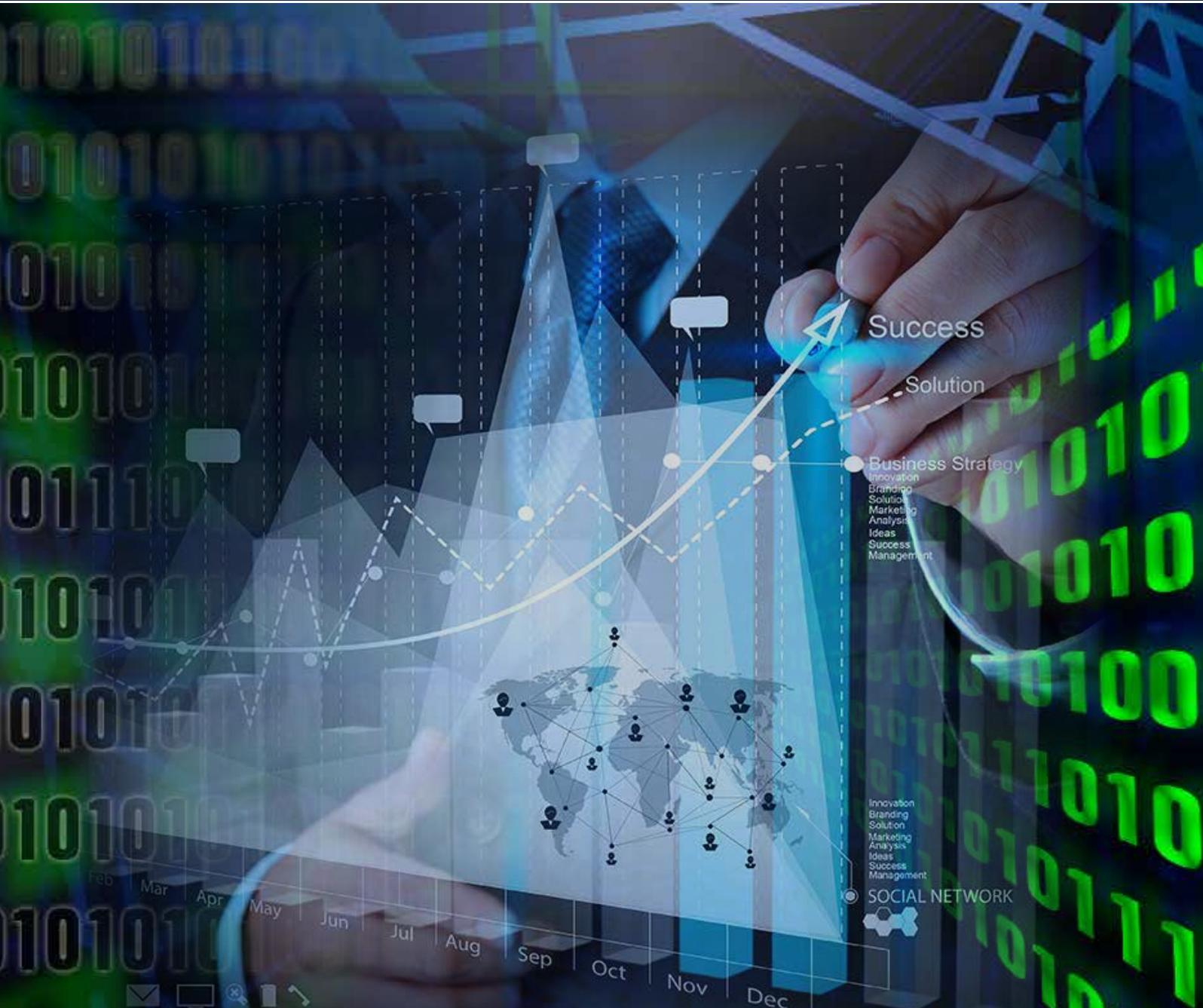


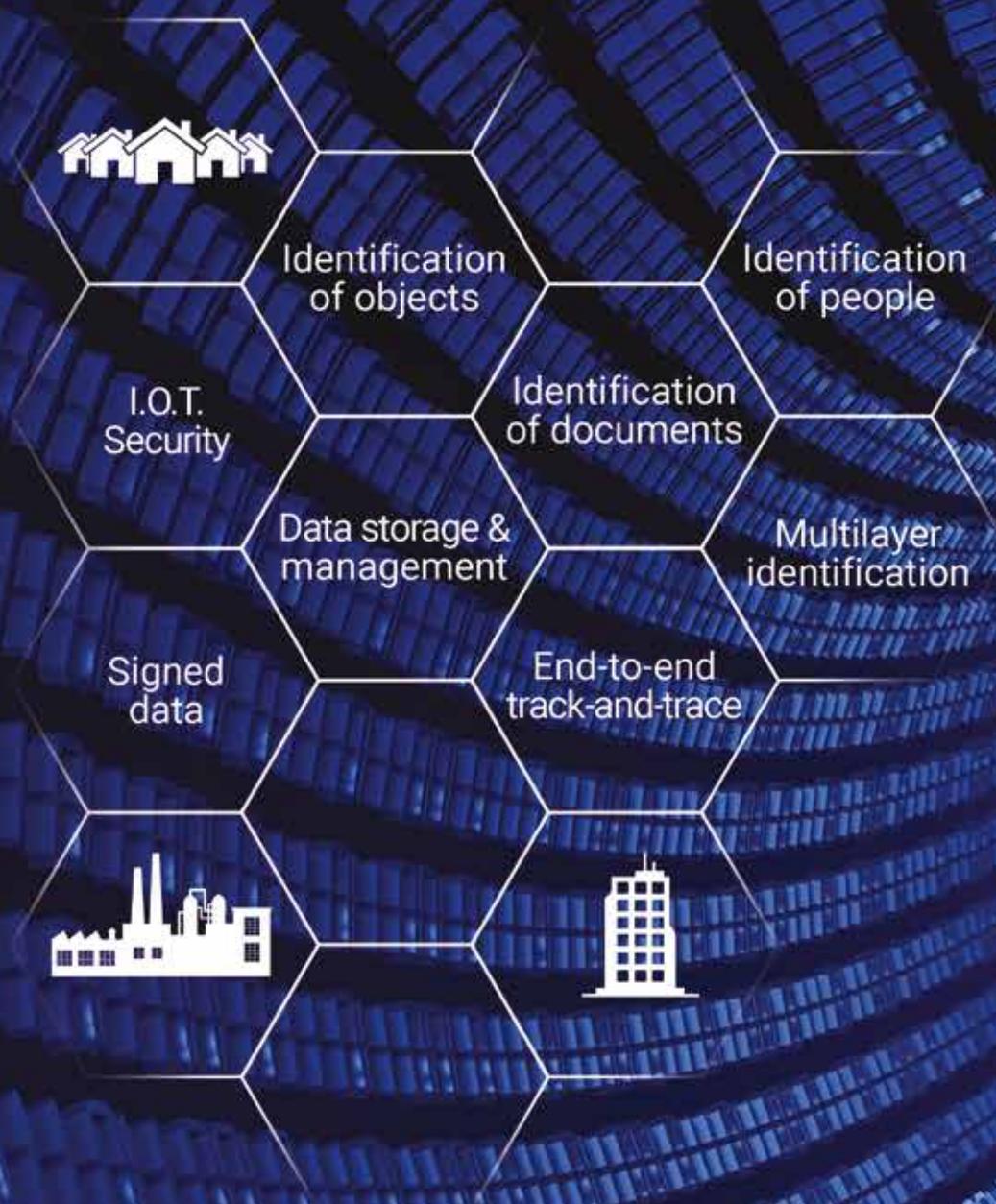


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BUILDING THE **EUROPEAN** DATA ECONOMY



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EDITORIAL

BUILDING THE EUROPEAN
DATA ECONOMY

The concern over the pace at which society is changed by technology is real within the European Union and its institutions. Noting its most recent acceleration, it is the rapid integration of data-dependent devices and processes that require closer consideration from policymakers and other key actors. Whether it's innovation in industry or consumer goods, data is now a central resource that can be found in all parts of the European citizens' life. The renewed calls for action through the Estonian Presidency of the Council of the European Union, and in conjunction with a variety of European Ministers and Members of Parliament, prescribe a serious case for improved legislation in security, confidentiality, and integration of data in Europe. This issue of the [European Files](#) unites the many experts and policymakers in this field that help project a vision of a Europe with a growing, positive, and secure Data Economy.

As data analysis continues to mature, the sophisticated conclusions are being applied to all levels of the economic process. More data, and better data, now facilitates better decision-making and risk management. This in turn feeds back into a strong innovation cycle for a more secure economic future. However the source of this data and those responsible for its storage and distribution are finally being put into question. The methods used by IT companies and the like to collect our data may not be fair and secure when compared with its value today and for the future. Put simply, consumer data drives marketing. Coupled with Big Data, constructed

from a macroscopic view of Europe's flow of information and goods, data as a whole is considered the new "oil to be drilled". This new competitive and aggressive search for usable data requires the attention and protection of the EU for its citizens. The focus should remain the healthy development of this potential resource without infringing on the rights of individuals. To achieve the perfect balance would be to ensure continued investment in all burgeoning technological ventures as well as strengthening the current market for data-dependent goods and services.

Optimism lies with policymakers and their ability to treat the entire EU to new standards. This legislative framework should promote a competitive, efficient, and united market for data services, such as the cloud computing. The hope is to develop new management styles, new leadership, new jobs, and a more positive relationship with the public. With the already growing Internet of Things, the network that connects devices and informs their processes, and the propagation of Artificial Intelligence in industrial and consumer spheres, a cyber future is far from science fiction. This new world of interacting with our surroundings demands new sensible and pioneering legal standards that reassure European citizens that the future is theirs. Whether its reevaluating the rights of robots or updating ePrivacy legislation, these measures should be taken to ensure that jobs are created, life is made easier, and equality maintained. This is a sensitive political endeavor, as the extent of this technology's impact cannot be completely foreseen. The guiding principles maintain the

need for a "positive impact" on our society, but the margins is a large one.

Within this new frontier of human development may be many pitfalls. To avoid damaging SMEs in Europe, the public's trust in the EU, or even the institutions themselves requires clear objectives and the inclusion of all stakeholders in the decision-making. Countries like Estonia have already proved responsible and are now enjoying all the benefits of a secure and efficient data infrastructure. Cases like these point to a positive future for Europe. As this issue of the [European Files](#) goes to press, we are excited by the prospect of the European Commission in identifying the legal and economic framework for a stronger Single Market and digital Europe.

LAURENT ULMANN

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“Developing Leading Digital Societies”



Urve PALO

Minister of Entrepreneurship and Information Technology of the Republic of Estonia

Estonia has become one of the most innovative and technologically wired EU member states since its independence 25 years ago. The country is now commonly called “e-Estonia” thanks to its efficient digital public services, a start-up scene brimming with innovative ideas and a favourable business environment to enhance our citizens’ ambitions. What’s more, we invite everyone to become part of our e-revolution and apply for Estonian e-Residency.

Whether young or elderly, an entrepreneur or a citizen, living in a city or in the countryside – everybody in Estonia can enjoy the benefits and comforts of our e-society. We use mobile devices to park our car, we can set up a company online and it will be legally functional in 2-3 hours (record was 18 minutes). All our medical prescriptions are digital: no going to the pharmacy with a paper slip in hand anymore and our doctors have access to nation-wide electronic medical records.

Whatever there is to sign, we do it electronically with our digital ID – whether you are a citizen submitting an application to a government agency, an entrepreneur signing contracts or Prime Minister sending a bill to the parliament. We declare our taxes online (96% of people), we do our banking almost solely online and we are the only country in the world to have simple and secure

internet-based voting in national and local elections.

Getting things done digitally

Less hassle means time better spent, therefore developing a digital society has been one of key governmental policies in Estonia. The main success factor has been enabling a technical and legal foundation: from digital ID to data exchange set-up to privacy safeguards and cyber defence. Estonia is the only country to connect all public databases over the internet. For example, a citizen can automatically access his medical data stored by different service providers (e.g. hospitals) and by different doctors. Estonian digital society is built upon a principle that people own their personal data and it can be exchanged only with their consent or a legally defined „need to know“. With these and other practical safeguarding principles, people do trust the government more with their data.

Estonia is the first country to offer e-residency, a transnational digital identity that allows digital signatures and the creation and operation of location-independent businesses online. Since 2014, people from 138 different countries have applied for e-residency and today we have more than 20 000 e-Residents. We’re used to getting things done quickly. Our legislation is transparent and supportive of business. We have one of the most competitive and investment-friendly taxation systems in Europe. If you wish to become a part of our e-success story and enjoy the same benefits as Estonians do, then there is no easier way than becoming an e-Resident of Estonia.

Estonia has also worked hard to create a world-class competence in cybersecurity. It is now the home of NATO Cooperative Cyber Defence Centre of Excellence and European Union’s Agency for Large Scale IT-systems in internal security area. Additionally, Estonia is leading the way towards creating the first ever data embassy in Luxembourg – this means keeping a complete backup of the information vital to the functioning of the state safe in the servers of other EU member states. In close partnership with these as well as other international allies we strive to make digital life more secure every day. Cybersecurity has become an

essential feature of our digital ecosystem and going back offline is not an option for us.

Estonia’s EU presidency has a highly digital agenda

From July to December 2017, Estonia will have the honour to steer the wheel of European Union as the presidency country for the Council of the EU. Given our practical experience and strong belief in digital development, digital topics will naturally be a priority for our presidency. In the core of Estonia’s digital agenda for Europe will be making progress on Digital Single Market (DSM) by removing any obstacles and advancing the enablers for a unified market. Estonia will do its best to help the Council meet deadlines of concluding negotiations on all files in the DSM strategy, including the various files on e-commerce, Electronic Communications Code, e-Privacy, and more. Altogether, more than 50 different digital events and conferences will take place in Estonia to discuss and agree on practical steps to make the DSM work.

DSM cannot be built without a special emphasis on the free movement of data amongst Member States. Estonia does consider it as the fifth freedom of EU, as data has become so crucial for the whole Single Market to function efficiently. The more business is digital, the more freeing up the data flows is necessary to avoid barriers to effective movement of people, capital, goods, services.

The outcome would be stronger Single Market and stronger Europe overall. Estonia is glad to have a chance to bring our 20 years of national digital experience to the table as EU presidency this year to make a move in this direction.

The Future of our Integrated Data Economy



Mariya GABRIEL

European Commissioner for Digital Economy and Society

Digital revolution is based on data. In 2020 the value of EU data economy can double up to €739 billion or 4% of GDP.

And citizens stand to benefit: Data collected by smart sensors and our day-to-day use of products, devices and services is both cheaper and richer than experimental data. For example, such data helps developing therapies for diseases which are rare but still have a large societal effect (with 30m Europeans suffering from 6,000 rare diseases). But personalised medicine is only one application area. There is also “personalised manufacturing” with smart machinery making small production runs economically viable; reduced and optimised consumption of resources such as water and energy; more targeted use of fertilisers for more efficient agriculture; better managed traffic flows and self-driving vehicles with less environmental impact ... the list goes on.

But a lot of data is needed for such applications. Artificial intelligence and machine learning also needs massive amounts of data for training. In this perspective, government-induced data collection (e.g. in China) or relatively wide availability of customer and social media data (e.g. in the US) have given an early competitive advantage to other parts of the world.

However, the economy is a long game, and in the longer term citizens’ trust will be essential.

First, because relevant data often is personal data. Not least since the Snowden revelations, citizens are more and more uncomfortable with data collection and processing and may opt out from data-driven services. Therefore business models which rely on intrusive use of citizens’ data for improving products and services targeting these very same citizens are inherently unsustainable.

Second, because the use of digital products and services themselves is constrained by widespread security concerns. The number, complexity and scale of cybersecurity incidents and their impact on the economy and society continue to grow. The parallel explosion of the number of internet of things devices will increase the “attack surface” manifold. It is predicted that cybercrime will cost businesses globally more than €5 trillion per year by 2021.

In Europe we have started addressing these challenges already many years ago and this is why I am convinced that Europe is well positioned for benefiting even more during the next phase of the digital development.

With the EU’s general data protection regulation coming into force in May 2018, and a proposal for a regulation on e-privacy also making its way through the legislature, we have created the right framework for personal data. Reinforced rules on consent, and new rights to access, remove or port data put the citizen at the centre.

For cybersecurity, the network and information security directive brings new rules for operators of essential services and for digital service providers. We have also proposed to strengthen the Union’s Cybersecurity Agency, ENISA, and an EU-wide security certification framework. Such measures protect European citizens, businesses, and public institutions against increasing cyber threats.

In addition to these overarching protections, we also need specific policies and technologies. For personal data, one building block are personal information management services (also called “personal data stores”, “personal data spaces” or similar¹) which empower

citizens to participate actively in the data economy. This is a paradigm shift because the individual is in control and decides who has access, how the data can be used, and under which conditions, all built on secure and standardised protocols. Both start-ups and major operators are active in an emerging ecosystem and the EU is supporting related research and innovation projects. Such technical developments reinforce policy measures for the data economy, and vice versa. For example, the more citizens use such services, the faster the “once only principle”, which foresees that individuals and organisations should not have to provide their digital information anew to every company or public administration they interact with, will become a reality.

For non-personal data (which includes previously personal data which has been irreversibly aggregated or anonymised), the European Commission has recently proposed a “free flow of data” principle, doing away with unjustified requirements for storing data at a specific geographical location. Moreover, we are working on an update of relevant legislation to make sure more data generated by the public sector, or with public funding, becomes open data accessible for re-use. And we fund work on data technologies and formats, including at the standardisation stage, to facilitate the use and also the exchange of data.

Like any industrial paradigm shift, the data economy creates new job profiles and requires new skills. Today it already employs more than 6m data professionals. This could increase by more than 10% per year to over 10m by 2020. But we need to make sure that the new skills are taught and learned throughout the EU. Otherwise the gap between open positions and available professionals could widen from 420,000 to almost 3m in 2020.

