

Title:	Document Version:
D6.11 Report of clustering activities and scaling-up M39	1.0

Project Number:	Project Acronym:	Project Title:
H2020-871493	DataPorts	A Data Platform for the Cognitive Ports of the Future

Contractual Delivery Date:	Actual Delivery Date:	Deliverable Type*-Security*:
M39 (March 2023)	M39 (March 2023)	R-PU

*Type: P: Prototype; R: Report; D: Demonstrator; O: Other; ORDP: Open Research Data Pilot; E: Ethics.

**Security Class: PU: Public; PP: Restricted to other programme participants (including the Commission); RE: Restricted to a group defined by the consortium (including the Commission); CO: Confidential, only for members of the consortium (including the Commission).

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Abstract:
The DataPorts platform aims to become the standard data platform for seaports in Europe. A well-defined scaling strategy and close collaboration with strategic initiatives are required to reach this ambitious goal. This document presents the development of the strategic activities and pillars to scale up on European level. Furthermore, the status of the collaboration with the strategic initiatives is presented.

Keywords:
Scaling Strategy, Scaling activities, Strategic Initiatives, IDSA, Certification, Roadmap, CRM

Revision History

Revision	Date	Description	Author (Organisation)
V0.1	26.11.2022	First version of the document, create ToC	Michael Arbter (FHG)
V0.2	09.12.2022	Input delivered	Michael Arbter (FHG)
V0.3	20.12.2022	First draft	Michael Arbter (FHG), Munef Bakran (FHG)
V0.4	31.01.2023	Input delivered	Christos Gizelis (OTE), Santiago Caceres (ITI), Andreu Belsa (UPV)
V0.5	27.02.2023	Draft finalized	Michael Arbter (FHG), Munef Bakran (FHG)
V0.6	21.03.2023	Correction based on the reviews	Michael Arbter (FHG)
V1.0	28.03.2023	Final version delivered	Michael Arbter (FHG)



This project has received funding from the European Union's Horizon 2020 Research and Innovation Programme under Grant Agreement № 871493.

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1 INTRODUCTION

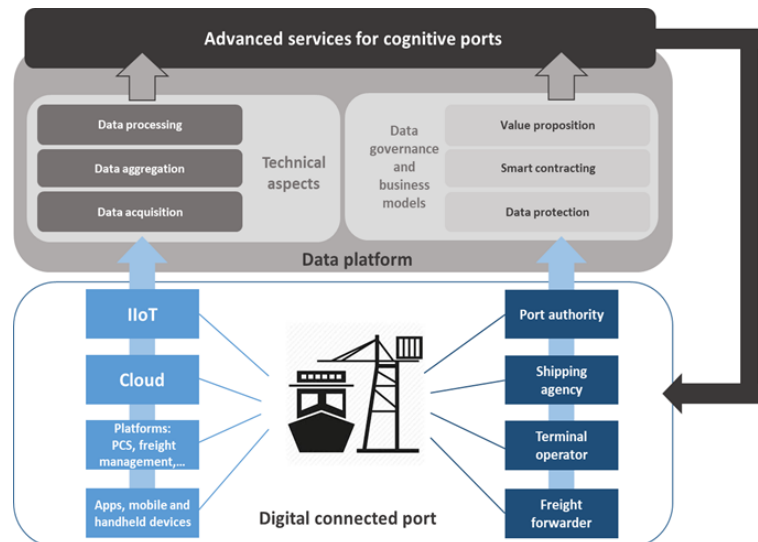
1.1 DATAPORTS PROJECT OVERVIEW

DataPorts is a project funded by the European Commission as part of the H2020 Big Data Value PPP programme, and coordinated by the ITI - Technological Institute of Informatics. DataPorts is based on the participation of 13 partners from five different nationalities. The project involves the design and implementation of a data platform, its deployment in two relevant European seaports, connecting to their existing digital infrastructures and addressing specific local constraints. Furthermore, a global use case exists involving these two ports and other actors, which targets inter-port objectives and certain actions through which to foster the adoption of the platform at a European level.

Hundreds of different European seaports collaborate with each other, exchanging different digital data from several data sources. However, to achieve efficient collaboration and benefit from AI-based technology, a new integrating environment is needed. To this end, the DataPorts project is designing and implementing an Industrial Data Platform.

The DataPorts Platform's aim is to connect to the different digital infrastructures currently existing in digital seaports, enabling the interconnection of a wide variety of systems into a tightly integrated ecosystem. In addition, to set the policies for a trusted and reliable data sharing and trading based on data owners' rules and to offer a clear value proposition. Finally, to leverage the collected data to provide advanced Data Analytics services, based on which the different actors in the port value chain could develop novel AI and cognitive applications.

DataPorts will allow the establishment of a unique future Data Space for all maritime ports of Europe and will contribute to the EC objective of creating a Common European Data Space.



1.2 DELIVERABLE PURPOSE AND SCOPE

Specifically, the DOA states the following regarding this Deliverable:

This report will collect all activities carried out in the scope of T6.3 and T6.4, involving community building, initiatives contacted and engaged and level of adoption of the platform by other actors.

DataPorts main goal is to become the de-facto data platform for seaports. For this purpose, several communications and collaboration activities need to be carried out to increase the awareness and the attraction of DataPorts. This approach requires an agile but also clearly defined workflow. Therefore, this document focuses on a strategic and an operative construct to scale up DataPorts on a European level. The strategic part describes the scaling direction to increase the appeal of DataPorts in Europe, while the operative part concentrates on the predefined collaboration with linked projects. In contrast to the strategic part, the scope of the operative part is clearly defined and determined by the limits of the collaboration with linked projects (see task 6.3). The strategic part covers a consideration area outside these limitations.

The purpose of the document is to define the interaction with various strategic initiatives, which can provide further awareness of DataPorts. Furthermore, appropriate certificates for DataPorts were selected for

building trust in the DataPorts platform. In section 5 the document describes the status of the collaboration with the linked projects.

1.3 DELIVERABLE CONTEXT

This deliverable's relationship to other documents is as follows:

Primary Preceding documents:

- Description of Action (DOA): Provides the foundation for the actual research and technological content of DataPorts. Importantly, the Description of Action includes a description of the overall project work plan.

Primary Dependant documents:

- D6.4 Report of clustering activities and scaling-up M12: First deliverable of tasks 6.3 and 6.4

1.4 DOCUMENT STRUCTURE

This deliverable is broken down into the following sections:

- **Section 2** provides an overview about the roadmap for DataPorts scaling strategy.
- **Section 3** describes important strategic initiatives and their possible engagement scenario.
- **Section 4** lists and selects required certificates for DataPorts platform.
- **Section 5** describes the customer engagement concept for DataPorts.
- **Section 6** provide an update on clustering activities.
- **Section 7** summarize the deliverable and provide insights in the upcoming tasks.

1.5 DOCUMENT DEPENDENCIES

This document's content builds on the content of the first deliverable for Tasks 6.3 & 6.4. This is the third and final version, delivered in M36.

2 ROADMAP FOR DATAPORTS SCALE UP

In our previous deliverable we focused on the development of the DataPorts Scaling Strategy covered by the strategic pillars and roadmap. For each pillar several activities were planned and prioritized on a timeline. In the following sections the areas of focus for 2021 and 2022 are explained.

2.1 AREAS OF FOCUS FOR DATAPORTS SCALE UP IN 2021 AND 2022

The roadmap for the scaling strategy is visualized in Table 1. The focus for 2021 relied on the activities of Engagement in Strategic Initiatives and Certification of the DataPorts Platform. In 2022, CRM and Community Building were focused on the last period of DataPorts. The main goal of these activities was to increase awareness and build trust around DataPorts. The activities were organized as follows (Table 1):

Strategic Initiatives	<ul style="list-style-type: none"> Engage with IDSA and GAIA-X AISBL Market research for other ports specific initiatives Choose and interact with initiatives based on market research
Certification of DataPorts	<ul style="list-style-type: none"> Market research for trustworthy certifications (standards and regulations) for platforms Understand IDS-Ready certificate Select and acquire suitable certifications for DataPorts
CRM	<ul style="list-style-type: none"> Develop CRM concept Engage with customers and analyse their strategic fit
Community Building	<ul style="list-style-type: none"> Define building blocks for the data provider community Identify potential community members

Table 1: Overview of DataPorts task 2021 and 2022

2.2 BACKGROUND

The activities to realize a de facto standard for seaports via the DataPorts project require a self-accelerating control loop. For this purpose, we have defined a scaling loop with various scaling activities (see Figure 1). Here, several activities need to be carried out in the long term and to be supported from all three directions (Community, Platform Ecosystem, Trends & Innovation). In the *Platform Ecosystem*, the various stakeholders are attracted and getting started is made as easy as possible with various measures, such as self-assessment. The *Community* is promoted through special activation for data providers and involvement in strategic initiatives relating to the topic of data spaces. The Community includes, among others, the participants of the Platform Ecosystem, but also many other interested parties that do not interact with the DataPorts platform or even operate in completely different subject areas. These can be open-source communities, strategic initiatives, or even groups of interested parties among potential customers. With *Trends & Innovation*, DataPorts ensures that the ecosystem is constantly aware of the latest innovations and is thus an accelerator for the community and platform. Trends & Innovations summarizes the innovation capabilities of DataPorts and the Platform Ecosystem. Examples can be the activities around future compatibility or the innovation ecosystem. These objectives ensure that DataPorts gets a 360-degree view of the collaboration between different actors and activities. It is worth noting that these activities do not end with the project. Rather, these activities are to be addressed beyond the end of the project. The elaborations within the

deliverables D6.4 and D6.11 provide the foundation such as CRM Concept, Community Building, or Self-Assessments.

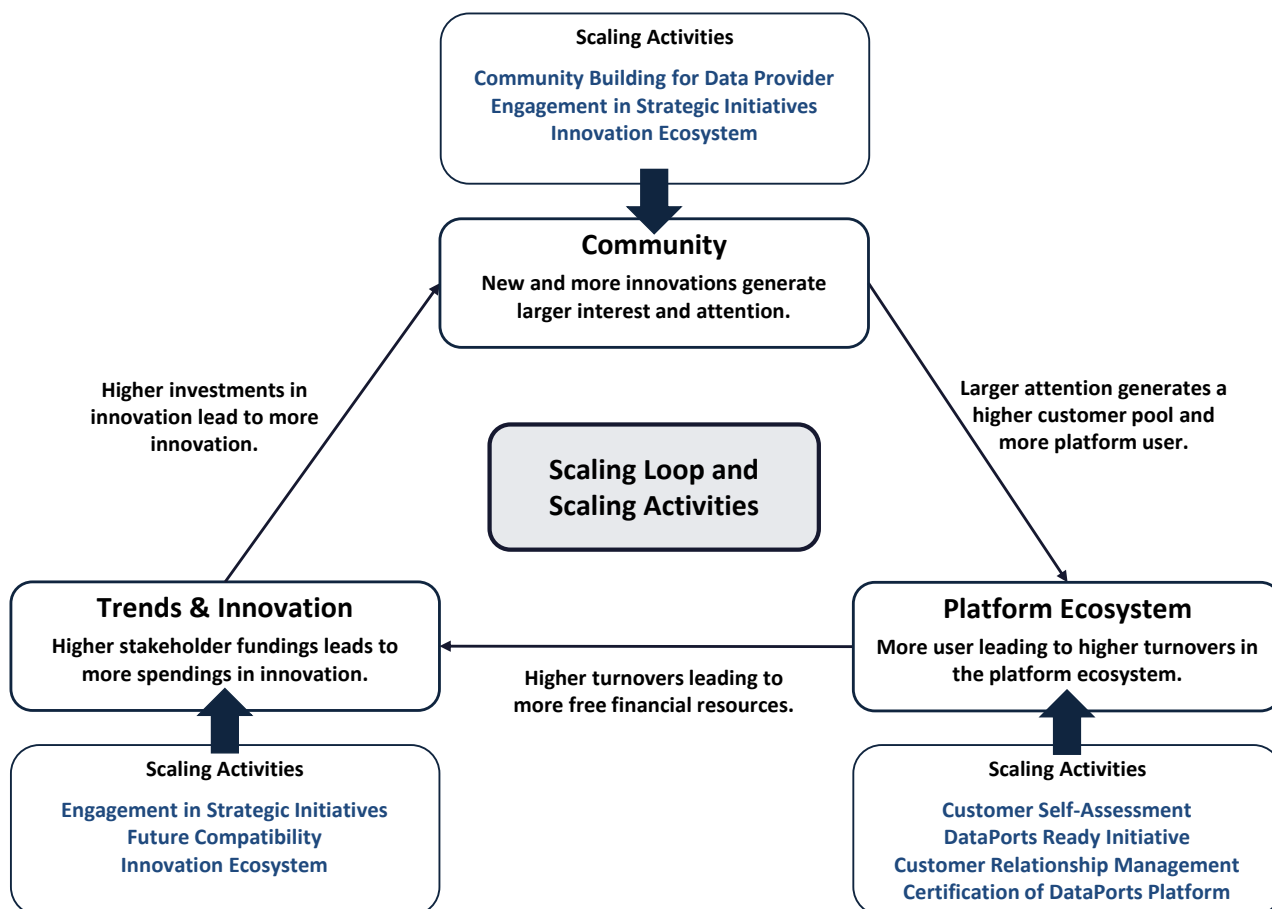


Figure 1: Scaling Strategy Overview

3 ENGAGEMENT IN STRATEGIC INITIATIVES

As explained in section 2, one activity for scaling the DataPorts platform involves engagement in strategic initiatives. On the one hand, this activity creates a communication channel for the respective target groups. On the other hand, the placement in strategic initiatives can be used to gain valuable information from these networks. This information can then be used to coordinate DataPorts activities and to optimise the DataPorts platform, thus helping maximise its potential. Placement in various strategic initiatives also makes it possible to address different customer groups and view them as potential customers/stakeholders.

A strategic initiative is a program that provides the framework for various large and small projects within the respective program. In these initiatives, predefined goals and projects are realized with the targeted use of funding. Strategic initiatives are not tied to specific regions and can be carried out on both regional and global levels. By building strong networks, developments are accelerated, and new ideas are realized through synergies.

In order for placement in a strategic initiative to be used to scale the DataPorts platform, it is advisable to select strategic initiatives based on the same properties. For this reason, the strategic initiatives are categorized according to the following criteria:

- Open Source
- Blockchain Technology
- Data ecosystem
- Data platform

The pre-selection results in 10 strategic initiatives, which have both a maritime and a neutral background (an overview is given in Appendix A: Survey of potential strategic initiatives). These initiatives are characterized in tabular form, taking into account the questions “What”, “How” and “Why”. This overview is reviewed by partners and evaluated for relevance. The selection of the initiatives to be considered takes into account the time aspect as well as the short-term benefit. Due to existing connections with the respective initiatives, the placement in these initiatives can be advanced faster. In addition, it can be seen in Figure 2 that the initiatives presented have a similar background and create a broad network of participants. In the following sections, the final selected strategic initiatives are described in detail. Furthermore, we explain why the respective initiative is appropriate for the scalability of the DataPorts platform and how it is placed in it.

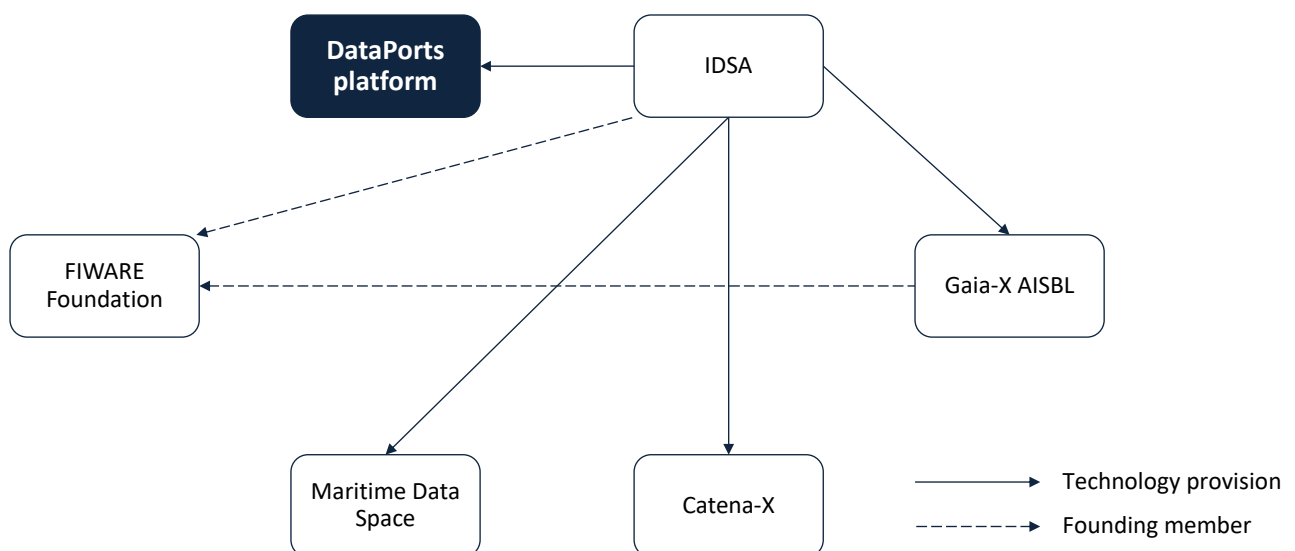


Figure 2: Connection of the Initiatives and DataPorts

3.1 INTERNATIONAL DATA SPACE ASSOCIATION

Members	IDSA Hubs	Countries	Use Cases
+120	8	22	+55

Table 2: Facts International Data Space Association

Introduction to the initiative

The foundation of the International Data Space Association (IDSA) stems from the International Data Spaces (IDS) initiative (some figures regarding IDSA are reported in Table 2). The object of this initiative was to establish a virtual data space that enables the secure exchange of data and ensures the digital sovereignty of data owners [1]. To this end, the IDS developed a reference architecture model. Since 2016, IDSA has been pushing the IDS reference architecture model as an international standard for data sovereignty [2].

