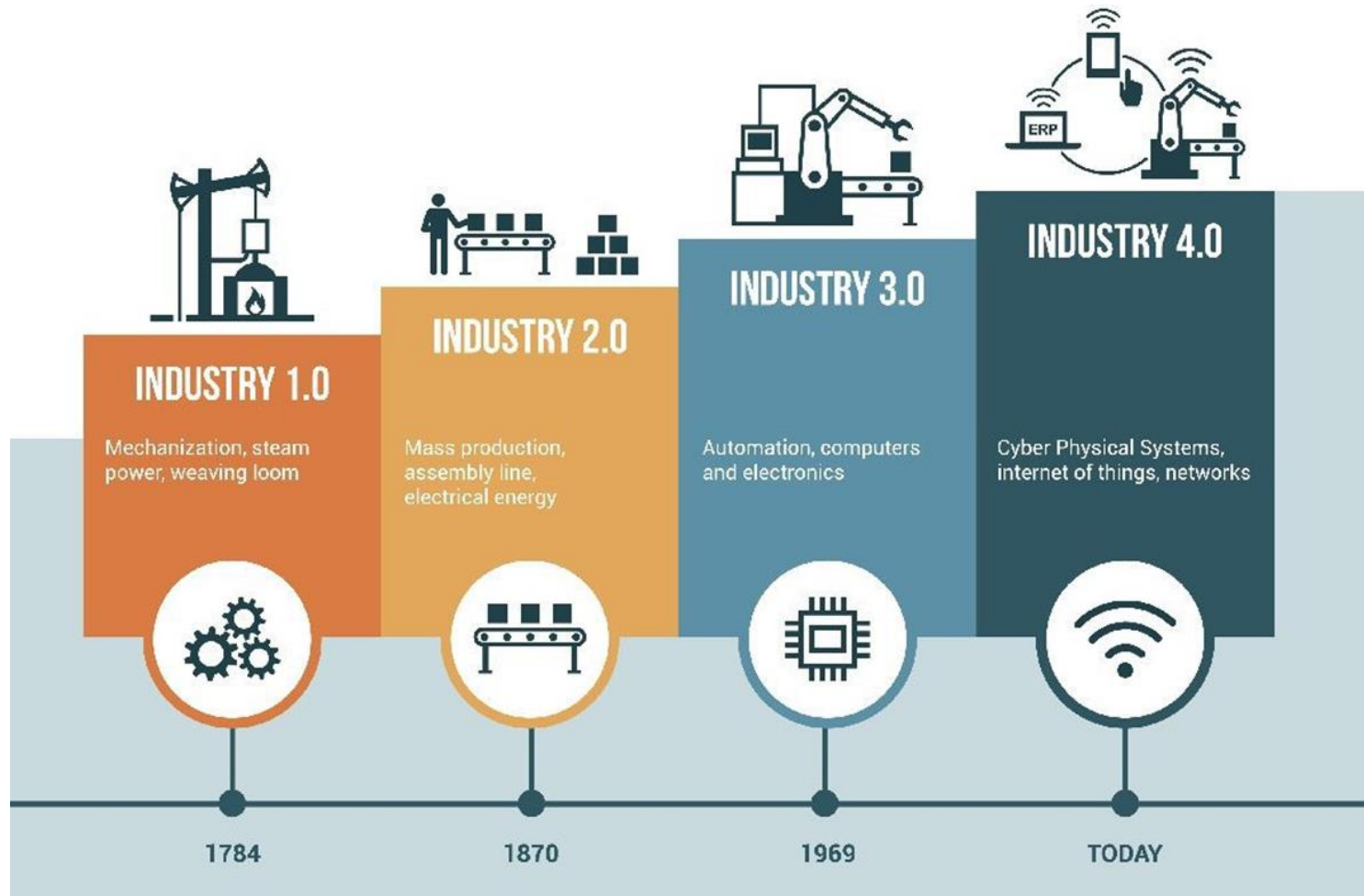




THE FUTURE OF WORK AND INDUSTRY 4.0 IN THE FACE OF MULTIPLE DRIVERS OF CHANGE

MAY 2022

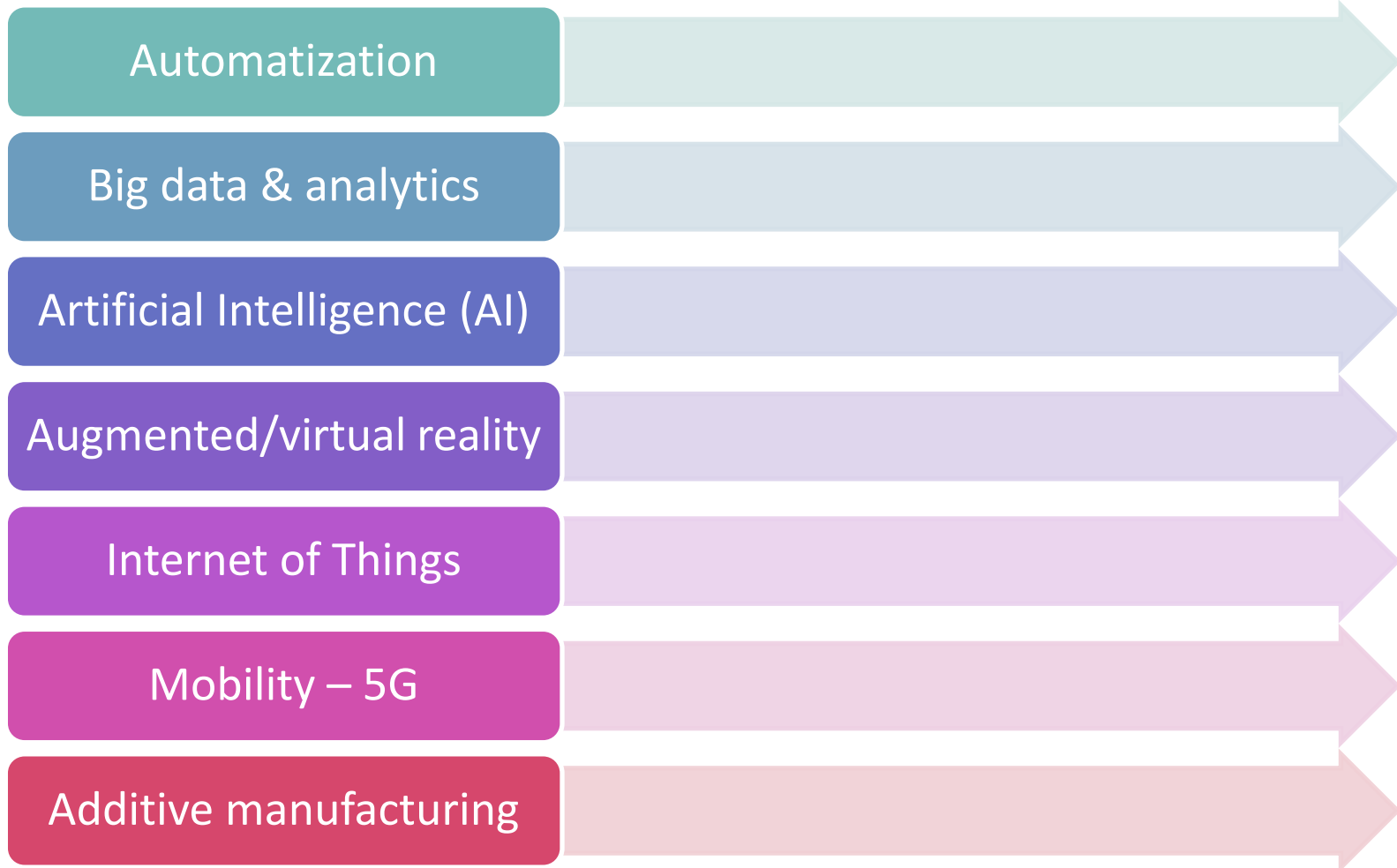
FROM STEAM POWER TO INDUSTRY 4.0: MORE THAN 2 CENTURIES OF CONTINUOUS CHANGES



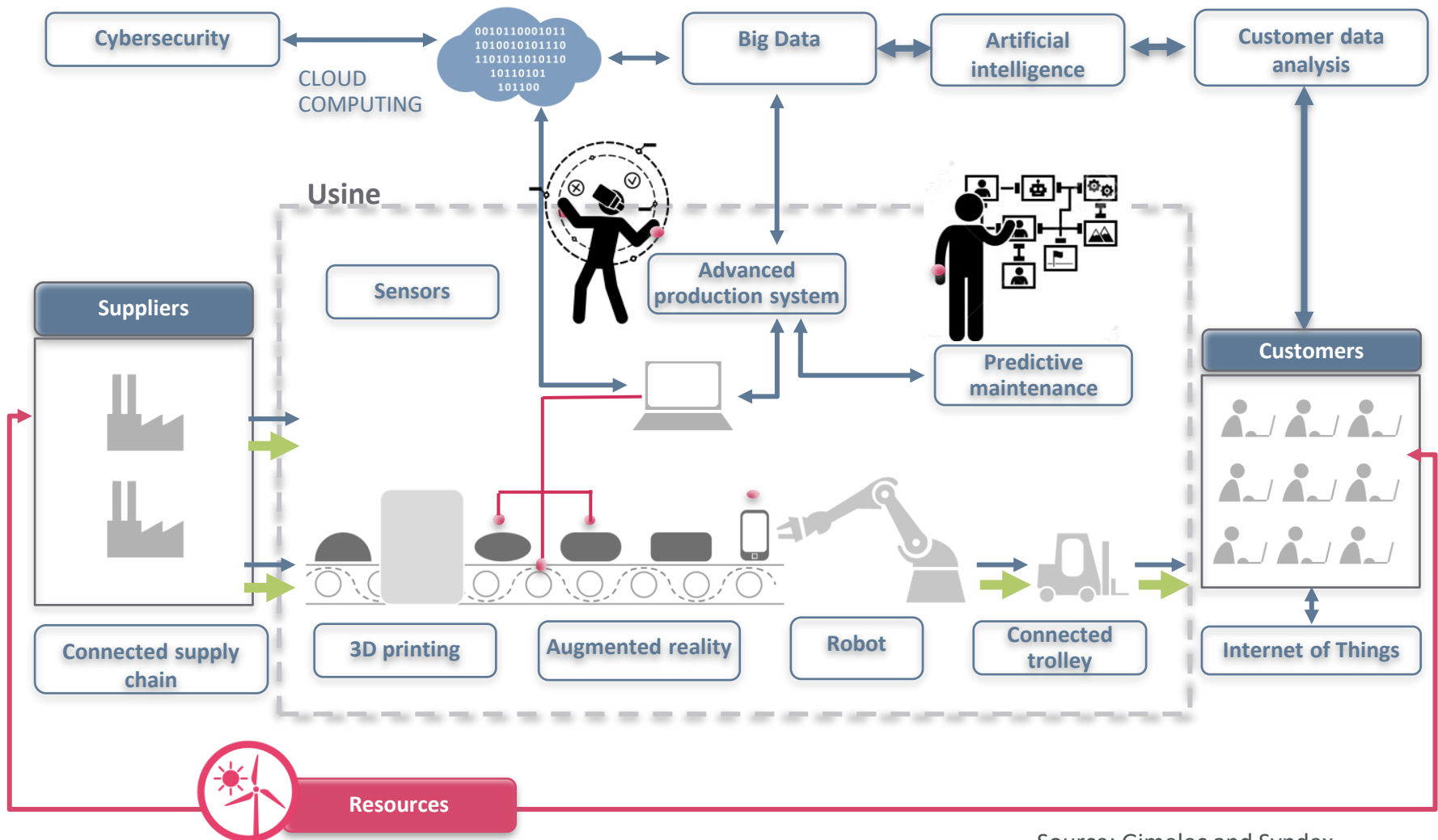
Source: Source: Lee J., Bagheri B. & Kao H.A. (2015)



MAJOR TECHNOLOGICAL TRENDS ALLOW THE SET UP OF INDUSTRY 4.0 AND THE SMART FACTORY



THE SMART FACTORY IS GRADUALLY TRANSFORMING THE INDUSTRY



Source: Gimelec and Syndex



#1

INDUSTRY 4.0 AND INDUSTRIAL POLICY

More and more countries all over the world have launched initiatives to favour the development of industry 4

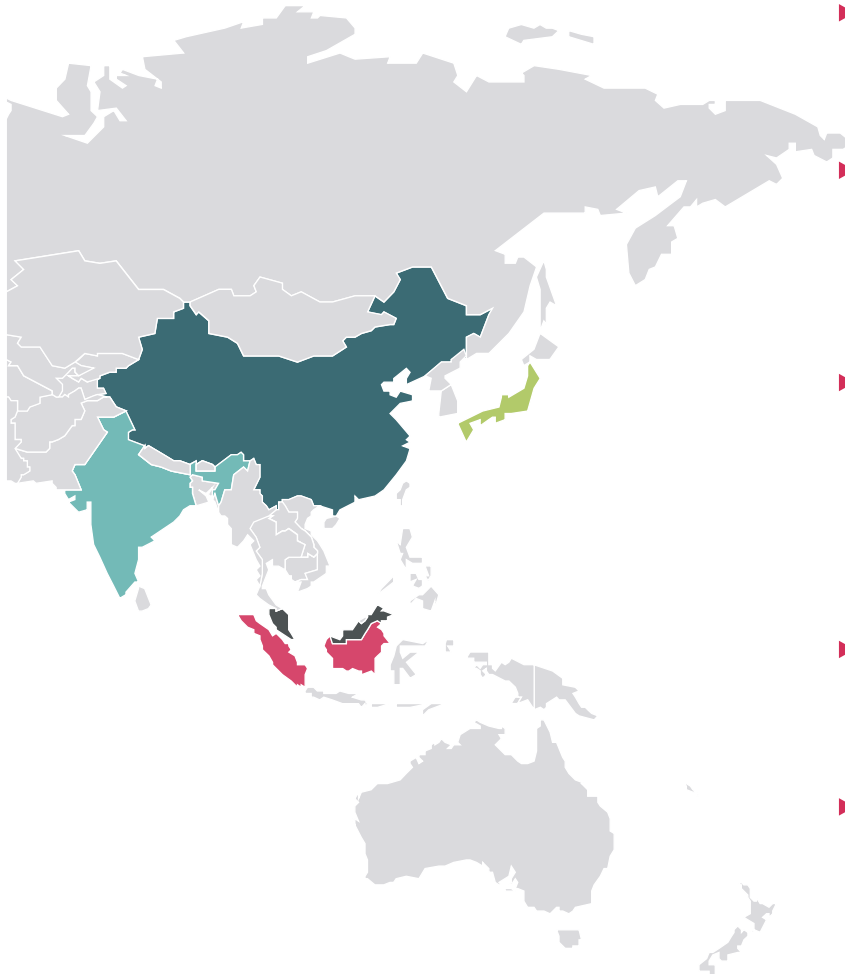


4 TYPES OF PUBLIC POLICY TO ENGAGE IN INDUSTRY 4.0

- ▶ UNIDO's industrial Development report defines 4 broad types of strategy developed by countries with regard to the 4th industrial revolution:
- ▶ **Managing the market (Most of the European Union, the USA, some ASEAN countries...):** Articulate a “Digital Single Market” strategy (as the EU intends to do) and set a framework of rules within which technological change takes place while trying to ensure stability and a certain level of fairness for all.
- ▶ **Taking control (China, in part Germany and the Republic of Korea...):** Take ownership of new technologies and use them for national advantage, whether for economic and domestic political purposes or for more assertive ends.
- ▶ **Open for Business (Singapore, most of ASEAN, some EU countries, in part the Republic of Korea, Ireland, the UK, Japan, Australia...):** Governments, particularly (but not only) smaller ones, may not be able to control 4IR, but can choose to instead surf the wave, doing all they can to attract inward investment through attractive tax regimes, light-touch regulations, investment in infrastructure (such as 5G) and openness to trade with other parts of the world.
- ▶ **Hands-off (none):** Governments radically downsizing by devolving more functions to regional and local levels, retaining only a few key functions, including defence and security, and foreign and trade relations.
- ▶ **Most of countries with a national strategy, or a dedicated 4IR industrial policy combine a mix of some - if not all of - the first three strategies.**

