DIGITALEUROPE

Accelerate to a trusted Digital Single Market

February 2018

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Foreword

Digitalisation is on everyone's mind and it will impact how people live, work, interact and conduct business. The upcoming digital transformation represents a tremendous opportunity for society as well as for the economy.

The members of DIGITALEUROPE hold great expertise along the whole spectrum of digital technologies and services, and they have the necessary know-how to support policymakers in building a future-proof regulatory environment. Evidenced-based policymaking is desperately needed to ensure that digital innovation becomes an enhancer of prosperity, security and not least social inclusion throughout the continent.

DIGITALEUROPE has a longstanding tradition of bringing as much clarity and knowledge as possible to the critical debate on how ICT can power Europe to world leadership, and we have proceeded with surveying additional business and political stakeholders. This makes for a compelling assessment of what the EU must do to turn the Digital Single Market from vision to reality.

There is no time to lose for Europe. Other markets are not only ahead of Europe today but they are also moving faster in building the next generation of digital infrastructures and in transforming their economies and societies into the digital age.

As part of the digital transformation, artificial intelligence will increasingly become a main driver for improvement and innovation in the public and private sector. AI will deeply affect the way we work and live. The importance of digital skills can therefore not be underestimated. It is crucial that education policies across Europe adapt to the new reality and strengthen their focus on equipping citizens with digital and computing skills.

We hope that this independent study will help to identify a set of key focus areas for the years to come.

DIGITALEUROPE believes that a close and open dialogue between industry and policymakers is necessary to shape a better future for all. This PwC study and its findings are meant to contribute to this open dialogue.

We take pride in taking leadership of bringing Europe into the digital era in a safe and inclusive manner.

Markus Borchert, President DIGITALEUROPE

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Executive summary

Based on the mid-term review of the Digital Single Market (DSM) strategy and extensive complementary analysis, this study takes the pulse of 40 top European executives on the ongoing digital transformation across industry sectors and governments. It identifies a series of key objectives and enablers which need to be streamlined across Europe, and outlines some case studies that illustrate positive changes.

Conclusions from the field

On 6 May 2015, the European Commission adopted an ambitious strategy to complete the Digital Single Market. Many actions outlined in this strategy are essential for the European internal market and industry. Yet, the EU's digital single market remains too fragmented, and progress is too slow.

Our interviews revealed that Europe could reap the full benefits of the digital transformation if it focuses on 6 areas of action:

Put a digital skills plan in place for the entire population. In 2016, only 56% of Europeans had adequate digital skills. It is urgent to *skill up* the workforce and include digital skills in the education curricula. Without the right framework for skills, Europe risks missing out on the opportunity to transform traditional industries with value-added digital jobs.

Facilitate and trigger the deployment of e-services and lead by example with state-of-the-art public administrations. The public sector constitutes between 20% and 30% of European GDP, and only 33% of the EU population are benefiting from advanced e-services today.

Maximise the potential of a data-driven economy to generate more growth based on innovation, customised services and new business models. Cross-border data flows amount to 13-16% in Europe, as a percentage of all data traffic. Keeping data imprisoned within national boundaries will hurt the growth and innovation potential of Europe.

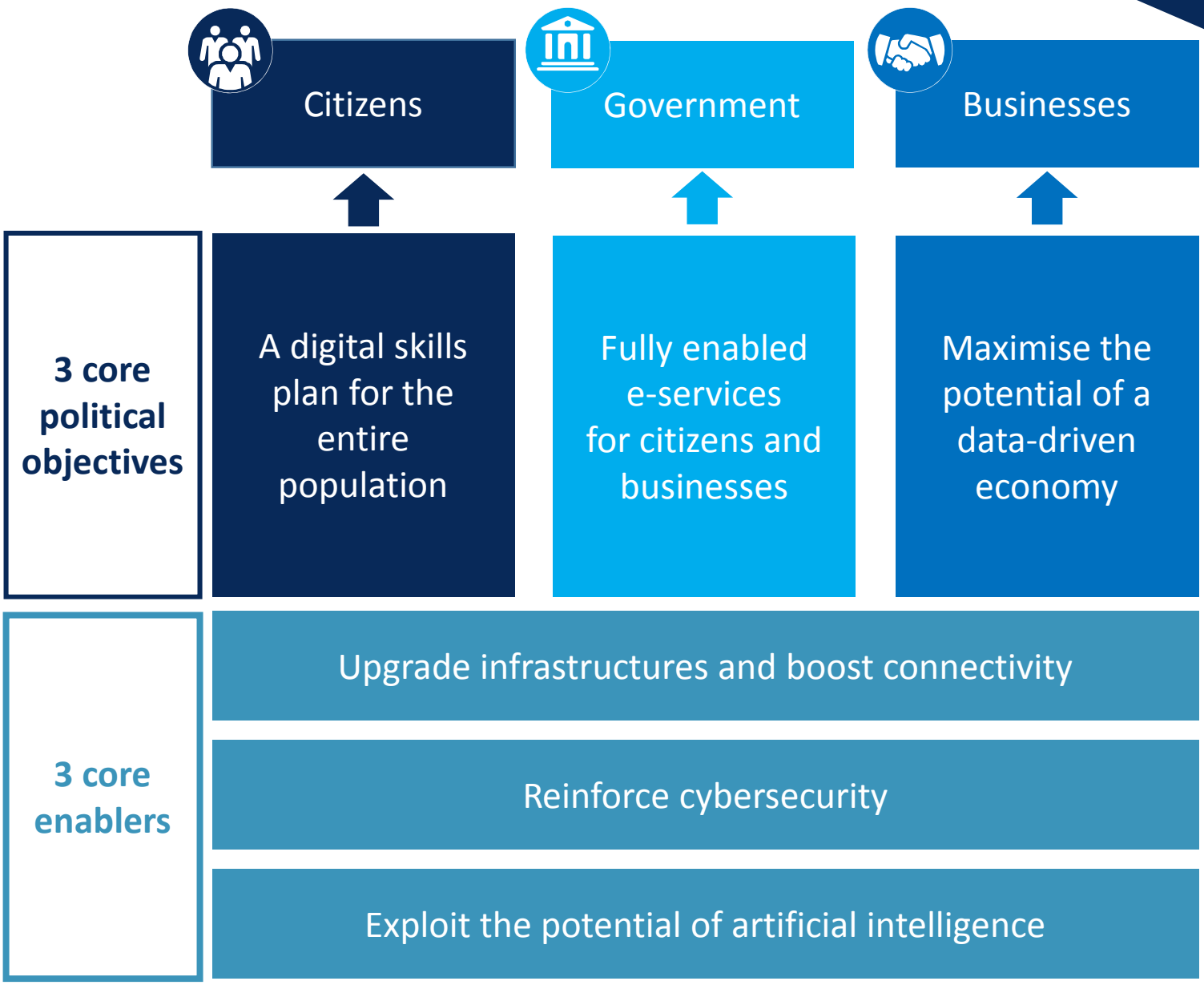
Upgrade the infrastructure to boost connectivity through spectrum, 5G, broadband, high performance computing and cloud computing. Ambitious rule-making and intense investment on spectrum and on connectivity are vital. If Europe were to invest €56.6 billion on 5G, it would create 2.3 million jobs and generate €113.1 billion benefits per annum by 2020.[1]

Reinforce cybersecurity capacity by further combining and coordinating efforts across Europe. It is estimated that an average of €265 billion is lost in Europe due to cybercrime. More collaboration among Member States and with the industry is needed to define and implement a secure cyber framework.

Urgently exploit the potential of artificial intelligence (AI). While AI is becoming an essential driver of future growth and job creation, 83% of external investment in AI is absorbed outside the EU. In 2030, AI's contribution to the global economy will reach €13 trillion. If the EU does not prepare and adapt now, this will lead to a major setback for innovation and job creation in Europe.

A set of 18 concrete actions supported by successful national case studies have been identified and categorised into this report for the 6 themes mentioned above.

We hope that these areas of action and case studies can be used as food for thought to better equip Europe's economy and society for the digital transformation, and can lead to the creation of a functional and more integrated Digital Single Market.



In 2030, AI's contribution to the global economy will reach[2]

EUR 13 trillion

EUR 265 billion
is lost every year in Europe due to cybercrime[3]

Building a world-class data economy infrastructure will require Europe to invest[4]

EUR 500 billion

"We need to keep investing in digital infrastructures while adding a focus on developing the new organisations, services and business models of tomorrow"

Saskia van Uffelen, CEO, Ericsson Belux

More ambitious actions towards a trusted DSM

Upgrade infrastructures and boost connectivity

- Set a clear goal for investments across the EU to ensure deployment of 5G and gigabit networks.
- Experiment with multi-stakeholder business models in infrastructures.
- Ensure reliable connectivity along the EU's main transport routes.

Fully enabled e-services for citizens and businesses

- A digital identity for all EU citizens that allows people to control their personal data and move personal files across European countries.
- Digitisation of governments as a driver for the digital ecosystem.

Reinforce cybersecurity

- Threats are global – so too should be the solutions.
- A shifting threat landscape requires an agile response.
- Increase focus on digital cyber skills.
- Innovation can only flourish if there is trust.

