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1 Executive Summary

BigDataStack delivers a complete high-performance stack of technologies addressing the needs of data operations and applications. BigDataStack holistic solution incorporates approaches for data-focused application analysis and dimensioning, and process modelling towards increased performance, agility and efficiency.

WP7 Dissemination, Exploitation, Standardisation and Roadmapping provides a practical business model which the project's stakeholders may effectively use with a roll-out plan to different target entities. With this aim in mind an effective communication strategy is put in place. Facilitating and increasing the uptake of BigDataStack results, a specific task on standardisation was set in place. This task is realising the European Open Source Initiative that will aim at high impact of the BigDataStack outcomes.

This Deliverable revisits the strategy defined at the beginning of the project, summarizes the impact achieved at M18, and defines the next steps to increase the uptake of the BigDataStack project results and integrate in plan defined in D7.3 Exploitation Plan and Business Potential (M18).

In this context, the document outlines the objectives of BigDataStack dissemination and standardisation and illustrates the assets of BigDataStack for dissemination and standardisation. Moreover, this deliverable summarizes the dissemination activities carried out in BigDataStack from until June 2019. Focusing on activities carried out to increase awareness of the project and to build the community of BigDataStack stakeholders. A series of horizontal activities have being carried out:

- BigDataStack's website is live from February 2018 and forms the central channel for communication and engagement. It reflects all the activities and functionalities driven inside the project itself.
- In order to align the overall brand identity and raise a unique awareness around BigDataStack's brand, a set of items has been produced and shared for internal and external use. These include the logo, a list of identified colours and font, a set of MS Office templates (MS Word and Powerpoint), one general project flyer, one flier explaining each use case, one rollup banner and a set of promotional videos with takes from our partners' interviews.
- LinkedIn, Twitter and Youtube profiles have been set up on behalf of the project to guarantee a fast and widespread communication among our community. Social networks are constantly fed with high-quality, highly relevant content to reach stakeholders, build the community and gather inputs. A more informal and warm tone of voice has been adopted for these channels; thus, high technical content has been digested through a more comprehensible and appealing language to better engage with our audience.

- BigDataStack has been present at Research & Academia, Industry and Big Data ecosystem targeted events. Partners have shared BigDataStack results via digital and printed items of the communication kit, booths, panel discussions, paper and poster presentations.
- A series of 3 workshops targeted at the end-users in the industries of the three use-cases will be organised to share the results and foster the uptake of the exploitable software components developed. Webinars help you remote connecting with real people. They are also less costly to organise compared to physical events with same size audience (higher impact to cost ratio). Webinars are an effective and cost-efficient way to engage with target stakeholders.
- The BigDataStack project and partners are building synergies to leverage on dissemination, exploitation and standardisation activities. Among the connections made are ICT-14 and ICT-15 projects, BDVA, Standardisation targeted projects and projects aimed at Start-Ups and SMEs working on Big Data.

Regarding the standardisation strategy and activities, key area of focus has been the European Open Source Initiative. Red Hat, leading all activities on standardisation, is one of the leading companies as regards to Open Source activities, being recognized worldwide for its contributions to Open Source Communities as well as open culture. In this context, the following activities took place:

- Red Hat organized an extra “Research Day” at its annual summit “Bridging Between Research and Upstream Engineering”
- To better align with the software standards in those communities we were present at the KubeCon & CloudNativeCon event
- Partner Trust-IT Services attended the 26th Multi Stakeholder Platform Meeting in June 2019 for the Research Data Alliance and StandICT project. The BigDataStack partner engaged with standardisation bodies, interesting for future liaising on future standardisation of BigDataStack results.
- BigDataStack partner NEC is currently applying “dynamic orchestrator” into FogFlow¹ to show the benefit of adaptive orchestration of data-intensive IoT services. FogFlow is a fog computing framework that brings context information management to the edge of the networks. FogFlow is compliant with the NGSI standard utilized by FIWARE for context information management.

¹ <https://www.fiware.org/news/nec-develops-a-fiware-based-fog-computing-framework-for-edge-based-iot-services/>

2 Objectives Dissemination and Standardisation BigDataStack

The main objective of WP7 Dissemination, Exploitation, Standardisation and Roadmapping is to provide a practical business model, which the project's stakeholders may effectively use with a roll-out plan to different target entities (e.g. decision makers, big data programmers and practitioners, research community, standardisation bodies, etc).

With this aim in mind, an effective communication strategy is put in place. Specifically:

1. Studying the external scenario for BigDataStack results: providing input and requirements related to market needs and trends and defining the market context for exploitation and positioning against competing solutions.
2. Maximizing the impact of the project aligning business opportunities and the roll-out of a credible business model with the technical and research activity.
3. Assisting and complementing the technical development with the business perspective particularly, relating to future uptake and sustainability, feeding from stakeholder needs is a vital exercise.
4. Ensuring relevant communication about BigDataStack outputs, outreach & stakeholder engagement and subsequently raising awareness to the scientific, industrial, and general public communities with the inclusion of three targeted workshops aimed at reinforcing user needs & their results.
5. Following, contributing to, promoting and ensuring usage of the corresponding relevant standards, while also supporting the liaison and collaboration activities with other EC funded related projects and initiatives;
6. Considering appropriate business opportunities for the roll-out of the use cases.

Facilitating and increasing the uptake of BigDataStack results, a specific task on standardisation was set in place. Specifically:

1. Scoping the European Open Source Initiative that will aim at high impact of the BigDataStack outcomes through relevant contributions to open-source projects.
2. Ensuring that the project work uses and is in line with the relevant global standards.
3. Fostering dialogues with relevant bodies in order to share potential findings and innovations made by BigDataStack that could contribute to standards.
4. Contributing towards open-source standards following the research outcomes of the projects

3 BigDataStack Key Assets

The assets of the BigDataStack project are at the centre of the project's activities in dissemination and standardisation.

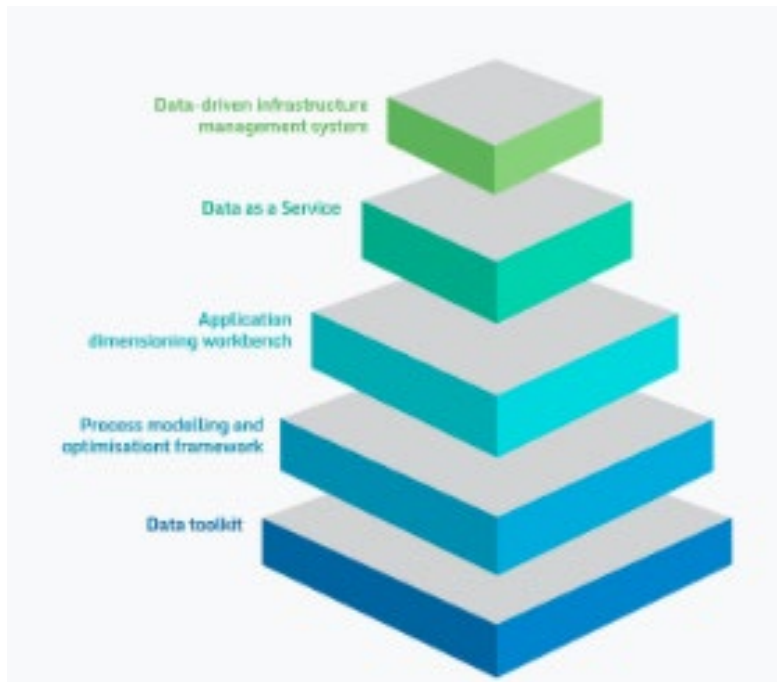


Figure 1: BigDataStack Key-assets

Data-driven infrastructure management system for infrastructure providers: BigDataStack introduces the paradigm of a new frontrunner data-driven system ensuring that computing, storage and networking resources management will be fully efficient and optimized for data operations and data-intensive applications.

The system will base all infrastructure management decisions on the data aspects and the data operations governing and affecting the interdependencies between storage, compute and network resources.

Data as a Service for data providers, decision makers, private and public organisations: Data as a Service promotes automation and quality and ensures that the provided data are meaningful, of value and fit-for-purpose through approaches for data cleaning, modelling, interoperability, and efficient storage. A novel approach to data analytics will enable to work with logical data sets which may be seamlessly distributed among multiple data stores and locations. In addition advanced modelling will defined flexibles schemas that can be exploited across processing frameworks.

Application dimensioning workbench for application providers and engineers: The workbench facilitates data-focused application analysis and dimensioning to predict the

required data services, their interdependencies with the application micro-services and the required underlying resources. Allowing the identification of the applications data-related properties and their data needs, enables the provisioning of specific performance and quality guarantees.

Process modelling and optimization framework for business analysts: Framework allowing the flexible, functionality-based modelling of processes, which will be mapped in an automated way to concrete technical-level process mining analytics. The analytics outcomes will provide feedback to the business analysts with specific recommendations towards overall process optimization and adaptation.

Data toolkit for data scientists and practitioners: Data toolkit enables openness and extensibility by providing an environment to data scientists and practitioners to easily ingest their data analytics functions by utilizing a declarative paradigm, as well as to specify their preferences and constraints that will be exploited by the infrastructure management system for resources and data management accordingly.

4 BigDataStack Dissemination M1-M18

Dissemination actions are key for positioning the project in the dynamic and rapidly evolving big data ecosystem, to federate big data solution providers communities around the project outputs, to take into account local ecosystems and users' needs in the pilots and to reach to the future innovators of the big data ecosystems such as entrepreneurs, start-ups and SMEs.

Dissemination actions have been defined at the project's start and based on the **SMART approach** (specific-measurable-achievable-realistic-timely & targeted) and regularly updated. This approach ensures that a) each action is focused on the interests/needs to well-defined stakeholders. b) that they will have a start and end, and c) that its impact will be measurable with KPIs. Dissemination actions are geared towards today's digital, connected society while making sure stakeholders are properly informed in a timely manner, facilitating understanding and ultimately facilitating uptake of project outcomes.

*Selected partners contribute at analysing the market and identifying exploitation opportunities, with regular desk research on market and technology trends. A **SMART Communications Kit** has been set in place at M3 with the D7.1 Initial publication package², where BigDataStack project's visual identity and the initiation of communication project materials have been defined for use at project and partner level.*

4.1 Key pillars of the BigDataStack dissemination strategy

At the start of the BigDataStack project, the following key pillars have been defined for the

² http://www.bigdatastack.eu/sites/default/files/BigDataStack_D7.1-v1.0.pdf

dissemination activities:

Integrating the project into the global big data ecosystem:

- BigDataStack will establish regular networking with big data organizations and initiatives (e.g. EC, BDVA, think tanks, NGOs, etc.) to both obtain and provide information related to project activities and outcomes.
- The project will also be open for connections with all big data projects and initiatives. These connections will be based on the existing connections and memberships of the BigDataStack partners (e.g. several partners are members of the BDVA). The project will also reach out to international organizations via already established connections and mark of interest in the US and Asia (Japan, South Korea) through the consortium members with global presence (i.e. IBM, NEC). To support these connections, the project will participate in community events, and the consortium will be mobilized to activate existing connections.

