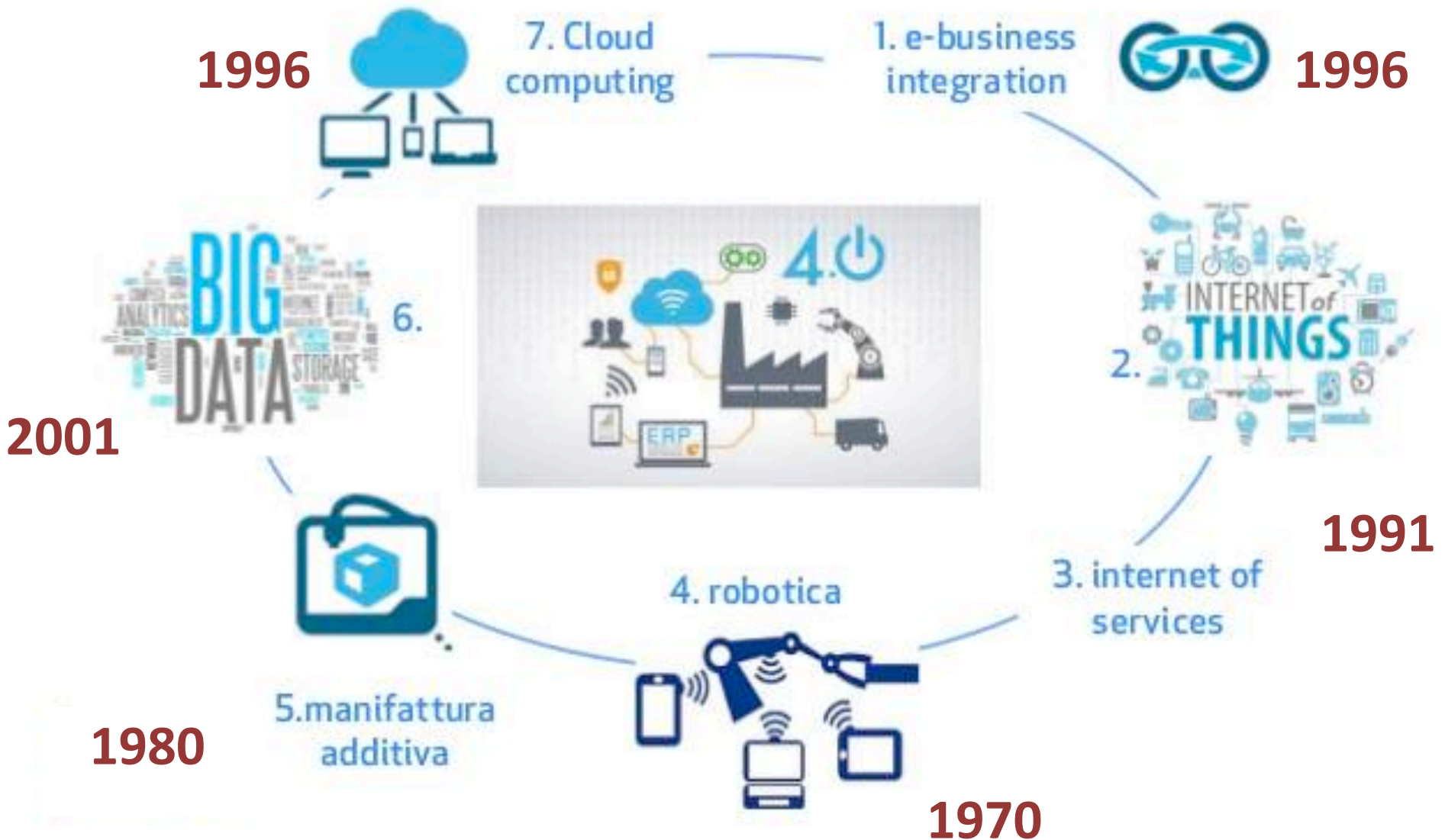
“there is a less than one-in-10,000 probability of getting results like these if no correlation exists.”

Chocolate Consumption (kg/yr/capita)