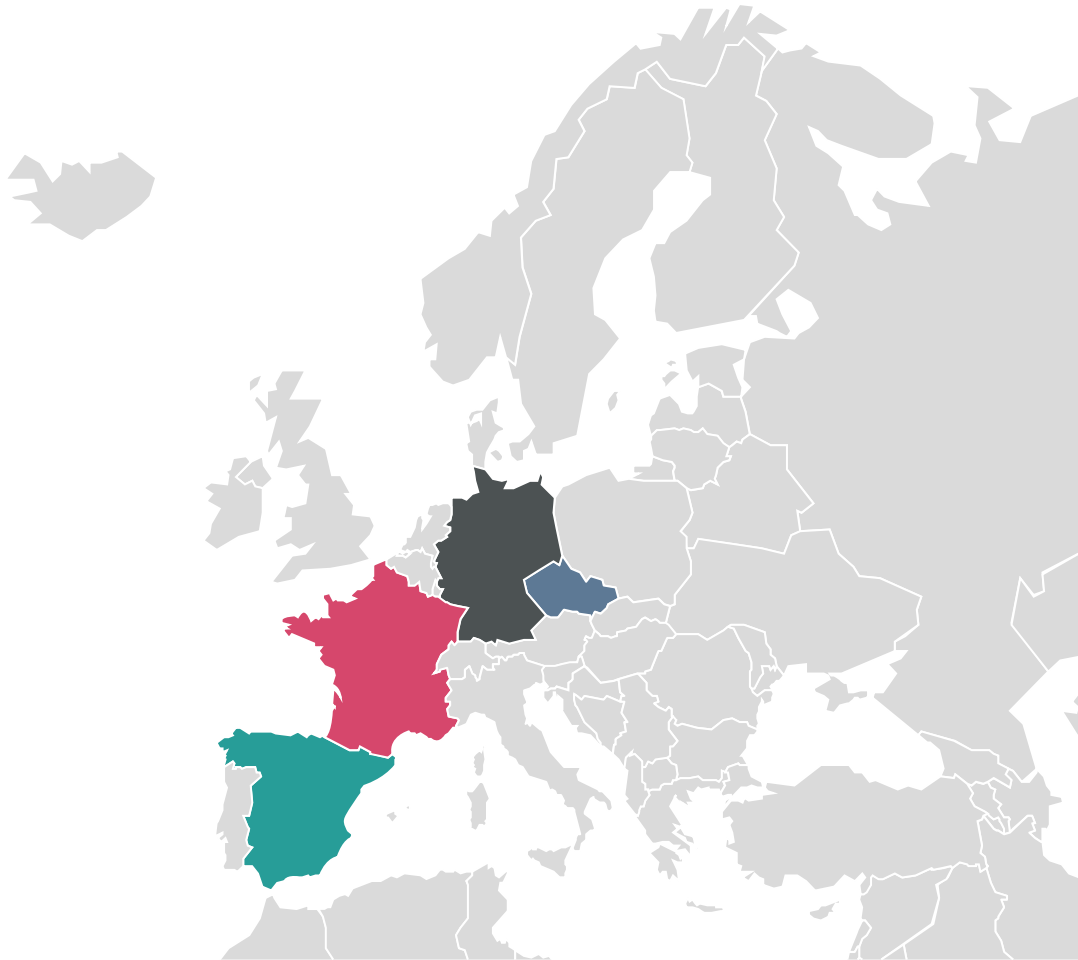


PUBLIC SUPPORT FOR INDUSTRY 4.0 IS WIDESPREAD IN ASIA



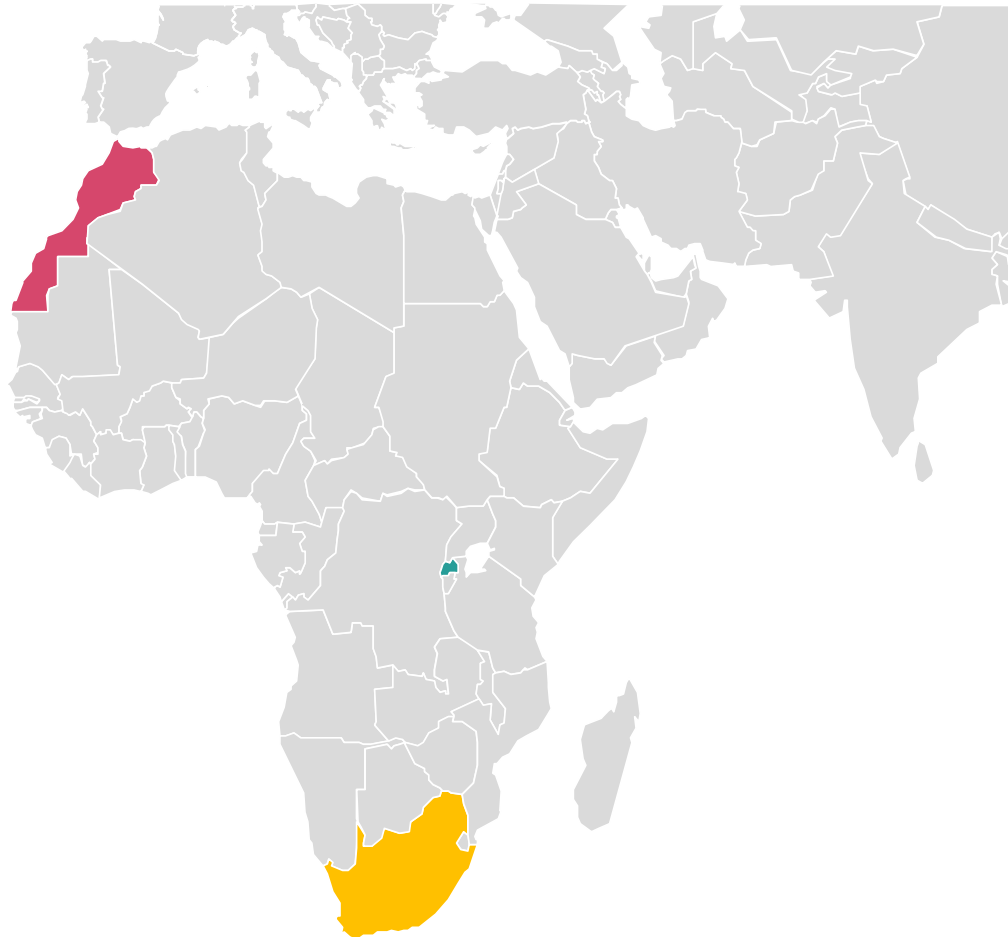
- ▶ Made in **China** promotes key technological breakthrough
- ▶ Society 5.0 in **Japan** focuses on industrial sector (robotics, mechanics...).
- ▶ In **India** National policy for Advanced Manufacturing goes together with National Strategy for Additive Manufacturing.
- ▶ Making **Indonesia** 4.0 aims to target 5 key sectors.
- ▶ National 4IR Policy in **Malaysia** aims to increase country's readiness.

