This deliverable includes the strategy of BDVe to attract and engage representatives of vertical industries, as an answer to the need of the PPP to bring Big Data technologies to different industrial sectors, currently underrepresented in the PPP.
D3.2. Value Proposition and Engagement Plan for Sectorial Communities

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<tbody>
<tr>
<td>ADAS</td>
<td>Advanced Driver Assistance Systems</td>
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<td>ADASIS</td>
<td>Advanced Driver Assistance Systems Interface Specifications</td>
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<td>AIOTI</td>
<td>Alliance for the IoT Innovation</td>
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<td>ARTEMIS-IA</td>
<td>ARTEMIS Industry Association</td>
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<td>BDE</td>
<td>Big Data Europe</td>
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<td>BDVe</td>
<td>Big Data Value Ecosystem</td>
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<td>BDVA</td>
<td>Big Data Value Association</td>
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<td>BDV PPP</td>
<td>Big Data Value Public Private Partnership</td>
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<tr>
<td>CAGR</td>
<td>Compound Annual Growth Rate</td>
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<td>CEO</td>
<td>Chief Executive Officer</td>
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<td>CIM</td>
<td>Context Information Management</td>
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<td>CPS</td>
<td>Cyber Physical Systems</td>
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<td>CVIM</td>
<td>Common Vehicle Information Model</td>
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<td>DEI</td>
<td>Digitizing European Industry</td>
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<td>DG</td>
<td>Directorate General</td>
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<td>DIH</td>
<td>Digital Innovation Hub</td>
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<td>DSS</td>
<td>Decision Support System</td>
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<tr>
<td>EASA</td>
<td>European Aviation Safety Agency</td>
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<td>EBDVF</td>
<td>European Big Data Value Forum</td>
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<tr>
<td>EC</td>
<td>European Commission</td>
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<tr>
<td>ECMWF</td>
<td>European Centre for Medium-Range Weather Forecasts</td>
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<tr>
<td>EFFRA</td>
<td>European Factories of the Future Research Association</td>
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<td>EIP</td>
<td>European Innovation Partnership</td>
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<td>EIT</td>
<td>European Institute of Technology</td>
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<td>ESA</td>
<td>European Space Agency</td>
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<td>ETP</td>
<td>European Technology Platform</td>
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<td>ETSI</td>
<td>European Telecommunications Standards Institute</td>
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<table>
<thead>
<tr>
<th>Acronym</th>
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<tbody>
<tr>
<td>EU</td>
<td>European Union</td>
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<tr>
<td>EUMETSAT</td>
<td>Exploitation of Meteorological Satellites</td>
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<tr>
<td>FAB</td>
<td>Food, Agriculture and Biotech</td>
</tr>
<tr>
<td>FAO</td>
<td>Food and Agriculture Organization</td>
</tr>
<tr>
<td>FNS</td>
<td>Food and Nutrition Security</td>
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<tr>
<td>FNSSA</td>
<td>Food and Nutrition Security and Sustainable Agriculture</td>
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<tr>
<td>GDP</td>
<td>Gross Domestic Product</td>
</tr>
<tr>
<td>GDPR</td>
<td>General Data Protection Regulation</td>
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<tr>
<td>GODAN</td>
<td>Global Open Data for Agriculture and Nutrition initiative</td>
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<tr>
<td>GPS</td>
<td>Global Positioning System</td>
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<td>HPC</td>
<td>High Performance Computing</td>
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<td>ICT</td>
<td>Information and Communication Technologies</td>
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<tr>
<td>IoT</td>
<td>Internet of Things</td>
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<tr>
<td>ISG</td>
<td>Industry Specification Group</td>
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<tr>
<td>IT</td>
<td>Information Technologies</td>
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<tr>
<td>ITS</td>
<td>Information and Society Technologies</td>
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<td>JPI</td>
<td>Joint Programming Initiative</td>
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<td>KOM</td>
<td>Kick Off Meeting</td>
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<td>LSP</td>
<td>Large Scale Pilot</td>
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<td>NESSI</td>
<td>Networked European Software and Services Initiative</td>
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<td>OASC</td>
<td>Open and Agile Smart Cities</td>
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<td>RDA</td>
<td>Research Data Alliance</td>
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<td>R&amp;I</td>
<td>Research and Innovation</td>
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<tr>
<td>RoI</td>
<td>Return on Investment</td>
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<tr>
<td>RTD</td>
<td>Research and Technology Development</td>
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<tr>
<td>S3</td>
<td>Smart Specialization Strategy</td>
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<tr>
<td>SME</td>
<td>Small and Medium Enterprise</td>
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<tr>
<td>SPIRE</td>
<td>Sustainable Process Industry through Resource and Energy Efficiency</td>
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<tr>
<td>TF</td>
<td>Task Force</td>
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<tr>
<td>T&amp;L</td>
<td>Transport and Logistics</td>
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<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
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<tr>
<td>TP</td>
<td>Technology Platform</td>
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<tr>
<td>TRL</td>
<td>Technology Readiness Level</td>
</tr>
<tr>
<td>UK</td>
<td>United Kingdom</td>
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<tr>
<td>UN</td>
<td>United Nations</td>
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<td>US</td>
<td>United States</td>
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<tr>
<td>USDA</td>
<td>United States Department of Agriculture</td>
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<tr>
<td>USP</td>
<td>Unique Selling Proposition</td>
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<td>WP</td>
<td>Work Programme</td>
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*Table 1: Definitions, Acronyms and Abbreviations*
Executive Summary

The mission of BDVe is to support the Big Data Value PPP in realizing a vibrant data-driven EU economy. Behind that mission, there are multiple goals to achieve, which should be taken into full consideration when defining the directions of the PPP. Some of the most challenging ones are: (1) achieving a more competitive landscape of European Big Data providers, leading to bigger market share; (2) creating the context for a more competitive EU industry (transport, manufacturing, public sector, Agrifood, media, energy…) in the advent of a data-driven revolution where many traditional players will have to transform their processes and re-think their business if they want to remain competitive –or in some cases, just to survive-; and (3) ensuring the sustainability of the investments and actions triggered by the PPP.

All of them are somehow interrelated, but (1) and (2) are quite dependent. Fostering the adoption of Big Data technologies in different industries will not only help to increase their competitiveness, but will also be a factor to increase the market share of Big Data suppliers. Thus, it is of high relevance that the PPP succeeds in attracting users to its activities. A number of representatives of user industries are members of BDVA and are already contributing to the PPP activities through their participation in projects. However, this number should be increased to achieve the vibrant and dynamic ecosystem that is expected from the PPP.

BDVe will work towards greater engagement of users or user industries. For this, the project will develop a series of assets such as the Big Data Marketplace, the Big Data Education Hub and some others that will enrich the value proposition to potential users of Big Data. These assets will be shared in the context of joint events and activities that will not be run by BDVA or the Big Data PPP in isolation, but that will be organized in a joint manner with industrial associations and initiatives that already act as trusted communities for those users.

In order to focus our actions, we have defined a roadmap based on prioritizing sectors in each of the implementation periods. As such, and as justified along this document, BDVe will work during the first year in Agrifood and Transport and Logistics. The rational for this selection is included in the document. The Value proposition for users in such sectors has been refined and is accompanied by an Engagement Plan that includes the identification of the initiatives and associations that will be used as entry point for engaging domain stakeholders. An overview of actions carried out so far is also provided as a matter of context.

“D3.2 Value proposition and engagement plan for sectorial communities” complements “D3.1 Enriched Map of Big Data players in Europe: user communities”, where major stakeholders of vertical industries engaged in Big Data activities will be represented on an interactive map available through the PPP portal.
D3.2. Value Proposition and Engagement Plan for Sectorial Communities

1 Introduction

The contractual agreement of the Big Data Value Public Private Partnership (from now on referred to by this document as the Big Data Value PPP or as the PPP in short) includes numerous statements about the relevance of fostering the adoption of Big Data technologies by different vertical industries. For example, it includes as part of the scope that the PPP should “provide and support successful solutions for major societal challenges in Europe, for example in the fields of health, energy, transport and the environment, and agriculture”. It also states as part of the competitiveness objectives that the PPP should “develop solutions leading towards the use of big data value technology for increased productivity, optimized production, more efficient logistics (inbound and outbound) and effective service provision from public and private organizations”.

BDVA, as the private counterpart of the PPP has already set up organizational structures to make this possible by fostering ecosystems focused on the application of Big Data in different vertical industries. Nevertheless, the PPP, as it is common practice in this kind of associations, has a very powerful message towards IT/Big Data providers (i.e. the supply side), but it is not so successful in convincing users to get engaged in the activities, at least to the necessary critical mass that would make outcomes of the groups representative enough. Why should a company working in a concrete sector join each association that brings a brand new technology? This would mean for them following a myriad of initiatives where just a minor part of their content would apply to their problems. In this context BDVe, as a support action to the PPP, has developed a strategy based on reaching out to users in their own trusted environments.

This document reflects on the current situation with respect to the involvement of user communities in the PPP as a whole and in BDVA as industrially-driven association, and provides a rational for concrete actions with respect to such communities. It justifies some priorities for the first period of BDVe and goes more in depth into the landscape of some of these user communities including a value proposition and engagement plan that will be worked out in the coming months and revisited when needed based on the evolution of the particular indicator of representation of user industries. BDVe includes as part of its workplan three additional deliverables with the title User Ecosystem characterization to be released in months M18, M36 and M48 that will be used to provide updates on both the action plan and the assessment of actions already proposed in this analysis.

If we do not develop a vibrant demand side for Big Data technologies, it will be difficult to feed the expectations of market share of EU players on the supply side. And consequently, we are brave enough to say that the competitiveness of both sides would be challenged in the future.
2 Motivation

Big Data represents not only a technology, but also a new way of doing things. The application of Big Data is not restricted to one or several application domains; instead, many reports and studies show the potential impact that big data could have in most vertical industries. As such, it is of utmost importance that those domains are represented in the Big Data Value PPP. This is particularly relevant with respect to three aspects:

(a) understanding the requirements and needs of user industries,

(b) validating the technologies in both their performance benchmarked against other solutions and the impact on business processes/indicators and

(c) building success stories that help in convincing other potential customers; the marketing element is indeed crucial to foster the adoption of new technologies.

The Big Data Value PPP can benefit from the momentum associated to the so called Digital Transformation, a movement associated to the application of digital technologies in different application domains and typologies of organizations (with special emphasis on SMEs) to improve their positioning when it comes to compete in a global playground. Big Data is one of those technologies that could have a high impact and help companies in their digital transformation (of course, many others add to the list). And here, as with many other technologies, the implication of the high level decision makers is essential, since the maximum benefit can only be reached when companies go through a process of re-thinking about their nature and the place they want to have in the future. This may have an implication in the product/service they provide, business models or in the way processes are run.

All in all, users are needed to ensure that technologies are not developed in a laboratory for the purpose of pleasing the scientific community, but are designed in a way that will make the EU industry highly competitive. Even though it sounds like if the motivation was purely economic, when we refer to highly competitive we also mean the ability to solve relevant societal challenges (including those that are associated to ageing population, environment or public safety, to name a few).

Nevertheless, the reality shows that technologists are very convinced about the benefits of their work, but convincing decision makers in big and small organizations is far more complex than making a power point presentation in front of a director. Lack of examples with a clear Return on Investment (RoI) assessment and the rapid evolution of technologies that brings buzzwords periodically are some of the reasons that increase the scepticism of companies.

BDVe believes that the best way to address these difficulties is to create multidisciplinary teams where different roles coming from both the Big Data side and the domain work together in defining, deploying and validating the solutions. That is what the so called lighthouse projects (or large scale pilots) have put in practice. However, a single project (or few projects) is just a seed of what can be done. This has to be multiplied and the community has to be extended in order for the benefits to scale.
D3.2. Value Proposition and Engagement Plan for Sectorial Communities

Despite the description of the essential role of the user communities, it is difficult to attract representatives of these industries to a forum like BDVA. It is not lack of interest, but in general limited time and resources to follow so many activities, besides the fact that many activities still fall under research, meaning that time-to-market as well as IPR issues may have an impact on attracting some decision-makers in companies. BDVe, as a project that supports BDVA particularly and the Big Data Value PPP in general, recognizes that only some organizations in the domains will join BDVA (and the PPP through its projects). But the community is much bigger. Therefore, what can be done to attract and engage a higher number of users?

The pillars of BDVe actions will be:

- To engage actively with those leaders and make them become “ambassadors” of big data technologies (and when possible attract new companies to the group),
- To provide guidelines with examples where any potential customer (big or small) can feel identified (i.e. work in understandable examples, success stories, references of what to do and what to avoid, since we can also learn from negative effects), and
- To engage with industrial associations where those user organizations contribute actively and where their interests are discussed in a trusted environment.

This is further detailed and explained in the Strategy part of this document.