In short: With the right actions on skills, investments and policies the EU’s citizens and society stand to gain a lot from our integrated data economy.

¹ A list of examples is at <http://mesinfos.fing.org/cartographies/usecases/>

Importance of Data Driven Society in Europe



Brigitte ZYPRIES

Minister for Economy and Energy, Germany

Each of us – whether we are students or entrepreneurs, researchers or doctors, journalists or pensioners – is in some way affected by digital change. We access information, make purchases, keep in touch with others, and do our work and research in ways that were completely unknown to our parents and grandparents. So fast is this change progressing that the only thing we can be certain of is that our children's digital everyday lives will again be very different to ours today. What may seem futuristic to us will be normal for them. Digitisation is helping us find new solutions for old problems. It presents us with new opportunities for accessing information, building better lives, doing business more efficiently, creating new business models, and creating inclusive growth.

The scale of these opportunities becomes apparent when you look at the figures and estimates published by experts: according to these, the global volume of data increased 66-fold between 2005 and 2015. It is continuing to double roughly every two years. Data flows are growing much faster than the volumes of goods or capital being exchanged. Today, in 2017, there are around 8.4 billion devices connected to a network. That's more than the global population. This development comes with many advantages: the industrial sector in Germany alone is expected to be able to generate an additional cumulated 425 billion euros in GDP by 2025, thanks to

productivity rates improving by up to 30 per cent. More intense cooperation on innovative products and services between established companies and startups is estimated to have the potential to generate an additional 100 billion euros in Germany by 2020. And the figures for the EU as a whole are far higher. The European Commission estimates that a digital single market could add 415 billion euros to GDP in the EU – every year! This would mean hundreds of thousands of new jobs.

And there are other advantages beyond the economic ones. Digitisation carries the promise of new solutions to societal challenges including climate change, diseases, and traffic management. Big data analyses and smart management systems can help resolve these issues. Innovative technologies can also be used to support individuals in their daily lives; for instance, as we maintain our social contacts, access information and continuing education, or simply manage our everyday lives. They are also making it easier for us to take an active part in our society. Many social and welfare initiatives are successfully using digital media to draw attention to their work, seek support and recruit volunteers.

All this is possible thanks to data being gathered and processed. Without data, *Industrie 4.0*, autonomous driving, remote medical treatment, or online support communities would be unthinkable. This also shows that we must ensure that our data infrastructure is powerful enough to be able to meet the needs of our digital economy and our society. As we forge ahead with this, Europe must not blindly jump on every bandwagon but make its own way. Data privacy and data security are the bedrock of any digital society and a prerequisite for user confidence and trust. We need to strike the right balance between allowing for personal data to be used in innovative business models and strengthening individuals' data sovereignty, for instance by providing for a right to have data deleted. The latest cyber attacks have reminded us once again that data security is a cornerstone of successful digitisation.

We must build a data infrastructure that is underpinned by high and uniform standards for data privacy and data security, and that allows us to harness the vast potential offered by digitisation – in the field of *Industrie 4.0*, in

competition with global digital platforms, as part of the flourishing startup scene, in eGovernment, and in science and research.

This is why it is so important that we create a uniform 'data area' in Europe, within which data can be exchanged in a free and secure manner. If we are to build a competitive European digital economy, we must put in place a digital single market in which machines and vehicles are interconnected, startups able to grow fast, and data transferred securely. Digitisation is not about better efficiency in established marketplaces: it is also becoming increasingly important for businesses to speed up their development of new digital products and business models. There are many companies that fear they may have to fight in a losing battle, simply because direct access to customers and their data is more important in the new, digital economy than having the best product on offer. This is why it is a key task for economic policy to help small and medium-sized companies harness the potential of digitisation.

Likewise, open data activities will also gain in importance. The opening of a European and several national open data web portals marks a first step here. A flagship example of this kind of programme is Copernicus, which is used to provide large amounts of Earth observation data that users can draw on freely. But a truly powerful future data infrastructure will have to deliver more than this, for instance for healthcare and mobility purposes. Data quality and availability will become ever more important. How we deal with data will also have a massive impact on the ability of the European digital economy to compete successfully in the important field of artificial intelligence.

We need to develop a form of digitisation that is 'Made in Europe' and that allows us to harness the new opportunities for the benefit of our societies whilst also affording protection against the risks. Our strategy should be guided by the motto: as much digital competition as possible, but within a framework that is governed by the state wherever this is necessary. This is because any digital society needs to be underpinned by clear rules that foster innovation whilst also affording legal certainty and inclusion.

Protecting our personal data in a digital economy



Věra JOUROVÁ

Commissioner for Justice, Consumers and Gender Equality

Data is the currency of today's digital economy. Collected, analysed and moved across the globe, personal data has acquired enormous economic significance. According to some estimates, the value of European citizens' personal data has the potential to grow to nearly €1 trillion annually by 2020.

But personal data isn't just valuable on account of its economic significance. We, as human beings, value our personal data precisely because it's personal – it's part of us. So, it is only natural that we want to safeguard it.

Whilst it is important to seize the opportunities offered by the global digital economy, it is equally important to respond to consumers' growing demands for stronger data security and privacy protection.

These were two fundamental considerations when it came to up-dating the EU's data protection legislation. Both of them are reflected in the data protection reform package which entered into force in May 2016 and will be applicable as of May 2018.

For citizens, the General Data Protection Regulation is an essential step towards strengthening their fundamental rights in the digital age and building their trust in the digital economy.

The new Regulation will give citizens more control over their personal data and make it easier to access it. For example, they will have a "right to be forgotten." If an individual no longer wants their data to be processed then it will be deleted, provided that there are no legitimate grounds for retaining it. In addition, individuals will have the right to know when their data has been hacked. Companies and organisations will have to notify the national supervisory authority of data breaches which put individuals at risk, and communicate to the data subject all high risk breaches as soon as possible so that users can take appropriate measures.

Giving individuals more control over their personal data will strengthen consumer trust in the digital economy. Stronger consumer trust will, in turn, allow businesses to fully seize the opportunities in the Digital Single Market.

Businesses will also benefit from the new Regulation, since it provides clarity and consistency regarding the rules to be applied. Essentially, the rules will make it simpler and cheaper for companies to do business throughout the EU.

A single, pan-European data protection law will replace the current inconsistent patchwork of national laws. Companies will deal with one law, not 28. The financial benefits of this are estimated to be €2.3 billion per year.

Similarly, companies will deal with one single supervisory authority, rather than 28. A 'one-stop-shop' will streamline cooperation between the data protection authorities on issues with implications for all of Europe. Companies will profit from faster decisions and from less red tape.

The new EU data protection rules will apply not only to European companies, but also to foreign companies offering products and services to EU citizens, or monitoring their behaviour. In other words, the same rules will apply to all companies operating in the EU regardless of where they come from. This will level the playing field between European and non-European companies and promote fair competition in a globalised world.

The digital economy is, after all, global. The internet and digitization of goods and services has transformed the world's economy. The transfer of data, including personal data, across borders has become part of the daily operations of companies of all sizes, across all sectors, in all parts of the world.

It is therefore important that we promote our European data protection values at international level. We must ensure that when Europeans' personal data is transferred abroad, the protection travels with it.

Hence, our data protection rules offer a range of mechanisms to transfer personal data from EU countries to non-EU countries: adequacy decisions, standard contractual clauses, binding corporate rules, certification mechanisms and codes of conduct. This constitutes a broad and varied 'toolkit' to enable data flows in different situations, while also ensuring a high level of protection.

We are making good use of the tools in this 'toolkit'. In August last year, we launched the EU-U.S. Privacy Shield to better protect personal data transferred across the Atlantic, while ensuring legal certainty for businesses.

Going forward, we will now prioritise discussions for new adequacy decisions with key trading partners, starting from Japan and Korea.

We also will work together with countries interested in adopting strong data protection laws and support them to adopt data protection principles that match EU standards. Nowadays, there are over 100 countries that have enacted data privacy laws. Around 35 countries are currently drafting data protection laws.

If data is the currency of the digital economy, then strong data protection rules are an essential precondition for the prosperity of such an economy. They are the foundations on which we can ensure the free flow of data across borders, both within the EU and worldwide. They are also the foundations upon which consumers will build their trust in the digital economy.

Artificial intelligence will enable a smarter and cleaner Europe



Mika LINTILÄ

Minister of Economic Affairs, Finland

The European Union is living through turbulent times, and we must remain vigilant in safeguarding the legitimacy of our common project. This underlines the necessity of focusing on policy areas and measures where it is possible to achieve tangible results that support the wellbeing of EU citizens.

Digitalization and the circular economy are major factors in this and are key growth drivers. Digital technologies, big data and advanced analytics enable companies to offer more value to customers through new products, services and business models. At the same time, the challenges of climate change and scarce resources are rapidly changing customer needs. Transparency has become a necessity for any business or public service.

Artificial intelligence (AI) will accelerate the ongoing digital transformation of the economy, society and daily life. It will be a key factor in moving towards a more competitive and sustainable Europe. Data is today one of the most valuable raw materials, but it is underutilized. However, with ever greater amounts of data, cheaper processing capacity and more sophisticated algorithms, the long expected breakthrough in AI is in the making.

Digitalization has already fundamentally changed the production of goods. In the future, AI will support decision-making

processes in manufacturing and bring considerable improvements in raw material, energy and resource efficiency. This efficiency is a cornerstone of our climate and energy policy.

AI will have an even bigger impact on services, both existing and future, including those that we would not yet even recognize. It will bring automation into clearly defined back office tasks and tasks at the customer interface. It will also provide the chance for innovative companies to create cleaner business, for example in transport and energy. In the public sector, AI has massive potential for efficiency gains and better services for citizens.

The take-up of AI throughout society will change the way we live and work. It will raise fundamental questions that require open discussion. Estimates suggest that between 25% and 40% of existing tasks (not jobs) are such that they could already be automated now. How will AI change the content and amount of work? How will it change education and re-training needs? What are the implications for welfare systems?

In Finland, we are tackling the challenges and opportunities of AI right now. I have established a public-private task force to find answers to the questions mentioned above and to accelerate the use of AI in the public and private sectors. The first set of actions will be ready by the end of September 2017 and new activities will be added regularly after that.

But the challenges and opportunities are global and we need more collaboration within the EU to make sure that AI will benefit all citizens and businesses. AI will create opportunities and challenges in various EU policy priority areas, such as jobs, growth and investments, the digital single market and the energy union and climate. According to a study by Accenture and Frontier Economics, effective use of AI could double the real value added growth rate of many EU countries compared to the baseline scenario.

How can we accelerate the positive and minimize the negative effects of AI in the EU? First, we need a fuller understanding of AI and its potential implications. We also need a common vision that cuts across growth, jobs, single market, energy and climate. We need forward-looking legislation and funding instruments that enable the innovative use of open data, artificial intelligence, digital platforms and ecosystems. And, last but not least, we must make sure that AI has a positive impact on the daily lives of EU citizens and businesses.



Maintaining sustainable employability in a digital European industry



Marianne THYSSEN

European Commissioner for Employment, Social Affairs, Skills and Labour Mobility

The world of work is transforming: digitalisation and technological developments are changing the way we work and live. Some people fear that these phenomena will destroy jobs and put workers in a race against machines. I am not one of them.

I believe digitalisation can be a force for better quality work, unleashing higher productivity and opening up new opportunities to work in different ways. For this to happen, we must set the right framework. We must set the right conditions to enable people, everyone and not just a 'happy few', to reap the benefits from the digital era.

One crucial condition is that people have the right skills. In the near future, nearly all jobs will require some level of digital skills, from the simplest to the most complex. The demand for digital technology professionals has grown by 4% annually in the last ten years. By contrast, the number of unfilled vacancies for ICT professionals is expected to increase to around 500,000 by 2020. At the same time, 37% of Europeans are digitally illiterate and do not reach even a basic level of ICT skills. And only 20 to 25% of students are taught by digitally confident and supportive teachers.

We need to change this if we want our people and our economy to prosper. **Europe needs digitally smart people who are not only able to use but also to innovate and lead in using new technologies.**

Last June the European Commission put forward a new **"Skills Agenda for Europe"**. It sets out 10 actions to make the most of our human capital, which is crucial to keep Europe on a competitive edge and growing. One of its focus areas for example is developing digital skills and helping low-skilled adults acquire a minimum level of digital skills. Another area we focus on is better skills intelligence: understanding skills bottlenecks and anticipating needs, including through stronger business-education partnerships and by analysing 'big data' to know what are the skills needed and where and how trends are emerging. Education needs to be more responsive to labour market needs, but to have the tools to be able to adapt based upon trustworthy information, and be empowered to look ahead to the careers of tomorrow.

A concrete example of how we foster partnerships in the digital sphere under the Skills Agenda is the **"Digital Skills and Jobs Coalition"**. It brings together a wide range of stakeholders – including Member States, companies, and education providers – to take action and tackle the lack of digital skills. It extends beyond the ICT sector across the whole economy. Each Member State is invited to develop a national digital skills strategy and establish a national coalition between education and industry. For example, in Belgium this coalition has launched the "Digital

Champions" action which aims to motivate 20,000 children (including at least 40% girls) to take part in a coding event. In Ireland the national coalition has kicked off a programme to re-train unemployed people in ICT skills, which has helped 12,500 job seekers into employment.

Moreover, our flagship initiative the **"European Pillar of Social Rights"** is an important contribution to tackle the challenges of the digital economy. Digitalisation and new technologies bring along new work patterns, which require an update of our social protection systems. That is why the Pillar sets out a number of key principles to address the changing world of work, including that people should have the right skills and access to education, training and lifelong learning throughout their careers. We are now working with the other EU institutions and social partners to make the European Pillar of Social Rights a reality on the ground.

It is crucial that everyone is on board: Member States, which are in charge of education and training, businesses and education providers – they need to work closer together to make sure the skills learned are the skills needed on today's work floor. Only by joining forces we can make sure that digitalisation is not something we undergo, but that we actively shape and profit from!



Supporting Innovation in a Digital Economy

Some clues from Spanish's experience



Carmen VELA

Spanish Secretary of State for Research, Development and Innovation

The digital revolution is a new technological, economic and social paradigm that is already changing every area of our society. And it's only the beginning.

To address this unprecedented revolution requires the commitment of all social agents (companies, public administration, citizens, consumers, social organizations, etc.) to boost it by maximizing its positive impacts. At the same time, it's vital to pay attention to the negative effects associated to a change of paradigm like this one.

In this context, digital innovation becomes a critical success factor for the transition to a digital economy, which it's characterized by the union and interaction of the physical world with the intangible world, the interconnection of millions of devices¹, the generation of network economies and cross-cutting effects in all economic sectors.

Digital innovation is facilitated or based on digital technologies that lead to new forms of digitization. This kind of innovation implies changes that not only occur in the digital world but transcend it to provide new or superior attributes, generating new features, as well as their integration or compatibility with the new digital environment.

There are many examples of digital innovation carrying on right now: the Internet of Things (IoT) transforms common devices into smart objects (from smart textiles to check our health in real time to smart factories). Big and Smart Data (capture, processing and analysis of digital information) allows better predictions of behavior and make better decisions. IA and automatization transform an ordinary factory to an smart factory capable of working autonomously and flexibly, with higher levels of customization and in quasi-real time, etc. Another constant element in digital innovation is the connectivity and interaction of multiple agents at remote points, generating more efficient networks, etc.

The following factors characterized the digital innovation:

- Cross-cutting effect: which it implies that all the value chain is affected in every sector.
- Heterogeneity: there are multiples sources of innovation and multiples technological solutions and products.
- Accelerated pace: it's a continuous process which an increased speed.
- Global.

The accelerated pace and heterogeneity of digital innovation, the absence of technological standards or a clear technological path,

they all imply a very high uncertainty to the innovative companies. In this situation usual top-down strategies and well planned actions do not work very well. It's observed more and more that companies change its strategy to a one more adaptive: It's the so called "fail fast, fail cheap"² strategy, that mean a quick entry into the market, test the product in real conditions, fail as soon as possible and readapt, as well, pilot development and deployment in small business units can be a crucial learning way to live in the digital innovation ecosystem.

The factors mentioned above demand a new way to aboard the innovation process in which the Open Innovation Paradigm becomes critical and, in particular, the public-private cooperation. The creation of stable dynamics of collaboration inter-companies, between academic and industry with the inclusion of relevant stakeholders acquires a relevant role in public policies to support innovation.

Open Innovation models become essential to deal with the accelerated pace of change, as well as the multiplicity of technologies and fields of knowledge involved in them (heterogeneity of digital innovation).

² Boston Consulting Group (2015). How to Jump-Star a Digital Transformation.



¹ Gartner estimates more than 20 billion of interconnected devices in 2020.

In addition the integration of the innovative value chain through the collaboration between suppliers, manufacturers and users becomes equally critical. The research, conceptualization and design of new products, services or processes will experience an unprecedented transformation in this sense (i.e. the impact of Smart Factories and mass customization).

So, in the situation I've been described the public support to innovative companies should try a new approach that considers the following items:

- Encouragement of open innovation in all areas, as stated above.
- Companies' leadership. The companies are in the first line of the digital revolution; they provide digital products and services and, at the same time, adopt digital technologies. Due their proximity to digital consumer –which it is substantially different from the analogic consumer– the business sector can react quicker to consumer's needs than any other agent. This closeness involves developing digital

strategies that not only contemplate technical change but change the business model itself; a crucial element to be aware is precisely how these technical changes are modifying business models.

- Flexible public support and funding strategy. Public support should adopt a flexible and dual strategy focus both in the supply side and in the demand side. The supply side are companies that develop basic enabling technologies that support the digital revolution (interface systems, man-machine interfaces, machine-machine interfaces, artificial intelligence algorithms, Smart Data, etc.). On the demand side are projects of those companies that want to develop and incorporate new solutions based on digital innovation to their businesses. Therefore, in our experience, because the heterogeneity of the digital innovation it's convenient to adopt a bottom-up strategy which allows and support any innovative solution in this field and yield the leadership to companies.

