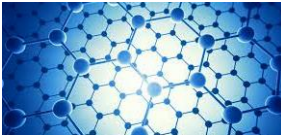




Industry 4.0: The new production paradigm

Kristel Van der Elst, CEO, The Global Foresight Group

12 June 2017



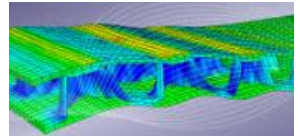
Widespread adoption of ICT in manufacturing

Blurring the lines between human, machine and virtual worlds

Digitisation and networking of existing manufacturing processes



A new production paradigm





Change in production

Cyber physical production systems

- Autonomous production management.
- Resources / products located anywhere
- React rapidly to changes in demand or stock levels
- Customer-specific and produced on-demand.

New skills required

Wearable technology - **monitor** productivity and efficiency of workers



Change in supply chains

Vertical and horizontal integration of supply chains from inbound logistics through warehousing, production, marketing and sales to outbound logistics and downstream services.



Change in information

Vast amounts of data will be collected and transmitted
This data will include valuable **information about consumers**, their preferences and the products they buy



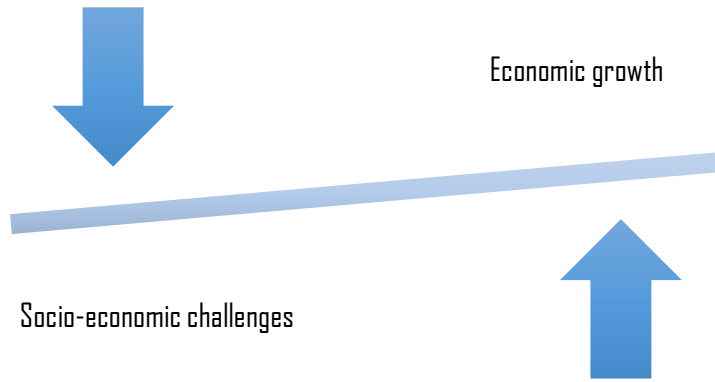
Change in context

Connect with **other 'smart' industries**, e.g., autonomous vehicles, smart grids

Based on critical assumptions

- **Technologies** need to be sufficiently **mature, economically viable and socially acceptable**
- **Sufficient levels of investment** required in new technology, R&D activities, infrastructure and education
- **Skilled, educated workers** are needed to design, operate and manage production systems
- **Businesses** need to be able to access **reliable digital communication systems** and network infrastructure
- **Standards** need to ensure that the exchange of data between machines and systems can take place across national borders and platforms
- **Ownership and access** to consumer and industrial **data** needs to be regulated
- **Intellectual property** needs to be protectable across national borders
- Many also assume that the **system-wide replacement of workers** by autonomous robots is inevitable

Industry 4.0, in need for policy



10 Policy areas to consider



10 Policy areas to consider

Competitive markets

How can policy foster a competitive environment for businesses looking to leverage the large economic growth opportunity that industry 4.0 represents?



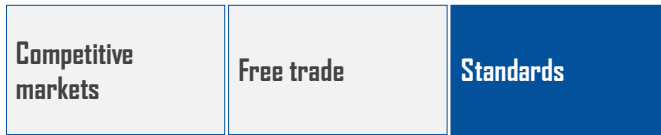
10 Policy areas to consider

Competitive markets **Free trade**

What changes to the trade framework are needed to accommodate trade in industry 4.0 products and services?



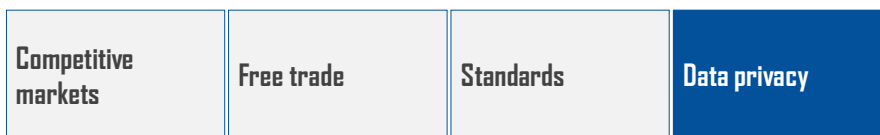
10 Policy areas to consider



Which international standard communication protocols, data formats and interfaces are required to guarantee a competitive industry and internal market, as well as inclusion in the global industry 4.0 economy?



10 Policy areas to consider



What rules on data privacy, ownership, access and usage need to be defined to stimulate industry 4.0 growth and trust among actors?



10 Policy areas to consider

Competitive markets	Free trade	Standards	Data privacy	Intellectual property
---------------------	------------	-----------	--------------	------------------------------

Are current intellectual property protection frameworks suited for the new types of products and services that might emerge?

Are all actors that will contribute appropriately and efficiently protected?



10 Policy areas to consider

Competitive markets	Free trade	Standards	Data privacy	Intellectual property
---------------------	------------	-----------	--------------	-----------------------

Sustainability

What policies are needed to capitalise on industry 4.0 to develop a more sustainable and circular economy?