Exploit the potential of artificial intelligence

- Develop a plan for the industry to stimulate AI adoption.
- Launch a European Plan for Strategic Investment in AI:
  EUR 1 billion to be invested in SMEs and start-ups.
- Develop an open AI scientific platform to enhance AI innovation across the public and private sector.

A digital skills plan for the entire population

- A comprehensive and pre-financed plan to upskill the workforce in the EU.
- Coding and digital education mandatory in EU secondary schools
- A Digital Erasmus for all citizens.
- Accelerate the impact of the Digital Skills and Jobs Coalition.

Maximise the potential of a data-driven economy

- Encourage international cooperation to exchange data.
- Leverage the potential of the data economy.

A new acceleration towards a trusted Digital Single Market

EIDAS

GDPR

High Performance Computing (HPC)

Digital Skills and Jobs Coalition

Cybersecurity PPP

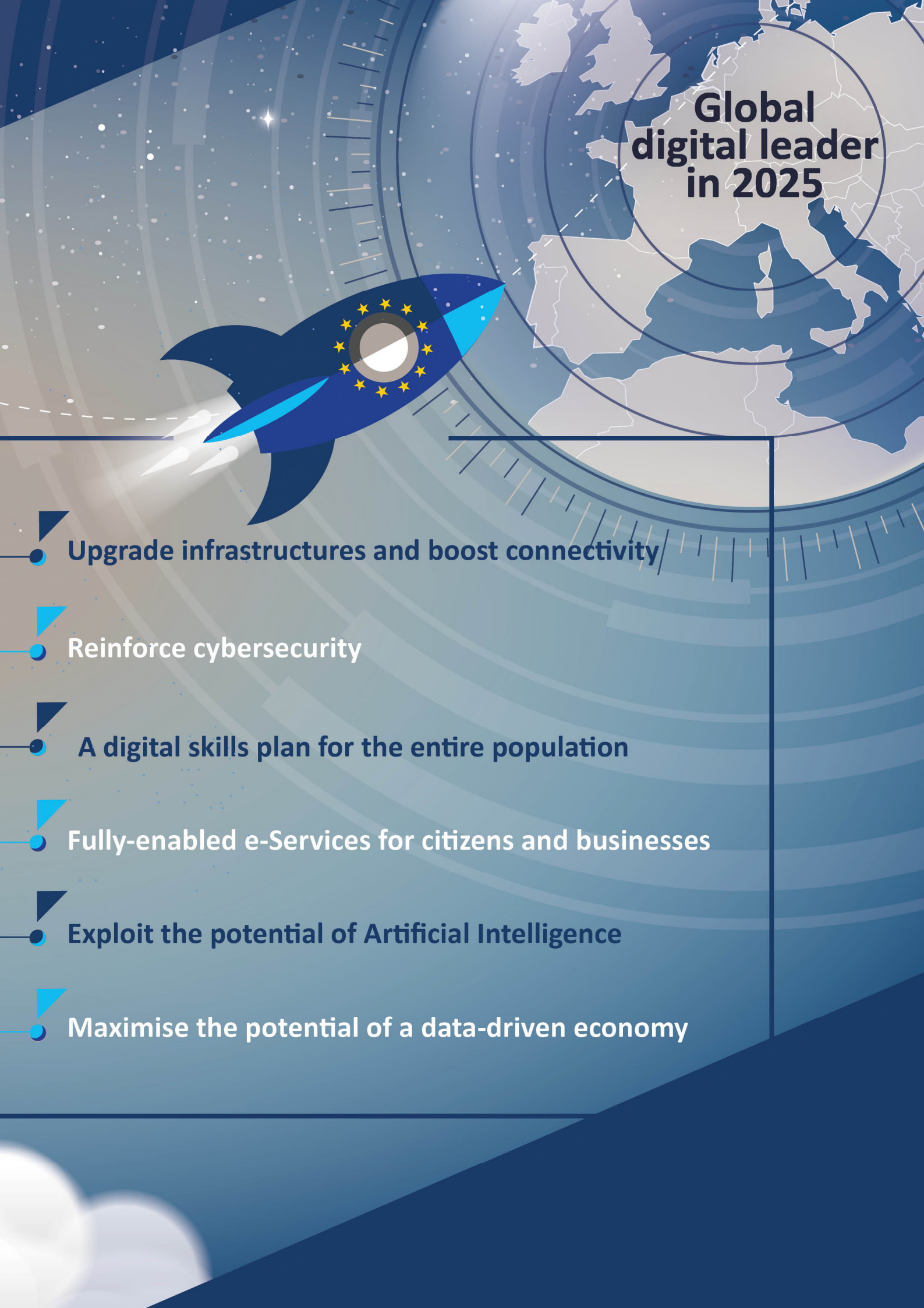
NIS Directive

5G for Europe Action Plan

Big Data Value PPP

Telecom rules

Connecting Europe Facility


Global
digital leader
in 2025
Upgrade infrastructures and boost connectivity
Reinforce cybersecurity
A digital skills plan for the entire population
Fully-enabled e-Services for citizens and businesses
Exploit the potential of Artificial Intelligence
Maximise the potential of a data-driven economy

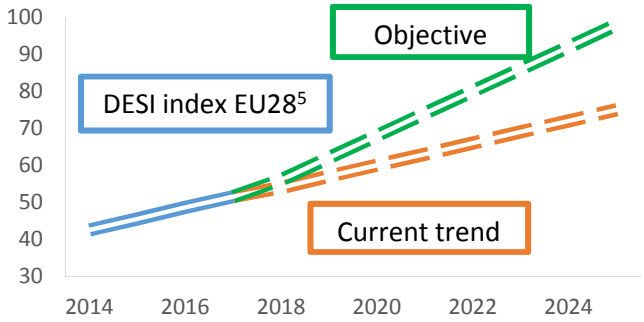
Why is more action required to achieve the DSM?

Why do we need to accelerate now?

The European Digital Single Market has been long anticipated. It sets the basis and vision for a market in which Europeans and businesses can enjoy the same benefits brought by the Digital Age, wherever they are in Europe.

Some progress has been made but the risk of over-regulation and fragmentation remains in many areas of the DSM strategy. However, it has also revealed new challenges and huge gaps in terms of country maturity and progress.

If we continue at this pace, it would take another 15 years to truly become a digital Europe.



"What we need from the public sector is a framework that is clear, transparent and providing minimal rights to all digital stakeholders to ensure fairness and protection."

Ulrich Grabenwarter, Deputy Director, European Investment Fund

We need more DSM, better DSM and faster DSM

Citizens, businesses and governments want to continue in the direction the DSM has taken, and make it truly become a reality.

But while the **DSM has been a step in the right direction, it is simply not enough** in its current state to power the digitisation of Europe and to create a fully trusted environment.

The cost of inaction is simply too high

There is a high price to pay for those who fail to embrace digital transformation.

- **Societal**: Failure to accelerate means that European citizens will lack the skills required for the inevitable changes happening in the workplace. AI has the potential to replace close to 50% of (US) jobs by 2050[6]. Connected cars and other autonomous objects can both be incredibly beneficial, but also potentially dangerous.
- **Geopolitical**: We live in a world where data is the new oil, and artificial intelligence will be involved in significant parts of our lives, including our safety and security. Our new opponents are cybercriminals, who know no borders and threaten our very democracy. We need to take account of this, or we run the serious risk of having to relinquish our leadership, and potentially our independence, to nations that have prepared better to take full advantage of the digital opportunity.
- **Economic**: Our universities are among the best in the world, but our brightest citizens are establishing promising start-ups on other continents. We have plenty of data, offering many opportunities for businesses and citizens through the use of e-services, yet today, it remains unexploited.

6 initiatives converted into actions

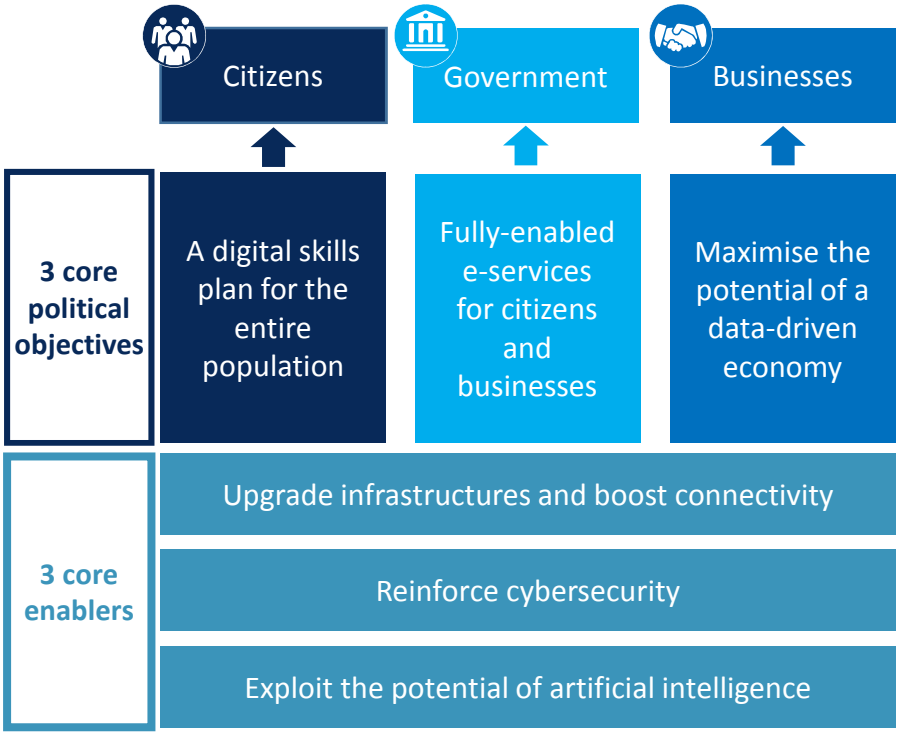
A 2025 deadline

Accelerate the creation of a trusted Digital Single Market

Accelerate towards an unfragmented DSM!