MANY GOVERNMENTS SUPPORT INDUSTRY 4.0 IN EUROPE



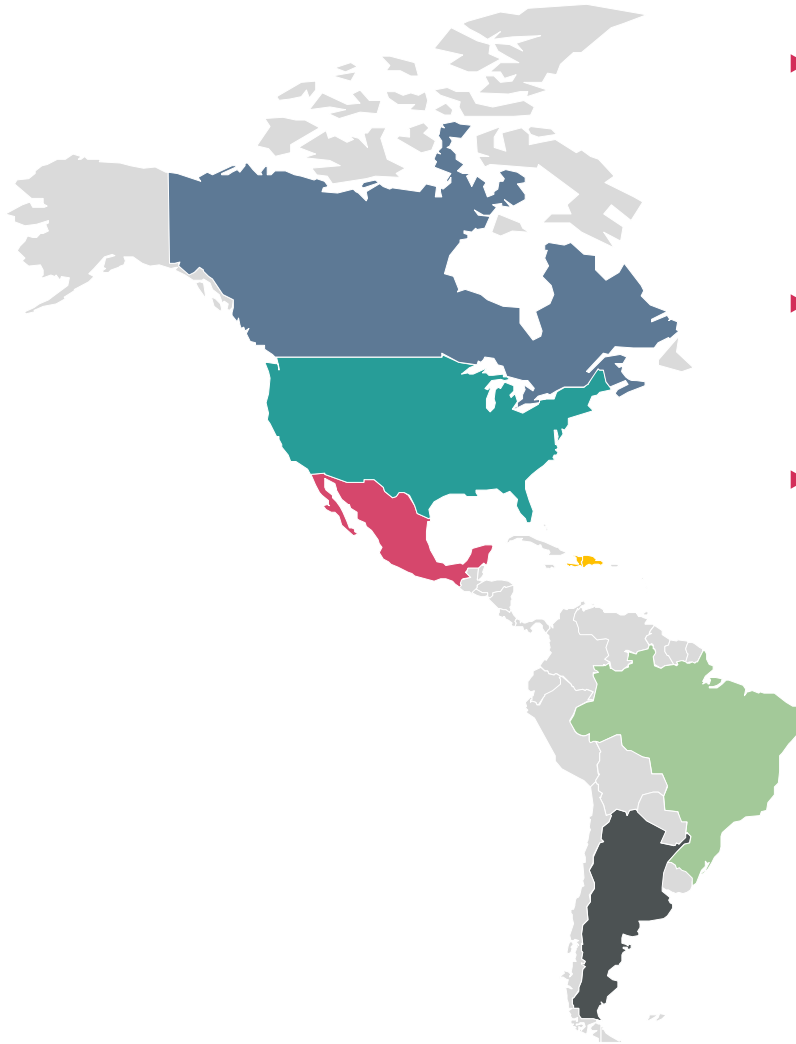
- ▶ Industrie du Futur in **France**.
- ▶ Industria Connecta 4.0 in **Spain**.
- ▶ Industrie 4.0 in **Germany**.
- ▶ Strategy Industry 4.0 in **Czechia**.
- ▶ Many other countries in Europe (Belgium, The Netherlands...) have also national plans.

REGIONAL INITIATIVES GO ALONG WITH SOME NATIONAL POLICIES IN AFRICA



- ▶ There are many regional initiatives that aim to support Industry 4.0 and digital economy in Africa:
 - EU-AU Digital Economy Task force, The Smart Africa Alliance, One Network Area, the Africa Skills initiative...
- ▶ There are also countries such as **Morocco**, **Rwanda** and **South Africa** that have set up their own national plans.

PUBLIC SUPPORT FOR INDUSTRY 4.0 CAN ALSO BE FOUND THROUGH THE AMERICAS



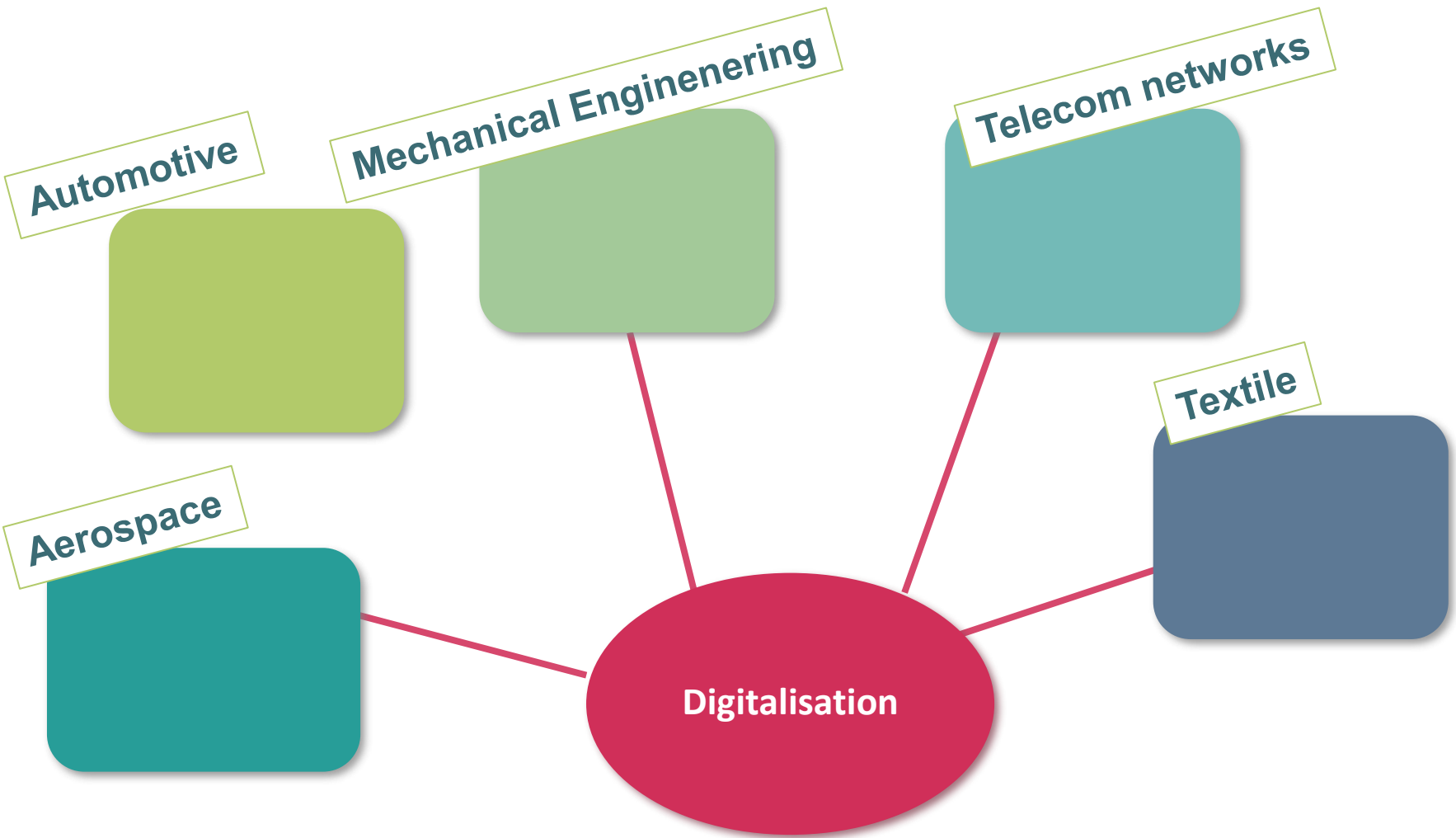
- ▶ Advanced Manufacturing in the **US** Partnership promotes innovative manufacturing.
- ▶ The digital charter in **Canada** is a plan for economic growth.
- ▶ Industry 4.0 in **Mexico**, Strategy plan in the **Dominican Republic**, Digital Industrial Innovation 4.0 in **Argentina** or National Strategy for Industry 4.0 in **Brazil** are all national government initiatives that aim to promote Industry 4.0.