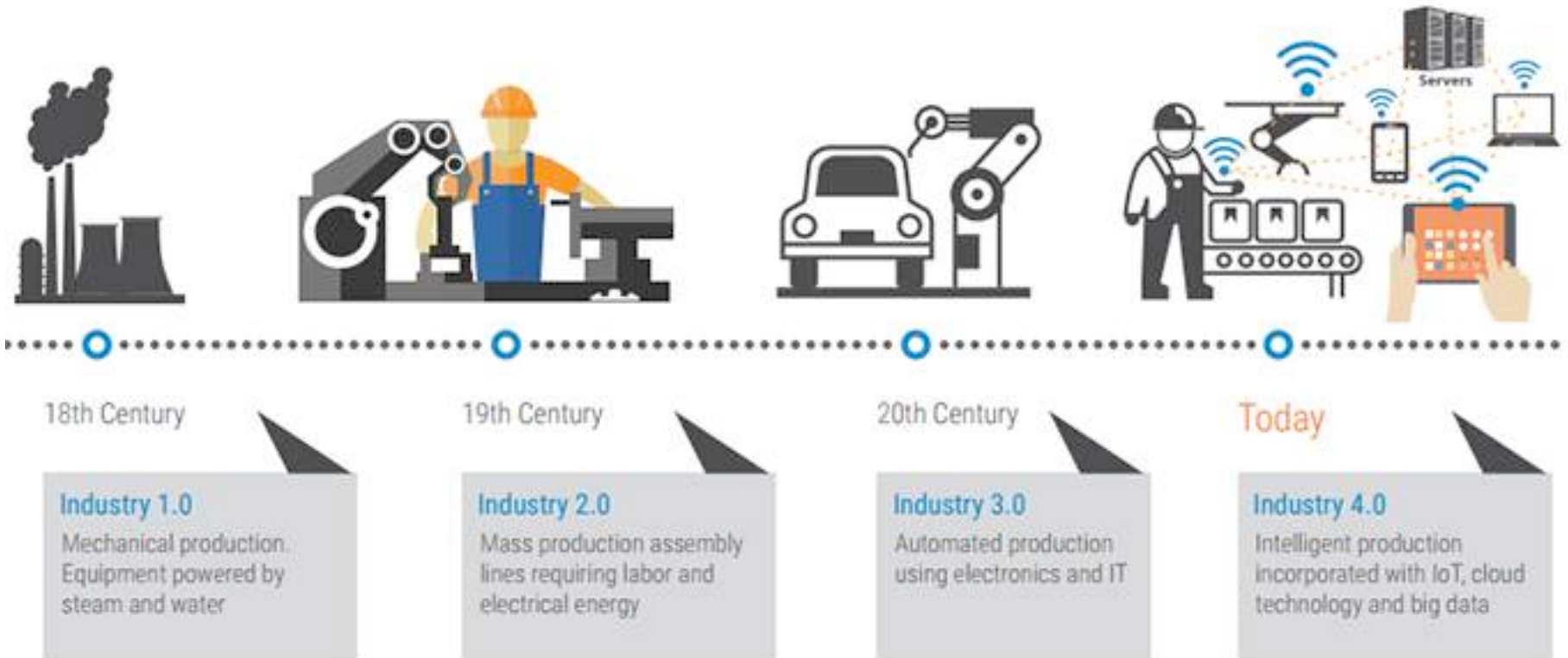


The ongoing digital transformation

The enabling digital technologies



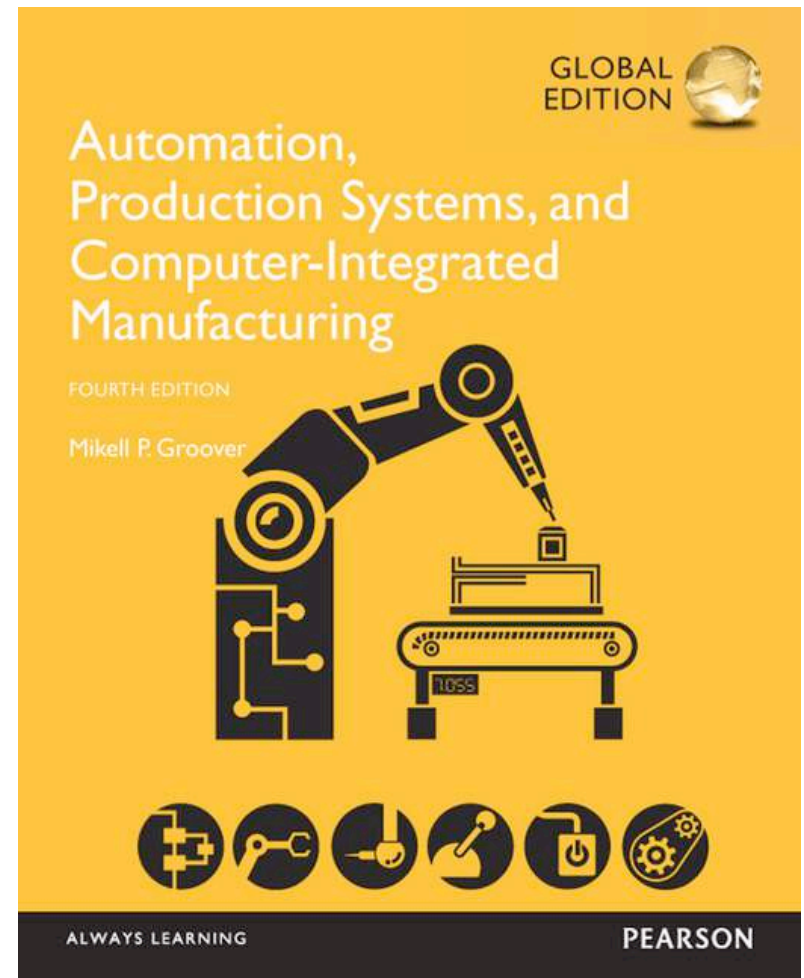
Industry 4.0: the 4th industrial revolution



The CIM Innovation (1970)

“Computer Integrated Manufacturing”

"CIM is the total integration of the enterprise through data and ICT together with new business and human resources organizational and management methods”



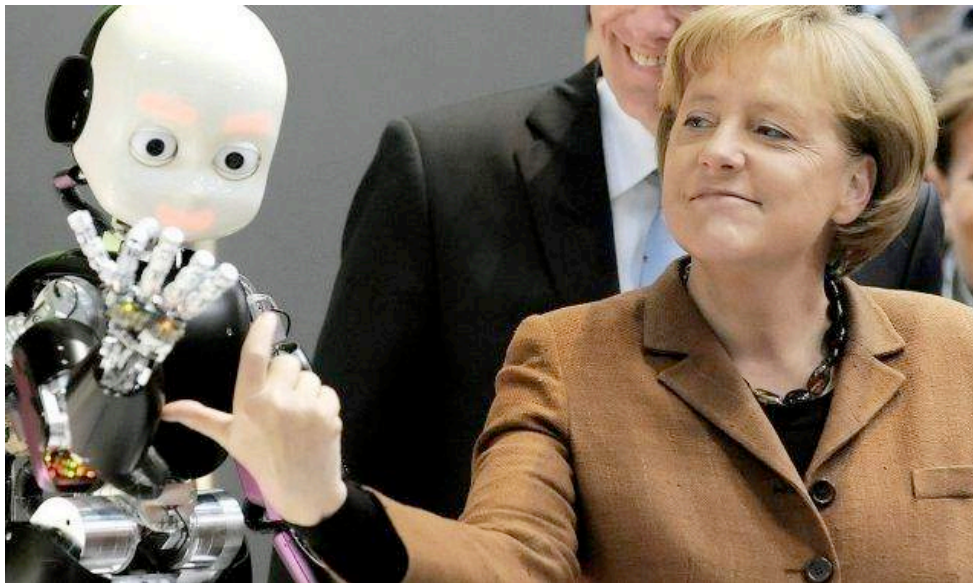
The Industry 4.0 Innovation (2011)

The platform Industry 4.0 has as objective to enforce and maintain *the leadership of Germany in the manufacturing industry.*