Federating big data innovator communities:

- The project will create the necessary supporting documentation, additional tutorials about the BigDataStack offerings and organize events for big data solution providers. Reaching out to these communities is essential not only to obtain feedback on the project outputs, but also to ensure their sustainability in the exploitation beyond the project lifespan. The project will reach out to various communities, to attract big data solution providers in the offerings of BigDataStack, as these providers will boost the project's exploitation strategy.

Engaging with relevant stakeholders' in the use cases of BigDataStack:

- The project will mobilize local ecosystems of the use cases in the definition of their big data needs and their potential business models. It will establish mechanisms to extend the project's use cases with new data analytics models and technologies. The consortium strongly believes in the necessity to involve all the relevant stakeholders in a collaborative process for the emergence of purpose driven and impactful use cases.

Disseminating technical results:

- The project will ensure that **technology advances** are properly disseminated to peer projects and technical constituencies through **high-impact publications** in peer-reviewed and specialised journals and conferences, as well as scientific forums mostly by academic partners, and through the establishment of synergies with peer projects. Industry partners will focus on workshops, information days, internal and external client meetings.

Reaching data providers:

- Several actions will be undertaken to engage the local ecosystems of the project through the "local cluster" consortium partners. These ecosystems will be invited to participate in project events and to foster mutual exchanges between the project

technical and use cases ecosystem. This first level of the local ecosystems will be supported by a second level of related ecosystems at EU and global level based on targeted networking (e.g. open data providers such as Galileo).

Supporting the project's commercialization and market uptake strategy:

- The project will undertake activities towards EU big data solution experts and providers following their classification according to the project's marketing strategy and the customization of related messages/results to be disseminated. Relevant activities including direct contacts with relevant participation in all high-profile exhibitions about big data and live demonstrations to different target groups will be contacted.

Marketing campaigns for the project offerings:

- As the project progresses from phase 1 to phase 2 and then to phase 3 (corresponding project years), engagement will significantly increase with the major targeted communities for the identified offerings. Specific actions will consider the different business and operational needs of various stakeholders, targeted with tangible benefits. To this end, **marketing campaigns** will play an increasingly important role and will the **pilot showcases**, using dynamic, user-friendly formats to drive home the benefits of BigDataStack.

4.2 BigDataStack Stakeholders Analysis and Targeted Messaging

4.2.1 BigDataStack added-value to different stakeholders

BigDataStack offerings address a wide range of stakeholders in *multiple ecosystems* and *sectors*. The *multi-dimensional impact and exploitation of project outcomes* is illustrated in the figure 2, which can also be seen as a value chain - for example data providers utilizing infrastructures and thus creating value to infrastructure providers or data aggregators amplifying value for data providers. Based on a separation of supply and user / demand side, the added value is summarized as follows:

Supply side (covering entities providing services and products):

- **Infrastructure providers:** BigDataStack data-driven infrastructure / cluster management will provide the means for wider offerings facilitating big data needs through efficient and performance management of all resources.
- **Data providers:** Data as a Service on top of data-optimized infrastructure resources allowing them to offer cleaned, modelled, stored and analysed data of value.
- **Application providers:** Application dimensioning workbench and exploitation of meaningful data through advanced infrastructure services enabling them to provide data-intensive applications with specific performance and quality guarantees.
- **Data practitioners:** Data toolkit and visualization environment allowing them to develop and ingest their own algorithms and offer them through BigDataStack

deployments.

User and supply side (covering entities acting as users of solutions by the providers and as suppliers towards users):

- **Infrastructure brokers:** Acting as second-step entities (following infrastructure providers) that take advantage of the BigDataStack data-driven infrastructure management solution.
- **Data aggregators & Data (re-)sellers:** Acting as second-step entities (following data providers) that take advantage of the Data as a Service according to their business models and goals.
- **Marketplace owners:** Acting as second-step entities (following application providers) that take advantage of data-intensive application provisioning. User / demand side (covering actual end-users):
- **Citizens:** Using applications, services and products with guaranteed levels of quality.
- **SMEs and big industries:** Utilizing BigDataStack for their deployments facilitating their internal data needs, using the Process Modelling Framework to optimize their processes, and / or utilizing BigDataStack services offered by different providers.
- **Public organisations:** Exploiting BigDataStack offerings with optimized operations across the complete data path as required for data being handled by public organisations.
- **Entrepreneurs:** Deploying and offering data-intensive applications through the efficient BigDataStack infrastructure.
- **Decision makers such as chief data / information / marketing officers:** Using the adaptive visualization environment and the process modelling framework to drive business decisions based on accurate, timely, meaningful data and analytics outcomes.

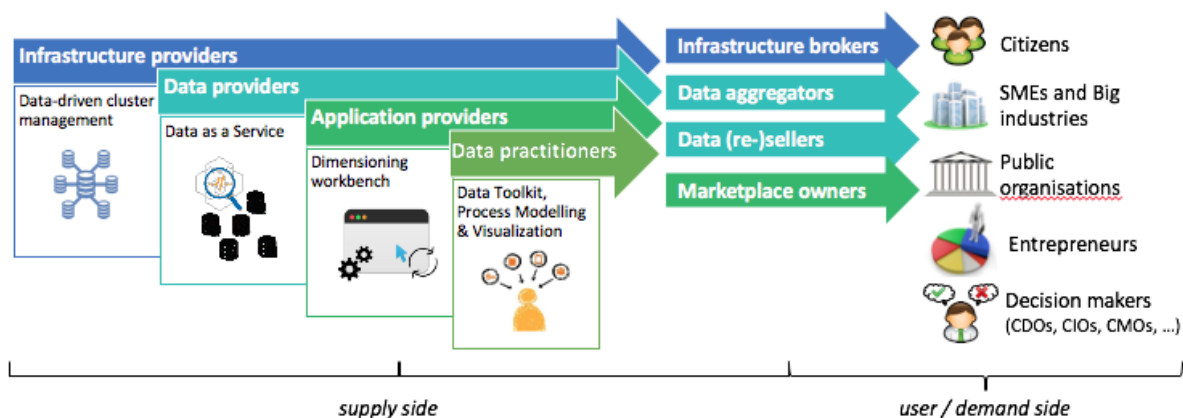


Figure 2: BigDataStack added value for stakeholders

4.2.2 BigDataStack results for targeted stakeholders

BigDataStack is developing a set of results for targeted stakeholders. Communication campaigns focus on these results when defining messages for specific stakeholder groups. It is worth noticing that these stakeholders do not operate in vacuum, campaigns may target more than one stakeholder group. The table below shows the BigDataStack results, with target stakeholder markets, and exploitable products of partners adopting these results.

Results	Partner	Target Market	Target Product
Seamless data analytics framework	IBM	Data management, infrastructure providers	IBM products: IBM Analytics for Apache Spark , IBM Watson Studio , IBM Event Streams
Advanced data skipping	IBM	Data management, infrastructure providers, Data Analytics	IBM products: IBM Analytics for Apache Spark, IBM Watson Studio , IBM Event Streams
Orchestration platform	NEC	Data management, IoT solutions providers	Optimized deployment of big data processing flows to data centers and edge nodes. NEC's Cloud City Operation Center and our FogFlow product
Data-driven cluster / infrastructure management	RHT	Enterprise data centers	Upstream cluster management and later to Red Hat Enterprise products and services
Triple monitoring framework	RHT, ATOS	Data management, infrastructure providers	Released as open-source complementing the data-driven infrastructure management system
Data-driven cluster / infrastructure management	ATOS	Infrastructure providers	Atos Codex suite enhanced with novel resource management services for big data operations and data-intensive applications
Adaptable distributed storage	LXS	Data management	Performance and high scalability during storage and processing of diverse datasets through the enhanced LeanXcale data management product
Real-time complex event processing	LXS, UPM	Data management	LeanXcale data management and analytics product
Data-driven networking framework	UBI	Infrastructure, data centres providers	Infrastructural and networking utility for management over virtualised resources

BigDataStack toolkit	UBI	Business analytics, data science market	Provision of the toolkit as a service on top of the ubi:analytics product for analytics specification
Data quality assessment and improvement	SILO	Application providers, data science market	Enhancement of Galaxy Enterprise Suite for increased quality of information and reliability of data
Adaptive visualization environment	ATC	Data management, media companies	Enhanced specific media products (i.e. NewsAsset: www.newasset.com, TruthNest: www.truthnest.com) with advanced visualization and process modelling functionalities
Process modelling framework	ATC	Data management	ATC products, mainly in the media sector
Application dimensioning workbench	UPRC, ATOS, UPM	Application providers, infrastructure providers	Open-source tool for the data-specific analysis and dimensioning of applications
Predictive and process analytics approaches	UPRC, LXS, UPM, GLA	Data Science Market	Released as open-source with evaluated market performance and efficiency outcomes
Deployment recommendation service	GLA	Application providers, data centers	Models and mechanisms provided as part of the open source Terrier Information Retrieval Platform
Inventory management for maintenance predictive algorithms	DANAOS	Maritime Industry	Enhance the DANAOS platform and offer it to other charter owners
Insurance-specific analytics	GFT	Insurance sector	Complete GFT portfolio of insurance solutions enhanced with efficient data-oriented added value services

Table 1: BigDataStack targeted results for Stakeholders

4.3 Phasing the BigDataStack Dissemination Strategy

As described in the Grant Agreement, dissemination and exploitation of results targeted dissemination activities during the project and after its completion have been organised around the three main phases of the project as indicated in this image below. Dissemination intensifies over the course of the project as more results are to be shared and more assets to be presented. This deliverable will report on all activities done M1-M18, take stock of the impact and define the next steps for M19-M36.

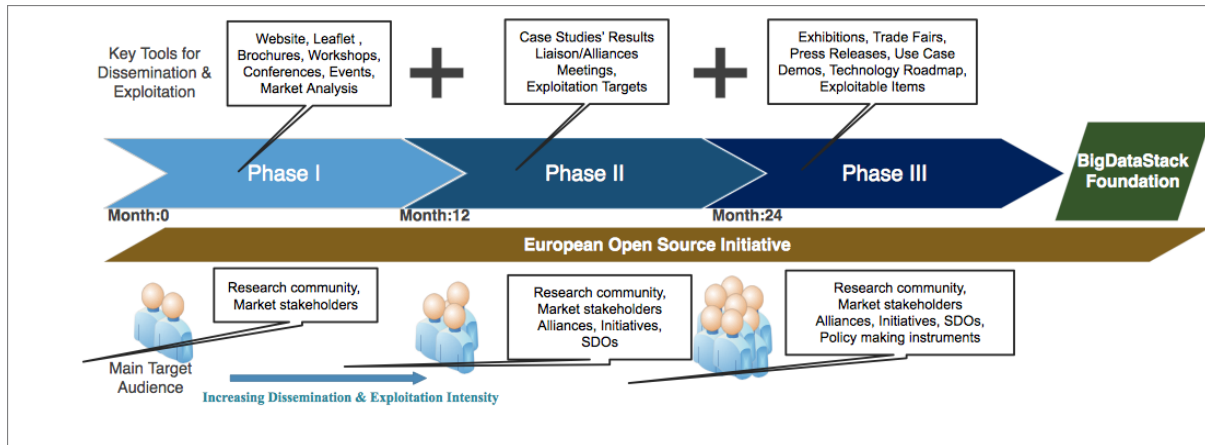


Figure 3: BigDataStack dissemination phases

4.3.1 Phase 1 - Raising awareness

In the first phase, from M1-M12, BigDataStack focused on raising awareness of the project and its workplan for the next three years

BigDataStack: The Innovative, High-Performing, and Data-Centric Stack for Big Data Applications and Operations

Today's data-driven industrial revolution calls for big data technologies to unlock the potent in various application domains, **and this is what BigDataStack project aims to provide.**

A new high-powered stack of technologies, BigDataStack, kicked off this January 2018. Headed by the multinational, strong consortium of 14 partners, is **IBM Haifa, Israel** with a focus on addressing the emerging needs of providing fully efficient and optimised cluster management for **data operations and data-intensive application.**

The project, funded under the European Commission Horizon 2020 Work Programme, will present in 36 months, a set of prototypes demonstrating a complete high-performance data centric stack of technologies.

