

“Industrie 4.0: Mastering the Transition”

**10 Key Recommendations for a European Framework
for the Successful Digital Transition in Industry**

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Table of contents

- Introduction: Industrie 4.0 – an opportunity and a challenge for Europe 3**
- 1. Data policy – enabling business models but protecting expertise 6**
- 2. Liability – identifying responsibilities 8**
- 3. Cybersecurity – securing the Internet worldwide 9**
- 4. “Collaborative economy” – enabling competition and innovation 9**
- 5. Excellent infrastructure and services – the basis 10**
- 6. EU single market 4.0 – Europe's asset in global digital competition 11**
- 7. Industry-driven standardisation – interoperability and acceptance 12**
- 8. Trade agreements – removing barriers, harmonising 13**
- 9. Access to technologies – through research, transfer and financing 13**
- 10. More than just digital skills – preparing society and the working environment 14**
- Conclusion: Developing a strategy, ensuring future-proof and flexible regulation 15**

Introduction: Industrie 4.0 – an opportunity and a challenge for Europe

Industry in Europe is facing a historic turning point. Digital technologies are unlocking huge opportunities for companies to achieve an entirely new level of quality, efficiency and customisation. In Industrie 4.0, people, machines and products communicate with one another via the Internet. This not only increases the competitiveness of existing industries such as automotive, steel, chemicals, textiles and agriculture, but also enables totally new business models for medium-sized companies and start-ups. Taking a leap into the digital age is an opportunity to keep the manufacturing industry and the jobs it provides in Europe for the long term.

Mechanical engineering at the heart

Industrie 4.0 means the convergence of industry and Internet technology. As a supplier of intelligent production systems, mechanical engineering is at the heart of this development. Modern machines allow European companies to exploit the potential of digitalisation in their production facilities and to unlock new business fields. Since it supplies equipment to European industry, the mechanical engineering sector knows better than any other how new technologies can be successfully integrated for the benefit of the customer and how the EU can support the spread of Industrie 4.0.

VDMA is Europe's strongest association in this industry, with more than 3,100 German and international member companies employing more than one million people. Nine out of ten VDMA member companies are small and medium-sized enterprises (SMEs) according to the EU definition, and two-thirds have fewer than 100 employees. Nevertheless, 11.8 per cent of all mechanical engineering companies in VDMA consider themselves pioneers in the development of new digital production technologies.

The companies can build on their capacity to innovate in this field: the entire German mechanical engineering industry invests around 3 per cent of its turnover in research and development (2014) and includes almost twice as many companies with product innovations as the economy as a whole.¹ Their quality puts German and European machines in high demand all over the world. Mechanical engineering companies achieve 76 per cent of their turnover abroad, while 57 per cent of exports are sold outside the EU. The combination of proximity to customers, technology leadership, capacity to innovate and strong exports make mechanical engineering a global ambassador for Industrie 4.0.

A single market for Industrie 4.0

Policy makers in Europe are also addressing the opportunities and risks presented by digitalisation. Published in May 2015, the European Commission's Digital Single Market package lays the foundation for a legal framework for consumers and service providers. The next step must now be to create a single market for industry in the digital age. Many member states have already launched promising initiatives, such as the platform Industrie 4.0 (and

¹ Proportion of companies with product innovations: Mechanical engineering: 56%. Economy as a whole: 28%. Source: ZEW (2015), Mannheimer Innovationspanel

the associated Labs Network I4.0), Smart Industry and the Industrie du Futur. However, the strength of modern production comes from its international networks, so there is no alternative to a European approach to digitalising industry and a common legal framework.

After all, Europe is not alone on its journey towards Industrie 4.0. Digitalisation of industry is a global development, as is shown by the Industrial Internet Consortium (IIC) in the USA. By working together, Europe has a much better chance of entering into global partnerships on an equal footing. That is why we need an EU single market for Industrie 4.0, enabling companies to develop their technologies for a domestic market of more than 500 million people and thus to benefit from economies of scale. If this fails, Europe risks being left behind in the development of Industrie 4.0.