Bundesministerium
für Wirtschaft
und Energie

Bundesministerium
für Bildung
und Forschung

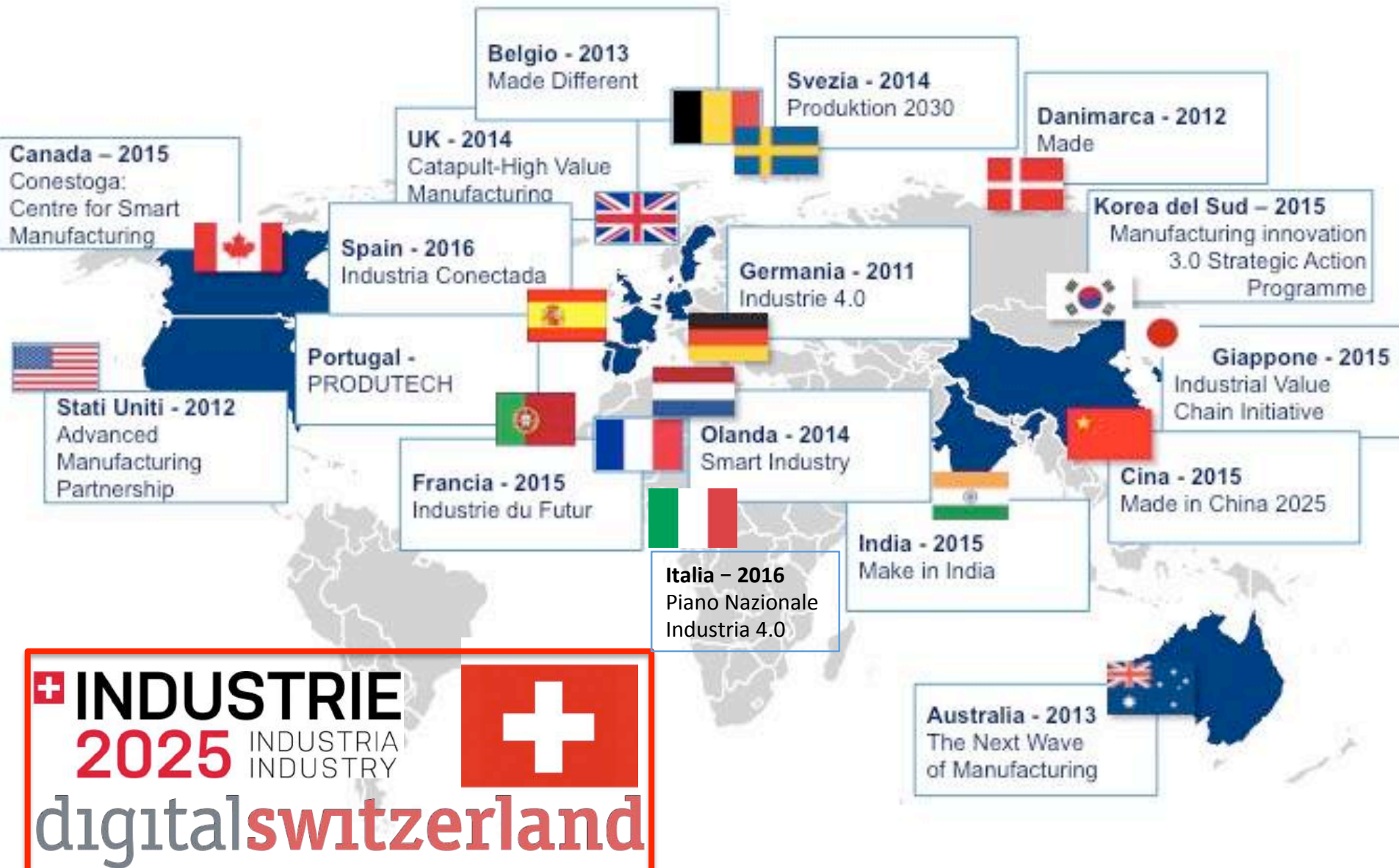


World Economic Forum (2015): Digital Transformation Initiative

“The Digital Transformation Initiative (DTI) - Launched in 2015 - offers unique insights into the impact of digital technologies on business and wider society over the next decade.”