#2

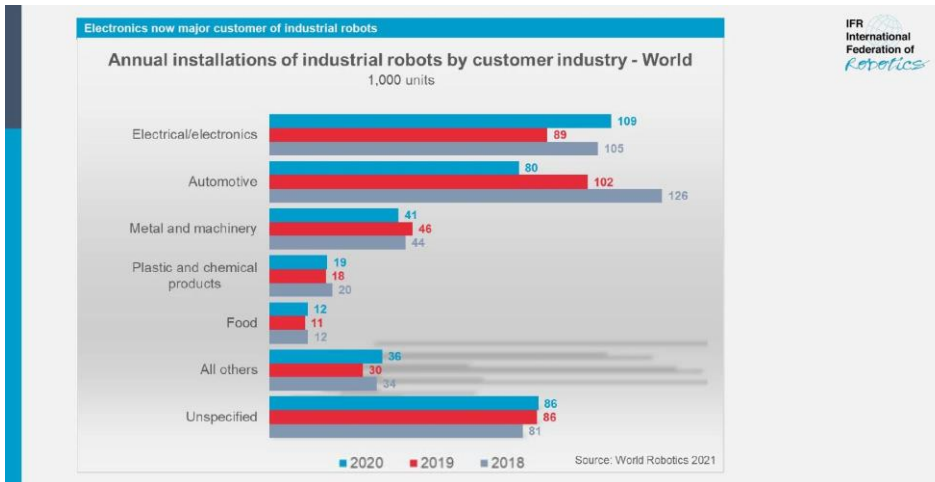
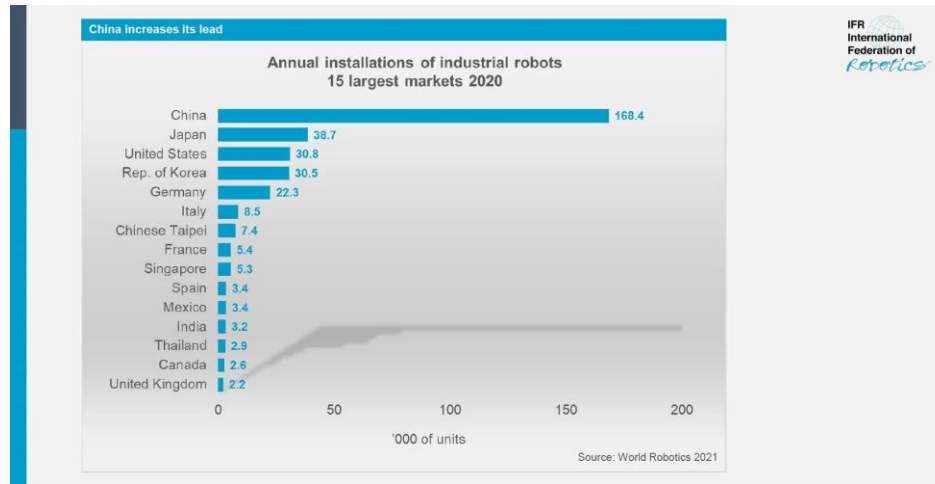
A SHORT GLANCE AT 3 SECTORS IMPACTED BY DIGITALIZATION



EVERY SECTOR IS BEING TRANSFORMED BY INDUSTRY 4.0 AND DIGITALISATION



INSTALLATION OF ROBOTS HIGHLY CHANGES FROM ONE COUNTRY TO ANOTHER AND FROM ONE INDUSTRY TO ANOTHER



#3A

The automotive sector is hugely shaken by digitalisation



THE AUTOMOTIVE SECTOR IS SHAKEN BY DIGITALIZATION 1/3

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Public transport	HSL 30-day ticket	HSL 30-day ticket	Unlimited HSL single tickets	Pay as you go
City bike	Unlimited	Unlimited	Unlimited	Not included
Taxi (5km)	€10	-15%	Unlimited	Pay as you go
Rental car	€49/day	Weekends	Unlimited	Pay as you go
	Read more	Read more	Read more	Read more

- ▶ Mobility as a Service (MaaS) enabling people to go from one point to another using all modes of transport (public transport, bicycles, taxis, rental cars, etc.). might be a game changer.



THE AUTOMOTIVE SECTOR IS SHAKEN BY DIGITALIZATION 2/3



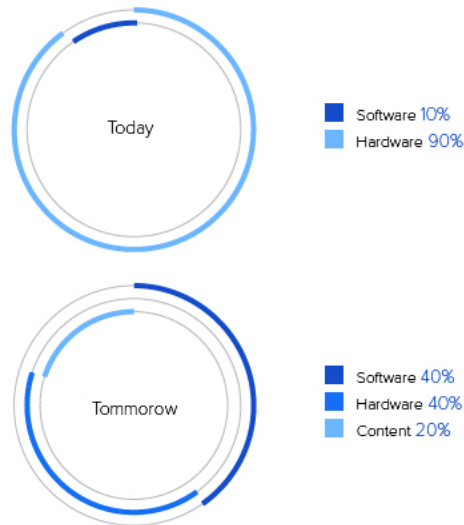
Source: PriceWaterHouse. Digital Auto report 2019.

- ▶ A growing part of revenues is going to new activities/new players: connected cars, MaaS etc.



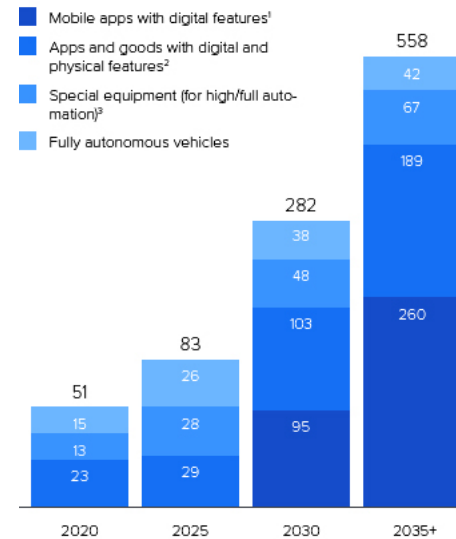
THE AUTOMOTIVE SECTOR IS SHAKEN BY DIGITALIZATION 3/3

Chart 6: Value of a Car. Today vs. Tomorrow



Source: Morgan Stanley Research

Chart 1: Global Market for Automated and Autonomous Driving, Including Related Services (\$Billions)



Source: AT Kearney

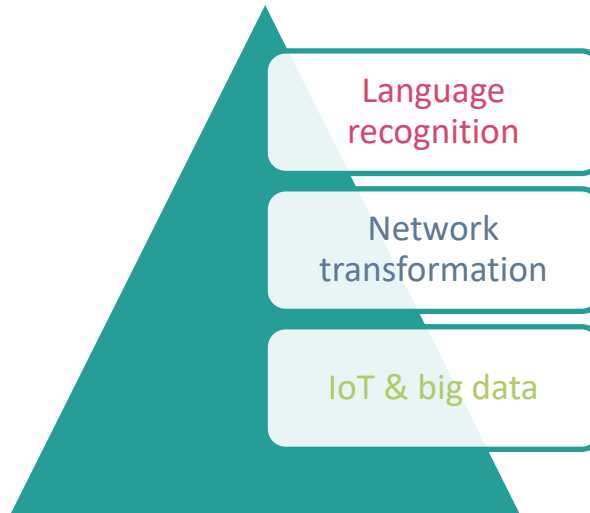
- ▶ Software and content are representing a growing chunk of the value of car.

#3B

▶ Networks are evolving due to digitalisation in the telecom equipment sector



ARTIFICIAL INTELLIGENCE IS BEING MORE AND MORE IMPORTANT IN THE TELECOM NETWORKS



- ▶ Artificial intelligence (AI) is increasingly present in mobile phones:
- ▶ AI is progressively found in 3 areas of the network: language recognition, network transformation and Internet of Things (IoT) & big data.

THE IMPORTANCE OF AI IN NETWORKS

▶ Telecom networks are being transformed, notably with the gradual arrival of Software-Defined Networks (SDN) and Network Functions Virtualisation (NFV). AI is at the heart of telecom networks:

- machine learning for network management and traffic flow prediction
- better control of the network
- radio resource optimisation
- predictive maintenance in networks

▶ When it comes to network analysis and performance, AI can provide many tools for improvement:

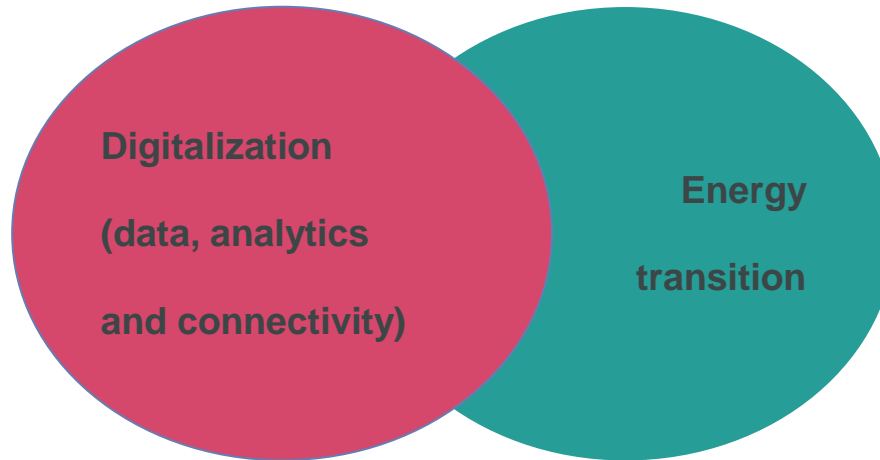
- AI in analytics. Analysis of network data enables network optimisation
- High degree of automation in the OSS (Operating Support System): improved network planning
- AI is proving to be a powerful tool for network planning and optimisation
- Solutions are being developed by players such as Nokia, Amdocs or Aria Networks



