DIGITALEUROPE

Making Europe Fit for the Data Economy

Brussels, 9 December 2014

EXECUTIVE SUMMARY

The data economy provides endless opportunities for citizens, businesses and the environment. DIGITALEUROPE as the voice of Europe's digital technology industry calls on policy-makers to put in place the right framework conditions that will enable the digital economy to thrive. While certain risks associated with Big Data must be addressed, the focus should lie on fostering its opportunities. The European Commission has taken an important first step in outlining possible elements of an EU action plan for advancing towards the data-driven economy of the future and addressing Europe's future societal challenges. According to DIGITALEUROPE, such an action plan should focus on the following measures:

- Adopt a harmonised, risk-based and modern EU framework for personal data protection that creates trust while at the same time enabling societally beneficial innovations in the data economy
- Encourage the protection of Big Data applications from cyber-attacks, focusing regulatory efforts on truly critical infrastructures
- Support the development of global, voluntary, market-driven and technology-neutral standards to ensure interoperability of datasets
- Clarify the application of EU copyright rules so as to facilitate text and data mining
- Boost the deployment of Open Data by transposing the Public Sector Information Directive into national law by June 2015 at the latest (EU Member States)
- Create trust in cross-border data flows by supporting the implementation of the Trusted Cloud Europe recommendations
- Continue addressing the data skills gap by supporting initiatives like the Grand Coalition for Digital Jobs
- Continue encouraging private investment in broadband infrastructure and HPC technologies with public funding

DIGITALEUROPE stands ready to actively engage with the Commission, Parliament, Council and Member States in the further shaping of the action plan.

1. Introduction

Over the past decade, rapid progress in computing technology, global connectivity and analytical capabilities has enabled a powerful new phase in the IT revolution: the Data Economy. In this new phase, data analysis has become more important than ever as a source of insight, innovation and competitive advantage for individuals, businesses and governments. It has been estimated that, by 2020, the analysis of data (Big Data analytics) could boost EU economic growth by an additional 1.9%, equalling a GDP increase of € 206 billion[1]. Big Data technology and services markets in Western Europe have been predicted to grow from €1.8 billion in 2013 to €5.3 billion in 2018.[2] In addition, Big Data has the potential to drive significant job creation. In the UK alone, the number of big

1 "Big and open data in Europe, A growth engine or a missed opportunity?", Warsaw Institute of Economic Studies, 2013
2 Western European Big Data Technology and Services Market to Grow by 24.6% CAGR by 2018, Says IDC, http://www.idc.com/getdoc.jsp?containerId=prUK25156914

DIGITALEUROPE
Rue de la Science, 14 B-1040 Brussels [Belgium]
T. +32 (0) 2 609 53 10 F. +32 (0) 2 431 04 89
www.digitaleurope.org | info@digitaleurope.org | @DIGITALEUROPE_
Transparency register member for the Commission: 64270747023-20

data staff specialists working in large firms has been predicted to increase by more than 240% between 2012 and 2017.[3]

We welcome that the European Commission has recognised the importance of Big Data for the European economy with its recent Communication "Towards a thriving data-driven economy".[4] DIGITALEUROPE fully supports the objective to develop a coordinated action plan to seize the opportunities of Big Data and to enable the EU to compete globally in the data economy.

With this paper, DIGITALEUROPE would like make a first contribution to this process. First of all we would like to illustrate the enormous opportunities offered by Big Data to businesses and society overall. By means of concrete examples, we show how data can transform different sectors of the economy, thereby benefitting society at large. In the Annex, we provide a list with more detailed case studies of selected Big Data applications. Further, the paper sets out a number of policy recommendations with a view to making the data economy a reality. In times of economic stagnation it is more important than ever to use Europe's untapped potential in the digital sector to enable innovation, boost growth and create new jobs.