The ongoing national I4.0 programmes



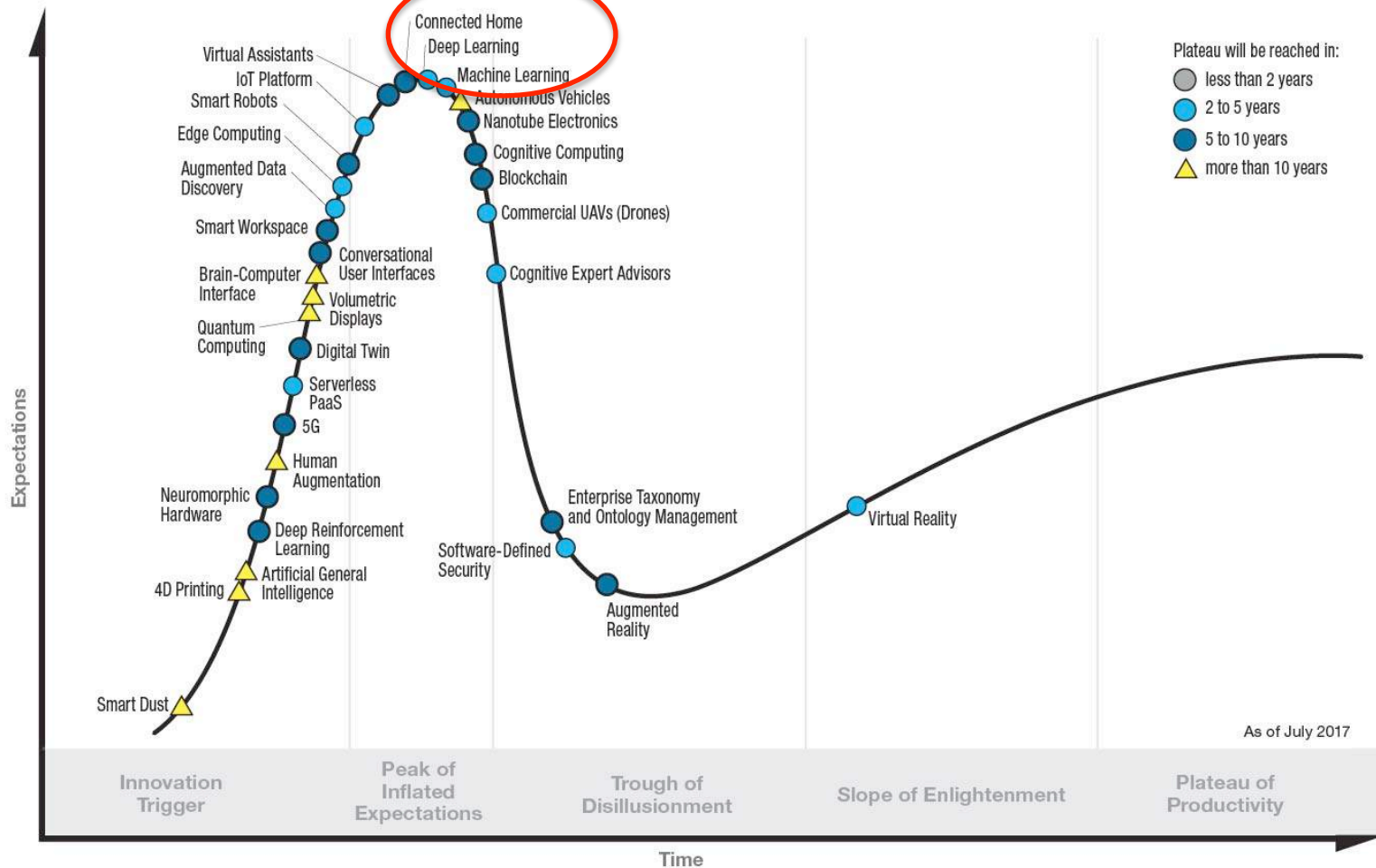
Actual Hype: AI

Gartner Hype Cycle for Emerging Technologies, 2016



Actual Hype: AI

Gartner Hype Cycle for Emerging Technologies, 2017



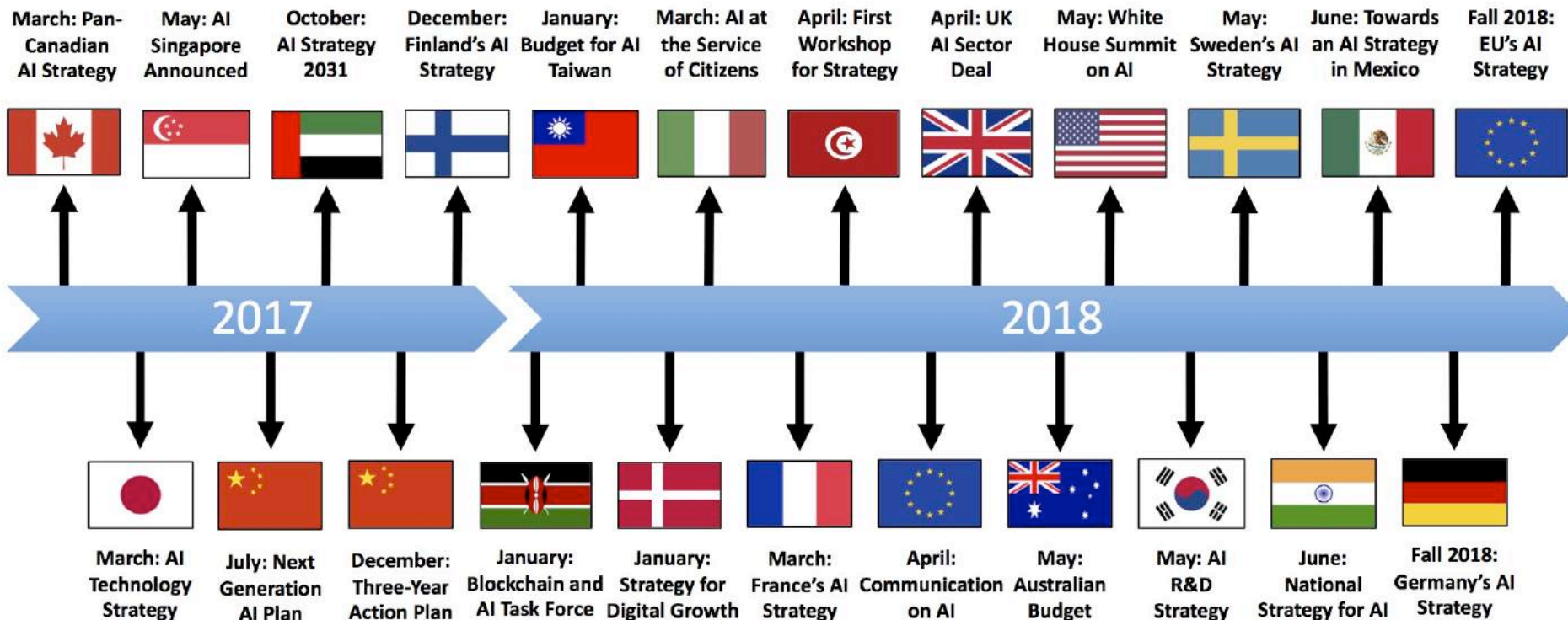
Actual Hype: AI

Hype Cycle for Emerging Technologies, 2018



The new national AI strategies

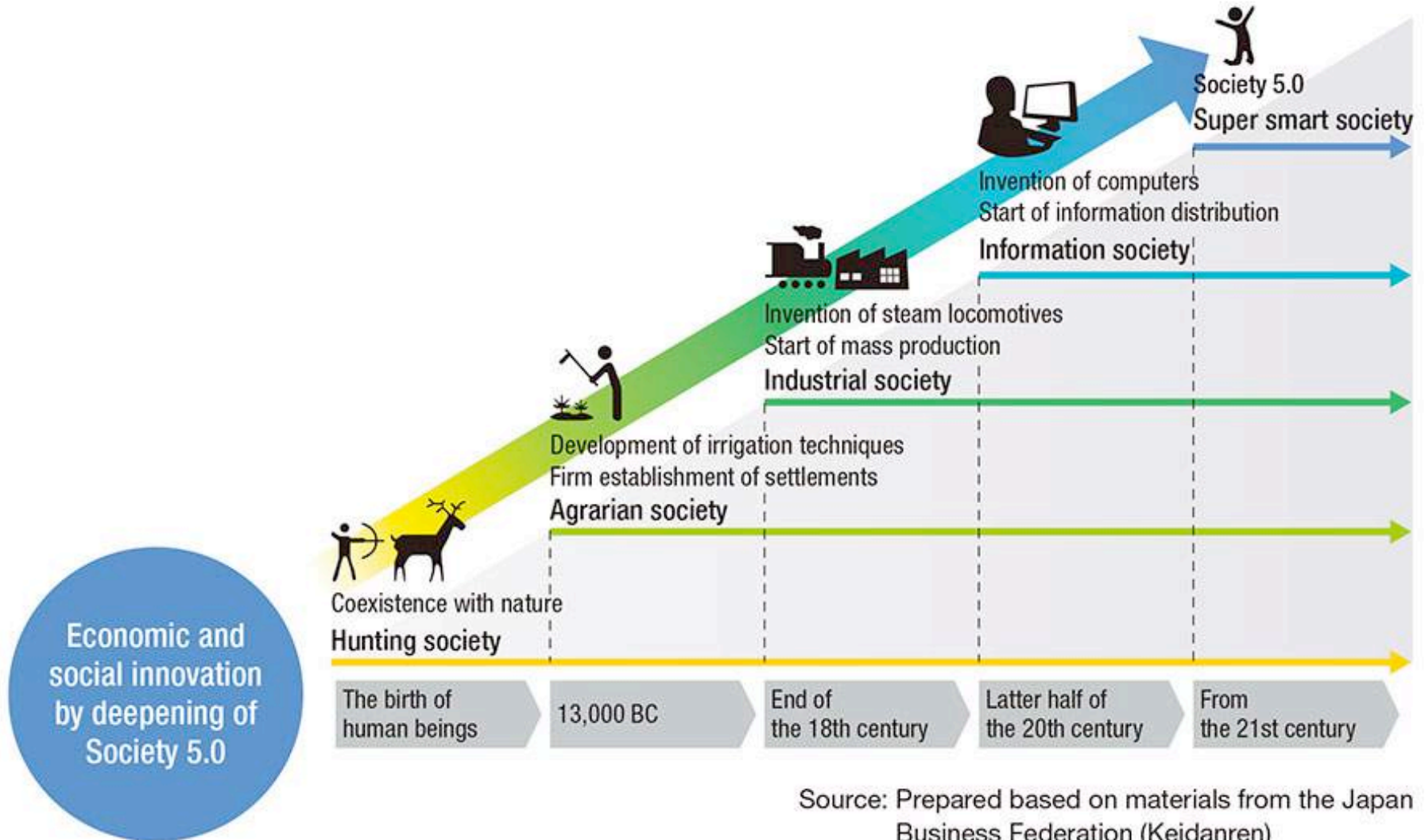
Artificial Intelligence Strategies



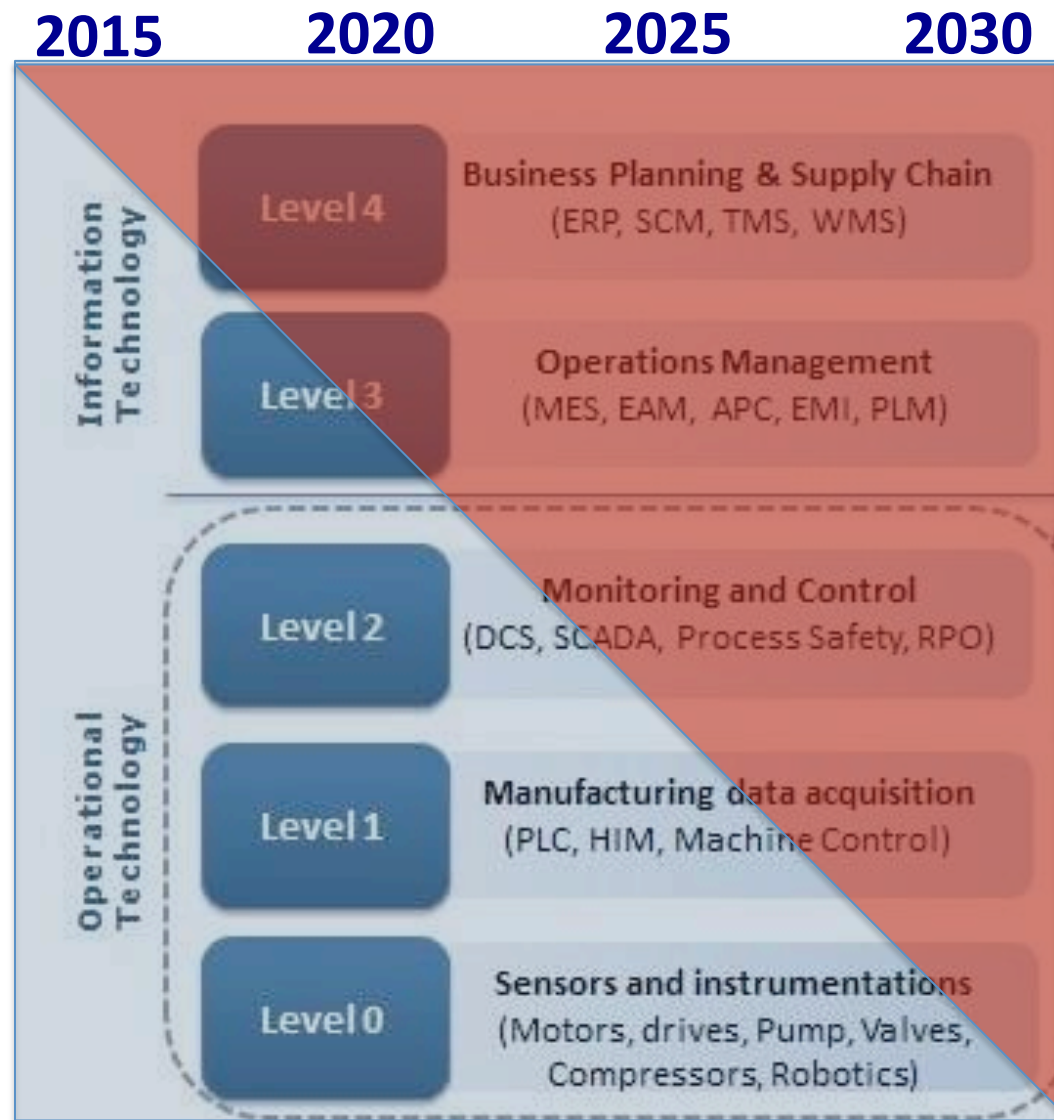
Coming soon ... Society 5.0!