This call to action summarises the key findings from extensive stakeholder consultation combined with in-depth desk research focusing on the Digital Single Market (DSM). Based on the insight from over 40 leaders from major industrial companies, start-ups, public administrations, higher education institutions and professional associations, the findings seek to give a new impetus towards the acceleration of the DSM.

A vision for a fully digitalised Europe by 2025



"We need to better protect Europeans in the digital age. Cyberattacks know no borders and no one is immune."

Jean-Claude Juncker, President of the European Commission

Speeding up DSM initiatives

With the recent launch of major EU initiatives, Europe is making adequate progress in most of the 6 identified areas of action. However, the current progress is not sufficient to position Europe as a global leader in the digital economy. More ambitious initiatives with a fast implementation pace have become an imperative.

Building on the momentum of the 3 core enablers

A fully digital Europe relies on 3 core enablers, which are interdependent and cut across major European industries. These enablers are highly interdependent. Digital infrastructures are the compulsory tracks on which the AI engine can speed up, protected by necessary cybersecurity technologies.

3 policy focus areas with no room for complacency

To build momentum for these 3 enablers, 3 policy objectives require immediate action. First, a skilled workforce is a prerequisite for ensuring employability and improving the competitiveness of EU businesses. The public sector should play a catalytic role through the introduction of efficient e-services. Companies must understand how to exploit their data resources. To succeed with Europe's digital transformation, all 3 policy fronts need to be tackled successfully.

State of play of DSM Initiatives: a step in the right direction but more remains to be done

A clear and consistent regulatory framework is necessary to accelerate Europe's digital transformation, to build trust and certainty for companies, and to protect its citizens. Significant progress has been achieved in the regulatory area. Most notably the GDPR and eIDAS are seen as providing the right foundation for a true DSM. Yet more is needed. Stakeholders interviewed shared how the regulatory framework around the DSM was having an impact on their business activities and highlighted areas for improvement to create an adaptive and forward-looking regulatory framework.

Regulatory framework

The GDPR, by further harmonising EU data protection legislation, is a step in the right direction, but workable implementation and enforcement as well as full alignment with the upcoming revision of the ePrivacy framework will also be essential.

Clarifications on the **free flow of data** are welcomed by industry. However, there is still a need to address the barrier of data localisation.

Legislative proposals to tackle geo-blocking are more controversial as some company leaders believe they can interfere with the freedom to conduct a business and will negatively affect start-ups and SMEs.

Implementing the GDPR: key issues

Data portability poses difficulties for companies with a business model relying on personal data collected from customers.

A right to be forgotten conflicts with blockchain: the main features of this technology are the storage of documents and the inalterability of the information stored.

Focus on innovation and privacy: PSD2 vs GDPR

The revised Payment Services Directive (PSD2) requires banking institutions to open access to customers' account information to third parties. The innovation provided for by the PSD2 relies on an interpretation of the GDPR that is consistent with its goals, for example on consent. The proposed ePrivacy regulation will need to solve similar conflicts if Europe wants its innovation potential to flourish – not just in financial services but in many other industries.

Infrastructures

The proposed **European Electronic Communications Code (EECC)** is an opportunity to reform the EU's telecoms regulatory framework in a way that can spur European leadership in the deployment and uptake of 5G and gigabit networks.

While the current framework has benefited consumers through increased competition, it hasn't been able to stimulate early investments in new fixed and mobile networks. Particularly with regard to future 5G deployment, the status quo is perceived as too fragmented to allow Europe to have the necessary scale to compete with other global economies.

A sufficiently ambitious and investment-focused reform needs to be agreed by the Council and the Parliament.

European Electronic Communications Code

✓ Strengths

- Strong co-investment provisions and more targeted regulation.
- More coordinated and timely spectrum authorisations.
- Further removing deployment costs and administrative burden.

✗ Weaknesses

- Effectiveness of spectrum provisions needs political will from Member States.
- Possible provisions on oligopolies detract from investment focus.
- Insufficient harmonisation for services.

Cybersecurity

The **Directive on Security of Network and Information Systems (NIS)** is the first piece of EU-wide legislation on cybersecurity. The efficiency and cooperation fostered by the Directive need to be tried against the reality on the ground. The Directive should be aligned with global standards and ensure the forthcoming Cybersecurity Certification Framework is compatible with international approaches.

e-services

The framework regarding e-services is seen as highly positive. **eIDAS** is often presented as an excellent initiative with impact beyond European borders. It is now up to Member States to follow up on the implementation. Awareness of other initiatives also needs to be increased.

The **Action Plan** presents a number of initiatives that are positive to the DSM. Implementation has been lagging behind and some proposals mentioned in the plan (e-ID and e-signatures) were delivered late. There is a need for acceleration in this domain.

Finally, while interviewees were glad that much is being done for companies, they felt that citizens would benefit from more focus on their needs.

eIDAS	
✓ Strengths	✗ Weaknesses
• A standard-based regulation enabling interoperability.	• Implementation pace.
• Recognition as an international best practice.	• Lack of public awareness.
	• Need for a harmonised framework on remote identification.

Artificial intelligence

The EU is planning a communication on AI. Currently there are ambitious plans in China and the US, among others.

AI is identified by the industry as ubiquitous and key for the future of the EU DSM; more international cooperation is needed in this domain.

The challenge will lie in the balance to be found between fostering AI experimentation and growth while developing guidance on ethical issues.

Digital skills

The **Digital Skills and Jobs Coalition** is a step in the right direction; it tackles how to improve the uptake of digital skills in Europe at various levels. It focuses on developing digital skills that enable all citizens to be active in our digital society. It promotes upskilling, and reskilling of workers and jobseekers in addition to promoting high-level digital skills for ICT professionals in all industry sectors. And, it addresses digital skills in education – transforming teaching and learning of digital skills into a lifelong learning perspective, including the training of teachers.

Organisations are invited to make pledges, concrete commitments to carry out actions to reduce the digital skills gap in Europe. The progress of pledges is reviewed periodically. National Coalitions are supporting Member States in developing national digital skills strategies.

The **Digital Opportunity Scheme**, with first traineeships starting in academic year 2018/2019, will give students and recent graduates of all disciplines hands-on experience in working in the digital economy.

Overall, problems regarding digital skills are well identified; however, more encouragement for Member States to create and implement national digital skills strategies is needed. Member States should further encourage national digital champions to work in collaboration with industry leaders to unite all stakeholders in their respective countries around the common objective of the Coalition. They can also work to secure funds from both public and private sources for digital skills training programmes.

Upgrade infrastructures and boost connectivity

- Set a clear goal for investments across the EU to ensure deployment of 5G and gigabit networks
- Experiment with multi-stakeholder business models in infrastructures
- Ensure reliable connectivity along the EU's main transport routes

"Today, the level of investment in Europe's digital infrastructure is not sufficient – in fact it is declining. This must change to ensure that Europe is at the forefront of digital transformation, not becoming a laggard"

Markus Borchert, Senior Vice President Europe, Nokia

High-quality connectivity available anytime and anywhere in the EU

Innovative value-added services thanks to next-generation infrastructure

The EU as a global champion in digital infrastructures

State of play in 2018

Stepping up the EU's digital infrastructure plans

The current actions and initiatives recently launched by European institutions (5G action plan, 5G PPP, PPP on HPC, European Cloud initiative, WIFI4EU) were warmly welcomed by industry.

However, EU digital infrastructures are still not at the level needed to ensure service continuity. Additional coordination and investments are needed to fully upgrade EU digital infrastructures and to bridge the gap in investment in digital infrastructures with global competitors. The reform of the EU's telecoms regulatory framework (the EECC) must be up to this challenge.

"We should not underestimate the role of digital networks in Europe. The more we facilitate their access and lower their cost in Europe, the faster we will accelerate the Digital Single Market."

Olivier Barette, Partner, Nowina

One step ahead

By focusing on new value-added services enabled by pervasive digital infrastructures, Europe has the ability to become an international leader in high connectivity and to create a business-friendly environment for the next wave of innovation in the global economy.

Never before have the stakes been so high. The "digital economy" is expanding with Industry 4.0 and the Internet of Things, and Europe will need to be at the forefront of infrastructure investment and cross-sectorial collaboration to regain its competitive edge.

What is at stake

The EU would become a global laggard in digital infrastructures

- Low connectivity: preventing the development of the technologies that run today's systems and equipment.
- Loss of high-growth companies: relocating to business-friendly environments with robust digital infrastructures.
- Slow technological advancement: resulting in a loss of competitiveness.