#3B

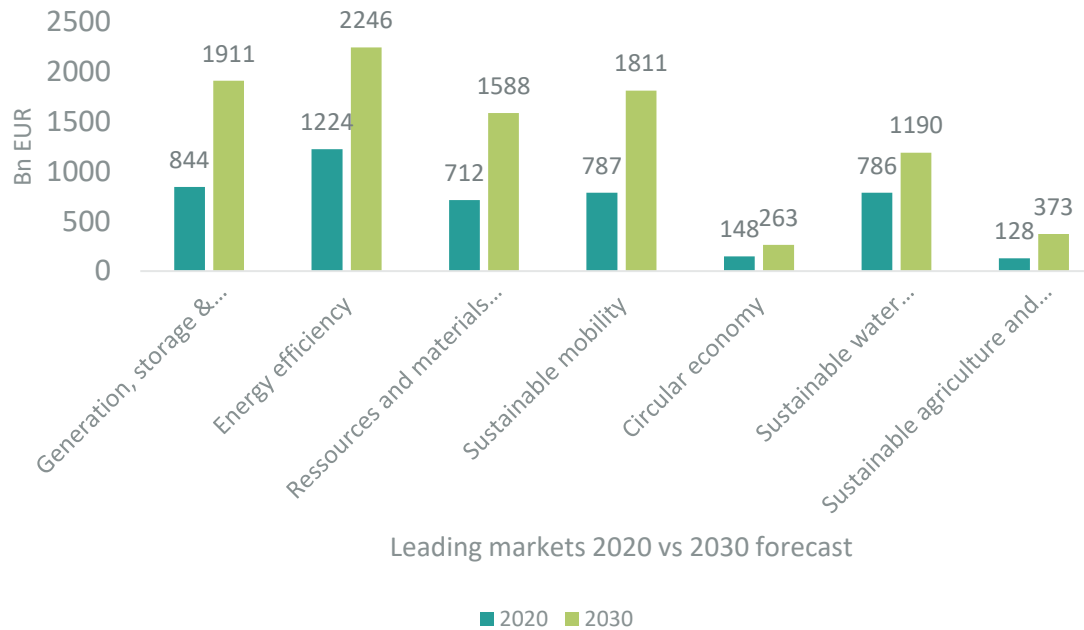
**DIGITALISATION IN THE
MECHANICAL ENGINEERING
SECTOR WITH A SNAPSHOT ON
ENERGY GENERATION SYSTEMS**

MECHANICAL ENGINEERING AND DIGITALISATION FEED EACH OTHER



- ▶ Mechanical Engineering is one of the most affected sectors by the digitalisation of manufacturing in two ways:
 - The sector provides the technologies for manufacturing sectors to introduce advance digitalization in their production process (hardware, software, big data) with new business models.
 - The sector itself is transforming due to digitalization: new form of designing, new producing tools, machinery and engines (e.g., 3D printing), new operating model.

MECHANICAL ENGINEERING MARKETS ARE GREENTECH AND THE USE OF DIGITAL IS KEY



Leading markets 2020 vs 2030 forecast

Source: Roland Berger (202

- ▶ The four main markets of mechanical engineering are:
 - Energy efficiency.
 - Raw material and material efficiency.
 - Sustainable mobility.
 - Environmentally friendly generation, storage and distributed energy.
- ▶ These 4 markets are growing and will continue to grow fast in the forthcoming years.
- ▶ In all these markets, the use of digital technology is key.

#3

DIGITALIZATION AND ITS IMPACT ON JOBS AND WORK



JOBS AT RISK

Techno pessimism

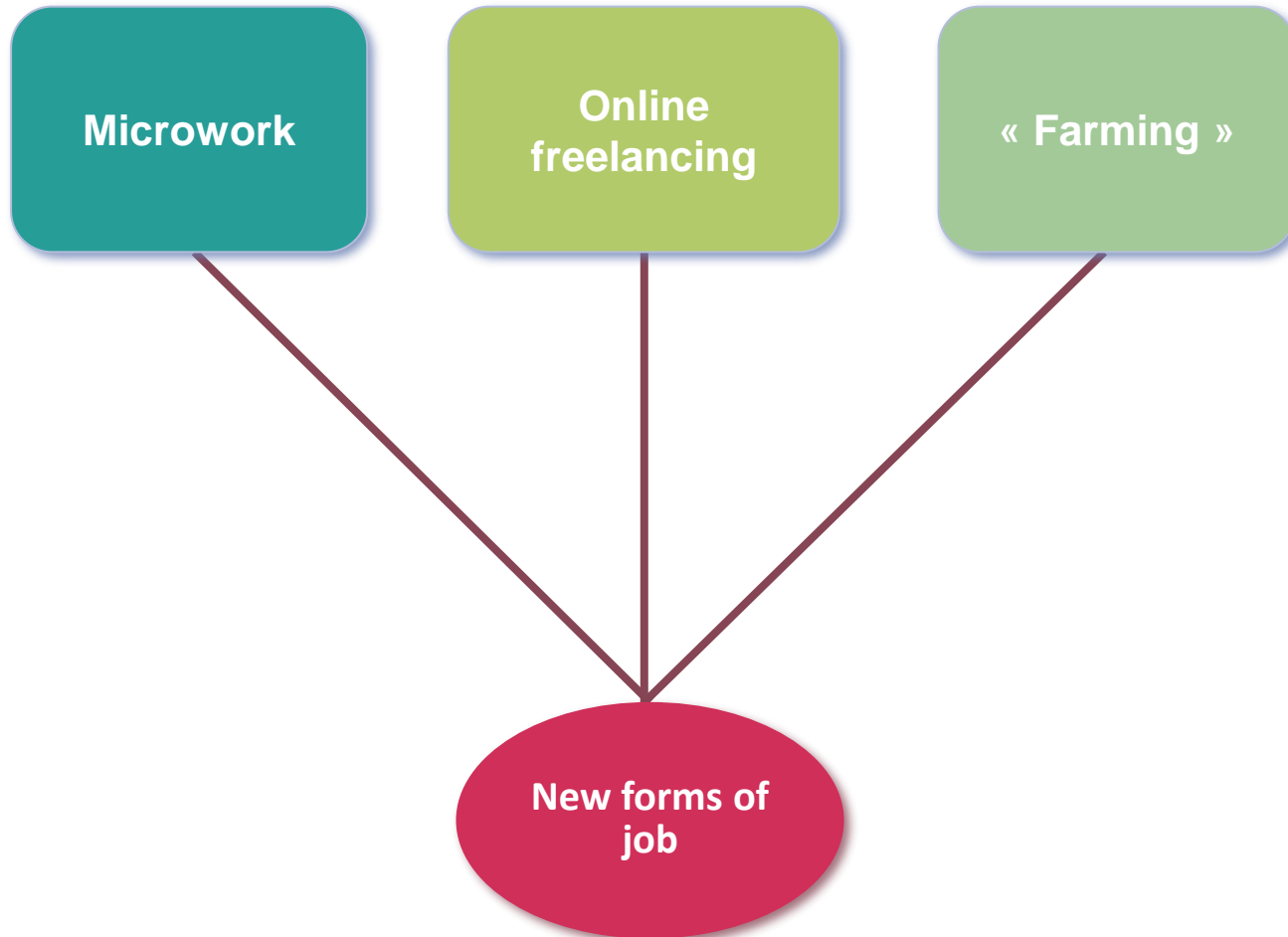
40 to 50 % jobs at risk with automation
(McKinsey, Frey & Osborne, Roland Berger)

Techno optimism

10 % to 15 % at risk with automation
(OECD, France Stratégie)

- New jobs are being created (data analysts...).
- Some jobs are being transformed due to digitalization (maintenance...).
- Others are destroyed by digitalization.