Coming soon ... Society 5.0!



It will be a fast but long transformation

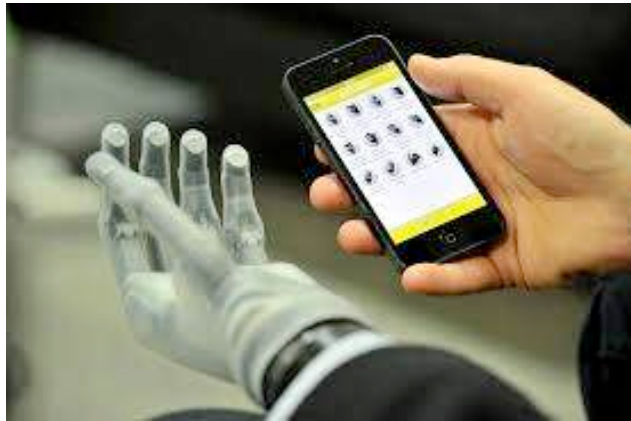


Innovations

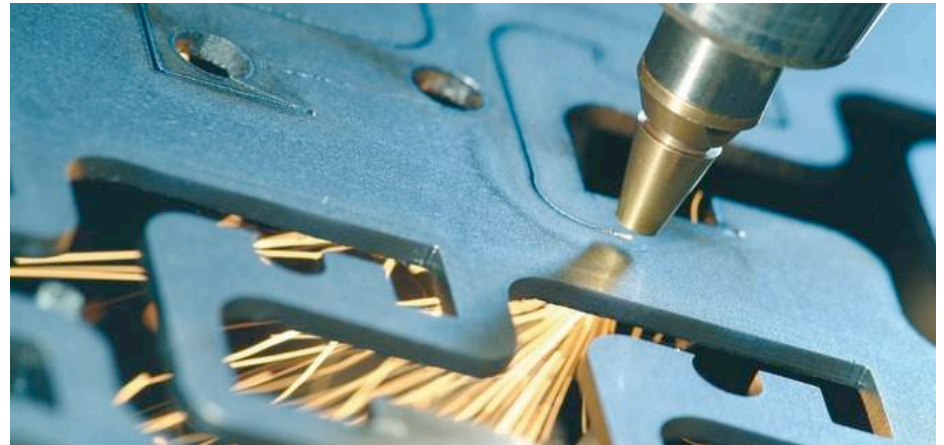
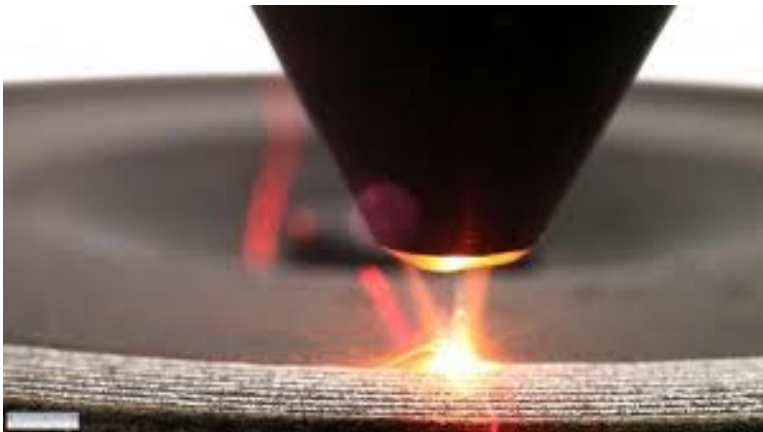
Marketing and sales: consumer interaction