More than digitalisation

For industry, digital technologies mean much more than simply enhancing existing processes. Past experience has shown that the Internet not only relocates processes, but changes them at a fundamental level. Over the last two decades, for example, not only have letters been largely replaced by email, but tools such as social networks, blogs and messenger services, as well as hardware like smartphones and tablets, have created totally new means of communication. Similarly, digitalisation and new production technologies will enable new paradigms and patterns in industry over the next two decades. There is good reason why Industrie 4.0 is also known as the fourth industrial revolution.

Good for business, good for people

Products today are developing faster all the time. Companies that react quickly and efficiently to changing trends have an enormous competitive advantage. In digitalised industry, machines will be able to produce customised products automatically – in a quality far above that which we are seeing from the first 3D printers today. Industrie 4.0 will make it possible to offer customised pieces for the price of series production in Europe. With new technologies, the functions of machines can be adapted even after they have been delivered. Connecting factories allows production processes to be tailored in the best possible way.

This new level of connectivity is happening not only within companies, but also between companies, customers and factories all over Europe. A client can order a product exactly as he requires it via the Internet. The company initiates production of the order automatically at a production facility close to the customer. Industrie 4.0 is thus the key to re-industrialisation in Europe and to bringing back production that moved to low-wage countries decades ago.

This benefits both companies and their staff. However, the type of work will change. Industrie 4.0 will not replace people in production, but it will allow a new division of labour between people and machines, where routine physical and mental tasks are increasingly replaced with coordination and control roles.

From vision to reality

Many European companies are already using digital technologies today, but development in Europe is still at an early stage. The application scenarios of Industrie 4.0 are limitless and cannot yet be predicted in detail. Europe's companies need to be given the chance to reinvent themselves, make mistakes, change their thinking and ultimately find the best solutions for the industry of the future.

This development can and must receive support from policy makers, who need to find the balance between creating a reliable regulatory framework and leaving space for innovation. This will take close dialogue between policy makers and companies, as well as a European industrial policy and growth strategy. VDMA has compiled a list of the aspects that are worth discussing today on the next few pages.

10 key recommendations for implementing Industrie 4.0:

Agreeing on the rules, creating trust

Industrie 4.0 will only be a success if companies, investors and customers have sufficient confidence in a connected world with systems that act independently and anonymously. The digital transition not only challenges companies' capacity to innovate and demands new strategies and organisational models, it also puts the regulatory framework to the test. The large number of players and data sources, the increasing number of self-learning systems and products that change over their lifespan, the speed of the processes and the properties of an Internet economy (sharing economy, platforms) present new issues for the traditional legal and economic framework.

At the same time, companies are going through an experimental phase. It is almost impossible to predict which structures and business models will emerge as the winners in the competition between ideas, technologies and companies. The challenge for policy makers and regulators is to leave enough space for this dynamism while also ensuring fair competition and developing the framework conditions prudently.

The trust needed for successful digitalisation requires not only the protection of personal data but also needs to be developed on multiple levels, especially in an industrial context.

- Cyber-physical and autonomous systems cannot be allowed to pose any risk to people or property.
- The systems need to be available and reliable.
- Business secrets, intellectual property and investment in innovation need to be protected.
- Identities and responsibilities need to be obvious online, too.
- Legal certainty, fair rules and opportunities to access technologies and markets are essential.

1. Data policy – enabling business models but protecting expertise

In the debate about big data, data is often referred to as the “new oil”. But many questions remain unanswered: Who is entitled to use this resource? Can data be traded and, if so, what rules apply to this? One thing is certain: companies and their staff need to be confident that their business and process knowledge is protected and that data is exchanged in accordance with fair rules. The very existence of SMEs is based on their expertise in the form of tacit process knowledge, experience and fast product innovation, which is often difficult to protect formally, such as through patents. Digitalisation formalises this knowledge and makes it transferable worldwide, thus making it vulnerable to unwanted, unauthorised and illegal economic use. At the same time, data is also relevant for liability issues: Can I be sure that the security-related data comes from a reliable source? Could my data be used by a third party, who could cause damage with it? What happens if my software is manipulated?