Building a world-class data economy infrastructure will require Europe to invest[7]

EUR 500 bn

"Europe needs to create the right conditions to roll out 5G in time. For that we need to get the regulatory framework for telecoms right to boost investment in digital infrastructure; we need spectrum availability and allocation, and sound IPR protection."

Markus Borchert, Senior Vice President Europe, Nokia

Case study on infrastructure

5G.ConnectedMobility Consortium

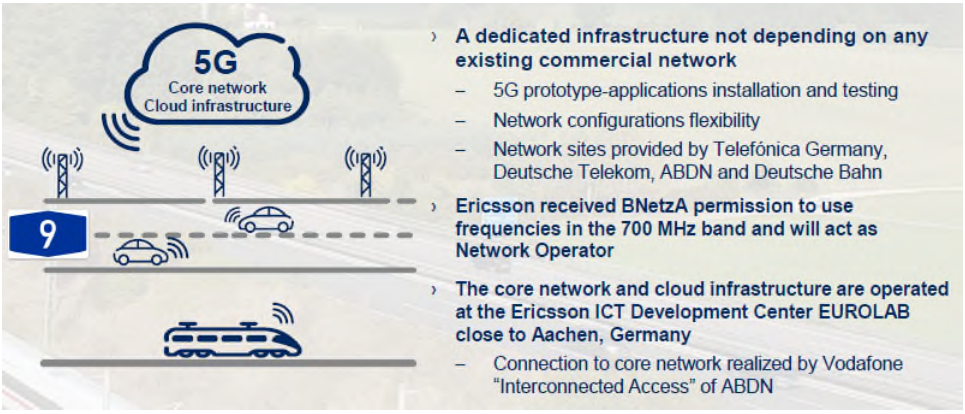
Leading industries in Germany initiated a consortium to **accelerate 5G R&D in Germany and facilitate the integration of technology requirements** from various industries into upcoming international 5G-standardisation activities. A testing platform has been created in Germany with the objective of being replicated later at EU level.

A joint investment driving 5G R&D

The consortium brings together 17 leading companies in 22 different industries including automotive, industry 4.0 and banking to develop an innovation platform where industries, operators and academia can experiment and cooperate.

This platform is a network infrastructure and application environment for 5G **analysis and testing in real time for vehicle-to-vehicle, vehicle-to-infrastructure and railway-to-infrastructure**. It consists of a **test track** of 30 km along the A9 motorway and a **high-speed railway** in Bavaria, Germany. Different projects have been developed on this infrastructure.

Ericsson involved in a collaborative project with government support



A consortium led by Nokia for real-time communication between vehicles

In November 2015, Continental, Deutsche Telekom AG, Fraunhofer ESK, and Nokia demonstrated real-time communication between vehicles via the LTE cell network on the German Motorway A9. This was the first project arising from the "Innovation Charter for the digital A9 motorway test bed". It was demonstrated how vehicles on the motorway can share hazard information using the LTE network of Deutsche Telekom with extremely short transmission times. Follow-up projects are ongoing.

"We need to keep investing in digital infrastructures while adding a focus on developing the new organisations, services and business models of tomorrow."

Saskia van Uffelen, CEO, Ericsson Belux

"It is important that EU-legislation is technology neutral, flexible and not overly detailed. This will ensure its applicability over time given the rapid technology development."

Alf Karlsson, State Secretary to the Swedish Minister for Housing and Digital Development.

Suggested initiatives

Set a clear goal for investments across the EU to ensure deployment of 5G and gigabit networks

The telecommunications industry sees 5G as the next global market, with a major enabler role for technologies such as the IoT. The EU's common vision "Making 5G a success for Europe" and the 5G roadmap are steps in the right direction, as is the goal of fostering "very high capacity networks". However, EU policymakers should unlock investments to turn this roadmap into reality, thereby enabling Europe to lead in infrastructure deployment:

- **Create clear investment incentives**, including co-investment, to ensure fast rollout of 5G and gigabit networks across Europe, allowing market players to create the right investment structures.
- **Reduce administrative burdens** and lower costs of deployment, for instance for small cells.

Experiment with multi-stakeholder business models in infrastructures

By focusing on new business models, EU businesses have the opportunity to maximise returns on new investments in ICT infrastructures while stimulating demand for impactful value-added services. The evolution of these new digital products and services will require new investments in world-class digital infrastructures. Europe's political and industry leaders should therefore:

- **Link the development of value-added services with investments** in infrastructures to consider the impact on the whole value chain.
- **Facilitate end-to-end testing experiences** in order to stimulate the demand for the next generation of digital infrastructures.
- **Incentivise collaborative business models** which can notably unlock joint investments for an optimal use of digital infrastructures.

Ensure reliable connectivity along the EU's main transport routes

The quality and reliability of connectivity are critical for many sectors of the economy, with transport being a key one with huge benefits also in terms of safety and efficiency. Yet, Europeans still find it challenging to perform even a continuous call while they're driving. Governments and industry leaders should work hand in hand to speed up connectivity for transport use cases:

- **Coordinate network infrastructure** upgrades (both fixed and mobile networks).
- **Harmonise the availability of spectrum** for automotive and other transport use cases.
- **Incentivise the introduction of new business models** that can spur investments and improve consumers' transport experience.

Reinforce cybersecurity

- The threats are global – so too should be the solutions
- A shifting threat landscape requires an agile response
- Increased focus on digital cyber skills
- Innovation can only flourish if there is trust

"Cybersecurity used to be a matter for specialists. Not anymore. It has become a matter of democracy and sovereignty."

Jean-Noël de Galzain,
CEO and Founder, WALLIX Group

Protecting democratic societies

Trust that our data is safe

Confidence that our industry is protected

Boost cyber skills

State of play in 2018

Today, with around 20 billion internet-connected devices[8], most of us cannot imagine a life without the benefits that the digital age brings. Whether you are an EU citizen, corporation or governmental institution, digitisation has completely changed the way we live and interact.

However, together with these remarkable possibilities, global citizens and corporations alike have increasingly become vulnerable to new serious cyber threats that few can understand or predict. In the EU, with our high degree of digitisation and limited sophistication, we are especially vulnerable.

What is at stake

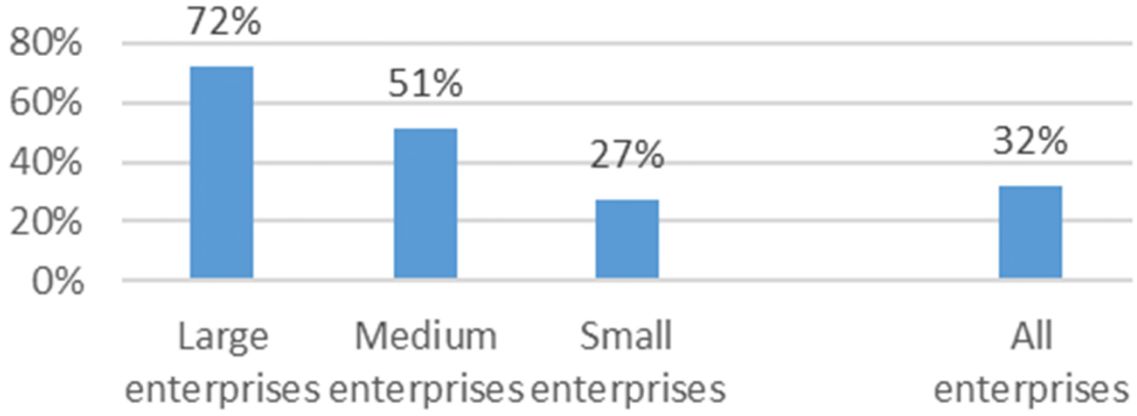
We run a serious risk of losing trust, incurring additional costs and inadequately responding to a major cyberattack:

- Cyberattacks against critical EU infrastructure can severely damage the European economy far beyond the national borders of the targeted country.
- EU countries will not be able to securely provide trusted cross-border platforms and infrastructures.
- Diminished trust in current or future digital platforms can severely undermine the European economy.

EUR 45 bn

Estimated average cost of a major global cyberattack following WannaCry[9]

EU enterprises having a formally defined ICT security policy[10]



Data breaches impacting the EU [11]

Organisation	Industry	Country	Source of breach	Records compromised	Data compromised
T Mobile	Telecoms	Czech Republic	Malicious insider	1 500 000	Undisclosed
Rosebutt Board	Adult	United Kingdom	Malicious outsider	107 000	Username, email address, IP address, hashed passwords
Postbank, Commerzbank & Landesbank Berlin	Finance	Germany	Malicious outsider	85 000	Credit card data
Swiss People's Party	Government	Switzerland	Malicious outsider	50 000	Name, email address
University of Greenwich	Education	United Kingdom	Malicious outsider	21 000	Name, address, date of birth, telephone number, signature
Engitel	Technology	Italy	Hacktivist	20 000+	Username, email address
National Childbirth Trust	Charity	United Kingdom	Malicious outsider	15 000	Email address, username, password

70% of all EU firms don't have a formally defined digital security policy[13]

EUR 265 billion *is lost every year in Europe due to cybercrime*[12]

Case study on cybersecurity

Estonia's digital embassy in Luxembourg

In 2007, cyberattacks originating from Russia took more than 50 major Estonian websites offline. These included banks, newspapers and government websites, and struck Estonia at the heart of its sovereignty, democracy and industry.

