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PREFACE

This document is a consolidated, concise version of the Y3 periodic report as submitted to the European Commission as part of our yearly reporting process under grant no. 619551. The information presented in this document is derived from that report and is intended for public consumption.

PREFACE

1   PROJECT SUMMARY

The **B**ig data roadmap and cross-disciplinar**Y** community for addressing socie**T**al **E**xternalities (BYTE) (www.byte-project.eu) project will assist European science and industry in capturing the positive externalities and diminishing the negative externalities associated with big data in order to gain a greater share of the big data market by 2020. In order to do so, BYTE will develop a policy and research roadmap for big data in Europe and form a big data community to implement the roadmap. One of the main goals of the first year of the project and the first step in this process is to conduct seven big data case studies in actual big data practices across a range of disciplinary and industrial sectors to gain an understanding of the economic, legal, social, ethical and political externalities that are in evidence. These case studies and a series of stakeholder engagement activities will be used to construct a vision for big data in Europe in 2020 that will provide a goal for which the roadmap will indicate steps to achieve.

Use of case studies

In order to provide an in-depth analysis of the externalities in evidence across a number of societal sectors and industries that utilise big data, BYTE will undertake case studies in the following sectors:

Energy	Transport/ Shipping
Crisis Informatics	Environment
Health	Culture
Utilities/ Smart Cities	

These case studies will provide a multi-disciplinary platform from which BYTE can examine the positive and negative externalities associated with big data within these sectors. The case studies draw on early BYTE research and context setting, including setting the stage on big data (WP1) and identifying elements of societal impact (WP2). As described above, they will provide evidence of actual positive and negative externalities associated with real big data use (WP3) in order to evaluate and consolidate them through a horizontal analysis (WP4) and to provide material for the foresight analysis and visioning exercise (WP5), roadmap (WP6) and big data community formation (WP7). The BYTE workflow and how the case studies are situated within it is depicted in the following Figure (Figure 1):
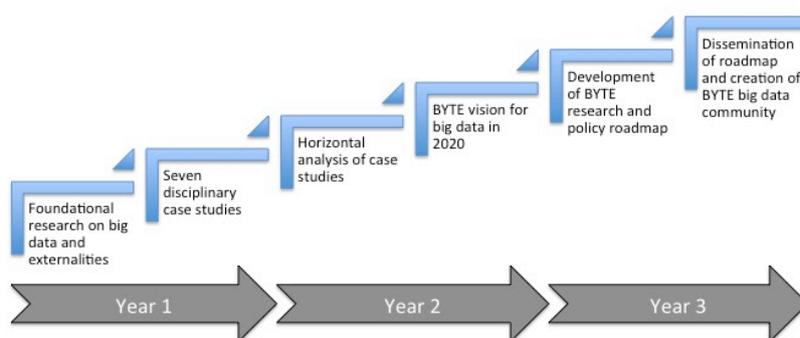

Figure 1: BYTE workflow

Stakeholder engagement is key to the success of the BYTE project, and is crucial to all stages of the research process including the case

Figure 2: BYTE workflow

studies, visioning exercise, roadmap and community building. Stakeholder collaboration is crucial in terms of building an active and relevant Big Data Community. In particular, the early work packages focus heavily on stakeholder collaboration and participation that will set a baseline that will encourage and enable stakeholders from different disciplinary, industry and sectoral perspectives to give input into the research and policy roadmap and the formation of the Big Data Community.

The BYTE project has the following **main objectives**:
- To **map the current context** in which big data is utilised
- To review **big data policies and initiatives** of the **public and private sector**
- To understand the **technological and infrastructural tools** relevant to **big data**
- To understand the **economic, legal, social, ethical and political issues** relevant to big data
- To gauge **public sentiment** around big data based on current information practices
- To understand the **relationship** between big data and **open access to data**
- To use **stakeholder participation** in **case studies** to identify the **positive and negative externalities** evident within these case studies
- To determine the extent to which **negative externalities can be diminished** and **positive externalities can be amplified**
- To develop **a series of sector-specific visions** for big data five years in the future
- To develop a **general vision for big data five** years in the future
- To design the **BYTE research** and **policy roadmap** for big data that accounts for the social impact, positive externalities, and negative externalities associated with big data and gain **stakeholder consensus** on the **BYTE roadmap**
- To **design** and **form** the **BYTE Big Data Community**

2   BYTE EXPECTED IMPACT

The key expected impact of the BYTE project is to support European stakeholders to achieve a 30% share of the big data market by 2020. The BYTE project aims to provide European industry and science with the tools to reach a proportionate share of the big data economy.

The roadmap and the big data community will assist industry in capturing current and potential efficiencies, new business models, etc. associated with the collection, analysis, linking and re-use of big data and proactively address current and potential negative externalities before beginning a project, initiative or programme. The result of the BYTE research roadmap will be a series of clear and precise questions for future research that are necessary to address in order for European companies to take further advantage of the possibilities of big data. Additionally, the policy roadmap will produce a series of policy questions that decision-makers must address in order to facilitate and support companies in addressing societal externalities.

The foresight analysis and visioning are specifically timed to ensure that the projection five years into the future of big data aligns with the 2020 benchmark discussed in the Digital Agenda for Europe and Horizon 2020. The research and policy roadmap will outline a series of incremental steps needed to support big data stakeholders in addressing current economic, legal, social, ethical and political barriers and challenges in meeting this goal. This will assist European industry and scientists to avoid costly mistakes associated with negative externalities, and thus achieve efficiencies and competitive advantages. Furthermore, the predictive element of BYTE will also enable European companies to anticipate emerging opportunities. BYTE's goal of diminishing negative externalities while amplifying positive externalities will result in a European big data economy that is predicated on responsible innovation practices.