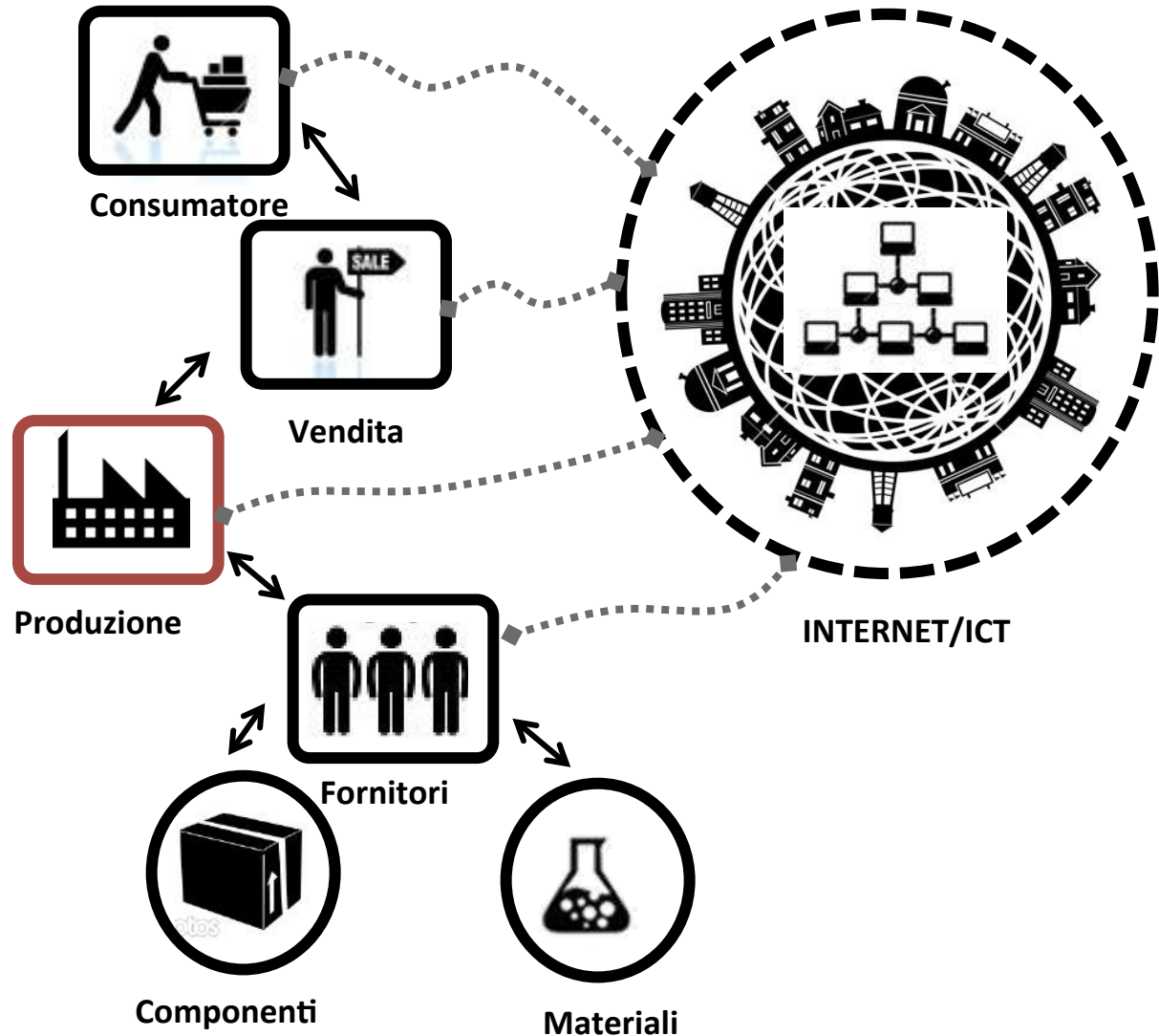
Products and services: customisation



Industrial processes: digital and flexible



Logistics and value chains: on demand



Business models: consumer centric



Standard products



Mass production



Sales in the shop



Personalised products



On demand production



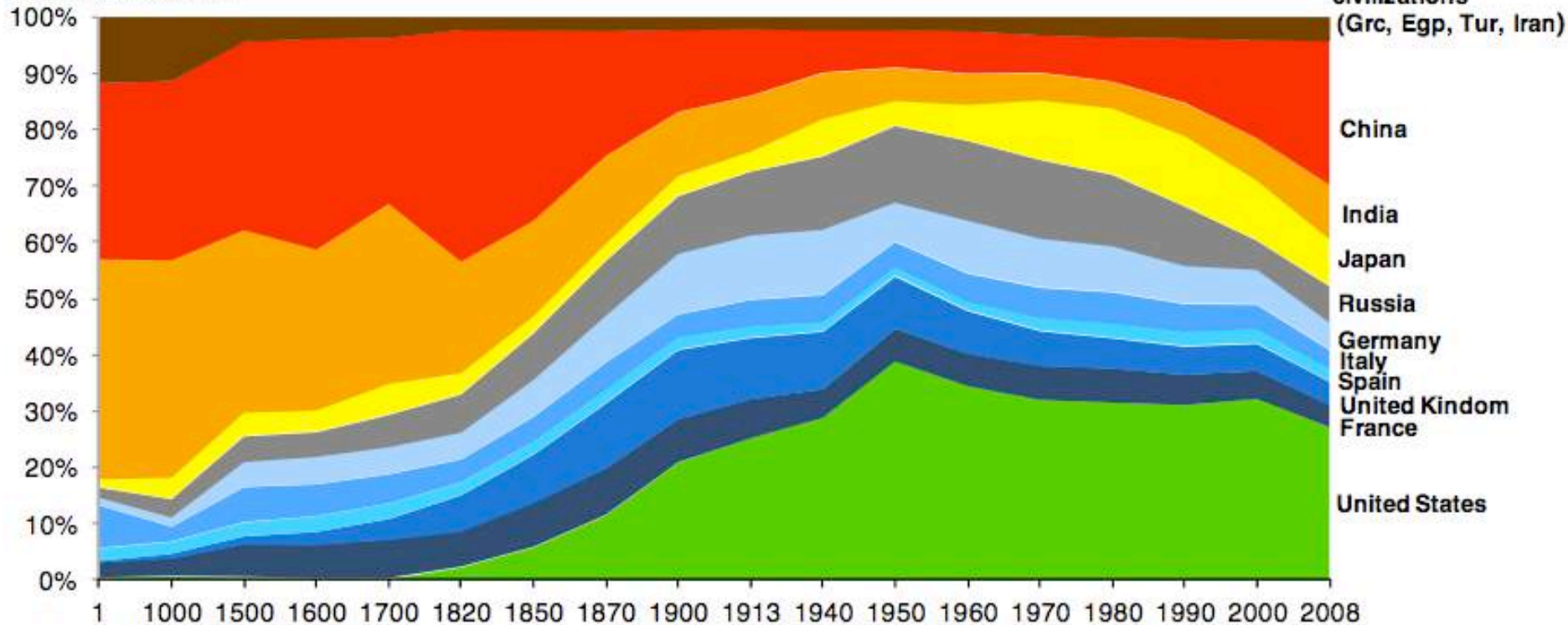
At home delivery

Impacts

Impact on global economy: world GDP redistribution

Economic history of China and other major powers

Share of world GDP



Source: "Statistics on World Population, GDP and Per Capita GDP, 1-2008 AD", Angus Maddison, University of Groningen.

Impact on customers: satisfaction, well being and health



Impact on the environment:

- consumptions and emissions, + sustainability



Manufacturing

+



Transportation

+



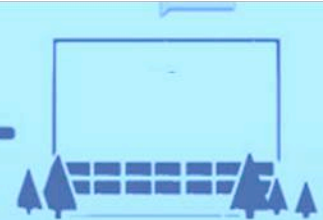
Product Use

+



Recycling

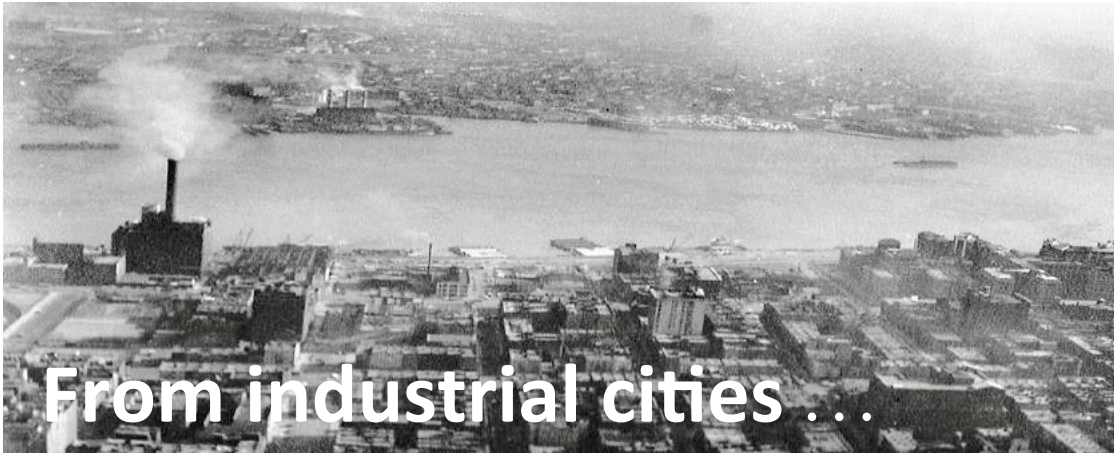
+



Facilities



Towards smart cities and regions?