The secure exchange as well as the linking of data are realized by means of the IDS architecture, which is based on collaborative governance models. This architecture ensures the digital sovereignty of the data creators and thus forms the basis for smart services and innovative business processes. The realization of these services and processes requires a strong incentive for data exchange. This is done via a European initiative that ensures data sovereignty via digital infrastructure components and a uniform interoperable format in a competition-neutral and cross-industry manner. Certified users gain access to the software architecture via IDS gateway software, the IDS connector. These users are given the ability to tag data with terms of use and implement self-determined data exchange between trusted partners. The IDS connector uses container technology. In this, data is secured against unauthorized access and manipulation. Furthermore, the corresponding data can only be used within the container under the previously agreed conditions. The IDS connector can be used on classic servers, in cloud environments, on IoT devices or smartphones [3].

Before IDS, there was a lack of a global and interoperable standard for describing and exchanging data. With DIN SPEC 27070, which was published in November 2019, the IDS solves a global general market problem. More than 120 members from 22 countries are now participating in the initiative. The initiative is thus European as well as international in scope. IDSA is in constant exchange with global initiatives, such as the Industrial Internet Consortium, OPC Foundation, Robot Revolution Initiative and Big Data Value Association. In addition, the IDSA participates in various EU research projects to anchor the IDS architecture and data sovereignty standards in European digitization strategies. Already 8 countries have been able to achieve contractually bound IDSA hubs to drive the standardization and adaptation of the technology in their own countries. Further information can be found on their website (<https://internationaldataspaces.org/adopt/data-space-radar/>)).

Relation to DataPorts

With its placement in the IDSA initiative, DataPorts becomes a member of an established European network for data security and data sovereignty. Thus, DataPorts can benefit not only from the technology but also from the industrial reach of the initiative. In return, the DataPorts platform will provide a complement to the services currently available to the industry. DataPorts interacted in different ways with the IDSA. The most promising connections can be viewed in the following subchapters.

3.1.1 Data Space Radar

One activity to achieve visibility within IDSA is through the Data Space Radar (Figure 3). Here, a large number of initiatives and projects are listed that are related to data spaces and have an added value to the increasing trend of data spaces. This radar is divided into different sectors (Smart City, Manufacturing, Energy, Mobility, Automotive, Supply Chain, Cross-domain/other) and differentiated in terms of maturity (Lead-In, Case Committed, Pilot, Live). Overall, there is only one Data Space that covers the Maritime domain - the Maritime

Data Space. This offers the opportunity for DataPorts to position itself more strongly beside the Maritime Data Space.

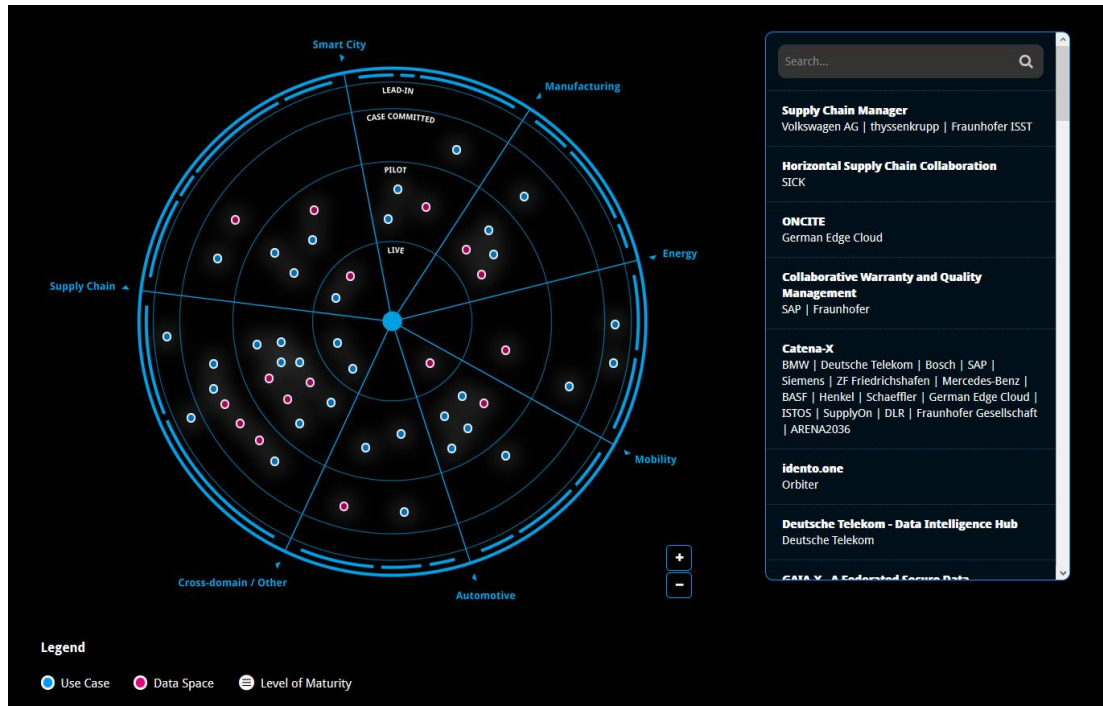


Figure 3: IDSA Data Space Radar (Source: internationaldataspaces.org)

Relation to DataPorts:

DataPorts has been registered as a new use case at this point and is accepted as a use case for the Data Space Radar. DataPorts is placed on the website and in the newest report of “The Data Spaces Radar” from the IDSA (2023), as shown in Figure 4.

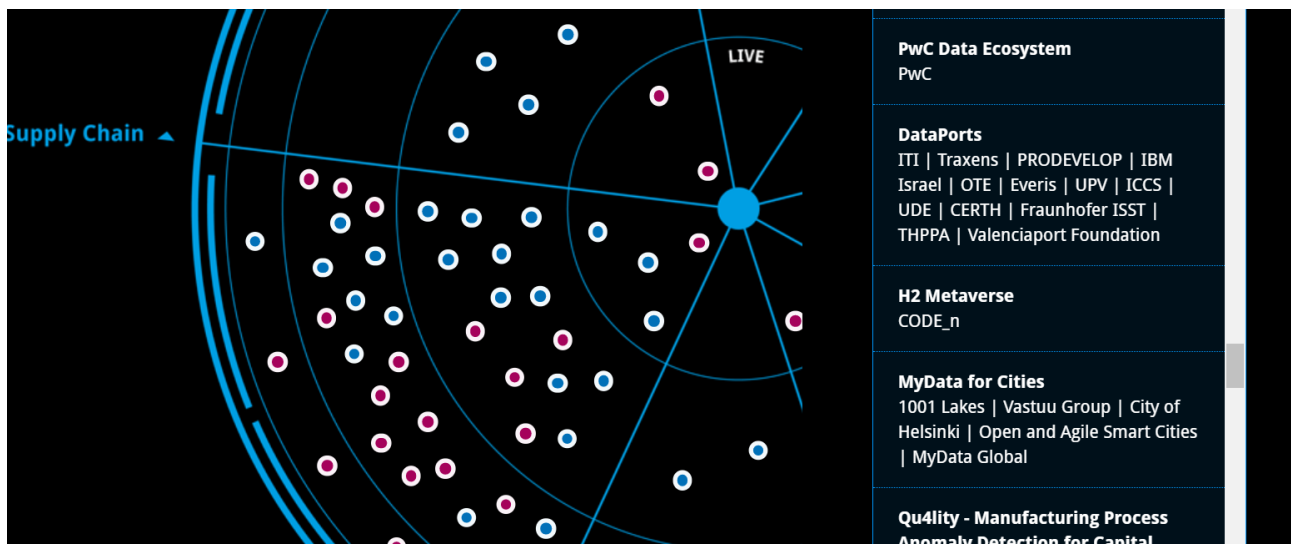


Figure 4: DataPorts listed on the IDSA website (source: <https://internationaldataspaces.org/adopt/data-space-radar/>)

3.1.2 IDS Communities

In addition to the Data Space Radar, there are four communities in the IDSA (Figure 5): Industrial, Mobility, Logistics, and Medical. Each community aims to establish technologies, methods, organizational structures and governance of the IDSA in a domain-specific approach. The concepts differ depending on the

requirements of the domain. A community has to unite five goals. First, it should represent stakeholders from industry, research and organizations. Secondly, they describe the use cases with their concepts and technologies. Thirdly, the requirement to compare these use cases with the IDS Functional Overview. Fourthly, the results need to be validated with the Reference Architecture Model. Fifthly, show the possible benefits for their data space implementation.



Figure 5: IDSA Data Space Communities (Source: internationaldataspaces.org/make/communities/)

Relation to DataPorts:

The IDSA community approach results into two options for DataPorts - joining an existing community or creating a new community.

For entry into the existing community, the Logistics Community is valuable because several industry partners bring in new idea which can be adapted by DataPorts (e.g., develop services or adapt business models ideas). Another approach would be to establish a Maritime Community. There are isolated initiatives in Europe that are setting up a data space for the Maritime. However, these are not currently bundled into an overarching Maritime Community. Existing initiatives such as the "Maritime Data Space" (see 3.4) are developing solutions for specific ports. From the point of view of the European ports, overarching work is to be advocated. First contacts have already been made to align with other initiatives.

Both approaches would lead to an increased awareness in the IDSA, whereby the establishment of an own community would have the greater leverage. The downside is the focus on the IDS Concept and its implementation. For DataPorts, this represents only a building block for data sharing, but is not central to the development of the overall platform.

For this reason, in chapter 5.2 we focused on the development of data provider community.

3.1.3 IDS-ready

Every organization can be certified by the IDSA. Depending on the focus of the use case, a distinction can be made between different certificates. For DataPorts, such certification would be of great importance, as it would strengthen trust in the platform. Therefore, the IDS-ready certificate is an essential part of section 4. Further information can be found in this section.

3.2 GAIA-X AISBL

Members	Organisation	Domain Working Groups	Gaia-X Hubs	Use Cases
+850	+425	10	15	+65

Table 3: Facts GAIA-X AISBL

Introduction to the initiative

In 2020, 22 members founded the European data infrastructure GAIA-X (main figures are shown in Table 3). The goal of this infrastructure is to fully exploit the value creation potential of existing data in European

companies. Considering the aspects of data availability, interoperability, portability, data sovereignty and transparency, the construction and operation of this infrastructure is carried out [4].

The Gaia-X architecture is based on the principles of decentralization. In a federated system, a network of providers and users is created. Building an ecosystem creates a trusted environment to provide, collect and share data. The central elements of the Gaia-X ecosystem are Federation Services, Data Spaces, Standards, and Services [5]. Federation Services are minimum technical requirements and services necessary to use the Gaia-X Ecosystem. General frameworks are used to provide and use standardized technologies. Open-source software represents one of these technologies [6]. The term data space describes a data relationship between trusted partners. Data is stored and used in accordance with predefined and agreed terms of use [7]. The data is not stored centrally, but in the actual data source (on premises). If necessary, they are shared via semantic interoperability. The basis of this function is a reference architecture model of the IDSA. So far, there are data rooms for the topics Industry 4.0/Small to medium-sized enterprises, Health, Education & Skills, Energy, Mobility, Finance & Insurance, and Space. Standards are another core element of the Gaia-X Ecosystem [8]. A key component of the Gaia-X initiative is the definition of a standard architecture that aligns existing standards and codes of conduct. These standards include regulatory standards, industry-specific standards, and technical standards. The development of these standards includes the definition and enforcement of data usage policies. Members of the Gaia-X ecosystem are required to follow the principles and guidelines. The last core element of the Gaia-X ecosystem comprises services [9]. New digital services will be developed as part of the project. With transparency, security, and interoperability in mind, a variety of teams are working to define standard processes, rules, and requirements necessary to develop new services.

The initiative Gaia-X European Association for Data and Cloud AISBL represents as a non-profit association the core of the organizational structure of the Gaia-X vision. The goal of the association is to lay a foundation for future data-based innovations, to set standards and to exchange knowledge. Gaia-X Hubs have already been formed in 15 countries to promote the use of the Gaia-X ecosystem in their countries. Further information can be found on the website (<https://www.gaia-x.eu/>).

Relation to DataPorts

The goal of Gaia-X is to establish a pan-European standard of a data infrastructure. The core elements mentioned are essential drivers for the realization of this goal. For the DataPorts platform, a placement in this initiative is appropriate: to be a member of a huge network on one side and to orientate itself on the development of the ecosystem on the other side. Gaia-X as well as the DataPorts platform enable data-secure and data-high exchange. Therefore, synergies can arise in the course of cooperation and interests. By placing DataPorts in the Gaia-X AISBL initiative, both data providers and data users can be gained. After first discussions and internal evaluation, a valuable connection could be achieved after the data platform is tested in a practical environment for a longer time. Therefore, further connection should be achieved after a successful exploitation.

3.3 FIWARE FOUNDATION

Members	Fiware iHubs	Countries
+415	+21	+45

Table 4: Facts FIWARE Foundation

Introduction to the initiative

The FIWARE Foundation is an open-source initiative founded in 2016 as a non-profit association by Atos, Engineering, Orange, and Telefónica (main figures are shown in Table 4). FIWARE started as a European research project funded by the Future Internet Private Public Partnership (FI-PPP) program. The aim of this

program was to promote European competitiveness in digital technologies and to develop a new European Cloud platform. [10]

FIWARE aims to develop sustainable business models by avoiding vendor lock-in scenarios. With the help of the FIWARE Foundation, a global community is initiated, whose members are committed to realizing the FIWARE mission. This includes building an open, sustainable ecosystem based on public, royalty-free and deployment-oriented software platform standards. This facilitates the development of new smart applications in various fields. [11]

FIWARE realizes the development of intelligent and cost-effective solutions by providing a curated framework of open-source software platform components. These components can be combined with third-party components to build platforms. The single and thereby also most important mandatory component of any "Powered by FIWARE" platform or solution is a "FIWARE Context Broker Generic Enabler". This represents a required basic function for every intelligent solution, namely the management of context information, the execution and updating as well as the access to the context. The API exported by the Context Broker, FIWARE NSGI, is used to implement this basic function. [12]

The FIWARE Foundation is a legally independent non-profit organization that drives the definition of open standards and promotes their adoption. Meanwhile, more than 415 members from over 45 countries have joined the initiative. The synergies from strategic partnerships with e.g., ETSI (NGSI-LD API specification), W3C (Web of Things), GSMA (IoT Big Data Ecosystem project) as well as TM Forum, have led the work of the Foundation in the field of standardization to stable results. Further information can be found on their website (<https://www.fiware.org/foundation/>). [13]

Relation to DataPorts

Despite the business restrictions imposed by COVID-19, the FIWARE Foundation has achieved outstanding growth results. FIWARE iHubs are located in various countries, from South America to East Asia. They help companies as well as individuals to build a network of technology-oriented communities. Additionally, they support the creation of Internet-based businesses on both local and international levels. FIWARE is demonstrating a major impact on smart cities. With the help of the FIWARE community, many cities have already been helped in transforming big data into knowledge, unlocking the potential of open data. DataPorts can leverage the experience and reach of the FIWARE community to gain broad insight into how the industry works, as well as access to new stakeholders. A direct contact with FIWARE was not made during the project. It should be focused after the successful exploitation of DataPorts.

3.4 MARITIME DATA SPACE

Members	Countries
6	1

Table 5: Facts Maritime Data Space

Introduction to the initiative

The range of cloud-based services and functions for specialized process steps in shipping operations and logistics is increasing daily. However, these offers are, in fact, often only isolated solutions that are implemented with a relatively high effort. In addition, only subsets of the fundamentally available data are included and handled with a lack of standard in terms of data security.

In 2018, the Maritime Data Space (MDS) initiative tackled the problem of providing data in a secure and cross-company manner for the development of digital business models in the maritime sector. Table 5 reports some of the main figures for MDS). Based on a digital representation of the ship (Digital Twin) and a networked infrastructure for these digital ships, they aim at driving the transformation of the industry. The goal of the initiative is to connect all companies that generate and/or process maritime data. In doing so, the

data remains with its owner or provider and is only released for specific uses. Via a connector, the data-holding systems are integrated into the distributed infrastructure of the Maritime Data Space. The technical implementation is based on the IDS reference architecture model. [14]

The Maritime Data Space is an innovation project funded by The Research Council of Norway that offers data providers a network of maritime-specific data users. The use of IDS technology assures data providers of security and protection against data misuse. Based on this data, data-driven business models and new digital services can be developed. The Maritime Data Space is therefore not only a secure area for data exchange, but also a space for innovation. [15]

The project is a collaboration between NAVTOR, Wilhelmsen Ship Management, Veracity by DNV, Neuron Solution and SINTEF. Wilhelmsen Ship Management is providing its knowledge and experience as a ship management company for this project and will validate the developed solutions after the end of the project (2021). The goal of this venture is to develop new and innovative services for information provision and to design an efficient and effective exchange between customers. The responsibility of the project lies with the company NAVTOR. This company contributes to the development of automated reporting and onboard infrastructure. Automated data collection and sharing motivates the company to participate in this project. The Veracity Ecosystem is provided by the company DNV for data sharing and exchanges as well as for the support of infrastructure for analytics. Together with the IDS community, Veracity aims to promote the strengthening of international standards. The technology partner, Neuron Solution, provides an architecture for data collection, especially for data provisioning and MDS data transfer solutions for onboard data sources. SINTEF is providing its experience and expertise in R&D in the field of shipping and ship management as well as international standardization (such as Shipping KPI and information exchange) as project manager. Further information can be found on the website (<https://www.sintef.no/projectweb/maritime-data-space-mds>). [14]

Relation to DataPorts

In addition to the strategic initiatives mentioned above, the Maritime Data Space is an initiative specifically for the maritime sector and transport logistics. By placing the company in this initiative, customers and stakeholders from this sector can be specifically addressed. A cooperation with DataPorts enables an intensive examination of maritime-specific problems and challenges. First contacts were made with a representative of SINTEF. While the first contact was conducted in the mid of 2021, the results of the project were not published. After the publication, the results were reviewed, and the developed framework was analysed. The project developed a framework for secure data exchange, while DataPorts developed a complete platform. Both are based on the IDSA standards. Further collaboration can be prioritized after successful exploitation of DataPorts to understand the actual usage of the platform.

3.5 CATENA-X

Members	Use Cases
+140	10

Table 6: Overview Catena-X

Introduction to the initiative

Catena-X is a collaborative and open data ecosystem for the automotive industry (main figures reported in Table 6). It connects global players to form end-to-end value chains. The common goal is standardized, global data exchange based on European values. A core objective is data sovereignty: whoever provides data should retain control and decide individually who participates in the data exchange, how, when, where and under what conditions. Catena-X is to ensure secure and reliable implementation.