At the same time, in our experience, it seems appropriate to develop long-term strategic actions in certain well-identified areas such as the development of Smart Cities, Smart Energy or Smart Factories, for example. In fact, in areas where many characteristic elements of digital innovation come together and generate drag effects to the whole innovation ecosystem.

The transition to a digital economy, based in digital innovation, is an opportunity that we must take advantage of as it will lead to a competitive economy and a wealth country.



Placing Industry and SMEs at the core of the European Agenda



Hon. CHRIS CARDONA

MP – Maltese Minister for the Economy, Investment and Small Business

The Maltese Presidency of the Council of the European Union has placed Industry and Small and Medium Sized Enterprises (SMEs) at the core of its six-month programme. The main objectives of the Maltese Presidency have been that of creating an environment of certainty for long-term planning investment and ensure that optimal resources allocation takes place. This has been done to foster economic growth and generate new employment opportunities within the Union.

Creating the optimal framework conditions

Strengthening European Competitiveness vis-a-vis third countries and territories is cornerstone to foster European and Foreign Direct Investment. European enterprises need to be at the forefront by being the best in class and use the internal market as the test base to expand their innovations internationally. European SMEs and Industries are operating in a highly dynamic environment were entrepreneurship, innovation and it is essential to create the optimal framework conditions. The Maltese Presidency is placing an importance to creating the optimal framework conditions by calling on the updating of the European Industry Policy which was last done in 2014. The Maltese Presidency is pushing forward for Council Conclusions that promote an update of the European Industry Policy that is proactive and forward looking.

Holistic approach

The Maltese Presidency acknowledges that a holistic policy approach based on value chains, inter-clustering linkages and activities is crucial, with a focus on start-up, scale-up and mid-cap SMEs. This should include, when necessary, sectorial initiatives for sectors facing economic change and high growth potential sectors. This holistic approach is important to ensure that there is a clear synergy between what is taking place at a European Union, Member State, regional and local level. The European Union needs to ensure that all its policies and initiatives are focused in the same directions.

Digitising European industry

The Maltese Presidency notes the progress in digitising European industry in the last year, notably the further launch of national initiatives and of a European Platform of these. It calls on to further stimulate, at the EU and national levels, framework conditions and associated investments in the digital economy. It highlights that this should embrace, amongst others, human capital, research, development and innovation, digital transformation, tackling efficiently and robustly unfair commercial practices, sustainable and affordable energy sources, resource efficiency, industrial servitisation and better regulation.

Initiatives taken

Within the industrial portfolio, the areas that the Presidency has been spearheading are the chemical industry, logistics industry and transportation, the recent Start-Up and Scale-Up initiative, the European Defence Action Plan, and the Digitisation of Industry.

- **The chemical industry:** The Presidency intends to have a discussion on the prospects of the European chemical industry on the 22nd May 2017 in the Industry Working Party. It will also be looking at the state of play of the chemical industry. Furthermore, the Working Party will be discussing the Cumulative Cost Assessment Study on the Glass and Ceramic Industry.
- **Logistics industry and transportation:** The Presidency has been analysing the current competitive advantages that the Union has within the logistics sector and

how these could further enhance industrial competitiveness.

- **The recent Start-Up and Scale-Up Initiative:** Strengthening the ecosystem for start-ups and scale-ups is one of the main priorities during the Presidency. There is no lack of innovative ideas and entrepreneurial spirit in Europe. But many new firms don't make it beyond the critical first few years, or they try their luck in a third country instead of tapping into the EU's potential and its 500 million customer base. The Presidency is determined to help start-ups deliver their full innovation and job creation potential. This was in fact the main theme for discussions during the Informal Meeting of Ministers responsible for Competitiveness held on the 5th-6th April 2017 in Valletta.
- **The new European Defence Action Plan:** The Presidency has put the European Defence Action Plan, which includes important incentives for industry, including for SMEs, on the agenda of the Competitiveness Council of the 20 February 2017.
- **Digitisation of Industry:** Digitisation has, for a few decades now, dramatically changed the production of goods, the delivery of services and even to a certain extent how public administrations work. But what we are witnessing today is how digitisation is profoundly changing more traditional industry and services sectors. Digitisation is changing the way we produce cars and chemicals, the way banks deliver financial services etc. etc. As part of this phenomenon the interactions between manufacturers and their suppliers and clients are changing profoundly. Cars, chemicals and medical devices themselves are changing, becoming smarter and more interconnected. The Presidency intends to continue placing the digitisation of industry at the forefront of its agenda during the May Competitiveness Council. Furthermore, the Presidency has engaged with the European Parliament and different stakeholders on a Business Transfers conference that was held on 17 March in Valletta.



Why change the rules?

It's about trust...

A lack of trust in old data protection rules held back the digital economy and quite possibly your business.



of people feel they have complete control over the information they provide online.

And helping business boom...



€130 million
cost of informing 28 different Data Protection Authorities for business in the EU under the old system.



€2.3 billion
estimated economic benefits of having one law.

New rules should **boost consumer confidence** and in turn **business**.

ePrivacy - An Outlook on a New Framework



Marju LAURISTIN

MEP (S&D Group), Member of the LIBE Committee

Electronic devices are no longer a luxury; for most, electronic devices are imperative for daily tasks. We rely on digital technologies to simplify and generate information on transportation schedules, exact location or allow us to video chat with friends and family; perhaps rate and recommend local attractions or restaurants to other users. The availability and exchange of information does simplify our lives but it also incurs risks on our privacy. Some of those risks have been mitigated while others are harder to pinpoint and foresee.

While respect for private life is a fundamental right as enshrined in Article 7 of the Charter of Fundamental Rights, new technologies are challenging our current laws. It is clear that old solutions provided by the 2002 ePrivacy Directive do not apply to new risks and that legislation on privacy needs to catch up to innovation. While the Directive was revised in 2009, emerging technologies such as OTTs and machine-to-machine communications were not subject to its scope, leaving a gap in data protection and users' privacy. That regulatory gap necessitates a new legal framework, one that is aligned with the General Data Protection Regulation (GDPR), and guarantees the confidentiality of communications and respect for private life, while taking into consideration the rapidly evolving digital tools, channels and platforms. That is why the new proposal for the ePrivacy

Regulation is of utmost importance. This new regulation, enabling harmonisation of the e-Privacy rules across the Member States, is an important part of the Digital Single Market package.

The ePrivacy Regulation is aimed at presenting a comprehensive framework for tackling electronic communications between people and between companies in a new digital environment. It also takes into consideration that information society services should be universally available for younger generations and for vulnerable groups who are becoming increasingly active in online communications. All our online activities leave a digital footprint; users should be in charge of deciding how that footprint can be used and for what reasons. Many users are not sufficiently aware of the risks for their privacy when using modern smart technologies nor do they have sufficient skills for protecting their own privacy. This situation creates widespread mistrust, preventing full enjoyment of those new opportunities.

Companies should provide a safer environment to users who can navigate, communicate, purchase and use digital services risk-free and without the fear of jeopardising their privacy. Only this will safeguard the freedom of thought and enable personal autonomy, democracy and equality in the mediated world. It is important for users to be given full information of what is being done with their data online and how they can take active steps to decide how they want their data to be used. If the service is interested in using users' info for any other purpose other than what is necessary for providing that specific service, then companies need to require the consent of the person. Seeing that online communications can reveal sensitive data about a person's line of work, health, relationships and finances, requiring users' consent should not be viewed as something unattainable; rather, it is a way to respect fundamental principles and provide a trustworthy service to users. We cannot underestimate people's concern over online privacy, as studies have shown that most people using electronic communications are worried about being tracked and do not trust that their data is handled with care.

While the Regulation takes a strong stance on confidentiality of a user's communications,

it also aims at upholding the added value that innovation and digital services offer to people. Providing users with protection from potential risks of digital innovations is not aimed at hampering their benefits. The ePrivacy Regulation will challenge businesses to develop innovative communication devices that are privacy-friendly by default and by design and thus help users be in charge of their own lives in the online world.

As set out in the draft report of the European Parliament, nobody should be granted the right to intervene in anybody's private life or to access his or her personal devices without consent or without a strict technical or legal necessity. In order to innovate their services and develop new devices, European industries need the confidence of European consumers. That is why the new privacy legislation takes into account the benefits for both businesses and users. For example, strengthening the rules of targeted advertising is not destined to restrict businesses from expanding but to engage them more actively in meaningful communications with the users. People should have a clear understanding of how their personal information can be processed by the service provider and used, stored and exchanged for purposes other than the ones initially suggested. People are more than willing to agree to being tracked by a certain service or a website if they trust it and approve the purposes for information processing. However, if they discover that the website grants other trackers unauthorised access to their private information, including to the metadata of their activities or their network of contacts, issues regarding confidentiality and privacy continue to persist.

The new e-Privacy regulation is called to tackle the growing concerns of citizens and to guarantee that confidentiality remains an unbreakable principle of all electronic communications online. European Digital Single Market needs strong protection of privacy in order to enjoy the high trust of European customers.

Personal Privacy and Data Accessibility for European Citizens



Axel VOSS

MEP (EPP Group), Member of the JURI Committee

The headline of this article describes perfectly the dilemma we are facing these days: In a data driven economy privacy and the protection of data are of utmost importance. However, if we do not grant access of data to others (private companies or law enforcement authorities), we will lack economical development and take a risk on an irreparable loss of security at the same time. The free flow of data is also of utmost importance. And we should not wait for the death of our privacy or the death of a strong future. If we do not balance the realities in our laws, our citizens will lose trust in the legislator.

Digitalisation has changed more than any other technological revolution and will change further our social and work behaviour, our means of communication, future competitiveness, law enforcement, property rights, copyright legislation and the fundamental right to data protection. The importance of data has changed fundamentally since the eighties. Back then it was about the simple processing of data to easily find, change and archive information. A simple piece of data remained a simple piece of data.

Today, relationships between accumulated data are made and processed in the way that someone's whereabouts, interests, feelings and behaviours can be read and conclusions can be interpreted from these analyses. Thus it is

possible to predict how an individual behaves, how he chooses, whether he lives healthily or what kind of potential or risk lies dormant within him. With other words: We are on our way to digitalise our souls!

The interconnection of these analytical results together with the personal data of other persons or with environmental, health or social data brings forth completely new insights and business models. In other words, data and its far-reaching analyses have become big business, which generates growth and prosperity.

This technological advancement challenges all previously existing business models, fundamental rights and our security. This „data-triangle“ is like communicating vessels. Therefore data must fulfil multiple purposes. This involves: Firstly, the protection of our privacy (fundamental rights); Secondly, our economic survival and competitiveness (business competition) and thirdly, an appropriate and also necessary combat through intelligence or law enforcement authorities against terrorism and organised crime (security).

Even if, somebody rejects this digital development, he/she cannot escape it. This would be economically fatal, as global economic competition will increasingly align itself with these technological competitive advantages, otherwise economical or personal irrelevance threatens.

On top of the above mentioned, artificial intelligence, self-learning algorithms and

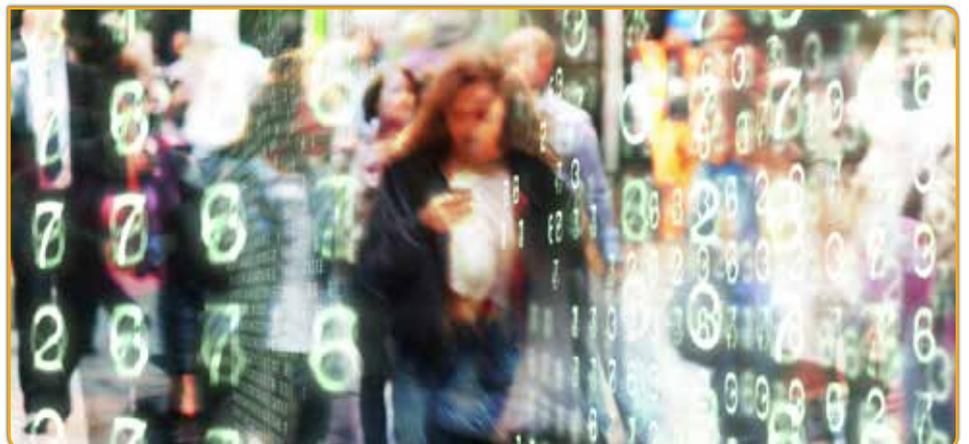
robotics will open again another dimension, also in creating more data, including big amounts of personal data (Big Data).

The type of privacy we knew one or two decades ago has no place in the future. It will be affected by the data that we produce ourselves and that we provide to others to optimise our lives, our business and our security.

To combine the challenges of an economic data-driven future with an easy access to (personal) data with the protection of privacy and security must be the EU's task for upcoming legislation in the digital area. In doing so, the rights of individuals should not be affected, but we should change creatively the main criteria (consent) into a data-sovereignty of the individual.

With more creativity, the EU could become a role model and could prove that it is possible to align the globalised digitalisation of people to the 'analog' framework based on fundamental rights-related values.

I am convinced that the future-oriented data protection must protect the privacy and not only the data. But this will not succeed with the criterion of compliance, because the individual will consent wherever he expects an advantage in his everyday life. This guarantees namely a kind of free flow of data and a certain access to data, but the accessibility to data itself (for business or security reasons) is so far not a criterion for legislators, for judges or the data protection authorities. That might be proven wrong.



An Integrated Digital Economy for the Consumer



Eva MAYDELL

MEP (EPP Group), Member of the IMCO Committee

With the fall of some of the barriers between the national online markets in Europe, the role of consumers has changed dramatically. From people who just visit stores nearby and buy what we are offered on the spot, we increasingly have become people searching for a particular item, no matter where it is stored physically, we are already choosing the best deals, we are sharing information in our online and offline networks, we are rating and writing reviews thus creating the image of companies and products. In other words, in a digital environment in which borders are becoming more and more blurred, the role of the consumer became central and very influential, a role that leads to changes in the business behavior.

On the other hand, the integrated digital environment gives something really impressive, something that all consumers have always dreamed of - choice - the more, the better. The ability everyone to freely offer products without the restriction of territory and location creates a new planet of opportunities for the consumers.

Many people will say that much of this picture is not a complete reality; that there are too many issues that prevent people from shopping online. And I agree to a certain extent. There is one thing that we must strive for in the process of developing the Digital Single Market - and this is consumers' trust.

Trust in the regulatory framework and mechanisms that despite that you do not see the seller, you have the rights and the protection of a consumer.

When we talk about digital economy we also need fair play. This is especially important for the small and medium enterprises and the startups; for those people who decide to take small business ventures into e-commerce. This is also important for consumers because it guarantees competition which eventually leads to better prices, quality and innovation.

Yet how fit is our legal framework? Most of the regulations, both national and EU, are lagging behind in the technological development. The European institutions have a clear idea of what needs to be changed to get the trust we need to make the integrated digital economy a valuable asset for both the consumer and the business. We have at least several elements on which we are working very hard already.

Building on our success on Portability of online content, we must seal a good deal on geoblocking, hopefully by mid-2018. Secondly, we need to secure the payments. In 2015 the EU adopted a new directive on payment services (PSD 2) to improve the existing rules and take new digital payment services into account. The directive will become applicable in 2018. But the devil as always lies in the detail and currently EC and the European Banking Authority (EBA) are finalising the Regulatory Technical Standards under PSD2. After two rounds of consultations there are just 4 minor outstanding issues but importantly the main points for both the traditional banks and FinTechs are already set.

Thirdly, we are already working on parcel services, so that they are affordable, transparent and high-quality cross-border service. The European Commission already presented a legislative proposal as part of its new e-commerce package. Trilogues between the Parliament and the Council are expected to begin this autumn and hopefully the deal will be sealed in 2018.

We still have several issues that remain like VAT application transparency for the online sales. We therefore need to ensure the

interoperability of systems, the use of common standards and that the same rules apply online as offline. Regardless of what we legislate though, there is one important element that should not be overlooked and this is digital literacy, the awareness of the consumers in the digital economy, however I do not believe that awareness can be achieved with legislation but rather with soft instruments such as interactive campaigns.

We need to be really careful when creating this new legal framework. As a MEP, I am convinced that the rules should not impose burdensome requirements on business. On the contrary, any rules of the Digital Single Market and aiming to integrating the digital economy in Europe should be made with the clear idea that the digital economy must be win-win for both consumers and businesses. The Internet should become an environment where small and medium-sized enterprises can easily create their own businesses and offer their products.

Similarly, there is an ongoing debate on what regulations should be introduced on the Internet so that a balance between the business needs for the development of the data economy and the consumers who provide their information is set. The consumers' security in the Internet is the first and foremost because, as I already stated this digital environment needs trust. On the other hand, however, we must be careful not to kill one strong and important evolving industry as the data economy, which actually creates products for the benefit of the people.

Making data count to consumers



Ursula PACHL

Deputy Director General of BEUC

In today's digital economy consumer data has become the raw material that companies use to boost advertising-based business models. Some say data is the new oil. Well, if that is true, then companies are drilling for it at the expense of consumers.

It is a fallacy to believe that consumers get digital services for free. Consumers accessing social media platforms and search engines are giving, very often unconsciously, their data away. In the small print companies explain in complicated but vague legal jargon what they do, could do in the future, or what third parties might do with their customers' data.

Not only do consumers give away their data for free. They currently do not have any rights in case the service they have accessed in exchange of their data malfunctions or is of poor quality. Thus, data protection rights need to be complemented by consumer rights. The European Commission's from 2015 proposal for a Digital Content Directive is a step in the right direction.