From industrial cities ...



... to commercial cities ...



... to smart cities?

Impact on industry and value chains: networked production with urban factories



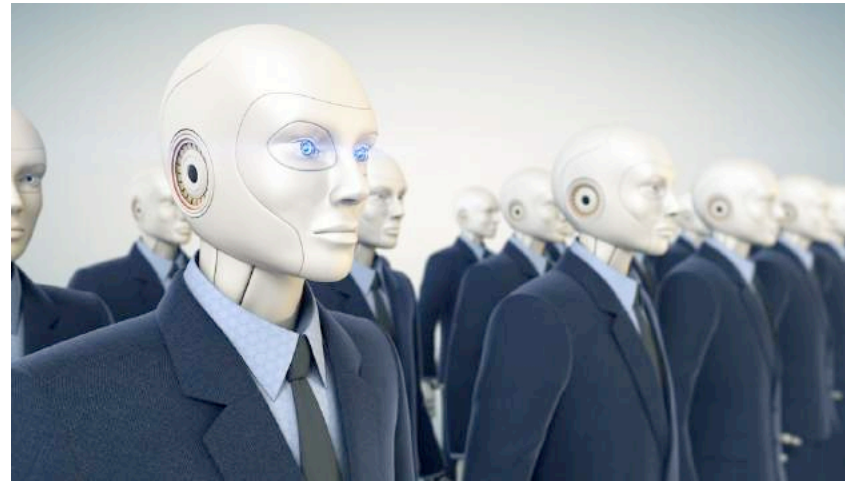
Impact on retail and shops: experience and service providers



Impact on jobs?



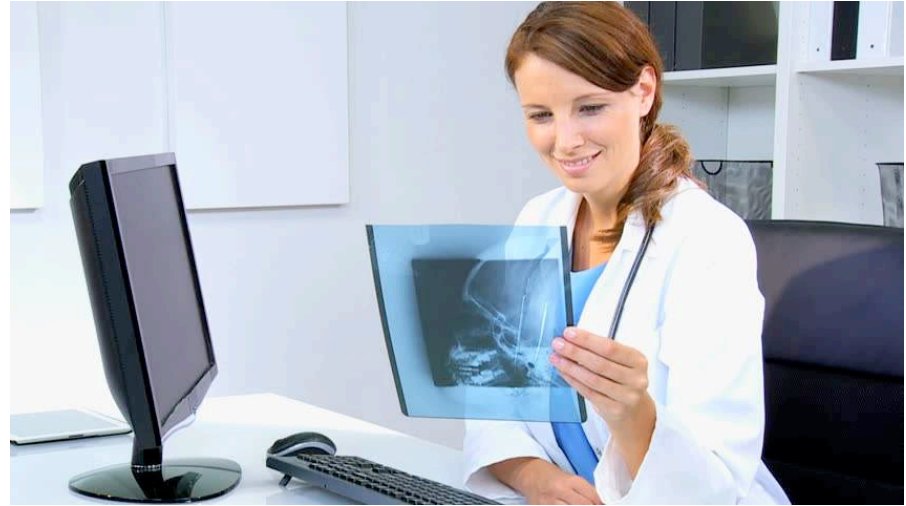
Will machines do everything?



Impact on workers: comfort, safety, health



Impact on workers: reliability, effectiveness, information



Impact on workers: quality of life and diversity



New jobs



**New products and services development:
design, new materials, electronics and IT,
aftersales, end of life**

**Marketing, trading, e-commerce and
customer relationship:
internet, social, IoT**



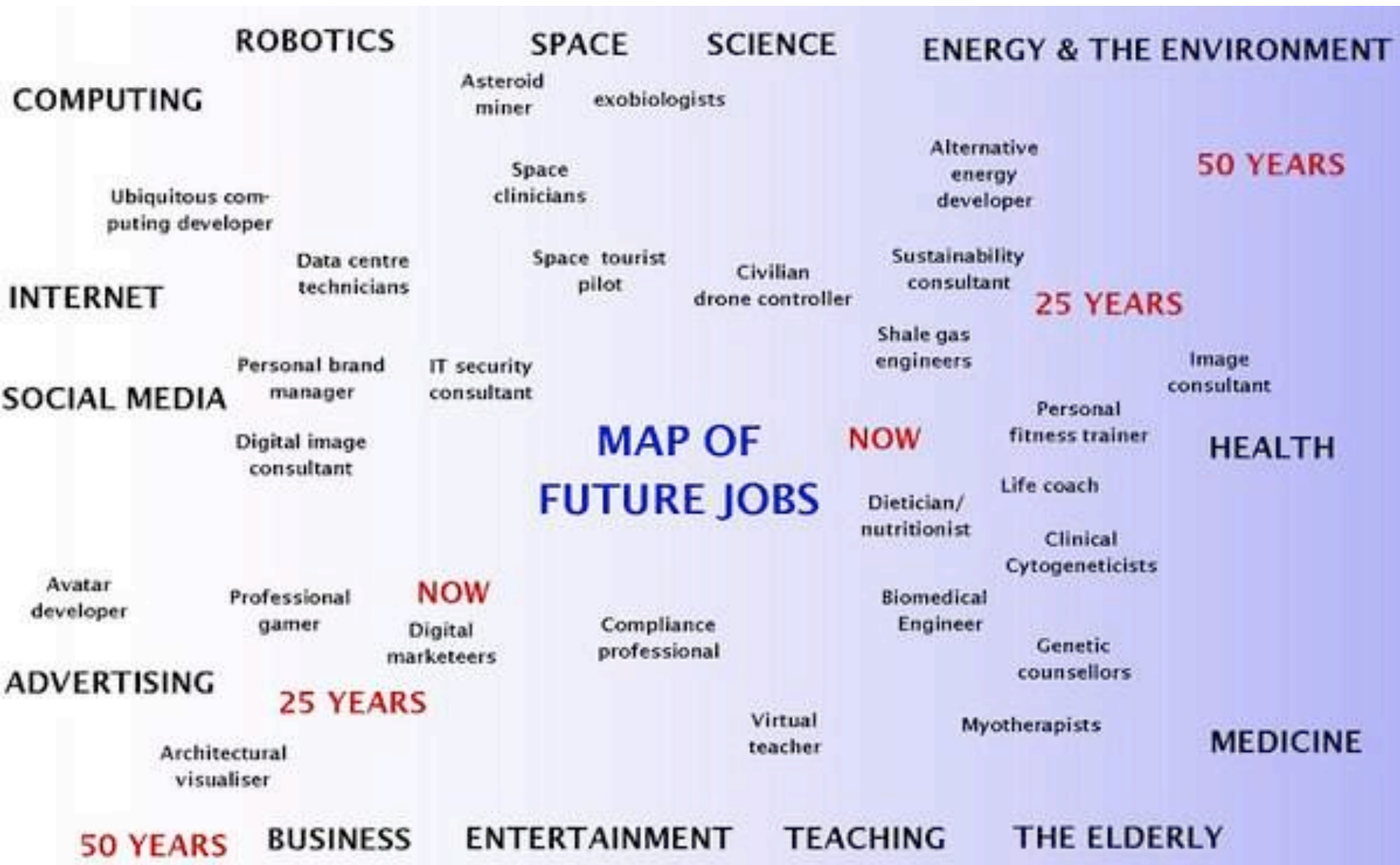
**Machine tools and production systems
development: automation, cloud, robotics, additive**