3 Current offering for user industries in the PPP

The contractual agreement of the Big Data Value PPP was signed by the EC and BDVA on the 13th October 2014. Since then, many activities have been developed and a particular focus has been assigned to understanding the needs of vertical industries. When setting up the PPP, the leading industrial group worked in two documents in parallel that were later on merged: a first one identifying major technical priorities in the big data domain (i.e. an in-depth view of the technological framework to understand which areas needed more work and investment), and a second one with an analysis of the current situation in different application domains, the potential impact of applying data-related technologies in such domains and examples of use cases where such impact could be made more explicit or visible, and that could therefore act as catalysers of future investments.

During the last two years, while consolidating activities of the association –even though no results from the projects were available yet- BDVA focused on populating Task Force 7 “Applications”, a container of tasks devoted to the application of Big Data to different industrial environments, notably Health, Smart Manufacturing, Telecom, Media and Earth Observation/geospatial. Recently BDVA has approved a new group addressing the challenges of Smart Cities and another one focused on Transport and Logistics.
D3.2. Value Proposition and Engagement Plan for Sectorial Communities

Major outcomes from this work can be summarized by a better understanding of the needs and challenges in those domains (including the analysis of major data sources, standards, technological solutions that are currently used in the different layers of the Big Data Value chain —and mapped against the BDVA model). This has been materialized by white papers that intend to inspire companies in the different user industries to think about their transformation towards a data-driven organization and to highlight concrete areas that require further work and investment by both the public, with special emphasis on the EC, and private side.

Those white papers have been promoted by companies that are active in the domain, which in most cases represent the supply side (for example Philips in the case of Healthcare). So, discussions reflect a prominent knowledge on the domain and its problems, however, they should attract more stakeholders that could highlight additional perspectives for the respective sectors, and could bring their understanding of the challenges.

That is part of the challenge of BDVe. We want to attract new players to this work and of course use additional channels to disseminate and promote the results. Nevertheless, the value proposition needs to be clearly defined and improved with respect to the existing baseline.

The current value proposition for users in the Big Data Value PPP is based on the same elements that we use to attract any other organization, i.e. access to both knowledge and partners. The first one allows new comers, technology providers or business-related, to get insights on different aspects associated to Big Data; the second one helps organizations to identify those players with the capabilities they need for different purposes: technologies to implement a commercial project; experience and knowledge to enter an innovation project in the context of the PPP.
D3.2. Value Proposition and Engagement Plan for Sectorial Communities

or other programmes funded at EU or national level; innovative products, services or technologies that could help them to enrich their own offering, etc. To foster the development of ecosystems and create dynamics among members of the community, BDVA organizes face-to-face meetings every 6 weeks, focused on different topics like standardization, i-spaces or High Performance Computing. Web- and teleconferences are also organized to follow-up the different topics and enable a continuous interaction among association members. All these instruments are also applied to the vertical communities mentioned earlier in this document.

4 Enriched Value Proposition & Strategy

The offering described in the previous section will be enriched thanks to BDVe with some additional elements aiming at making Big Data desirable to users (so creating convincing expectations around the technology through examples and a solid technology proposal), as well as feasible and viable thanks to the availability of guidelines, tools and resources that help organizations in their data-driven transformation:

A marketplace that will give access to interesting products and technologies in Big Data. The marketplace will be a virtual place where parties interested in Big Data will be able to find the latest developments in the field. Assets will be categorized and users will be given advanced search tools to facilitate their operations. We expect assets with different TRLs to be accessible so that we can combine market-ready products with very innovative frameworks and technologies that could arise from research projects (characterized by a lower TRL). This will allow us to address different communities, including those that are looking for very mature solutions, but also the research community that may be looking for collaborations or a baseline for future developments. BDVe will give visibility to the offering and will help the demand side to find the right tools to implement Big Data solutions based on their context and strategy. It is our intention to include categories of solutions targeted to specific vertical sectors, which would undoubtedly help user communities.

Guidelines and references so that different typologies of organizations can define a path to achieve their objectives if they are not experts in the subject. BDVA has already started this work by defining the BDVA Reference model. BDVe will contribute to that work content-wise and will focus its efforts on lowering the barriers for organizations to deploy big data solutions by facilitating this process. For example, we will elaborate a catalogue with existing I-Spaces where organizations could first test different big data

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frameworks or experiment with different data sets. Access to a myriad of resources in an easy and understandable way is a step ahead.

**Educational tools.** One of the reasons that justifies that a great percentage of organizations has not even started to think about Big Data is the lack of skills. Access to experts can be expensive, but furthermore it is difficult because of the shortage of profiles with the suitable capabilities. BDVe is already working in this area and will provide different tools to face such problem: on the one hand an education hub that will compile the offering of Big Data educational programs available in the EU; on the other hand we will set up a mobility programme that will help organizations to send or receive experts to work in specific challenges. We are confident that this will support the process of finding talent and on the other hand will create a market of data scientists with more experience in real industrial problems.

All these services will be fine-tuned based on the evolution of the landscape and needs of the PPP ecosystem, but we are confident that they will facilitate the life of different stakeholders involved in the Big Data value chain and thus will help to increase the potential impact of this initiative.

Some of the assets mentioned above will clearly enrich the value proposition of the PPP as a whole, but will not necessarily create an immediate attraction in potential users. That is why these actions will be accompanied by a plan to reach out these communities in a more targeted way. That is what we refer to as engagement plan.

In the first months of the project we have elaborated a strategy based on:

- **Prioritizing or focusing on a small number of domains in each period so that more targeted actions can be implemented** and potential impact of such actions can be measured. Launching a plan to address 10 application domains at the same time with the available resources would probably end up in very poor results, since we could not address them properly. Instead we will devote our attention to a couple of sectors per year and we will evolve the plan based on our performance.

- **Supporting BDVA in its current activities towards vertical industries.** It is obvious that there is a powerful framework in place that we should capitalize. In this particular case (a) we will help existing communities to promote their results, (b) we will establish cooperation with industrial associations working in the respective domains to create synergies and (c) organize joint activities that lead to a higher presence of the demand side in the discussions. Even though it seems quite similar to the first point, the main difference is that we will implement a targeted plan for the sectors selected within each period taking a leadership position, while a more general supporting role will be provided to the other industries, leaving the leadership and strategy to the respective leaders of the working groups in BDVA.
4.1 Sectorial priorities

**BDVe will focus first actions on the Agrifood sector as well as Transport and Logistics.** These industries will be prioritized until M18, even though—as mentioned before- BDVe will support ongoing activities already under development in the context of BDVA. An overview of ongoing activities in other sectors is provided in Chapter 7.

What is the rationale behind that decision?

- **Agrifood** is a sector where the penetration of ICT varies a lot between big and small players; it also depends very much on the geographical area of operation as well as the sub-sector. Despite that heterogeneity, Agrifood represents a sector with an average ICT penetration that is poor in comparison to other sectors; however the potential impact of ICT in general and Big Data in particular could be very high. Transport and logistics is precisely on the other side; it is one of the areas where data-related technologies are applied more intensively and where data sharing has enabled a lot of mobility applications in the last years. The selection of these two industries, with their different starting points, seems an interesting approach to understand how to address stakeholders that are more reluctant to apply new technologies (Agrifood) and at the same time take advantage of the momentum of another sector that is more ready to deploy and test innovative approaches (not only in terms of technologies, but also business models, as it is the case of mobility, where we have seen emerging models like those of Uber and Cabify).

- **Bioeconomy** (including Agrifood) and Transport & logistics are precisely the two sectors addressed by the lighthouses of the first wave of PPP projects. Lighthouse projects—because of their focus on deployment, integration and demonstration at large scale—are very suitable instruments to build upon. It seems logical to think about the new lighthouse projects resulting from the second wave of PPP projects as basis for the decision on the next two sectors that will be prioritized after M18.

- While sectors like health, manufacturing, media and smart cities are more mature in the context of BDVA activities, the situation with respect to Agrifood and transport is different. In the first case there is no formal working group established for the discussions. On the other hand, interest has been shown by many players, which means that one of the reasons why no further steps have been taken is lack of leadership or resources to move forward. BDVe can help on this through its leadership. When it comes to transport and logistics there is an informal group of stakeholders established in the framework of BDVA; furthermore, its creation as a sub-task force within the structure of working groups of BDVA was approved by the Board of Directors. However, formal issues regarding typology of membership of leader and co-leader of the group have blocked the operations so far. BDVe cannot change such formalities, but we are confident that our work will put some pressure on this and will positively impact the development of the activities around
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this domain. For the case of Agrifood, we expect that the work proposed by BDVe will result in the formal establishment of a working group in BDVA focused on this subject. Consequently, the selection of these two sectors by BDVe will make possible that both verticals are well represented in the BDVA context and work in a jointly manner with the Large Scale Pilots for a more coherent approach. Thus, it clearly adds value on top of existing activities.

- As it has been said in this document, limitation of resources makes unfeasible that these activities can reach reasonable impact unless they are implemented in cooperation with other efforts; to make a simple analogy, it is like if you wanted to make huge changes in a company without having convinced the CEO; this would never materialize. The condition of having the sector convinced about the benefits of Big Data and have additional initiatives and stakeholders interested in working on that in a jointly manner is fulfilled in the case of the two domains selected by BDVe.

  - In Agrifood we have seen an increasing interest by DG AGRI and DG RTD in the application of new technologies like IoT and Big Data for the implementation of the Food 2030 goals. This has enabled a close relationship with DG CONNECT and has opened up discussions on how to bring these technologies to relevant use cases. DG AGRI for example is one of the active contributors to the Digitizing EU Industry strategy, where there is a specific area of work focused on this sector. Ongoing activities in the EIP AGRI address explicitly the area of data (data sharing models, big data for traceability, etc). Furthermore, besides the lighthouse project DataBio, we count on IoF2020, a large scale pilot focused on the deployment of IoT solutions in the smart farming sector; this project brings many relevant stakeholders in this field and it is an additional tool to be used by us. Food as a whole is financially supported by H2020 with a workprogramme under Societal Challenges. Even though this work programme does include many different topics –which are not necessarily associated with our area of interest- it reinforces the importance of the sector for Europe and gives a framework to operationalize many of the outcomes that could arise from this work.

  - In the case of Transport and Logistics we also see an increasing interest in the application of IoT and big data technologies, among others. It is a very vibrant sector where a lot of transformations are happening as a result of ICT and as such, it counts on a good number of projects already in place that can be used for the objectives of the PPP. Besides Transforming Transport, which is the Lighthouse project in the context of our programme, the EC has funded projects that directly tackle data challenges (a good example is the Automat project, which aims to develop a data marketplace for the automotive industry). Going beyond DG CONNECT, Transport is being covered by its own work programme under Societal Challenges; therefore, reflections mentioned above for Agrifood can be well applied here. BDVA and BDVe specifically in the last months keep a good relationship with industrial associations in the field, such as ERTICO and ALICE. They will both
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be used for the purpose of community engagement, as described later on in this document.

- Finally, in spite of addressing two different sectors we find synergies among them and we may play with the idea of potential cases where elements of both industries could be combined in a more powerful business case (let’s think for example about the logistics involved in the value chain of most food products).

4.2 Next steps

As it has been pointed out, BDVe will support the operations of the working groups already established in BDVA that aim to analyse the deployment of Big Data solutions in vertical industries. While this will be a supporting function, BDVe will work in a more targeted way towards the two sectors justified in this chapter. This will be the approach until M18. At that stage BDVe will assess the achievements and will revisit its strategy accordingly. The updated plans and report on actions and achievements will be reflected in the deliverable User Ecosystem characterization, which has versions in M18, M36 and M48. In principle the focus will be on 2 sectors per period and probably 3 sectors in the second period because of the longer duration (18 months instead of 12). This will give as a result 6 (+1) sectors addressed in a targeted way with their specific strategy and plans. This will complement the support function of BDVe for all the vertical industries that are already included and those that may emerge in the next months.
5 The Agrifood Sector

5.1 Big Data in the Agrifood sector: overview, challenges and opportunities

When we talk about Big Data, those sectors that come more easily to our mind are manufacturing, health, energy and maybe few others, but we rarely see Agrifood as part of the list. However, the interest has been growing in the last years because Big Data could open business opportunities in fields like precision farming. Furthermore, a potential revolution in the Agrifood sector could be driven by new data-driven business models.

And the food sector is not a minor one. The Food 2030 High-level conference background document published by DG RTD provides a good overview of what the sector represents. According to it, the “food, beverage and tobacco” and “agriculture sectors” are the leading European bioeconomy markets in terms of turnover and employment at 50% and 19% respectively; [...] As far as employment is concerned, with the addition of fisheries and aquaculture, provide over 80% of bioeconomy-related jobs in Europe². Three European food-related sectors employ one fifth of the workforce, or 48 million people across 11 million farms holdings, 300.000 food and drink manufacturers (99% of them SMEs), 1,3 million wholesalers and retailers, and 1,4 million service companies³. These companies contribute 6% of Europe’s GDP and 7% of external EU trade, mostly in value-added food products.