Eliot Salant, BigDataStack's project coordinator, with a proven track record on managing large-scale infrastructure projects such as this, highlights that: *"BigDataStack will provide a complete infrastructure management system that will base the management and deployment decisions on data aspects thus being fully scalable, runtime adaptable and high-performing for big data operations and data-intensive applications".*

BigDataStack will provide ground for the European Open Source Initiative

BigDataStack will provide the ground for the realization of an initiative to provide the expertise and know-how to the EU research community for creating valuable open source artefacts and maximizing their impact: the **European Open Source Initiative.**

The goal of the European Open Source Initiative is to support open source developments towards their route to upstream in different projects, such as Apache Spark, Apache Kafka, OpenStack, OpenShift, KVM and Linux Kernel. The support includes activities ranging from "open" brain storm discussions to quality and evaluation of the source code. These discussions will include all aspects starting with the necessity of the feature, followed by how to best implement it, and what tools are available for the task at hand.

The European Open Source Initiative will not be limited to the project but it will be open to the complete research community, welcoming participation from EU-funded projects, industrial and academic institutions, and individual contributors. Collaboration with the (global) Open Source Initiative and the **Big Data Value Association** will be pursued to foster the openness of the European Open Source Initiative to entities and contributors outside BigDataStack project.

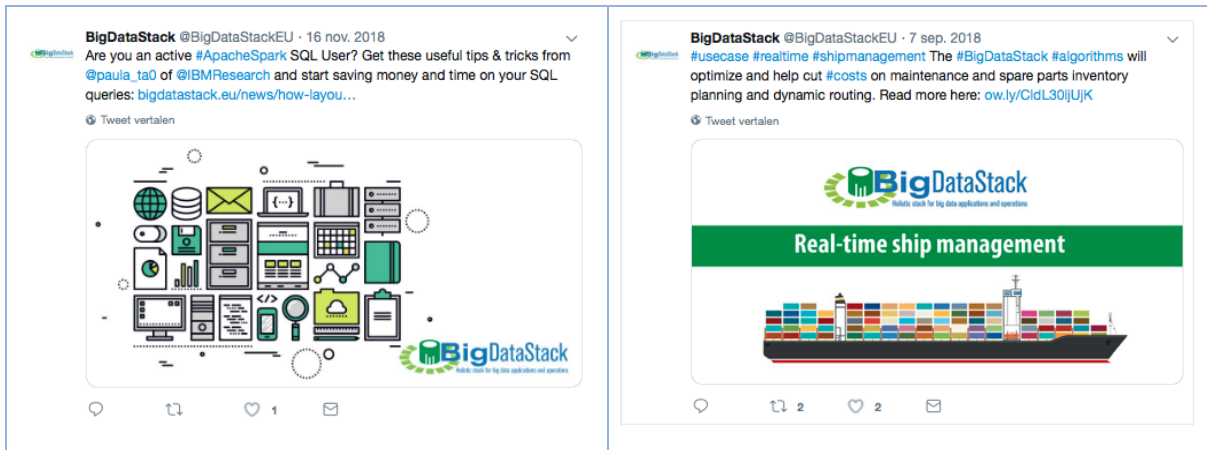


Figure 4: Sample messaging phase 1

4.3.2 Phase 2 - Sharing Results

The project is now in its second phase, the communication campaigns evolve around sharing results published in reports, presented at events and laid out in scientific reports. The ongoing implementation of the BigdataStack technologies in the Use-Cases are highlighted in communication and engagement activities to illustrate the practical use of the project results.

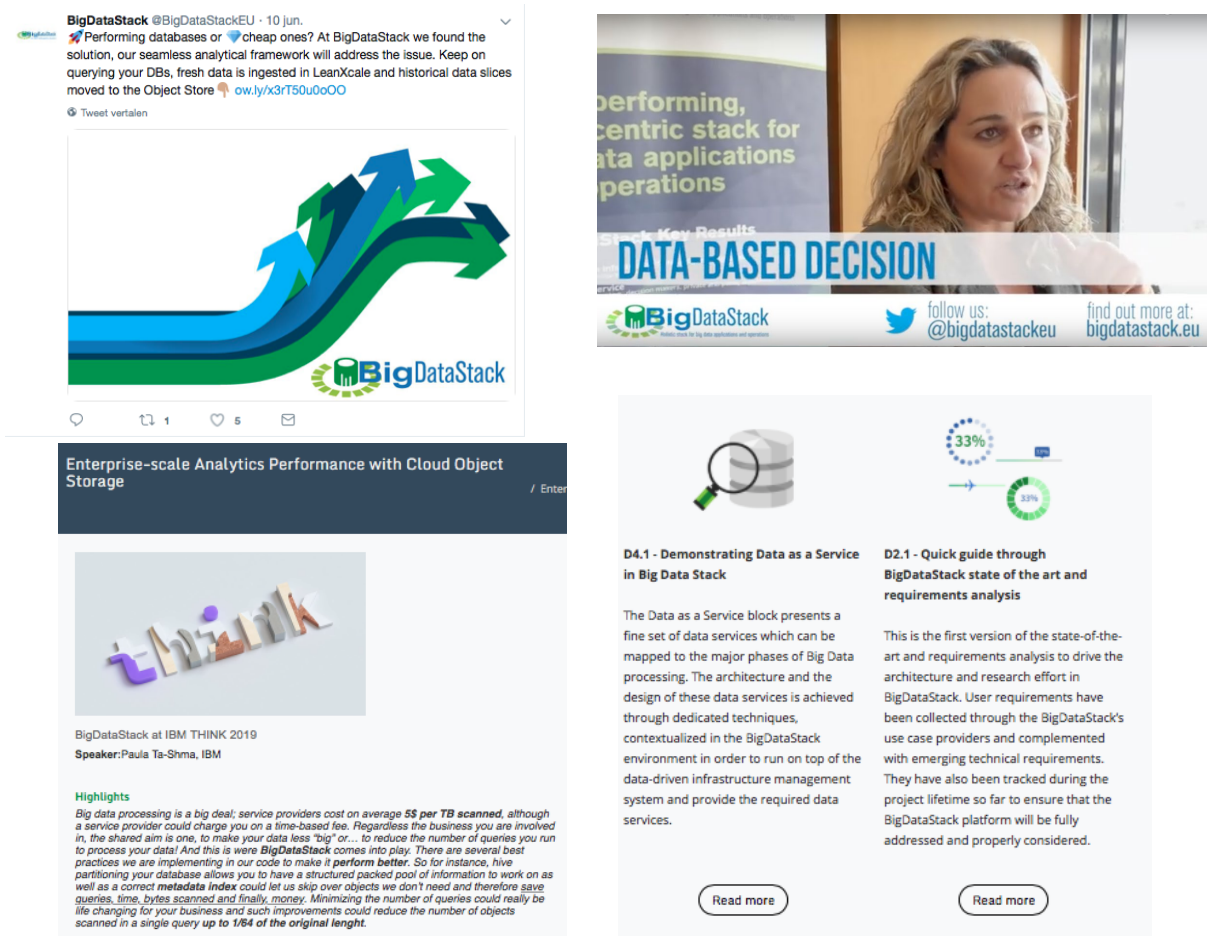


Figure 5: Sample messaging phase 2

4.3.3 Phase 2 - Promote results for exploitation and standardisation

In the 3rd and final phase of the project, communication campaigns supporting the exploitation plan, will focus on the BigDataStack results for future practical use. Communication activities will highlight the projects efforts in standardisation and the European Open Source Initiative.

4.4 Horizontal activities

4.4.1 Website

BigDataStack’s website [bigdatastack.eu] has been the central channel for communication and engagement already from February 2018. It reflects all the activities and functionalities driven inside the project itself.



The screenshot shows the website's home page with a navigation menu at the top including 'Use Cases', 'Key Pillars', 'Results', 'European OSI', 'Liaisons', 'News', 'Events', and 'About Us'. The main banner promotes a webinar on shipping technologies. Below the banner, the 'MAIN OBJECTIVES' section lists: Performance and dynamicity; Deliver an infrastructure management system for the holistic management of computing, storage and networking resources, encompassing techniques for runtime adaptations of all BigDataStack operations; Optimization and scalability; Architect and implement a complete real-time, data-oriented environment targeting data operations and data-intensive applications; Automation, agility, quality; Realize Data as a Service through data functions across the complete data path and lifecycle; Dimensioning and automation; Understand and model distributed data analytics and process mining tasks, as well as data-intensive applications to compile deployment patterns; Sustainability and competitive advantage; Introduce the European Open Source initiative and define clear exploitation paths and strategy; Openness and extensibility; Provide a data toolkit and an adaptive visualization environment; Applicability and validation; Challenge and showcase BigDataStack innovations through various use cases.

Video



Figure 6: Above-the-fold of the website’s home page, 18th June 2019

The website functionalities are not limited to showcase the project itself; all the communication materials produced are collected here, while the website itself can be seen as a living hub for all the correlated activities. The website provides the possibility to register and subscribe to the newsletter, learn about BigDataStack's use cases and the people working on them, access a set of results achieved via a dedicated section and stay updated through our social network channels, accessible from each page. Special attention is given both to the news and the events sections where, to ensure a Search Engine Optimization (SEO) driven approach, fresh content is added on a weekly basis.

The website is continuously updated, not only in its contents but also in its structure, following and addressing the needs of a growing project. Thus, new sections, layouts, blocks and pages are produced as needed.

A number of liaisons and collaborations have been established with different projects ICT-14 and ICT 15 projects, as mandated in the call for BigDataStack (such as BigDataOcean - see table 7 for reference). In addition BigDataStack has built synergies with EC and Research initiatives to join forces and strengthen impact (such as Big Data Association, StandICT and DataPitch, see table 7 for reference). Thanks to these liaisons the BigDataStack website collected backlinks and brand recognition on the internet. Brand awareness is also provided through all the links constantly shared on social networks (they are responsible, on average, of 8% of the overall traffic).