According to the World Bank, Estonia has since become a mostly **digital society**. The impact of another cyberattack on the 2007 scale would be devastating, potentially taking down services that **citizens rely on for their security and safety**.

Estonia has become the first country to create a **digital embassy**, where they store the most confidential and critical data for the functioning of the nation.

Estonia has full sovereignty over this digital embassy, just like it has with its physical embassies. It also has the trust that its data is **backed up and safe from physical and cyberattacks** targeting Estonia's mainland.

This is a prime example of how trust between Member States can be leveraged for the common European good, and how to mitigate the risks of a cyberattack at European level.

"Cybersecurity is one of the key elements to build trust into digital platforms, and the digital market. Today we are lacking a common approach towards cybersecurity. Without it, and as long as the DSM is based mostly on trust, any effort toward its establishment will have a limited effect."

Krum Garkov, Executive Director, eu-LISA

Case study on cybersecurity

ENISA

The mandate of the European Union Agency for Network and Information Security (ENISA), created in 2004, is to secure Europe's information society.

"We want the EU to encourage countries to have a common approach for cybersecurity. More harmonisation is a vital need for the DSM."

Bertrand Deprez, Vice President EU Government Affairs, Schneider Electric

ENISA plays a very important role in coordinating common policy discussions for national cyber authorities and guiding legislative implementation. ENISA's role encompasses **recommendations** to national governments, **assistance** on cyber policymaking and implementation, **cyber exercises** and **training courses**. It also coordinates national cybersecurity centres. Its actions are perceived positively by industry and policymakers.

Strengthening ENISA's role in supporting Member States and businesses, including in the implementation of the NIS Directive, will greatly improve Europe's ability to prevent cyberattacks and mitigate their impact.

Solutions envisaged at EU level

The threats are global – so too should be the solutions

Threats in cyberspace do not respect borders and governments cannot retreat into national responses to them. Cyber authorities should ensure security measures under the NIS Directive align to global standards and that schemes under the forthcoming Cybersecurity Certification Framework are compatible with international approaches.

A shifting threat landscape requires an agile response

As digitisation drives innovation across ever-expanding aspects of our economic and social lives, malicious actors are quickly looking for new exploitation paths. We need the flexibility to keep pace. Making space for fast-track, light-touch certifications under the proposed EU Framework is one way to help industry do so.

Increased focus on digital cyber skills

The pace of digitisation brings new threats that many are not aware of or ready to respond to. There must be a strong focus on improving digital skills across all levels of society, business and the public sector.

Innovation can only flourish if there is trust

Cooperation between the public and private sector is essential not only to cybersecurity but to citizens' trust in technology. Sharing information should be a two-way street and public authorities should take care to avoid an overzealous approach to data access for law enforcement and national security.

A digital skills plan for the entire population

- A comprehensive and pre-financed plan to upskill the workforce in the EU
- Coding and digital education mandatory in EU secondary schools
- A Digital Erasmus for all citizens
- Accelerate the impact of the Digital Skills and Jobs Coalition

"If you do not invest in this generation, you will have a lost generation."

Candace Johnson, European Business Angel Network, President

A high level of digital literacy and learning capacity for all EU citizens

A population with the right skillset for the job market

A bridged skills gap

All workers empowered to undertake in-depth professional training

Digital education for all children

Secure private and public funding for digital skills training courses

State of play in 2018

A European plan to bridge the skills gap

Europe has understood the need for an action plan regarding digital skills, and in December 2016 it initiated the Digital Skills and Jobs Coalition to bridge the 500,000 ICT professionals gap.[14] The Coalition recognises that the skills gap is multifaceted: ICT specialists are missing, people combining technical and soft skills are even scarcer, public and private leaders are not sufficiently familiar with digital transformation and children are not receiving enough digital education. Specific objectives need to be set.

A more ambitious and operational programme to upskill the EU workforce

The Digital Skills and Jobs Coalition shows that the EU has realised the extent of the issue related to skills but has not translated it into a comprehensive solution. Its objectives are well defined, but it is not sufficiently ambitious. 37% of people in the EU workforce do not have adequate digital skills [15] and 40% of jobs available will remain unfulfilled[16]. This represents a huge competitiveness and growth challenge for the EU economy and is a major social risk. The European Social Fund and the European Regional Development Fund will inject over EUR 30 billion to support skills development in the period 2014-2020.[17] National governments need to ensure that most of this money will be used for boosting digital skills.

What is at stake

The EU would become a global laggard in digital transformation and economic competitiveness

If nothing more is done, the EU won't be able to capitalise on the opportunities offered by the digital transformation and its competitiveness will be harmed.

First, the skills gap will widen, with 500,000 digital specialists lacking by 2020. [18] At the same time, there will be a huge talent mismatch at EU level, with 40% of the job market unfilled or filled by people without the right skillset.[19] This will result in massive unemployment and social costs for non-qualified workers.

During the last decade, the number of employed ICT specialists increased by 33% across the EU, compared with the 2% growth for total employment.[20] If no upskilling plan is put in place, today's workforce will be less productive and have a lower employability.

2/5 *of companies trying to recruit ICT specialists reported difficulties in filling vacancies*[21]

Case study: Fast track to digital skills

PPP between NumericALL - ADEM-ESF partnerships: Turn unemployed people into junior web developers in 3 months

NumericALL is a digital school that aims to help anyone learn the digital skills required in the job market within 3-5 months.

A concrete training course focusing on employability

With its three-month employment programme, the school offers collaborative and operational training. The objective is clear: foster the employability of learners. To do so, NumericALL interacts with local industry thanks to partnerships and with employment agencies such as ADEM in Luxembourg, and also teaches soft skills to its students.

A PPP covering the full chain from candidate identification to job placements

The Luxembourg employment agency selects candidates for the intensive three-month coding programmes while NumericALL runs the coding camp, the employability framework, and facilitates the placement into companies.

80% success rate on 110 candidates

Benefits and obstacles

The programme results in a very high employability after completion (89% employment rate after 6 months).

However, financed as an innovative programme by the Luxembourg government and the ESF, the scale and diversity of the programme do not fit the magnitude of the market needs.

Computational thinking in Finland

Finland has taken the lead in integrating computational thinking into compulsory education and views coding as an essential new learning skill to complement reading, writing, drawing and calculating.

Mandatory computer science education

In autumn 2016, Finland introduced algorithmic thinking and programming as a mandatory, cross-curricular activity starting from the first year of school.

The teaching of programming and algorithmic thinking is part of maths (grades 1-9) and crafts (grades 7-9). In grades 1 and 2, students learn about the principle of giving step-by-step commands. In the final years of basic education (grades 7-9), they gradually progress from simple to more complex tasks, learning what algorithms are and comparing the usefulness of different algorithms.

In addition, programming is applied to all subjects as a means and as a practical activity. Programming is seen as a way to foster creative expression and increase motivation.

The aim is to develop students' logical thinking skills and problem-solving skills as well as their creative expression and general motivation.

This approach is now considered at EU level as a model for other European countries on how to integrate coding in schools.

"We need to have a highly skilled digital workforce, but we also need to make digital technologies simple enough to enable individuals who do not have adequate digital skills to exploit them."

Ilkka Lakaniemi, Vice President, Finland Chamber of Commerce and Research Director, Aalto University School of Business

Suggested initiatives

A Digital Erasmus for all citizens

The Erasmus Programme is a flagship European initiative. Its success can be extended to an ambitious programme that fits the digital needs of industry and targets all individuals and companies willing to take full advantage of the digital economy.

- Start-ups and entrepreneurs are key players in the digital economy and should be a very first target for a Digital Erasmus.
- An ambitious Digital Erasmus should educate young people and children and give them an early appetite for all things digital.

The subjects taught, and the certification awarded by the Digital Erasmus should be defined by public and private stakeholders together and include national employment agencies in order to be fully recognised at EU level. The Digital Erasmus should therefore have three aims:

- Bridge the IT skills gap by making children, entrepreneurs and decision makers digitally literate.
- Bridge the talent mismatch by offering industry curricula tailored to the market needs.
- Develop new collaboration frameworks between academia and industry to attract talented people to study at European universities and to work on industry issues.

Coding and digital education mandatory in EU secondary schools

- Educate children on subjects linked to digital (cybersecurity, citizenship education in a digitised society, etc.);
- Extend digital education throughout the entire schooling period. There is a need to give an early appetite for new technologies and careers in engineering and ICT.

Coding should be promoted as a basic key skill, just like reading, mathematics and science in curricula and education surveys

Accelerate the impact of the Digital Skills and Jobs Coalition

- Fully empower the National Coalitions in the Member States by harnessing their links to their National Digital Skills strategies.
- The European Commission and national governments should ensure that sufficient resources from the European Structural and Investment Funds (ESIF) are allocated to digital skills development (on basic and advanced levels separately). Fast-track allocation of such EU funds from currently 24 months to 3 months.
- Accelerate the awareness of information on existing digital skills training on the European Commission's website to all citizens.