Despite the relevance of the sector and its contribution to the EU economy, according to FoodDrinkEurope, “EU R&I investment by the food and drink sector is 0,27% of the sector’s turnover⁴, which is half as high as in the US and one third of the Japanese value. Studies have demonstrated that it would be profitable to invest more in agricultural R&D⁵”. In the last years, H2020 has devoted a full programme to Food-related issues, but ICT was still quite weak in the overall picture. Recent investments have been useful to exemplify the benefits and impact that new ICT technologies could have in such a sector, leading to an increasing interest in technologies like IoT and Big Data. For these particular technologies DG AGRI works closely with DG CONNECT (that is the case for example of the IoF2020 project,

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³ http://ec.europa.eu/eurostat/statistic-explained/index.php/Archive:From_farm_to_fork-food_chain_statistics
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funded 50% by each of those DGs). In Big Data, the DataBio\(^6\) project, a lighthouse project in the context of the Big Data Value PPP seems a seed for further works.

5.1.1 A data revolution in the Agrifood sector?

In June 2016, the European Commission’s Directorate-General for Agriculture and Rural Development organised a seminar in Sofia (Bulgaria) in the framework of the European Innovation Partnership for Agricultural Productivity and Sustainability (EIP-AGRI). The goal was to reflect on how agricultural and rural development policy can support the data revolution for an enhanced productivity and sustainability in the wide Agrifood chain; more than 100 people attended such workshop.

The seminar brought up discussions about the following five types of business models related to data, according to Van’t Spijker (2014): (1) basic data sales; (2) product innovation; (3) commodity swap: data for data; (4) value chain integration and (5) value net creation. As it is stated in the resulting EIP-AGRI report, one of the major outcomes was the identification of major limiting factors when it comes to the application of data-related business models:

- A lack of awareness of the possibilities and benefits of data-driven applications for agriculture. For ICT developers this implies a necessity to focus on farmers’ needs.
- The lack of standardisation and interoperability.
- Incentives for letting farmers share data are needed to add value to data.
- Discussions on the governance of data and the potential effects of ICT on the food chain.
- Financing the investments in data-driven solutions.

However, barriers are there to be destroyed or lowered, and we consider that a more positive approach driven by the materialization of potential opportunities should be adopted. For this exercise we have gone through literature and existing activities with the aim of identifying concrete areas of action. The following priorities/challenges have been selected by BDVe: (1) Food production, (2) Food security and traceability, (3) Sustainability and (4) Privacy and Security principles for farm data. All of them are explained in more detail in the following sections.

We can expect synergies and overlaps later on during the development phase.

5.1.2 Food production: do more with less

Population growth is one of the most important challenges the world is facing today, and feeding everyone requires creative thinking and new ways to do things. According to the Food and Agriculture Organization of the UN, world population is expected to grow by over a third, or 2.3 billion people, between 2009 and 2050. Some studies have concluded that total food production should be increased by at least 60% to feed a world of more than 9 billion people by 2050\(^7\). In parallel we are facing climate changes (with associated natural disasters) as well as shortage of resources because of lack of sustainability policies for many, many years. Even though solutions could be of different nature (changing diets, improving access and

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\(^6\) https://www.databio.eu/

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distribution of food, or reducing food waste), all this has put a lot of pressure on increasing food production.

The term of precision agriculture fits precisely in this context. It is a farming management concept based on observing, measuring and responding to inter and intra-field variability in crops. The goal of precision agriculture research is to define a decision support system (DSS) for whole farm management with the goal of optimizing returns on inputs while preserving resources. In order to so, farms are introducing progressively more ICT technologies, with special emphasis on IoT devices, drones, high-precision positioning systems, cloud-based systems and robotics, among others. All these technologies lead to a great amount of data, which needs to be processed and analysed in order to help farmers to improve their decisions. As a result, data has become an extremely valuable asset to improve the production, since –if used to its maximum extent- it allows farmers to operate in a much more accurate way according to a myriad of parameters.

Figure 2 –Big Data and the future of Agriculture (source: US Department of Agriculture)

The uptake of these technologies for precision agriculture is still limited and varies between regions and countries as well as size of the organizations (less penetration in small players versus big ones). IDC highlights in its report “Data Driven Technologies in the Primary Sector: The Case of Precision Agriculture” (February, 2016; part of the European Data Market Study) some of the existing barriers: (1) prevalence of national and local focus, with small-scaled and regional players; (2) handling large amounts of data from agricultural equipment and (3) need of interoperability between various systems at farm level and in the supply chain network. However, as IDC also states, the global precision farming market size is expected to grow at a CAGR of 12.2% from 2014 to 2020 and reach almost € 4.20 billion by 2027, but its potential is much higher and still in its infancy. Europe is the second market with a value of € 2.3 € billion in 2014 after North America and is expected to grow at a healthy 15% CAGR through 2020 (see figure below).

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8 According to Wikipedia
Increasing Investments reinforce this message. IDC points out that “according to AgFunder, a US marketplace for startups addressing the agriculture and agri-tech markets, global relevance is showcased by agri-tech as roughly € 919 million were invested into non-US companies in the first half of 2015, with companies for Israel and China bringing in more than € 468 million and approximately € 140 million respectively”. Public programmes add to this list by pulling additional investments for the Agrifood sector and its digital transformation; in some cases this sector is addressed as a sub-sector within Industry 4.0 initiatives; in some other cases specific programmes have been created to address these challenges separately. Several well-known investors recently dropped a combined $40 million into Farmers Business Network, a data analytics startup. Venture capital has flooded the ag tech space, with investment increasing 80% annually since 2012, as investors realize Big Data can revolutionize the food chain from farm to table. The software market for precision farming tools (such as yield monitoring, field mapping, crop scouting and weather forecasting) is expected to grow 14% by 2022 in the United States alone, reflecting a solid belief that productivity will increase dramatically thanks to this kind of tools and technologies.

In this context and based on USDA, the data-driven decision process by farmers depends on a number of critical decision sets (see figure below). In the context of BDVe we will address with stakeholders from both the Big Data field and especially from the farmers side data sets that need to be available, data sharing mechanisms, frameworks, tools, etc, and we will try to map this to the BDVA reference model and the guidelines of the PPP that can help companies that have not started this process.

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10 How Big Data And Tech Will Improve Agriculture, From Farm To Table; Forbes (Sparapani, March 2017)
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to do that in a more informed way, therefore supporting a wider adoption of a data-based approaches and the supporting Big Data technologies.

Main stakeholder for collaboration in this particular topic will be DG AGRI (responsible entity for food production at EU level) and we will build on the resources and activities of their stakeholder platform EIP-AGRI. See details in Section 2.3.1.

5.1.3 Food Security and Traceability

Food security here is understood in its wider sense, i.e., we could use instead the term applied by the EC of FNS, which stands for Food and Nutrition Security. According to FAO, approximately 795 million people (which means one in nine of the global population) suffer from chronic undernourishment. Paradoxically, about 2 billion people worldwide are obese or overweight. This leads to 37 million people with diseases, including cardiovascular diseases or diabetes, among others. DG RTD explained it bluntly in its Food 2030 High Level Conference: “food safety issues on a global level continues to be a concern with an estimated 600 million people (almost one in twelve) falling ill after eating contaminated food, and with 420.000 food safety related deaths every year”. New technologies have led to a situation where more data than before is available; this is also being enforced by Public Administrations in order to be able to monitor specific parameters. This situation opens up new opportunities in the context of food traceability. One of the initiatives that has recently emerged to address this topic is the so called Thematic Partnership on Traceability and Big Data, under the umbrella of the Smart Specialisation Thematic Platform on Agrifood, as part of the European Commission’s S3 Platform.

BDVe will anchor its work on this topic to this initiative as a way to work with the most relevant stakeholders. Priority topics include:

- Traceability and Big Data in the “Lifecycles of the value chain”
- Traceability and Big Data in the “Smart monitoring of the value chain (production, Agrifood industry, logistics, distribution and consumer) aiming to improve the competitiveness in the Agrifood sector”
- Traceability and Big Data in order to “Incorporate consumer experience and of the various different operators of the food chain in decision-making processes”
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- And “Open data, interoperability, data governance and information security, cybersecurity” as a cross-cutting topic

Both DG Regio (where S3 Platform is hosted) and DG RTD (the one that holds responsibility over food traceability) will be engaged as major public stakeholders on the side of EU policies.

Figure 5 – Intervention logic of the thematic partnership on Traceability and Big Data

5.1.4 Sustainability of resources, including environmental impact

The EC states that definition of food systems should go beyond production and delivery of sufficient food for all (quantity) in order to include the provision of safe and nutritious food for healthy and sustainable diets (quality). Going through existing reports, policy documents and studies, Sustainability seems to be one of the most repeated terms. In general this is addressed from the point of view of reaching sustainable systems with respect to natural resources (every time more scarce). DG RTD in its background document of the Food 2030 High Level Conference highlights again representative figures that describe the current situation:

Food production is by far the largest user of global freshwater supplies, with agriculture being responsible for 70% of consumption. Industrial activities related to food systems require approximately 26% of the EU’s energy consumption. Food production accounts for 60% of global terrestrial biodiversity loss. Including primary production, the food sector accounts for more than 25% of global greenhouse gas emissions.

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We could fill in a couple of pages more with this kind of figures, but we feel that this paragraph is enough to visualize the dramatic situation we are heading and how relevant it is to put Big Data technologies at the service of this societal challenge. Actors responsible for food systems are the largest group of natural resource managers in the world, and Data revolutions in measurement, management and accountability can make a strong contribution. Another way to look at it by translating the consequences to our normal lifestyle is to think about scarcity of products like chocolate, coffee, vanilla, tea or other commodities. It is difficult for us to imagine that we go to the supermarket and we do not see these products anymore. Well, The Guardian was already alerting about this some time ago: “[...] The reality for many global food manufacturers is uncertainty. Chocolate production is one example. Some 40% of the world’s cocoa comes from the Ivory Coast, grown on farms with only a few hectares of cocoa trees. In China alone, US firm The Hershey Company estimates that sales of chocolate will grow 60% between 2014 and 2019 to a value of $4.3bn”. The misalignment between increasing demand and decreasing supply will inevitably lead to scarcity of some products. Due to fragmentation of the Food supply system, the integration of data from suppliers and producers has been almost inexistent so far. In view of the potential benefits (and the obvious need) this is changing. Progress on satellites, sensors as well as integration of heterogeneous data sets could help in monitoring fields and farms and improve inefficiencies leading to a more sustainable system.

Figure 6 –Using big data could alert us to risks in the food supply chain


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12 Satellite image of Central Europe, 2012. Improvements in satellite sensor quality means we can better monitor crop production and supply chain risks. Photograph: HANDOUT/REUTERS

Figure 6 –Using big data could alert us to risks in the food supply chain
5.1.5 Security principles for farm data

The PPP has a good number of projects working on Privacy-preserving technologies. Here confidentiality and security are more relevant than privacy, but we will analyse solutions arising from those projects in case their combination with the use cases of the DataBio project could be a very good starting point for this particular work. Nevertheless and besides the technical aspects associated to data security, we would like to enter here the specific discussion of ethics and power asymmetry between farmers and large agribusinesses that current data practices are rising. One of the major barriers encountered so far for data sharing in this sector has been precisely the fear of farmers for their data to be disclosed and let others get insights on what they are doing and how. The American Farm Bureau run a survey in October 2014 that brought to light that “Fully 77.5% of farmers surveyed said they feared regulators and other government officials might gain access to their private information without their knowledge or permission. Nearly 76% of respondents said they were concerned others could use their information for commodity market speculation without their consent”. While “more than 81% believe they retain ownership of their farm data”, more than 82% said they had no idea what companies were going to do with the farmer’s data (American Farm Bureau, 2015).

Access to data is precisely one of the factors that could strengthen the position of a company in the value chain, or on the contrary put it in a dependent –and therefore weak- position. Big companies in this sector, like Monsanto, John Deere, Syngenta, and DuPont, have been investing in Big Data since a while. This is not at all new to them. Data aggregation has made their position even more privileged with respect to individual (small) farmers than before, with unique insights on a field-by-field basis. Thus, data access is key. Based on the following examples extracted from “The ethics of big data in big agriculture” (Internet Policy review; Carbonell, 2016), we are facing the risk of creating a Big Data divide between people and their data:

John Deere, a company which manufactures agricultural machinery, filed a copyright claim along with General Motors to prevent farmers from accessing, modifying, or repairing software on their tractors.

Climate Corp.\(^{13}\) stipulates farmers cannot, “modify, edit, adapt, disassemble, scrape... decompile, reverse engineer or create derivative works from any Climate Products”

While farmers have to provide all their data to big companies, these ones do not reveal anything about their processes or how these data are used. There is a clear asymmetry in the relationship that makes one side of the rope stronger while the other every time weaker. The purpose of BDVe here will be to include this discussion in the PPP and encourage farmers to test standard-based technologies that give them independence from vendors and allow them to keep data ownership while

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\(^{13}\) Climate Corp., a powerful big data analytic tool has been acquired by Monsanto, making it become one of the biggest players of Big Data in agriculture
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enjoying the benefits of data analytics. Some examples of solutions we will have a look at are: ISOBlue, open-source project based at Purdue University, aimed at teaching farmers to capture and independently store their data; FarmLogs, a company which sells data analytics software that allows farmers to fully control their own data collection, but also some initiatives like the Open Ag Data Alliance, whose mission is to help farmers access and control their data, or the Global Open Data for Agriculture and Nutrition initiative (GODAN), which supports open data in agriculture and nutrition for research and innovation.