NEW FORMS OF JOBS



EMPLOYMENT & WORK: ISSUES AT STAKE

Number of
jobs



Type
of jobs



Type of
contract



Work
organization

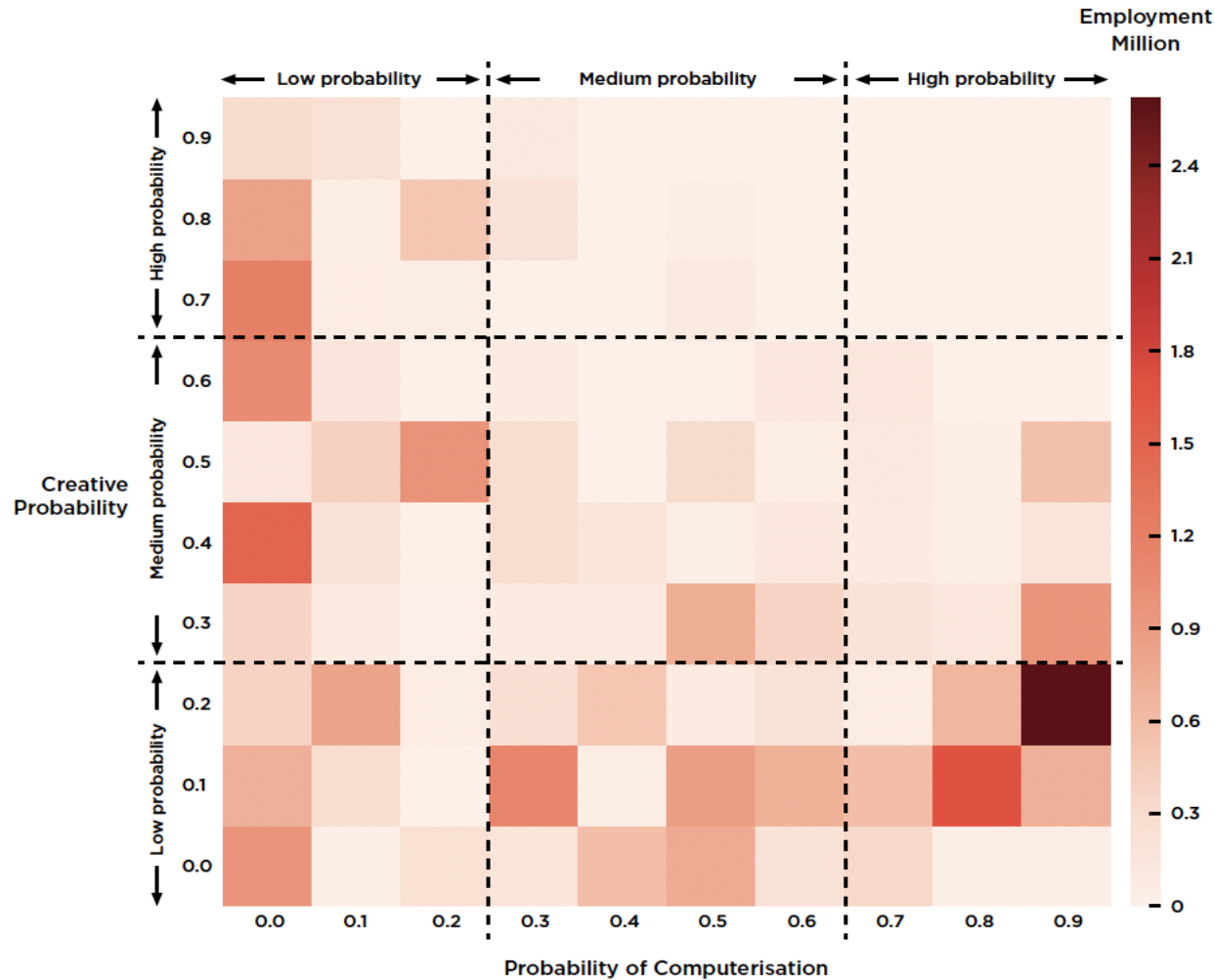


Working
conditions



CREATIVITY PROTECTS AGAINST AUTOMATIZATION

Figure 4 Computerisable vs. Creative, UK



#4

TRADE UNION INITIATIVES TO TACKLE DIGITALIZATION

There are many different initiatives that have been launched by Unions all around the world

SOCIAL DIALOGUE AT THE WORLD LEVEL AND AT THE NATIONAL LEVEL

▶ Social dialogue at global level

- Only a handful of companies have negotiations/agreements on digitalisation.

▶ International Framework Agreements (IFAs)

- IFAs could be an interesting tool to negotiate digitalisation.

▶ Research/seminars/conferences:

- Global Unions as well as Unions at the national level.

▶ Interesting initiatives at the national level :

- Brazil on Industry 4.0 with SMABC (Sindicato dos Metalúrgicos do ABC).
- Germany: IG Metall and the Work + Innovation (W+I) project.
- France, FGMM CFDT & UIMM (employer): “How to tackle digitalization through negotiation & agreements?” Experience and test at company level.
- Israel: Histadrout and its success to unionize IT workers.
- Indonesia: unionisation of app-based transport workers.
- Uganda: Kambe a cooperative designed an app to support its members/workers.
- Etc.



SOCIAL DIALOGUE AT THE EUROPEAN LEVEL 1/2

- ▶ In the European Union (EU), social partners have the prerogative to negotiate and conclude binding agreements for the whole EU. These must then be transposed into a legislative act.
- ▶ In 2020, an agreement on digitalisation was signed by the European Social Partners. Its aim is to “optimise the benefits and deals with the challenges of digitalisation in the world of work”.
 - <https://www.etuc.org/fr/node/19184>
- ▶ In 2020, IndustriAll European Trade Union published a mini-guide addressing all its European Works Council members.

SOCIAL DIALOGUE AT THE EUROPEAN LEVEL 2/2

- ▶ **European Trade Union Federations:** many position papers/statements
- ▶ **Joint EFFAT** (European Federation of Food, Agriculture and Tourism Trade Union)-**HOTREC** (Association of Hotels, Restaurants, Bars and Cafes) **statement:** On the “Sharing Economy”
- ▶ **IndustriAll Europe** and **Ceemet** (European Tech & Industry Employers) signed a joint statement in which they identify four areas in which social dialogue can shape the ongoing technological change to the benefit of both, employers and workers.
 - work organisation
 - skills
 - occupational health & safety
 - data protection.

SOCIAL DIALOGUE AT COMPANY LEVEL: SOME AGREEMENTS

Type of agreement	Examples
Work organization: telework and right to disconnect. Several agreements embed work organization when the issue of telework and right to disconnect is being addressed.	<p>BMW (Germany)</p> <p>E.ON (Germany)</p> <p>Bosch (Germany)</p> <p>Enel (Italy)</p> <p>Solvay (Belgium)</p> <p>Repsol Group (Spain)</p>
Information and participation of workers' representatives in introduction of new technologies	<p>Renault (Spain)</p> <p>Nano Automotive S/L-Tudela (Spain)</p> <p>Electrotecnica Artech Grid (Spain)</p> <p>Bosch (Germany)</p> <p>Orange (France)</p> <p>Seat (Spain)</p>
Education, reskilling and employment. Some agreements address the issue of skills and training given digitalization	<p>Otis (Germany)</p> <p>Robert Bosh Espana Fabrica (Spain)</p> <p>Engie (France)</p> <p>Solvay (Belgium)</p> <p>TIM (Italy)</p>

#4

A TYPOLOGY OF TRADE UNION INITIATIVES



AN OVERVIEW OF DIFFERENT TRADE UNION INITIATIVES

Research, papers and seminars

Achieving regulatory changes

Social dialogue

Trade Union demands

Experiment and testing

Organising online/app/platform workers

Legal actions



RESEARCH, PAPERS AND SEMINARS 1/3



- ▶ **IndustriALL Global Union** published the challenge of industry 4.0 and the demand for new answers.
- ▶ It has also published papers on:
 - **Future of work**
 - **Just transition :**
- ▶ **IndustriAll Europe** published a policy brief in 2015 on “digitalising manufacturing whilst ensuring equality, participation and cooperation”
- ▶ **CCOO (Spain)**. In September 2016, it set up the working group Digitalisation and Industry 4.0, to analyse the impacts of digitalisation.