Catena-X was initiated in 2020 by a number of pioneering companies and announced publicly for the first time at the Federal Government's Digital Summit in December 2020. The project is funded by the Federal

Ministry of Economics and Climate Protection until mid-2024. Already during the project, generated content is transferred to different operating environments.

Based on the groundwork of Gaia-X and the IDSA, data sovereignty and security as well as interoperability will be ensured. The Eclipse Dataspace Connector (EDC) acts as the central communication component. Together with end-to-end semantics, the EDC implements contractually secured, technologically secure and highly efficient peer-to-peer communication. With the help of this open system architecture and the principles of data sovereignty and interoperability, Catena-X creates the basis for a new market and new business models. Service providers can serve different customer requirements. Furthermore, the decentralized operator model prevents lock-in effects and at the same time provides access to further platforms and ecosystems (network of networks). The fundamentals of the Catena-X ecosystem are based on open-source solutions that are transparently made available to all. With the help of these solutions, business applications are developed within a wide variety of use cases to ensure the competitiveness of the participants. Furthermore, service providers can have their existing solutions verified and certified by Catena-X. Together, a basis for future collaboration within the automotive industry is created, thereby strengthening the global competitiveness of companies. Further information can be found on the website (<https://catena-x.net/en/>).

Relation to DataPorts

As the first Gaia-X lighthouse project in the industry, Catena-X is creating a collaborative data ecosystem to maximize the data-driven economy. International as well as cross-sectoral scaling is considered within the project and is currently being pursued. Accordingly, the placement of DataPorts in Catena-X provides access to a comprehensive logistics network, business cases and ideas for implementing data spaces at scale. Therefore, several talks between Catena-X members and DataPorts partners have been conducted. The fruitful discussions between these data space visions impacted several results at DataPorts (e.g., the customer journey in Chapter 5 or the business model development in WP7). Due to the high maturity of the data spaces solution in Catena-X, the talks should be continued in 2023.

3.6 FURTHER ACTIVITIES POST 2023

Engagement in the above strategic initiatives is a subtask of the scaling strategy for the DataPorts platform. Once the project ends, the task of strategic engagement must continue so that DataPorts can continue to attract new data providers as well as data users to the platform.

The discussions with the corresponding initiatives have shown that it becomes visible which problems the current initiatives are suffering from. In addition, it has been possible to identify what has emerged as best practices. The exchange with the initiatives proved to be particularly beneficial when it came to adapting the procedures or models with regard to the use cases, exploitation, or customer connection. The further focus of the initiatives beyond 2023 should take place in particular with the data space owners (e.g., Catena-X, Maritime Data Space) and in this context have the impact of the data spaces on the ecosystem in mind.

In summary, the following connections should be prioritized even after March 2023:

- IDSA
 - Participate in IDSA Days to get more technical background for data space solution
 - Review data space radar regularly and get in touch with other Data Space Initiatives
- Gaia-X AISBL
 - Expand collaboration to Gaia-X Community
- Fiware Foundation
 - Reaching out to the Fiware Foundation community
- Maritime Data Space
 - Exchange on challenges and solutions for the maritime sector
 - Follow the impact of project closely
- Catena-X

- Follow-up on exploitation plan of Catena-X
- Identify further use cases and on-boarding plan of data space participants

4 CERTIFICATION OF DATAPORTS PLATFORM

As one of the fundamental pillars of the Scaling Strategy and an important milestone in the roadmap for DataPorts, certification takes a central place. The following section discusses the goals pursued with the certification of DataPorts, how certification works, and the influencing factors. Based on this, an overview of possible certificates is given, from which a goal-oriented selection is made with the participation of the DataPorts consortium. Finally, a roadmap is drawn showing how the actual path to certification of DataPorts will be taken.

4.1 CERTIFICATION BASICS

For a general understanding of the topic of certification, we will discuss what certificates are, how they work, and how to obtain them. We will then explain what the goals of a certificate are, in general, and how this can be applied specifically to DataPorts.

What is a Certificate?

A certificate is a type of attestation or deed, by which compliance with certain requirements is demonstrated and usually awarded for a limited period of time. Although they have the same conceptual origin and similar purposes, certification in this sense must be distinguished from the same term in cryptography or finance, as these describe other types of certificates. Certification is clearly regulated and standardized internationally and is integrated into comprehensive processes. It is a sub-process of conformity assessment (ISO/IEC 17000) and is usually awarded by an external organization. These organizations can issue certificates for applicable standards (ISO, IEC, DIN etc.) or check individual requirements they have set themselves.

What gets certificated?

Products and services, associated processes and relationships, people, systems and companies can be certified. As a rule, international, European, national or industry-specific standards are used for the respective areas.

Who does certification?

As a rule, certification is carried out by certification bodies (e.g., TÜV and Dekra). These are usually private companies that require accreditation (ISO/IEC 17011:2018-03) (further important for certification bodies: ISO/IEC 17021, ISO/IEC 17024 and ISO/IEC 17065). For example, in Germany accreditation is granted by the Deutsche Akkreditierungsstelle GmbH (DAKKS), which assumes the function of an authority and is under the control of the federal states, the federal government, and the Federation of German Industries.

How does a certification process work?

In general, it is possible to divide the path to certification into certain phases and work steps, which represent a framework in most cases. By looking at the processes, the way to certification can be broken down into three core phases with several sub-processes (Figure 6):

1. Internal conformity testing

In the first step towards certification, the goal is to bring the company's processes in line with the requirements of the respective certificate. For certificates that certify standards, these requirements are clearly defined in the corresponding standard documents and can be independently viewed by the organization. This is also the variant on which this process is mainly oriented. Other variants will be discussed further in section 4.2 [20].

Based on the selection of the certificate, the process begins with the analysis of the requirements. Based on this, the conformity of the organization's own processes with these requirements is sought through internal project planning and checked in internal conformity tests/audits. Here, an internal control loop is formed (often according to PDCA scheme) to achieve these goals.

2. Conformance testing / Audit

The second step is the actual certification. Depending on the certifying organization and the certificate, there may be slight variations here, but the general core of this process step is the verification of conformity by an external certification organization. Here, external auditors come to the organization to be certified and check the corresponding requirements set in the standards. This can take several days to weeks, depending on the certificate and the size of the organization. A self-assessment is often completed beforehand to increase the chances of success and speed up the process. If the audit is successful, the organization is issued a certificate with which it can present the fulfilment of the standard to the outside world. Such a certificate usually has a certain duration, which in most cases is in the range of 2 - 5 years [20].

3. Re-certification

After the certificate expires, recertification is due in order to continue to demonstrate conformity with the relevant standards. This process usually consists of a streamlined version of the certification process and renews the certificate upon successful completion

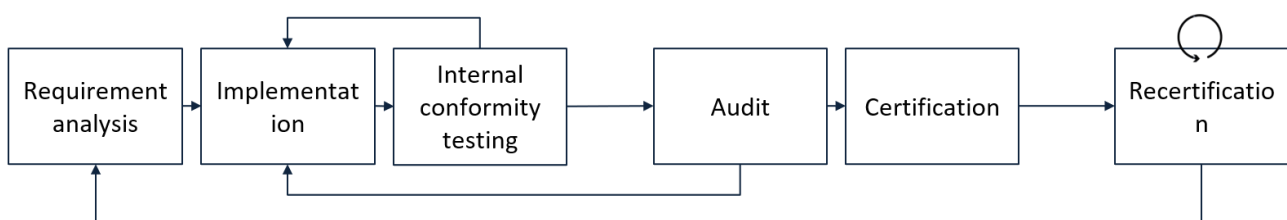


Figure 6: Certification process phases

Motivation

As already mentioned in D6.4, certification is an important instrument for scaling DataPorts on the market. The basic goals of certification are to create trust and acceptance among customers and partners by demonstrating one's own qualifications and providing proof of certain standards. In general, there are companies that require certain certificates from their partners for cooperation, without which cooperation is not possible. A good example of this is the automotive industry, where certain mandatory standards are imposed on suppliers by OEMs. Especially in digital areas, certificates are playing an ever-increasing role, as topics such as data security and General Data Protection Regulation (GDPR) compliance continue to increase complexity and requirements. Here it is particularly important to be able to prove compliance with these requirements to customers and partners.

For DataPorts, this makes certification one of the pillars on which the scaling strategy is based. This measure is intended to address the two core elements of scaling the platform. The first is the expansion of the reach, i.e., the acquisition of customers and partners, and the data revenue on the platform. The aim is to have a strengthening effect on both aspects through certification. The points described in the above paragraph apply at the level of increasing reach. By proving that DataPorts meets certain requirements, any potential barrier to the adoption of DataPorts by interested parties is lowered.

The impact on data turnover on the platform is expected to be even stronger than on reach. To increase data turnover, the group of parties actively sharing their data on DataPorts needs to be addressed. By proving certificates, DataPorts can demonstrate its trustworthy and transparent handling of this data. Compliance topics such as GDPR are also necessary requirements here for many customers. Through certification, DataPorts has the opportunity to address the risks of its customers and significantly lower the barrier to sharing and trading their own data on the platform.

4.2 OVERVIEW OF CERTIFICATIONS

Based on the theoretical principles and the objective of the certification of DataPorts, the selection of suitable certificates is carried out here. For this purpose, a rough framework for classifying the different certificates is first given. A selection of various certificates is then classified and evaluated. Through a survey within the

consortium, a prioritization is then given, through which the targeted certifications for the DataPorts Roadmap are selected.

4.2.1 Certificate Framework

For the classification and rough evaluation of different certificates, a framework is necessary that summarizes the most important characteristics of the individual certificates. For this purpose, the certificates are classified on the basis of their meta-factors and their objectives. For the evaluation of the meta-factors, the certificates are evaluated with regard to their scope of validity, their reference and their certification process (Table 7). In the following, these factors are explained individually.

The *scope of validity* describes which parts of the world the corresponding certificate is recognized in and can thus effectively contribute to scaling. Since DataPorts is primarily a European solution, the focus here is naturally also on the European market. Nevertheless, against the background of further expansion and its establishment as a universal solution, other markets should also be considered.

The *reference* describes whether a certificate refers to a standard issued by a standardization organization or is based on requirements defined by the certification organization itself. For the first case, only the standard to be certified is mentioned in the following listing of certificates. This is usually certified by various organizations, which is why this is rather in the background here. In the second case, the certificate and the certifying organization are considered directly, as these are highly individual.

The *certification process* describes whether a certificate can be obtained through self-assessment, i.e., the company's own review of the requirements, or through an external audit. In the course of the investigation, it became clear that although there are examples of certification through self-assessment (e.g., IDS Participant Certification, CSA Star Certification), these are often only part of multi-stage certification programs. Although they are valid on their own, they offer only limited significance. As a result, they do not play a relevant role for practical application, which is why the focus is clearly on certification through external audits.

Dimension	Characteristics			
Scope	EU	USA	Asia	International
Reference	Standards		Certification Organization	
Process	Auditing		Self-assessment	

Table 7: Certificate factors

For the objective of certification, individual categories were defined into which the individual certificates are classified. Since DataPorts is a digital platform, the focus here is also on digital topics. The topic of cloud certificates, in particular, was considered here in a particularly fine-grained manner, since it is not clearly defined which of the different service models DataPorts is best suited for. In addition to cloud-specific issues, other areas of general relevance for companies and organizations are summarized and briefly described below [21] [22] [23] [24]:

- Cloud Systems
 - Cloud computing describes a model in which on-demand shared computing resources are provided as a service. There are various service models that provide different services. The cloud system referred to here is the Infrastructure as a Service (IaaS) model, where only the computing resources and storage capacities are provided. These are described in the next three objectives. The service models build on each other, whereby each additional one also includes the services of the preceding one.

- Platform as a Service (PaaS)
- PaaS describes a service model in which a programming and runtime environment is provided in addition to the infrastructure. Flexible and adaptable computing and data capacities can be accessed here. The specific offerings differ from provider to provider .
- Software as a Service (SaaS)
- SaaS describes a service model in which the provider offers access to software collections and programs. Traditional licensed software products are often supplemented or replaced in this way by their respective providers.
- Functionality as a Service (FaaS)
- With FaaS, providers make certain frequently used functions available and thus outsource the computing capacity required for them.
- Data Security
 - Data security describes the protection of data against unauthorized access throughout the entire data lifecycle
- Privacy
 - Data privacy describes the control over one's own data and how it is used. Privacy cannot be guaranteed without data security, which is why these areas are strongly interrelated .
- Management Systems
 - Management systems describe a framework of processes, rules and methods that are used to achieve all tasks and activities in an organization according to the objectives. There may be certain specializations, such as quality or environmental management systems.
- Compliance
 - Compliance describes conformity with rules. This applies not only to legal requirements such as the GDPR, but also to guidelines, voluntary codes, or internal company rules. .

4.2.2 Certificates

Based on this framework, the researched certificates are classified and evaluated below (Table 8). The basis for the selection of the certificates are strategy papers of German and European authorities as well as the research for topic-specific certificates. This selection forms the basis from which a certificate baseline for DataPorts is developed with the involvement of the DataPorts consortium as well as responsible persons of the participating ports. In the following the term “Cloud+” means an objective on cloud systems plus several other service model levels.

Nb.	Certificate	Organization	Scope	Validity in months	Process	Objective
1	EuroCloud StarAudit	EuroCloud	EU	24	Audit	Data Security, Compliance, Cloud+
2	Trust in Cloud	SaaS-EcoSystem	DE	12	Self-assessment	Data Security, Privacy, Cloud
3	Trusted Cloud	TÜV Trust IT	EU	24	Audit	Data Security, Cloud, PaaS
4	Trusted Cloud Privacy	TRUSTe	Int.	12	Audit	Privacy, Compliance, Cloud+
5	CSA Star	CSA	Int.	12	Self-assessment	Data Security, Cloud+
6	FedRaMP	FedRaMP Rheinlang	USA	12	Self-assessment	Data Security

Nb.	Certificate	Organization	Scope	Validity in months	Process	Objective
7	EuroPrise	EuroPrise GmbH, Diverse	EU	24	Audit	Privacy
8	ISAE 3402/ SSAE 16	Diverse	Int.	6 - 12	Audit	Management Systems
9	ISO/ICE 27001	Diverse	Int.	36	Audit	Data security, Management Systems
10	IEC 62443	Diverse	Int.	12	Audit	Data Security, Privacy
11	NIST-800-53	Diverse	USA			Security, Privacy
12	BVDW Quality Certificate	BVDW	EU	24	Audit	Digital Services
13	ISO 9001	Diverse	Int.	36	Audit	Management Systems
14	Participant Certification	IDSA	EU	?	Self-assessment, Audit	Management Systems, Data Security
15	Core Component Certification	IDSA	EU	?	Audit	Data Security
16	Operational Environment Certification	IDSA	EU	?	Audit	Management Systems
17	ISO 27701	Diverse	Int.	36	Audit	Compliance

Table 8: List of Certificates

4.2.3 Survey

The selection of individual certificates for further tracking is under the control of the DataPorts consortium. For this purpose, in addition to work package leaders, representatives of the two participating ports of Valencia and Thessaloniki, in charge of certification, were consulted. In total, eight participants from the consortium conducted the survey. A questionnaire was developed for the above list of certificates, which was evaluated and commented by the individual contacts. The result of the survey, discussed in the following section, is derived from the mean values of the individual feedbacks.

The concept of the survey is based on the framework developed for the certificates. Here, the respondents do not evaluate the certificates directly, but rather the certificate characteristics that, from their perspective, should be present in any certificate relevant to DataPorts. This ensures that competent answers can be obtained from the individual perspectives without the participants having to delve too deeply into the topic of the certifications. Within this framework (Table 9), respondents have the opportunity to rank the relevance of the individual characteristics on a scale of 1 (low) to 5 (high) and to provide supplementary comments. The result of this survey should be a prioritization of the individual characteristics of the certificates, on the basis of which a selection of certificates can ultimately be made by means of a cross matrix. In addition to feedback from the reviewers, attention will also be paid to synergies and suitable additions, which will be discussed in more detail in the following section. The full Survey Template can be found in Appendix B: Template Survey Certification.

No.	Question
1	How important is the certification of DataPorts for generating trust with customers in general?
2	Per definition compliance is not a part of certification, but there are huge intersections. How important do you rate the issue of compliance for DataPorts?
3	<p>Various Certifications have a different geographical scope. How important are the following regions for the success of a certification of DataPorts:</p> <ul style="list-style-type: none"> • EU • USA • Asia • International
4	<p>How important is the certification in the following areas for generating trust:</p> <ul style="list-style-type: none"> • Cloud Systems • Software as a Service • Platform as a Service • Functionality as a Service • Data Security • Privacy • Compliance • Management Systems
5	<p>Certificates can be issued according to various (international) standards (e.g., ISO, IEC) or individual requirements of accredited certification organizations (usually private companies). How important is a certification according to these two domains?</p> <ul style="list-style-type: none"> • According to standards • According to certification organizations
6	<p>Depending on the intended certificate and (sometimes) the certification level there are in general two different types of certification processes. On the one hand, you can get your certification by self-assessment, which usually produces a weaker certificate. On the other hand, you can get your certification by an external organization that conducts an audit in the target organization, which is usually more costly but generates a stronger certificate. How high do you assess the impact of each?</p> <ul style="list-style-type: none"> • Certification through self-assessment • Certification through audit

Table 9: Questionary Survey

4.3 SELECTION OF CERTIFICATIONS

By conducting the survey among consortium members, a prioritization for further commitment to certificates emerges. This section concludes by evaluating the results of the survey of eight participants and, based on them, making a selection for certificates that are particularly relevant to DataPorts. These certificates will be examined in more detail at this point and a roadmap for further action will be provided.

4.3.1 Survey Evaluation

The survey outcomes provide a clear prioritization based on the consortium members preferences, which allows a sustainable assessment of the certificates. For this purpose, both the numerically recorded evaluation on the meta-factors, the objectives and further question points as well as the comments of the individual participants are evaluated. For the analysis of the numerically recorded data, a mean value was calculated on the basis of the recorded responses. On a scale of 1 (very low) to 5 (very high), this resulting value reflects the expected relevance of the corresponding property for the DataPorts scaling strategy. The detailed results can be found in 8.3.3Appendix C: Result Survey Certification; they are just summarized and evaluated here (Table 10).