This may need to be preceded by initial discussions on data sharing and the value of data since many companies are still lagging behind this step. Notice that most of the companies mentioned so far in this document are based in US; if they get access — and even become “owners”- of farmers’ data, and taking into account that as global companies they are also providers of EU farms, would the European agriculture be at some point in time in their hands?

5.2 Value proposition of the PPP for the Agrifood community

On the objectives of BDVe is to support the PPP in aligning the supply and the demand. That is only possible if both sides are present and work together. As depicted at the beginning of the document, the PPP has a representative sample of providers; however, just a low number of users and providers that are fully specialized on a vertical industry as it could be Agrifood. This is essential to understand the requirements, needs and existing challenges not only from the technical point of view, but also considering cultural and legal barriers. Some sections above have reflected on the opportunities but also the threats associated to the transformation of Agrifood into a data-based industry. Both of them should be addressed equally through the collaboration of all relevant stakeholders of the sector.

Attracting stakeholders sounds like if we were asking them to come to us; but the reality prevails; the Big Data Value PPP has to go to them. That will be the major change of mindset compared to previous activities.

It is not the goal of BDVe to necessarily involve users as BDVA members (although welcome), but to engage with them through our involvement in their trusted industrial networks. That is why section 5.3 shows a pragmatic approach based on linking our activities with other ongoing initiatives that already count on major players in the Agrifood sector instead of setting up new collaboration structures.

The Unique Selling Points (USP) of our proposal can be synthetized as follows:

- **Proactively listen to the needs, requirements, concerns and challenges of the Agrifood sector** so that Big Data solutions supplied by the Big Data community comply with them. This may require considering angles that do not fall under technical considerations and could be relevant for the adoption of such solutions.

- **Share knowledge with players of the Agrifood industry** that help those organizations who are not engaged in their digital transformation to
understand what the value of their data is, data sharing practices and existing solutions.

- **Provide practical and neutral guidance** on how to step-in once they are willing to invest in Big Data technologies. For this we will use resources that BDVA is already providing or will provide in the future, such as reference models and guidelines that help users in their path, but also assets under development in BDVe. Some examples of those have been generically described in section 4; that is the case of educational tools that could have an impact in creating the team of human resources needed in that endeavour (by finding external experts or through training of available personnel of the company); the Big Data marketplace has also been highlighted as a major tool to find technical solutions and providers in the Big Data area. Experimentation environments (such as i-Spaces), access to data sources including marketplaces may also be promoted through this portal, as well as setting up collaboration schemes with ongoing initiatives, as it could be the potential replication of large scale pilots included in projects like DataBio.

- **Support with our marketing services ambassadors of Big Data technologies in the domain** that provide understandable and high-impact examples of deployment of Big Data technologies in concrete operational contexts, be they originated by the supply or the demand side. Priority will be given to high-impact examples, including RoI cases.

The list of practical assets of Section 4 gives a more tangible value proposition than the initial starting point in BDVA. For this to be implemented we also need the right structures in BDVA that help the supply side to work around the topics mentioned above (going beyond the partners in BDVe). That is why there is an ongoing process to set up a group under the Applications Task Force (see Figure 1) specifically devoted to Agrifood. This group will interface with the aforementioned trusted environments and initiatives where the farming sector already meets regularly.

The ambition is that all these elements help a wide number of players in the Agrifood sector to enter the process of transforming their companies into data-driven organizations or at least that they are fully aware of the advantages and disadvantages that reacting or not may have on their future, so that they can take informed decisions. For those that are a step ahead of that, the PPP will provide full support with respect to the USPs listed above.

In the context of innovation-related activities the goal is to increase data-related experimentation through engagement of companies in open calls (when they are available), replication of use cases already envisaged in existing projects, support to access the capabilities and resources of Innovation Spaces and Digital Innovation Hubs. For the long-term we expect that a tight collaboration happens between Big Data suppliers/IT providers and the farming sector so that future roadmaps of R&I (when it comes to data-related technologies) are shared and are not created in isolation by different communities, therefore leading to lack of coherence in the implementation of EU strategies.
5.3 Synergies with ongoing activities & Engagement Plan

This section presents a list of activities and initiatives that are considered important as part of the engagement plan with players (including essentially – but not only-users) in the Agrifood/farming sector. It is based on the work already developed in the initial phase of the project and may not be a complete one. The project is open to recommendations and changes of priorities provided they fit with the goals, available resources and potential impact. Updates of the plan and reporting of achievements will be provided through the subsequent versions of the User Ecosystem characterization in M18, 36 and 48 respectively. The list takes into consideration the four thematic priorities already identified in section 5.1.

5.3.1 Data-related activities in the context of EIP AGRI

The EIP-AGRI aims to catalyse the innovation process in the agricultural and forestry sectors by bringing research and practice closer together – in research and innovation projects as well as through the EIP-AGRI network. Two specific funding sources are particularly important for the EIP-AGRI: the EU Research and Innovation framework, Horizon 2020 and the EU Rural Development Policy. On their portal we can read that it is “the one-stop-shop for agricultural innovation”, and therefore the place where most discussions and activities related to digital technologies for agriculture and “with” farmers, happen. EIP AGRI has a number of focus groups on topics such as agroforestry, fertilizer efficiency, dairy production systems, benchmarking farm performance, or diseases and pests in viticulture, to name a few. They are too specialized for the purpose of our work. Fortunately, in January 2015, the European Rural Networks’ Assembly was successfully launched as the main governance body of the ENRD and EIP-AGRI Networks with several subgroups under it. The permanent Subgroup on Innovation for agricultural productivity and sustainability (Subgroup on Innovation) is one of them and the most relevant to us. Members belong to three categories: Managing Authorities / National Rural Networks, Agricultural Advisory Service Providers / Agricultural Research Institutes, and Civil Dialogue Groups on Rural Development / Local Authorities. They are a clear target for our activities and therefore, we will analyse how to take advantage of this resource.

EIP AGRI is also used as a framework by DG AGRI to run activities on interesting topics. And here is where IoT and Big Data have emerged as some of the hot topics in the domain. Two major activities have been developed in the last months.

- Seminar on ‘Data revolution: emerging new data-driven business models in the Agrifood sector’ (Bratislava, June 2016). The main goal was to reflect on how agricultural and rural development policy can support the data revolution for an enhanced productivity and sustainability in the wide Agrifood chain. Different business models enabled by data were discussed. For many participants, product innovation was more associated with manufacturing agricultural equipment, and commodity swaps rather with data exchange between farmers and food processors, showing that cultural changes may be required too. Limiting factors were also discussed as a way of
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defining major priorities in terms of work, as emphasized at the beginning of this report.

- Seminar on “Digital Innovation Hubs: mainstreaming Digital Agriculture” (Kilkenny, June 2017). This one was attended by members of BDVe such as Atos and TNO. Digital Innovation Hubs appear as a suitable instrument to bring innovation through different services (such as access to technology, training, funds) to farmers locally. As a concept it belongs to the so called Digitizing European Industry (DEI) Strategy, and therefore it is being worked out with the collaboration of several DGs, in this particular case DG AGRI and DG CONNECT. The starting point for the activity was that “ICT developers and agricultural businesses are keen to assess which technologies, including the most disruptive ones like the Internet of Things, Big Data, Robotics, Artificial Intelligence etc., could help the sector meet the current challenge of ‘producing more with less’”. However, the farming sector can find it difficult to see the real added value of these technologies, to decide which ones to invest in, when to invest and to what extent”. The seminar helped to take some steps towards the definition of the concrete requirements that should be fulfilled by a DIH in Agriculture; as it has been pointed out along this document, the relevant idea here is not only the outcome but the fact that the process is mainly run by farmers and companies specialized in the sector, but with the support and collaboration of other players in the public and private domain. Data-related topics were extremely prominent (best practices for data sharing, if there should be a shared infrastructure for data storage in the EU, how to make it neutral and safe, data-driven business models, etc).

BDVe has followed the results of activities that started before the launch of the project but is already working closely with DG AGRI in activities in the domain of data. Highlights include the two major lines of work in the context of the DEI Strategy: on the one hand Digital Platforms (WP2018-20 includes a specific topic on Digital Platforms for Agriculture and it is part of the so called WG2 of DEI) and on the other hand, Digital Innovation Hubs (as it has been clarified, some tasks have already been launched specifically in the farming community to follow-up the more generic activities under WG1 of DEI on DIH). In H2-2017 DG AGRI will contribute to a panel on Big Data for Agrifood that will be organized in the context of the European Big Data Value Forum (Versailles, November 2017) and the set-up of a task force on the same topic under the BDVA organizational structure for the purpose of integrating the views of the Big Data and Agrifood communities. The organization of a particular workshop as follow-up of the AGRI activities on data in Bratislava is part of our roadmap too. Depending on the agendas this may be postponed to H1-2018.

A good number of events will be held in H2-2017 by DG AGRI; they are under analysis now to understand the RoI for the Big Data community.

5.3.2 Big Data Europe

Big Data Europe (BDE) is a project funded by DG CONNECT in the Data field, but before the Big Data Value PPP was created. Its main goal is to undertake the
foundational work for enabling European companies to build innovative multilingual products and services based on semantically interoperable, large-scale, multi-lingual data assets and knowledge, available under a variety of licenses and business models. They are doing specifically two things: collecting requirements for the ICT infrastructure that could support such goal and then designing and implementing such framework. The interesting thing is that the requirements analysis is being done for a number of societal challenges through Big Data focus areas that involve players of the sector. Among them, one on Food and Agriculture focused on Large-scale distributed data integration. This pilot is driven by Agroknow and FAO and addresses the challenge of integrating heterogeneous data sources in viticulture. The use of Big Data here should complement existing community-driven systems (e.g. VITIS for the Viticulture Research Community) with efficient large-scale back-end processing workflows.

BDVe has followed-up some of the outcomes of the project and its main goal is not to reinvent the wheel; on the contrary to capitalize and build on top of the work already developed by BDE. Therefore findings such as the requirements already gathered or the architecture of the pilot will be brought to the BDVA TF on Agrifood and will be disseminated for inspiring other pilots, including the DataBio cases. The leadership by Fraunhofer, also member of BDVA, will help on this and on attracting the existing community behind Big Data Europe. BDVA has already run some common activities with BDE, including seminars, but all of them of generic nature and not focused on any concrete industry.

5.3.3 Research Data Alliance

The Research Data Alliance (RDA)\(^{14}\) was launched as a community-driven organization in 2013 by the European Commission, the United States National Science Foundation and National Institute of Standards and Technology, and the Australian Government’s Department of Innovation with the goal of building the social and technical infrastructure to enable open sharing of data. It has over 5,800 members from 128 countries who share the principles of openness, consensus, balance, and harmonisation. RDA enables data to be shared across barriers, and this is done through working groups and interest groups. Of course data sharing is one of the prior steps to talk about Big Data and a major barrier that prevents the agricultural sector from entering the data-driven transformation. A good number of WGs fit with our objectives; among them, the ones on Agrisemantic, Wheat Data Interoperability, Rice Data Interoperability, Soil Data Interoperability and on-farm data sharing seem crucial. Interest groups also include Agricultural data, Big Data, Biodiversity integration or weather, climate and air quality as important topics. Discussions between BDVA and RDA are already happening in order to exploit synergies. BDVe will pay special attention not only to the contents but to the potential engagement of representatives behind the agri-community in our activities.

\(^{14}\) https://www.rd-alliance.org/
5.3.4 Large Scale Pilots focused on data in Agriculture

The Big Data Value PPP has two large scale pilots running at this stage. One of them is DataBio\textsuperscript{15}, whose main goal is to show the benefits of Big Data technologies in the raw material production from agriculture, forestry and fishery/aquaculture for the bioeconomy industry to produce food, energy and biomaterials responsibly and sustainably. It is worth highlighting the following expected impacts: Demonstrate increase of productivity in bioeconomy, increase of market share of Big Data technology providers in the bioeconomy sector more than double the use of Big Data technology in bioeconomy, leveraging additional target sector investments by a factor of >5, and involve more than 100 organizations in demonstrations. All this, as it is logical, is fully aligned with the support BDVe has to provide. The DataBio architecture/platform seems to be already one of the assets to be discussed in the TF on Agrifood to be created in BDVA, going further than the generic approach of the BDVA Reference Model that has been considered so far; this could be also compared with the architecture used in BDE for the FAO pilot.