Consumers deserve rights in return

To date, when consumers subscribe to a digital service, think Facebook or LinkedIn, or purchase a digital product, for instance an online game, the provider uses the consumers' data for personalised advertising or other ways to make money. This economic reality,

according to industry figures, amounts to over 30% of the revenues generated online. This economic fact creates an imbalance because the consumer who provides his or her data is deprived from any protection which would be normal in a contractual relationship based on the exchange of money. This can no longer be ignored by the EU legislator.

And consumer law is the appropriate means to address this economic imbalance. While data protection laws provide the legal grounds for the collection and processing of personal data and implement the fundamental right to privacy, consumer law is about providing benchmarks for fairness in markets and more particularly in business-to-consumer contracts.

The Digital Content Directive would introduce rights for consumers in case for example an online game or music subscription malfunctions or doesn't meet consumers justified expectations. Such rights are currently absent at EU level.

One of the features of the proposed law is to give consumers the possibility to retrieve their data after the contract has been terminated. This right already exists under current data protection laws, but only for personal data. The Digital Content Directive provides the next step by covering other consumer data such as pictures, home-video's, reviews or playlists.

Consumers have a real interest in recovering this data, for example when they switch services. They might want to remove the images they posted on a social media app or move their reviews to another comparison website. Under current consumer legislation this isn't that easy. The law today only recognises rights when there has been a monetary payment. But today we are playing a different ballgame.

The authorities need rules to enforce the law

The lack of regulation around data-based transactions does not make the live of consumer protection authorities easier.

Recognising data as a counter-performance in consumer law – such as the Digital Content Directive Proposal – is necessary for a fairer and more trustworthy online ecosystem for consumers.

Regulating data-based consumer transactions will bring the legal certainty that market players expect from legislators. Companies cannot innovate if they don't know which consumer rights to apply if there's a problem with their digital product or service. Authorities cannot fulfil their public mandate if they do not have clear rules to enforce. And finally, consumers will only trust digital services if they have control over their data and know they can get redress if things go wrong.

As we speak, EU legislators are still debating the details of the proposed Digital Content Directive and the jury is still out. But it will be the first regulatory endeavor to bring together two areas of law – data protection and consumer law – in a complementary manner ensuring EU rules work seamlessly together to make consumers' data count for them in the digital economy and to protect them where needed.

The right to informational self-determination: Keep it simple!



Mathias CELLARIUS

*SAP, Data Protection Officer;
Head of Data Protection and Privacy*

One of SAP's mantras is "Keep it simple!". Why simple? Because complexity is always a challenge to master.

For 40 years, SAP has helped businesses run better through world-class software solutions that solve complex problems to help them focus on their main occupation and core strengths. Overly complex business processes can slow down and frustrate an entire organization, and people will start looking for ways to bypass them.

Data protection and privacy laws have been conceived to protect people against the threats of a digital world. Today their purpose is more relevant than ever. While most people enjoy the benefits of the World Wide Web, of being able to connect themselves and communicate at anytime and anywhere, there is also a growing uneasiness among individuals about possible misuse of their personal data and the increase of cyber threats. Data protection, thus, should be a no-brainer. Simple.

How is it then, that data protection professionals often encounter reservation and reluctance when they are doing their jobs? Well, the answer is simple, too: data protection laws are complex. Not only do they limit the use and development of new technologies, they also require a breathtaking level of bureaucracy, which are, with the exception of

tax and accounting rules maybe, nowhere to be seen in any other field of law!

Unfortunately, achieving a well-balanced and well-functioning data protection framework is non-trivial, and finding the right balance between data protection and privacy risks and the benefits stemming from new technologies may very well be one of the biggest challenges of our times.

Data protection rules do not exist in a legal vacuum. There is no question that privacy and the right to data protection are fundamental rights. However, they must be balanced against other fundamental rights, such as the right to liberty and security, the freedom to conduct business, the right to choose an occupation and engage in work, the freedom of expression and the freedom for the arts and sciences – to name but a few. Informational self-determination¹ is a fundamental element of human dignity but so are the rights to physical well-being and economic prosperity, and we need to excel in research and education if we want to remain meaningful and guarantee our European values for the generations to come. The question is how to achieve this?

The former EU data protection law was conceived in the pre-Internet age. While it has proven to be remarkably resilient, and has been flexible enough to retain relevance even in today's globally-networked world, the emergence of new data-driven technologies and business models has put increasing pressure on the underlying principles. The dilemma starts with the definition of personal data. The logic of an expansion in scope of 'personal data' is appealing and sounds simple: the broader the definition of personal data, the more data comes in scope, the more data is protected. However, if all data that can be linked back to an individual no matter how unlikely it is to be used, how much effort is required to make the link nor how tenuous the link maybe, comes under the full scope of data protection laws, many beneficial uses of data become questionable. Companies and authorities are faced with the unmanageable

reality that, in effect, all data could be considered personal.

A further challenge presents itself with the traditional principles relating to the processing of personal data as they have also been formalized in Art. 5 of the GDPR when it comes to new data-driven technologies. "Big Data", "Internet of Things" and "machine learning", to name a few of the buzz words, all have in common that they are based on the processing of large quantities of data. They create new insights by combining and relating data to each other. Of course, this may affect the interests of human beings where data relating to them is concerned. It only seems natural that one should go to the affected individuals and ask for permission first, and then stay within the scope of permissions granted. However, are the general consent requirement and the principle of purpose limitation efficient protections in reality? One can have doubts given that hardly anyone reads privacy statements and that users happily and in no time click "I agree" buttons on web sites and in mobile phone apps. On the other hand, businesses that take the legal requirements seriously are required to invest significant effort and money in recording and maintaining consents. This is not simple! Neither for the users who click-accepts declarations of consent without reading them because they are too complex nor for the businesses who have drafted them this way to be legally safe.

The principles laid down in Art. 5 of the General Data Protection Regulation (GDPR) have changed only marginally since 1995 when the GDPR's predecessor, Directive 95/46/EC, was enacted. And even at that time, when they were written into Art. 6 of that Directive, they were not new. In fact, the entire GDPR rather is an evolution, not a revolution. Data processing technologies, on the other hand, and the opportunities they provide have changed in a breathtaking manner. The volume of processing activities has multiplied. Along with this development has gone a broad social acceptance. One does not require a crystal ball to predict that this trend will continue and that data processing will evolve exponentially.

This raises the question whether the concept that has been underlying data protection laws in Europe for 20 years and more, to limit data

¹ The right to determine the governance of his/her personal information

processing and to keep the digital footprint of a person as low as possible, has failed or, to the contrary, helped prevent the worst. I believe that neither is the case. Data protection and privacy is still relevant, more than ever. Now, however, it may be time to re-consider its concepts. If one does not want to go as far as changing from today's general prohibition (the processing of personal data is prohibited unless expressly allowed) to generally allowing the processing of personal data unless expressly prohibited, then at least we should think about introducing statutory permissions that define the boundary conditions for what is socially acceptable. We should concentrate more on what matters to people and less on what we believe should matter to them!

Conceptual changes may be thoughts for the future, now that the GDPR has been enacted and that, according to some sources, is meant to be relevant for the next 20 years. However, so much will now depend on how the new law will be put into practice, whether the EU and its' citizens will be able to participate in next-generation innovation which is being driven by data, or not. At the same time a modern way of interpreting and implementing the regulation should not assume a "one size fits all" approach. Going forward, we should concentrate on what is important: the individual's right to informational self-determination – where it is significantly impacted. Not every processing of data is equally intrusive, not every piece of data is equally sensitive. We need to recognize the importance of context and how it affects potential consequences to users. Trying to eliminate every remote privacy risk may jeopardize valuable data uses in return for small privacy gains.

Several tools and approaches (foreseen under the GDPR) including anonymization, privacy impact assessments and privacy by design which, when properly applied, can help reduce or minimize the impact on privacy. Companies have the possibility to enact technical safeguards, such as pseudonymizing and encrypting data, automated data logging,

data analytics restrictions, access management and automated data validation. A legal system that is closely attuned to these additional safeguards will enable organizations to maximize data utility while minimizing privacy risks. If companies set tighter controls on access to such data and provide consumers with meaningful controls, this should be encouraged and merit more liberal legal treatment and lighter obligations.

SAP has established an entire Data Protection and Privacy (DPP) team consisting of people with a business background, technical experts, auditors and attorneys. The team's core responsibilities include the shaping of SAP's data protection policies and standards, providing advice, recommending key compliance measures, monitoring compliance, conducting audits, training of staff and incident response. The DPP team works together with development and operational units across SAP to provide training and advice, and thus help them develop new and improve existing data protection technology. In addition, making employees aware of what is expected of them in this domain helps build a culture that values the protection of personal data and the individual human beings. Ongoing privacy education and awareness training gives all employees access to the information needed to recognize and properly handle personal information, on a day-to-day basis. The entire SAP workforce worldwide receives a data protection and information security-focused training covering all business and staff units.

We very much support the idea that the European Data Protection Supervisor as well as national data protection authorities recruit staff with more technical (e.g. data scientists) and economic education. It is an excellent way to ensuring a balanced approach. Data protection and privacy constitute a fundamental human right. But it must not become a "super" or "über" right that overrules and pushes aside every other benefit for the individual, the economy or society itself.

We must foster an approach with innovation, technology, business and European competitiveness in mind while putting the necessary controls and balances in place to ensure that society will not be put at crossroads. In this context, we must ensure that the debate isn't becoming too polarized, with each side dismissing the concerns of the other. An automatic negative connotation versus new technologies would be detrimental and only lead to us consuming services and solutions that are offered from other parts of the world.

As little as we like the idea of having machines make decisions on our behalf, we must ensure we take conscious decisions on the right balance for the future of Europe. We are not suggesting that we should be subjecting key issues around our human individuality and dignity to automated, algorithmic decision-making. Clearly, the individual is at the center of society and critical decisions must always remain under the control of a human being. However, in a world ruled by economic principles, our European values will only be able to prevail if we manage to translate them into clear and easy to follow rules that people understand and accept and that our businesses can easily implement and comply with rather than being stalled by bureaucratic burdens and paralyzed by the fear of high fines for non-compliance. Reduce complexity, make it simple and win!

SAP Data Protection & Privacy - the importance of having a multidisciplinary Team



Clarifying rights of access and use of data to promote sustainable digital and data-driven solutions



Laurent AUGUSTE

*Veolia, Senior Executive Vice President
Development, Innovation & Markets*

The European Digital Single Market strategy¹ identifies the digitisation and particularly data driven growth as the future growth engine for Europe. A strong emphasis is put on the significance of removing obstacles for the European data economy in order to stimulate innovation and investments within the single market, and to create business opportunities for European companies. Digital technologies are delivering cross-sectoral efficiencies to business, including SMEs. As an example, the market for IoT components and systems has grown by 160 % in 2013 and 2014, and is expected to grow more than 30% in the next ten years². For instance, a company like Veolia operates some 6 million connected devices worldwide.

The utilities sector may be perceived as trailing behind when it comes to digital innovation in comparison to industries like retail, banking or insurance. However, this sector is now getting on the digital bandwagon too, with online customer engagement, smart sensors, and better use of advanced analytic capabilities. Digital technologies give utility companies the opportunity to collect much richer data, analyse them for service

improvements and provide new services or products.

As many other economic operators, Veolia is leveraging digital transformation in order to optimise the performance of its existing services - provided to industrial and municipal clients, as well as to citizens - and to create new ones. As part of this data-driven approach, Veolia develops systems enabling its customers to monitor their water services or energy facilities in near-real time. In the area of waste management, digital technologies are used to connect actors and develop innovative solutions, such as connected devices that allow for smarter management of urban waste. The

infrastructures linked to Veolia's activities are essential for the cities – there is no city without water network or waste management plan. Therefore, Veolia is well placed to help its customers, municipalities and citizens to evolve towards digital and data-driven solutions, as they are a natural extension of its activities.



Waternamics – Veolia's smart water management

Veolia was among the pioneers of connected meters, launched in 2001, and of smart management of water, with the creation of the first Waternamics hypervision center in 2015. Waternamics was created to help water operators to face challenging situations because of aging infrastructures, shrinking budgets, declining resources (in quantity and quality), and increasing customer expectations. In order to help both public sector and industrial water operations to develop an overall vision to address these challenges, Veolia proposes the implementation of a digital and data-driven solution, leveraging advanced analytics and optimization.



Photothèque VEOLIA - Olivier Guerrin

1 COM/2015/0192 final

2 McKinsey Global Institute, The internet of things: mapping the value beyond the hype, June 2015, McKinsey&Company

The need for a sound legal framework

However, the introduction and expansion of the smart solutions may be in some cases hampered due to an unclear legal framework and divergent approaches at national level. The European Commission has been perceptive on this issue and is preparing initiatives “on the EU free flow of data cooperation framework which takes into account the principle of free flow of data within the EU.”³

In the current context of growing digitisation and development of data-driven solutions, **Veolia supports the Commission’s objective to clarify the framework for the flow, access and use of non-personal data within the EU.**

Indeed, while the General Data Protection Regulation (GDPR) oversees the movement of personal data within the EU, there are currently no common rules among Members States for accessing, sharing and transferring non-personal data.

3 COM(2017) 228 final

Part of building a vibrant European Data Economy is to enable providers and users of data-driven services to benefit from a single market that does not unfairly restrict the flow of data within the EU, while preserving legitimate industrial and business interests of data producers and processing companies.

Veolia is established in countries worldwide and as such the company historically has data stored and processed in different places across the EU. In the context of growing digitisation, Veolia, as other actors, is considering the solutions to evolve towards a “datacenter-less” approach, making it easier to exchange and process data between countries to enhance its own operational performance.

The significance of access and re-use of non-personal data to build a European data economy

Allowing data to flow more freely within the EU seems necessary. This objective could be achieved by harmonizing the approach of localisation requirements on the EU level. In the same way, the emphasis should be made on the dissemination of the state-of-the-art ICT management best practices to address the concerns about data security.

The ability to transfer and to obtain access to data is becoming more and more important for companies, no matter their size or the geographic area where they operate. Therefore, the Commission believes⁴ that the trading of non-personal data it promotes would give an opportunity to the companies needing data for their products or services to obtain them otherwise than by directly generating them. For the companies that generate data, such trading **would open some additional sources of revenue, and -which is very important in building growing and sustainable digital ecosystems- collaboration opportunities.**

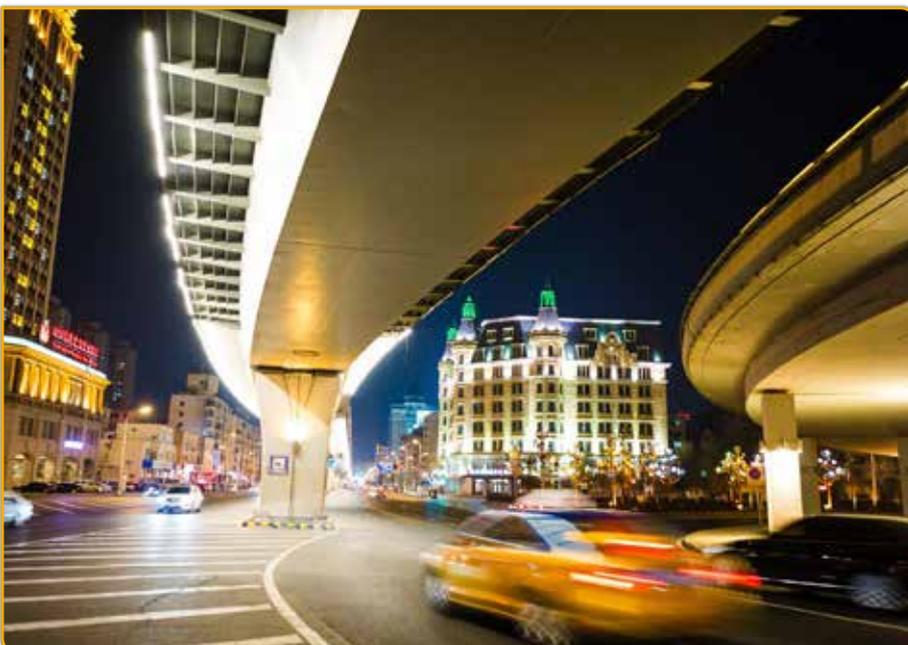
The Commission’s approach which looks at promoting the sharing of data by enabling the trading of machine-generated data, while seeking to avoid the disclosure of sensitive and confidential data, appears legitimate. However, there is still a **need to clarify legal situation of the economic operators investing in sensor-equipped machines, software, tools or devices, used within the infrastructures they exploit under a contract with their customers (public or private).** It is paramount to remove uncertainties concerning the ability of such economic operators to access and use the data they generate this way. It seems therefore necessary to define rights of access and use of data, rather than their “ownership”.

EU data to tackle environmental challenges in the interest of EU citizens

Provided such legal framework is in place, the unleashing of data flows across the EU could be instrumental in addressing the new unprecedented challenges in areas such as clean water, sanitation, congestion, waste management and energy services. Indeed, to meet the daunting issues posed by exploding urbanisation, companies and policy makers are increasingly looking to emerging technologies that rely on data. Therefore **the development of an EU data economy will enable the expansion of smart solutions which in turn will be rewarding for European citizens and the environment.** For instance, this would be beneficial for the growth of smart cities, which use digital technologies to improve the comfort of citizens, solve problems more efficiently, and make the most of the economic development opportunities they bring.

Urban Pulse

Urban Pulse gives citizens a role in the smart city. This application provides real time information about the city via smartphone. Citizens can get involved in the local circular economy: car rental, shared parking spaces, car sharing, thrift stores, etc. They can improve the environmental impact of the city’s infrastructure: sorted waste collection, taking waste directly to waste centers, reporting leaks, etc.. Urban Pulse puts city dwellers at the heart of a new urban experience: playing an active role in their own comfort, they help the city operate effectively and protect their environment.



Photothèque VEOLIA - Alexandre Dupeyron

4 Communication on “Building a European Data Economy”, accompanied by a Staff Working Document, January 2017

E-privacy regulation – an outlook on a new framework



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The Digital Single Market Strategy is the European Commission's plan to allow the European Union to embrace the digital revolution and to fit in the digital age.