If data-based business is to be attractive, data exchange needs to work in such a way that companies know who they are dealing with, that minimum protection standards are ensured and that the disclosure of information does not violate any economic interests. For example, factory operators will only allow a start-up to analyse the energy efficiency of their plants if they know that the data cannot be used by the competition. For its part, in order to implement its business idea, the start-up needs real-time access to the data and legal certainty – and to know that its own analysis expertise and processed data are protected. A balance needs to be found between the potential sharing of data and the protection of knowledge investments.

Unauthorised and criminal access is a threat to this. Cybersecurity is one answer, but the danger of unauthorised use also exists even without hackers and spies, for example when platforms pass on data on their customers or suppliers.

Contract law provides suitable instruments for legal data exchange. Based on freedom of contract, the exchange and use of data can be largely governed contractually, even in international transactions. However, limitations to the principle of freedom of contract could make it impossible to find suitable contractual solutions. Under German law, for example, freedom of contract is heavily constrained by the legal restrictions concerning the content of general terms and conditions.

There is also the question of whether a clearer statutory framework is needed in some cases with regard to the importance and handling of data as part of Industrie 4.0 (for example with respect to data ownership, security or protection). Further thorough analysis and debate is necessary before final answers can be given.

This discourse should not be limited to the categories of personal data and non-personal data, but focus on the following three groups:

- Personal data (as addressed in the General Data Protection Regulation)
- Company data (operative process data such as sensor data from a production machine and business secrets such as software, CAD drawings)
- Public data: Data released in the public interest (transport, weather, research) or data provided voluntarily.

In this context, VDMA welcomes the Commission's intention to address topics such as data ownership, data exchange between companies and machine communication as part of the “Free Flow of Data” initiative. However, it is important that this analysis does not lose sight of the significance of the company data category. A one-sided focus on “free data” without taking the economic and competition-related value of data into account would be wrong and could lead to fundamentally incorrect orientation in industrial policy. In the context of the review of the law on online trade of goods and services, the EU Commission is using an approach that considers the provision of data as an intrinsically valuable benefit. This is an important aspect, and one that can provide important stimulus in the debate surrounding B2B data exchange.

- **Launch of a strategic debate on company data with the goal of identifying fundamental principles for data exchange (e.g. data minimisation, no compulsory disclosure of data, obligation to return data)**
- **Establishment of an EU High-level Expert Group on the legal aspects of data exchange (incorporating existing initiatives such as the “Legal framework conditions” working group of the “Platform Industrie 4.0” and the relevant Commission directorate-generals).**
- **More research, studies and legal opinions on the ownership of and access rights to data**
- **More research on technical options for data security**

2. Liability – identifying responsibilities

Product liability assumes that any damage can be attributed to human actions and that responsibility can be assigned. However, Industrie 4.0 is based on intelligent, self-controlling and self-learning systems that communicate autonomously within a network. Machines with artificial intelligence no longer work with fixed, programmed sequences, but make decisions based on situative data configurations – which may even be provided by third parties in the network. In future, it will become more difficult to identify the causes of accidents and errors and to assign responsibility. Who is to blame when a machine causes damage? The programmer of the algorithm? The cloud services provider who delivered the data? Or the customer? Perhaps an external saboteur? The company that did not protect the product sufficiently against access and sabotage? The more the function of the machine is controlled by data, the more responsibility is hidden in the data flows and algorithms.

The interdisciplinary topics of cybersecurity, data sovereignty and authentication play a key role here. Solving these problems will take analysis and time. At the same time, technologies and business models are evolving, making it difficult to find appropriate regulatory approaches. For example, it would be inappropriate to introduce strict liability regimes without the prior and proper analysis of the impact on the economy and innovation policy. Innovation and the take-up of new technologies must not be hampered by excessive financial risks. For example, it would not be appropriate to hold only the operator of an Industrie 4.0 factory responsible without examining who is actually responsible for the damage. The objective must be to enable a sound risk assessment and to make it easier to obtain insurance.