For the agricultural pilots specifically (which are the ones we will look at), the main idea is that Big Data analytics provide pilot managers with highly localized descriptive (better and more advanced way of looking at an operation), prescriptive (timely recommendations for operation improvement i.e., seed, fertilizer and other agricultural inputs application rates, soil analysis, and localized weather and disease/pest reports, based on real-time and historical data) and predictive plans (use current and historical data sets to forecast future localized events and returns). This will be driven by three major areas of work, each of them with two particular cases:

(1) Precision Horticulture including vine and olives
   a. Precision agriculture in olives, fruits, grapes and vegetables
   b. Big Data management in greenhouse eco-systems

(2) Arable Precision Farming
   a. Cereals and biomass crops
   b. Machinery management and environmental issues

(3) Subsidies and insurance
   a. Insurance
   b. CAP support

BDVe already attended the Kick-off meeting of DataBio and is following the launch of its activities. One of the pilots will already be showcased at the Agrifood session to be held at the European Big Data Value Forum\textsuperscript{16} in November. Since some partners of the project are already BDVA members, getting them involved in the TF Applications with a new subgroup will bring valuable input and synergies. Nevertheless, the goal will be to have farmers and users collaborate beyond the IT/Big Data providers currently active in this framework.

BDVe is also working closely with another large scale pilot that is not running under the umbrella of the Big Data Value PPP but is equally relevant to our topic: the

\textsuperscript{15} https://www.databio.eu/en/
\textsuperscript{16} http://www.european-big-data-value-forum.eu/
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IoF2020\(^{17}\) project (Internet of Food and Farm 2020), one of the projects of the IoT Large Scale Pilots programme. In this case IoF2020 focuses on the potential impact of IoT to revolutionize processes in the farming sector, but the extensive use of IoT brings as effect a tremendous generation of data. As such, they are also addressing topics like data gathering, processing, data integration or data-driven business models, to name a few. The project brings successfully many users thanks to the high number of demonstrators:

1. **Arable**: combine IoT technologies with existing networks and databases to enable precision farming.
   - Use cases include: within-field management zoning, precision crop management, farm machine interoperability and soya protein management.
2. **Fruits**: increase fruit quality and yield through data for pre and postharvest loss and enable product traceability
   - Use cases include: fresh table grapes chain, big wine optimization, automated olive chain and intelligent fruit logistics.
3. **Meat**: optimize animal health, enhance transparency throughout the production chain and improve the traceability of meat
   - Use cases include: pig farm management, meat transparency and traceability, and poultry chain management.
4. **Dairy**: use real-time sensor and location data to create added value in the dairy chain
   - Use cases include: grazing cow monitor, remote milk quality, happy cow and herdsman (Precision Livestock Farming)
5. **Vegetables**: demonstrate the automatic execution of cultivation patterns through the intelligent combination of sensor data
   - Use cases include: added-value weeding data, chain-integrated greenhouse production, enhanced quality certification system and city farming for leafy vegetables.

The evolution of demonstrators will help us to understand which ones are more relevant for the collaboration with the Big Data PPP; many of them already use machine-learning techniques and address Big Data challenges. Meetings with the coordinator (University of Wageningen) and some partners of IoF2020 have already happened in the last months and one of the agricultural use cases will be showcased at the European Big Data Value Forum. Furthermore University of Wageningen has been invited to co-lead the activities of Big Data for the farming sector in this event.

The engagement with the IoF2020 project generates also a direct link with the working group of Agrifood/farming in the context of AIOTI, the Alliance for IoT Innovation, since it is a central project in that community.

IoF2020 uses **FIWARE\(^{18}\)** as one of its baseline platforms. FIWARE (a bet of the EC built by means of the Future Internet PPP, also known as the FIWARE programme) is an IoT platform that brings many functionalities to application developers (including not only IoT but also cloud, data management, etc) with the added value of being

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\(^{17}\) https://www.iof2020.eu/contact

\(^{18}\) https://www.fiware.org/
open source and preventing vendor lock-in. Anyone can be part of the community and contribute to further developments. Training summits take place periodically in Europe to extent the OS community as well as the number of adopters.

FIWARE has been a relevant framework to bring innovative technologies to a sector like Agrifood. A good number of projects have been developed in the context of this programme, such as SmartAgrifood, FI-SPACE and some projects focused on accelerating companies in the agri-business, which include: FRACTALS, Finish, Finodex, SmartAgrifood, SpeedUP!. In fact, the biggest group of SMEs funded in the FIWARE accelerators was in the area of agriculture (18%)\(^{19}\).

It is not a surprise that some of the activities that have been mentioned so far include common partners and are somehow connected. The development of this community along several years has ended up in the creation of an Agrifood track under the Adoption chapter of the FIWARE Foundation\(^{20}\). The community meets physically at least once a year during the FIWARE Summit (last edition was held in Utrecht, June 2017). We have strong ties with this community, which brings together a good number of partners of the DataBio and IoF2020 large scale pilots depicted before. BDVe will follow the developments of both the community and synergies that may be capitalized in the field of Big Data and data management generic enablers of the FIWARE Framework.

In a separate chapter, because it does not fit with the title of Large Scale Pilot, but we think it should be mentioned as an ongoing collaboration, the PPP builds for specific activities on top of the work done by the EU Data Market Study run by IDC and Open Evidence. This applies particularly to the map of Big Data Players that will be set up by BDVe, as well as KPI monitoring (especially for macro-economic indicators), but this document has also made use of the sector analysis and in concrete terms the study of Data Driven Technologies in the Primary Sector: The Case of Precision Agriculture (IDC, Feb. 2016).

5.3.5 Smart Specialisation Thematic Platform on Agrifood: Thematic Partnership on Traceability and Big Data

Some references about this initiative were already included in section 2.1.3. It aims at encouraging, motivating and facilitating the incorporation of necessary digital technologies and data application in Agrifood sector value chains. Among its specific objectives we find:

- Improving the competitiveness, resilience and sustainability of the Agrifood sector.
- Achieving a transparent, collaborative and balanced Agrifood value chain and promoting an economy of shared value.
- Accelerating adoption of ICT, improved data management and interoperability in the Agrifood sector

\(^{19}\) See “Ideas turn into real business” [https://www.fiware.org/wp-content/uploads/tabs-img/tab-accelerator/infograf%23C3%ADa-acccprogramme.pdf](https://www.fiware.org/wp-content/uploads/tabs-img/tab-accelerator/infograf%23C3%ADa-acccprogramme.pdf)

\(^{20}\) [https://www.fiware.org/foundation/](https://www.fiware.org/foundation/)
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- Fostering data-driven innovation at all stages of the Agrifood value chain
- Developing new business models and market opportunities and quality job creation
- Establishing creative designs for decision-making based on data management and the creation of decision support systems
- Ensuring the inclusive governance of data and knowledge flows
- Improving the synergies between public institutions, knowledge agents, civil society entities, farmers and companies.
- Sharing best practices and developing standards and benchmarking in relation to Agrifood value chain developments based on the digital economy.
- Promoting cooperation between different disciplines and areas, as well as between regions taking advantage of common interests and market opportunity niches.
- Promoting the incorporation of the Agrifood sector into ICTs and the digital economy.
- Facilitating the development of the economy linked to "open data" and learning and support for the same.
- Improving coherence and strategic alliance with the objectives of the Commission on the strategy for smart, sustainable and inclusive growth.

Key thematic areas of the initiative include:

- More complete and trusted information available to consumers.
- Smart information systems for companies and the public administration.
- Territorial cooperation as basis for the transfer of technology and research outcomes, experiences, research staff and between companies, in those regions that are interested in this topic.
- The shared value that will generate added value in all stages of the chain that will have an impact on the rest of phases and in society and the territories at large.
- Improvement of business competitiveness, resilience and sustainability and creation of new businesses

These topics suggest that this partnership is one of the seeds of the phenomenon of Digital Innovation Hubs for Agriculture. As such it is directly contributing to that objective in the context of previously mentioned initiatives. Even though the baseline comes from the region of Andalucía and has generated a cluster of stakeholders in the region, it also envisages inter-region cooperation in those areas that could greatly affect the whole food value chain that, as we know, it is not confined to a limited geographical area. This cooperation has given birth to the definition of some priority topics of work, as pointed out in 2.1.3.

- Traceability and Big Data in the “Lifecycles of the value chain”
- Traceability and Big Data in the “Smart monitoring of the value chain (production, Agrifood industry, logistics, distribution and consumer) aiming to improve the competitiveness in the Agrifood sector”
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- Traceability and Big Data in order to “Incorporate consumer experience and of the various different operators of the food chain in decision-making processes”
- And the cross-cutting topic of “Open data, interoperability, data governance and information security, cybersecurity”

Dialogue with this initiative is ongoing and some partners of BDVe are integrated into discussions with Junta de Andalucía and some of the members of the clusters. Contents of the initiative will feed and will be integrated into the operations of the related TF in BDVA and synergies will be exploited for the benefit of supply and demand sides. One of the experiments of the region will be showcased at the European Big Data Value Forum as starting point for further cooperation.

5.3.6 Other actions for potential dialogue

The list above shows the priorities for BDVe with regards to actions and engagement. Limited resources make unfeasible that we can approach many other initiatives that may have concrete elements of interest for our work. However, they should be part of the network for the purpose of attracting wider constituencies and extend the reach of our dissemination activities. We provide here a brief overview of those that are already in our radar.

5.3.6.1 Other actions/initiatives at EU level

Some of these initiatives include ETPs in the field of FNS such as Food for Life and TP Organics (with whom BDVA has already collaborated for joint elaboration of a topic on Big Data for the organic food industry); PPPs like Factories of the Future, which has a number of activities in the Food manufacturing sector (and with whom dialogue is already ongoing at more general level), or the Bio-based industries Joint Undertaking; the EIT Food: Food4Future- Sustainable Supply Chain from resources to consumers, which will complement EIP-AGRI and JPIs and will pool national research efforts to integrate the food supply chain in agriculture and other sectors.

The European Cloud Initiative that builds on the Digital Single Market Strategy may also be an increasingly interesting one especially in the context of the PPP activities with the HPC community. It aims to deploy super-computing capacity, fast connectivity and high-capacity cloud solutions for the scientific community. Discussions of BDVe with DG RTD have revealed that one of the initial pilots will be based precisely on agriculture.

In terms of projects the desk research conducted by BDVe has brought some additional opportunities that will be explored in the coming months. That is the case of the PLAID project. PLAID (Peer-to-peer Learning: Accessing Innovation through Demonstration) is funded by H2020 and its main goal is to encourage farmers and farm employees to embrace innovations in agriculture, leading to a greater sustainability of European Agriculture, by accessing high quality demonstration activities on commercial farms. The project website states that PLAID will collaborate with the AgriDemoF2F project to create some on-line resources including an inventory of demonstration activities in the EU 28, Switzerland, Serbia and Norway. The inventory will be stored in the FarmDemo hub, which will be linked to a georeferenced searchable map. All this seems a priori an interesting asset to us, but it will depend on the positioning of Big Data technologies in the picture. Timing
could be an ally, since PLAID has started at the same time than BDVe and will be running till July 2019.

5.3.6.2 Other actions/initiatives at International Level

At International level, even though it is not the focus of this PPP yet, we will capitalize opportunities that may be easy to capture. Criteria here will be cost efficiency and impact. Collaboration has already been established with the PICASSO\(^{21}\) project, which develops a dialogue between the EU and US on different technical disciplines, including an expert group on Big Data.

More targeted actions for this particular domain of Agrifood could be implemented through initiatives that include FNS priorities, such as FNSSA (Pro-poor innovation and research, for Food and Nutrition security and sustainable agriculture), the High-Level Dialogue for EU-Africa Cooperation, the Partnership with China for Food, Agriculture and Biotech (FAB) or the Partnership with the Mediterranean (PRIMA).

6 Transport and Logistics

6.1 Big Data in Transport & Logistics (T&L): overview, challenges and opportunities

Intelligent Transport Systems, or the acronym ITS\(^{22}\), has been in place since 2010 or earlier. Wikipedia defines the concept as “an advanced application which, without embodying intelligence as such, aims to provide innovative services relating to different modes of transport and traffic management and enable various users to be better informed and make safer, more coordinated, and ‘smarter’ use of transport networks”. The application of ICT in the sector has rapidly evolved since then, leading to disruptive businesses like the autonomous car –which has gained a lot of momentum thanks to current 5G deployments-. But it is without any doubt the increased availability of data that makes this moment so crucial in the Transport and logistics industries, enabling innovations that could change value chains and the power position of old and new players. This is partly due to the IoT; in 2020 we expect more than 50 billion connected devices, with the obvious consequence of expanding the volume, velocity and variety of data related to transport and mobility.

The transport Systems Catapult in UK\(^{23}\) has identified 20 services that may emerge over the next 10 years thanks to these changes, and has anticipated three cycles for their emergence:

\(^{21}\) http://www.picasso-project.eu/

\(^{22}\) Although ITS may refer to all modes of transport, the directive of the European Union 2010/40/EU, made on the 7 July, 2010, defined ITS as systems in which information and communication technologies are applied in the field of road transport, including infrastructure, vehicles and users, and in traffic management and mobility management, as well as for interfaces with other modes of transport (Wikipedia)

\(^{23}\) The Transport Data Revolution: Investigation into the data required to support and drive intelligent mobility (March, 2015)
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- 2014-17: Better integration of existing transport systems using sources of data that already exist, and becoming increasingly open or available at low-cost.
- 2018-21: Optimisation across multiple transport networks through exploitation of archived data collected in real-time, to which predictive analytics are applied.