2. Opportunities of Big Data for businesses and the wider society

Big Data opens up manifold opportunities for businesses and the wider society. The capacity to quickly analyse large amounts of structured and unstructured data from various sources has already led to the development of many popular new products and services. Well-known data-driven applications include targeted recommendations to users on e-commerce platforms, social networks and search engines ("If you liked X, you might also like Y").

But the potential of Big Data is much bigger. The list of applications with economic, social and environmental benefits is long, and this is just the beginning. The following subsections provide a quick overview of examples.[5]

2.1. Economic benefits

Data is becoming a means of distinction and asset for many sectors, also outside of the ICT sector, helping businesses to take evidence-based decisions to increase their operational efficiency and productivity.

Real-time analysis of data from product manufacturing or usage provides new insights about machines and production processes. The Internet of Things enables machines to communicate with each other and to automatically respond to changing market demands. The massively increasing amounts of data from social networks, machine sensors, electronic devices with IP addresses, mobile applications and location-based services become valuable assets when combined intelligently by using big data technologies with appropriate privacy safeguards. The analysis of such diverse data sets can provide manufacturers with important feedback for their future production decisions, connecting the unexpected with the hitherto unknown. For example, an engineer can use feedback from social networks to solve a quality-related problem. Similarly, manufacturers working with complex global supply chains can now quickly access the entire history of a product part and its critical subcomponents to ensure product quality and safety throughout the supply chain for the benefit of their customers and sales.

3 Big Data Analytics - An assessment of demand for labour and skills, 2012-2017, e-skills UK, 2013
4 COM(2014) 442 final
5 Please refer to the Annex to learn more about some of the applications mentioned in this section.

Open Data provides developers and start-ups with a rich collection of publicly available and free data, which they can use to develop innovative products and services for consumers, businesses and governments (e.g. mobile apps for location services).

2.2. Social benefits

Data solutions can enhance government services and public safety (e.g. crime mapping software for predictive policing, smart procurement technology for emergency services real-time traffic information), overcome language barriers (e.g. machine translation) and support developing economies (e.g. mobile price information technology for farmers).

Responsible data use in politics can be democratising and empowering. Political data analysis provides politicians with an unprecedented insight into what motivates voters, what they value and how they feel about key issues, bringing them closer to their voters and strengthening grass roots democracy. Governments can also increase transparency and accountability by publishing data that is relevant to both the public as well as government performance (e.g. information about public construction projects). If done in the right way, Open Government can increase efficiency by promoting inclusion and civic participation, which in turn fosters innovation.

Furthermore, Big Data enables scientific breakthroughs by combining large data sets from different sources and disciplines. In medical research, analysing the vast and continuously growing amount of health data (e.g. genomics, medical journals, patient records) can enable scientists to understand the causes of diseases such as paediatric cancer and to develop new drugs and therapies tailored to the specific needs of individuals (personalised medicine).

Big Data can also enhance education systems. Big Data systems can increase student achievement by giving them access to personalised learning resources based on their past learning achievements, and help their teachers get a clear view of strengths and weaknesses.

2.3. Environmental benefits

Big Data can help to dramatically increase the efficiency of energy use. Moving certain business software applications to the cloud could reduce the amount of energy consumed by IT by as much as 87%.[6] Smart and intelligent metering technology allows electricity customers to keep an eye on their current and previous energy consumption at all times. The pivotal role of consumers in energy management will be greatly facilitated by their ability to access their usage data. Such transparency helps end-users to better control their consumption, use energy more efficiently, protect the environment and potentially save money. Organisations can make huge energy efficiency gains, for instance through intelligent lighting and heating systems which only activate when facilities are in use.

Mobile apps help citizens to use intelligently integrated transport systems (e.g. public bike pools), to optimise their driving style in terms of fuel efficiency or to buy greener products, thereby contributing to a more resource and energy efficient society. Providers of public transport services can use sensors to track the usage of different means of transportation, and analyse this data in order to determine the best and most efficient routes to use.