As of today, more than 35 legislative proposals and policy initiatives have been adopted by the European Commission with the aim of unlocking the full potential of a data-driven economy which, according to the EU Institutions' studies, could contribute 415 billion Euros per year to the European market.¹

The next step of this "digital revolution" will be the adoption of the proposed ePrivacy Regulation. Together with the already adopted General Data Protection Regulation² (GDPR), which will enter into force on 25 May 2018, and the Directive on security of network and information systems³ (the NIS Directive), the ePrivacy Regulation will constitute a new global landscape for privacy and security.

The main challenge of the European Commission is to promote trust in the digital environment between businesses and consumers,

1 European Commission, *A Digital Single Market Strategy for Europe*, 6 May 2015.

2 Regulation (EU) 2016/679, *General Data Protection Regulation*, 27 April 2016.

3 Directive (EU) 2016/1148 concerning measures for a high common level of security of network and information systems across the union, 6 July 2016.

by building a framework that will at the same time enable innovation and investments and increase the protection of individuals' privacy.

The European Commission published its proposed ePrivacy Regulation on 10 January 2017, aimed at replacing the ePrivacy Directive⁴. ePrivacy deals with the processing of personal data and the protection of privacy in the electronic communication sector. The proposed Regulation, by addressing specific aspects typical of the provision of electronic communication services and terminal equipment devices, will constitute *lex specialis* in relation to the GDPR. While the GDPR targets solely personal data, the proposed Regulation will cover communications content (e.g., emails, videos, images) and metadata (e.g., the time and location of a call or how much time a user spent on a website). It is far reaching.

The proposed Regulation will apply to companies that were not targeted by the current Directive, including the so-called over-the-top (OTT). It will bring new technologies into its scope, such as the Internet of Things, Wi-Fi tracking tools and device fingerprinting.

The proposed Regulation will introduce stricter requirements related to consent,

4 Directive 2002/58/EC, *Directive on privacy and electronic communications*, 12 July 2002.

confidentiality, direct marketing, use of cookies, tracking walls and, as the GDPR, it will apply to EU and non-EU companies providing services to individuals located in the EU (as the GDPR giving the EU extra-territorial reach).

Since its publication, the European Commission's proposal has attracted considerable attention from many stakeholders from both the industry itself and civil liberties groups. As of today, the Working Party Article 29 (WP29), the EU body composed of representatives of the national data protection authorities, and the European Data Protection Supervisor (EDPS), the EU's independent data protection authority, have already published their opinions⁵ on the proposed text. The European Parliament Committee on Civil Liberties, Justice and Home Affairs has published its draft opinion on the text with proposed amendments.⁶

Some aspects of the ePrivacy Regulation are recognised as positive from both the EU

5 Article 29 Data Protection Working Party, Opinion 01/2017 on the Proposed Regulation for the ePrivacy Regulation, 04 April 2017 and European Data Protection Supervisor, Opinion 6/2017, EDPS Opinion on the Proposal for a Regulation on Privacy and Electronic Communications, 24 April 2017.

6 Draft Opinion of the Committee on Civil Liberties, Justice and Home Affairs on the proposal for an ePrivacy Regulation, 9 June 2017.

Institutions and the digital industry; in particular, the introduction of provisions aimed at guarantying a more uniform application of EU law in the Member States. This derives from the choice of a Regulation as a legislative instrument, avoiding diverging implementations in the Member States. By the same token, stakeholders and regulators have welcomed the fact that the same authority will be responsible for monitoring compliance with both the GDPR and the ePrivacy Regulation and the removal of specific data breach notification obligations.

It is fair to say however that other aspects are more actively questioned by the industry. Many of the new provisions appear highly contentious and one may think that they will still evolve in the course of the legislative process.

We highlight some of those aspects below.

1-Consent

Consent plays a central role in the proposed ePrivacy Regulation. This is also the case under GDPR. In this regard, a key issue seems to be the so-called “consent fatigue” and the related need to introduce a more user-friendly approach to inform end-users about their privacy. The proposed ePrivacy Regulation identifies, in the introduction of appropriate software settings of applications, a way to make privacy options for consumers more accessible. However, businesses operating in the digital sectors advocate for a more flexible framework, which could be based on the introduction of the “legitimate interest” legal ground for processing of electronic communication. In this regard, many companies believe that the processing of electronic communication data should be allowed under the same conditions as personal data. The legal basis for processing permitted under the GDPR should be available to the processing of electronic communication data. Under the GDPR, companies can process data when they have a legitimate interest and when this interest is not overridden by the interest and fundamental rights of the data subjects. This could help companies in conducting automated processing of notifications, which is sometimes necessary to provide a service (such as spam filtering or automatic calendaring). However, as of today, the European Commission has excluded this possibility under the proposed ePrivacy Regulation.

2-M2M

Another key issue is the application of the proposed Regulation in relation to machine-to-machine (M2M) services. The text of the Regulation on this point is rather vague, an aspect which could cause legal uncertainty for companies providing this kind of services.

The proposed text suggests that the ePrivacy rules should apply to M2M communications, covering the transmission of data until the intended addressee receives the content of the electronic communication. This broad interpretation of “transmission” brings all M2M services into the scope of the ePrivacy Regulation, which appears to be difficult to apply in practice. Given that the ePrivacy Regulation will concern both personal and non-personal data, the new rules will capture the transmission of non-personal data between connected devices where there are no end-users who could provide consent (e.g., when data are processed for analytical purposes or when the transmission relates to data such as temperature, soil acidity, etc.).

While the EU Commission argues for a broad scope of application of the proposed Regulation, from a business perspective, the application of the proposed Regulation to M2M services could be problematic for the development of new technologies (such as the Internet of Things). In its draft Report, the Parliament Committee on Civil Liberties, Justice and Home Affairs has suggested a narrower interpretation, limiting the application of the ePrivacy Regulation to M2M communications related to end-users.

3-Tracking walls

The EU Institutions will also have to finalise their definitive approach in tracking walls (i.e., the practice whereby access to a website or service is denied unless individuals agree to be tracked on other websites or services, such as cookies or device fingerprinting). With this regard, the text of the Commission’s proposal has restricted the use of tracking walls under specific conditions, while, for instance, the EDPS and the WP29 have considered that a general prohibition should be introduced.

The above issues represent just a few examples of what will constitute the heart of the negotiation process. The EU Institutions will now have to reach an agreement on the final text, which, when adopted, will introduce a complex regulatory framework for companies providing Internet-based services and new technologies.

Although the Commission is adamant to have the draft Regulation come into effect at the same time as the GDPR (25 May 2018), the legislative journey has hopefully only just begun.



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The New Data Economy in IoT/IloT - Challenges and Opportunities



Jean-Michel BRUN

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We are facing three megatrends — urbanization, industrialization, and digitization — that demand that we all do more with less, including energy.

To target the optimization of operational (and energy) efficiency, the improvement of productivity and maximization of asset utilization, one answer is the IT/OT convergence which consists of the integration of IT systems (enterprise data computing) with OT systems (used to monitor and control processes of enterprise industrial operations like manufacturing, oil & gas, water treatment, utilities...)

The IT and OT worlds were relatively isolated until recently, but digital technologies (Cloud computing, Big data, Internet of Things) has brought a revolution of Digital transformation leading to the convergence of IT and OT worlds increasing efficiency and productivity.

IoT/IloT revolution as data enabler

The Internet of Things will be one of the primary drivers of the digital transformation of enterprises and society. The Industrial Internet of Things (IIoT) is the use of Internet of Things (IoT) technologies in manufacturing and industrial processes. We note that IDC estimates more than 80 percent of IoT spending through 2020 will be on B2B applications and use cases.

For instance, Industry 4.0 is the new industrial revolution to push manufacturing into optimization.

Today's IoT world is pervasive collecting data and transforming it into useful information. The benefits are immeasurable: [Connected equipment can permit farmers](#) to remotely adjust their irrigators based on real-time wind and weather conditions, thereby saving water

and energy. Additionally, it can [improve the efficiency of industrial robots](#). Perhaps, in the near future, digital services will lead us to self-repairing machines in factories and equipment in data centers.

Entering a data economy: IoT & AI combine to convert data into tangible value

Economic success no longer depends on just physical products, but on the combination of those products with actionable data. It is imperative that we find a way to transfer the massive data collected by IoT devices into tangible value.

Artificial Intelligence (AI) is the way to address that challenge. In a nutshell, big data fuels AI, which gives all this data meaning through machine learning (as in predictive maintenance), augmented reality (data in context), and deep learning (technology that mimics the brain's ability to learn).

At Schneider Electric, we leverage AI technologies to turn data into actionable insights. Our open, IoT-enabled [EcoStruxure™ architecture](#) is our “vehicle” for doing so. We bring together energy management, automation, connectivity, and software to make it possible for our customers to compete in today's digital economy with one IoT architecture which enables IT/OT solution development at speed and scale.

Challenges and threats of the Digital transformation

The following challenges are key to foster the IoT/IIoT revolution:

- › **Data integration:** the streams of data are making real-time data integration a critical competency. Use of Data Model is key.
- › **Skills and competencies:** several skills (network, software, integration, analytics...) are required
- › **Way of thinking:** remove organizational silos and transform to a collaborative approach between IT and OT
- › **Security, software and cloud industry:** have European industry to deliver the necessary bricks (e.g. EU cryptographic library for IIoT devices)
- › **Secure Connectivity:** deliver connectivity capability which respects 4 needs: low power consumption of devices, security, ease of installation, cost effectiveness. LPWAN (Low Power Wide-Area Network) is part of the technology suite which can achieve the target.

- › **Standards & Interoperability:** To reach interoperability, the EU shall promote a well-functioning and globally leading standardization system, putting business players at the center while ensuring convergence of standards from various industrial sectors (IT & OT). A critical priority is to align objectives of Industry 4.0, AIOTI, IIC initiatives.

Cybersecurity is one of the main challenges of Digitization. IoT and IIoT are a target for malicious actors. We must maintain the trust of users and this is one important objective of the Digital Single Market strategy, to protect the European assets.

We believe that the EU should insist on 3 aspects to foster the protection of IoT/IIoT systems and data

- › **Cyber Security:** The European cybersecurity certification framework, put forward by the EU commission, should take the following main concerns:
 - Solve the certification fragmentation in EU
 - Maintain “interoperability” with international standards to not damage the competitiveness of EU companies outside Europe
 - Adopt domain-specific international security standard like IEC62443 series
 - Base the certification model on risk assessment and security process rather than product alone
 - Do not support an IoT (IIoT) label for B2B products and systems. This could bring confusion and ignore the challenge of system security and integrity
- › **Data protection:** Ensure consistency between different data privacy regulations; i.e. between GDPR, e-Privacy...
 - For B2B applications, managing the complexity of different rules with other countries, like US or China, is a risk for the competitiveness of EU companies outside Europe (for instance, professional email address is considered as private in EU, but not in US and can have a huge impact of the design cost of IIoT offers and a barrier for SMEs)
- › **Import/export:** Ease the use of encryption in EU by simplifying the import/export control of cryptographic means.

Conclusion

IoT/IIoT and Artificial Intelligence are at the heart of the data economy in industrial systems. The protection of systems and data implies to tackle the challenges of cyber security and privacy.

Europe and the data economy: a great potential for industry



Pilar DEL CASTILLO

MEP (EPP Group), Member of the ITRE Committee, Chair of European Internet Forum

Beyond any doubt the European Union provides unique and extraordinary conditions to seize all the opportunities of the Digital Transformation. With a GDP of 16.5 trillion Euros, representing 22.8% of global GDP, and more than 500 million consumers, has the necessary economies of scale for developments such as cloud computing, Big Data, data-driven science, robotics, artificial intelligence, the Internet of Things and of course 5G.

However, today Europe's industry cannot fully seize all the benefits of these technological

developments. In the EU, we still face very significant regulatory fragmentation. For this reason, action has been taken in many fields. In that sense network security, e-identification, e-commerce, roaming, geoblocking, copyright, Cloud computing, ePrivacy and free flow of data are clear examples where we must continue to work.

On the other hand, the path to Digitalising Europe's Industry is also very much determined by connectivity. In this regard, the Regulatory Framework for Electronic Communications will be a crucial tool in making Europe a Gigabit society.

With this in mind connectivity must be the backbone of future legislation such as the Electronic Communications Code now under discussion. In this regard the investment need for very high capacity infrastructure is estimated in a range from 500 to 600 billion Euros, and up to 90% of that will have to be provided by the private sector. For these reasons predictability, reward risk-taking and long-term investment in very high capacity networks are crucial.

At the end of the day investment, competition and regulation must shape a virtuous circle that fosters the rollout of ubiquitous, very high-capacity networks and 5G broadband infrastructure.

Europe is in a good competitive position not only because of the mentioned economies of scale, we also have an outstanding global

competitive position in manufacturing, a sector that represents the major share of investment in EU R&D (62.3%) and 80% of total EU exports.

In addition other EU assets should be mentioned such as its strong global position on industry software, the development of open platforms (such as Industry 4.0 or FIWERE), artificial intelligence and robotics.

These strengths will prove of outmost importance in an Era where the growth of machine-to-machine communications is exploding beyond the charts, transforming the physical world in a type of information system through sensors and actuators embedded in physical objects and linked via the Internet Protocol.

While social networks and ecommerce platforms are today at the origin of data, in the near future it will mainly be supplied by the Internet of Things. Already by 2020, 40% of all data will come from sensor data and it will unlock a \$ 1 trillion global market and by 2023 we will reach 1 trillion sensors.

With the adequate highways of the future, the high capacity networks, Europe's industrial sector will be perfectly equipped to be a front-runner in the data economy, which is undeniably the key competitive advantage of the XXIst century.

It is not wishful thinking, it is a concrete possibility.



Digitalisation of the energy sector: a key driver for a secure, sustainable and competitive energy system



Dominique RISTORI
Director-General DG Energy,
European Commission

The energy sector is central to our modern society and is essential for all parts of our economy. It enables us to produce, travel, withdraw money, refuel our cars, run hospitals and schools or access the internet. Today, the energy system is undergoing rapid changes underpinned by the decarbonisation of our economy, greater decentralisation and increasing digitalisation.

First, the energy sector is decisive for the decarbonisation of the economy. Indeed, two thirds of CO₂ emissions are related to energy production and consumption. Besides, the implementation of the Paris Agreement will mean that by 2030 at least 27% of the energy we consume will come from renewables. Half of the electricity produced will be generated by renewable energies.

Second, with the growing share of renewable energy sources, the energy system is becoming more decentralised. Today, 90% of renewable energy is now connected at distribution level in the electricity sector. Furthermore, electricity will be increasingly used in sectors such as transport and heating and cooling. This calls for changes in the way we build and operate our electricity networks as well as for innovative solutions to make the electricity market fit for renewables and distributed energy.

Finally, if we want to integrate in a secure and competitive manner the growing share of renewable energies to the market, the intelligence of the energy system, and in particular of the electricity system, needs to be improved. In this context, digital technologies are playing

an increasingly important role, with new intelligent components and ICT complementing the existing technologies. The advancing digitalisation makes the energy system smart and is necessary to support the energy transition.

The market for smart appliances and data in the energy sector is expected to grow exponentially in the coming years. In Europe, the industry is eager to embrace these opportunities and the EU should seek to foster these efforts.

Recognising the opportunities and challenges ahead, the Commission has placed the digital transformation of the energy sector high on its agenda. The Commission adopted the Clean Energy for All Europeans package in November 2016 which puts forward a set of proposals to support the energy transition. This package puts in place a performant and stable regulatory framework that is flexible enough to adapt to the challenges ahead and to support technology development and innovation in order to trigger investment and unlock Europe's growth and jobs potential. It addresses the promotion of renewable energy and energy efficiency to meet the 2030 energy targets but it also tackles the way in which the electricity market should be organised in order to integrate renewable energy, stimulate energy efficiency and secure supply of electricity, while ensuring that consumers fully benefit from the energy transition.

Indeed, this package puts consumers at the centre of the energy system and ensures that they can benefit from innovative energy services such as smart grids, smart meters and smart homes. For instance, consumers will be entitled to request smart meters. This will enable a host of new services and better standard of service for consumers, including eliminating inaccurate billing due to estimated consumption. It will also allow consumers who wish to do so to react to price signals when it is best to consume, store or sell electricity. This will enable them to take control of their energy consumption while ensuring greater flexibility of the electricity system. Besides, the Commission proposals will also exploit the energy efficiency gains in the building sector which represents 40% of Europe's energy consumption. It will encourage the use of ICT and smart technologies to ensure buildings operate more efficiently. This will help consumers to reduce their energy bills while improving their comfort.

The proposed EU regulatory framework will also make it easier for new business ideas and

new players to bring innovation to the table, fostering synergies between ICT and energy industries. This will stimulate growth, jobs and improve services for consumers, gaining their trust and satisfaction, while strengthening the level of competition in the energy market and IT services. Ultimately, it can develop a whole range of services and opportunities for consumers.

However, an increased use of smart technologies and ICT will generate a wide range of sensitive energy data, carrying high commercial value. Therefore, it is key to ensure a sound management of these data. The Commission's proposals put forward measures to guarantee that the ownership of such data ultimately rest with the consumers and that it is made available only with their consent.

Besides, with the increasing role of data and the digitalisation of the energy sector, the need for a strong cyber-security is even more acute. Indeed, cyber-security and security of supply are two sides of the same coin. And with the interconnection of the European power grid, cyber-attacks in one Member State or region can cause cascading effects all across Europe. As a result, the Commission intends to develop measures to ensure privacy protection and cyber-security and increase the synergies between the Energy Union and the Digital Single Market. At the European Council last June, Member States agreed on the need to look at infrastructure and cyber-security in the context of the digitalisation of our economy.