RESEARCH, PAPERS AND SEMINARS 2/3



- ▶ **ÖGB (Austria) with UNI Europa and GPA-DJP:** In September 2015, they organise a conference on “Digitalisation and its economic and social potentials”. They issued a joint declaration stressing the need for social dialogue, data protection, the rights and protection of crowdworkers, education and the preservation of the European social model. The ÖGB also published a book on “Work in the GIG Economy” in which legal experts evaluate selected platforms and their legal status against labour law.
- ▶ **CFDT, CGT, FO, CFE/CGC (FRANCE):** the Mettling report elaborated in 2015 with an expert group made of experts from those 4 trade unions, the general director of the employer association (MEDEF) and experts in labour rights and sociology. The report investigates the “*digital transformation and life at work*”. It defines 36 propositions to manage the digital transformation.
- ▶ **UGICT-CGT (engineers, managers and technicians Union of CGT) (France):** A seminary in 2018 on “where is going Artificial Intelligence?”

RESEARCH, PAPERS AND SEMINARS 3/3



- ▶ **UNI-Europa** organised a seminar in 2015 jointly with **ÖGB** on “Digitalisation and its economic and social potential. It also held another seminar in 2017 with a report that was published.
- ▶ The **Japan Council of Metalworkers’ Unions (JCM)** is regularly organizing seminars and workshops on the issue of the digital revolution.
- ▶ **CFDT (France)**: In association with the IRES research center, they published a report on the use of digital technologies.
- ▶ **IG Metall (Germany) published** a lot of resources on Industry 4.0.
- ▶ **The CGIL (Italy)** has established a publicly not accessible, online platform ("*Idea Diffusa*") with the participation of trade unionists, academics and experts to discuss the impact of the digitalisation transformation.
- ▶ **TUC (UK)** issued the “the Gig is Up. Trade Unions tackling Insecure Work” in 2017. It also published that same year *Shaping our digital future*”.
- ▶ Several Initiatives and studies in Sweden with **IF Metall** being involved.



ACHIEVING REGULATORY CHANGES



- ▶ In **Japan**, tripartism has an ancient history
- ▶ **IG Metall and the DGB** are involved in several governmental initiative
- ▶ In **Austria**, the **ÖGB** were founding member of the Industry 4.0 platform alongside Ministry of Transport, Innovation and Technology, business and academia
- ▶ In **Singapore**, tripartism has been used to tackle the issue of industry 4.0.
- ▶ Unionen along with IF Metall in **Sweden** are part of a Multi-stakeholder Digitalisation Council
- ▶ In **Denmark**, 6 Trade Unions representatives are part of the Disruption Council



SOCIAL DIALOGUE



- ▶ **ETUC** with BusinessEurope, CEEP and SME United Statement of the European Social Partners to support the successful digital transformation of Europe's economy.
- ▶ **AMICE, BIPAR, Insurance Europe & UNI Global Union Europe Finance (2016).** Joint Declaration on the Social Effects of Digitalisation by the European Social Partners in the Insurance Sector
- ▶ In **Denmark**, the first collective agreement was signed in 2018 for the platform economy between the cleaning platform *Hilfr* and the union The United Federation of Danish Workers (3F).
- ▶ In **Italy**, the 3 Trade Union were able to sign an agreement with Just Eat. Thanks to this agreement, the collective agreement of the Logistics sector will be extended to the company's workers with crucial topics such as fair wage, labour rights and the right to get a social protection.
- ▶ **UGICT-CGT (engineers, managers and technicians Union of CGT) (France):**
 - A guide to face Artificial Intelligence
 - A guide to negotiate the right to disconnect



TRADE UNION DEMANDS



- ▶ **IndustriAll European Trade Union** already published its official position in 2015: «Digitalisation for equality, participation and cooperation in industry - More and better industrial jobs in the digital age ».
- ▶ **EFFAT** (European federation of Food, Agriculture and Tourism Trade Union) published a position paper in 2015 on the “sharing economy in tourism”
- ▶ In June 2016, **German** DGB responded to BDA’s paper by calling for the setting of new rules for new forms of employment and the protection of workers in the platform economy or who are engaged in crowd-working or in other flexible employment forms
- ▶ In Germany, IG Metall defined already in 2015 its priority:
 - To guarantee social right of workers: adapt and enhance co-decision mechanisms, develop and implement a complete regulation on mobile workers, establish the right of participation and protection for crowdworkers and strengthen the date protection of workers
 - Actively take part in technological and working organisation change: develop a participative approach, develop the skills of civil servants, encourage public debate and influence the research policy, developing norms and health and security issues.
 - Equal opportunities for workers: development of VET, use of new digital training on the workplace and certification of those skills.
- ▶ The **Japanese** Union JCM (Japan council of Metalworkers’ Unions) is asking for a dialogue at all level, from the from the workplace to business between Unions, government and Companies.
- ▶ In **Spain**, Trade Unions consider that digitalisation poses both opportunities and risks for the manufacturing industry. “Digital technologies provide the manufacturing industry with the possibility of respond to the new demands of its customers at the level of "Products, Processes and Business Models", producing a decisive impact in the value chain and providing both benefits and threats for those who remain outside, at the same time that it incorporates an



EXPERIMENT AND TRAINING



- ▶ **IG Metall** and **IG BCE** “Arbeit 2020”.
- ▶ **IG Metall** and the Work + Innovation (W+I) project.
- ▶ **France FGMM CFDT** organized an experiment between employer and Unions in a company to co-design the changes generated by digitalisation. An attempt to tackle the changes in a joint approach. An action meant to be disseminated.
- ▶ **Unite the Union:** the unions of the Unit the Union from Great Britain prepared a draft ‘**New Technology Agreement**’. The aim of the agreement is to ensure that the introduction of new technologies takes place on the basis of a mutual agreement based on a comprehensive review of the relevant information and is monitored by commissioners or representatives of Unit the Union. The agreement provides an organization-wide framework and set of principles for addressing issues arising from proposals to introduce new technology.



INITIATIVES REGARDING PLATFORM FOR CROWDWORKERS, FREELANCERS AND ONLINE WORKERS



- ▶ The **European Trade Union Congress** along with 2 research institutes launched a Digital Platform Observatory
 - The observatory is in charge of the following tasks:
 - Mapping and assessing existing practices of worker representation and social dialogue within platforms;
 - Developing new methods of representation and dialogue with the stakeholders and specifically platform workers at the European level.
- ▶ The **German IG-Metall** launched the information and exchange platform for crowd workers (www.faircrowd.work) that the Swedish Unionen and the Austrian ÖGB (with the Austrian Chamber of Labour) joined in the process.
- ▶ **Ver.di** launched in 2016 a platform that offers self-employed individuals special information, support and an opportunity to become actively involved
- ▶ The **Spanish UGT** also created a platform.
- ▶ In **Italy**, Trade Unions opened platforms for precarious workers and freelance workers: CGIL and NiDIL, CISL and Alia, Clacs vIVAce and FeLSA, UIL with CpO and SindacatoNetworkers.
- ▶ In **Sweden Unionen** has set up a platform to help and inform freelancer workers
- ▶ Several **French Unions** opened new branches to support online platform drivers and platform workers
- ▶ In the **UK**, the worker's observatory was initiated by Gig workers and the **Scottish Trade Union** congress supporting platform and gig workers to develop tools and tactics to build the information and influence they need to become collectively empowered



LEGAL ACTIONS



- ▶ Several actions were launched in many countries regarding workers' rights and their recognition as employees.
- ▶ France
- ▶ Italy
- ▶ Netherlands
- ▶ Spain
- ▶ UK
- ▶ USA



CONTACT:

FABIEN COUDERC BRUSSELS

f.couderc@syndex.eu
+32 (0)491 28 99 41

EMMANUEL REICH PARIS

e.reich@syndex.fr
+33 (0)6 68 71 52 66

www.syndex.eu
www.syndex.fr