- **Given the dynamic development, regulators should refrain from introducing new regulations too quickly. The focus must be on the use of existing instruments and further critical analysis.**
- **Strict liability regimes should not be introduced prematurely.**
- **The players in connected processes need to be clearly authenticated.**

3. Cybersecurity – securing the Internet worldwide

Machines are sold and connected around the world, so Industrie 4.0 would not be possible without networks and data traffic that cross borders. However, this also increases the risks, as cyberattacks do not stop at borders either. That is why we need coordinated security mechanisms at a European level. Efforts by single EU member states that lead to different requirements or inconsistent testing conditions are not appropriate.

That is why we welcome the Commission's approach of creating common standards under the NIS Directive. From companies' point of view, reporting both attacks and threats is useful, although such events should first be reported to national bodies and an anonymised procedure should be used.

However, the legal conditions are very different at the international level, and only a harmonised procedure – achieved through international treaties and minimum standards, for example – can actually lead to greater security.

- **Harmonised legal requirements and testing standards at EU level.**
- **Harmonised EU-wide cybersecurity requirements are a useful approach, but need to be developed in a sector-specific way, taking industrial criteria into account.**

4. “Collaborative economy” – enabling competition and innovation

Digitalisation goes hand in hand with the growing importance of platforms for data exchange, customer contact and services. In principle, online platforms facilitate market access, reduce transaction costs and enable innovation through new business models. Platform-based, data-driven business models will also be part of Industrie 4.0, for example when a mechanical engineering company offers its customers a tailored package of maintenance and optimisation services based on their usage data.

However, platforms also present risks due to the concentration of user data and the market power this produces. These risks are already familiar from the consumer and media sectors, but will also affect industrial platforms in the future. It remains to be seen to what extent previous experience is transferable. However, industrial platforms are undoubtedly different from consumer platforms: the value chains are more diverse, connected to the real economy and often sector-specific. Moreover, data exchange in industry often involves highly-sensitive company secrets; the designer of an innovative product will hesitate to put his CAD drawing online unless he can expect absolute confidentiality – something that in principle can be arranged under contract law. However, the situation becomes critical when a lack of competition or insufficient rules make it difficult to choose or switch providers freely. This has a negative impact not only on the market efficiency, but also on the self-regulation of the market with regard to confidentiality, data security and liability.

It is therefore a very positive step that the Commission is examining the role of online platforms more closely and addressing questions on portability, lock-ins, conflicts of interest

of the platform operator and the enforceability of the rights of platform users and suppliers. However, it will also be important to analyse future developments in industry and not only to investigate media and consumer platforms.

The objective must be to find a balanced political answer that enables new business models and gains in efficiency on the one hand, while also ensuring fair competition and limiting the power of monopolies. Online markets must be contestable and allow access by new businesses.

Where unregulated, platform-driven business models meet regulated, traditional services, competition between the systems based on largely harmonised legislation should be ensured and artificial fragmentation between online and offline markets avoided. In harmonising the regulatory framework, it is important to also consider the option of amending existing legislation for all market participants and not rush into regulating new business models and technologies.²

- **The framework for the sharing economy must leave room for innovative business models, while also ensuring fair competition within the relevant market – online and offline.**
- **Regulations on the transparency of data use and the portability of data must ensure that lock-ins and one-sided dependencies on online platforms are avoided. Online markets must also remain contestable.**

5. Excellent infrastructure and services – the basis

The data superhighways are running out of capacity. The volume of data transmitted worldwide is predicted to triple over the next five years (Cisco VNI, 2015). Much of this consists of streaming and video services, but the Internet of Things is also developing rapidly. Estimates for the number of objects that will be connected via the Internet by 2020 range from 25 billion (Gartner) to 50 billion (Cisco). Many of them – such as those in digitalised production and telemedicine – will work in applications that require reality to be represented in real time, thus increasing the performance requirements even further. Many usage scenarios of Industrie 4.0 also need minimum standards for real-time data exchange between machines. This is about not just data volume, but also application-dependent quality criteria. It is therefore important that regulations on network neutrality not only ensure discrimination-free access, but also allow space for business models with fast, reliable data transmission.