All the traffic on the website and users' behaviours are tracked and measured with the Google Analytics platform, and displayed through Google Data Studio, which allows a user friendly visualisation and an easy reading of the results.



Figure 7: Summary of M12-M18 website traffic via BigDataStack’s Google Data Studio dashboard

4.4.2 Communication Kit

In order to align the overall brand identity and raise a unique awareness around BigDataStack’s brand, a set of items has been produced and shared for internal and external use. These include the logo, a list of identified colours and font, a set of MS Office templates (MS Word and Powerpoint), one general project flyer, one flier explaining each use case, one rollup banner and a set of promotional videos with takes from our partners’ interviews.

In addition, all the correlated images going with BigDataStack’s general and social publications reflect its identity using its logo and/or colour set.



Figure 8: MS Office templates

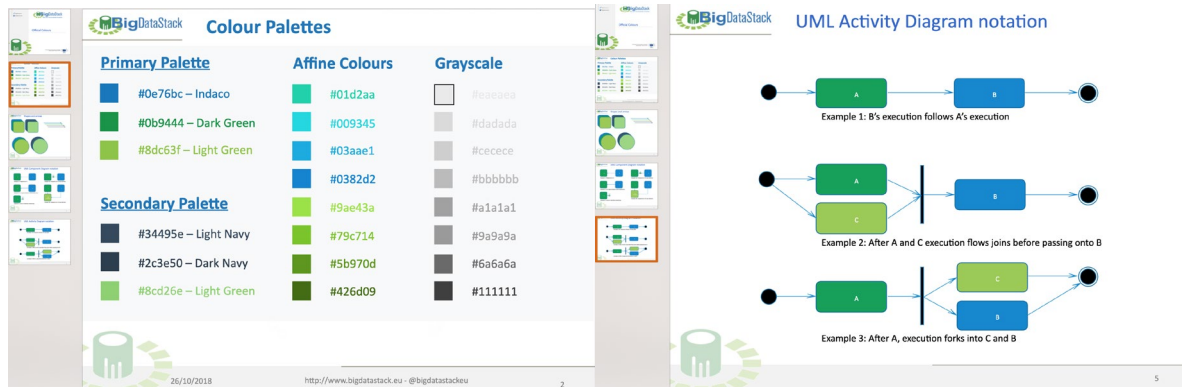


Figure 9: unified colours, shapes and diagrams

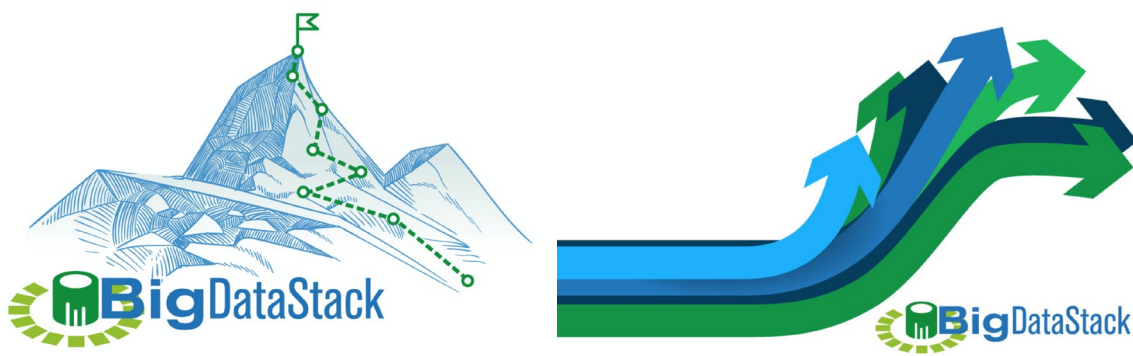


Figure 10: social and general publication images using project's colours and logo



Figure 11: general flyer and rollup banner

In order to constantly strengthen the brand awareness and recognition, every dissemination item that has been produced so far strictly follows the brand guidelines. Same will apply for the upcoming ones.

4.4.3 Social Media Channels

Linkedin, Twitter and Youtube profiles have been set up on behalf of the project to guarantee a fast and widespread communication among our community. Social networks are constantly fed with high-quality, highly relevant content to reach stakeholders, build the community and gather inputs. A more informal and warm tone has been adopted for these channels; thus, high technical content has been digested through a more comprehensible and appealing language to better engage with our audience.

All the networks are constantly growing and the average engagement rate for general communication is above the 5%. The engagement rate easily goes up when peer-to-peer campaigns are run (as we did on

Linkedin, for instance, to promote our webinars). Thanks to the volume of content produced on social networks, monthly values for overall visibility of our tweets go **over 7.000 impressions on Twitter (more than 14.000 on May 2019)** while on LinkedIn each post easily reach hundreds of people.

As of June 19, the social community counts more than 200 followers on Twitter and 470 connections on LinkedIn.

Tweet activity

Your Tweets earned **14.5K impressions** over this **28 day period**

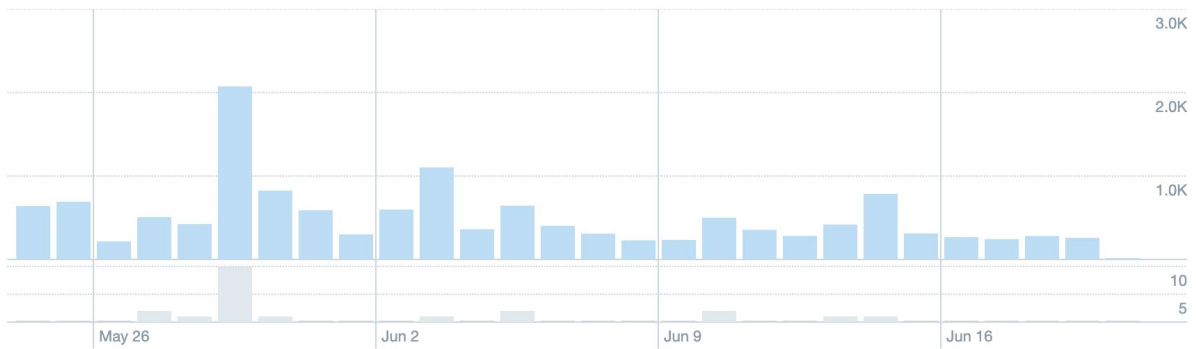


Figure 12: Twitter impressions on the period 24 May - 19 June 2019



Figure 13: 2 tweets from BigDataStack’s Twitter feed

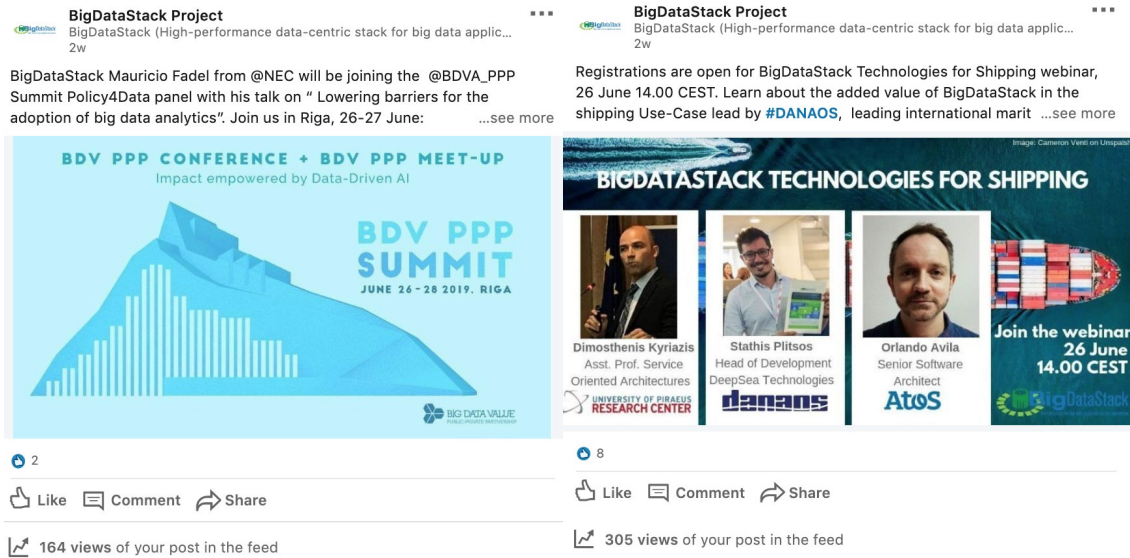


Figure 14: 2 posts from BigDataStack’s LinkedIn feed

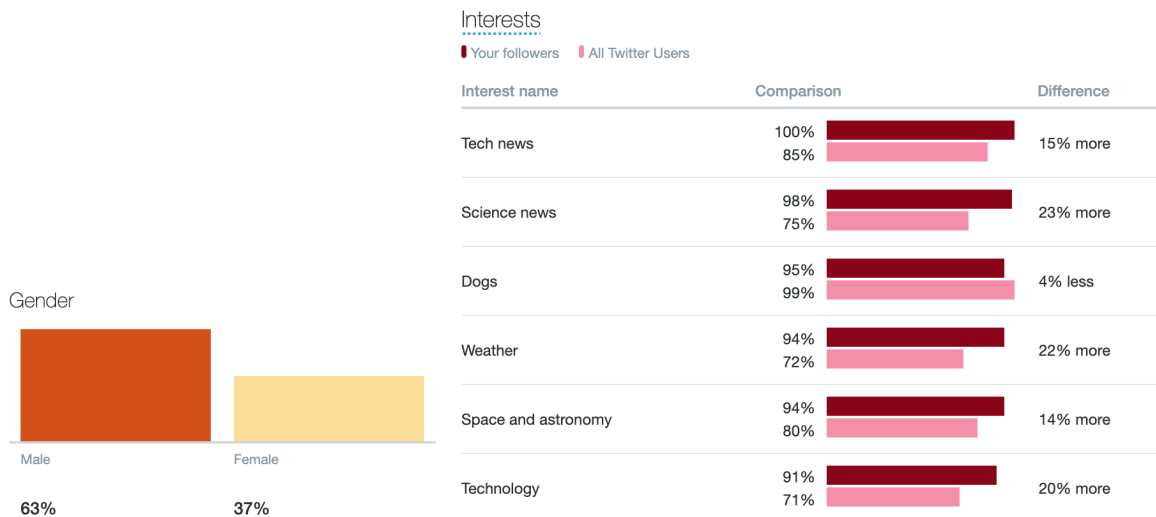


Figure 15: Gender Breakdown of BigDataStack’s Twitter audience and gap in interests between our Twitter followers and the average.

4.4.4 Events

BigDataStack has been present at Research & Academia, Industry and Big Data ecosystem targeted events. Partners have shared BigDataStack results via digital and printed items of the communication kit, booths, panel discussions, paper and poster presentations. The tables below show the events attended, audience targeted, activity carried out and the output produced.