The same source provides a structured analysis of datasets that will make these services possible. 9 themes have been identified and within them, 19 datasets have been determined: **map data; weather; personal location data; network disruptions; planned events; real-time network capacity for people, vehicles & goods; public transport schedules; vehicle location data; fare and pricing data; sentiment data from service users and non-users; third party service usage data; and payment/transaction data.** Major challenges at this stage is that despite the growing availability of data, some of these datasets are not available yet, others are not open or are provided at very local level (normally maintained by companies operating in small areas or by local authorities), making their integration a hard task. Furthermore, for some data owners it is not a priority to invest in the maintenance of sensor networks and the infrastructures and skills to store and process such data. For data discovery, problems like too many catalogues or platforms are highlighted, but emphasis is put on the poor availability of real-time data. We feel rather confident to say that this has improved thanks to different collection mechanisms in the last years. Two additional items could be included (at least) on the list of challenges: one of them is dealing with **privacy of data**, which is partly solved thanks to the already approved GDPR; the other makes reference the need for global standards that help to scale services and applications and contribute to integration and interoperability. This one is still at its infancy.

When it comes to exploitation of data it is worth distinguishing between the different business fields. While in public transport we see a major involvement of public authorities and a myriad of startups launching personal mobility services based on fulfilling the preferences of customers, in logistics problems are different and most innovations are happening in silos (through the whole value chain of the logistic operators but with poor or no integration with third parties); the automotive industry is another case that could be disruptive. The autonomous car was mentioned earlier as an example of the -potentially dominant- role that IT companies like Apple or Google could play in the evolution of this industry and the emergence of completely new players, such as Tesla. The car industry is a very important one in EU and major stakeholders have been preparing themselves towards this new era. Operations like the alliance of HERE with some big giants of this industry reflect this movement. In personal mobility we have already experienced completely new business models, such as those of Uber or Cabify, currently dealing with legal processes in some countries. This opens up an important

24 Some initiatives exist in Europe such as GTFS or DATEX II
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discussion point about the governance of innovation and the evolution of the regulatory environment, which should be able to promote a fair playground that motivates innovation, still engaging all affected stakeholders to avoid a potential rejection of new technologies by some population groups.

figure 7 – data exploitation for mobility services (source: www.ts.catapult.org.uk)

we finish this introduction with some business models background provided by the study commanded by transport systems catapult, which points out the most relevant models to exploit transport-related data:

- opening-up and releasing unexploited datasets currently held by the public sector and its contracted service providers as open data.
- autonomous sensor-based monitoring and data capture for transport networks and services via the growing internet of things.
- aggregating and collating multiple transport data feeds so they can be readily combined and analysed for patterns, deployed in models, and up-scaled from representative population samples to inform strategic transport planning and analyses.
- statistical and computational analyses/modelling of transport datasets, with consumer and socio-economic datasets, to create market intelligence and actionable insights.
- predictive and real-time analytics, and automated control systems, that optimise capacity in relation to demand across all transport networks.
- products and information services that are compelling enough to be ‘baked-in’ to the next generation of intelligent mobility services (e.g. connected/autonomous vehicles).
- developing ‘intermediate technology’ transport applications, tools and open data standards relevant to emerging economies’ transport systems.
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- Establishing ethically-focused tools that fairly and transparently trade user’s digital exhaust data in return for contextually relevant information, insight, and/or incentives.

6.2 Value proposition of the PPP for the T&L community

As it has already been highlighted, the main goal of BDVe with respect to user industries is to align the supply and the demand sides. That happens when all parties come together and do not work in silos. Discussions that have happened in the context of BDVA so far with respect to mobility services counted on few expert players of the domain, but we consider that insufficient for the fulfilment of the objectives of the PPP in terms of innovation and competitiveness. But exactly as it was described in the case of Agrifood, the transport and logistic industries have their own fora and industrial groups to discuss, share and agree on challenges of common interest, including those related to innovation in general and to data in particular. Those are the ones that BDVe has already approached in the initial phase of the project (ex. ALICE, Ertico) and that will be used for the purpose of engaging with Transport players (see Section 6.3 for more details). But of course we cannot approach these communities with empty hands. Here is where some of the assets of the PPP, enriched by BDVe, play a role. As we did previously, we list here the most representative USPs with few variations for this particular sector:

- **Proactively listen to the needs, requirements, concerns and challenges of the T&L sector** so that Big Data solutions supplied by the Big Data community comply with them. This may require considering angles that do not fall under technical considerations and could be relevant for the adoption of such solutions.

- **Share knowledge with players of the T&L industry** that help those organizations who are not engaged in their digital transformation to understand what the value of their data is, data sharing practices and existing solutions. In this particular case we face a different situation than the one of Agrifood, since this sector has been one of the pioneering ones in applying big data to innovate in processes or services. Still, differences exist depending on the application area and stakeholders involved. Discussions will benefit aspects related to fields of actuation that require consensus among stakeholders, as it could be the case of standards.

- **Provide practical and neutral guidance** on how to step-in once they are willing to invest in Big Data technologies. For this we will use resources that BDVA is already providing or will provide in the future, such as reference models and guidelines that help users in their path, but also assets under development in BDVe. Some examples of those have been generically described in section 4; that is the case of educational tools that could have an impact in creating the team of human resources needed in that endeavour (by finding external experts or through training of available personnel of the company); the Big Data marketplace has also been highlighted as a major tool to find technical solutions and providers in the Big Data area.
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Experimentation environments (i-Spaces), access to data sources including marketplaces may also be promoted through this portal, as well as setting up collaboration schemes with ongoing initiatives, as it could be the potential replication of large scale pilots included in projects like Transforming Transport. As said before, many players in the domain have been engaged in data—related discussions since a while. So we are addressing here a sector that has come up with demonstrators and technical solutions for several years. So, our contribution here will rely on the analysis of the existing offering (for example, data marketplaces for some areas of activity are already in place) and the provision of a critical assessment of solutions.

- Support with our marketing services ambassadors of Big Data technologies in the domain that provide understandable and high-impact examples of deployment of Big Data technologies in concrete operational contexts, be they originated by the supply or the demand side. Priority will be given to high-impact examples, including RoI cases.

All these points will require having the right working structures in place. For this BDVe will push forward the launch of activities in the context of the already formally approved- TF on Transport and Logistics within BDVA. BDVe will support it in its operations and activities with industrial associations as the ones mentioned earlier. Some meetings have already been held as well as attendance to some of the sessions organized by such platforms, but some specific events and follow-up actions are envisaged for H2 2017, as it is portrayed in the following section.

6.3 Synergies with Ongoing Initiatives & Engagement Plan

6.3.1 ALICE

ALICE stands for Alliance for Logistics Innovation through Collaboration in Europe. The vision of ALICE is substantiated by the fact that a 10% to 30% increase of efficiency in the EU logistics sector means € 100 – 300 billion cost relief for European industry. Based on that, the mission of this ETP is the development of new logistics and supply chain concepts and innovation for a more competitive and sustainable industry, with the ambition of contributing to a 30% improvement of end to end logistics performance by 2030. ALICE was created in the frame of the WINN project and was recognized as ETP by the EC in July 2013. Some of the initiatives that support the operations of ALICE are the European Green Cars Initiative (logistics section) and EIRAC, European Intermodal Research Advisory Council. With more than 100 members, ALICE agglutinates major stakeholders of the domain, including shippers and retailers, logistic service providers, courier and postal operators and freight forwarders, ports, transport hubs and infrastructure holders, vehicle manufacturers, logistic clusters at national level or IT specialists in the sector.

The so called working group on Information Systems for Interconnected Logistics is the one that analyses and reflects on the challenges and impact of ICT technologies.

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http://www.etp-logistics.eu/
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in the sector, being a major tool for innovation. Its R&I roadmap depicts three major milestones to achieve the overall goals of ALICE:

- 2020: Interoperability between networks and IT applications for logistics
- 2030: Full visibility through the supply chain
- 2040: Fully functional and operating open logistics networks
- 2050: Physical Internet

More revealing than that is the identification of the gaps to achieve such vision. Among them, we find some that are explicitly related to data, such as “Secure and reliable data management approaches that facilitate the collection and analysis of authorized data so that operational efficiency can be improved while assuring the public that privacy is maintained”, as well as “the development of appropriate standards and data collection systems for reporting commercially and socially important information (e.g., emissions, load factors, congestion levels, etc.) so that proper comparisons can be obtained and informed decisions made”. Some others more focused on the use of cloud-based technologies, IoT and other infrastructures have a clear impact on data, but are not added here for simplicity.

ALICE addresses those gaps by analysing innovations from three different perspectives: technology (ICT), business models and data governance. There is clear evidence that data is at the center of most of the innovations that can be expected in the Logistics area in the coming years.

![Themes addressed by the ALICE roadmap](http://euetpl-kirechlik.savviihq.com/wp-content/uploads/2015/08/W36mayo-kopie.pdf)

When going deeper into the roadmap and specifically the chapter of ICT innovation, we distinguish two concrete areas of work emphasized by ALICE that are of interest to us. The first one focuses directly on Big Data challenges; a second one points out some additional priorities under data analytics, which is addressed as a separate theme. The two of them are based on the forecasts of huge availability of data as a consequence of an increasing number of intelligent infrastructures and “things” that will be connected to the internet or to other infrastructures/elements of the system and therefore will be generating data almost on a continuous basis.

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**Areas to be addressed under Big Data:**
- Linking of data from heterogeneous sources, including semantic matching.
- Visualisation and analytical services for high volume, high variety, static data.
- Visualisation and analytical services for “real time” high volume event services.
- Processing, storing and indexing capabilities to manage the inflow of sensor information on a scale significantly beyond what is seen today.
- Standardisation in data collection and storage approaches to cope with distributed processing.
- Real time context enriched decision making tools.

**Areas to be addressed under the data analytics theme:**
- Simple to use tools for the rapid analysis of large volumes and varieties of transport and related data.
- Easy to use software for predictive analytics that can be integrated into IoT, ITS and sensor generated data flows.
- “In line” tools to facilitate dynamic configuration and operational changes based on real time IoT data;
- Visual data analytics tools and approaches to facilitate rapid decision making.
- Robust assessment techniques for data certainty and trust.

The following picture shows the potential instruments (or typology of activities/investments) that may be needed to fulfil the milestones previously mentioned in the context of these two themes related to data. In addition to that, the table below details some information about the expected impact as well as barriers to be overcome.

![Figure 9 – Typologies of activities needed to fulfil milestones explicitly related to data (source: ALICE)](image-url)
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The information provided so far could be categorized as the “wish list” of the organizations behind this ETP. They can be therefore be used for the purpose of collaboration with BDVA. For the specific case of the support of BDVe we need a more focused approach to make sure our resources can add value to the existing work and create some tangible impact. For this we have revised the Implementation Plan of ALICE, supported by its Secretary General and we have jointly selected the following two topics, whose summarized description is taken entirely from their IP. However, more details are presented in that document for those interested in the motivation behind the content.

6.3.1.1 Collaborative data analytics for logistics and supply networks

**Challenge:** Leverage C-ITS potential for end to end logistics applications including real time optimisation of delivery schedules and routes, corridors and hubs.
management reducing empty trips, waiting time in terminals, optimizing transport (e.g. thanks to automation), ensuring integrity of the cargo and protection against damage and theft. Develop and showcase viable innovative (shared) business models in order to incorporate the added value of C-ITS directly into the carriers and LSPs while taking into account the specific needs of the logistics sector.

**Outcome:**
- Develop and demonstrate C-ITS applications and business cases for logistics, including **corridors management**, end-to-end, first and last mile delivery, trucks platooning, **transportation routing optimization**, **delivery execution**, and **terminals management**: loading and unloading reducing the waiting time in terminals.
- **Measure performance, impact and potential of deployment** of the tested business cases through specific quality indicators.
- Build on the ITS directive (2010/40/EU), **identifying good practices and lessons learnt** potentially transferred from the transportation of people to the transportation of goods.

**Impacts and expected Targets:**
- Increase energy efficiency by 10 % and increase traffic safety.
- Minimize waiting time in terminals increasing at the same time management capacity of terminals with already available infrastructure.
- Demonstrate business cases achieving an increase in load factors from 50 to 70 % and reducing empty trips by 20 %.

### 6.3.1.2 Integrated data framework and Big Data analytics assisting decision-making in urban freight transport

**Challenge:** Smarter and holistic data collection and management need to be taken in proper consideration according to two perspectives, jointly affecting decision-making and overall efficiency of the urban transport system: **business outlook and freight mobility planning / network management**. Big data analytics will offer greater opportunities to link freight operator’s decision making with city planners decision making (e.g. urban network planning) in order to achieve resilient, optimised, sustainable and cost-effective governance of the city and more competitive position of business actors.

**Outcome:**
- **Structured knowledge base on current applications of Big Data in urban freight transport**. Identification of good practices of value added applications of Big Data management and linked KPIs to elicit the potential and added value of such applications to improve decision making in urban freight transport (both private and public sectors);
- Development and testing of evidence-based business cases, achieving **positive impacts on energy use, environment and resilience of cities** in facing megatrends impacts (e.g. sharing economy – crowd-sourcing; social and demographic evolutions; e-commerce, etc.).
- **Roadmap of research to mitigate gaps between private & public decision-making** and improve the adoption of suitable methods. Incentive schemes will be supporting optimal
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and integrated use of big data in freight transport decision making for both private and public sectors.