6 “Berkeley Lab Study Finds Moving Select Computer Services to the Cloud Promises Significant Energy Savings“, Lawrence Berkeley National Lab, 2013

Around 700 million people (in 43 countries) suffer today from water scarcity. By 2025, this number will increase to 1,8 billion[7]. Smart water management solutions enable real-time tracking and reporting of infrastructure and natural waterways, helping to prevent water loss from aging, leaky pipes (up to 50% of the world's water). Field sensors and data transmitters, satellite remote sensing and other tools provide high-quality on-site data in a digital format and offer real-time optimisation of water usage.

3. Policy recommendations for a regulatory framework that enables the European data economy to thrive

Despite the many potential benefits of Big Data set out above, barriers to the data economy have been growing. Reports on government surveillance and growing incidents of criminal data breaches have damaged trust in governments and data-based business-models. The EU has reacted to these developments with a number of policy initiatives to strengthen personal data protection and cyber security. While DIGITALEUROPE agrees that certain risks associated with the data economy may justify regulatory measures, we urge legislators to take a balanced approach and to make sure that new regulations will be proportionate and not create further barriers, taking into account the significant benefits that would be lost due to excessive regulation. Well-functioning, self-regulatory measures by the industry to protect personal data and ensure data security should be fully taken into account. In addition, the EU needs proactive policies to improve the legislative framework for Big Data. The following subsections include some more detailed policy recommendations on selected topics.

3.1. Adopt an EU framework for personal data protection that creates trust and enables societally beneficial innovations

Big Data relies on the collection and processing of large amounts of data. While not all of this data will be personal data, we acknowledge that personal data will play an important role in Big Data applications. Therefore the take-up and success of Big Data will depend heavily on the EU's future Data Protection Regulation, which is currently being negotiated.

DIGITALEUROPE welcomes the overhaul of the European data protection legislation with the aim of creating a regulation that is future-proof and that fosters data-driven innovation. Good data protection legislation is the backbone needed for a successful uptake of Big Data initiatives. A harmonised, risk-based and modern EU data protection framework would increase trust and support the development of big data applications in Europe, thereby contributing to the completion of the digital single market. DIGITALEUROPE believes that the right principles can already be found in the current Data Protection Directive[8]. However they need to be further developed in the draft Regulation[9] in order to adapt them to the challenges of the digital revolution.

To address privacy concerns, deconstructing Big Data into its elements –collection, combination, analysis and use of data – can help identify where safeguards are sensible and necessary.

Data anonymisation and data pseudonymisation are helpful tools to enable big data applications based on what was originally personal data whilst keeping the risk of re-identification of the data subjects minimal. Both mechanisms should be incentivised and incorporated in the product/service development via Privacy by

7 United Nations Factsheet www.un.org/waterforlifedecade/scarcity.shtml
8 Directive 95/46/EC
9 COM(2012) 11 final

Design/Default (i.e. certain data should be anonymised by default before it is processed further). If interpreted too restrictively, the principles of purpose limitation, data minimisation, notice and consent would make many Big Data applications difficult if not impossible. Provided that the anonymisation of personal data is performed adequately, any possible adverse effects of re-identification are relatively low and appropriate security measures are in place, it should be possible to use this data for Big Data purposes that may not have been explicitly called out or foreseen at the time of collection. Likewise, many societally beneficial innovations depend on the collection of large data sets. The principles of data minimisation, notice and consent must therefore be balanced against additional societal values such as public health, national security and law enforcement, environmental protection and economic efficiency.

Finally, at the international level, agreements on appropriate safeguards for the transfer of personal data between the EU and third countries for the purpose of data analytics should be facilitated if Europe is to reap the full benefit of Big Data. The new Data Protection Regulation should ensure that companies may transfer personal data to third countries where they can demonstrate a legitimate interest to do so and demonstrate appropriate security controls are in place for the processing of the data. Furthermore, The Safe Harbour arrangement for the transfer of personal data between the EU and the US is a particularly important data transfer mechanism given the size of the respective economies. We are hopeful that the ongoing reform of Safe Harbour will ensure that it remains a trusted tool for data transfer in the future.