Industry events

Event	Date	Location	Audience	Title	Author	Activity	Output
EBDVF18³ . Attended by more than 200 researchers on the big data domain	12-14 November 2018	Vienna, Austria	Researchers, industry and policy makers	AI everywhere: technical challenges	Dimosthenis Kyriazis (UPRC)	BigDataStack participated and presented relevant offerings and challenges in the Session "AI everywhere: technical challenges"	Raising awareness for infrastructure-related offerings towards AI
ICT 2018⁴ Attended by more than 6000 researchers, innovators, entrepreneurs, industry representatives, young people and policy makers⁵ from all over the world	4-6 December 2018	Vienna, Austria	Researchers, industry and policy makers	Data Democratization	Dimosthenis Kyriazis (UPRC)	BigDataStack joined the discussion panel on Data Democratization lead by BDVA, with EW-SHOPP, Network of Living labs and BDVe.	Co-writing report panel discussion Data Democratization ⁶
Posidonia⁷ Bi-annual international maritime event, with more than 39.000 international participants.	4-6 June 2018	Athens, Greece	Shipping industry		Stathis Piltzos (Danaos)	Demonstration preliminary results BigDataStack shipping use-case	Awareness raising international maritime community

³ <http://2018.european-big-data-value-forum.eu>

⁴ <https://ec.europa.eu/digital-single-market/en/events/ict-2018-imagine-digital-connect-europe>

⁵ <https://ec.europa.eu/digital-single-market/events/cf/ict2018/browse-persons.cfm?full=0&type=registered&browseby=country>

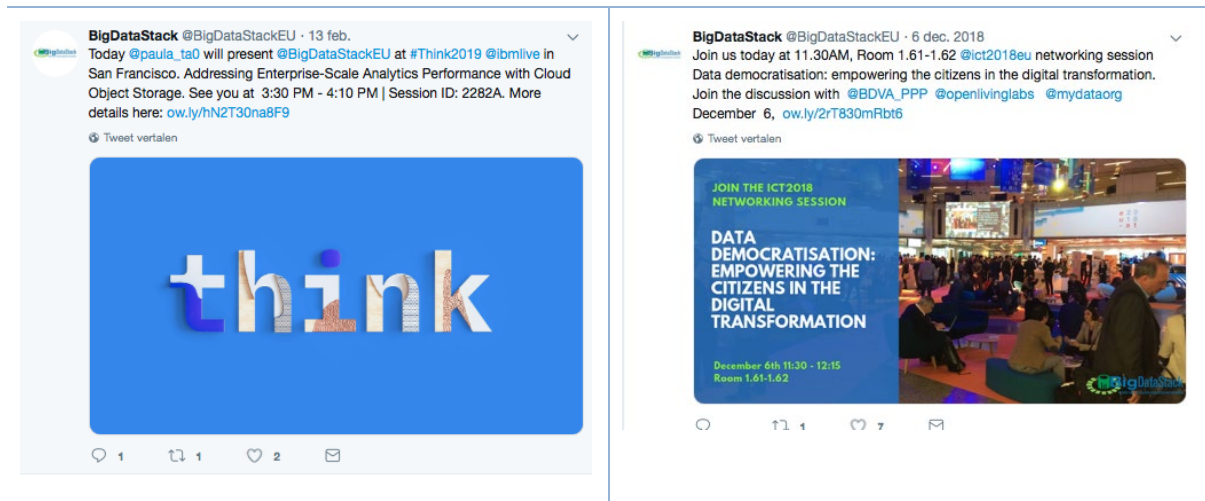
⁶ <https://lnkd.in/dtzzfSi>

⁷ <http://posidonia-events.com>

<p>Think2019⁸</p> <p>Attended by 40.000 IBM customers from all over the world</p>	<p>12-15 February 2019</p>	<p>San Francisco, USA</p>	<p>Industry</p>	<p>Enterprise-Scale Analytics Performance with Cloud Object Storage</p>	<p>Paula Ta-Shma, Gidon Gershinsky (IBM) and Stathis Plitsos (Danaos)</p>	<p>BigDataStack presented Enterprise-scale Analytics Performance with Cloud Object Storage⁹ with the Danaos Shipping Use-Case example.</p>	<p>Enterprise-scale Analytics Performance with Cloud Object Storage presentation¹⁰</p>
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Table 2: BigDataStack attended industry events

Communication campaigns on BigDataStack’s presence at the above mentioned industry events focus on the announcement, visibility during the event and post event publications of reports and presentations. A sample of communication campaign messages, that point at the results to be shared with the industry audience of the event.



⁸ <https://www.ibm.com/events/think/>

⁹ <https://www.bigdatastack.eu/news/enterprise-scale-analytics-performance-cloud-object-storage>

¹⁰ [full presentation on Enterprise-scale Analytics Performance](#)



Figure 16: sample communication on industry event attendance

Research and Academia events

Event	Date	Location	audience	Title	Author	Activity	Output
IEEE2018 ¹¹	2-7 July 2018	Boston, USA	Technical, Research & Academia	A holistic data-driven stack for big data applications and operations	Dimosthenis Kyriazisa, Christos Doulkeridisa, Panagiotis Gouvasb, Ricardo Jimenez-Perisc, Ana Juan Ferrerd, Leonidas Kallipolitise, Pavlos Kranasc, George Kousiourisa, Craig Macdonaldf, Richard McCreadief, Yosef Moattig, Apostolos Papageorgio uh, Marta Patino-Martinezi, Stathis Plitsosj, Dimitris Pouloupoulos a, Antonio Paradell, Amaryllis Raouzaioue,	Scientific paper presentation	BigDataStack: A holistic data-driven stack for big data applications and operations ¹²

¹¹ <http://conferences.computer.org/services/2018/>

¹² https://www.bigdatastack.eu/sites/default/files/BigDataStack_paper_IEEE2018.pdf

					Paula Ta-Shmag, Valerio Vianello		
BMDA 2019 ¹³	26-28 March 2019	Lisbon, Portugal	Technical, Research & Academia	Integration of Mobility Data with Weather Information paper	Nikolaos Koutroumani s, Georgios M. Santipantaki s, Apostolos Glenis, Christos Doukeridis, George A. Vouros (UPRC)	Scientific paper and poster presentation	Integration of Mobility Data with Weather Information paper ¹⁴ and poster ¹⁵
WF IoT 2019 ¹⁶	15-18 April 2019	Limerick, Ireland	Technical, Research & Academia	Reinforcement Learning based Orchestration for Elastic Services		Scientific paper presentation	Reinforcement Learning based Orchestration for Elastic Services paper publication ¹⁷
RedHat Summit 2019 ¹⁸	27-30 April 2019	Boston, USA	Open Source, technical	Data Processing Researcher Day at the RedHat Summit	Luis Tomas, Miki Kenneth (RedHat) and Dimosthenis Kyriazis (UPRC)	Participation at the RedHat Summit (organizing a Research Day around Data processing)	Upcoming blog item on insights Researcher Day RedHat Summit
SYSTOR 2019 ¹⁹	6 June 2019	Haifa, Israel	Technical, Research & Academia	BigData Skipping in the Cloud	Yosef Moatti	Poster presentation BigData Skipping in the Cloud	BigData Skipping in the Cloud Abstract at SYSTOR 2019 ²⁰
IEEE2019 ²¹	8-13 July 2019	Milan, Italy	Technical, Research & Academia	FogFlow: Easy Programming of IoT Services	Mauricio Fadel Argerich, Bin Cheng,	Scientific paper presentation	IEEE2019 paper published ²² and contribution to FogFlow ²³ - one of the largest EU open

¹³ <http://www.datastories.org/bmda19/>

¹⁴ https://bigdatastack.eu/sites/default/files/WeatherIntegrator_CR.pdf

¹⁵ https://bigdatastack.eu/sites/default/files/bmda_poster.pdf

¹⁶ <http://wfiot2019.iot.ieee.org>

¹⁷ <https://www.bigdatastack.eu/sites/default/files/Elastic%20Search.pdf>

¹⁸ <https://www.redhat.com/en/summit/2019>

¹⁹ <https://www.systor.org/2019/>

²⁰ [Big Data Skipping in the Cloud](#)

²¹ <https://conferences.computer.org/services/2019/>

²² <https://ieeexplore.ieee.org/document/8022859>

²³ <https://fogflow.readthedocs.io/en/latest/>

				Over Cloud and Edges for Smart Cities	Jonathan Furst (NEC)		source initiatives for IoT. The “dynamic orchestrator” is currently being applied into FogFlow to show the benefit of adaptive orchestration of data-intensive IoT services.
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Table 3: BigDataStack attendance research & academia events

Communication campaigns on BigDataStack’s presence at the above mentioned research & academia events focus on the announcement, visibility during the event and post event publications of reports and presentations. A sample of communication campaign messages, that point at the results to be shared with the academic audience of the event.

