

BACKGROUND DISCUSSION DOCUMENT

Informal Meeting of Ministers Responsible for Competitiveness (Internal Market and Industry)

17 – 18 July 2016, Bratislava

ACCELERATING THE DIGITAL TRANSFORMATION OF EUROPE'S INDUSTRY AND ENTERPRISES

Advanced technologies are currently driving what has been labelled as the "fourth industrial revolution". With the potential to transform industries and have a significant social, economic and environmental impact, this smart transformation of business and society presents an enormous growth potential for Europe.

Today, approximately one third of the growth of the overall industrial output in the EU is linked to the uptake of digital technologies¹ and it is estimated that digitising products and services further will add more than EUR 110 billion of revenue per year in Europe in the next 5 years². Moreover, the interoperability and interconnectedness of digital technology and services – through the Internet of Things – is said to have the potential to add EUR 5.5 trillion to the global economy by 2025³.

The improvements to product quality from integrating digital and physical production can play an important role in reducing costs: the top 100 European manufacturers could save an estimated EUR 160 billion in the costs of scrapping or reworking defective products if they could eliminate all defects⁴. By using advanced analytics in predictive maintenance programmes, manufacturing companies can avoid machine failures on the factory floor, cutting downtime by an estimated 50% and increasing production by 20%⁵.

¹ Estimates by LIFE and a series of studies 2016

² Boston Consulting Group, 2015. The future of productivity and growth in manufacturing industries; PwC, 2015. Opportunities and challenges of the industrial internet

³ Disruptive technologies: advances that will transform life, business, and the global economy; McKinsey Global Institute, 2013

⁴ European Commission, 2015. Digital Transformation of European Industry and Enterprises

⁵ Ibid

Industrial companies expect to generate 3.6% p.a. in cost reductions over the next five years, driven by internal improvements and by integration across value chains. They are also expecting to generate 2.9% p.a. in increased revenues by digitising products and services and developing new digital service offerings, all the way through to hosting platforms for industrial ecosystems⁶.

The biggest opportunity for Europe lies in the smart transformation of existing industry and enterprises based on a combination of technologies. Europe has a leading position in many manufacturing sectors from automotive and mechanical engineering, through pharmaceuticals, to services such as the tourism and leisure. Three quarters of the value of the future economy will come from traditional businesses. For example, the market for connected cars will grow from EUR 40 billion in 2016 to EUR 120 billion in 2021⁷.

It is therefore essential to support the transformation of traditional industries in order for Europe to keep its leading position. Disruptive business models and improved production processes, empowered by digital investments, will generate new international market opportunities. Europe needs to fully exploit these opportunities to become more competitive and offer a better place to invest and do business.

The magnitude of the impact of technological transformation on the workforce remains uncertain. The extent to which different sectors, companies and functions will be impacted has to be further investigated in order to better frame the relevant policy actions to be taken to ensure Europe's competitiveness.

The objective of the Informal Meeting of Ministers Responsible for Competitiveness is to discuss a common vision and identify a series of actions to encourage investments, create favourable conditions and accelerate the up-skilling of the EU workforce as a means to prepare the smart transformation of European businesses. These actions are intended to help to unlock unprecedented and still not-fully exploited business opportunities, and allow European companies to take a leading place in the modern digital economy.

As the Competitiveness Council recognised in its conclusions of 26 May 2016, speed of action is of the essence to capture all the benefits of digitalisation as soon as possible. Europe has the opportunity to boost growth through smart transformation. To seize the opportunity Europe needs strong leadership, a bold vision, and the ambition to lead in the key industrial and technological domains, coupled with rapid implementation. Concrete, joint action plans are needed to address current and future challenges.

⁶ PwC, 2016. Industry 4.0: Building the digital enterprise

⁷ PwC, Strategy&, 2015, Connected Car Study 2015

The meeting on 18 July will be arranged in the following way:

After the **opening plenary session**, Ministers will take part in two interactive sessions.

Digital Compass: in small groups of 5-6, Ministers will discuss the market opportunities, the regulatory and social impacts, the skills requirements – and lack thereof – and investment issues of selected European technologies. To support the debate of Ministers on the most appropriate ways the tackle these challenges, a demonstration of technologies including virtual reality, robotics, cyber security, education technologies, 3D printing, big data and UAVs will illustrate the magnitude and the speed of the current industrial revolution, as well as highlight the opportunities and challenges stemming from it.