3.2. Protect Big Data applications from cyber-attacks

The more data is stored for Big Data applications, the more important cybersecurity becomes to protect such data from theft and abuse. DIGITALEUROPE welcomes the measures included in the EU Cyber Security Strategy[10], including the proposed Directive to achieve a high common level of network and information security within Europe (NIS Directive)[11]. In order to avoid counterproductive burdens on companies without evident improvements to resilience, the Directive should strive for a high level of harmonisation, be limited in its scope to critical infrastructures and focus on significant incidents. Incident-reporting should be governed by voluntary cooperation and trust rather than a top-down approach.

3.3. Ensure interoperability through global standards

In order to unfold the full potential of Big Data applications, different datasets must be interoperable. For this purpose we need common standards for formats and protocols for gathering and processing data from different sources. Such standards should be global, voluntary, market-driven and technology-neutral. Based on its expertise and proximity to the market, industry should lead the standardisation process within the different European and international platforms involved.

3.4. Clarify copyright rules to facilitate text and data mining

Restrictions to the use of text and data mining techniques by copyright protection can significantly hamper the uptake of these technologies, including for research purposes. We therefore call on the Commission to explore how the application of EU copyright rules can be clarified in this respect, so to facilitate data-driven innovation based on text and data mining.

10 JOIN(2013) 1 final
11 COM(2013) 48 final

3.5. Boost the deployment of Open Data

Open Data provides many potential benefits for citizens and companies (see sections 2.1 and 2.2) and should be encouraged at all political levels. DIGITALEUROPE welcomes the recent revision of the Public Sector Information Directive[12], which introduces a genuine right to reuse government data and encourages Member States to make more documents available in machine-readable and open formats. We also welcome the Commission guidelines on recommended standard licences, datasets and charging for the re-use of documents[13]. This will help Member States to implement the Directive to take full advantage of the commercial and non-commercial opportunities offered by the re-use of public data. In order not to lose any precious time, we call on Member States to respect the deadline of June 2015 for the transposition of the Directive into national law.

3.6. Create trust in cross-border data flows

As the Commission has rightly recognised, data location requirements often limit cross-border data flows, forming a barrier to a single market for cloud computing and Big Data (e.g. in the financial or public sectors). Big Data services are mostly delivered through the cloud for economic and technical reasons. The European Cloud Partnership has set out a useful framework to achieve a European single market for cloud computing called Trusted Cloud Europe.[14] This concept is formed by two pillars – building best practices, consisting of legal and operational guidelines as well as technical standards, among cloud providers and building consensus on their use in practice through public consultations, workshops etc. involving all stakeholders. They also state that non-European cloud providers should be able to access the European cloud market on equal terms. DIGITALEUROPE calls on the Commission to support this approach and to help implementing the proposed actions towards establishing the Trusted Cloud Europe framework.

3.7. Fill the data skills gap

With a digital economy growing at seven times the rate of the rest of the economy, the growing shortage of specialised workforce with data science skills is of great concern. Indeed, Europe might face a shortage of up to 900,000 ICT practitioners by 2020. It is therefore crucial that the EU encourages and coordinates Member States' efforts to address the mismatch between demand for and supply of ICT-related skills, including so-called STEM (science, technology, engineering, and mathematics) skills and –particularly statistical and analytical competences. Continued support from the European Commission and EU Member States to initiatives such as the Grand Coalition for Digital Jobs and its priority policy clusters (ICT training, mobility of workers, certification, awareness raising, new forms of education) is necessary. Industry and other stakeholders have pledged concrete actions to address the e-Skills gap, and DIGITALEUROPE is actively supporting the initiative through its role of Secretariat of the Grand Coalition. DIGITALEUROPE is also leading the e-Skills for Jobs 2014 Campaign, which aims at raising awareness of the need for EU citizens to improve their command of ICT skills.