Sufficient capacity in the network infrastructure is needed in order to ensure this free access and quality. However, it is still doubtful whether the regional, national and European broadband targets will be sufficient. An industry stress test is required, taking future industrial

² Cf. German Monopolies Commission (2015), “Special Report 68: Competition policy: The challenge of digital markets”, page 194, http://www.monopolkommission.de/images/PDF/SG/SG68/S68_volltext.pdf

Internet usage into account, in order to provide greater clarity about the need for action. One thing is certain, however: the broadband Internet infrastructure throughout Europe needs to be expanded comprehensively all across Europe as quickly as possible, especially in rural areas. SMEs are especially firmly rooted in the regions of Europe, and need the same access to fast Internet as companies and consumers in urban centres.

Driving technological development forward is also important. According to forecasts, around two-thirds of data transmission will take place via Wi-Fi or mobile connections by 2019. When developing the relevant wireless and 5G technologies, it is crucial to guarantee that industrial requirements are taken into account.

- **Conduct an industry stress test to shed more light on the need for action**
- **Improve the broadband Internet infrastructure, ensuring coverage in Europe's regions**
- **Ensure network neutrality while allowing quality categories**

Crossing borders – Industrie 4.0 needs a global view

Industrie 4.0 means not only exchanging data across borders, but also trading new products and services from a digitalised industry. For this to work, the right rules and interfaces need to be in place – both for the digital dimension and for the real, tangible goods and services of Industrie 4.0. A product in the EU not only needs to be sold in line with harmonised rules for Internet trade, but must also fit in with existing systems, standards and legislative requirements. Uniform rules and standards within the EU single market and at an international level are therefore essential for the success of Industrie 4.0.

6. EU single market 4.0 – Europe's asset in global digital competition

The EU single market is one of the EU's success stories. The common market is an excellent basis for the digitalisation of industry and an advantage in international competition. An EU single market is the only way to achieve the necessary economies of scale that justify investment and secure the competitiveness of European companies.

The Digital Single Market (DSM) package addresses many important questions and launches promising initiatives. For example, the planned “Free Flow of Data” initiative is also fundamentally important for connected production. However, it is essential to strengthen the industrial aspects of the debate and to understand that digitalising industry means the transformation of existing value chains, not just the Internet economy. This applies particularly to the significance of company data, which has not been given enough attention in the current debate.

The Commission's communication on “A deeper and fairer single market” in October 2015 also contains many proposals that are important for industry in the EU. However, there is still no coherent and coordinated strategy to support the exchange of data in the context of the four fundamental freedoms of the EU: goods, persons, services and capital. Industrie 4.0

means linking products, production technologies and digital technologies. Data and information are not an end in themselves in Industrie 4.0, but serve as a “digital twin” of real production, increasing efficiency and enabling new services. In the future, machines and products will be analysed, optimised and perhaps even given new properties after delivery, for example in order to instantly increase the power of an engine or to extend a maintenance interval. In contrast to an Internet service, this is a new dimension of digitalisation – in a similar way to the Internet of Things. New production technologies such as 3D printing, networked intelligent products, data-based services and the blurring of boundaries between products and services present a challenge for existing legislation – especially legislation that dates back to a time when there was no Internet and sensors in products were expensive and rare. Although many directives and regulations remain valid, additions and adjustments may be necessary in some cases. One example is the legislation on product safety. The increasing integration of security-related hardware and software components is raising the importance of security updates and blurring the boundaries between the market introduction and operation stages. This puts EU legislation, which is very strict in this regard, to the test. More and more, software-based product functions can be modified after delivery – a situation that will also require analysis of the suitability of existing regulations. Energy and environmental policy will also need to be reviewed against the background of greater information and optimisation potential through the digitalisation of real processes. There are significant opportunities to improve resource and energy efficiency here, but the regulatory framework may have to be reviewed.