**Digital platforms and tools for industry: AI, Cloud,
Web, Big Data, Data Mining**



Map of future jobs



New Skills (WEF)

Top 10 skills

in 2020

1. Complex Problem Solving
2. Critical Thinking
3. Creativity
4. People Management
5. Coordinating with Others
6. Emotional Intelligence
7. Judgment and Decision Making
8. Service Orientation
9. Negotiation
10. Cognitive Flexibility

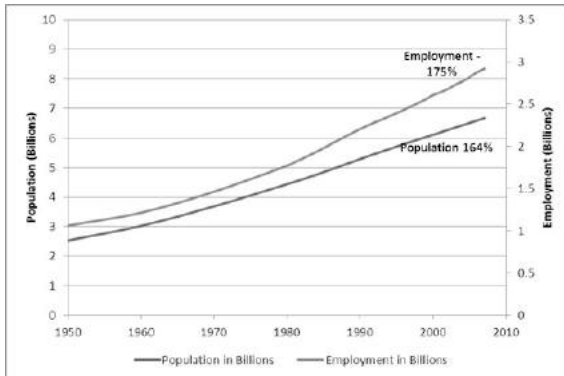
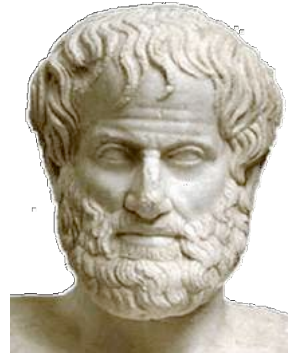
in 2015

1. Complex Problem Solving
2. Coordinating with Others
3. People Management
4. Critical Thinking
5. Negotiation
6. Quality Control
7. Service Orientation
8. Judgment and Decision Making
9. Active Listening
10. Creativity

Impact on Jobs: some notes

“Once the machines will advance enough, there will be no need for human workers any more”

First Book, Politics, Aristotele, 440 a.c.



Technological unemployment (1930):
an historical concern ... still not occurred!

“50% of jobs will be
replaced by automatic
and digital solutions”



“65% of 12-aged teen agers will
have a job still not existing today”

Conclusions

The three dimensions changing the future of work



Workforce

2

Who can do the work?

Technological advancements enabling new models for interaction between companies, employees, and customers



Work

1

What work can be automated?

Increasing automation, cognitive, and AI technologies over the next 10 years

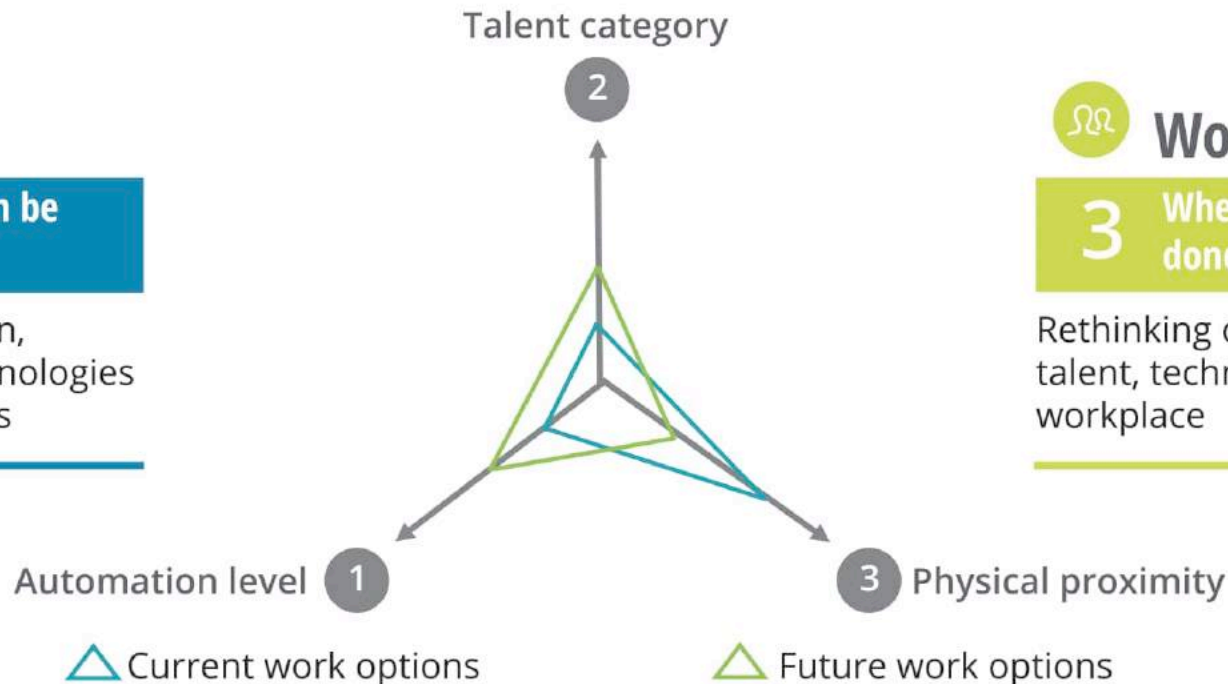


Workplace

3

Where is the work done?

Rethinking combinations of talent, technology, and workplace

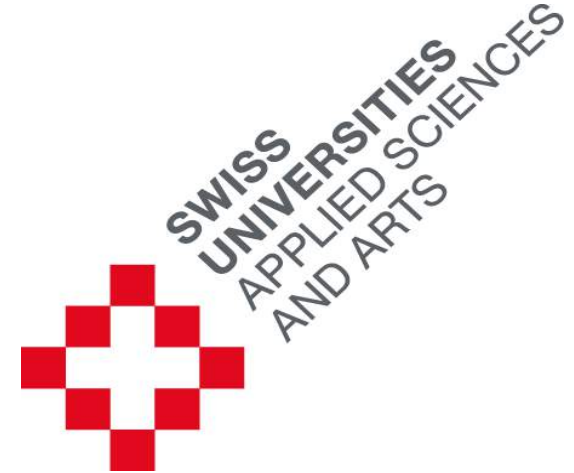


Challenges for regions

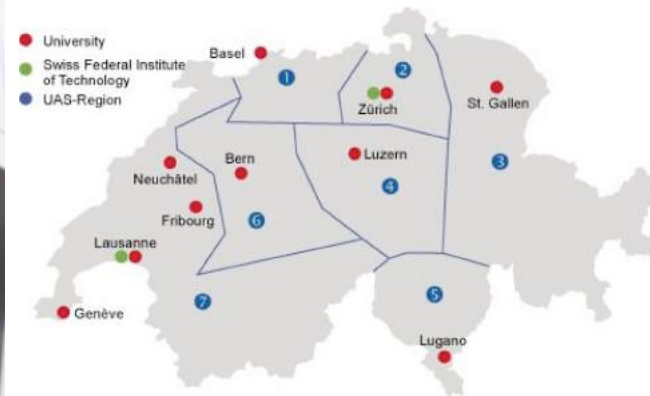
- Create and attract talents
- Launch and connect research and technology centres
- Provide attractive conditions for workers and companies
- Integrate such three ingredients through innovation and entrepreneurship programs involving and networking all related stakeholders
- ... in your strategic sectors and niches!



The crucial role of research & education



Basic education



Continuing education

“Your task is *not to foresee the future, but to enable it!*”

Antoine de Saint-Exupéry (1900-1944)

Thanks for your attention!

Prof. Dr. **Emanuele Carpanzano**

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