Two Parallel Break-out Sessions, moderated by experienced experts in the respective fields, aim to trigger an active discussion on how to overcome two of the major barriers for the digital transformation of European businesses and the modernisation of industry: Investment and Skills. In **Group A**, Ministers will discuss how revamping investment opportunities in the EU can lead to improved competitiveness, growth and technological leadership of European industry. In **Group B**, the discussion will focus on up-skilling the workforce to match industry needs for generations to come, maintaining technological and innovative leadership of European industry. The guiding principles for the transformation are: industry-led initiatives, execution, and timing.

After the Break-out Sessions, a summary and concluding remarks will be presented over **lunch**. During the lunch there will be an opportunity for further open discussion on other issues presented during the Digital Compass or as part of the Break-out Sessions. Our discussions will of course be subject to Chatham House rules and key conclusions will be considered as possible items for future action.

GROUP A: MOBILISING SMART INVESTMENTS FOR TRANSFORMING EU INDUSTRY

The implementation of smart industry principles creates new opportunities for businesses and expands the dimensions of competition, creating new markets and disrupting existing ones. Digitisation of virtually every aspect of manufacturing, conducting business and providing services allows industries to increasingly turn data generated as part of their operation and use of products into profit. Rather than competing solely on cost, European companies can compete on the basis of innovation, the ability to offer mass-customisation, or on quality and high value added services. In addition, the expansion of product portfolio of manufacturing companies is reported to significantly increase profitability and employment⁸.

To adapt to this changing industrial environment dominated by new digital technologies, existing and new businesses will need to increase investment in their technological readiness. The necessary investment is estimated at approx. EUR 140 billion p.a.⁹. This is a daunting prediction, particularly for SMEs and traditional industries, which in many cases are likely to struggle to grasp the long-term benefits of such investment. At present, as few as 1.7 % of EU companies reap the benefits of advanced digital technologies and the new business opportunities they bring about. This is mainly due to a lack of flexibility and investment (especially in the case of SMEs)¹⁰.

For example, in robotics and automation of processes, it is estimated that of the total system costs of a robot, the capital alone accounts for 25% to 30%, excluding costs for programming, setup, and dedicated work shells. This means automation can be prohibitively expensive for SMEs.

In the automotive sector, for instance, producers are progressively shifting from a product-sales model to a pay-per-use or subscription model, selling services rather than products. Moreover, the near future will exhibit a predominance of digital platforms in the value chains, as they manage and control client data - 30% to 40% of the value is expected to pass through digital platforms¹¹. In addition, e-commerce solutions represent a great opportunity for traditional businesses as they allow them to sell existing goods and services to a larger market, as well as launch new goods and services.



⁸ Crozet, M. and Milet, E., Should everybody be in services? CEPII working paper 2015

⁹ PwC, 2015: Industry 4.0. Opportunities and challenges of the industrial internet

¹⁰ IDC European Vertical Markets Survey 2012

¹¹ Strategic Policy Forum on Digital Entrepreneurship 2016: Big data and B2B digital platforms: The next frontier for Europe's industry and enterprises

The current amount invested by European companies in research and innovation is being outpaced by global competition. In comparison to the US, total private investment in R&D&I in the EU represents only 40% of US companies' investments¹². Investment in ICT and infrastructure for new technologies is another area in which the EU is losing ground to its global competitors. To close the accumulated gap in R&D&I and ICT investments with the US, the EU would have to invest EUR 335 billion¹³. Moreover, in terms of mobile broadband penetration, while North America's 4G network coverage is at 97%, Europe's is only at 63%¹⁴.

Revamped Support for Innovation

Today, and in both the near and distance future, the challenges the EU faces are both the insufficiency and the inefficiency of investment. With the emergence of new business models and industrial innovation, EU and Member State should not only adjust the regulatory framework to tackle barriers for investments and to foster innovation, but also look for innovative ways of providing financial support and incentives for mobilising private investment. Existing and emerging policy instrument and initiatives should help re-shape the current R&D&I spending models. In a portfolio approach, focus should shift from traditional R&D to include innovative products, services and processes.

Innovative solutions and projects can also increasingly help bring innovation into the public sector at the national and EU level alike. Also through smarter procurement of innovative solutions, governments and public administration authorities should also adapt and innovate their internal processes. Moreover, innovation procurement can also create demand and new markets for innovation, even in pre-commercial stage.

Ad-hoc and predicted challenges could test the innovative potential and flexibility of European Start-ups and Innovative SMEs, and stimulate research and knowledge transfer. Effective implementation of innovative solutions and technology development can also benefit entire communities, cities and regions by, for example, effectively implementing the Smart Cities concept.

Member States should create the right conditions for investors and disruptive business models on the Single Market, both at the EU as well as at a national level. The Commission's recommendations on challenges for investments and growth¹⁵ and Country Specific Recommendations can help Member States to identify and tackle barriers to investment and growth.