**Impacts & Targets:**

- Better use of predictive analysis to achieve economies of scale in accessing data (accessibility of public sector to private data - lower cost than 20% - 30% and lower time);
- Faster development of big data program and regulation frameworks in public sector and reduced procurement time frame for the use of private big data;
- Resilient use of city transport network (optimal network capacity with increased use of 15-20%);
- Engage with the public sector to profit from potential collaboration / dialogue with private sector.

Representatives of BDVe were invited to the ALICE WG3 meeting that took place at the end of April 2017 in Brussels to engage with the members of the group interested in data-related topics. In the meantime information has been shared between the two initiatives and the following steps have been defined for H2-2017:

- Organization of a joint workshop that addresses the main challenges highlighted by the ALICE roadmap in the areas of Data analytics and Big Data and supports the Implementation Plan of the initiative. It should bring together members of the two communities for a more fruitful discussion and should point out existing initiatives/projects that are already working on the topics (some of them referenced by this document).
- Visibility of the challenges of transport and logistics in the upcoming European Big Data Value Forum. This point could be merged with the first one, since at the time of submitting this report most decisions about sessions and workshops to be run at the EBDVF have been taken. They include precisely a relevant number of initiatives in the T&L area that go from a panel at the conference to more interactive sessions/workshops.
- Kick-off activities of the T&L TF in the context of BDVA by building upon ongoing plans of ALICE and inviting the most relevant stakeholders of this initiative as well as some others described later on in this document.

### 6.3.2 ERTICO

ERTICO is a platform to develop and deploy ITS in Europe through the cooperation of all relevant stakeholders with the goal of bringing intelligence into mobility of people and goods in Europe. This intelligence should lead to safer mobility (zero accidents), smarter mobility (zero delays and fully informed people) and cleaner mobility (reduced impact on the environment). It is a PPP with more than 100 partners that include mobile network operators, public authorities with competences in the domain, research institutions, service providers and suppliers to the sector, but also, and more interestingly a wide number of representatives of the traffic and transport industries, users and vehicle manufacturers. For the purpose of BDVe specifically, but also more generally for BDVA and the PPP, all stakeholders that represent the
views of the demand side (even though they play different roles in the value chain) are referred to as users.

ERTICO has run some activities related to Big Data in the last years and collaborates with projects like Big Data Europe (mentioned later in section 6.3.3.3). It coordinates the Advanced Driver Assistance Systems Interface Specifications (ADASIS) Forum, motivated by the need for acceptable methods of data exchange. Its prime purpose was to enable automotive manufacturers wanting to develop advanced driver assistance systems (ADAS) to access and use the information stored in the proprietary formats of navigation systems – such as map data, vehicle position and speed. This happened when HERE patented its technologies and resulted into the first version of a new standard for ADAS as enabler for automated driving.

First interactions between BDVA and ERTICO already happened some months ago. However, not much activity has been developed partly because of the lack of the operations of the T&L TF. This will be pushed forward by BDVe taking advantage of the fluid relationship with some members of the different organizations and initiatives included in this document. All this creates a nurturing environment that should not be wasted.

### 6.3.3 Relevant projects in the domain

For the logistics part our colleagues from the ALICE ETP have already identified a number of relevant projects associated to the challenges depicted above; in most cases, but not exclusively, they are implemented in the context of the WP of Transport under the leadership of DG MOVE, but there are also some that belong to ICT for ITS. We build upon this list and extract the basic information as background. After that we provide some additional details about major projects selected by BDVe to move forward with respect to the activities of the PPP. They should be used as tools for engagement in collaboration with BDVA TFs.

*Linking of data from heterogeneous sources, including semantic matching*

- **OTN**: collects and harmonises transport related data to drive the rapid creation of innovative new applications and services

*Standardisation in data collection and storage approaches to cope with distributed processing*

- **SMARTIE**: creates a distributed framework to share large volumes of heterogeneous information for the use in smart-city applications
- **ISO-COLD**: ERPlan has developed a comprehensive ICT solution able to collect and aggregate information from T&L operations.

*Simple to use tools for the rapid analysis of large volumes and varieties of transport and related data*

- **ADVANCE**: Open-source software to develop predictive-analysis-based decision support platform for novel competitive strategies in logistics operations
- **DISCO**: captures and analyses real-time structured and unstructured data from internal and external sources, and provides multiple scenario plans to
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optimise individual company and overall supply chain performance through predictive analytics

**Visual data analytics tools and approaches to facilitate rapid decision making**

- **OPTICITIES**: Decision support tools based on predictive data for proactive transport management and Multimodal Traffic Control Systems
- **Spoilage Down**: RELEX has built an innovative supply chain management solution for the demand forecasting and inventory optimisation of retailers and wholesalers, built on a unique columnar in-memory database

As said, the series of projects depicted above is a good starting point to understand what has already been done and which major gaps require further investment. BDVe will support the exercise of completing the list together with ALICE so that a more comprehensive view can be provided to interested stakeholders. However, it is worth identifying some projects that will serve us to trigger specific activities in the T&L sector with respect to Big Data and that act as gravity points for the strategy of engaging users, which is our ultimate goal.

**6.3.3.1 Large Scale Pilot Transforming Transport (TT)**

TT is one of the two lighthouse projects funded under the PPP; as it was justified for the case of Agrifood, it offers a unique opportunity to extend the engagement of stakeholders in this particular vertical industry. It fulfils the requirements to attract these players more than usual research projects. The reason is that they are focused on solutions with high TRL, therefore operating close to real operational conditions. Decision-makers in companies are more interested in understanding technologies and solutions that have some maturity provided there is a business case behind. TT will include demonstrations of Big Data solutions in different sub-sectors and contexts that will be replicable and measurable. Thus, it provides a hook to other players in the domain. The interest of the exercise is already obvious if we have a look at the relevant presence of stakeholders that belong to the T&L sector. BDVe objective will be to use this framework as starting point to extend the stakeholder group; so, on the one hand attract more players of the domain, but also to trigger the participation of the operators already engaged in pilot activities in other relevant initiatives out of their comfort area (i.e. outside the boundaries of their specific task in the project). The seven pilot domains addressed by TT are: Smart High-ways, Sustainable Vehicle Fleets, Proactive Rail Infrastructures, Ports as Intelligent Logistics Hubs, Efficient Air Transport, Multi-modal Urban Mobility and Dynamic Supply Chains, offering a wide coverage of transport modes. The collaboration with TT is already ongoing with some activities already developed in the first months in the context of the Steering and Technical committees of the PPP but also in joint events. Preparations for the EBDVF are also in place at this stage as well as the involvement of TT in the upcoming workshops that will be co-organized with the relevant industrial initiatives in the domain.

Because of its size and potential impact, TT is a platform to establish links with other projects of the PPP. When it comes specifically to the engagement of stakeholders in the domain, it is worth mentioning the synergies with Big Data Ocean (Exploiting Oceans of Data for Maritime Applications) and QROWD (Because Big Data Integration is Humanly Possible), which includes mobility scenarios in Smart Cities.
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6.3.3.2 Automat (Automotive Big Data Marketplace for Innovative Cross-sectorial Vehicle Data Services)

We have selected Automat as an example of a project that is fostering the culture of data sharing in transport and particularly in the automotive industry. There are probably others that will be analysed along this year, but Automat, because of synergies with existing partners and the presence of major players in the domain seem to us a very good option to build upon. The objective of Automat is to establish an open ecosystem in the form of a cross-border Vehicle Big Data Marketplace that leverages currently unused information gathered from a large amount of vehicles from various brands. They use a brand-independent Common Vehicle Information Model (CVIM) that makes aggregated vehicle data accessible to cross-sectorial service providers. We consider essential that this kind of initiatives work together with projects in the PPP that are targeting data integration in the sector (some examples have been provided before). It can also be useful to learn about good and bad practices, concerns and challenges for data sharing, as well as to learn about the alliances that are undoubtedly needed to keep a competitive position in the market in view of its transformation. To avoid the “silo” approach we have already engaged with Automat. BDVe has had several discussions with them and has attracted the project and its players to our current activities in the PPP, notably the pilots in TT and the upcoming sessions on T&L that will be held in EBDVF.

6.3.3.3 Big Data Europe

The BDE project was already introduced in Section 5.3.2, where we also justified why connections with our project and the PPP are important in view of common challenges. T&L is one of the industries selected by the project (or societal challenges, as it refers to them). The goal of the BDE pilot for Smart, green and integrated transport is to “improve mobility related data collection, utilising real-time data for the provision of accurate ‘info-mobility’ services and advanced transport planning, leading to better decisions from the travellers’ side as well as improved traffic management at city level by the respective traffic management authorities”. It faces challenges associated to the integration of diverse and heterogeneous datasets (sensor data, spatial databases, GPS data, messages from social networks, webcams, data from the vehicles) as well as the collection and processing of data in real time (since the value of data decreases after some time). BDE adds to the piloting activities a number of workshops and events that could be used by BDVe for community engagement. Furthermore, the PPP should not reinvent the wheel by ignoring work that has already been done, but build on top of it. That is the purpose of the collaborations already established.

6.3.4 EASA (European Aviation Safety Agency)

We have seen so far that the T&L provides an umbrella of many different scenarios and operational contexts, which may be quite different among them. While sectors like the automotive industry, (road-based) logistics or mobility services in urban areas have a good number of activities around data, others are rarely mentioned. That is the case of the aviation industry. And this is probably not because its players are not going through the same digital (data-driven) transformation, but because most of the discussions among these players happen in initiatives that have few or no connections with DG CONNECT. The reality is that data has become a central
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point of discussion for the future of many players, but in some cases, as it will be described here, a necessity to address serious challenges such as safety in aviation.

EASA is the agency in charge of the European Aviation Safety. It was established in 2002, has headquarters in Cologne and counts on more than 800 aviation experts and administrators. Its mission includes: ensuring the highest common level of safety protection for EU citizens, ensuring the highest common level of environmental protection, single regulatory and certification process among Member States, facilitating the internal aviation single market & creating a level playing field, and working with other international aviation organisations & regulators. Its management board is composed by representatives of the Member States and the European Commission, but its budget comes also from Industry. We could therefore say that it is a real partnership that brings together all the stakeholders in the aviation industry, be they from the public or private side. In 2016 it was EASA precisely who contacted first BDVA to show interest about the activities of the PPP. Through some interactions we got to know their DS4 (The Data4Safety Programme), also known as “The European Big Data programme for aviation safety”. DS4 aims at (1) making the European aviation system even safer; (2) supporting European technological and market leadership in Civil Aviation and; (3) enhancing European know-how in Big Data technology. No doubt that these objectives fit perfectly well with ours. The use of the huge amount of the (already and increasingly) available datasets would allow this industry to move from reactive to proactive safety management. Beyond safety, Big Data analytics is expected to be useful to determine the interdependencies between performance indicators in the context of Air Traffic Management Performance, environmental protection and, in the longer term, be extended to other modes of transports, such as maritime and railways.

This programme is a unique opportunity to bring together Big Data experts with the Aviation Safety industry. Partners of this programme are: EU Member State Aviation Authorities, airlines, pilot associations, aircraft manufacturers and air navigation service providers.

The programme has a specific roadmap that started with a feasibility study in July 2015 and is being followed by a Proof-of-concept phase that includes availability of safety data, development of aviation analysis capability, and the set-up of the IT infrastructure needed to support the analytics platform. An informative session was launched in June 2017. The interest for collaboration between the two entities will materialize through a meeting with EASA representatives in September. From there additional steps could be defined depending on the opportunities.
7 Support to other vertical industries

BDVA, as private counterpart of the PPP has the mission to increase the market share of Big Data providers as well as contribute to the competitiveness of different industrial sectors in Europe thanks to the application of such technologies. The way this is approached from an organizational perspective is through the so called Applications Task Forces. These are working groups that bring together the community interested in the topic. Nowadays BDVA counts on a TF focused on Applications (or application domains) with subgroups of the following sectors: Telecom, Healthcare, Media, Earth observation & geospatial, Smart Manufacturing Industry or Smart Cities. As it has been pointed out in this document, another subgroup targets T&L but has not kicked-off its operations because of some formalities. In addition, there is a more generic sub working group on “emerging areas” that frames discussions about other sectors that have not become a formal working group (because of different reasons, like lack of leadership, not enough critical mass, no resources to drive forward the roadmap...). Some topics included here are energy, finance or Agrifood.

It is a priority for BDVe, as explained through this document to drive forward the process of establishing a formal sub-WG on Agrifood and trigger the operations of the formally approved sub-WG on T&L. This will already give us an operational environment to bring together the different relevant initiatives and give a reference to users and stakeholders in the two domains respectively avoiding silos. That was addressed in detail by previous sections of this document.