A look at the meta-factors reveals a clear classification by the respondents, for the most part. In terms of scope, there is a clear priority on the EU region. Among the other available regions, no clear tendency can be seen, but a further prioritization of internationally valid certificates is preferred. When considering the reference, the focus should be on certification according to standards. However, with a gap of only 0.5 points, a certification according to certification organization is not prioritized much lower. Depending on the individual certificate there is therefore some latitude here. The process is again clearly rated with a strong tendency toward certification by external audits, which also corresponds to the assessment from section 4.2.1.

Dimension	Characteristics			
Scope	EU 5,0	USA 2,6	Asia 2,6	International 3,8
Reference	Standards 4,0		Certification Organization 3,5	
Process	Auditing 4,5		Self-assessment 2,8	

Table 10: Certificate factors evaluation

A clear preference by the consortium can also be seen for the objectives. The topics of data security and privacy represent the focus for the targeted certificates. However, by looking at the individual evaluations of the members (Table 11), it can be seen that the spread is significantly greater than for the meta-factors. This is presumably due to the different professional perspectives of the participants. In combination with the comments on the individual fields, it can also be seen that the certification of management systems and compliance play a particularly relevant role for certain specialist areas. The prioritization of compliance topics is also underlined in other questions, which is a statement consistent with assumptions, given the background of DataPorts as a data platform. The exact data and anonymized comments on this are also available in Appendix C: Result Survey Certification.

Objective	Score
Cloud Systems	3,8
Software as a Service	3,4
Platform as a Service	3,8
Functionality as a Service	3,5
Data Security	4,8
Privacy	4,5
Compliance	3,6
Management Systems	3,9

Table 11: Certificate objectives evaluation

4.3.2 Certificate Selection

Based on the data from the survey, the intersection with the individual certificates can now be determined. In addition to the specifications from the analysis of the survey, the selection of the certificates is also based on the balance and complementarity between them. Possible synergies between the certificates are also taken into account. All in all, the selection of three to four certificates should result in a balanced overall picture that takes into account the priorities of the consortium and can effectively act as a pillar of the scaling strategy. Using the cross matrix resulting from the survey and the certificate framework, the following certificates were selected.

ISO/IEC 27001 and ISO/IEC 27701

Organization: Diverse, e.g., TÜV Nord

Objective: Data Security

Scope: International

Process: Audit

Validity: 36 months

The ISO/IEC 27001 is an internationally recognized standard and part of the ISO/IEC 27000 standard series published by the International Organization for Standardization and International Electrotechnical Commission. It defines the requirements for establishing, implementing, maintaining, and continuously improving a documented information security management system and the risk management related to information security management. It is applicable to any organization. The other parts of the ISO/IEC 27000 series are also relevant for the integration of the standard, especially ISO/IEC 27002, which gives recommendations for control mechanisms for information security - especially against attacks. This standard has many links to ISO/IEC 90003, which will be discussed in the next section. However, only ISO/IEC 27001 is relevant for direct certificate selection, as it is the only certifiable component of the standard series. As mentioned, ISO/IEC 27001 is a standard and not a certificate. However, there are numerous accredited organizations internationally that can verify and certify conformance to this standard.

The ISO/IEC 27701 is an extension to the ISO/IEC 27001 and covers data privacy issues. The standard provides requirements for establishing, implementing, maintaining, and continually improving privacy information management systems and sets a framework for Personally Identifiable Information (PII) controllers. It is thus important for addressing compliance and adherence to GDPR guidelines. An ISO/IEC 27001 certification is a precondition for its certification.

ISO 9001

Organization: Diverse, e.g., TÜV Süd, Dekra

Objective: Quality Management Systems

Scope: International

Process: Audit

Validity: 36 months

The ISO 9001 is an internationally recognized standard and part of the ISO 9000 standards series, that is issued by the International Organization for Standardization. It specifies requirements that organizations must meet in order to provide products and services that meet customer expectations as well as legal and regulatory requirements. It is applicable to all organizations, regardless of size, type and product/services, and is a fundamental requirement for cooperation with many other companies. The standard is based on the four fundamental pillars of orientation to the context of the organization, process orientation, continuous improvement and risk management. Like the ISO/IEC 27001 the ISO 9001 is a standard and not a certificate, but the conformity with it can be certified by accredited organizations.

Another part of particular relevance to DataPorts is ISO/IEC 90003, which provides guidelines on the application of ISO 9001 to the acquisition, provision, development, operation and maintenance of computer software and related (supporting) services. Like the ISO/IEC 27701 this standard is not certifiable.

EuroPriSe Certificate (European Privacy Seal)

Organization: EuroPriSe GmbH, others

Objective: Data Protection and Privacy

Scope: EU

Process: Audit and document review

Validity: 24 months

The European Privacy Seal is a certificate valid in the EU. It is deployed by the Independent State Center for Data Protection Schleswig-Holstein (ULD) and sponsored by the European Union within the framework of the eTEN-program. Primal the certification is carried out by EuroPriSe GmbH, which was founded especially for the certification, meanwhile there are different organisations that are accredited to issue the certificate. Objective is the certification of the data protection conformity of IT products and IT-based services aligned with the principles of European data protection law.

IDSA Participant & Core Component Certificate

Organization: International Data Spaces Association

Objective: Data Security, Infrastructure

Scope: EU, IDSA partners

Process: Self-assessment, Audit

Validity: limited

With International Data Spaces as a key infrastructure, IDSA occupies the position of a particularly relevant partner for DataPorts. For this collaboration with the IDSA and the partners in this network, different certificates are issued, two of which are particularly relevant for DataPorts. The participant certificate refers to an organizational / management level, while the core component certificate refers to a technological level.

The IDSA Participant Certification is a certificate that every IDS member needs to be able to work in infrastructure. The certificate is intended to demonstrate basic security requirements and effective implementation of a management system in the organization being certified. Three different security levels can be certified, the first of which can be achieved through a self-assessment and the next two through audits of the relevant systems. While the first level is sufficient to participate in the IDS, the third and highest level is necessary for the provision of important services. The third level would therefore be recommended for DataPorts. Synergies with other certificates can also be used for this certification, since properties that have already been certified are recognized here. This applies in particular to ISO/IEC 27001.

The IDSA Core Component Certificate is also required to operate in the IDS. The aim of this certificate is to be able to guarantee the functionality of the components used on the one hand and a corresponding security level on the other. In contrast to the Participant Certification, the focus here is on the technological level. Here, too, there are three successive security levels, the first of which is sufficient to operate in the IDS. Here, too, the third security level would be recommended for DataPorts, but at least the second security level. The criteria for certification are made up of IDS-specific requirements, best practice requirements and functional requirements from ISA/IEC 62443 (standard for industrial communications networks).

In this context, certification of DataPorts in conformity with ISA/IEC 62443 would become relevant for DataPorts. Certification of conformity with this standard alone does not have a high priority as things stand, but with the synergies with IDSA certification, a closer look could become more pertinent.

4.3.3 Certification plan

Building on the selection of certificates suitable for DataPorts, the first steps along the way are then necessary. Important characteristics of the certifications are whether they fall more into a technological or organizational task area and whether they can only be implemented after the rollout or already in the projecting phase.

The selected certificates can be roughly classified as organizationally or technologically oriented, which is relevant to further procedures. Organizational requirements refer to the processes and management in the organization. Since DataPorts does not currently exist as a company, but rather as a project in a consortium, no requirements can yet be implemented or tested here, nor can certification be performed. It makes sense to analyse the requirements for the organization and to develop the company processes in line with these requirements. However, certification of these processes can only take place after the spin-off. The certificates for ISO 90001 and ISO/IEC 27001 as well as IDSA Participant Certification fall into this category. Technology-related certificates refer - as the name suggests - to the technology behind the platform. In the case of DataPorts, this is therefore the software and infrastructure that constitute the data platform. These, too, can only be certified once a market-ready product is available. In contrast to the organizationally related certificates, however, an early orientation to the requirements of the certificates is necessary here to ensure successful certification. Since the platform was not ready in an earlier phase, the technical certification should start after the final testing phase (which depends on the exploitation plan). This group includes the certificates for ISO/IEC 27001 (occurs in both groups), the EuroPriSe certificate and the IDSA Core Component certificate (including relevant components of ISA/IEC 62443).

5 CUSTOMER RELATIONSHIP MANAGEMENT

This chapter describes the concept how DataPorts will be successfully acquiring customers in the long-term. For this purpose, our approach was based on several pillars (Interactions with consortium partners, external experts, potential customers) to align the requirements and needs of the DataPorts platform (Chapter 5.1). An important part of the concept is the data provider community that helps improve the understanding of data sharing in the ecosystem (Chapter 5.2).

5.1 APPROACHES FOR CUSTOMER INTERACTION

Focusing on customer interaction will be an important starting point for DataPorts. A Customer Relationship Management (CRM) is essential in the platform business because it enables companies to effectively manage and monitor interactions across a large user base. Utilizing a CRM system, platform companies can gain a deeper understanding of its users' preferences (e.g., most utilized services, frequency of service usage), which can help improve the DataLab Business model and increase engagement with the DataPorts. The lack of insights into the DataPorts users' preferences can lead to poor customer service, misplaced marketing efforts or missing sales leads which is critical situation for the start of each platform business due to the scaling business models.

5.1.1 Definition and purpose of CRM

CRM refers to a customer-oriented corporate strategy which attempts to build profitable, long-term customer relationships with the support of modern information technology [25]. With CRM, a company can identify the right customers and provide information about products and services using the right channel. The general main purpose of CRM is to optimize revenue through improved customer satisfaction and through improved interactions across the entire customer journey. This can be achieved through a better understanding of customers, based on their buying behaviour and demographics [26].

In general, every company should use CRM if customer satisfaction is to be sustainably increased and higher profits are to be achieved in the long term through cost reductions or sales increases [27].

Customer relationship management is an important tool for a company to build a long-term customer relationship. Therefore, it is essential to deal with this topic early within the company. In order to ensure customer loyalty at an early stage, it is useful to build up a CRM directly with the establishment of the company. This also has the advantage that no restructuring at a later stage is necessary, as this would be expensive and inconvenient. Many studies show that a company's profit increases by up to 85% if it succeeds in reducing the customer abandonment rate by 5% [25]. If companies understand the importance of customer dialog, they will benefit from it in the long run.

The selection and implementation of a suitable CRM solution will help the company achieve several business benefits. The potential benefits are significant and some of them are: Increased customer satisfaction, market share, profit margin, and revenue, immediate access to customer information, improved response time to customer inquiries, Reduced cost to purchase and use products, and Reduced cost to manage customers (e.g., order information, account history, etc.) [26].

However, the organization should be aware that the implementation of CRM is a continuous process that never ends. Customer information was collected to enable DataPorts CRM for successful implementation.

5.1.2 CRM at DataPorts

Typically, enterprises establish a clear CRM vision and strategy. It starts with the description of the products and services that the company offers in the market and highlights the benefits and value propositions that integrated CRM will bring to the customers and the enterprise itself. The description of the products and services are outlined in the deliverable D7.5. Most strategies must focus on building profitable relationships

and customer loyalty through effectively managing the customer lifecycle - acquiring new and existing customers, servicing customers, and retaining customers [26].

In practice, CRM is composed of four different building blocks. First (and foremost) is the strategy for CRM as the first building block. The next building block is the customer journey, where the focus is on the customer touchpoints across five phases. The next building block is the operational processes. These cover everything regarding marketing, sales and service in the customer interaction. The last building block is the analytical CRM. This is important for evaluating the previous building blocks and adjusting them if necessary. To adjust the CRM concept ideally for DataPorts, several customer data has been analysed and the insights have been integrated into the CRM concept.

A CRM guiding principle for DataPorts has been developed (see Figure 7) based on the survey of DataPorts experts and the best practices in CRM. In total, we defined six building blocks for DataPorts – CRM strategy, customer journey, processes/workflows, analytical CRM, and Data Provider Community – to define the interaction with DataPorts’ customers. The CRM strategy defines the overall goals and objectives of the customer relationship management (CRM) that influence the interaction in the customer journey. Processes and workflows are the operational steps that enable the organization to deliver consistent customer experiences across all touchpoints. The data that are collected across the customer journey and processes are used to gain insights into the customer behaviour and preferences. The Data Provider Community supports all functions and deliver detailed insights for the entire DataPorts CRM. Furthermore, all building blocks are aligned with customer data which the DataPorts partners collected in several events which were interested in DataPorts. In the following, the customer data and the individual building blocks/steps for CRM at DataPorts are explained in detail.

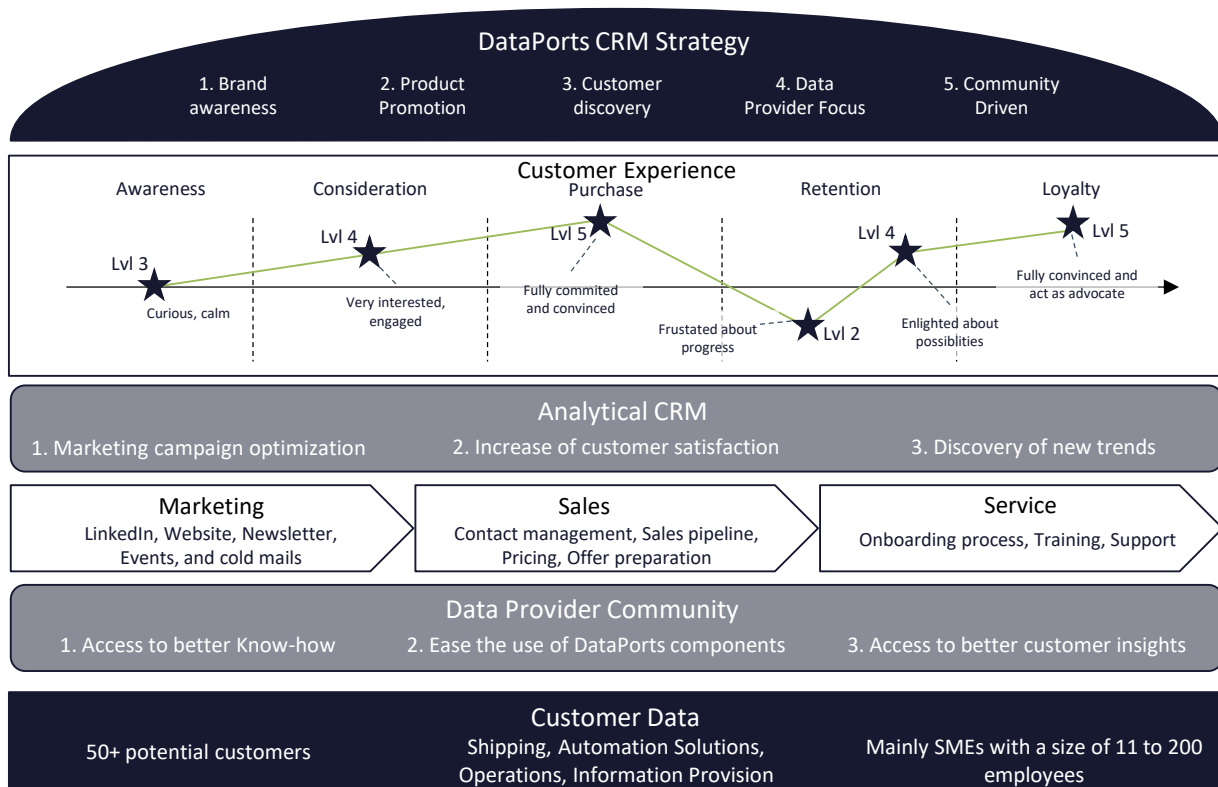


Figure 7: Customer Relationship Management at DataPorts

5.1.3 Potential Customer Data for DataPorts

The goal of CRM is to provide personalized customer service to reach the right customer in the right time with the best value proposition. For that purpose, over 50 customer data records of maritime customers were collected and analysed. The data and personal talks with customer on several events will be used to enhance each building blocks and create the best possible CRM concept for DataPorts.

Leading to the implementation of the DataPorts platform into the market, potential customers need to be found which are interested in taking part in the whole ecosystem. First customers are needed to be found, through different methods of advertisement and communication, to start the ecosystem of different organizations in the maritime industry. A Data Platform can only operate successfully if there is data of different organizations to trade with. With an initial number of organizations in the ecosystem, the economy of scales can gain traction. An organically growing can be initiated only after the first batch of companies. Finding these potential organizations is the challenge of the CRM.

To tap potential customers for DataPorts, on the one hand, data is used that has been obtained through several sources. These are data given by company representatives to DataPorts representatives. Their interest in the project gives an indicator for a potential first customer. In addition, DataPorts consortium partners were interviewed for potential customers. Furthermore, companies were researched through LinkedIn in the maritime sector across Europe.

The collection of the potential customer data includes key factors used for later analysis and forming of the CRM strategy. The points are considered while analysing the organization to find potential customers. The location gives us an overlook about the geographical environment they are in and the economic proximity. A key factor which needs to be considered is the size of each given organization. Enterprises in the list have a size reaching from “1 to 10 employees” to “501-1000 employees”. It is necessary to analyse which size is optimal for a potential customer in the Industrial Data Platform, especially in the initial phase of operation.

The industry sector of organizations is as well an essential point in analysing the possible customers of DataPorts. The products and services by a given company will also be gathered and clustered in matching groups. This gives an overview, what kind of data could be provided as Data Provider into the market.

In addition to these points, we analysed the possible customer groups, which could be interested in the services offered.

An initial analysis of the potential customers records 52 customer data. Based on the size of the companies, a brief overview of the distribution is shown below:

I.	1 to 10 employees	n=2
II.	11 to 50 employees	n=26
III.	51 to 200 employees	n=13
IV.	201 to 500 employees	n=6
V.	501 to 1.000 employees	n=1
VI.	1.001 to 5.000 employees	n=4

The analysis of the size of potential customers shows that mostly, 41 out of 52 customers could be identified as small and medium-sized enterprises (SME's). Only 11 companies can be described as big corporations with over 500 employees.

Geographically, organizations are located across whole Europe. We can find maritime companies in countries from the United Kingdom, Germany, Spain, and Cyprus, while many of the companies are in Greece. Reason for this is the geographical proximity to the DataPorts use case in Thessaloniki, which acts as an accelerator in the acceptance of the project for the organizations.