A comprehensive and pre-financed plan to upskill the workforce in the EU

In order to improve citizen employability and to better cover market needs:

- Provide all businesses and employees with the upskilling toolbox enabling the acquisition of new skills in a short period of time.
- Make employers contribute to the funding of vocational training through a European public training fund.
- Develop the concept of Individual Skills Plan on the model of the retirement third pillar in which the employee and the employer could save money to finance future upskilling plans.
- The return of the investment in upskilling for corporations, as for states, is high compared to unemployment risks and costs.
- Upskilling pre-financing is key. The development of a Social Impact bond under EIB and EU private banks framework to attract public and private investors would constitute an innovative solution given the magnitude of the project.

"A Digital Erasmus addressed to students and start ups as well could not only become a useful European programme but also a worldwide success." ***Bruno Lanvin, Executive Director, INSEAD***

Fully-enabled e-services for citizens and businesses

- A digital identity for all EU citizens, allowing people to control their personal data and move personal files across European countries
- Faster digital transformation of public services as a driver for increased digital adoption by EU businesses

"The lack of interoperable e-Government infrastructure at EU level is often the barrier that stays in the way of doing business or achieving a result."

Eva Maydell, MEP, European Parliament

Secure and convenient cross-border digital interactions for anyone, anywhere and for any service (e-Government, e-Health, e-Banking, etc.)

Life-changing e-services – from giving an identity to a refugee to facilitating daily admin

Governments paving the way to a digitised industry

A digital, mobile identity for every citizen

State of play in 2018

eIDAS is an example of an EU success. Its regulation and specifications have managed to set a common framework in a fragmented market for using digital services across Europe.

However, eIDAS uptake is slow, and no EU-wide network exists today to secure or guarantee ID transactions. Initiatives such as BankID in Sweden demonstrate what can be achieved by local, private initiatives: e-Gov., e-Banking or e-Health at your fingertips. Unfortunately, there are still too few of these initiatives, which occur at local level and do not provide objects with e-identities.

Digital identity and e-services are crucial for EU nationals, and can also help with European challenges such as the current migration crisis.

Today, only **33%** *of European citizens use e-services*[22]

What is at stake

Europe will be lagging in the digitisation of its economy

- Countries which have the most mature e-Government capabilities are also those whose industries are the most digitally advanced.
- Citizens who do not use e-Services on a daily basis are less likely to be front runners of innovation in the Digital Age.
- There will be missed opportunities to reduce costs and fraud, and to increase trust, in particular when it comes to e-Health and e-Gov.

1/3

of Europeans live in a region bordering another country[23]

Case study on e-services

BankID

BankID is a citizen identification solution that allows companies, banks and government agencies to authenticate and conclude agreements with individuals over the internet.

Secure online identification and signing

BankID is a personal electronic proof of identity for identification and advanced electronic signatures.

With BankID, citizens can sign contracts electronically, pay taxes online, access their social security portal online, and of course, access their bank.

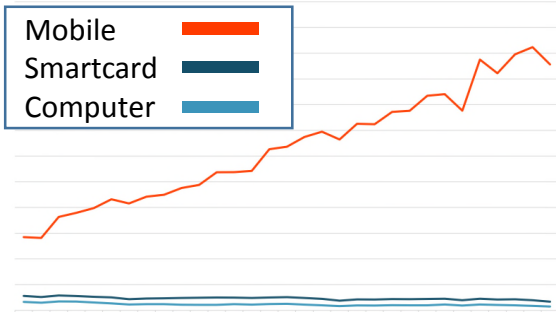
BankID is recognised as an electronic ID document comparable to passports and other physical credentials, thanks to the eIDAS regulation.

A tremendous national success for a mobile ID

With 7.5 million users in 2017, mainly in Sweden where the population is below 10 million, the reach of BankID is substantially higher than what most EU countries reach with their own e-Government solutions. In 2017, BankID was used to identify citizens 2.5 billion times. [24]

The mobile app is not only the most successful way to identify someone, it is also the fastest growing by far.

BankID usage growth by type, Jan-15 to Jul-17[23]



"eIDAS is definitely a positive regulation for our industry and citizens. Now it needs to go further and the technical framework needs to be specified exhaustively."
Pascal Rogiest, CEO, Luxtrust

Case study on e-services

FIEC social ID cards

FIEC, the European Construction Industry Federation works on providing social ID cards to its workers to tackle issues of fraudulent workers.

What are "social ID cards"?

Social ID cards serve many goals: create more transparency with targeted social requirements, store data, access external databases regarding social security, serve as a tool to document the employment period of highly mobile workers or for professional training certification, etc.

Social ID to solve political and social issues

Social ID cards could be a solution to social fraud and undeclared/illicit employment by facilitating controls on construction worksites and ensuring transparency.

Impact assessment and future development

Since 2014, social ID cards have been deployed differently in 11 countries. Discussions are ongoing on whether this could be extended at EU level and on the required legal instruments to implement this.

ÆVATAR ID wallet

ÆVATAR is a common interest corporation providing identity management software open to all public and private stakeholders and in full compliance with the GDPR, PSD2, AML4, and eIDAS for instance.

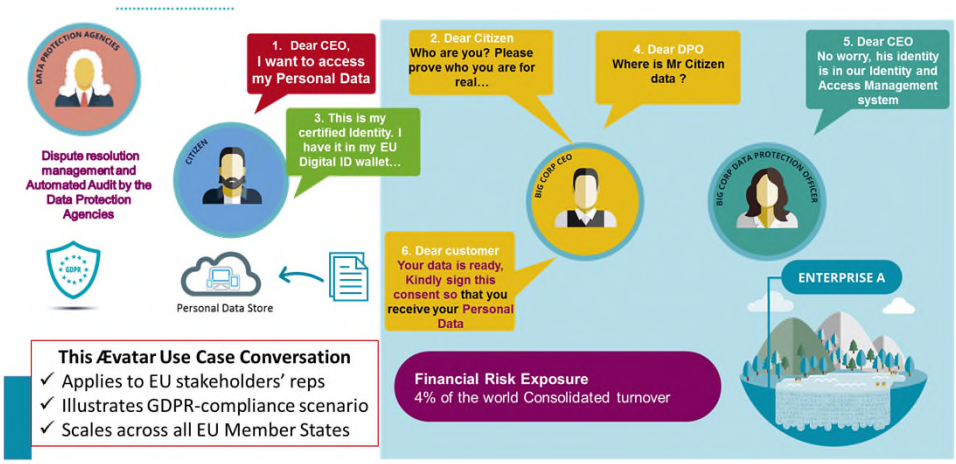
ÆVATAR provides trusted identity access management client-servers for any enterprise or application requiring to identify users who want to access their personal data.

ÆVATAR provides an app enabling all citizens to create a GDPR-compliant ID wallet and to store their personal data in a Personal Data Store.

The users of the app can use their personal ID wallet on a daily basis for any operation they want such as banking, transport or government operation. The objective is to empower EU citizens' data control capabilities.

ÆVATAR is working as a trusted, privacy-preserving, peer-to-peer conversation platform with citizens, employees and customers.

It has applications with instant messaging payment, data consent management, physical access to stadiums, emergency access to IDs, health consultation and more.



Case study on e-services

E-CODEX

E-CODEX is a large-scale project designed to improve access for European citizens and businesses to legal services across borders.

Achieving cross-border European e-justice

E-CODEX aims to connect the existing European judicial systems by improving the interoperability of the information systems of legal authorities within the EU and supporting the implementation of common standards and solutions. To do so, e-CODEX will build on national solutions and on the European e-Justice Portal (2010).

The project has a total EUR 14 million budget with a EUR 7 million contribution from the EU. It involves 19 EU countries and 3 candidate countries (Jersey, Norway, Turkey). [25]

Nets

Nets, a Copenhagen-headquartered company, provides an international network facilitating digital payment and works as the backbone of the Nordic payments ecosystem.

A leading provider of digital payment services

Nets offers a wide range of standards and end-to-end IT solutions building a comprehensive network committed to delivering stable and secure operations at all times.

The network connects banks, businesses, the public sector, merchants and consumers in the Nordic region, mainly in Denmark, Norway, Finland, Sweden and Estonia.

Key figures[26]

- 98% of all digital payment transactions in Danish stores involve one or more of Nets' services.
- 90% of Danish households use Betalingsservice (a payment solution launched by Nets) for their recurring bills.
- More than 240,000 corporate customers use Nets' services.

Suggested initiatives

A digital identity for all EU citizens, allowing people to control their own personal data and move personal files across European countries

Systematically create a digital ID when citizens apply for an ID, a passport or a bank account

e-IDs are still not provided by all EU Member States. To enable systematic usage of e-Government and other e-services, all citizens must be given an e-ID equivalent of their ID. This e-ID must be usable on mobile devices to ensure high uptake.

Build an identity backbone for all EU e-transactions

An identity backbone secures transactions, ensures interoperability of data between services and guarantees data integrity. Innovative businesses and governments can create added-value services on top of the backbone, to facilitate the crossing from traditional to digital service delivery methods.