- **Combine the DSM and single market initiative in a single strategic growth initiative, creating a single market for the products and services of Industrie 4.0**
- **A digital fitness check for both future and existing traditional “analogue” legislation**

7. Industry-driven standardisation – interoperability and acceptance

The increased connectivity of Industrie 4.0 will multiply the number of interfaces. These interfaces need to be clearly described, ideally through standardisation. Non-contradictory standardisation is essential if elements of Industrie 4.0 are to communicate with one another.

In order to achieve a sustainable result for the long term, it is crucial that the manufacturers and operators of machines and plants are involved. The consensus-based standardisation usually applied in electrical and mechanical engineering is also the ideal approach for Industrie 4.0, in order to define market access conditions and interfaces.

However, Industrie 4.0 also presents new aspects. For example, in information technology, it is very common for agreements to be made in the form of industry-driven consortium standards. Given the convergence of IT and production technologies, this type of standardisation will also play a role in Industrie 4.0. Global IT standards that already exist can provide an important contribution to this and complement consensus-based standardisation. However, it is essential that consistency is ensured and one-sided

dependencies are avoided. Especially where there are “standard-essential patents”, it is vital to guarantee that the standard can be applied by all companies under fair conditions.

It should also be noted that certain aspects of the standardisation may be the subject of legislation. Here, in particular, it is important to ensure that the relevant stakeholders are involved in the process and that consistency is ensured.

- **Preferential use of consensus-based standardisation for Industrie 4.0**
- **Ensuring consistent standardisation**

8. Trade agreements – removing barriers, harmonising

From the point of view of mechanical engineering, digital trade is not isolated from the exchange of goods and services. This means that trade with third countries is also unthinkable without protecting data and expertise in international processes. Trade agreements must ensure that companies' data is protected against unauthorised criminal access in digital transactions, as well as against unauthorised economic exploitation by third parties.

Solo efforts by individual countries are insufficient, especially when it comes to industrial security. Policy makers therefore need to work towards coordinated security mechanisms at a European level. Otherwise, small and medium-sized firms in particular will have difficulties in meeting standards and doing business. At the same time, it is equally important to remove trade barriers for software products and services. This also includes restrictions on cryptography products and protection mechanisms. The forced disclosure of source codes or keys should also be seen as a trade barrier of this kind.

In general, VDMA advocates a free flow of data, transparency and open access to data infrastructures. However, there should be no obligations or bans regarding where the data is stored, as long as legal requirements are respected and security requirements are met. Entrepreneurial freedom of choice for companies must be guaranteed.

- **Remove trade barriers for Industrie 4.0 products**
- **Cybersecurity and protection of company data as part of trade agreements**

An economic area fit for the future – through knowledge and flexibility

9. Access to technologies – through research, transfer and financing

If the digital transition in European industry is to succeed, all companies need access to technologies, infrastructures and networks. The key to success in research funding is to establish links between players and to transfer research results into industrial practice quickly. To achieve this, unbureaucratic and fast access to research projects and transfer activities is important, especially for industrial medium-sized companies.

EU production research plays a key role here. It can bring together machinery manufacturers, research institutes, universities and customer industries from all European countries, and create the necessary European perspective. The “Factories of the Future” programme has set the right priorities here, and needs to be developed further. One of the strengths of EU research remains pre-competitive and cooperative research. However, this needs to be complemented by appropriate elements that enable pre-competitive testing and validation of Industrie 4.0 solutions in cross-border value networks.

But there is still room for improvement in the EU programmes: the entry barriers remain too high and there is a lack of suitable instruments to deal with the dynamic industrial development. Approaches like the I4MS format are a step in the right direction, but need to be developed further.

The EU's programmes are not suitable for supporting close-to-market activities, as they are largely based on grants, not sufficiently flexible and could distort competition. Credit-financed innovation support (such as that created in the Horizon 2020 SME programme) may help to fill the gaps in a flexible manner. The Readiness Study by VDMA's IMPULS Foundation shows that there is a need for action. Around 63% of pioneering companies in Industrie 4.0 stated that a lack of financial resources is the greatest barrier to fully implementing Industrie 4.0 projects.