Cyber-security is also an issue of international interest. The G7 Energy Ministerial last April in Rome focused on cyber-security, identifying as a priority energy infrastructure and grids. Indeed, they are among the most complex and most critical infrastructure of our modern society. They serve as the backbone of our economic activities and security.

The Clean Energy for All Europeans package acknowledges the importance of cyber-security for the energy sector and the need to duly assess at all levels – European, regional and national – the cyber-risks and their impact on security of supply.

Overall, this package creates the right environment for making the most of the digitalisation of the energy sector. This will not only contribute to a more efficient management of the energy system but will also increase energy security and facilitate the integration of renewable energy sources, while benefitting to all European consumers.

Digital transformation of the power system: sustainable, safe and competitive energy for all European citizens



François BROTTES

CEO of RTE

The energy transition is now underway in Europe. Combined with the digital revolution, it is bringing lasting changes for the electricity power system:

- an increasing number of players and an increasing number of decisions are being made within very short timeframes and closer to real-time.
- new technical solutions are emerging (e.g. decentralised storage).
- the so-called “uberisation” phenomena encourages usage rather than ownership, dematerialisation rather than infrastructure, intermediation rather than centralisation.
- last but not least, both end users and decisions makers are more and more expressing their willingness to become “actors” of their electricity consumption.

One thing is certain. The electricity sector will undergo more changes in the next 5 years than it has done in the past 50 years. Nevertheless, the exact shape of tomorrow’s power system is still very uncertain and winning solutions are still hard to predict.

All stakeholders and more specifically TSOs need to rethink their business models to make sure that they are actually enabling the energy transition and avoid lock-in effects, which would lead to heavy stranded costs for the entire European community. Indeed, as the economics of the electricity system are undergoing deep-rooted changes, it is our role to adapt the sector for the benefits of consumers as a whole, while responding to the political ambitions of the Energy transition..

Digitisation offers opportunities ...

Digitisation can improve efficiency and sustainability by optimising transmission system usage and by supporting the emergence of new

flexibilities (jointly developed by all stakeholders). Already, pilot projects show that digitisation can increase the energy flows on current network infrastructures up to 30%. Such performances have been witnessed when increasing local transmission capacity thanks to the up-scaling of substations using “smart” technologies (as in the “Blocaux” substation in the north of France) or when boosting cross-border capacities thanks to the development of new capacity calculation methodologies (such as the so-called “Flow-based” methodology implemented in 2015).

Indeed, the ability to gather, transmit and process large volumes of real-time data is completely transforming grid management and operation, as TSOs are more and more able to get the most out of existing infrastructures and to operate the grid to its limits while maintaining the same level of security of supply.

More and more, the information collected on the “state” of the grid allow TSOs to better operate the grid in real time. The ability to manage in a combined way the maintenance and operation of the grid is a living plea for the role of transmission system operator, and to avoid the unbundling of grid management functions.

Moreover, grid digitisation is an extremely powerful tool which, when supported by existing infrastructures, facilitates the development of evolutive, flexible, agile and most importantly, reversible solutions that can be easily reconfigured in a rapidly changing environment. These new solutions offer alternatives to the construction of infrastructures. This is particularly useful in the current phase of transition of the power system. Market mechanisms close to real time, new services such as peer-to-peer exchanges of blocks of electricity are being developed. New interactivity between storage facilities, demand response and grid operators are being studied. A study published in July 2017 by RTE and ADEME has shown the important role of distributed flexibilities for the security of supply and real-time balancing of the system. Digitisation is the key towards aggregation, which shows that the future of the power system is not linked to the connecting “points” but to the ability of each market player – regardless of its connection to the grid – to act thanks to the smart data offered by new technologies.

Result of digitisation: savings for the community; savings for new RES generation facilities which no longer have to contribute financially to the construction of new lines; savings for the end user, and a response to societal expectations (fewer infrastructures, fewer consequences for the landscape, better use of environmental resources).

...and raises challenges

A formidable tool to accompany energy transition across Europe, digitisation also comes with its share of risks that must be managed by policy-makers and regulators. Digital transformation is having a significant effect on the value chain and on industrial aspects. It affects an entire ecosystem including (existing and new) generation facilities, transmission system operators, distributors, equipment suppliers, regulatory organisations, communities, industrial facilities, start-ups, new actors and citizens to name but a few.

As new initiatives emerge, it is our collective role to pay attention to the redistributive effects of these new models. Indeed, the highest household incomes are the most susceptible to invest into innovative technologies, such as decentralized storage capacities or household solar power, and will get the benefits from these investments. When these incentives are based on the exemption of taxes or of part of network tariff, it is then up to the other households, including the lowest incomes, to support the costs inherent to the power system, a power system that benefits to the whole community. It is also the role of TSOs to alert decision-makers and to provide their expertise in order to be able to design new solution and market designs which captures the new opportunities of digitisation while ensuring the solidarity between consumers.

An initiative to gather all electricity system stakeholders on digitisation

Digitisation is therefore paving the way towards an efficient Energy transition. All stakeholders need to be involved and aware that it is at the core of the evolution that the power system will undergo in the near future. RTE is experiencing every day the power of digitisation on its own infrastructures but also on the electrical system as a whole (e.g. though the development of new distributed and aggregated flexibilities) and is convinced that the future of the power system will be digital.

In order to keep acting as an aggregator of smart grids and new ideas and to ensure that the new landscape doesn’t leave behind the most fragile citizen, RTE is actively working with Elering, the Estonian TSO, under the Presidency of the European Union in order to create an initiative that will push these topics on the European agenda. The kickoff will take place in Tallinn in September 2017 and a 2nd “rendez-vous” is already being planned in Paris next spring in order to start a new dynamic with all stakeholders, allow new ideas to be brought around the table and to ensure that Europe actually benefits from this momentum.

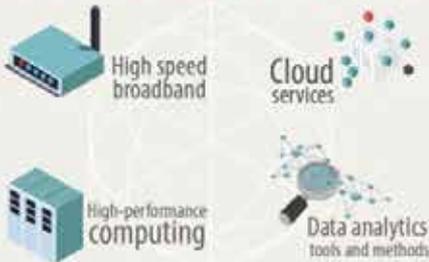
HOW CAN BIG DATA MAKE A DIFFERENCE?

DO YOU KNOW?

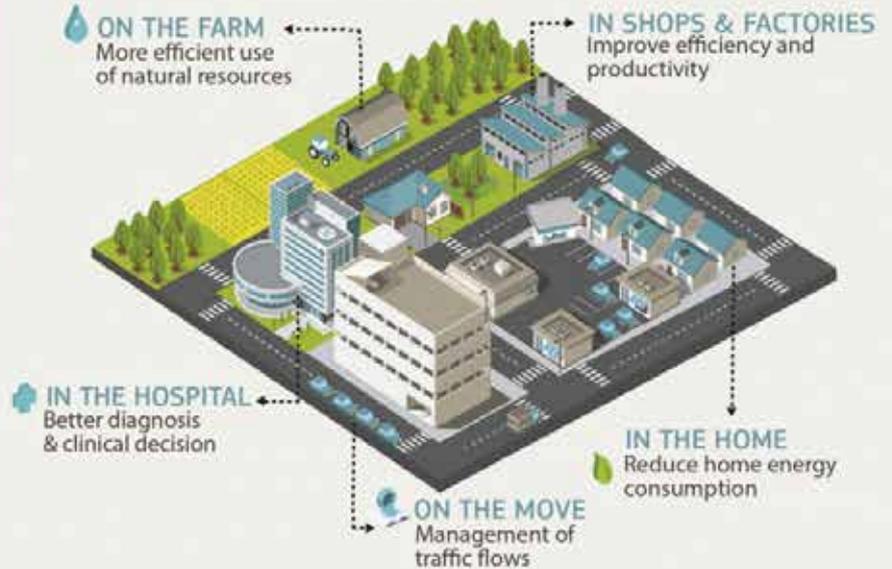
Decoding the human genome took

in 2003 → 10 Years
 today → less than a WEEK
 near future → a few HOURS

ALL OF THIS IS POSSIBLE BECAUSE OF



REAL LIFE APPLICATIONS



Data will create **HUNDREDS OF THOUSANDS** of new jobs

e.g. In the UK **240%** Big data specialists by 2017 = **69 000** Jobs

& growth
€ 17 BILLION worldwide in 2015

4 STEPS TO LEVERAGE THE POTENTIAL OF BIG DATA

1. INVESTING IN IDEAS
 Search for **game-shifting** ideas
Public Private Partnership
Research in Horizon2020

2. INFRASTRUCTURE FOR A DATA-DRIVEN ECONOMY
Network of data processing facilities
 Invest in the **GEANT** network
Supercomputing centres of excellence
 Build big data mobile internet through **5G PPP**
Telecoms Single Market for broadband investment

3. DEVELOP BUILDING BLOCKS
Guidelines on standard licences, datasets & charging
One-stop-shop to open data across the EU
Mapping big data standards
 Open data **incubator for SMEs**
Training for data professionals
 Data market **monitoring** tool

4. TRUST AND SECURITY
 EU **Data protection** rules
Guidelines on secure data storage
Consultations on:
 - Policy options after **Trusted Cloud** Europe report
 - Data ownership & liability of data provision
 - User-controlled cloud-based technologies

Rethinking a European Digital Economy



Patrizia TOIA

*MEP (S&D Group), Vice-Chair
of the ITRE committee*

The digital revolution is reshaping European Union's economy, from financial services and telecom to creative industries and the way workers are employed. Digital technologies and digital communications are permeating every aspect of life. However in Europe we imported from abroad most of the technological changes, most of the business models and most of the innovation of the digital economy. Almost all the most popular online platform used by European citizen are American or non-European. All digital innovation that today are part of the daily life of most European citizen are based on old, national, fragmented legislations and suffer of a lack of infrastructure and human capital. If we want to use all the opportunities of this digital revolution, and to tackle the risks it poses, we have to rethink the European digital economy, starting from a quick and effective implementation of the Digital Single Market Strategy. According to the latest communication from the Commission to the European Parliament on the Mid-Term review on the implementation of the Digital Single Market Strategy of the last May in Europe we have several advantages to seize at best the opportunities offered by digital economy: a strong manufacturing base and fast-growing startup ecosystem, newly digitised industrial processes and a skilled workforce. But these strengths can only be used to the full if there is substantial additional investment in digital skills and infrastructure,

from the EU level, Member States and the private sector. In order to fully unlock the data economy, the EU must also harness such assets to maximise the digitisation of the European service sectors, in particular health and care, energy, transport and finance. Furthermore the completion of the EU Single Digital Market also needs a clear and stable legal environment to stimulate innovation, tackle market fragmentation and allow all players to tap into the new market dynamics under fair and balanced conditions. This will provide the bedrock of trust that is essential for business and consumer confidence. Personally I negotiated the regulation of roaming tariffs and the cross-border coordination on spectrum, to make sure that Member States will take coordinated action to make the high-quality 700 MHz band available for wireless broadband use. As shadow rapporteur of the S&D Group I followed also the dossier on "digitising European industry" where I insisted on the opportunities linked to Industry 4.0, new methods of productions and ways to improve the quality of European manufacturing.

However creating the conditions for a business friendly environment is not enough. New technological developments must help tackle social inequalities and discrimination, create jobs, and promote openness, fairness, transparency, sustainability and accountability in our society. EU digital policies need to be reviewed carefully so that all Europeans can benefit from the growing digital economy. The advantages of digital economy must benefit all our communities and we need to support weaker and non-digitally literate disadvantaged citizens in our society and increase access to digital public services in remote locations and ensure that citizens (including people with disabilities), who cannot access internet are not left behind. In the workplace, digitization is an opportunity for many new jobs and growth through innovation. Europe must become a world leader in the development of new smart and attractive workplaces where people collaborate seamlessly with ICT technologies. But not every employee will be able to adapt quickly enough. The EU is facing continuous shifts in technology that are bringing major changes to the labour market. There is a great need for a proactive industrial policy to meet the necessary adjustments and challenges that

labour market is facing, in line with increasing complexity, continuing automation and robotization. Ongoing automation and robotization is impacting on our workforces directly. We must invest more in the knowledge of how automation and robotics can be used to improve quality of life and quality of employment. We should also consider how these other ICT technologies can be used to do the job better and more safely, increase productivity, and provide opportunities to replace repetitive tasks with better quality and more challenging ones both in large companies and SMEs. The increase in new forms of employment such as information and technology (ICT) based mobile work and crowdsourcing provide an opportunity for workers since it can lead to a higher level of autonomy and flexibility to coordinate private life and work. At the same time, the digital economy is seen by some as posing a threat to traditional jobs in the industrial and services sectors. It also makes it easier to transform secure employment into more precarious forms of employment and poses serious challenges for the occupational health and safety of workers. This also presents an additional new challenge for older women and men re-entering the work force in later life. We must ensure that any future policy framework takes this into account and seeks to mitigate, or at least manage, this challenge. Finally we have to ensure a fair and innovation-friendly platform economy. The Commission has conducted a fact-finding exercise on platform-to-business trading practices and preliminary results indicate that some online platforms are engaging in trading practices which are to the potential detriment of their professional users, such as the removal ('delisting') of products or services without due notice or without any effective possibility to contest the platform's decision.

Putting urban transport into the third dimension, together

© Airbus S.A.S. 2017; photo by P. Masclet / master films.



Mathias THOMSEN

General Manager Urban Air Mobility, Airbus

The convergence of new technologies coupled with digitally-enabled business models is making it possible to add the third dimension - the sky - to European and global urban transport networks. The road to unlocking urban congestion is paved with collaboration and coordination among industry, policymakers and civil society.

We stand at a unique convergence point of several new technologies, such as autonomy, electric propulsion and low-cost mass produced carbon composites that make it possible to offer a new class of urban flying vehicles. While commercial helicopters since the 1940s was the pioneering technology that made urban air mobility possible, they never had much civil success in cities due to their appearance and noise.

The new class of vertical flight vehicles will be able to carry people and goods around cities as part of a resilient, environmentally friendly and effective transportation network. The Middle East and Asia have already announced planned tests of self-piloted electrical flying vehicles in their attempt to keep pace with the latest transport innovations. To accelerate market uptake and make urban air mobility a reality in Europe, closer cooperation between private and public stakeholders is required now to set up the necessary infrastructure and regulatory frameworks.

Looking to the sky to unlock urban gridlock

More than two out of every three EU citizens live in urban areas. I am one of them,

and like many others, I see how urban growth year after year continues to push our cities' transportation systems to their limits. By 2030, authorities expect demand for ground transport in Stockholm to increase by 80%. That is more than three times the city's projected population growth of 25% in the same timeframe.¹ In many European cities, the trend is the same. Congestion takes away valuable time that could be spent in more convenient and enjoyable ways.

In the EU, traffic congestion currently costs almost €100 billion a year. By 2030, it could be closer to €300 billion. Equally noteworthy, the physical infrastructure required for congestion management is expensive and uses land otherwise needed for housing. Adding the third dimension to urban transportation networks would make city travel faster, safer, more reliable and stress-free. At first at prices levels on par with that of street taxis and later, as market uptake enables lower unit costs, at even lower price points. It would also allow us to rethink urban spaces: building roofs or parking lots, for example, could be given a new purpose as part of the infrastructure for landing pads.

Digitising urban mobility

Self-piloted flying vehicles are made possible in part by large investments in digital competencies that characterise the aerospace and defence industry of today. Urban air mobility requires newly developed sensors, batteries, nodes for take-off and landing, as well as digitally-enabled business models to seamlessly offer services to the end customer.

We have already made a first successful step towards offering on-demand personal airborne mobility in São Paulo, where we offer a new helicopter ride-hailing service called *Voom*. The service, which aims to ease congestion by making helicopter travel more accessible and affordable via an easy-to-use app, is now being rolled out in additional cities. Even more ambitious are our flight demonstrator projects: our teams in both Europe and Silicon Valley are developing two entirely new autonomous, fully-electric urban flying vehicles: *CityAirbus* is a vertical take-off and landing vehicle for up to four passengers, while *Vahana* targets the transport of

individual travellers or cargo. Such vehicles will also operate via B-to-C digital business models, using an app to request a ride. And although this might sound like science fiction, the reality is not so far off: Airbus plans to flight test *Vahana* as early as the end of this year, and *CityAirbus* by 2018.

Bringing network nodality to urban transportation networks

When fully deployed, urban air mobility will bring multiple, tangible societal gains:

- European commuters will benefit from the higher speed and geographical range of urban air mobility. Research suggests that self-piloted flying vehicles can operate at three times the speed of the average road vehicle while extending commuters' geographic reach by ten times, as there is no ground congestion to slow down mobility.²
- As self-piloted flying vehicles produce little local pollution, are fueled by electricity and are energy efficient, they contribute to European policies for an improved urban environment. For trips up to 160 kilometres in range, analyses show that urban electric aircraft require 76% less onboard energy than conventional aircraft. Depending on the local energy mix, they can rely solely on renewable electricity.
- European cities will continue to grow economically with urban air mobility despite high property values and insufficient road capacity, which according to researchers at NASA have historically limited further physical growth of cities.³ Urban development will be made easier because urban air mobility increases the geographic accessibility to remote and underserved areas of the city while making new urban planning possible.

2 Vascik & Hansman: Systems-Level Analysis of On Demand Mobility for Aviation; MIT International Center for Air Transportation (ICAT) Department of Aeronautics & Astronautics Massachusetts Institute of Technology (February, 2017). ([link](#))

3 M. D. Moore, K. Goodrich, J. Viken, J. Smith, B. Fredericks, B. German, and M. Patterson, "High-Speed Mobility through On-Demand Aviation," in 13th AIAA Aviation Technology, Integration, and Operations Conference, 2013, pp. 1–27 ([link](#))

1 <http://www.trafa.se/kollektivtrafik/arbetspendling-i-storstadsregionerna-3994/>

URBAN AIR MOBILITY

Airbus believes that adding the third dimension to multimodal urban transport networks will improve the way we live and offer an alternative to congested megacity transport systems. To that end, the company is working with a diverse ecosystem to develop partnerships and a portfolio of projects to make urban air mobility a reality.