The maritime industry contains branches with different offered services and products. Similar industries can be clustered into one branch with services that can be grouped together. For one instance, one of the sectors

is the traditional **maritime shipping and logistics**. It involves all physical activities in getting the cargo transported from point A to point B through ships. The **Maritime Operations** sector defines all secondary activities, which assist the naval shipment in any form. These can range from planning, managing and operating ships and their shipment. The Maintenance of ships, Fleet and Crewing Management activities fall under this sector [28] . To communicate the goals and benefits of the DataPorts Platform, organizations are needed, which fall in the **Information and Communication Community sector**. All organizations are grouped here, which focus on the exchange of information through magazines, events, or other forms of communication. **Automation Solutions and IT-Services** includes all services and software products in the maritime sector who offer maritime technology. Other organization we found will be listed under **Others**. The distribution of the found customers can be found below:

I.	Maritime Shipping and Logistics	n=8
II.	Maritime Operations	n=9
III.	Information and Communication Community	n=5
IV.	Automation Solutions and IT-Services	n=14
V.	Others	n=16

Across all branches of the maritime industry, an even distribution of companies can be seen. All branches have potential in providing data to the platform, which lead to an exchange of data through the different customers in the Data Platform.

Through a qualitative assessment with different members of the DataPorts committee, an evaluation of the fit of the organizations found can be conducted. The evaluation ranks the strategic fit from the lowest (1) to the highest (5) in a subjective way. A mean average is formed and used for further analysis. The two most important key factor for CRM is the industry of the companies and their size. Evaluating the strategic fit in relation with these factors gives insight for building the optimal CRM strategy for DataPorts.

After evaluating the different maritime industry sectors in contrast with their strategic fit leads to the matrix below:

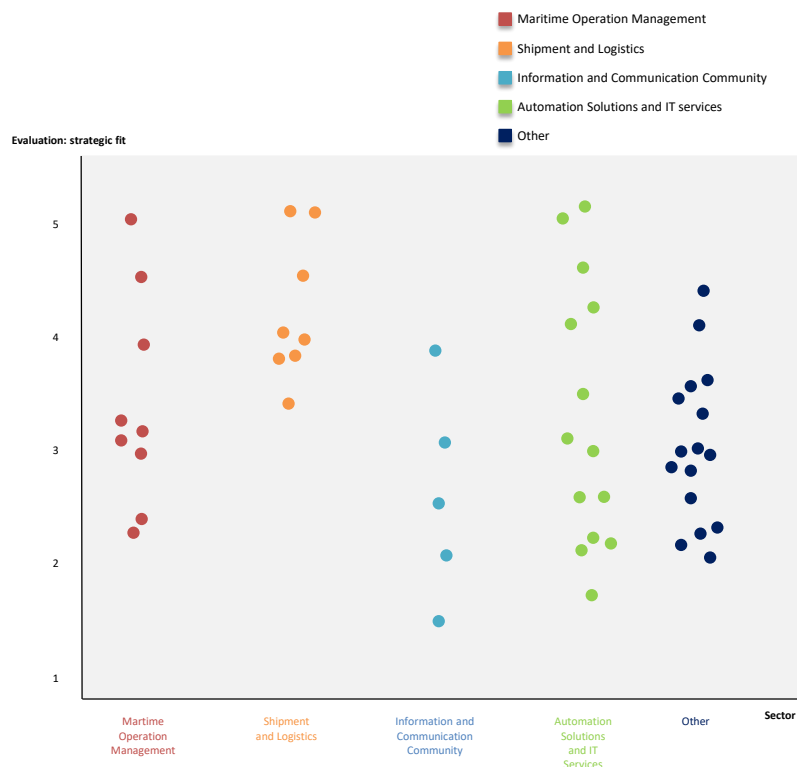


Figure 8: Evaluation of potential customers by sector

All 5 defined sectors show a wide strategic fit of the organizations with no clear patterns emerging. However, different sectors have a slightly higher and lower median strategic fit in sum. In particular, the Information and Communication Community Sector shows a lower evaluation of the fit in comparison with the other industries. Here, the median of the organization is at 2.6, which is the lowest of all sectors.

The highest evaluation received lies in the Shipment and Logistics sectors. With a median evaluation of 4.25, this industry has the highest potential in finding potential customers who can add value to the ecosystem and has higher interest in joining DataPorts.

Organizations in the Maritime Operation Sector lie in the range from 2.5 to 5 and are with an average of 3.38 the second highest evaluated companies in the analysis, followed by the Automation Solutions and IT-Services with an average of 3.18. IT-Services are in comparison strategically broader than the other industries. Organizations here range from an evaluation of 1.5 to 5.

Organizations in sector “Others” have the lowest assessment. The evaluation shows a strategic fit of 2.9 throughout all the potential customers in this sector.

The other factor, which will be analysed for the strategic fit is the size of the company. Figure 9 visualizes the broad clusters of the organizations, distributed in the sizes of the companies. The colour of each point in the matrix represents each given company with the colour of the related industry branch:

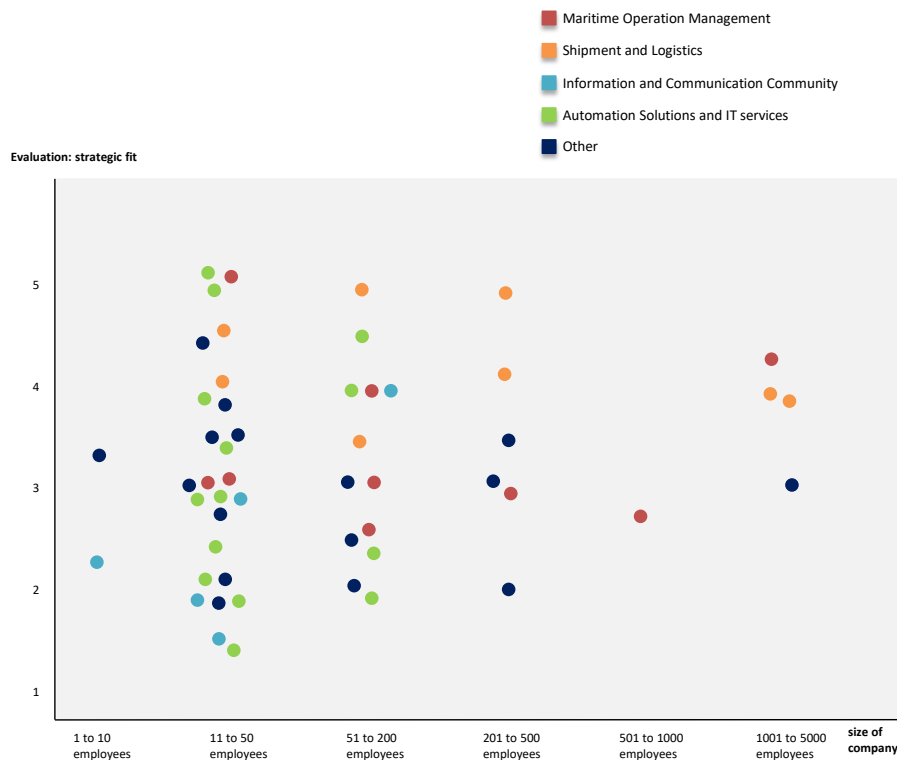


Figure 9: Evaluation of potential customers by size

Most of the companies are found in the range of 11 to 200 employees. Companies with a size of 1-10 employees as well as the category of companies with the size of 501 to 1000 employees will not be analysed further, due to the small sample size. Generally, no correlation can be found between the size of the company and the strategic fitness in the DataPorts ecosystem. An even distribution of the organizations is seen, from a low evaluation to a high one. The average evaluation across all sizes is 3.3. As the size of the company increases, so does the strategic fit as potential customer. A trend can be seen emerging, going from an average fit of 3 with small companies with under 11 employees to an evaluation of 3.8 for organization with

501 to 1000 employees. With exception of the evaluation of 201 to 500 employees, the trend increase can be shown in Figure 10:

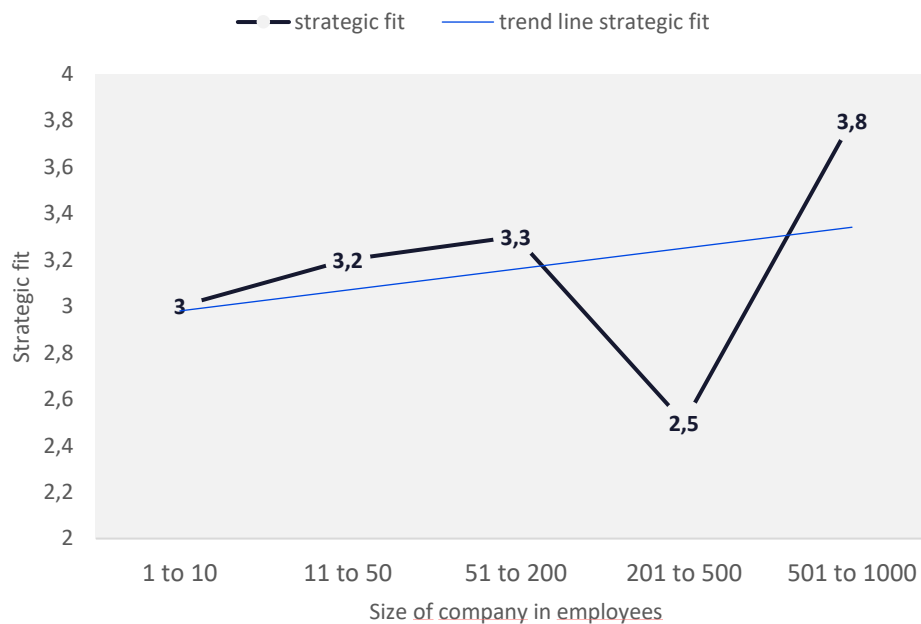


Figure 10: Trend of strategic fit with growing company size

With the insights about potential customers of DataPorts and the analysis, a CRM strategy can be formed, which focuses on the scaling of the platform through new members. We can split the companies into 3 groups, depending on the evaluated strategic fit. With a rating of above 4, companies are **direct potential customers** and immediate action needs to be taken to engage them and persuade them into joining DataPorts.

Organizations with a strategic fit between 2.5 and 4 can be defined as **indirect potential customers**, who don't need to join to platform as early customers. A constant communication is still needed to remain in contact with this group and to spread awareness across the industry. A tool for communication is through a DataPorts community, which will be explained in a later section.

The last group are organizations with an evaluation lower than 2.5. They are not relevant for the CRM and won't be considered in further analysis.

5.1.4 CRM Strategy

For defining the CRM strategy, several sources were used. Events as Posidonia Events, results from other working packages and a survey with consortium partners were used to define the possible goals and targets for DataPorts. Since DataPorts is an EU-Research Project, the overall goal is to involve as many customers as possible and get as many new customers as possible to the prototype. Especially, DataPorts need to build up the network within the maritime sector to establish DataPorts as an interesting product. For this purpose, several goals can be established to define the CRM strategy:

1. Increase brand awareness: The initial step will be directed towards promoting DataPorts' brand. This is important because DataPorts business is currently unknown in the market, and it is required to establish the brand so that customers will start associating with it. Since the kick-off of the project, several events and collaboration have been conducted to raise awareness for DataPorts (see Chapter 6).

2. Promote the product: The products (e.g., 2-3 promising services based on the deliverable D7.5) and functionalities will be promoted to address the advantages and solution space to the customer. It increases the customer trust in DataPorts and enables data sharing in the long-term.
3. Discover potential new customers frequently: It is crucial to recognize potential customers and categorize them in accordance with their traits and requirements. DataPorts serves several customer groups in a variety of customer roles (e.g., Data Provider, Data Consumer). The priorities as an EU research project should be to involve more ports across Europe and gain new users for the platform, beyond the project. New customers should be identified through the CRM strategy on a regular basis.
4. Focus on data provider: The customer data analysis reveals that data providers, particularly, are underrepresented role and need to be strengthened. Since data provider (e.g., ports, logistics actors) are crucial for delivering the data for DataPorts, this customer role/group needs to be involved in regular meetings and strategic planning to build trust in the brand. For this reason, data provider are evaluated high in the strategic fit, usually over 4, which means that immediate action should be taken. Through direct contact with representatives, the services and products of DataPorts should be advertised to the potential customer.
5. Strengthen the community: Since collaboration in data spaces is still an upcoming trend and not familiar for many companies, it is required to introduce the technology step-by-step for future customers. The DataPorts community is the vehicle for collecting requirements and understanding the special needs for the individual customer groups. Especially the pain points that need to be extracted from current situation to determine the requirements for their daily work. In the evaluation, we can find most organizations in the threshold of the strategic fit between 3 and 4. In this segment, customers are not suitable yet for data space, but with new emerging services in the space and a rising interest in the technology, more and more companies in the community will see the value of joining DataPorts and sharing their data. For this reason, a community of companies should be established and actively lived.

There are also other goals as continuously monitor and measure the progress in DataPorts. These activities shouldn't be used as goals in the strategy. Monitoring is an important activity which needs to be conducted regularly. In the fast-growing market "Data Spaces", the CRM strategy should be updated in 2-3 years after DataPorts established in the market.

5.1.5 Customer Journey

A customer journey is the collection of experiences that a customer goes through when engaging with a company. It includes all customer interactions with a company, from awareness and consideration to purchase, retention, and loyalty. Defining the customer journey is an important artefact because it allows companies to understand and improve the overall customer experience, identify areas for improvement, and increase customer satisfaction. The structure which is used to describe each phase of the customer journey includes seven key components. These components are customer activities, goals, and participants, touchpoints, experiences, business goals of DataPorts, KPIs, ownership at DataPorts, and organizational activities [29]. This structure provides a comprehensive understanding of each phase and helps to identify the key actions and goals to successfully accompany customers through the customer journey.

Customer Phase: Awareness

In the awareness phase, the customer groups search actively for solutions to fulfil their daily operational needs by reading success stories on different communication channels. The customers have not defined specific goals yet how to improve their business operations. The customers are open-minded for various technologies and solutions and curious about DataPorts' idea and solution. They prefer to interact via social media (primarily LinkedIn), events (e.g., Posidonia) or get information via cold mail. The overall experience for the customer is interesting, but still moderately calm.

The goal of DataPorts in the awareness stage is to increase its visibility, raise the importance of data sharing in the maritime sector and the customer groups, and get deeper insights into the sector problems. It is the tasks to establish DataPorts as a reliable solution for data sharing in the sector and provide the first mover advantage. Typical activities at this stage are creating a website, identifying appropriate events for presenting DataPorts, detecting customer pain points, creating marketing materials (both online and offline), and engaging with the data sharing community.

The key performance indicators (KPIs) that will be monitored during this phase include for example, the number of business cards collected from events, LinkedIn views per post, identified contact persons, number of followers on LinkedIn, and Google Analytics. Especially, the marketing and sales department will be in charge of executing this stage in the customer journey.

In the last three years already a lot of awareness was created among different data space initiatives (see chapter 6).

Customer Phase: Consideration

The customer finds several products and ideas for solving its business issues (incl. DataPorts Platform). They understand the idea of data sharing opportunities by talking to other DataPorts participants and are actively mapping data sharing solutions to their business needs to see possible business operation improvements. DataPorts as a potential solution will be reported and discussed with the customer top management. The customer participants could be the business development, innovation management, process engineering, or IT. An important enabler at this stage is the top management, which need to include data sharing business cases into their digital strategies.

To provide a strong engagement points, DataPorts should provide several touchpoints for the customer. The first deeper contact will be via the website of DataPorts. In order to get more information, the customer can join the newsletter, the community or workshops, where the customer enters in a passive communication form to receive more knowledge about the solution. These touchpoints should provide the customer with valuable information, best practices, and examples of how other companies have benefited from data sharing. Additionally, DataPorts can understand the customer's specific needs and pain points and adjust their solution to meet their needs through the community.

DataPorts' goal in this phase is to increase engagement, extent the network and support the customer's understanding of the data sharing opportunities. It might be that the solution will not trigger the customer to participate in DataPorts directly (due to digital maturity for example). The knowledge transfer (in form of success stories, use cases and incentives) of data sharing will impact them in the long-term. For this purpose, it is crucial to executed organisational activities as preparing community meetings, sharing best practices of data sharing possibilities, understanding further problems of interested parties, or identifying top stakeholders in the corresponding company. This increased brand awareness can be measured through KPIs such as the number of participants in community meetings, website visits, and newsletter subscribers. The responsibility for creating and executing these activities lies with the community leader, sales, and communications teams.

In conclusion, the consideration phase is a critical moment in the customer journey where DataPorts can make a sustainable impression on the customer and improve the relationship. By providing valuable information and opportunities for engagement, DataPorts can position themselves as a trusted and knowledgeable partner in the data sharing ecosystem.

The customer journey in this phase actively addresses the data providers. It takes more effort and time to convince data provider to join the platform. The analysis of the customer data also shows that there are less data providers than data consumers. Due to the analysis, the top management needs to be involved in an early stage of the customer journey.

Customer Phase: Purchase

In the Purchase phase, the customer's goal is to ensure that the right solution is selected for the company. The customer evaluates the DataPorts solutions using information collected in different sources (e.g., community or events). Mostly, the top management is involved in the final decision. Due to the fact that data sharing is a completely new concept for the maritime sector and general digital maturity is traditionally low, the decision-making process will be more challenging and will require more persuasive power from DataPorts representatives. The customer participants at this phase are typically close to top management. The decision-making process should be supported by multi-layered touchpoints such as workshops, mail exchanges and personal meetings with the top management. Workshops can be used to further educate and persuade top management about the benefits of data sharing and DataPorts solutions in their company. Mails can be used to provide detailed information about the procurement process and answer remaining questions.

DataPorts' overall goal should aim to convince the customer's top management of the vision and show them the long-term benefits of their solution. DataPorts needs to establish themselves as a trusted partner for the maritime sector to fulfil the business goals of new customer acquisition. To define success in this phase, the performance system should consider KPIs such as the number of meetings with top management engagement and the number of acquired customers. Especially in the beginning of DataPorts, the number of meetings with top management is an important indicator how much attention DataPorts will receive.

The procurement and DataPorts' top management are responsible for executing the activities in this phase. To summarize them, activities during this phase include actively connecting with customer's top management, starting the procurement process, and releasing press information about the collaboration.

As mentioned above, data sharing across enterprise levels is a completely new concept, which is why the purchase phase requires additional engagement and education efforts from DataPorts. The first three phases are important to convince the whole management from the data space vision, because the on-boarding in a traditional industry will be challenging and frustrating for the customer.