Expand on the TESTA network to provide a secure and trusted communication channel

The TESTA network has proven its reliability and added value in highly sensitive environments. The learnings could be leveraged to interconnect governments, facilitate cross-border transactions and enable trust in the data exchange for all types of applications. It could be used both as a simple secure transaction channel or double as a logger to keep track of transactions.

Enable this digital identity framework for all connected objects

Identity is becoming as crucial for objects as it is for people. Systematic creation of an ID, a reliable framework enabling trust in the digital counterpart is as essential for citizens as it is for businesses, and could use similar systems to make it work resiliently.

Faster digital transformation of public services as a driver for increased digital adoption by EU businesses

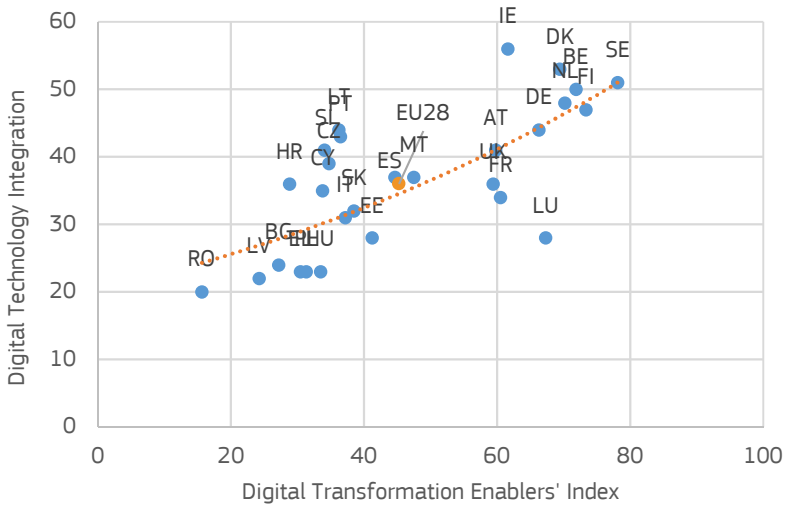
Make e-services a priority!

Too many public services are not yet provided online. This lack of digital transformation limits the adoption of digital technologies by citizens and businesses and maintains inefficiencies. Interoperable solutions for public administrations should be promoted to accelerate the full transformation of public services into e-services.

Positive relationship between digital transformation and the set of enabling conditions[27]

Countries that provide the best digital transformation enabling environment are also those that present the highest level of digital transformation.

Governments play a key role in driving their ecosystem forward.



Exploit the potential of artificial intelligence

- Develop a plan for the industry to stimulate AI adoption
- Launch a European Plan for Strategic Investment in AI: EUR 1 billion to be invested in SMEs and start-ups
- Develop an international dialogue to enhance AI innovation across the public and private sector

"We need to develop our capacities in AI in order to enable Europe to be tomorrow's digital leader."

Krum Garkov, Executive Director, eu-LISA

EU SMEs need to tap into the full potential of AI

International multi-stakeholder on the potential impact of AI

Europe needs to compete with the US and China in terms of AI Investment

State of play in 2018

AI: a key enabler for the data economy

The industry is unanimous: **AI will change the world and be ubiquitous in the digital economy**. AI major gains are likely to focus on productivity, efficiency, automation and costs, thus enabling consumers and businesses to capitalise on the digital economy. More than 60% of consumers and business decision makers believe that AI can help provide solutions to the most important issues facing modern society, ranging from clean energy to cancer and diseases. [28]

However, Europe is **currently lagging behind its competitors in the run for AI leadership in several fields**:

- Some Member States have started to develop their AI strategic plans but they have not yet been integrated and harmonised into a full European approach.
- The level of public and external investment is much lower than in the US or Asia.
- The adoption from companies and the general public remains low.
- No clear conclusions have yet been reached about the application of the existing EU product regulation for AI.

83% *of external investment in AI is absorbed by the US and China.*[29]

What is at stake

The EU will lag behind the US and China in terms of competitiveness and innovation

- Investment will not be sufficient to enable a broad adoption of AI in Europe.
- Well established enterprises and even whole business models will be rendered obsolete or threatened to be outsourced.
- The productivity of EU companies will dip.

More than 70%

of business leaders believe that AI will be the business advantage of the future. [30]

"Money is what is missing in Europe for the uptake of AI. Europe should implement an investment plan in AI but also ensure that there are enough private funds and VC to get money flowing."

Fabrice Moizan, CEO, Gayatech

Case study on artificial intelligence

INRIA, the French National Institute for Research in Computer Science and Automation

A public science and technology institution

INIRIA is under the supervision of the French ministries of research and industry and promotes scientific excellence for technology transfer and society. It is organised in "project teams": today, there are 183 project teams organised around five fields of research:

- Applied Mathematics, Computation and Simulation
- Algorithmics, Programming, Software and Architecture
- Networks, Systems and Services, Distributed Computing
- Perception, Cognition and Interaction
- Digital Health, Biology and Earth

Fujitsu AI Partnership

In 2017, INRIA signed a partnership with Fujitsu (the third-largest provider of IT services in the world) for a long-term research programme on AI and big data processing.

Fujitsu plans to invest EUR 50 million over five years.[31] Three areas of research have been identified:

1. **Quality control** by using advanced image recognition to detect product defects during the inspection process.

2. **Customer flow real-time video analysis** to spot risky behaviours and hazardous situations and intervene early.

3. **Maintenance of social infrastructure** by integrating sensor data and image interpretation tools.

This engagement has already led to pilot projects with customers and may result in the creation of a joint laboratory with INRIA within 2 years.

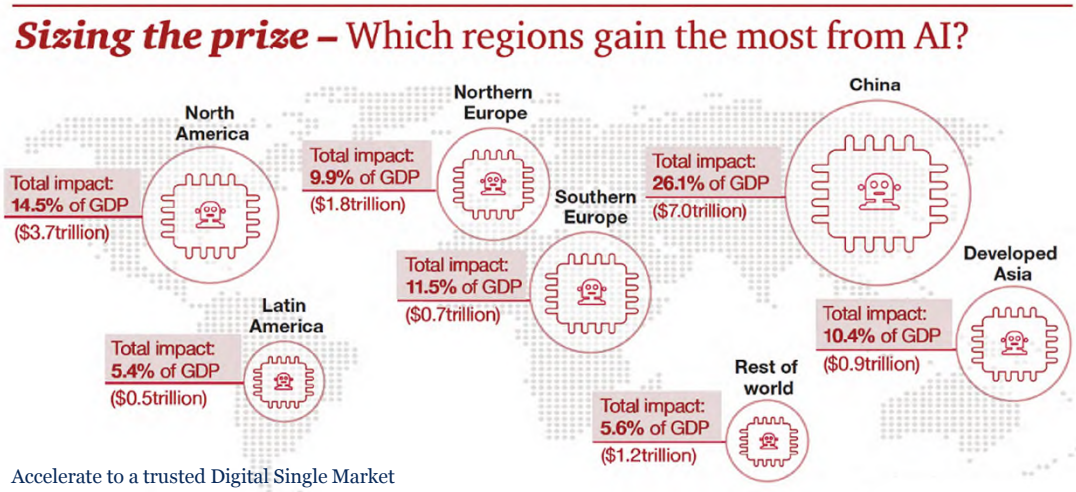
China's Next Generation Artificial Intelligence Development Plan

In July 2017, China released the Next Generation Artificial Intelligence Development Plan in order to become the world leader in the field by 2030. It articulates a "three in one" agenda in AI:

- **Tackling key problems in R&D**
- **Pursuing a range of products and applications of AI**
- **Cultivating an AI industry**

By 2020, China plans to have achieved major progress in next generation AI technologies, including big data, swarm intelligence, hybrid enhanced intelligence and autonomous intelligent systems.

Ultimately, by 2030, China aims to become the world's premier AI innovation centre. By then, China's AI industry is targeted to exceed RMB 1 trillion (EUR 130 million), with AI-related fields totalling RMB 10 trillion (EUR 1.6 trillion). [32]



In 2030, AI's contribution to the global economy will reach [33]

EUR 13 trillion

Suggested initiatives

Develop a plan for the industry to stimulate the adoption of AI

Company leaders are aware of the strategic importance of AI but are not benefitting from its potential. There should, therefore, be an EU plan to promote and incentivise the adoption of AI in leading industries.

- **Define strategic priorities** to streamline effort and investments.
- Focus on sectors with the biggest potential for AI in the short-to-medium term, such as **healthcare, automotive and financial services**.
- **The plan should be supported by a European analysis** of the current supply and demand for AI and its economic and social consequences on all economic sectors **to provide information to industry leaders on the exact value of AI.**

Launch a European plan for strategic investment in AI: invest EUR 1 billion in SMEs and start-ups

There is an urgent need to invest more heavily in AI at EU level through a European plan drawing on the framework of ESI Funds and the Juncker Investment Plan. Such a plan should support entrepreneurs and attract European talent by:

- **Injecting EUR 1 billion in start-ups and SMEs to support them in their research and scaling-up efforts.**
- Create incentives, such as tax breaks, to attract foreign investors and AI entrepreneurs through tech visa quotas.
- Provide grants to universities, laboratories and research initiatives.
- Make governments act as lead customers to stimulate start-ups and help them find a clientele.