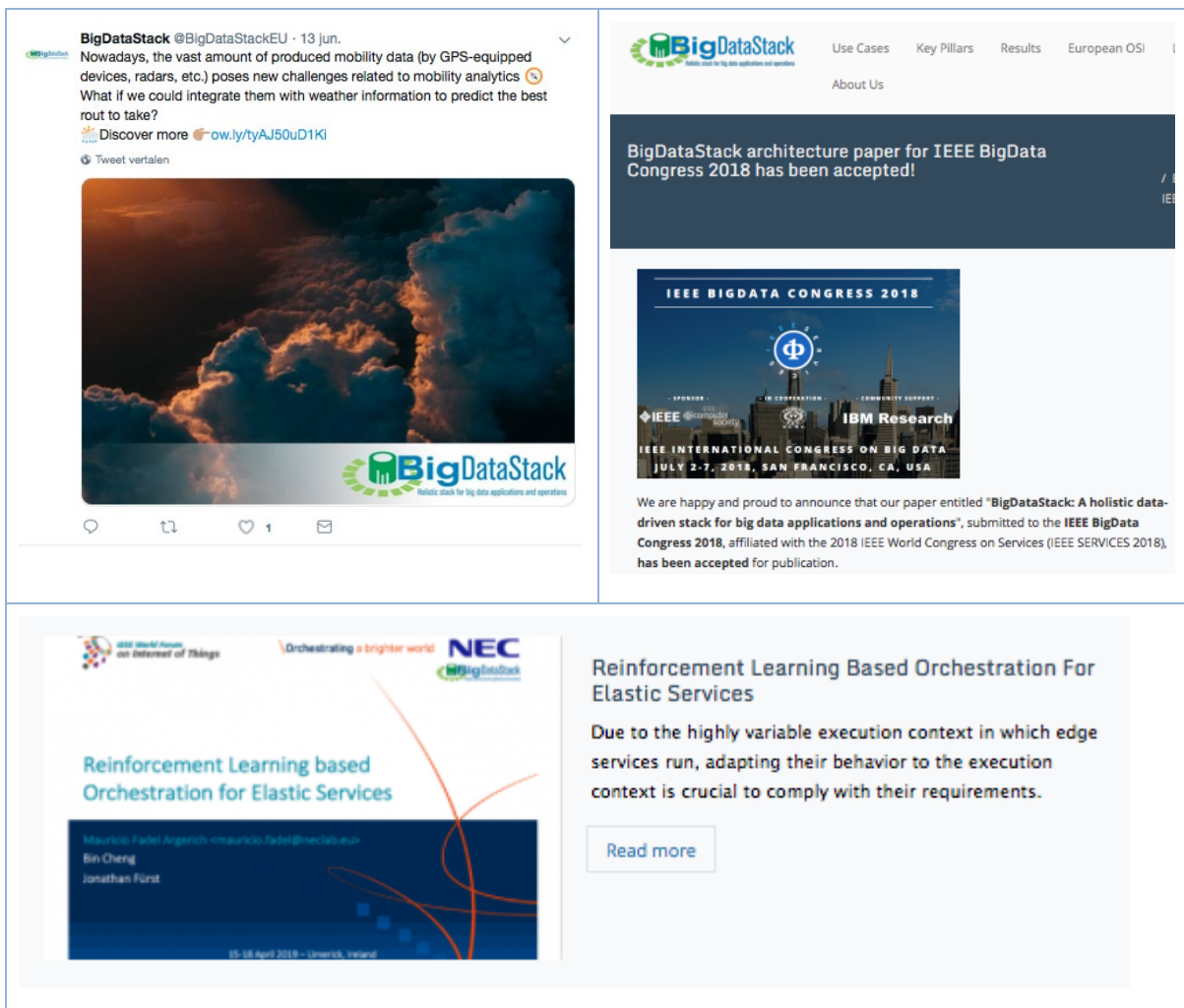


Figure 17: sample communication on research & academia event attendance

BigData Ecosystem events

Event	Date	Location	Audience	Title	Author/ participant	Activity	Output
EBDVF 2018 ²⁴	12-14 November 2018	Viena, Austria	Technical & Non-technical, Big Data	Data4AI everywhere	Dimosthenis Kyriazis	Participation discussion panel "Data4AI everywhere"	Participation discussion panel "Data4AI everywhere" and dissemination flyers BDVe booth
OpenStack summit 2019 ²⁵	29 April – 1 May 2019	Denver, USA	Open Source, Standards, Technical		Luis Tomas	RHT was present at OpenStack summit with the Kuryr upstream work (network policies implementation), in relation to BigDataStack developments	Engagement policy makers in relation to open standards
KubeCon + Cloud Natives 2019 ²⁶	20-23 May 2019	Barcelona, Spain	Open Source, technical		Luis Tomas	Participation KubeCon/CloudNativeCon	Start of collaboration with Cloud Native Computing Foundation policies implementation ²⁷
BDV PPP Summit 2019 ²⁸	26-28 June 2019	Riga, Latvia	Technical, non-technical, policy makers, industry, Big Data	Lowering barriers for the adoption of Big Data Analytics	Mauricio Fadel Argerich	Discussion panel Policy4Data	co-writing policy brief on discussion panel ²⁹

Table 4: BigDataStack attendance Big Data ecosystem events

²⁴ <http://2018.european-big-data-value-forum.eu>

²⁵ <https://www.openstack.org/summit/denver-2019/>

²⁶ <https://events.linuxfoundation.org/events/kubecon-cloudnativecon-europe-2019/>

²⁷ <https://www.cncf.io>

²⁸ <https://www.big-data-value.eu/ppp-summit-2019/>

²⁹ At time of writing of the report, the policy brief is being defined.

4.4.5 Webinars

In the second half of the BigDataStack project, a series of 3 workshops targeted at the end-users in the industries of the three use-cases will be organised to share the results and foster the uptake of the exploitable software components developed.

To increase the awareness amongst end-users of BigDataStack technologies in the Retail ecosystem, Shipping industry and insurance sector, a series of 3 webinars on the BigdataStack use-cases is being organised. Why Webinars? Webinars are an effective and cost-efficient way to engage with target stakeholders.

31 people registered to the first webinar on **BigDataStack Connected Consumer technologies for Retailers** and caused an increase in the traffic to the website as shown in chapter 4.4.1. The recordings and slides of the webinar are published as tutorials on the website³⁰.

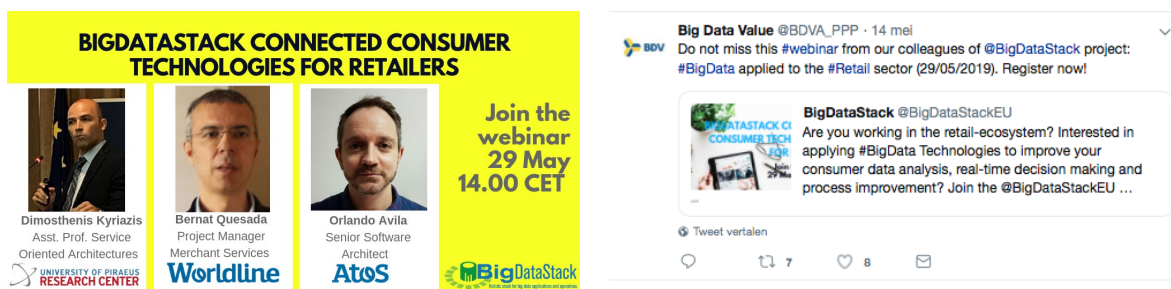


Table 5: sample communication on “BigDataStack Connected Consumer Technologies for Retailers” Webinar

The second webinar focused on **BigdataStack Technologies for Shipping**. During the writing of this report the webinar is widely promoted via partner channels, project channels, liaison channels, external channels and social media. The Shipping Use-Case partner provided expert insights by Prof. Varelas on the BigDataStack technologies for Shipping to increase awareness of the results to be shared during the webinar³¹. 29 people registered to the first webinar on **BigdataStack Technologies for Shipping**. The recordings and slide of the webinar will be published as tutorials on the website.

³⁰ <https://bigdatastack.eu/news/webinar-bigdatastack-connected-consumer-technologies-retailers>

³¹ <https://bigdatastack.eu/news/international-leading-maritime-player-danaos-real-time-ship-management-bigdatastack>



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News

BigDataStack Technologies for Shipping

Register now for the webinar on 26 June 14.00 CEST

DIGITAL ECONOMY NEW PRODUCTS AND TECHNOLOGIES

Join the webinar 26 June 14.00 CET

"From Danaos Shipping point of view, BigDataStack sets the foundation for the development of platforms that handle and manage big-data applications. The resource allocation and deployment problem of a big-data application is something that requires engineers with expertise on new technologies along with domain knowledge. BigDataStack tries to assist these people to integrate their business knowledge/application/algorithms in one platform. Thus, it is expected that further versions or ideas of this project will enhance this approach."
 Stathis Plitsos - Head of Development DeepSea Technologies - DANAOS

Figure 18: sample communication on “BigDataStack for Shipping” Webinar

4.4.6 Liaising to strengthen impact via joint efforts

The BigDataStack project and partners are building synergies to leverage on dissemination, exploitation and standardisation activities. The table below lists all BigDataStack synergies established from M1-18.

Initiative	Community	Synergy	Activities
BDVA	Big Data Value association	Strengthen impact via joint efforts	Dissemination, Workshops at ICT 2018, EBDVF 2018 and BDV PPP Summit 2019
DataPitch	BigData ecosystem, Start-ups	Strengthen impact via joint efforts Attract customers	Dissemination, connect project to start-ups
FIWARE	Open Source Community	Strengthen impact via	Implementation

		joint efforts	BigDataStack component in FogFlow, in open source platform catalogue FIWARE
Multi Stakeholder Platform	Standardisation bodies	Strengthen impact via joint efforts	sharing connections
Cloud Natives	Open Source Community	Strengthen impact via joint efforts	working group on open source recommendations for policy makers
BigDataOcean	ICT-14 project	Strengthen impact via joint efforts	Dissemination
Fashion Brain	ICT-14 project	Strengthen impact via joint efforts	Dissemination
BodyPass	ICT-14 project	Strengthen impact via joint efforts	Dissemination
EUBusinessGraph	ICT-14 project	Strengthen impact via joint efforts	Dissemination
EDI_Net	ICT-14 project	Strengthen impact via joint efforts	Dissemination
EW-Shopp	ICT-14 project	Strengthen impact via joint efforts	Stakeholder engagement
Transforming Transport	ICT-15 project	Strengthen impact via joint efforts	Dissemination
BDVe	BigData ecosystem	Strengthen impact via joint efforts	Dissemination, Stakeholder engagement, Policy recommendations on Big Data
StandICT	Standardisation	Strengthen impact via joint efforts	Dissemination and Stakeholder engagement

Table 6: BigDataStack liaisons

4.4.7 Community




Our community relies mainly on a very big group of enterprises (64%), non-profit organisations (24%) and minor stakeholder categories as shown in figure 3.14.

The database counts more than 4500 people considered leads and form the basis for further nurturing either as a customer, tender responder or even as an adopter of the results of the project.

Category	Count	%
Academia	168	3.60%
Large Enterprise	558	11.96%
Media	98	2.10%
NGO	1	0.02%
NPO	1141	24.46%
Public Policy Maker	230	4.93%
Research Centre	70	1.50%
SDO	26	0.56%
SME	2446	52.43%
SME (non-EU)	29	0.62%
Others	66	1.41%

Table 7: BigDataStack Community Breakdown according to stakeholder categories

Amongst the BigDataStack social media connections that count

Organisation	Social media account	Stakeholder group	Followers
 <p>AI @DeepLearn007</p>	@DeepLearn007	Artificial Intelligence, Big Data ecosystem	126K+ followers
 <p>figshare @figshare Follows you</p>	@figshare	Service provider	37K+ followers
 <p>EGI @EGI_einfra Follows you</p>	@EGI_einfra	Infrastructure providers	2700+ followers

 	@ecso_eu	PPP, Cybersecurity	2300+ followers
 	@BDVA_PPP	Big Data ecosystem	2200+ followers
 	@DataPitchEU	BigData ecosystem, Industry start-ups	1100+ followers
 	@GoAgio	IT, Cybersecurity, finance,	2200+ followers
 	@Eoscipilot	Research Infrastructures, Cloud	2000+ followers

Table 8: A sample of BigDataStack connections that count

Content that raises awareness

The content-rich messages that BigdataStack sends out on concrete activities such as

webinars increase the visibility of the project.

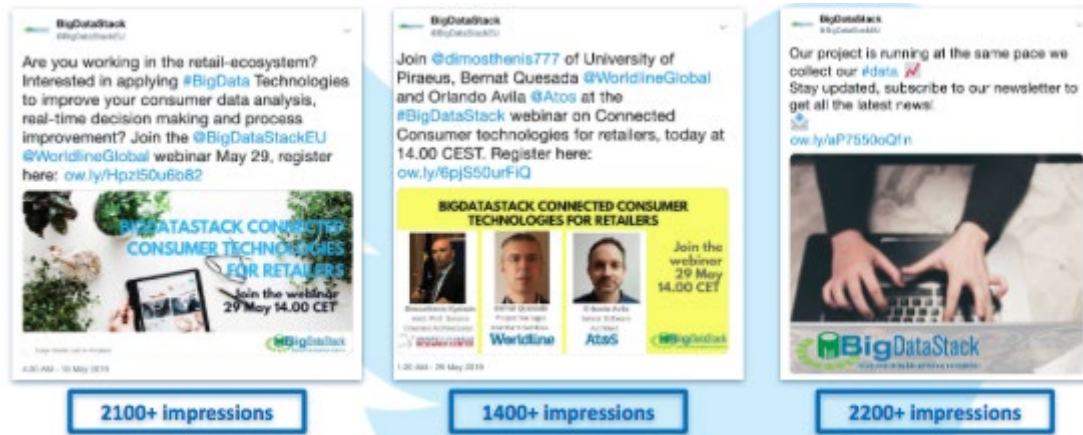


Figure 19: sample of social media content raising awareness

Expert endorsement

First in what is intended to become a series of expert endorsements, is this quote from an interview with Professor Takis Varelas, expert and reference in maritime and information industry.