Failure to adequately address the emerging investment gap could result in economic inefficiencies or even instability and reduce the potential impact of digital and technological progress on growth and productivity in the EU. Hence, it is crucial to amend the existing investment framework and develop new models and instruments to better support the needs of

¹² European Commission, 2016, Communication - Digitising European Industry: Reaping the full benefits of a digital single market.

¹³ European Commission, 2015, The 2015 Single Market Integration and competitiveness in the EU and its Member States.

¹⁴ IDC Predictions 2013: Competing on the Third Platform

¹⁵ European Commission, 2016, Commission staff working document – Member States investments challenges

European industries and business of all sizes and sectors. Europe needs more effective investment to ensure higher quality outputs.

Linking Public to Private Investment

Public sector investment has a key role to play in acting as a catalyst. Projects of Public-Private Partnership (PPP), public sector investment or the European Fund for Strategic Investments (EFSI) should be leveraged to incentivise private investment and encouraging innovation in priority or high-potential areas. Multiple stakeholders, including SMEs, could then engage in closer collaboration on and co-invest in projects of common interest and in building up an infrastructure of R&D&I to bring new, innovative products to market. Moreover, industries and companies should realise the potential of this investment and become proactive in cooperation with universities, within their R&D infrastructure, as well as tap into innovative solutions of Start-ups.

Coordination of existing and new EU level strategic platforms for consultation can also help deliver the necessary strategic focus. Addressing the growing footprint of digital technologies, the initiative for **Digitising European Industry** sets a set of concrete actions to ensure modernisation of European industry. Among other things, it will connect Member States initiatives, pool knowledge, and provide the right infrastructure to support the digital transformation¹⁶.

Adding to this coordination, the newly established **Smart specialisation platform for industrial modernisation** builds on the existing Smart specialisation strategies, as it has the ambition to match smart specialisation priorities in areas key to industrial modernisation and new growth sectors across the EU¹⁷. This will be instrumental to facilitate, through interregional cooperation and the active involvement of industry and clusters, the development of a pipeline of high quality investment in industrial projects on shared smart specialisation areas. In support of the industrial modernisation platform, the recently published **Blueprint and network of model regions of digital transformation and modernisation** will inspire regions take leadership, build-up innovation capacity, reinforce stakeholder partnerships to co-design mega-projects and unleash cross-region investments¹⁸.

EU level and Member States support and incentives in R&D&I activities should also be guided by an investment pipeline of mature projects across the EU. A diagnostic of regional industrial landscapes and the proposed catalogue of national and regional initiatives and priorities could inform the selection of projects to be included in such a pipeline¹⁹. This would account for differences in performance of EU regions in the area of industrial modernisation, as well as help create a level playing field.

¹⁶ European Commission, 2016, Communication - Digitising European Industry: Reaping the full benefits of a digital single market.

¹⁷ European Commission, 2016. Smart Specialisation Platform.

¹⁸ Strategic Policy Forum on Digital Entrepreneurship 2016: Blueprint for cities and regions as launch pads for digital transformation

¹⁹ European Commission, 2016, Communication - Digitising European Industry: Reaping the full benefits of a digital single market.

Turning Investment into Smart Money

In addition to creating new methods of funding innovation and rethinking the current investment framework, the EU should continue to foster more projects of common interest. Such collaborative activities could, for example, be made possible through measures better targeting investments in promising fields like ICT, research and innovation. In other words, the focus of EU investment, as well as national and private, should mirror industry sectors of strategic importance and niche areas, to ensure European industry remains competitive in its most advanced sectors, as well as develop faster priority areas.

Investing in ICT alone is not enough, however. The effective use of technology and new digital trends require additional investments in complementary knowledge-based capital. To ensure the future “return on investment”, preconditions stimulating co-creation, knowledge and technology transfer should be established where applicable.

Technology transfer centres, clusters and (digital) Innovation Hubs can indeed combine investment with both experience and knowledge transfer, for the benefit of local, regional and cross-border industries, traditional business, and innovative companies. Particular support combining different EU investment instruments, linked with facilitating stakeholder partnerships, mentoring and access to existing and emerging technologies can build-up regional and Member State innovation capacity. Moreover, strategic cluster partnerships and collaboration with scaleups and startups can help expose traditional industries to technological progress and speed up the uptake of new, digital technologies, leading to potential synergies and cross-regional collaborative projects.