Nevertheless, BDVe will support the operations of the working structures of BDVA in other sectors too on a continuous basis. The focus will be in all cases on:

- Establishing, developing or reinforcing relationships with relevant initiatives where major players of the domain already discuss relevant issues to our work, i.e. interface with industrial associations and initiatives that are assumed as the trusted and reference place for users to discuss about innovation and technology in that particular industry.

- Bring together the different communities, i.e. the supply side represented by the Big Data community (the Big Data Value PPP through BDVA and the PPP projects) and the demand side (the associations previously mentioned and their memberships, among others). This should lead to the discussion of data-related topics in a joint manner preventing us from having these discussions without experts in the domain and them having exactly the same discussions without the support by the Big Data experts). Interesting enough this has been the situation so far.

- Support the organization of workshops, events, webminars to provide a common framework of work.

- Widely disseminate the tools, assets and outcomes of the PPP (including both projects and BDVA activities) so that they can be useful for all organizations, beyond those involved in the PPP and of course, far beyond the research community.
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- Promote a complete and representative view of user industries in white papers or any other deliverable envisaged by BDVA TF and working groups.
- Give visibility to solutions that target different application domains going beyond a purely technological approach (i.e. give relevance to the operational environments where technologies will be deployed, which may vary a lot from one sector to another and also between different use cases and contexts of use). This will also be facilitated through the PPP marketplace.

Many of the areas that BDVe is supporting now in a more generic way may become more central action points if they are selected as targeted sectors in the next implementation phases (see section 4.2).

Concrete activities developed so far include:

- **Relationship with EFFRA (European Factories of the Future Research Association).** Several meetings have taken place between BDVA and EFFRA and some opportunities have already been identified to work on Big Data topics together. The most immediate one is the invitation to participate in the *European Scenario Building workshop* that will be facilitated by the Connected Factories CSA on 28 September in Brussels. The Smart Manufacturing Industry subgroup will be represented there. We have also exchanged insights on the respective SRIA and have worked together towards the *Digitizing EU Industry policy of the EC*. The Secretary General of EFFRA has been appointed member of the BDVe Advisory Board based on the potential of this relationship.

- **Collaboration with ARTEMIS-IA (ARTEMIS Industry Association that represents the Cyber Physical Systems community or Embedded Intelligent Systems).** ARTEMIS-IA as such is not focused on a single sector, but brings a good number of industries working in aviation, transport in general and automotive in particular, and manufacturing, all of them highly dependent on the use of CPS. Discussions about data have been running there since a while, and we have already worked together in roadmap elaboration workshops in the topics of Digital Platforms and Data with the support of the Road2CPS project. This included participation in their last ARTEMIS-IA Brokerage event (Brussels, January 2017), joint organization of the panel “Big Data, CPS and IoT: Enabling the Digital Transformation of European Industry” at the last IoT Week (Geneva, June 2017) and set up of an exhibition booth of our PPP at the last edition of the Digital Innovation Forum (Amsterdam, May 2017) where some of the projects where promoted). Furthermore, ARTEMIS-IA leads an informal initiative called FEDIRA that brings together several PPPs and ETPs that address common challenges (and that includes, besides the BDVA as industrial representative of the Big Data Value PPP, EFFRA, SPIRE or NESSI) for the purpose of information and knowledge sharing.

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- **Signature of a Collaboration Agreement with OASC (Open and Agile Smart Cities Alliance).** A good number of members of BDVA are engaged in projects and activities that fall under the label of “smart cities”; this has enabled a straightforward alignment of interests between BDVA and OASC, an initiative that works with more than 100 cities from 23 countries in Europe, Latin America and Asia-Pacific. Representatives of OASC have been invited to the meetings of this sub-working group in BDVA and discussions are ongoing to organize a session specifically focused on Big Data at the upcoming Connected Smart Cities Conference that will be held in January 2017 in Brussels. In fact, one major challenge that is currently addressed by both initiatives is the definition of common standard data models to facilitate data integration as well as management of data gathered from cities in real time. OASC works for that purpose with some standardization activities and notably in the context of the Industry Specification Group on cross-sector Context Information Management (ISG CIM) for IoT-enabled Smart Cities newly created by ETSI\(^\text{28}\) with the support of initiatives like FIWARE and OASC. The relationship with OASC will be complemented by the Synchronicity project, the Large Scale Pilot of IoT for Smart Cities, which aims precisely at implementing the OASC principles in different cities in Europe. The use of standard data models is one of the four pillars advocated by OASC to create a Digital Single Market in Europe for Smart Cities.

- **Activities in the context of Earth Observation and Geospatial Services.** This support impacts directly the sub working group with the same title, but has an indirect impact on many other activities, such as those related to Agrifood and transport, fully associated to the use of geo-referenced data. For this, several meetings have been run with Copernicus programme, led by DG GROW. Copernicus aims at developing European information services based on satellite Earth Observation and in situ (non-space) data. As said, the programme is coordinated and managed by the European Commission, but it is implemented in partnership with the Member States, the European Space Agency (ESA), the European Organisation for the Exploitation of Meteorological Satellites (EUMETSAT), the European Centre for Medium-Range Weather Forecasts (ECMWF), EU Agencies and Mercator Océan. Availability of data has been the focus so far thanks to the launch of new satellites but Copernicus has also been working on improving the quality and maturity of information services that address six thematic areas: atmosphere, marine, land, climate, emergency and security. This PPP provides a very good framework to discuss on data integration, data access and data analytics over this huge amount of data. It also provides a marketing channel to promote the usage of these datasets, generated for European competitiveness. Some of their events have been attended by BDVA representatives and BDVe has supported discussions with them. This relationship has also created a close link to some of the activities performed by ESA, the European Space Agency, which started some industry consultations in 2016 about their ESA Earth Observation Envelope Programme for a substantial investment into a cloud-

\(^{28}\) [https://www.fiware.org/category/oasc/]
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based ecosystem, which should allow for a new era of data exploitation in research and value-adding business development.
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9 Conclusions

BDVe will support the alignment of supply and demand in the context of the Big Data PPP with the goal of fostering the adoption of Big Data. For this, a pre-condition is that the demand side is well represented. Unfortunately, the situation as of today is characterized by a low representation of what we call “users” or potential “adopters” of Big Data. This has biased many of the discussions related to the application of Big Data in different vertical industries towards technical aspects brought by IT providers. We are sure that a higher presence of users in these discussions would provide additional perspectives and elements and would enrich the outcomes of the working groups. Furthermore, this would be useful to train, convince, and extend the adoption of Big Data in different environments, contexts and sectors.

The objective of this task is to facilitate the engagement of user communities in the activities of the PPP. To guide this process we have analysed the existing value proposition for users and we have added the following assets to enrich such value proposition (USP). Further details can be found in Section 4.

- **A marketplace** that will give access to interesting products and technologies in Big Data. The marketplace will be a virtual place where parties interested in Big Data will be able to find the latest developments in the field.
- **Guidelines and references** so that different typologies of organizations can define a path to achieve their objectives if they are not experts in the subject.
- **Educational tools**, to address the lack of skills, and among them the Big Data Education Hub and a mobility programme.

These new assets should help us to approach users with a more convincing message.

The second instrument described in this document is the **Engagement Plan or the way the PPP will reach out to these users**. The strategy will be based on working with those **industrial associations and initiatives that already act as trusted hubs for users in different sectors**. These initiatives exist in the domains of manufacturing, Agrifood, energy, smart cities, etc. So, instead of creating more working structures, BDVe will use the working framework of BDVA and will work in a joint manner with such associations and initiatives when it comes to discuss data-related topics. This will also lead to the efficient use of resources, since some discussions have been duplicated so far (for example, Big Data in Agrifood has been addressed by the AGRI community without enough experts in Big Data, while the same has happened in the PPP, with a low representation of farmers). Therefore, while users are welcomed as potential members of BDVA, this should not be a condition to get them engaged in PPP discussions and activities.

This task is not a minor one. Since we have limited resources, BDVe has defined a modus operandi based on:

- Supporting working groups in BDVA that address the different application domains
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- Taking a more active leadership in pushing forward activities in (at least) 2 sectors per period. This will allow a more focused work within each period. But it obviously leads to the need of defining priorities. The two sectors that have been prioritized for the period M6-M18 are Agrifood and Transport & Logistics (see section 4.1 for rational and justification).

The strategy in Agrifood will include challenges of special interest to the sector, such as Food Production, Food Security and Traceability, Sustainability of resources, including environmental impact and Security principles for farm data. These topics have led us to identify the following initiatives as major references for our engagement work: EIP AGRI, Big Data Europe, the Research Data Alliance, Large Scale Pilots focused on data in Agriculture -notably DataBio and IoF2020-, and the Smart Specialisation Thematic Platform on Agrifood (Thematic Partnership on Traceability and Big Data).

In the case of Transport and Logistics these are the initiatives that have been initially selected to drive forward the discussions: ALICE, ERTICO, relevant projects in the domain -notably the lighthouse project Transforming Transport, but also others like Big Data Europe and Automat-; for the particular topic of Aviation Safety we will interact with EASA. The situation is quite different depending on the specific area of work (automotive industry, aviation, trains, ports, urban mobility...). We expect that discussions with experts in the coming months will help us to shape the agenda, even though some concrete topics of work are already depicted in this document.

Activities that will be developed as part of our roadmap are:

- **Set up the necessary discussion group in BDVA that can interface with the aforementioned initiatives.** This requires launching a sub working group on Agrifood and kicking off activities in the group of Transport and Logistics.

- **Proactively listen to the needs, requirements, concerns and challenges of these sectors** so that Big Data solutions supplied by the Big Data community comply with them. This will be done through workshops and meetings with those initiatives and reflected in deliverables and outcomes defined by the BDVA working groups.

- **Share knowledge with those players** that help those organizations who are not engaged in their digital transformation to understand what the value of their data is, data sharing practices and existing solutions. This includes providing guidance on Big Data technologies. It will be mainly based on **widely disseminating the assets of the enriched value proposition** through the same meetings and workshops as well as other communication channels.

- **Use our marketing services** to support ambassadors of Big Data technologies in the vertical industries through communication of understandable and high-impact examples.

All these activities should help us to work closely with users and increase substantially the number of stakeholders engaged in PPP activities. For better understanding, see Figure 11, which organizes the same information in a more structured way.
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<table>
<thead>
<tr>
<th>Strategy</th>
<th>Assets provided by BDVe</th>
<th>Main Initiatives for engagement</th>
<th>Main activities</th>
<th>Expected Outcomes</th>
</tr>
</thead>
</table>
| Focus on 2-3 sectors per period:  
M6: Engagement Plan for Agrifood and Transport & Logistics; Implementation: M6-M18 | • A marketplace that will give access to interesting products and technologies in Big Data. The marketplace will be a virtual place where parties interested in Big Data will be able to find the latest developments in the field.  
• Guidelines and references so that different typologies of organizations can define a path to achieve their objectives if they are not experts in the subject.  
• Educational tools, to address the lack of skills, and among them the Big Data Education Hub and a mobility programme. | • Agrifood: EIP AGRI, Big Data Europe, Research Data Alliance, Large Scale Pilots focused on data in Agriculture - notably DataBio and IoF2020-, Smart Specialisation Thematic Platform on Agrifood (Thematic Partnership on Traceability and Big Data).  
• Transport and Logistics: ALICE, ERTICO, relevant projects in the domain -notably the lighthouse project Transforming Transport, but also others like Big Data Europe and Automat-; Big Data Programme for Civil Aviation through EASA. The list will evolve if needed. | • Launch a sub working group on Agrifood and kickoff activities in the group of Transport and Logistics.  
• Organization of workshops and meetings with those initiatives. Proactively listen to the needs, requirements, concerns and challenges of these sectors so that Big Data solutions supplied by the Big Data community comply with them.  
• Knowledge sharing (including PPP assets) through those workshops/meetings but also through wider use of other communication channels.  
• Marketing of solutions, examples and use cases in vertical industries. | • Increased number of users engaged in PPP activities  
(in the first period this should lead to high representation of organizations in Agrifood and Transport and Logistics); later on this will be extended to other sectors  
• Needs and challenges well reflected through white papers and other outcomes of PPP activities  
• More visibility of the PPP |
| M18: Engagement Plan for 2-3 sectors; Implementation: M18-M36 | | | |
| M36: Engagement Plan for 2 additional sectors; Implementation: M36-M48 | | | |
| Supporting function of BDVe towards other vertical industries through BDVA groups. | EFFRA, AIOTI working groups focused on sectors, OASC, etc. | As needed by working groups, but mainly interaction with industrial associations to attract users | Same outcomes apply here, but with less expectations because BDVe will have a minor supporting role |

Figure 11 – Strategy, activities and assets for User Engagement
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Finally, chapter 7 of the document provides a brief report of activities developed to support other sectors in the first period of the project.

The updated plans and report on actions and achievements will be reflected in the deliverable “User Ecosystem characterization”, which has versions in M18, M36 and M48. As it was mentioned before, the focus will be on 2 sectors per period and probably 3 sectors in the second period because of the longer duration (18 months instead of 12). This will give as a result 6 (+1) sectors addressed in a targeted way with their specific strategy and plans. This will complement the supporting function of BDVe for all the vertical industries, as widely described in this document.
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