Customer Phase: Retention

In the Retention phase, the customers slowly start to use the services provided by DataPorts and get a better understanding of the value that shared data sharing provides. However, the onboarding process can still be challenging for the organization due to the complex data sharing concept and the low digital maturity. The customer activities engage closely with the DataPorts services and ecosystem with the goal to integrate the services into the business operations and to onboard employees for the data space technology. The customer participants in this phase are the organizational units that are using the services, including business development and IT. The touchpoints during this phase are technical and organizational onboarding and the interaction within the community. Technical onboarding includes the deployment and maintenance of the technology, while organizational onboarding focuses on adapting the tasks for using the technology (e.g., how to start the service, who do I contact in regards of issues). The community represents a group of data providers that participate to learn from best practices and to achieve better collaboration with other organizations.

At the beginning of the retention phase, the customer experience is rather frustrating due to technical issues in deploying or maintaining the technology. They may also feel that the organization and people do not have enough willingness to adapt to the technology. However, after successful adaptation, the customer experience reaches another peak: The business units are excited to see the possibilities based on shared data and start to develop new ideas.

The main business goal of DataPorts during this phase is to simplify technical and organizational onboarding with ready-to-use technologies. To measure the success, the time for completion of onboarding (from start implementing technologies until the first operation) and the usage frequency of services on the platform should be tracked. Organizational activities include developing documentation and training materials for the onboarding, supporting the customer technically and organizationally, and motivate customers to participate

in the community. The responsibility for these tasks is mostly allocated in the IT, supported by other organizational units.

To successfully attract customers sustainable, DataPorts must simplify the onboarding process with ready-to-use concepts, provide technical and organizational support to the customer, and focus heavily on data provider community. Consequently, DataPorts can ensure that the customer sees the value of data sharing and continues to use DataPorts' services for the long term.

Customer Phase: Loyalty

After some time of working operationally with the services, the customer has completely understood the concept of data sharing and have seen the benefits that it brings to their organization. During this phase, customers become advocates for DataPorts and helps to increase the participation of further partners in the ecosystem, by talking to their customers and motivating them to join the platform. A further interest of the customer is to improve the platform by giving regularly feedback. This could be done by different departments or employees such as business development, the impacted organization, and top management. The most personal touchpoints with DataPorts happens in the community and workshops, such as innovation workshops, where the customer actively engage. In the community the customer shares feedback and best practices with other DataPorts participants, while the innovation workshops focus on improving services for the customer itself. As the customer continues to use DataPorts, their experience reaches its highest point where the customer turns into an advocate – they understand possibilities and limitations of data sharing, are able to define business cases, and convince other partners to join the platform.

The business goals for DataPorts are to turn customers into advocates and share their experiences on several platforms, such as LinkedIn, websites, and events (e.g., Posidonia). For achieving this, DataPorts must proactively collect feedback and testimonials from customers, improve services in workshops, prepare community meetings, and share best practices. The KPIs that should be tracked during this phase include active participants in community meetings and the number of social media posts with customer testimonials. The ownership of these goals and activities remains with the community leader, marketing, and sales departments.

5.1.6 Operative CRM processes

Beside the customer journey, there are important operational CRM processes that are considered across the entire customer journey, including marketing, sales, and service. All three processes are relevant in each phase. Beyond the DataPorts project (form of exploitation is determined in the exploitation plan) the marketing needs to be prioritized in order to acquire the first customers.

The marketing processes are active in the awareness, consideration, and loyalty phase of the customer journey. DataPorts aims to increase its visibility, raise the importance of data sharing, and establish itself as a reliable solution for data sharing in the maritime sector. In the customer journey, LinkedIn, Website, Newsletter, Events, and cold mails are already selected as the instruments. Therefore, appropriate events for presenting DataPorts need to be identified, detect customer pain points, and create marketing materials (both online and offline) to engage with the data provider community. But also use testimonials of satisfied customers to present them on social media.

The sales processes cover the Purchase phase of the customer journey. The goal is to turn potential customers into customers. This is where the sales department comes in. They must convince the customer's top management of the vision and show them the long-term benefits of the solution. The sales department and DataPorts' top management are responsible for executing this phase. They take care of the sales pipeline, product, pricing, offer preparation, and contact management. They approach potential customers, negotiate prices, and conclude purchases or contracts. DataPorts actively connects with the customer's top management, starts the procurement process, and releases press information about the collaboration.

The Retention phase of the customer journey is where the service department collaborate with the customer. The goal is to simplify technical and organizational onboarding into DataPorts. IT and other organizational units (e.g., service) are responsible for executing this phase. DataPorts must simplify the onboarding process with ready-to-use concepts, provide technical and organizational support to the customer, and focus on the data provider community. This leads to organizational activities that include the development of documentation and training materials for the onboarding process, supporting the customer technically and organizationally, and motivating customers to participate in the community.

In summary, the marketing department's main responsibility is to attract potential customers to DataPorts, while the sales department is responsible for turning those potential customers into actual customers and the service is keeping the customer on the platform. These processes work together to build a strong customer base and promote long-term success for DataPorts.

5.1.7 Analytical CRM

In this step, it is important to track and analyse customer data and behaviour. Data analysis and monitoring with the use of KPIs can be utilized to evaluate previous actions and to make recommendations for action.

An analytical CRM basically consists of three components:

1. Data warehouse (here: central management of CRM profile data) as the central data source for analysing customer data (360-degree customer view)
2. Reporting applications for answering questions and hypotheses
3. Data mining for identifying patterns in customer behaviour

Here the focus is on the first point, the creation of a data warehouse. This is because the data basis must first be created and as described at the beginning, the CRM profile data must be the first step. In the data warehouse, all information about the existing and potential new customers are collected and stored. Data from customers with general information, contact information and the products and services offered are contained in the warehouse and used for analysing. Already carried out actions and interaction with the individual customer are collected in the warehouse for monitoring activities. With sufficient data collected, an analytical CRM approach can be performed to achieve the goals of our strategy.

On a general level, the interaction with customers and their behaviour can be monitored with Key Performance Indicators. Used to measure the success of the actions taken, KPIs are needed to provide a guidance throughout the strategy. It enables the prioritization of efforts to maximize the resources used to improve customer satisfaction, an increase of sales and the reduction of churn among customers. The KPIs are used to track the progress of the strategy over time and adjust the CRM strategy over time.

Common Key Performance Indicators in Analytical CRM give insights about the performance of activities performed to satisfy customers. For that, the *customer satisfaction* can be measured as a metric. It measures the level of customer satisfaction with products and services of DataPorts. Through customer survey, feedback forms and other methods, the customer satisfaction can be measured.

The use of the Platform can be quantified with the help of the *customer retention*. This measures the percentage of customers who continue to use the service over a given period e.g., over 1 year.

On a financial point of view, can be measured the cost of acquiring new customers with the KPI *customer acquisition cost*. A quantification of the cost of acquiring a new customer with the expenses of marketing and communication.

Through Analytical CRM, the brand awareness (1.) and the promoting of the product (2.) through **marketing campaign optimization** can be increased. By showing, which marketing campaigns are working, and which are not, an optimization of efforts by creating the awareness for the platform is carried out, while reducing the cost and the time for these activities. One tool to track the efficiency of the marketing activities is to compare the number of potential new clients collected for each activity. E.g., we found through the Posidonia

Event 21 new potential customers, which is a basis for upcoming events and communications channels. Over time, one can compare the number of potential new clients of an event with this number and evaluate the efficiency of the campaign.

A key factor of monitoring the customer data is the **increase of customer satisfaction**. With a high satisfaction of customers, the goal of focusing on data provider (4.) is achieved and roles in the ecosystem are strengthened. With information gathered in the warehouse, an individual customer profile can be created for a customer to understand their values and preferences. Based on their profile, a tailored service can be offered to them.

New potential customers, who are close to the ideal customer are identified based on the analysis of the data. Our CRM goal of discover potential new customers frequently (3.) can be achieved with the **discovery of new trends and market analysis** through analytical CRM. Patterns in current customers and leads can be identified to predict emerging trends in the industry. Potential new markets and new customer segments can be discovered with its help, which can fit as new data provider for the platform. The basis for the discovery is the dataset collected over time, which allow for insights in already existing customer, which will be projected into the whole market to form a customer segmentation, based on factors like where companies are geographically located in and are potentially on the verge of a disruptive digital change. There, new customers can be immediately identified and integrated into the community of data provider for DataPorts, where they can later be transformed into new customers. The goal to strengthen the community (5.) can therefore also be achieved with an analytical CRM approach

Based on the customer analysis, different approaches can be helpful. Analytical CRM is intended to be supportive for other CRM operators. First, KPIs can be used to conduct detailed monitoring. KPIs that can be used are, for example, number of campaigns, number of potential customers, number of interactions, number of completed purchases, etc. This can further fill the CRM database and recommendations for actions can be made. For example, the analytical CRM can help to improve the customer journey, as it becomes apparent which approach concepts work well. This approach helps to cover white spots of DataPorts and to deepen the already established business.

5.2 DATA PROVIDER COMMUNITY

A community is defined as platform, in which different stakeholder get together, because they pursue similar or the same interests. A shared added value is achieved through the communication and a dialog with each other [30]. In general, it's an association of different people, who share a common identity. Within this group of people, a sense of belonging together is developed. Values are shared across the community through interactions. One property of a successful community is a self-controlling drive, in which the community regulates itself without any influence from the outside. It can grow towards other interests and can follow different goals over the lifespan of the community.

In contrary to a crowd, a community consist of a manageable number of members, which are well-known to all. In a crowd, a high number of people exist, which are anonymous. A crowd and a community both follow a same goal they try to achieve, but in a crowd, there is no interactions between the members. A community thrives from these interactions. Over the course of following the goals, the identity build in the community leads towards building similarities.

DataPorts is a community, which acts mainly in a digital environment. Digital environments have the technology, which the platform is built on, as a characteristic. It defines, which hardware and software are used for the interaction of the members. The use of ease of the user interface acts as a success factor. Furthermore, the two other characteristics of an online community are the social relations of the members and the content generated through an exchange of information. The structure of a community in a digital environment has the goal in adding value to all its members through an exchange of the members. Therefore, a suitable structure of the community should be established first before trying to involve members in the community. The structure of the DataPorts community is showed in the following (see Figure 11):

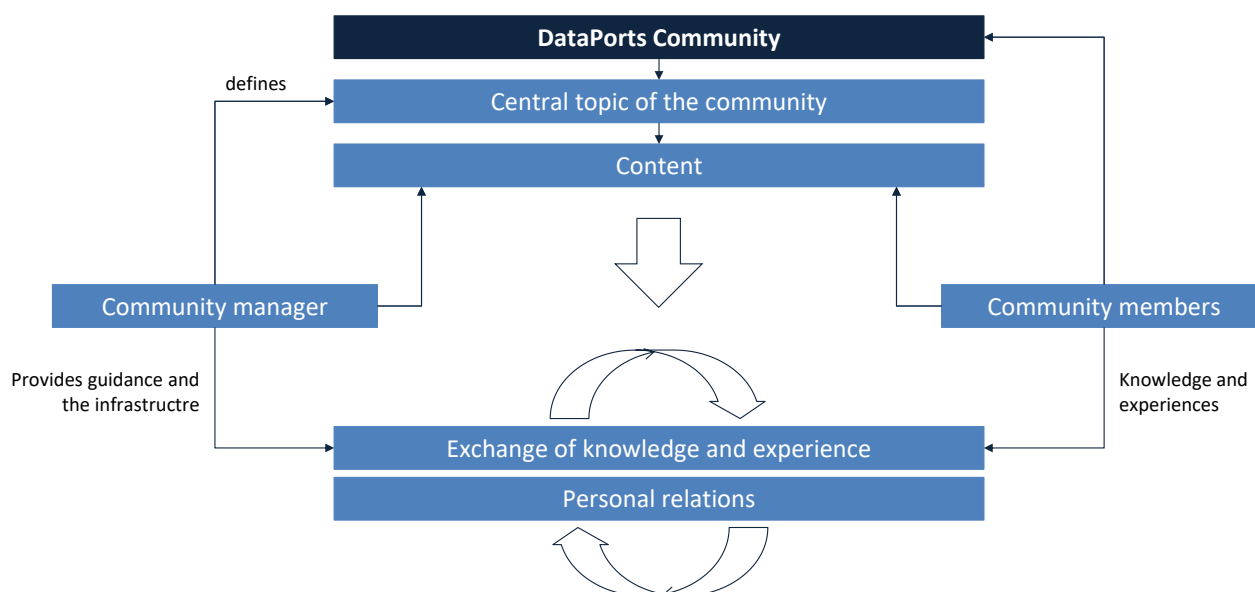


Figure 11: Structure of the data provider community

Different success factors are essential in building a strong community. The biggest is the role of the community manager. The role coordinates all activities around the community. Building relationships with the customers and potential new customers lies in the responsibilities, alongside the organization and lead of various events to the central topic. The community manager defines the topic and provide content, either by himself or internally by members of the community. Community managers are neutral instances with the responsibility of building the community as a whole. In its inception phase, they are looking for potential members for the community and are trying to build a core group of companies fitting for the ecosystem, even before the official building of the community. With the help of the community manager, potential members can be found. Possible barriers of entry and other challenges are identified in one-on-one interaction with each individual member. With that, the motivation is improved, and members are encouraged to participate in activities. External communication is crucial in the inception of the community and is needed to be executed by the community manager.

The central topic of the community is to be defined as clear as possible. The question must be asked whether other communities exist in the maritime sector and to evaluate the similarities of the topics. A successful community is characterized by a clearly specified thematic area, in this case the use of data in a maritime environment and around port authorities. At the beginning, the core topic of the community should be the integration of the technology into the company and the resulting benefits based on use cases. The implementation of data sharing technologies is complex, and the resulting lessons learned are an important component for other members.

Based on the questionnaire conducted with DataPorts partners, the general topic and the associated type of content for a community of data provider can be narrowed down. Main activities are needed to focus on collaboration, exchange of information and data sharing. Result for community members is an information exchange and know-how about data exploitation, which leads to deeper customer insights and a better support of the DataPorts components on the DataPorts side. Task- and product-oriented content are especially of importance. They are a type of content, which provide information about relevant topics and products in the community. Blog entries, studies, whitepapers, surveys, case studies, a directory for industry experts or product presentation of DataPorts services. Roundtables, regular meetings, collaborative workshops, or questions rounds are a type of content based on interaction between community members. Content with a focus on interactions lead to collaboration and the exchange of information in the community of data provider, which is one of the priorities analysed from the questionnaire. All content, regardless of its type, focus on the DataPorts ecosystem and the value generated by sharing data in a marketplace. In

addition, a regular communication and interaction in the community through content is one of the biggest success factors in achieving an active community.

As described in 5.1.3, potential customers of DataPorts, who have a barrier to join the ecosystem or who are not strategically fit yet for the DataPorts, could be members in the community and capitalize on the exchange of knowledge and experience within the community. Out of the 50 potential customers analysed, 24 are indirect potential customers in the future and would fit optimally in a DataPorts community. Furthermore, the 18 direct potential customers show higher engagement and are more fit for the ecosystem and could bring more value into the community. In Figure 12 below, the indirect potential customers find themselves in sector I. of the community commitment curve, while the direct potential are emerging members. Other potential members are relevant associations, Port Authorities, DataPorts partners and partners in customs, shipping, or logistics. The importance is the perceived value in participating in a community for each member. Intrinsic motives are necessary for a sustainable development of a community. New members should be made as easy to join as possible, a support when joining the community should be provided.

The value created in a DataPorts community arises from their members and their participation. Four main factors are needed to be fulfilled to achieve commitment among the community: the support of members, the community value, member contribution and a freedom of expression [31]. Generally said, the commitment is built in a curve over time. Therefore, different types of content and activities are needed to be offered the members. To make the community as attractive as possible for everyone, there should be activities which requires low effort and enables possible new members to join and attend the community. Activities with higher effort are for committed members, who are trying to actively shape and involve themselves in the DataPorts community.

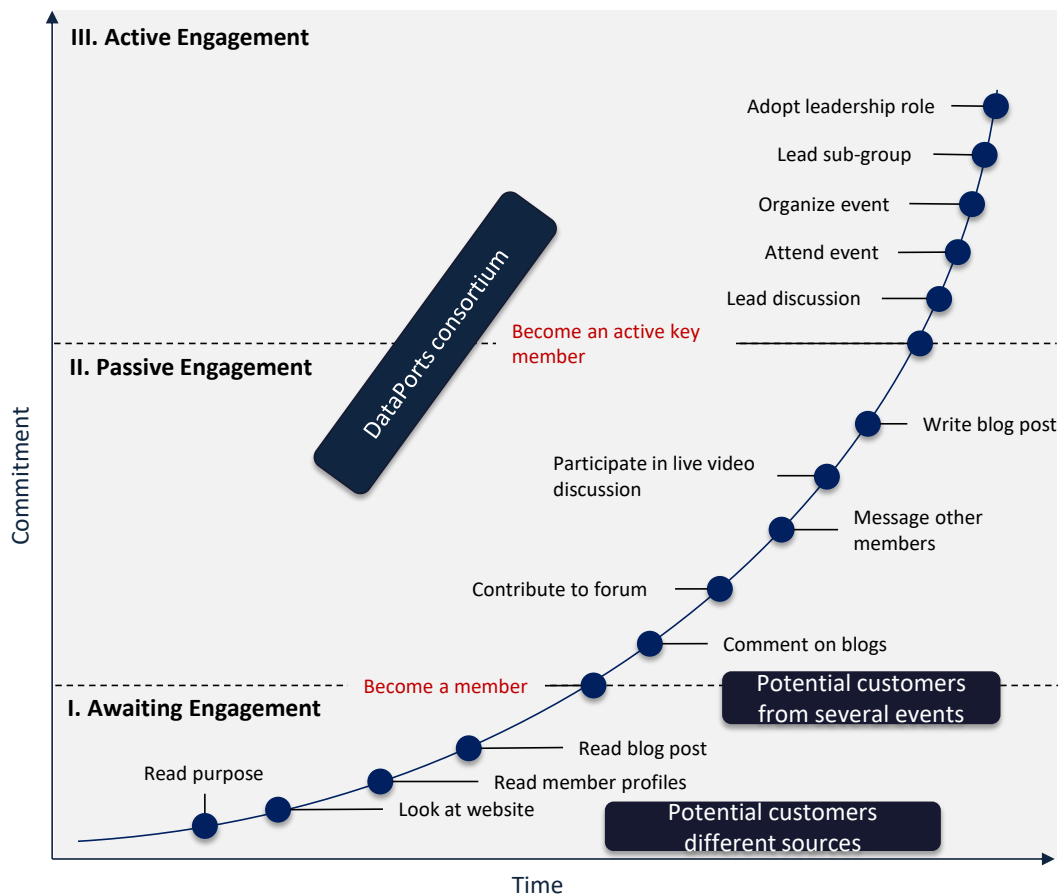


Figure 12: Community Commitment Curve

To develop relationships beyond the pure transactions between a seller and a buyer in DataPorts, an identity needs to be formed. For that, various boundaries need to be overcome. Classic transactions between two organisations can be broken down to the main content of it, namely the exchange of a service and its monetary value. Therefore, the facing partners are not seen as valuable allies for achieving the goals of the company. On the contrary, transactions lead to a separation of the seller and buyer. Both follow goals of their own interest, which stand in the way of each other. With developing a community in the maritime industry, a collective understanding of values which arise from collaborating leads to an exchange of information and to the success of all partners in the DataPorts community. The identity is created, and meaningful relationships can evolve.