BigDataStack, as a platform for big data platforms, will pave the way for European projects on the big data research area.

PROF. TAKIS VARELAS

DANAOS RESEARCH CENTRE DIRECTOR



Figure 20: Expert endorsement

4.5 M19-M36 Dissemination Roadmap

As indicated in chapter 3.1 dissemination and stakeholder engagement activities will increase, as the BigDataStack project will have more results to share for uptake. Below a roadmap for dissemination supporting standardisation and exploitation for M19-M36.

Phase	Action	Description	Time
Phase 2	Case study results	Continue development of analysis of case studies and potential routes for exploitation in order to drive the exploitation strategy.	M19-M24
Phase 2	Exploitation target	Identification of exploitation targets following the market analysis performed in Phase 1.	M19-M24
Phase 2 & 3	On-line Dissemination	Social networks and relevant online communities and platforms, e.g. LinkedIn, Twitter, etc	M19-M36
Phase 2 & 3	Additional dissemination material	Press releases, flyers, project leaflets, brochures, and posters will be elaborated to support on-line dissemination. An active writing campaign in press releases, trade journals, industry press and websites will further BigDataStack' s reach to the community. Towards the middle of the project a printed brochure guide will be created, concentrating on the first year results, as well as a clear vision of the remainder of the project and its lasting impact beyond its run.	M19-M36
Phase 2 & 3	Scientific Community	Scientific papers and publications in Journals, Presentations in the conferences, Collaboration with other EU projects.	M19-M36
Phase 2 & 3	Industrial community	Actions to encourage BigDataStack results adoption: Articles in industrial magazines, presence in industrial led conferences, clients presentations	M19-M36
Phase 3	Use-case demos	Participation in exhibitions and trade fairs, organization of road shows in order to demonstrate the BigDataStack outcomes to different potential clients.	M24-M36
Phase 3	Exhibitions, Trade Fairs	Use case demonstrations in real-world scenarios utilized as a means to showcase the added value of BigDataStack outcomes to different stakeholders – invited in the live demos.	M24-M36
During and after project	European Open Source Initiative	Realization of the introduced European Open Source Initiative as a means to exploit project results in open source projects	M19-M36+

Table 9: Dissemination Roadmap M19-M36

4.6 KPIs achieved at M18 and planning M19-M36

KPIs for Communication Kit and overall visibility					
Measure	Driver	Action	KPI	M18	M19-M36
Monthly Web content	Regular information updates with SEO-driven approach	Identify and publish new content on a regular basis.	YR1: min 2/month YR2: min 3/month YR3: min 4/month	<input type="checkbox"/> KPI achieved for M18 With 2*12 and 3*6 adding up to a total of 42 web content pieces at M18	From month 18 the project is ready to share more results, resulting an additional (6*3 + 12*4) 66 content pieces on the website.
In-house newsletters	Different stakeholders are properly informed in a timely manner	Produce and circulate a monthly newsletter based on stakeholder targets	YR1: min 6 YR2: min 8 YR3: min 10	<input type="checkbox"/> KPI achieved for M18 10 in-house newsletters	For M19- M36 an additional 14 newsletters will be published.
Promotional material, including video content	Specific audiences receive tailored and timely messages	Design and produce focused material (for stakeholders / events)	YR1: min 3 YR2: min 6 YR3: min 12	<input type="checkbox"/> KPI achieved for M18 1 project presentation 3 flyers 1 roll-up banner 3 video's	In M19- M36 an additional 13 promotional material pieces with tailored messages will be developed.
Press releases targeting major stakeholders on supply/demand sides	Raise interest and recruit demand/supply side actors	Produce press releases targeting different media channels and audiences	YR1: min 2 YR2: min 1 YR3: min 2 major stakeholder category	<input type="checkbox"/> KPI achieved for M18 2 press releases	In M19- M36 an additional 3 press releases will be published and disseminated.
Press releases targeting general public	Raise interest amongst non-specialized audiences	Lightweight blog/article targeting non-specialized channels	≥ 2 press clippings	to start after M18	2 press clippings will be collected, showing the impact of press-releases published in

					M19-M36
Visibility in channels used by different stakeholder categories	Ensure back-links/branding recognition through synergies and social media towards general brand recognition	Liaise and engage with projects/initiatives, journalists and LinkedIn groups	<p>≥ 20 back-links across major stakeholders</p> <p>≥ 50 entities identifying BigDataStack brand</p>	<p><input type="checkbox"/> KPI achieved for M18</p> <p>40 backlinks from 17 different domains</p>	In M19-M36 the project will continue to foster backlinks and monitor BigDataStack brand recognition by 50 entities.

Table 10: KPIs for Communication Kit and overall visibility

KPIs for the Stakeholder Engagement and Community Development					
Measure	Driver	Action	KPI	M18	M19-M36
Social media content: Twitter	Grow community, Regular stakeholder engagement gives insights into interests/concerns	Publish tweets, including SMART-based campaigns & monitor outcomes	YR1: min 8/month YR2: min 24/month YR3: min 48/month	<p><input type="checkbox"/> KPI achieved for M18</p> <p>With 8*12 and 24*6 tweets adding up to a total of 240/240 tweets at M18</p>	In M19-M36 an additional 720 tweets will be published
Social media content: LinkedIn	Grow community, Regular stakeholder engagement gives important insights into interests/concerns	Publish posts, make relevant tweets, including SMART-based campaigns & monitor outcomes	YR1: min 1 post/month YR2: min. 4 posts/month YR3: min 8 posts/month	<p><input type="checkbox"/> KPI overachieved for M18 leveraging on steady amount of 475 followers on LinkedIn</p> <p>141/36 posts and 9 articles</p>	In M19-M36 an additional 120 LinkedIn posts will be published
Stakeholder database	Early identification of prospective stakeholders	Develop a profiled DB of contacts for incremental community development and stakeholder engagement	1.500 profiled & engaged stakeholders by M12; over, 2.500 by M24, and 4,000 by M36	<p><input type="checkbox"/> KPI achieved for M18</p> <p>4922 Connections in BigDataStack DataBase</p> <p>475 connections on LinkedIn + 212</p>	In M19-M36 the project DataBase will be extensively exploited for stakeholder engagement fostering uptake of the

				followers on twitter + 90 Newsletter subscribers	project's results.
Targeted workshops with free admission, focusing on user needs, challenges & results,	Ensure outreach to non-specialised audiences	Show BigDataStack to visitors in lively, lightweight environment	<p>≥ 3 targeted workshop, capitalising on the user needs, showcasing results, and liaising with ICT-14 & ICT-15 projects</p> <p>≥ 50-100 non-specialized attendees</p>	This activity will start after M18, currently the project is identifying industry events for co-location of these workshops.	In M19-M36 3 industry stakeholder workshops will be organised.
Online and/or F2F training sessions	Ensure general public is "educated" about need to advanced research to address their needs	Provide a service for non- IT savvy to show what the new service means for them	<p>≥ 1 online sessions ≥ 50 non-specialized attendees</p>	<p><input type="checkbox"/> KPI achieved for M18 with 2 webinars for non-IT savvy audience</p> <p>1 webinar on the use-case connected consumers, 31 registrations,</p> <p>1 webinar on Real-Time Ship Management on June 26</p>	In M19-M36 1 webinar on the 3rd use case will be organised and a proposal for a BigDataStack will be submitted for the BDVA webinar series ³²
F2F interactions with local clusters	Ensure engagement of "real people" at the local level	Work with local clusters to co-host an open day with media presence	<p>≥ 1 local events</p> <p>≥ 3 appearance in local media</p>	This activity will start after M18, with more project results in place.	In M19-M36 1 open day event will be co-organised with local clusters and presence of local media, resulting in appearance in 3 local media.
Free trials for general public	Facilitate and drive uptake through early trial testing	Organise free trials after reaching a maturity level	≥ 5 "testers"	This activity will start after M18	In M24-M36 BigDataStack will organise 5 free trials

³² <http://www.bdva.eu/node/1104>

Marketing events, e.g. trade fairs/exhibitions	Ensure direct engagement with major stakeholders	Host a properly decked exhibition stand with demos	YR2: min 1 YR3: min 2	<input type="checkbox"/> KPI achieved for M18 with 1 exhibition stand and demo Danaos Demonstration at the international Maritime Posidonia Bi-annual Exhibition with over 39.000 participants.	In M24-M36 BigDataStack will host at least 2 properly decked exhibition stands with demos.
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Table 11: KPIs for the Stakeholder Engagement and Community Development

Dissemination KPIs					
Measure	Why	Action	target KPI	M18	M19-M36
Organization and/or attendance to conferences and exhibitions	Attract customers	10 Conferences 3 exhibitions	100 visitors 10 speakers	<input type="checkbox"/> KPI achieved for M18 with 2 booths 12 speakers Joint booths with BDVe at ICT 2018 and EBDVF 13 conferences attended, targeting research & academia, industry and the BigData eco-system	In M19-M36 BigDataStack will ensure presence at least 1 additional conference or exhibition booth and will continue to attend conferences disseminating BigDataStack results.
Synergies established at local, national, or international level for uptake of BigDataStack results	Raise Awareness, Attract users (supply or demand)	Events (any type) for F2F discussions	6 synergies established	<input type="checkbox"/> KPI achieved for M18 with 4 synergies established at events: -ICT 2018: panel discussion - synergy with BDVe -RedHat summit researcher day -EBDVF 2018 - Data4AI everywhere panel discussion -BDV PPP Summit: panel discussion with	In M19-M36 BigDataStack will ensure an additional 2 synergies via events

				BDV PPP projects and upcoming co-written policy brief	
Synergies at national or international levels for sharing knowledge and standardisation.	Strengthen impact via joint efforts	Meeting attendance and common publications	> 5 projects	<input type="checkbox"/> KPI achieved for M18 with 3 synergies -KubeCon + Cloud Natives (working group on policies for open source) -BDV PPP Summit BDV PPP coordination and technical meetings -Open Source Summit - RedHat Kuryr BigdataStack element presented.	In M19-M36 BigDataStack will ensure an additional 2 synergies via joint meeting attendance and common publication
On-site demonstrations and presentations	Attract customers Raise awareness	6 demonstrations 6 presentations	3 responders 2 on-site demos	To start at M24	In M24-M36 BigDataStack will organise 6 demonstrations, of which at least 2 on-site, to attract 3 responders
Open Access publications	Scientific dissemination	Publication to journals and magazines	> 20 publications	At M18 BigDataStack has published 5 scientific articles	In M19-M36 BigDataStack, with more results in place, will make an additional 15 publications in scientific journals.
Online publishing (online magazines, blogs, etc.)	Social Awareness	> 15 publications and four blog post per month	> 500 views / publications / year	At M18 BigDataStack made 2 BDVA publications 1 EOSC pilot publication 2 CORDIS publications 1 Atos booklet ³³	In M19-M36 BigDataStack, with more results in place, will make an additional 10 publications in online magazines, blogs, etc.
Customisable marketing packages (videos, how-to demos, press kit etc.), suitable also for trade fairs	Raise awareness Attract users (supply or demand)	Production professional tailored to audiences of material	> 10 produced > 50 distributions	<input type="checkbox"/> 6 videos produced which got a total of +370 views	In M19-36 BigDataStack will fit produce another 4 video's for marketing packages.