Urban Air Traffic Management

Actively shaping regulations and future air traffic control requirements to safely utilise urban skies

Voom

An on-demand service developed by A* that allows megacity dwellers to book a helicopter on a shared basis via a mobile app



CityAirbus

A multi-passenger, self-piloted electric vertical take-off and landing (VTOL) demonstrator designed for urban air mobility with cost efficiency, high-volume production and a low environmental footprint in mind



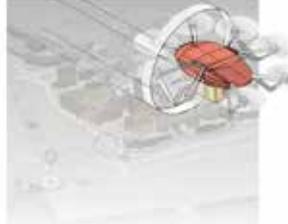
Vahana

A single-passenger, self-piloted electric vertical take-off and landing (VTOL) aircraft being developed by A* to open up urban airways



Skyways

Collaboration with Airbus Helicopters and the National University of Singapore to test the seamless delivery of small parcels on its campus using unmanned aircraft systems



AIRBUS

- Fiscal policies will become more efficient. Instead of spending an exorbitant amount of money on roads or railway infrastructure, capacity building for self-piloted flying vehicles is limited to take-off and landing infrastructure which is much more cost beneficial and easily made by private investments.
- While one kilometre of new road offers citizens another kilometre to drive, creating a new take-off and landing node means that it connects to every other node in the urban air mobility network. This network nodality offers flexibility and resilience to cities and emergency operations since vehicles can land at a nearby node if the target node is unavailable.
- The booming European e-commerce sector will benefit from easier access to parcel delivery and help mitigate the need for large delivery trucks that currently fill up streets.

Calling for new regulatory frameworks, investments and public dialogue

Developing safe and viable self-piloted flying vehicles for urban spaces is no longer the main blocking point. The hurdles we see are less about technology and business model, and more about urban integration, public acceptance, and automated air traffic management. This is why we must embark not just on the development of the vehicles, but rather on a journey to make an integrated urban air mobility solution a reality. To reap the many benefits in Europe, we must start

working now with policymakers on new regulatory frameworks, public investments in infrastructure, and dialogue with civil society.

More specifically, we envision an updated regulatory framework that takes recent European accomplishments in drone regulation to a new level. The EU Commission's recently published blueprint, U-Space, which covers altitudes of up to 150 metres, paves the way for the development of an EU drone services market. Opting for a U-Space framework where urban air mobility services offer integrated interfaces with manned aviation will allow us to benefit from the very high level of automation, connectivity and digitalisation for both the drone and the U-Space system.

Drone insertion pilot studies in the EU will be key to accelerate market uptake and the local expertise about how best to build an urban air mobility ecosystem in partnership with companies, such as Airbus. In this regard, strengthening the European Aviation Safety Agency's competence in self-piloted flying vehicles, including the conditions and processes for approving such vehicles, to the EASA Basic Regulation is welcomed. And on the Data Economy, we must make further strides with regards to access to non-personal data that is generated during flight operations. As such, all stakeholders involved - suppliers, vehicle manufacturers and public authorities - will need to work closely together to find a fair and balanced soft law approach for data access and a new liability regime that takes into account digital innovations such as self-flying vehicles.

A solid urban air mobility transportation network depends on public investments and

engagement in building the infrastructure. Various EU-funded investments in 5G mobile networks are crucial to providing the necessary digital infrastructure for urban air mobility to enable safe, passenger and commercial drone deployments that can optimise safe low-altitude operations beyond visual line-of-sight. To ensure cost-efficiency, a maximum of synergies with other sectors, such as automotive, should be envisioned. Another example is amending building codes to refurbish and build for vertical takeoff and landing pods and to create the standards for such pods to meet requirements for safety, access to electricity and measures to mitigate noise.

Every industrial revolution has been driven and symbolised by a new form of transportation. Ships with sails and later steamboats. Railways and cars. At the doorstep of the digital revolution, self-piloted flying vehicles could easily be the driver and symbol for taking economic growth, urban development and mobility into the next era. Industry, policymakers and civil society must come together to find out how best to harvest the benefits that come from putting urban transport into the third dimension.



Industrie 4.0 in Practice – Value Proposition of the Asset Administration Shell



Thomas HAHN

Chief Software Expert, Siemens AG,
Corporate Technology

The real and the digital worlds are merging from both directions: before control systems are created in the real world, they are planned and designed in the digital world; conversely, existing systems and processes are re-modeled and optimized in the digital world. As a result, the value of the digital representation of the control system increases, so that these – in addition to the physical components and systems – must be well administrated. Entities managed by a Company are referred to as assets in the following.

Digital representations are generated in a variety of different software systems, and often assets are represented in various software systems. Assets need to be managed throughout their entire lifecycle. If, for example, a component is physically changed or automation software is reprogrammed, these changes must be consistently adapted in all digital representations. Since digital representations are usually managed differently in the various systems, these adaptation processes are expensive and error-prone. The challenge is therefore a systematic management of all assets across the various software systems.

Concept and Value Proposition of the Asset Administration Shell

In the future, all assets will be encapsulated via a so-called asset management shell, such that assets may be managed in a uniform

manner. The combination of asset and asset administration shell is also called an Industrie 4.0 component.

The concept of the asset administration shell was defined by the Plattform Industrie 4.0. This concept offers the following value propositions:

- › General concept for modeling different types of assets:

Assets may be physical, such as a Drive, but assets may also not be physical, such as a piping scheme. Assets can be simple things, e.g. a pipe, so management of the asset must be done outside of it, and the identification of the associated information in a software system must be ensured through a unique identification of the asset. However, assets can also be complex and can be constructed from other assets, such as a machine or a whole production plant. The asset administration shell offers an approach to manage these very different assets uniformly.

- › Assets can be tracked consistently throughout their entire lifecycle:

Information about the lifecycle of an asset, such as the change of a configuration or the physical exchange of an asset, is managed in a uniform way. Typically, different stakeholders operate with an asset throughout their lifecycle. The asset administration shell

provides all stakeholders with a unified view to the life of an asset. For them, all information is visible, where authorization is allowed.

- › Assets have unique semantics:

Assets are characterized by property value statements. The definition of the properties follows international standards such as eCl@ss. In addition, property value statements are typed. Thus, for example, it is possible to differentiate between assurances and requirements, and on this basis, generic negotiation algorithms can be implemented relating to requirements and assurances.

Practical Implementation of the Asset Administration Shell

The subject matter of the asset administration shell is a complex issue, for each stakeholder it may have a different meaning and relevance. Accordingly, each stakeholder has their own perspective on the asset administration shell.

To focus these discussions, the ZVEI has sponsored a project to implement the asset administration shell. In order to be able to incorporate as many ideas as possible and to ensure a balanced view of the various perspectives, the project was executed as an open source project (<https://github.com/acplt/openAAS>) under the name openAAS



Real world meets virtual world (Copyright Reitz Plattform Industrie 4.0)

(open asset administration shell). The project was managed by the Department of Process Control Engineering of Aachen University.

The technical implementation of the asset administration shell can be based on different technologies. The implementation in the openAAS project is based on OPC UA. OPC UA separates the transport mechanism from the data modeling and thus also enables a high degree of interoperability. For this reason, OPC UA is becoming more and more a standard in the Industrial Internet of Things, especially in the manufacturing industry. An important consequence is that today many devices already offer OPC UA capabilities,

therefore a migration path is possible for the asset administration shell with existing systems.

Guided by Siemens and the participation of other companies and associations, the openAAS implementation was installed on the Industrie 4.0 demonstrator, a machine consisting of a real flexible transport system in combination with virtual processing cells and presented at the Hannover Fair 2017.

Outlook

OpenAAS is a research project and therefore product quality cannot be guaranteed. Nevertheless, it illustrates a direction

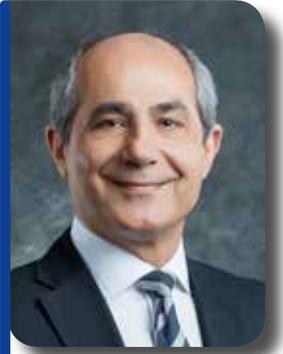
of the manufacturing industry in the era of digitalization. The project also provides indications how OPC UA should be developed in the future.

An important next step now, is for many other companies to test openAAS on the basis of specific application scenarios and provide feedback to the openAAS development community. This will result in an improved understanding of the different stakeholders regarding the concept of the asset administration shell, and will support standardization through practical dissemination.

Industrie 4.0 demonstrator at Hannover Fair 2017 (Copyright Reitz/Plattform Industrie 4.0)



Building a data economy in Europe: the priorities of European electronics manufacturers



Laith ALTIMIME
President, SEMI Europe

Electronics manufacturing plays a crucial role in linking the physical and digital worlds. Electronics components and systems help capture, transmit and process personal and industrial data. They, thus, accelerate the uptake of emerging technologies such as autonomous cars, wearables, AR/VR and AI that rely on data. Yet, the transition from traditional markets, such as PCs, to emerging applications is a challenge for many electronics manufacturers, in particular for SMEs. The EU can play a pivotal role in transition to a data economy in Europe by supporting research and education in electronics, promoting industry-driven standards, investing in its infrastructure and implementing a forward-looking policy framework.

Communication infrastructure allowing high-speed data flow

The increasing number of connected products is expected to generate a significant burden on mobile data traffic. IDC estimates that the data we create and copy is doubling in size every two years, and by 2020 it will reach 44 trillion gigabytes. Also, different sources estimate that 50 to 200 billion devices will be connected to the Internet by 2020. In parallel, real-time interactions increase the need for minimum latencies (i.e. 10 gigabit speed per second, latency below 5 milliseconds) across the world. Given that, the EU should speed up the roll out of 5G communication

infrastructure that is needed for seamless data transfer between devices at cross-border level. 5G infrastructure should cover manufacturing companies that are often located far from city centers but that provide a great source for big data. To this end, EU's 5G Action Plan is a strategic initiative that aims at stimulating public and private investment in digital infrastructure. A key pillar of 5G Action Plan should be the coordination of national priorities for 5G, as industrial data is often transferred across Member States.

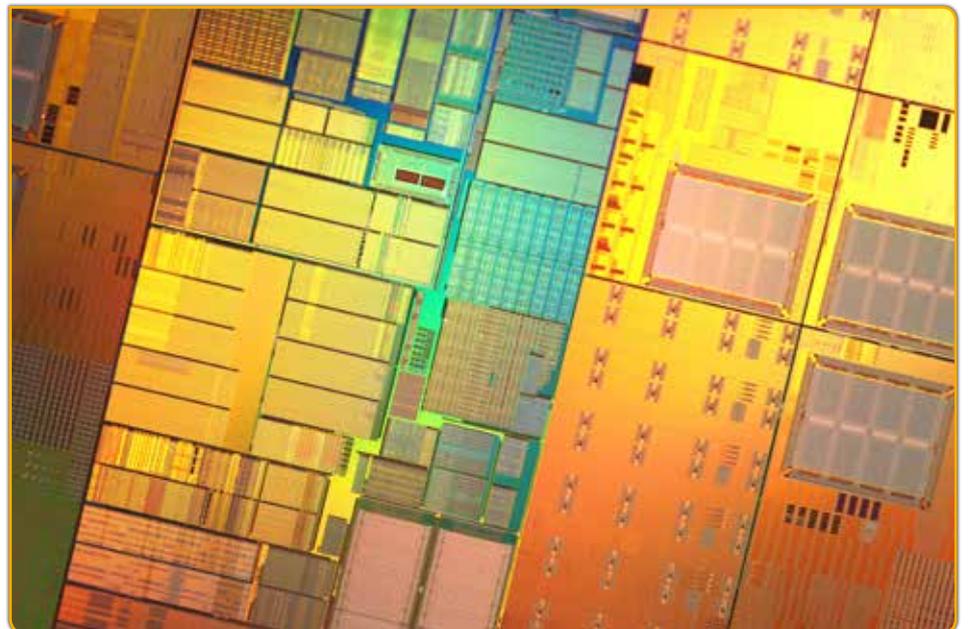
Forward-looking policy framework

In 2017, the European Commission launched the "building a European data economy" package. The electronics manufacturing sector welcomes the EU's efforts to remove unnecessary data localization restrictions hampering free flow of data within the EU. The package also refers extensively to industrial data in the B2B context and foresees new policy initiatives to promote data-driven solutions. In B2B sectors, access to machine-generated data is defined through contracts. As innovation cycles are getting shorter in high-tech sectors, introducing pre-mature regulations on access and use of industrial data would cause lock-in effects for many businesses. Given that, electronics manufacturers do not favor a one-size-fits-all regulatory approach, imposing

generic rules on access to and use of machine-generated data that are context-sensitive. That being said, the Commission, with the help of stakeholder groups, should raise awareness, in particular among SMEs and start-ups, on how industrial data can be monetized; provide non-binding guidance; and promote industry-led standards on data. The Commission should also accelerate the work on a framework for data exchange with third countries as data economy knows no border and trade is an important pillar of growth for the electronics manufacturing sector.

Funding for research, development and innovation

Research and development is essential to accelerate innovation in electronics manufacturing as wells for the broader data-economy. EU's framework programmes in that sense plays an instrumental role in providing funding, accelerating cross-border collaboration and supporting risky projects. The collaborative R&I model can also play important roles in advancing data-driven solutions by bringing in actors of electronics, software and vertical technologies. In addition, future framework programmes should take into account that generating electronics components for IoT is complex and costly, in particular for SMEs. Given that, the EU should significantly increase the overall budget for R&I in the



next framework program and extend the SME role in collaborative projects. EU funded R&I actions should support more experimentation, demonstration, piloting, and prototyping activities and cooperation between different actors of data economy.

In parallel, Important Projects for Common European Interest (IPCEI) should remain high on the public policy agenda, as a very powerful tool to support real manufacturing projects, creating added-value jobs. IPCEIs bring together knowledge, resources and economic players throughout Europe to undertake large-scale and highly innovative projects. IPCEIs are good examples of expanding Europe's industrial production capabilities strengthening European industry's competitiveness internationally.

Workforce development

Shifting demands in electronics is heavily affecting the skills needs of electronics manufacturers. To support the growth of data-driven products and services, the electronics manufacturing industry will need more and more a workforce pool with a mixed skill-set. This mixed skill-set should include human

resources from various disciplines; manufacturing, software, data analytics and specific verticals, to name a few. To this end, Europe needs new education policies that promotes multi-disciplinary teaching in STEM degrees, raising the workforce needed for a flourishing data economy. The European Commission should also foster an environment in which technology leaders and education providers can partner at cross-border level. Aligned with this, the Commission's new initiative, blueprint for a sectorial cooperation on skills, is an excellent step.

Data security and trust on new IoT products

Products and services that contain data and that are open to cyberattacks raise serious security-related concerns for both manufacturers and users of IoT devices. According to a McKinsey study, lack of secure hardware and software is indeed seen as an important factor hindering investment in data technologies. To ensure market acceptance and trust, data should be secured at different levels, covering both hardware and software. The EU can achieve a secure data economy by promoting

the "security by design" principle and by supporting industry-led standards with the help of stakeholder groups.

Standards and interoperability

Electronics manufacturers rely on standards to prove the functionality and security of their products. In addition, many IoT devices are being placed on the market by various producers that use different platforms need to be interoperable. Lack of commonly agreed applicable IoT standards and interoperability between various IoT devices is a major barrier against building a data economy in Europe. Against this background, the Commission is in a good position to foster a dialogue between standardization stakeholders (industry, research, standardization bodies...), which would unlock networking effects and enable the mass deployment of big data products and services.



A data economy distributing value added and welfare across industrial value chains – a trade union perspective



Dr. LAURENT ZIBELL

Policy Adviser, Industrial and Technology policy, industriAll European trade union

industriAll European trade union, the European federation of trade unions in industrial value chains, intends to **shape** the digital transformation of industry, towards more equality, participation and cooperation¹.

We are concerned that the data economy may lead to (1) a **concentration** of wealth and power in the hands of the few Artificial Intelligence companies, to the detriment of the know-how embedded in industrial workers and companies, and (2) an increased **control** over workers. We propose some policy means to prevent these risks.

1 - Capture of access to industrial data: a risk to the production and maintenance know-how of workers in continuous process industries

In a possible scenario in which one company would exert a **monopolistic control** over **industrial, sensor-generated data**, this company would be in a position, by exploiting Artificial Intelligence algorithms, to capture industrial workers' **know-how** on the operation of the plant in **production**, and on the **maintenance** of its equipment. This would be particularly relevant in industries mobilising **continuous processes**, such as

chemicals, paper, basic materials and metals. Thereby, the company monopolising access to industrial data would be the one controlling the **differentiating asset** of the industrial plant, and thus its **value added**. The current industrial company would be left with the low-value function of owning the material productive assets. The workers would see their professional competences captured by the Artificial Intelligence algorithm, and be left with low-qualification tasks.

If we want to avoid that the production and maintenance know-how is transferred from the existing European industrial companies and workers industries towards the Artificial Intelligence firm holding a monopolistic access to their industrial data, the **legal and economic conditions** for accessing and processing **industrial data** must be **Fair, Reasonable and Non-Discriminatory (FRAND)**.

A first step is to frame the discussion around the **rights attached to data** under a legal regime of **licensing**². This regime should define who is entitled to mobilise these rights, for how long, where, and for what purpose. A list of the rights attached to data, and which could each lead to the need for a specific licensing agreement could be: to access, to duplicate, to store (and if so, for how long), to modify, to erase, to transfer (and if so, where, to whom, under which conditions, specifically with or without the transfer of the original rights and obligations), to aggregate (i.e. to analyse jointly with the same nature of data collected on other machines / persons / items), to correlate (i.e. to analyse jointly with different nature of data collected on the same

² This means specifically that we consider the concept of data "ownership" to be fundamentally **wrong**. The concept of "ownership" is not neutral, it conveys the idea that once the data is "sold", the seller loses any further rights over the way it is used. In our view, the democratic discussion to take place on the rights attached to industrial data should leave open the option of maintaining a legal connection between the originator of the data (and potentially of others), and the data itself, across its whole life. This option of retaining a legal connection between the originator of the data and the data itself is made possible by the fact that data, unlike a material item, is a "non-rival" good (the concept of "non-rival" captures the fact that when one entity uses data, it does not deprive any other entity from using it as well, with no loss of benefit).

machines / persons / items), to exploit (commercially or not, in anonymised form or not, where, when).