Based on the workshop with the members of the plenary, three main goals were derived from the statements given. Each of the goal addresses one specific subject of the DataPorts community.

5.2.1 Access to better Know-how

One of the main goals of the community for service provider in the data marketplace is the access to better know-how through sharing of information between all the members of the community. It has the highest value and importance between all the participants of the workshop. With the help of the community, approaches for data sharing can be shared across the users. For that, some requirements are necessary to ensure the exchange of information. A mindset of collaboration and trust between the community members needs to be established. Without a certain level of trust, no information can be shared between the service providers. For this reason, one requirement for the exchange is the motivation of the users. The participants should not feel like they are wasting their time interacting in the community but see the value of the information given in it. The motivation can either be achieved through intrinsic motives or through extrinsic motives. Intrinsic motives like the own interest of the participant should be focus in motivating the users.

The activities conducted in a community focused on information sharing can be described as interaction based. The focus revolves primarily around resolving current specific problems of Data Providers. Use Cases of Data Sharing approaches are presented and later discussed. Each member brings its own knowledge and experience into the community. With the input of the data provider of the community, current problems of the maritime are addressed, which builds a common knowledge among all. After a basis of knowledge is created in the DataPorts community, new innovations can be created.

5.2.2 Ease the use of DataPorts components

The second goal related in creating a community for Data Provider is to ease the use of components of DataPorts. The technical infrastructure of the data marketplace is in constant need of maintenance and new providers needs to be integrated in the whole ecosystem, which leads in a need for a community that maintains the DataPorts components. The DataPorts providers and buyers can be enabled to use the services of the marketplace, given they are provided with a structure description model and a form of guidance for using the platform. As a result, new and better tools & services can be implemented to share and trade data, which can be beneficial for the community. With the integration of new third-party providers with complementary services into the platform, the DataPorts services can be enhanced as a whole. This will boost efficiency within the DataPorts community.

The challenges of the technical part of this community are especially in the compliance of the data with European regulations, for example the GDPR compliance of data. The results of the workshop shows the importance of having an infrastructure within the framework of the regulations. The Data Providers should have no problems in operating within the DataPorts environment. Workshops with relevant stakeholder should be conducted to gain an overview of all the needed innovations and ideas given for optimizing the data sharing process. A requirement for this type of goal is the multi-level perspective on the design of the whole system. With the help of different views of the different stakeholder, an input from the side of the data providers is given, as well from the side of the buyers. As a result, a data and service catalogue can be

provided for all community members. It provides the guidance needed to ease the use of the components of DataPorts. A roadmap can also give guidance and provides transparency on the new services and new developments in this community.

5.2.3 Access to better Customer Insights

An access to better customer insights is the third main goal which was derived from the results of the workshop. Data Providers see the community to connect to already existing and potentially new customers. Information about the needs of the customers is needed to optimize the services to these demands. It's also a good opportunity to connect the data providers with possible new customers inside of the community to increase its customer base. To reach outside of the community with content and media to generate interest is also possible through content and tools inside the community.

A requirement for the success of this goal is any form of feedback mechanism from the customers to the data providers. A form of content, which is tailored towards the communication between the customers and sellers of the data is needed, to ensure the connection with the customers. Here, studies and whitepapers can create content, which can be distributed internally and externally to expand the reach of the services and the goals of the community. Another form of media, like podcasts and videos about topics of the maritime industry, can lead to a higher engagement in the community and potential new customers. To get access to customer insights, surveys can be carried out to get information from the customers to the data providers. A better form of communication are roundtables and discussion rounds. These types of interactions are two-sided, which has a higher acceptance towards customers and are met with a higher participation and motivation.

This goal has benefits for both participants. The customers have the opportunity to exchange knowledge and experiences with each other and with the provider of the used services. In addition, new services and products can be shown to them with specific use cases. It's beneficial for potential customers, who needs additional information before using a specific service. The community helps in answering questions and showing them clear use cases of the services, which they are interested in. On the other side, the data providers gain value from the knowledge and experience from the customers, which can be used to improve their services and products. With the help of real-time feedback from users, useful insights can be captured and utilized. Better services and the connection with the customers will lead eventually to new customers in the DataPorts marketplace, which buy the services of the data provider.

6 UPDATE ON CLUSTERING ACTIVITIES

DataPorts is not working in isolation, but is part of different European innovation ecosystems, where the project will leverage connections to exploit collaborations and build community around data driven innovation, data sharing, data platforms and digitization of maritime ports and logistic value chains.

Facilitated by T6.3, the following three main kinds of activities are carried out, which are elaborated below:

- **Collaboration with related BDV PPP activities:** Collaborations are pursued with related projects and in the scope of relevant activities of the Big Data Value PPP.
- **Collaboration with linked activities:** In addition to the linked projects identified during the conception of the DataPorts project, collaborations cover related projects and other related activities from are not covered under the previous bullet.
- **Interaction with Advisory Board:** The DataPorts Advisory Board (AB) is one key instrument to strategically engage with decision makers and the wider stakeholder community.

6.1 COLLABORATION WITH RELATED BDV PPP ACTIVITIES

DataPorts is part of the implementation actions of the Big Data Value PPP, composed of the European Commission (EC) and the Big Data Value Association (BDVA) as public and private counterparts. BDVA is an industry-driven international not-for-profit organisation with over 200 members all over Europe, whose mission is to develop the Innovation Ecosystem that will enable the data and AI-driven digital transformation in Europe, delivering maximum economic and societal benefit, and achieving and sustaining Europe's leadership on Big Data Value creation and Artificial Intelligence (www.bdva.eu).

DataPorts collaborates with other projects in the portfolio of the PPP (more than 60 projects, see https://www.big-data-value.eu/our_projects/). The collaboration and coordination of all projects is done through three different committees:

- **Technical Committee** includes technical managers.
- **Steering Committee** includes the coordinators of the projects.
- **Communications group**, which includes the leads of dissemination and communication.

DataPorts participates in all those committees, seeking to align strategies in the different fields, and to explore potential collaborations. Below we explicitly report on the activities in relation with the technical committee, as this is where DataPorts contributed with concrete technical presentations.

At the time of reporting, the following concrete activities have been carried out as part of the BDV PPP collaboration (Table 12):

Activity	Date	Main contact
Data Week 2022 Organised session	24.05.2022 – 09.06.2022	UPV
DataPorts workshop at EBDVF 2022 Organised session	21-23.11.2022	UPV

Table 12: Collaboration activities with related BDV PPP activities

Below we briefly summarize these activities:

6.1.1 EUHubs4Data Data Forum

The EUHubs4Data is setting up a European federation of Big Data Digital Innovation Hubs (DIHs) with the ambition of becoming a reference instrument for data-driven cross-border experimentation and innovation and supporting the growth of European SMEs and start-ups in a global Data Economy.

Based on the concept of “European catalogue, local offer”, EUHubs4Data will establish a Europe-wide, sustainable ecosystem drawing upon local expertise and achievements of European initiatives and national/regional Big Data DIHs.

DataPorts collaborates with EUHubs4Data to identify synergies in exchanging datasets and services.

More specifically, in an online meeting held on October 22, the following steps were agreed upon:

- EUH4D to send a service description template.
- EUH4D to investigate the process internally for course integration and inform DataPorts.
- DataPorts to discuss with partners internally.
- In parallel, DataPorts is exploring collaboration on a use case involving an IDS connector developed by ITI.

DataPorts participated at the session organised by the EUHubs4Data at EBDVF 2022 held in Prague on November 22nd, “Lessons learnt from Data Platforms projects”, where the DataPorts project coordinator Santiago Cáceres (ITI) presented the project’s lessons learnt so far, together with different experts from other tasks related with European Big Data.

In addition, DataPorts has deployed an IDS connector to link with the DIH community of EUH4D. It consists of a proof of concept where data is transferred between both platforms. It allows changing data between the port of Valencia and ITI DIH (which forms part of the EUH4D DIH federation). Data is transferred to calculate the Estimated Time of Arrival (ETA) of vessels at the port of Valencia. Valencia Port foundation acts as a data provider (raw data of the port), and the data consumer (vessels ETA prediction). ITI DIH provides the DataPorts cognitive service to make the prediction.

Furthermore, DataPorts has created courses for the technology developed within the project, these will be published and publicly available.

6.1.2 Data Week 2022

Data Week 2022 (<https://www.big-data-value.eu/data-week-2022/>) was held from 24th of May to 9th of June. Data Week 2022 brought together the European Big Data and Data Driven AI research and innovation communities. Following the Big Data Value Summit's footsteps, Data Week hosted exciting workshops and sessions to put the BDVA/DAIRO, Big Data Value PPP projects and the EUHubs4Data community at the centre of the event. DataPorts organised a workshop titled “Joining research forces and create the future of ports and maritime based on data-driven services: Defining the Strategy” taking one new step on the topic of the workshop that was held in DataWeek 2021: “Unleashing the potential of ports and maritime logistics via data-driven solutions: Opportunities and Challenges”. In this edition, the progress and achievement performed since the last year in DataPorts and ASSIST-IoT projects were presented. In addition, two new projects, CYRENE (<https://www.cyrene.eu/>) and Vessel-AI (<https://vessel-ai.eu/>), joined their forces to define the strategy for data-driven services in the seaports and maritime of the future.

This workshop elaborated on how data-driven services and applications (including AI-based cognitive solutions) can help stakeholders in the logistics, ports, and maritime sectors to improve their operations. It will also help identify and understand the challenges that must be addressed to facilitate adoption of these solutions. Thereby, this workshop focused on industrial data spaces and platforms, with a focus on transport and logistics, as one key vertical sector of European importance.

The Speakers:

- Santiago Cáceres, Project Manager at ITI - Instituto Tecnológico de Informática
- Christos-Antonios Gizelis, Principal Innovation Analyst at Hellenic Telecommunications Organization S.A.
- Dora Kallipolitou, Delivery Manager at Zelus, CYRENE
- Spiros Mouzakitis, NTUA, Project Manager at VesselAI and I-ENERGY
- Carlos-Enrique Palau Salvador, Universitat Politècnica de València, coordinator at ASSIST-IoT

6.1.3 DataPorts workshop at European Big Data Value Forum (EBDVF) 2022

Organised by the BDVA and the European Commission (DG CNECT), the European Big Data Value Forum (EBDVF) brings together industry professionals, business developers, researchers, and policymakers from all over Europe and other regions of the world to advance policy actions, and industrial and research activities in the areas of Data and AI.

A sponsored workshop of DataPorts at the Big Data Value Forum 2021 was given which took place from 21/11/2022 to 23/11/2022. The session titled “Joining forces for shaping the future of ports and maritime sector with data-driven services” lasted 1 hour, where a 10-minute presentation was given by Santiago Cáceres (ITI) project coordinator of DataPorts followed by the architecture design by Andreu Belsa (UPV). Thessaloniki Port Pilot scenarios were then presented by Eirini Tserga (THPA) and then DataPorts guests Spiros Mouzakitis and Panagiotis Demestichas, presented Vessel-AI and Vital-5G achievements and commonalities with DataPorts respectively. Then there was a 10’ Q&As with the audience. The session was moderated by Christos-Antonios Gizelis (OTE). The DataPorts slot was attended by 20 persons with good feedback received from audience and several questions raised.

DataPorts also had an information booth (nr.19) where visitors had the opportunity to learn more about the project.

6.2 COLLABORATION WITH LINKED ACTIVITIES

Collaborations are pursued carried out jointly with linked activities at the time of reporting are presented below (Table 13):

Linked project	Main contact
Digital Transformation Summit 2022Vessel-AI	UPV
RE4DY “Data-driven concept for a sustainable European industry”	UPV
PIXEL: “Port IoT for Environmental Leverage”	UPV
Assist IoT: “Architecture for Scalable, Self-*, human-centric, Intelligent, Secure, and Tactile next generation IoT”	UPV
MobiDataLab “Labs for prototyping future mobility data sharing solutions in the cloud”	ITI
Projects Alliance for Shipping and Maritime Sector (Vessel-AI, CYRENE, VITAL-5G)	OTE, ITI, UPV, PRO

Table 13: Collaboration activities with linked projects

Below we briefly summarize these activities:

6.2.1 DataPorts at Digital Transformation Summit 2022

DataPorts (UPV) participated at “The Madeira’s Digital Transformation Summit” (<https://summit.digit-madeira.pt/>), a forum where the EU’s Digital Strategy and ongoing results were debated to achieve the visionary objectives at European and regional levels. Bringing together recognised individualities from the European Commission, Government, Academia and Industry, The Summit sets the scene for a human-centric

vision in a digital society. Needs, expectations, developments and innovative solutions were discussed aiming at digitally empowering citizens and businesses to improve, grow, innovate and compete on fair terms, while achieving climate neutrality. The Summit took place from 24th to 27th of October in Madeira (Portugal). DataPorts (UPV) presented on 27th October in the session titled “Enabling Maritime Digitalization”, which is organised by VesselAI Project.

The Agenda:

- Enabling maritime digitalization by extreme-scale analytics, AI and digital twins – VesselAI – Spiros Mouzakitis (moderator, National Technical University of Athens)
- VesselAI solutions for maritime digitalisation – Giannis Tsapelas (National Technical University of Athens)
- Globally optimal design of ship energy systems – Zou Guangrong (VTT Technical Research Centre of Finland)
- Weather routing and fleet intelligence service in shipping – Roberto Vettor (NAPA)
- Shaping the future of the seaports – DataPorts – Andreu Belsa (Universitat Politècnica de València)
- How digitalization and data analytics can support maritime decarbonization and regulatory compliance – Elina Furustam (NAPA)
- Artificial Intelligence for the next generation energy – Opportunities for collaboration with the maritime domain – I-ENERGY – Giorgos Korpakakis (National Technical University of Athens)

6.2.2 RE4DY “Data-driven concept for a sustainable European industry”

RE4DY (<https://cordis.europa.eu/project/id/101058384>), aims to the green, circular, and digital transformation of European manufacturing requires the integration of innovative data-driven processes. Only businesses that successfully implement distributed data-intensive intelligent and dynamic industrial decision support based on AI, digital threads and digital twin solutions will remain competitive. In this context, the EU-funded RE4DY project proposes the ‘data as a product’ core concept to facilitate the implementation of digital continuity across digital threads, data spaces, digital twin workflows and AI/machine learning/data pipelines. The project will show how European Industry 4.0 can build unique data-driven digital value networks to remain competitive through digital continuity and sovereign data spaces across all phases of production. UPV is in contact, aiming to collaborate in a data management concepts.

6.2.3 PIXEL

PIXEL (<https://pixel-ports.eu/>) (H2020-MG-2017) aimed to enable a two-way collaboration of ports, multimodal transport agents and cities for optimal use of internal and external resources, sustainable economic growth, and environmental impact mitigation, towards the Ports of the Future.

As both projects have several partners in common (like UPV, PRO and THPA), the feedback received from PIXEL Project have been constant in the previous months. The architecture and tools used in PIXEL have been analysed. As a result, it was decided to use the same FIWARE components and Data Models guidelines used in PIXEL to implement the Data Access Layer components. There are some common points in the developments needed to integrate these FIWARE components with the rest of the components of the respective project platforms. Moreover, DataPorts is making use of a framework for data access agent development (<https://pypi.org/project/pyngsi/>) provided by PIXEL to access the heterogeneous data sources.

Regarding the collaboration on communication and dissemination activities, DataPorts participated in a Pixel Webinar (https://pixel-ports.eu/?page_id=1692) in June as an external speaker in the session dedicated to “PIXEL architecture modules and platform installation”. In this session, there was a slot dedicated to explaining how the modularity of PIXEL is being leveraged by external EC-funded projects like DataPorts. Moreover, PIXEL participated in the workshop organized by DataPorts in the Data Week 2021, which was

titled “Unleashing the potential of ports and maritime logistics via data-driven solutions: Opportunities and Challenges”. The workshop focused on how data-driven services and applications can help stakeholders in the logistics, ports, and maritime sectors to improve their operations, as well as the challenges that must be addressed to facilitate adoption of these solutions.

In addition, PIXEL and DataPorts presented a joint work in the 14th International Symposium on Intelligent Distributed Computing (IDC), where the use of DataPorts components in some scenarios developed in PIXEL was proposed from the point of view of architecture and design. This work will be published as part of the proceedings of the symposium. More details about this collaboration are provided in deliverable D6.6.

Finally, the PIXEL project ended this November, but efforts continue to seek synergies and participate in events and scientific publications between both projects.

6.2.4 ASSIST-IOT

ASSIST-IoT (<https://assist-iot.eu/>) is an EU H2020 ICT-56-2020 funded research project which aims at the design, implementation and validation of an open, decentralized reference architecture, associated enablers, services and tools, to assist human-centric applications in multiple verticals. One of the pilots consists of a port automation scenario. The ASSIST-IoT project began at the end of 2020. As both projects have several partners in common (like UPV, PRO and CERTH), the feedback received from ASSIST-IoT Project have been regular in the previous months.

Regarding the collaboration on communication and dissemination activities, ASSIST-IoT participated in the workshop organized by DataPorts in the Data Week 2021, which was titled “Unleashing the potential of ports and maritime logistics via data-driven solutions: Opportunities and Challenges”. The innovation manager of ASSIST-IoT presented the main synergies of the project with DataPorts.