Questions for Discussion in Group A:

1. With new business models leading to new opportunities for entrepreneurs and new business ventures, what do we need to do on a national and a European level to embrace disruptive business models?
How can we ensure the availability of appropriate financing, entrepreneurial support and the right regulatory framework that these trends require?
How can Member States help to tackle barriers for these business models in order to ensure efficient resource allocation by the market?
2. In innovative projects with high added value, how can public funding be used most effectively to attract private investment?
3. How can we ensure that public-private financial support benefits innovative entrepreneurs (Smart Money), facilitating cooperation and knowledge transfer by means of e.g. Digital Innovation Hubs, the industrial modernisation platform, the network of regions of digital transformation, etc.? What should be the highest priority?

GROUP B: FUTURE READINESS OF THE EU WORKFORCE

Over recent years the range of new skills required in the workplace has broadened out to include the concept of digital literacy - encompassing multiple types of skill-sets such as basic, operational, cognitive, social and attitudinal. However, many of the existing frameworks are blurred in terms of the types of skills they define (e.g. by not distinguishing between high and low level skills), and a lack of clarity around the types of digital competencies necessary for certain tasks to be performed by specific user groups. Other types of frameworks focus on specific categories of user groups rather than considering the picture as a whole.

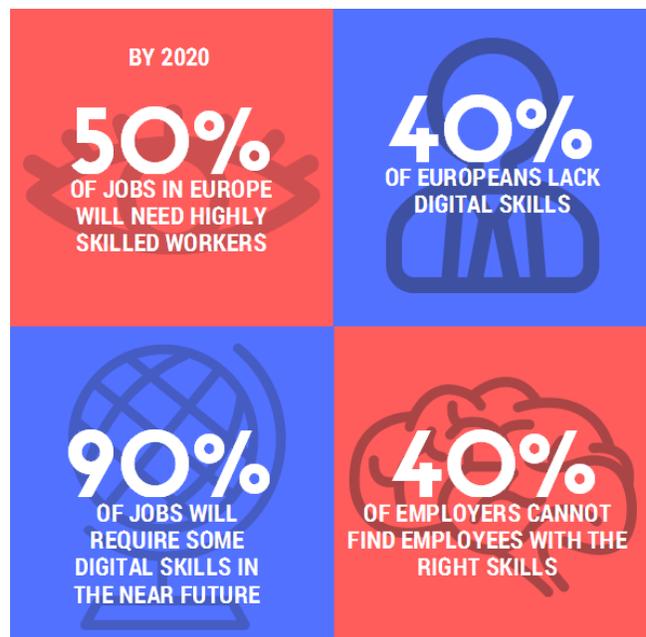
It is possible to identify the overarching digital skill needs under three key groups:

- › Practitioner skills required for researching, developing, designing, strategic planning, managing, producing, consulting, marketing, selling, integrating, installing, administering, maintaining, supporting and servicing ICT systems.
- › User skills required for the effective application of ICT systems and devices by the individual.
- › Leadership skills covering a range of skills, attributes and attitudes related to: knowledge of the capabilities and limitations of software systems and information systems in use; ability to quickly assess new capabilities of existing systems and the relevance of offers of software and web services emerging on the market; ability to describe prototype solutions; understanding of the fundamentals of alignment of business and IT functions in an organisation.

Digital skills gaps across a range of sectors have emerged mainly as a result of the introduction of new technologies and new processes that require IT specific skills. By 2020, it is anticipated that there will be around 56,000 job opportunities p.a. in 'Big Data' alone and by 2025, skills forecasts foresee as much as 90% of jobs will require some level of digital skills. Moreover, new technologies are re-shaping the structures of businesses and the way people work, allowing for more flexibility and broadening job profiles.

These trends reflect technological progress and the increasing amounts of data that will be created and used from internet-connected devices - the Internet of Things.

The growing imbalance in many national labour markets will require new, fit-for-purpose approaches to mitigate the immediate and long-term effects.



Overall, it is expected that smart transformation of European industry has the potential to create from 400,000 to 1.5 million new jobs²⁰. Technological advances are estimated to affect 54% of workforce across the entire EU over the coming decades demanding new, specific and multidisciplinary high-skill human capital. Linked to advanced technologies such as UAVs and 3D-printing for instance the skillset required of new staff is so specific that successful applicants typically comply with only 30% of the requirements for the job. The remaining 70% is achieved by training and “learning by doing”. In 3D printing, operators must have skills in mechanical engineering, material science and 3D-design in order to meet the production process requirements.

Around 45 % of the tasks performed by EU workers can be automated by existing technologies²¹ and about 60 % of occupations could have 30 % or more of their activities automated. Many jobs and business processes will be redefined and how technology complements work will evolve rapidly. Both public and private sector need to adapt to help individuals acquire new skills and navigate the period of transition.