The first collector of the data would have the specific role of a "**data steward**", in charge of managing it properly and of concluding the licensing contracts. The "data steward" would of course be entitled to make a reasonable profit from this activity, but would have no monopoly.

Multiple entities can legitimately claim access and rights of use over the same set of industrially generated data³. In order to avoid endless conflicts around equally

³ E.g. from an industrial machine: the manufacturer of the whole machine, in order to improve its design; the manufacturer of each specific module, for the same reason; the maintainer of the whole machine or of each specific module, in order to predict failures and to implement the necessary preventive measures in time; the operator, in order to measure performance and yield. This is only an example of the most obvious entities potentially interested in exploiting data. In real life, one could expect the number and variety of legitimate claimants wanting to access a given data set to increase very significantly.



¹ cf. our [Position Paper "Digitalisation for equality, participation and cooperation in industry"](#), Dec. 2015.

KETs and big data: a big opportunity for Europe



Slawomir TOKARSKI

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Smart phones, electric batteries, bioplastics, lightweight materials and connected machines - for all of this, we need key enabling technologies (KETs). Advanced manufacturing and materials, nanotech and biotech, semiconductors and photonics are crucial for triggering innovation in processes, products and services in Europe. Products strongly dependent on these technologies represent a volume of almost 1 trillion EUR, or 19% of the total production of all EU countries. Altogether they enable 3.3 million European jobs or 11% of all EU employment related to manufacturing; and these numbers are growing.

KETs are increasingly contributing towards meeting today's most pressing societal challenges. Their growth potential offers huge opportunities for businesses and new services to consumers. If our companies can seize them, this will mean more jobs for our citizens.

Even more opportunities are yet to come. An important trend is the increasing merging of KETs with ICT: the combination of key enabling (physical) and digital technologies is at the core of the new industrial revolution. The merging of ICT and KETs has enormous transformative potential and gives rise to a broad range of emerging applications.

3D-Printing is a good example illustrating the embeddedness of ICT and advanced manufacturing. From the Airbus' bionic titanium brackets to the scanning of broken bones to be printed in the form of new implants, no

success could have been achieved without performant IT systems which are still to be developed further, especially in terms of big data management able to deal with the increasingly complex design files.

Big data management will be essential to enhance the value coming from KETs and ICT and their combination. Generating value at the different stages of the data value chain is at the centre of the future knowledge economy. By harnessing the intelligence of data, captured by sensors on machines for example, European industries can enhance productivity and performance, increase profitability, strengthen their competitive advantage, reduce risk, and pave the way for innovation.

According to the report, '[Big data and B2B digital platforms: The next frontier for Europe's industry and enterprises](#)' by the [Strategic Policy Forum on Digital Entrepreneurship](#)¹, industrial companies are expected to reduce costs by 3.6% per year over the next 5 years by basing business decisions on big data analytics. Using big data to manage resources more efficiently could bring annual net savings of up to €600 billion for EU businesses. It is estimated that digital platforms will capture 30–40% of the value created in industrial value chains and there is a global race in order to keep control of the value chains. European industry has the opportunity and strength to lead in this area.

However Europe needs to overcome a series of challenges to capture the full potential of big data and digital platforms. Today, only 28% of companies have managed to achieve advanced levels of digitalisation. Only 6.3% of European enterprises are making use of big data. Europe witnesses the emergence of many dispersed, low volume, incompatible platforms and data sets across countries. Europe needs to boost significant industry investments for data infrastructures and support services that are necessary to restore the trust of European enterprises in the data-driven economy.

Companies and governments need to take urgent action. It is fundamental to review the

complex regulatory environment, stimulate investments in key infrastructures and applications, ensure that standards exist that allow IT systems to be interoperable, in order to create a data-driven economy in Europe.

In January 2017, the European Commission adopted a Communication on [Building a European Data Economy](#)², with the aim to foster the best possible use of the potential of digital data to benefit the economy and society and achieve a European single market.

In this context, we are launching targeted Horizon 2020 and COSME actions that help European SMEs to reap the full benefits of the data economy and stimulate strategic investments in high-impact data infrastructures.

Interoperability and standards is another important pillar of our actions. Efficient sharing and exchange of data across national borders, within 'data value chains' (e.g. data exchange on spare parts between vehicle manufacturers and the aftermarket) and across sectors (e.g. sharing traffic data) will be key. Non-proprietary standards, as well as initiatives such as Open Data Portal, can help overcome barriers to data sharing between technologies, scientific disciplines and countries.

For building a data economy, we must also have a workforce with the right skills. Big data is listed in the top 10 skills for IT professionals in 2016. But big data is not the preserve of IT specialists. The opportunities are vast for data producers and users in all other economic sectors. SMEs need support to understand how they can concretely profit from big data. The Commission has therefore launched an action to support specialised skills development in the area of big data, internet of things and cybersecurity for SMEs. The emergence of the latter is creating significant new specialised skills gaps, shortages and mismatches, especially for SMEs, who cannot afford to compete with large enterprises to attract and retain digital talents.

All together, we can build a successful data economy. It is a huge opportunity we cannot miss.

¹ The Strategic Policy Forum on Digital Entrepreneurship is a think tank composed of business leaders, academia, international organisations and policy makers. Its objective was to shape a vision for the digital transformation of European industry: https://ec.europa.eu/growth/industry/digital-transformation/strategic-policy-forum-digital-entrepreneurship_en

² <https://ec.europa.eu/digital-single-market/en/building-european-data-economy>

Standardising the Rights of Robots and Artificial Intelligence



Mady DELVAUX

MEP (S&D), Vice-Chair of the JURI Committee, Rapporteur on Civil Law Rules on Robotics

Robotics represents one of the most relevant technological innovations of the current century and a growing number of areas of our daily lives are increasingly affected by robotics.

Statistics prove that robotics and AI is a promising field for European industry. Europe is still leading in high-end robotics production, however, we have to pay attention not to sell all our champions to foreign investors. Europe has demonstrated over the last decades that it struggles to transform its innovations in the areas of new technologies into commercial successes. Apart from that, no success story goes without creating trust first and thus no human-robot collaboration goes smoothly without trust. In this sense, if we want humans to accept robots, we have to carefully pay attention to some very crucial aspects.

One of the biggest issues when it comes to robotics is safety and security of the robot's system. How can we make sure that the system is not hackable? The only possible answer to this is the development of new international and European standards. Moreover, robots collect a huge amount of information from their environment and permanently adjust their functionalities. This massive volume of collected data presents wide-ranging opportunities and benefits for those who process this data. However, the downside of these perceived benefits is that this mass data collection

and processing could have significant impact upon the privacy of individuals. Thus, one of the main issues regarding big data is transparency and data protection, not only in robotics but in the digital process as a whole. Guaranteeing that individuals are provided with appropriate information and have the control over their personal data should be one of our priorities.

As the autonomy of the system increases, it becomes harder and harder to establish a connection between the inputs (users' command) and the outputs (the robots' behavior), but this connection always exists. This increasing complexity of a robot's system leads to new questions of liability. That's why we urge the European Commission for instance to evaluate if the current product liability directive is still applicable to robots that are coming to the market in the next 10 to 20 years, and if not, it should propose legislation where necessary. In a first step, it is important to regulate imminent current problems related to robot's liability like self-driving cars or drones.

In the longer perspective, it is very likely that more and more robots are able to make smart autonomous decisions or interact with third parties independently. A crucial question arises from this trend: Should the owner still be liable for damage caused by his smart robot? The creation of an e-personality for robots, at least for those robots with a higher degree in artificial intelligence and with self-learning capabilities, could be a possible way forward. This does not mean that robots will have the same rights as humans. Anyway, the e-personality for robots could be an option, but only later, in a second step.

Moreover, we need to engage more actively in the manifold ethical aspects related to this issue. Are the increasingly intelligent robots going to have a "moral" behaviour? How can we assure that those autonomous robots are going to respect our values, human rights, human dignity? Asimov's Laws are excellent for writing fiction, but they are clearly not operational for regulating robots in real life. Endowing robots with ethical principles will reduce the risks related to their autonomous decisions and make technological advances in robotics, along with their legal categorisation, more easily acceptable in society. In my opinion, there is no alternative to the creation of a European ethical committee for robots and AI, which monitors the development and integration of robots in to society and defines principles for robotics research.

Going beyond the purely legal questions, we also need to reflect on the robotic revolution's impact on all aspects of our lives. Are robots going to destroy or instead create jobs? Are they going to liberate mankind from labour? And if so, what are humans going to devote their free time to?

The debate is ongoing and it is fascinating. Let's not turn a blind eye: robots are already a reality, their numbers is growing and they become increasingly efficient. We have to give ourselves codes of conduct and rules which allow us to organise this man-machine coexistence in the most harmonious way possible. The arrival of robots is a great opportunity, now it depends on us, humans, to put it to good use.



Artificial Intelligence: a real game-changer requiring focus on our own skills



Cecilia BONEFELD-DAHL
Director General of Digital Europe

Looking back in time, it is hard to grasp that people in a space ship managed to travel 356.000 km through dark space in 1969 and landed safely on the moon. Especially considering that the combined computer power of the Lunar Lander was no more powerful than an old-school pocket calculator. In the analogue time, the whole idea of artificial intelligence (AI) was a topic of Sci-Fi movies only.

When we are discussing AI today, 50 years later, we foresee new realities and we imagine concrete impact on our daily life and work. It is no secret that AI has now become an integrated part of our lives: advanced AI in cars can now make them completely self-navigating; smartphones can act as our voice-recognizing personal assistants; audio-visual service providers, such as Netflix, predict our viewing habits based on our daily viewing behaviour.

With the speed of the digital evolution, we will not wait another 50-year before experiencing the next generations of advanced AI. I am convinced that, in less than 10-15 years, AI will have changed the world as we know it today. Language barriers are disappearing, as self-learning systems learn to translate our spoken conversations on the fly; completely self-driving cars will make the daily commute a

natural extension of the office; healthcare will take account of new possibilities for diagnosis and treatment that we can only dream of today.

Yet, AI triggers many questions and can be perceived as a source of concerns. Will AI outsmart us and take over the world? Will it be used to do evil instead of good? Will it make humans obsolete, resulting in an explosion in unemployment? Close monitoring and ethical considerations must naturally come along with AI as we should not be blind to the potential dangers or disadvantages. Nor must we, however, let the fear of development and the unknown be the cause of overregulation and unnecessary boundaries that will halt positive innovation and progress.

When it comes to the work place, AI will in no doubt make many of today's jobs obsolete. Just as the development of modern farming equipment made the need for manual field labouring redundant and today's giant cargo ships can sail with only a hand-full of crew members where dozens were needed a few years ago. We should rather consider the constant change in the labour market due to technological progress, as a natural evolution, not a sudden revolution.

We must, however, realize that the speed of development, supported by technologies like AI, is much faster today than only a few years ago. As individuals, we cannot afford to be lagging behind these technological developments. On the contrary, we must be proactive in predicting which skills are needed tomorrow and ensure that we are equipped with the right set of skills in due time. As employees adjust their skills, new opportunities are created and the number of jobs will follow.

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About DIGITALEUROPE

DIGITALEUROPE represents the digital technology industry in Europe. We want European businesses and citizens to benefit fully from digital technologies.

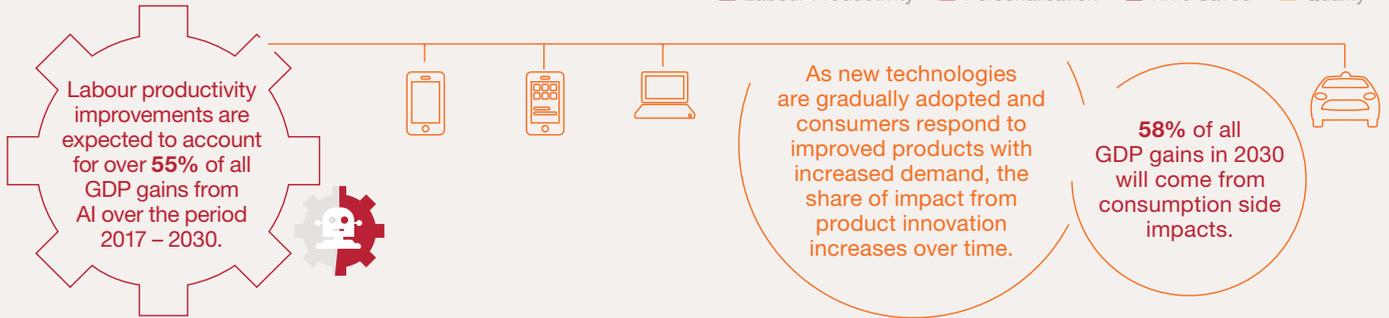
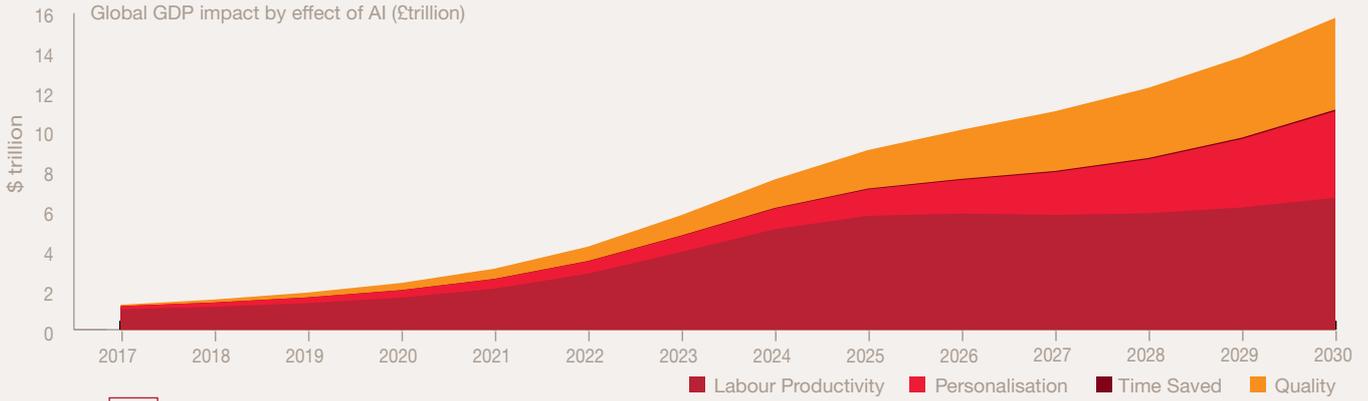
DIGITALEUROPE ensures industry participation in the development and implementation of EU policies. We seek to maximise the positive impact of the ongoing digital transformation on Europe's economy and society. We try to help European governments and institutions understand future technology trends and realise how digital technologies can sustain economic performance in Europe.

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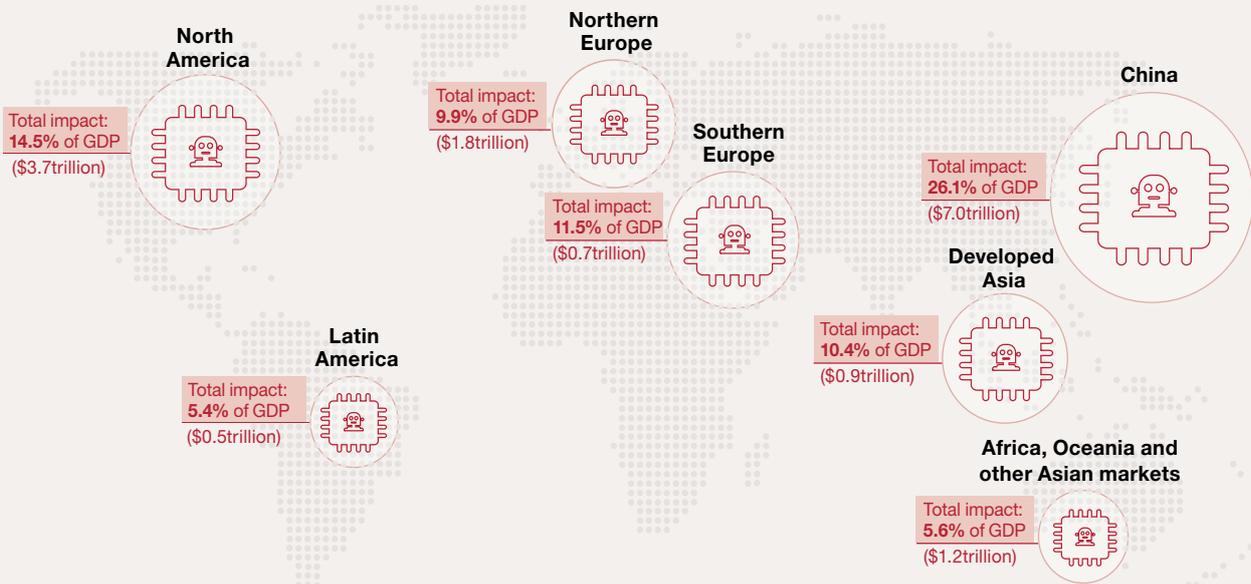
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Where will the value gains come from with AI?



Source: PwC analysis

Which regions will gain the most from AI?



All GDP figures are reported in market exchange rate terms
 All GDP figures are reported in real 2016 prices, GDP baseline based on Market Exchange Rate Basis

Source: www.pwc.com/gx/en/issues/data-and-analytics/publications/artificial-intelligence-study.html



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