G7 promoting international cooperation

Both the public and private sector see that AI has the potential to bring immense benefits to our economies and societies. It is also a matter of understanding the broader potential effects of these technologies on society and our economies. Building on the debate initiated by the 2016 G7 ICT Ministers' Meeting in Takamatsu, national and international events have been held to foster exchanges of views.

The G7 declaration acknowledges:

- Understanding that the economic, ethical, cultural, regulatory and legal issues are linked to AI and thoroughly researched and understood by policymakers, industry and the civil society.
- Exploring the multi-stakeholder discussions about, inter alia, economic growth, job creation, productivity, innovation, accountability, transparency, privacy, cybersecurity and safety.
- Having a better understanding of how the potential of AI can be fully and equitably realised across society and how the current and future labour force will obtain the necessary skills to work with AI-based technologies.

"Europe must define its innovation strategy. Investing in AI is not enough, there is a need for a political vision!"

Gilles Babinet, serial entrepreneur and French Digital Champion

Maximise the potential of a data-driven economy

- Analyse the opportunity for an EU exchange of data
- Free up the potential of the data economy

"We need to scale up data exchanges because no single European country has the power to develop an EU data market on its own."

Mario Campolargo, DG DIGIT

International cooperation will drive innovation while data protectionism will be a deterrent

Widespread adoption of data technologies is needed

State of play in 2018

EU companies need trust to monetise data assets

EU businesses have started to understand the commercialisation complexity and the monetisation potential of untapped data sets. CEOs are starting to grapple with the legal certainty, compliance with GDPR, skills required to prepare and commercialise data, commercial investments into new areas and return on investments.

The EU data economy heavily relies on a limited number of pioneering data-driven companies and suffers from the slow adoption growth of traditional businesses.

In 2018, the implementation of the GPDR is likely to enable companies to start data monetisation within a strong privacy framework.

What is at stake

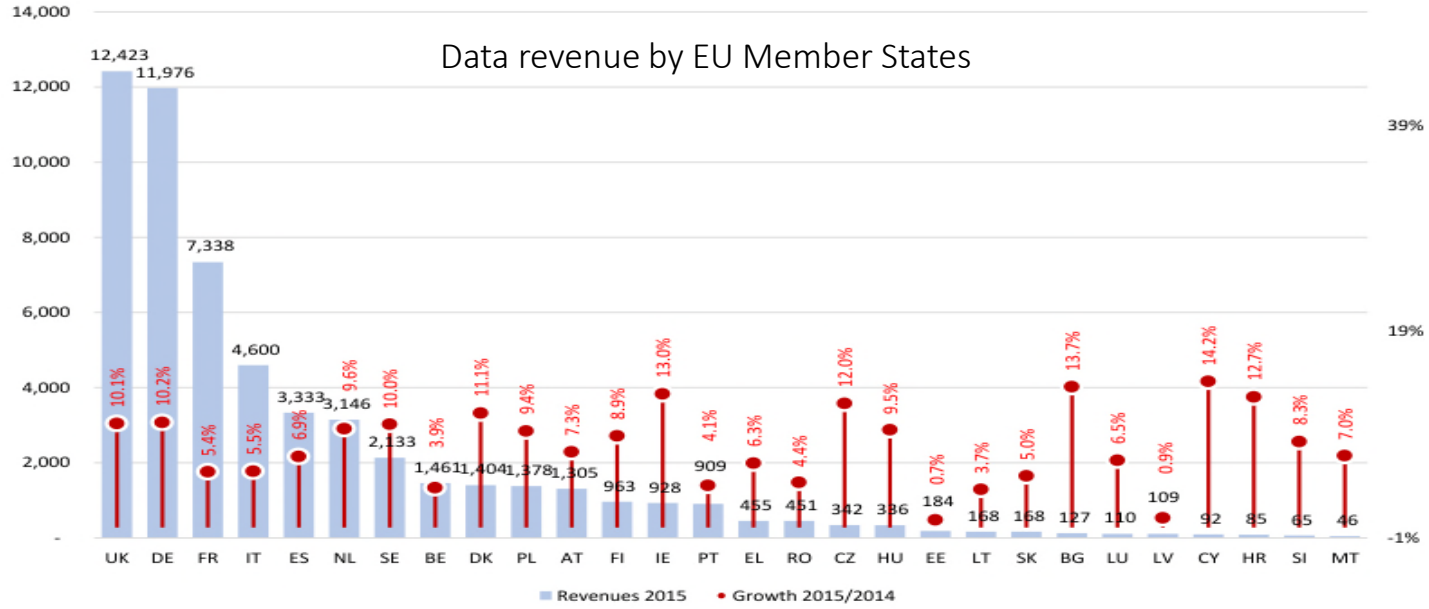
The EU would not be part of the next gold rush

- Loss of competitiveness due to EU companies' inability to tap into the potential of their data portfolio.
- Lags on innovation and on the development of new economies: IoT, smart cities, AI.

"Data sharing and exchange is not going fast enough in Europe."

Olivier Barette, Partner, Nowina

An EU data market driven by a few Member States [34]



Case study on exploiting the power of data

Dawex: accelerating data flows in Europe

Dawex is a global data-exchange platform, based in Europe, facilitating the exchange, sharing and monetisation of data in a trusted and secure way. By matching the supply and demand for data in Europe and worldwide, Dawex acts as a key accelerator of the data economy. However, regulatory constraints such as the lack of a legal status currently hinder the growth of the platform.

A trusted platform to turn data portfolios into economic value

Dawex allows companies to find the right partner to share, exchange and monetise their data. The company acts as a **data transaction pool** without accessing data sets themselves.

Companies with little information on the value of their data can operate with **any kind of data**, from customer and product-related data to financial data, IoT data, licensed as one-off deals or subscriptions.

Speeding up secure data flows in Europe

Dawex contributes to the data economy by facilitating cross-border data flows and making **data exchange accessible and secure for all economic stakeholders.**

The company emphasises "**data protection by design and by default**". It therefore allows businesses and public administrations to comply with their legal obligations especially when dealing with personal data.

DAWEX
SELL BUY SHARE DATA

EUR 2 million

raised from the Caisse des Dépôts in 2016 by Dawex[35]

The data market is estimated at around [36]

EUR 100 bn

Suggested initiatives

Analyse the opportunity for an exchange of data in the EU and beyond

The opportunity analysis of a true international data exchange is needed including:

- International cooperation for data exchanges.
- The traceability of data flows and licences through the use of blockchain technologies or other technologies.
- The security of transactions.
- The development of international data standardisation to facilitate interoperability.

Free up the potential of the data economy by:

- Implementing free flow of data within the EU, thus allowing the data economy to flourish within a digital single market.
- Preventing national data localisation.
- Freeing up public data enabling businesses to develop new innovative business services.

"A way of promoting data driven and digitally driven innovation is to make it possible to, in a cost-efficient way, make use of data for new solutions, but also to improve systems, processes and organisations as a result of data processing."

Alf Karlsson, State Secretary to the Swedish Minister for Housing and Digital Development.

Cross-border data flows (as a percentage of all data traffic) [37]

16-25%
in the US

13-16%
in Europe

Conclusions

The European decision makers interviewed for this study confirmed the high potential and opportunities that EU businesses could tap into if Europe were to reap the full benefits of the digital economy.
They addressed the following four key messages:

1. Build on Europe's strengths

The interviewees confirmed that the current EU ecosystem represents a solid foundation to maximise the potential of:

- A highly skilled workforce and deep STEM foundation conducive to future developments in the digital and tech economy.
- A high-quality and interoperable environment for companies and users.
- A new wave of innovation and investments into the next phase of digitisation.

2. Acknowledge actions at EU and Member State levels to accelerate the Digital Single Market (DSM) but beware of over-regulation and fragmentation

Interviewees acknowledge the many initiatives at EU and Member State levels to translate the DSM strategy into reality. However, they are also concerned by the risk of over-regulation leading to high market complexities and costs as well as to a loss of competitiveness vis-à-vis the US and Asia.

They also emphasised the need to push all Member States to further invest in infrastructures and competencies to ensure the same quality of digital services across Europe. Endorsing and supporting forward-looking Member States with ambitious intergovernmental initiatives (such as the project of Joint European Disruptive Initiative (JEDI) between Germany and France) is also key.

3. Urgently tackle the three fundamental challenges for a trusted Digital Single Market

A more integrated Digital Single Market will require more trust, more speed and more harmonisation. The proposed set of actions identified in this study aims to reach these 3 objectives:

- Trust: more collaboration between private and public players is needed to improve Europe's cyber resilience and truly protect citizens' fundamental privacy rights.
- A harmonised market: the fragmentation of markets (notably telecommunications) keeps slowing down EU growth and preventing Europe from scaling up.
- Speed: the pace of implementation of concrete reforms remains too slow to adequately address the challenges of Europe's digital economy.

4. Increase the dialogue between industry leaders, regulators and all relevant stakeholders to scale up common digital projects conducive to the implementation of our 6 recommended initiatives:

- Upgrade infrastructures and boost connectivity.
- Reinforce cybersecurity.
- Implement a digital skills plan for the entire population.
- Fully enabled e-services for citizens and businesses.
- Exploit the potential of artificial intelligence.
- Maximise the potential of a data-driven economy.

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