Research must also contribute to advancing data security and know-how protection, transferring knowledge and thus improving acceptance within companies. In addition to technological research, Industrie 4.0 requires horizontal research activities, for example in relation to the economic and legal framework conditions.

- **Develop the “Factories of the Future” programme in dialogue with industry and add flexible, easily accessible elements**
- **Promote cross-border EU test beds with flexible instruments**
- **Improve access to financing in the EU, especially to support the digital transition in production**

10. More than just digital skills – preparing society and the working environment

Industrie 4.0 will change the way people, machines and organisations work together. New work content and organisations will require new and additional qualifications. But Industrie 4.0 is also a vision that will evolve very differently depending on the company, sector, business model and application, and will lead to different levels of digital penetration. It is therefore impossible to make a definitive statement about which requirements can be expected and what qualifications and level of education will be needed. There will certainly be no such thing as a factory without workers, but Industrie 4.0 will provide opportunities to relieve people of strenuous activities, offer better support for operators and adapt working hours to personal situations. However, new skills will be required – not only from staff in production, but also in the administrative offices, development centres and management.

This is a question not only of programming skills, machine communication and human-machine interfaces, but also of communication between people – between the IT experts and the application disciplines, between the company departments and throughout the process. Changes in the work organisation, new responsibilities and increased requirements in methods and social skills are therefore to be expected. An initiative like the EU's "Grand Coalition for Digital Jobs" will not be enough for Industrie 4.0. In order to prepare people for the transition, education and training needs to be flexible, so that people can learn and re-skill continuously. There is therefore a need for concepts that are sufficiently flexible and allow continuous updates. This can be achieved through substantial industrial content and training that offers complementary content (such as combinations of degree programmes and apprenticeships, or compressed first degrees followed by internships or complementary studies).

Industrie 4.0 essentially offers and demands more flexibility. In shaping the framework conditions, such as labour law, it is important to remember this and to leave space for collective agreements or arrangements at company level.

Education and research should also contribute to increasing the capacity of science, industry and politics to shape the digital transition successfully in the long term. To achieve this, the various disciplines and social groups need to come together to conduct interdisciplinary, cross-border research, lead the discourse and develop suitable methods and solutions.

- **Promote exchange of staff between countries and disciplines, e.g. through an "Erasmus programme for shop floor workers" and an interdisciplinary, cross-border exchange programme for engineers and IT experts**
- **Put Industrie 4.0 requirements at the heart of the KIC Advanced Manufacturing**
- **Strengthen Europe's adaptability and capacity for the long term**

Conclusion: Developing a strategy, ensuring future-proof and flexible regulation

Industrie 4.0 is a dynamic development and it will take years for its potential and limitations to become fully clear. Companies are currently in a phase of experimentation, during which they develop and test new processes and business models. Policy makers must leave enough space for innovation and entrepreneurial initiative, while also developing the required regulatory framework. We need a regulatory framework for the future – this cannot be achieved by looking back. Preference should be given to instruments that are sufficiently flexible to keep pace with the speed of innovation. The future functional properties and flexible application fields of products need to be taken into account even more, especially in the case of regulations that impact significantly on the product design and thus define investment and technological developments for years.

It is important to establish and maintain strong strategic European dialogue between research, industry and policy makers. DG Connect's round tables on Digitising Europe are the right approach, but need to be continued and embedded in an overall EU strategy on

industrial policy. At the same time, the capacity and ability of industry, science and legislators to shape a competitive and sustainable Industrie 4.0 for the long term needs to be strengthened.

Industrie 4.0 is not only about digitalising production further, but will be a far-reaching change in the way we develop, work, produce and consume. The political governance of this transition cannot be delivered by digital and network policy alone – it needs to be a priority embedded in a European strategy for growth and innovation. At the heart of this is a single market 4.0 for the products of a new and changing industry, be they data, objects or services.

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