12 DIRECTIVE 2003/98/EC
13 2014/C 240/01
14 http://ec.europa.eu/digital-agenda/en/news/trusted-cloud-europe

3.8. Support investments in infrastructures and research

Finally, the successful deployment and further development of Big Data solutions depends on the availability of high capacity networks and cutting-edge research into High Performance Computing (HPC). Public funding, such as through the EU's research and innovation programme Horizon 2020 and the telecommunications part of the Connecting Europe Facility, can be suitable to encourage private investment in broadband infrastructure and HPC technologies. We welcome the European Commission's recent initiatives in this regard, notably the conclusion of Public-Private Partnerships for HPC and Big Data.

4. Conclusion

The data economy provides endless opportunities for citizens, businesses and the environment, many of which are not very well-known yet. Europe must recognise that this new and ongoing technological revolution is not merely a sectorial phenomenon, but impacts our entire economy and society. If Europe's industry is to remain competitive in this new digital era and society is to reap the full benefits, its policy-makers must put in place the right framework conditions that enable the digital economy to thrive. While it is necessary to address certain risks associated with Big Data, the focus should lie on fostering its opportunities. The European Commission has recognised this need and has taken an important first step in outlining possible elements of an EU action plan for advancing towards the data-driven economy of the future and addressing Europe's future societal challenges. In this paper, we have set out the European IT industry's perspective of what are the most important measures for the EU and its Member States to take in this respect. DIGITALEUROPE as the voice of Europe's digital technology industry stands ready to actively engage with the Commission, Parliament, Council and Member States in the further shaping of the action plan.

Annex: Case studies of selected Big Data applications

Analysis of supply-chain data helps to maintain product safety and quality

Every day, manufacturers deliver millions of electronic devices and other products to customers throughout the world. But as customers become increasingly global and supply chains become more dependent on partner networks, manufacturers face a big challenge: identifying risks to product quality. The company Omneo worked with Dell/Cloudera to develop a Big Data Solution, accelerated by Intel, which helps manufacturers gain a 360-degree view of the supply chain by accessing billions of product data records in less than three seconds.[15] The cloud-based product data management solution ingests raw manufacturing data (e.g. factory, supplier, field services and after-market repair data) and then transforms it, so it can be searched, analysed and mined in a single place. By entering a single serial number, manufacturers can access the entire history of a part and its critical subcomponents in order to identify and resolve supply chain issues before they negatively affect customers or sales. Omneo's clients report total annual savings between €12 million and €20 million each thanks to this solution, based on conservative estimates.

Big Data speeds up genomics research

In the National Center for Tumor Diseases (NCT) and the Stanford School of Medicine, researchers are using a SAP database management system for real-time analytics of genetic variants that contribute to population health and disease. Discovering patterns of variation within and among different populations can help clarify how genes contribute to disease susceptibility in humans. To date, Stanford has seen from 17 to 600 times faster computations in analysing their genomics data. Stanford's work will ultimately lead to new treatments targeted for autism and cardiovascular disease, both of which are public health concerns.

Data analytics helps to make more precise insurance risk calculations and to prevent future accidents

Insurance companies embrace the world of advanced web-based service models and the Internet of Things (IoT) in order reduce their operating costs and to provide more attractive offers to their customers. Telemetrics in cars allow a more precise calculation of risk based on measurements of cars' technical features and individual driving style, which can be translated into insurance premium advantages for policy holders. A high level of personal data protection following the "privacy by design" approach can be ensured when insurance companies inspect dense visual patterns over large, anonymous groups of people and objects. The Dutch analytics software company Synerscope has reported that one of its customers, a major insurance company, could drive efficiencies between € 16 million and € 21 million thanks to its solution. Furthermore, combining Open Government Data on roadside accidents with claim data from insurance companies will allow the calculation of risk at the level of road construction/local driving circumstances and car design. This information can then be used to design safer roads and cars, thereby preventing future accidents.