³³ <http://booklet.atosresearch.eu/node/1902>

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Table 12: Dissemination KPIs

5 Standards & Open Source Contributions: European Open Source Initiative (M1-M18)

5.1 Realising the European Open Source Initiative to increase the impact of the BigDataStack outcomes

Red Hat is one of the leading companies involved in Open Source activities. It is world widely recognized for its contributions to Open Source Communities as well as for its open culture. In order to increase the impact that BigDataStack contributions, Red Hat organized an extra “Research Day” at its annual summit (Red Hat summit 2019 -- <https://www.redhat.com/en/summit/2019> had the participation of than 8 thousand people from many companies around the world). The Research Day was an extra dedicated day, that brought together academy researcher as well as partners and engineers from different companies to talk about “practical research” and open-source.

The main topic about the Red Hat Research Day was “Bridging Between Research and Upstream Engineering”, where the morning talks were focused on different data processing topics, such as machine learning and multi-party computation. During the Research Day, a talk (“An Architecture Slack for Data-Driven Infrastructure Management”) was also given by Dimosthenis Kyriazis about the BigDataStack project. The second half of the day was dedicated to the infrastructure side and exploration of different tools and techniques to improve the way data can be processed, such as adding FPGAs, UniKernels, OS accelerators, etc. During the Red Hat Summit, BigDataStack was also represented in a panel focusing on data management and sharing, namely: “Democratizing access to data for the greater good”.

In addition to the Research Day, the BigDataStack project was also presented at the Emerging Technology booth at the exposition hall. This also led to discussions with related projects that were working on similar tools, such as OpenDataHub (A Data & AI Platform for the Hybrid Cloud -- <https://opendatahub.io>).

5.2 BigDataStack Alignment global standards and standardisation of project results

One of the standards for software development and products is the “open source way”. Open Source is nowadays attracting tremendous technical talent and companies. Much of

the innovation is taking place in open source communities, made of people all over the world. Successful examples are Linux, OpenStack, Kubernetes, Git, etc.

Red Hat is the largest open source company in the world, building open source products from open source upstream projects. In order to “comply” with the open source standards and being able to have a product out of an open source repository it is not enough to make your code available in GitHub or similar repositories, but to:

- Create a community behind the projects, i.e., engaging more than just one company behind a given project
- Create an open forum for ideas
- Enforce open culture and collaboration, i.e., code reviews, testing, meritocracy (a.k.a., best ideas win)

Big Data Stack project is relying on many successful open source projects/products, especially the ones targeting cloud computing. It is using the ‘de-facto’ standard tools for the infrastructure to ensure easy adoption of the developed tools:

- OpenStack for the Cloud Infrastructure
- OpenShift/Kubernetes for the Container Orchestration Engine

To better align with the software standards in those communities we were present at the KubeCon & CloudNativeCon event (<https://events.linuxfoundation.org/events/kubecon-cloudnativecon-europe-2019/>). Being led by the Red Hat knowledge about the current trends on application development for Cloud Native applications, the project has made a few decisions to increase portability between different clouds:

- Containerize the different BigDataStack components
- Components deployment are defined on Kubernetes/OpenShift templates that are the ‘de-facto’ standards for containers orchestration engines
- Use of OpenShift provides extra tools for DevOps that further facilitates the deployment and management of the applications life cycle (from code up to running containers)
- Creation of operators that will handle different components (such as Kuryr Cluster Network Operator) that make it easier to manage both applications and infrastructure in a fully automated and software defined manner.

Thanks to this, it will be easier to run Big Data Stack components anyway, be it an on-premise cloud (e.g., OpenStack) or a public one (Azure, GCE, AWS, ...).

The Cloud Native Computing Foundation (CNCF) target is to build sustainable ecosystems and fosters a community around a big constellation of high-quality projects that orchestrate containers as part of the microservices architecture (<https://www.cncf.io/>). The main idea behind is to ensure, through the open source way, a universal and sustainable cloud native computing. Red Hat is one of the Platinum Members of such an organization.

To make BigDataStack components more aligned with the CNCF, which in turn will help on possible adoption of their outcomes, we are both:

- Relying on many of the projects already being part of the organization

- Adopting best practices from them, such as containerization of the applications as well as working on operators for full applications lifecycle management

Note the CNCF projects are divided in 3 different maturity levels, depending on their status and adoption:

- **Graduated:** the most mature projects that have widely adoption and high maturity. Among them, we have Kubernetes, Prometheus and CoreDNS, already used in the BigDataStack infrastructure. For instance, changes being made to the Triple Monitoring tool, if adopted by the upstream community, may have a big impact.
- **Incubation:** more recent projects that are already mature and have increasing adoption. Examples of that are CNI, etcd, CRI-O, rook, ... As part of the projects we are working on extending Kuryr, which is a CNI plugin for Kubernetes, helping it to increase its adoption, and already raising interest by big companies that need single SDN control plane for VMs and Containers, as well as requiring extra networking performance.
- **Sandbox projects:** This is the entry point for early stage projects with the main goal of facilitating alignment with the existing projects as well as fostering community collaboration/uptake. Example of this are Network Service Mesh or Open Telemetry. This could be one of the targets for specific Big Data Stack components in order to ensure full alignment with open standards as well as adoption/maintainability after the project.

5.3 ICT standardisation in support of EU policies

The 2019 Rolling plan on ICT Standardisation provides a unique overview of standardisation activities in the field of information and communication technologies (ICT) linked to EU legislation and policies, such as healthcare, cloud computing, intelligent transport systems, security, accessibility, Internet of Things, eGovernment, smart grids and many others. It is crucial to clarify this link with European legislation and policies because ICT standards convey important technological requirements for privacy, security and accessibility.³⁴

The rolling plan was developed with the help of the Multi-Stakeholder Platform on ICT Standardisation (MSP). The MSP is an expert group composed of representatives of EU and EFTA countries, ICT standardisation organisations, and industry and societal stakeholders. The MSP advises the Commission on all matters related to ICT standardisation. This inclusive and participatory approach to developing the rolling plan ensures wide support from the European and international standardisation organisations, associations, EU countries, and key global industrial and technology companies.

Partner Trust-IT Services attended the 26th Multi Stakeholder Platform Meeting in June 2019 for the Research Data Alliance and StandICT project. Trust-IT engaged with standardisation bodies, interesting for future liaising on future standardisation of BigDataStack results.

³⁴ <https://ec.europa.eu/docsroom/documents/34788>

5.3.1 A common standard for the referencing of open data

With the continuously growing amount of data and the increasing amount of open data, interoperability is increasingly a key issue in exploiting the value of this data. Standardisation at different levels (such as metadata schemata, data representation formats and licensing conditions of open data) is essential to enable broad data integration, data exchange and interoperability with the overall goal of fostering innovation based on data. A common standard for the referencing of open data in the European open data portals would be useful. A candidate for a common standard in this area is the Application Profile for data portals in Europe (DCAT) and the FIWARE open stack-based specification and open standards APIs.

BigDataStack partner NEC is currently applying “dynamic orchestrator” into FogFlow³⁵ to show the benefit of adaptive orchestration of data-intensive IoT services. FogFlow is a fog computing framework that brings context information management to the edge of the networks. FogFlow is compliant with the NGSI standard utilized by FIWARE for context information management. FogWare is included in the FIWARE catalogue of curated framework of open source platform components (Generic Enablers) which can be assembled together to accelerate the development of Smart Solutions.

5.3.2 Analytics Insights and Scaling Policies for Microservices

BigDataStack partner Ubitech is working on this topic. The work in progress gives guidelines for platform-agnostic elasticity management of elastic-by-design microservices. Elasticity refers to the way a microservice is reacting to the increase or decrease of its load. Microservices that have the ability to scale in/out are considered elastic-by-design. The scope of our work is to set the guidelines for platform agnostic elasticity management. Platform agnostic implies that the mechanism/orchestration entity which will perform the actual scale-in/out process remains agnostic to the cloud infrastructure details. Instead, the definition of the actual elasticity events and the relationship of this definition with the underlying monitoring mechanisms will be formally described.

6 Conclusions and Next Steps

In the first 18 months, the BigDataStack project has worked on raising awareness of the project by building the project website, the hub to the project social media channels, events, publications, news, growing communication kit and network.

The project has shared early results and focused on the Use-Cases to show the implementation and added value of BigDataStack technologies. The series of webinars on the three use-cases the project is currently pulling out, targets end-users on the practical use of

³⁵ <https://www.fiware.org/news/nec-develops-a-fiware-based-fog-computing-framework-for-edge-based-iot-services/>

BigDataStack results, fostering uptake.

BigDataStack has a growing social media network, with connections that count. The project has built up a solid network of liaisons and synergies, engaging target stakeholders at relevant events.

The project is now halfway through the second phase, and is intensifying its dissemination, stakeholder engagement, activities on standardisation and connections to standardising bodies. Aiming at fostering the practical uptake of the BigDataStack results. In the latter 18 months of the BigDataStack project partners will:

- Organise 3 industry workshop for end-users of the retail ecosystem, shipping industry and insurance sector to foster uptake BigDataStack results.
- Facilitating and driving uptake through early trial testing, BigDataStack will organise 5 free trials targeted at the general public.
- Increase engagement with standardising bodies to align BigDataStack components with global standards and increase the uptake of BigDataStack components via standardisation.
- Continue to expand the BigdataStack network of ICT14 and - 15 projects to strengthen impact via joint efforts in dissemination and stakeholder engagement.
- Publish an additional 15 scientific papers on the project results achieved to raise awareness on the project's results and finally foster uptake.
- Publish an additional 10 non-scientific articles on external channels, on the project results achieved to raise awareness on the project's results and finally foster uptake.
- Fostering the uptake of the BigDataStack components, dissemination and standardisation will support the exploitation plans defined in D7.3 (M18)
- A printed brochure guide will be created, concentrating on the first year results, as well as a clear vision of the remainder of the project and its lasting impact beyond its run.
- Organise one on-site demonstration for end-users to foster adoption of the BigDataStack software components and holistic solution.
- Record one demo for end-user audience and publication on Youtube and BigDataStack website.

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