10 Policy areas to consider

Competitive markets	Free trade	Standards	Data privacy	Intellectual property
Sustainability	Inclusive economic growth			

How do we ensure there is the right level of investment in education and (re-)training in the skills required for industry 4.0 to insure there is equality of opportunity for citizens to participate in the industry 4.0 economy?

Where might the social contract fail?



10 Policy areas to consider

Competitive markets	Free trade	Standards	Data privacy	Intellectual property
Sustainability	Inclusive economic growth	Country level competition – single market		

What fiscal and social security policy needs to be developed at EU level to avoid inter-nation competition/protectionism?



10 Policy areas to consider

Competitive markets	Free trade	Standards	Data privacy	Intellectual property
Sustainability	Inclusive economic growth	Country level competition – single market	Digital divide between countries	

What is needed to encourage the deployment of the minimal level of digital infrastructure across Europe to provide a level playing field and inclusion of all European nations?



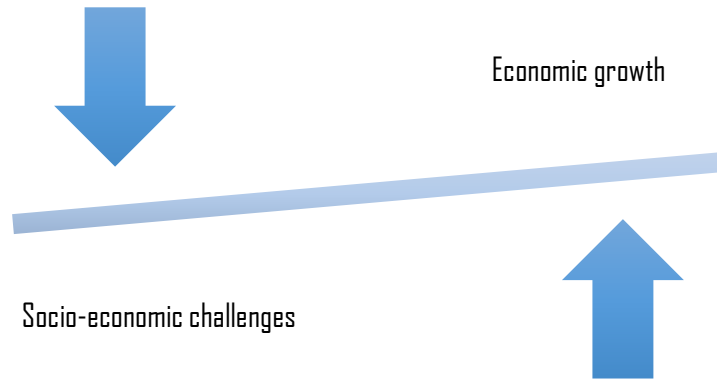
10 Policy areas to consider

Competitive markets	Free trade	Standards	Data privacy	Intellectual property
Sustainability	Inclusive economic growth	Country level competition – single market	Digital divide between countries	Critical / strategic infrastructure

What is needed to safeguard the industry 4.0 infrastructure from attacks and who is responsible?



Are we ready?



Thank you!

The Global Foresight Group

Boulevard de la Tour 6

1205 Geneva, Switzerland

+41 79 423 08 61

info@theglobalforesightgroup.com

www.theglobalforesightgroup.com

Twitter: [@GForesightG](https://twitter.com/GForesightG)

LinkedIn: [/the-global-foresight-group](https://www.linkedin.com/company/the-global-foresight-group)

Facebook: [/GlobalForesightGroup](https://www.facebook.com/GlobalForesightGroup)



Industry 4.0 technologies

- **Artificial intelligence and collaborative robotics:** Autonomous robots will be able to perform more complex tasks, make sense of complex data, make decisions and interact with one another, as well as with humans, in the factory.
- **Additive manufacturing:** Better known as 3D printing, additive manufacturing creates objects by adding rather than subtracting layers. This method will be widely used to produce customized products with complex and lightweight designs.
- **Nanotechnology:** Nanotechnology creates physical objects by manipulating individual atoms and molecules. It will profoundly change how products are manufactured, particularly in the fields of metals, engineering and electronics.
- **Biotechnology:** Biological processes will increasingly be used for industrial purposes, with examples including engineered leather and sustainably produced fuel and chemicals.
- **Cloud computing:** Deploying machine data to a network of remote servers hosted on the Internet, and sharing it across sites and company boundaries, will continue to enhance productivity and supply chain management.



Industry 4.0 technologies

- **Sensor technology:** Sensors connected to technology networks will be integrated into machines and products to collect a vast amount of data. These data streams will allow companies to prevent faults, monitor their supply chains and to provide new services to customers.
- **Big data analytics:** The collection and analysis of large data sets from machines, production systems, suppliers, products and customers will support real-time decision-making, improve understanding of customer preferences and make supply chain management more efficient.
- **Simulation:** By using real-time data to create a virtual model mirroring the physical factory, simulations will enable the optimisation of plant operations and machine settings before physical production.
- **Augmented reality:** Augmented reality technology will provide real-time information to manufacturing workers that can be visualised (e.g. repair instructions). This will improve decision-making and work procedures in the factory.
- **Network and communication technology (Industrial Internet of Things):** Electronic systems that enable communication between individuals, groups and machines through Internet-based wireless technologies. Machines, systems and workers will be connected through digital networks and communicate with each other by exchanging digital information.