15 http://www.cloudera.com/content/dam/cloudera/Resources/PDF/casestudy/Cloudera_Omneo_CaseStudy.pdf

Real time analytics improve user experience in telecommunications

Telecom networks generate enormous amounts of data every second. A wireless network with 10 million subscribers runs about one million transactions per second (tps) during peak hours. Nokia Networks is working on a solution that gathers all network data in real time and performs detailed analytics to almost instantly measure the actual Quality of Experience (QoE) for every application session. This can then be used to predict performance degradations before they are perceived by the subscriber. Nokia Networks also implements artificial intelligence in an analytics and decision engine that immediately pinpoints the cause of issues in a subscriber's application session and decides automatically on the best corrective action. Machine learning techniques ensure ever more accurate decisions over time even when data is incomplete or new situations arise. This innovation provides good QoE in nearly 100% of sessions under high load.

Fuel and cost savings and better employee and customer satisfaction through data analysis in public transportation

In close cooperation with its technology partners, CGI and Microsoft, the Helsinki Bus Transportation Co (Helsingin Bussiliikenne Oy) chose to analyse the data their buses generated in order to improve business decision-making and fuel economy. The bus fleet was equipped with data sensors that collected information about fuel consumption, acceleration and g-force in real time. The analysed data provided a lot of information on buses themselves, on driving manners of drivers and on bus routes and their bottlenecks. The data showed for example that abrupt starts and sudden stops were wasting a lot of fuel. The fuel consumption differences between drivers could be as high as 10%. As a result, drivers were trained to roll into stops and to accelerate more smoothly. Drivers also receive regular reports on their own performance which has markedly improved employee satisfaction and given incentives for further improvement. Remarkably, within two years, Helsinki Bus Transportation Co was able to save as much as 5% in fuel cost through smarter driving and improved maintenance. Moreover, as an unforeseen consequence the economical driving contributed to greater customer satisfaction and fewer accidents. The Helsinki Bus Transportation Co also sees further possibilities to use the data collected in the future, e.g. for traffic planning.

Big Data and Smarter Buildings

IBM is optimising energy and water usage and enhancing the working environment for IBM researchers by analysing real-time data from 2.500 sensors throughout the 35.500 sq. ft. IBM Smarter Cities Technology Centre in Ireland. Real-time reports provide deeper insight into how the space is being used, how the infrastructure is performing, and where resource usage can be optimised. The sensors provide a full picture of almost every aspect of the building's status. An intelligent lighting system uses infrared sensors to determine whether a space is occupied or not, how much daylight there is, whether the lights are on and what level of lighting they provide. Models create detailed energy forecasts that predict the building's behaviour and energy usage in different weather conditions and at different times of the year. The analytics software also helps identify anomalies and address issues much more quickly. Analysis revealed a significant discrepancy between the readings from the main water meter and the sub-meters in the building's kitchens and restrooms: unstoppered pipes were constantly discharging water into the ground.

The use of Big Data has resulted in dramatic year-one savings through the intelligent lighting system (45% less electricity), point-of-use water heaters (65% less water heating costs) and out-of-hours air-conditioning (outside of specific designated areas, reduced by 98%). In total, annual energy use has been reduced by 180,000 KWh (equivalent to 100 tons of CO2) and the building's electricity bill has decreased by nearly 20 percent.

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For more information please contact:
Jean-Marc Leclerc, DIGITALEUROPE's Policy Director
+32 2 609 53 25 or jeanmarc.leclerc@digitaleurope.org

ABOUT DIGITALEUROPE

DIGITALEUROPE represents the digital technology industry in Europe. Our members include some of the world's largest IT, telecoms and consumer electronics companies and national associations from every part of Europe. DIGITALEUROPE wants European businesses and citizens to benefit fully from digital technologies and for Europe to grow, attract and sustain the world's best digital technology companies.

DIGITALEUROPE ensures industry participation in the development and implementation of EU policies. DIGITALEUROPE's members include 59 corporate members and 36 national trade associations from across Europe. Our website provides further information on our recent news and activities: http://www.digitaleurope.org

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