3   THE TEAM

The BYTE project team is made up of 11 organisations from 10 different European countries. The consortium includes universities, large industry, SMEs and research institutes.

The BYTE project focuses on working across disciplinary and stakeholder boundaries. Each of the BYTE research activities relies upon close collaboration between the partners involved, including the perspectives of industry, social science and technologists.

4   KEY RESEARCH FINDINGS AND OUTPUTS

The BYTE project has progressed well in meeting its objectives, and BYTE partners have produced a series of deliverables relevant to understanding the societal externalities associated with big data. Each of the reports mentioned below can be found on our project website: http://byte-project.eu/research/

Work package 1, *Setting the stage on big data* is complete. All of the deliverables are publicly available on the project website. WP1 partners undertook a literature review of relevant materials to define big data and map current data flow internationally (D1.1), to review policies and initiatives relevant to big data in the public and private sector (D1.2 and D1.3), and to understand the technological and infrastructural tools relevant to big data (D1.4). This extensive research revealed a number of meaningful insights to assist big data stakeholders in better understanding the European big data ecosystem. Aspects of this research were validated in a workshop in Lyon, France in September 2014.

Work package 2, outlining *Elements of societal impacts of big data* was also completed during the first year, and copies of the Deliverables are available on the project website. WP2 partners undertook a literature review of materials relevant to the economic, legal, social and ethical, and political issues that arise in relation to big data. WP2 partners also examined public sentiment towards big data information practices, including public aspirations for big data information practices, as well as reviewing the current status of big data and open access policies. WP2 partners identified practical examples of externalities impacting different stakeholders (industry, public sector, governments, citizens etc.) Analyses of this information confirmed that a number of economic, legal, social and ethical and political issues are present in the big data landscape in Europe and they impact a number of key sectors, and potentially the big data industry as a whole. These findings were validated at a workshop that was held in Lyon, France in September 2014.

Work package 3, *Case studies in positive and negative externalities* undertakes case studies with big data practitioners in seven sectors: Energy, Crisis informatics, Health, Smart Cities, Transport/Shipping, Environment and Culture. Case studies were underway at the close of the first year, although preliminary results from the case studies were tested at a number of focus that were held in four locations across Europe, including London, Munich, Vienna and Oslo. These case studies provided evidence-based information about what externalities were in evidence and how practitioners were addressing them. The output of WP3 was a methodology for conducting the case studies (D3.1, produced in Y1) and a comprehensive case study report *D3.2: Case study reports on positive and negative externalities* that provides first-hand information about the positive and negative impacts identified in each of the case study organisations and the associated sector.

This information fed into the *Horizontal analysis* produced in work package 4 that consolidated the case study findings and identified good practice in amplifying positive externalities and addressing negative externalities. The outputs of this work package were two comprehensive deliverables:
D4.1   Horizontal analysis and social impacts of positive and negative externalities
D4.2   Report on diminishing negative externalities and amplifying positive externalities

One of the highlights of D4.2, in particular, is the examination of legal gaps associated with the ability to realize opportunities associated with big data and potential avenues to address these gaps.

Work package 5 utilized the good practice identified in the case studies and horizontal analysis to undertake a series of foresight exercises and consolidate a vision for big data in Europe for 2020. The *BYTE Vision* (D5.2) developed a series of scenarios to help decision-makers plan for the changes associated with the data economy, as well as a series of sector-specific visions that considered how prepared different sectors were for the transition to the data economy. Deliverable 5.2, *Tackling the externalities of the vision*, describes an adaptive framework to aid policy decision-making to assist in addressing the externalities associated with the BYTE vision.

In year three, the project used information from the visioning exercise and the other material produced in the project to build a comprehensive *Research and policy roadmap* (D6.1) to enable European stakeholders to take advantage of the opportunities associated with big data while addressing the potential positive and negative impacts associated with its deployment. The roadmap includes specific policy recommendations and key areas for further research in the short, medium and long-term. The BYTE Big Data Community will take this roadmap forward and implement it through the year 2020.

Work package 7, *The big data community*, developed an strategy (D7.1.2) and sustainability plan (D7.2.2) for building the BYTE big data community. Both documents examine three potential strategies for the BYTE big data community: acting as an autonomous organization, acting as an umbrella organization or joining with an existing, multi-stakeholder organization. The project has confirmed an inter-relationship with the Big Data Value Association (BDVA) regarding the third option, and the community will organize an annual liaison with industry, policy makers and other stakeholders within the BDVA to feed societal concerns directly to these actors.

5   OUR ENGAGEMENT WITH THE PUBLIC

BYTE has undertaken a comprehensive dissemination and stakeholder engagement campaign. This has included direct liaison with a number of European research projects and big data organisations, including:

In addition, BYTE has disseminated the results of the project widely in order to generate additional interest in BYTE activities and participation in future BYTE events. BYTE partners have had **37 publications** accepted to peer-reviewed journals, conducted **86 presentations** of BYTE work. In addition to our website, we have also produced visual materials like project posters and brochures. Finally, the project has a Twitter account (@BYTE_EU) where information is shared regularly. Please visit our website for more information on BYTE, to subscribe to our newsletter or to join the big data community (www.byte-project.eu).