In light of these striking figures, the issue of skills should not fall exclusively under the remit of national and EU authorities charged with education and labour policies. On the contrary, due to the implications the smart transformation of industry has on the labour market, it is imperative to address the issue from an economic and industry perspective, inextricably linked with labour legislation and education systems²².

Addressing the Growing Skills Gap

The call for imminent action is addressed by the European Commission’s new Skills Agenda for Europe, published on 10 June 2016 aimed at strengthening human capital, employability and competitiveness. It presents a number of actions and initiatives with the ambition to tackle the specific and multidisciplinary skills deficit in Europe.

Over the next two years, the new agenda sets out to improve the quality and relevance of skills formation, to make skills and qualifications more visible and comparable, and advancing skills intelligence and informed career choices. Among other things, it contains actions on Digital Skills and Job Coalition, on a Blueprint for Sectoral cooperation on Skills, and on promoting entrepreneurial and innovation-oriented mind-sets and skills²³.

Although the new Skills Agenda for Europe is the flagship initiative, it is absolutely crucial to go beyond the concept and think about concrete steps for implementation of the agenda. Industry stakeholders in cooperation with educational institutions should be the frontrunners of skills initiatives, while regional and national funding agencies should stimulate local clusters to foster modernisation of vocational education and training. Much like in the case of adopting new technologies, cooperation activities require financing outside of the business-as-usual budgets of companies. To provide additional incentives for industries to engage in proactive and closer

²⁰ Strategic Principles of Competing in Digital Age, 2014, Martin Hirt and Paul Willmott, McKinsey

²¹ Ibid.

²² Education Policies and Practices to Foster Tolerance, Respect for Diversity and Civic Responsibility

²³ European Commission, 2016. New Skills Agenda for Europe

cooperation with academia, the EU places more than € 27 billion of the European Social Fund to support skills (period of 2014-2020)²⁴.

Ensuring Right Skills for the Future

Qualified workers are already in short supply and there is fierce competition for talent. The need is growing for not only new, highly specialised skills in areas such as robotics, simulation, data mining, cyber security, but also for highly qualified labour in traditional industries. Moreover, technical skills must be combined with development of soft skills like creative thinking, problem-solving, communication and negotiation skills etc.

To illustrate the likely skills demand, the European Commission expects the market for Big Data to grow by 40% each year. Big data analytics skills are particularly (and increasingly) sought-after in the labour market. In the UK alone, the number of big data analysts working in larger firms is expected to increase by more than 240% over the next five years. Another recent study in Ireland pointed out that, under a high growth scenario, demand from businesses expanding, as well as replacing people, could result in 21,000 job vacancies for big data analysts in the run-up to 2020²⁵.

Opening up to Innovation

Besides direct and indirect incentives for industry and businesses, it is imperative that the private sector recognise the importance and benefits of such cooperation and knowledge transfer, in order to ensure continuity. Industry-driven PPP initiatives also have great potential to better utilise existing R&D&I infrastructure, motivating private sector investment to foster open innovation models in cooperation with R&D institutions, technology transfer offices, government bodies and universities. Such business-university partnerships are advantageous from the investment perspective as well as in the context of fostering entrepreneurial spirit and building human capital with specific skills.

Skills in areas such as business, management, IT, creative industry, and similar, could be transferred in-house, through training and mentoring by professionals and employees. However, in the case of industry specific and equipment-intensive skills, for example, a common infrastructure in the form of shared training centres could be developed to facilitate knowledge transfers in a cost effective way.

Not underestimating the existing innovative potential of EU's human capital, both public and private sector should use this potential by promoting, supporting and incentivising the use of open innovation models. More and more corporations and industries realise the benefits of engaging in triple helix R&D&I ecosystems – a model which not only allows researchers and innovators to gain industry specific knowledge, but also in a reverse knowledge-sharing fashion, fosters out-of-the-box thinking in less flexible, structured businesses.

²⁴ Ibid.

²⁵ Digital Skills for the UK Economy, 2016, report by ECORYS

Questions for Discussion in Group B:

1. How should we prepare Europe for the new “future skills” that its labour market and industries will demand in the next 5, 10, 15 years?
2. How can we motivate both public and private sector to adopt open innovation models to tackle the skills challenge?
What has been the most effective approach to implement the open innovation model?
3. How can we best mitigate the immediate impact that this digital and technological shift will have on our current professions, labour force, and education system?
How do we incentivise industry to actively participate in this process?
What new methods can be adopted?