Finally, the collaboration between DataPorts and ASSIST-IoT is still focused on possible collaborations and synergies between both projects in some common areas like AI, interoperability, IoT, Distributed Ledger Technology (DLT), Data Spaces or Data Sharing. Mainly, the projects are currently trying to collaborate on scientific publications and events.

6.2.5 MobiDataLab

MobiDataLab (<https://mobidatalab.eu/>) is the EU-funded lab for prototyping new mobility data sharing solutions. Its aim is to foster data sharing in the transport sector, providing mobility organising authorities with recommendations on how to improve the value of their data, contributing to the development of open tools in the cloud, and organising hackathons aiming to find innovative solutions to concrete mobility problems.

MobidataLab and DataPorts joined forces in the Transport Research Arena in Lisbon from 14th to 17th November 2022. Both projects presented a paper about their developments and shared a booth where we had the opportunity to show and discuss project findings.

Projects Alliance for Shipping and Maritime Sector (Vessel-AI, CYRENE, VITAL-5G)

Since M30, DataPorts is organizing bi-monthly meetings with several port/data-related projects. Together with Vessel-AI, CYRENE and Vital-5G, proceeded with technical discussions that could potentially lead in a common architecture proposal to be a future reference for the seaport transformation, and at the same time to jointly disseminate their results. To this end these projects are invited as guests in all the events emphasizing on the collaborative activities.

The projects’ dissemination and communication representatives are in discussions for co-organizing a workshop (a parallel session at the Slide2open Shipping Finance 2023, that will be held in Athens, Greece (expected date with March 2023).

6.3 INTERACTION WITH ADVISORY BOARD

The 2nd meeting with the Advisory Board members was held physically, at the DataPorts booth at Posidonia, the International Shipping Exhibition (<https://posidonia-events.com/>), held between June 6th and June 10th, 2022, in Athens Greece.

As reported in previous WP6 reports, the DataPorts Advisory Board (AB) is one key instrument to strategically engage with decision makers and the wider stakeholder community. The AB will foster an active engagement between AB members and key partners of the DataPorts consortium, thereby providing AB members with early insights into project results and findings, whilst providing DataPorts members with external views and recommendations.

In particular, the role of the AB is to engage with DataPorts in the following ways:

- Challenge DataPorts work against new developments and advances in the state-of-the-art.
- Ensure that DataPorts stays in the highest level of scientific and technical quality, thereby ensuring expected impact.
- Provide scientific, technical and domain expertise on DataPorts results and methodology.
- Share common priorities and establish future cooperation opportunities of mutual benefit.

As opinion-leaders in their respective fields the members of the AB will provide a valuable referral point at critical milestones along the DataPorts project development.

The following individuals constitute the members of the AB:

- Lorenzo Cotino Hueso, Constitutional Law & Political Science Professor, University of Valencia
- Fernando Liesa, Secretary General, ALICE ETP
- Fotis Oikonomou, Senior Researcher, DANAOS Shipping
- Sue Probert, Chair of UN CEFACT
- Till Schlumberger, Strategy Consultant Digital Transformation, HPC Hamburg Port Consulting

The 2nd AB meeting was chaired by Christos-Antonios Gizelis (OTE). All DataPorts partners (e.g., members of the general assembly or leaders of key work packages) joined it at the DataPorts booth, Hall 1 Stand 342. The agenda was as follows (Table 14):

Item	Presenter/Moderator
Welcome and Round Table	Christos Gizelis, OTE (AB Chair)
High-level Overview and Achievements (goals, objectives, risks, ...)	Santiago Cáceres, ITI (Project Coordinator)
Platform Technical Overview (architecture, technical components, ...)	Matilde Julián Segui, UPV (WP3 / Platform Leader)
Piloting activities (Use cases, applications ...)	Héctor Iturria, PRO (WP5 / Pilot leader)
Impact (outreach, awareness, KPIs, ...)	Christos Gizelis, OTE (Impact Manager)
Dissemination (communication, social media, scientific publications, ...)	Matilde Julián Segui, UPV (Dissemination Manager)
Business, exploitation, and sustainability	Michael Arbter, FHG

Item	Presenter/Moderator
(business opportunities, exploitation, ...)	(WP7 / Business leader)
Wrap-up and final comments	Christos Gizelis, OTE

Table 14: Agenda for the Advisory Board meeting

The DataPorts members participating in the meeting were: Beside speakers DataPorts partners representatives and the AB members:

- Sue Probert, UN/CEFACT; Chair
- Till Schlumberger, HPC Hamburg Port Consulting; Strategy Consultant Digital Transformation
- Fotis Oikonomou, Danaos Shipping, Senior Researcher

The meeting was very productive, with helpful comments and constructive feedback. The main conclusions to come out of the meeting were the following:

- Links to ongoing work on semantics for big data exchange in the domain (UN/CEFACT) considered a transversal task of DataPorts Data Modelling
- Opportunities for Enhancing the Platform (Federation of Platforms)

The outcomes were analysed, and action are being taken to strengthen the DataPorts activities.

6.4 FUTURE PLANS

DataPorts partners will continue their clustering activities with other projects, associations and officials aiming to further increase their awareness and adopting the data sharing concept produced by DataPorts, that will lead to the data-driven digital transformation of the seaport ecosystems, where the seaports will become not only smart but also cognitive.

7 CONCLUSION

This document constitutes deliverable D6.11 and summarizes tasks T6.3 and T6.4. It contains the initial activities to be performed in order to reach the goal of platform adoption and becoming the de-facto standard platform for seaports. These objectives required two different approaches to reach the ambitious goals. For this purpose, Task 6.3 defines a number of initiatives in which DataPorts is regularly represented. Task 6.4 deals with defined strategic directions for anchoring the DataPorts platform in the seaport sector.

Sections 3 and 4 provided input for the first two pillars of the scaling strategy. Section 3 identified the strategic initiatives that are highly relevant to DataPorts, for its further development process and beyond. These initiatives and possible interactions with DataPorts are described. Stronger focus is placed on the IDSA, as an emerging topic for data sharing. Section 4 established the foundations for trust in the platform. The basics of certifications were described, an overview of existing certificates was presented, and a selection on relevant certificates for DataPorts was included, based on the feedback of the consortium members. In section 5, a customer relationship management concept was developed to strengthen customer loyalty. The concept was defined based on internal and external data from various sources, to meet the requirements for DataPorts. It is built on several building blocks as the customer journey, analytical CRM or community building.

In the section 6, three main activities to exploit collaborations and build community were presented. The collaboration with related BDV PPP activities was increased based on presentation, pitches, project meetings and publications. Further collaboration was enhanced with linked project, such as Pixel, RE4DY or MobiDataLab. With the organization of the DataPorts Advisory Board meeting an external perspective provides additional recommendations for the development of the DataPorts platform.

8 REFERENCES AND ACRONYMS

8.1 REFERENCES

- [1] B. Otto, S. Auer, J. Cirullies, J. Jürjens, N. Menz, J. Schon and S. Wenzel, "Industrial Data Space - Digitale Souveränität über Daten (White Paper)," 2016. [Online]. Available: https://www.fraunhofer.de/content/dam/zv/de/Forschungsfelder/industrial-data-space/Industrial-Data-Space_whitepaper.pdf. [Accessed 19 11 2021].
- [2] B. Otto and M. Jarke, "Designing a Multi-Sided Data Platform: Findings From the International Data Spaces Case," *Electronic Markets*, vol. 43 (1), no. 39, 2019.
- [3] "International Data Spaces," [Online]. Available: <https://internationaldataspaces.org/>. [Accessed 16 November 2021].
- [4] "What is Gaia-X," [Online]. Available: <https://www.gaia-x.eu/what-is-gaia-x>. [Accessed 19 November 2021].
- [5] "What is Gaia-X," [Online]. Available: <https://www.gaia-x.eu/what-is-gaia-x>. [Accessed 19 November 2021].
- [6] "Federation services," [Online]. Available: <https://www.gaia-x.eu/what-is-gaia-x/federation-services>. [Accessed 19 November 2021].
- [7] "Data spaces," [Online]. Available: <https://www.gaia-x.eu/what-is-gaia-x/data-spaces>. [Accessed 19 November 2021].
- [8] "Standards," [Online]. Available: <https://www.gaia-x.eu/what-is-gaia-x/standards>. [Accessed 19 November 2021].
- [9] "Services," [Online]. Available: <https://www.gaia-x.eu/what-is-gaia-x/services>. [Accessed 19 November 2021].
- [10] "Led by industry, driven by users Addressing the challenge of Internet development in Europe," Future Internet PPP, [Online]. Available: <https://www.fi-ppp.eu/>. [Accessed 16 11 2021].
- [11] "FIWARE Foundation," Urban Digital, [Online]. Available: <https://urban-digital.de/fiware-foundation/>. [Accessed 16 11 2021].
- [12] "Components," FIWARE, [Online]. Available: <https://www.fiware.org/developers/catalogue/>. [Accessed 16 11 2021].
- [13] C. Baumann, "Die FIWARE Foundation meldet hervorragende Halbjahresergebnisse für 2020," IT-Management.today, [Online]. Available: <https://www.it-management.today/die-fiware-foundation-meldet-hervorragende-halbjahresergebnisse-fuer-2020/>. [Accessed 16 11 2021].
- [14] U. Freiherr, "Maritime Data Space: Mehrwert durch sichere Verknüpfung von Daten," *Lukas Schiff & Hafen*, vol. April 2017 , no. 4, pp. 24-26, 2017.
- [15] "Maritime Data Space - MDS," [Online]. Available: <https://www.sintef.no/projectweb/maritime-data-space-mds/results/>. [Accessed 19 November 2021].
- [16] "Smart Maritime Network," [Online]. Available: <https://smartmaritimenetwork.com/about/>. [Accessed 16 11 2021].
- [17] "On the MoS way," [Online]. Available: <https://www.onthemosway.eu/smart-maritime-council/?cn-reloaded=1>. [Accessed 16 11 2021].
- [18] "Smart Maritime Network," [Online]. Available: <https://smartmaritimenetwork.com/smn-events-2021/>. [Accessed 16 11 2021].
- [19] "Smart Maritime Network Tokyo Conference 2020," ST Engineering, [Online]. Available: <https://www.idirect.net/event/smart-maritime-network-tokyo-conference-2020/>. [Accessed 16 11 2021].
- [20] International Organization for Standardisation, "Certification," [Online]. Available: <https://www.iso.org/certification.html>. [Accessed 01 12 2021].
- [21] P. Mell and T. Grance, "The NIST Definition of Cloud Computing," National Institute of Standards and Technology: U.S. Department of Commerce, 2011.

- [22] NortonLifeLock, 18 01 2021. [Online]. Available: <https://us.norton.com/internetsecurity-privacy-privacy-vs-security-whats-the-difference.html>. [Accessed 01 12 2021].
- [23] TÜV Süd, [Online]. Available: <https://www.tuvsud.com/de-de/dienstleistungen/auditierung-und-zertifizierung/integriertes-managementsystem>. [Accessed 01 12 2021].
- [24] T. C. W. Lin, "Compliance, Technology, and Modern Finance," 11 Brook. J. Corp. Fin. & Com. , 2016.
- [25] R. Schnauffer, H.H. Jung, "CRM-Entscheidungen richtig treffen, Die unternehmensindividuelle Ausgestaltung der Anbieter-Kunden-Beziehung", Berlin, Heidelberg, s.l.: Springer Berlin Heidelberg, 2004. R. Schnauffer, H.H. Jung, "CRM-Entscheidungen richtig treffen, Die unternehmensindividuelle Ausgestaltung der Anbieter-Kunden-Beziehung", Berlin, Heidelberg, s.l.: Springer Berlin Heidelberg, 2004.
- [26] K. Harej, RV Horvat, "Customer relationship management momentum for business improvement", 26th International Conference on Information Technology Interfaces, IEEE, 2004.
- [27] G. Stokburger, M. Pufahl, "Kosten senken mit CRM, Strategien, Methoden und Kennzahlen", Wiesbaden: Gabler Verlag, 2002.
- [28] H. Manaadiar, "Difference between Maritime, Shipping, Freight, Logistics and Supply Chain", [Online]. Available: <https://www.linkedin.com/pulse/difference-between-maritime-shipping-freight-supply-chain-manaadiar/> [Accessed 06 01 2022]
- [29] E. Mixon, L. Horwitz, "customer journey map", [Online]. Available: <https://www.techtarget.com/searchcustomerexperience/definition/customer-journey-map> [Accessed 20 02 2023]
- [30] J. Tanasic, C. Casaretto, "Digital Community Management: Communitys erfolgreich aufbauen und das digitale Geschäft meistern", Schaeffer-Poeschel, 2017.
- [31] J.W. Kim, J. Choi, W. Qualls and K. Han, "It takes a marketplace community to raise brand commitment", Journal of Marketing Management, 2008.
- [32] C. Jones, "Creating a Community Commitment Curve", [Online]. Available: <https://cmxhub.com/the-cmx-social-identity-cycle/> [Accessed 06 01 2022]

8.2 ACRONYMS

Acronym List	
AB	Advisory Board
AISBL	Association internationale sans but lucratif
BDVA	Big Data Value Association
CRM	Customer Relationship Management
DIN	Deutsches Institut für Normung
DoA	Description of Action
EBDVF	European Big Data Value Forum
EC	European Commission
EU	European Union
FaaS	Functionality as a Service
FI-PPP	Future Internet Public-Private Partnership
GDPR	General Data Protection Regulation
HE	Horizon Europe
IaaS	Infrastructure as a Service
ICT	Information and Communications Technology
IDS	International Data Spaces
IDSA	International Data Spaces Association
IEC	International Electrotechnical Commission
Int.	International
ISO	International Organization for Standardization
MDS	Maritime Data Space
OPC	Open Platform Communications
PaaS	Platform as a Service
Prio	Priority
SaaS	Software as a Service
T	Task
ToC	Table of Contents
W3C	World Wide Web Consortium
WP	Working package

Table 15: Acronyms

8.3 APPENDIX

8.3.1 Appendix A: Survey of potential strategic initiatives

Initiative	Keywords	Location	What does the initiative offer?	Why is it interesting?	How does it connect do DataPorts?	Participation type
Fiware Foundation	non-profit open-source ecosystem	Germany	Open sustainable ecosystem around public, royalty-free and implementation-driven software platform standards Easing the development of new Smart Applications in multiple sectors framework of open-source platform components to accelerate the development of Smart Solutions Standard APIs for data management and exchange Easy "plug & play" integration with other solutions and services	Open and global community Vendor-neutral approach for building and sharing portable and interoperable smart solutions Wide range of experimental infrastructures Global strategy Covers different domains: Farming, city, Energy and Industry	DataPorts as a vendor of a product Content creator for newsletters, blogs, etc. Expert for solutions in the maritime sector Collaborative working in hubs/creative spaces	Platinum 100.000 € p.a. (to take lead in the further development) Platinum strategic end user 100.000 € p.a. (users of ICT, but not ICT organisations as such) Gold 2.500 to 50.000 € p.a. (for an active role in pursuing the FIWARE mission) Gold strategic end user 1.250 to 25.000 € p.a. (users of ICT, but not ICT organisations as such) Gold Start-ups 1.000 € p.a. (companies that are less than four years old) Associate 1.000 € p.a. (ideal or non-profit legal entities, universities, technology centres, associations and similar organizations)
Open Industry 4.0 Alliance	ecosystem marketplace communication platform	Swiss	Framework and guiding principles for interoperability for all members Direct contact with the customer	Contact with potential customers Support with market entry and advertising Asset repository and network is API-enabled and can be	DataPorts as a vendor of a product Content creator for newsletters, blogs, etc. Expert for solutions in the maritime sector	Annual Revenue Tier (EUROS) -> Annual fee 1B+ -> 25.000 € 101M - 1B -> 10.000 € 11M - 100M -> 5.000 € <= 10M -> 2.500 €

Initiative	Keywords	Location	What does the initiative offer?	Why is it interesting?	How does it connect do DataPorts?	Participation type
			Initiative supports and promotes at time of market launch	integrated with customer back-end systems The vision of the alliance is global	Placement of the DataPorts Data Lab as a creative space for DataPorts to collaborate with other vendors or customers in a risk-free manner	
<u>EIT Digital</u>	Education Start-ups Creative and innovative work	Belgium	Innovation and Education Ecosystem EIT Digital answers specific innovation needs by, for example, finding the right partners to bring technology to the market, supporting the scale-up of digital technology ventures, attracting talent and developing their digital knowledge and skills	Engaging with European partners in EIT Digital's Innovation Factory to create new products Future innovative collaboration Network for institutes and universities Network for investors	Collaborating and developing creatively and innovatively with each other Network that can be used to establish further contacts	Member of the Innovation Factory for creating digital products and find partners Member as an Accelerator to get support to raise investment, secure new business and find partners Member of ecosystem for entrepreneurial digital education for research and education Costs are unknown
<u>Smart Maritime Network</u>	open data platform maritime and transport Blockchain	Ireland	Platform to promote the benefits of enhanced integration and data sharing among stakeholders within the maritime and transport logistics sectors Informing and educating the industry on technological developments and innovations Providing wider opportunities for relationship building and knowledge sharing Smart Maritime Council, a series of private meetings for maritime technology developers and systems integrators for discussions on	Insight into new innovations and products Use of the network for further development of the platform Acquisition of new customers in the maritime sector	Placement as a provider Placement as a developer Content creator for newsletters, blogs, etc. Expert for solutions in the maritime sector Collaborative working in hubs/creative spaces Connection to the global market	on request

Initiative	Keywords	Location	What does the initiative offer?	Why is it interesting?	How does it connect to DataPorts?	Participation type
			the development of a wider range of mutually beneficial partnerships, on issues relating to compatibility, standardisation and harmonisation			
<u>Maritime Data Space</u>	ecosystem maritime sector marketplace	Norway	<p>Open maritime data exchange ecosystem for secure sharing of ship related data among trusted stakeholders</p> <p>Data analysis services while securing proper governance of the data</p> <p>Based on IDSA</p> <p>Transparent access to vessel related data from anywhere onboard or ashore, while securing proper governance of access by the data owners</p> <p>Automated, secure, robust, and efficient communication between ship and shore</p> <p>Building and commercializing services for their clients</p> <p>Enable platform-to-platform data exchange</p>	<p>Merger of both platforms</p> <p>Offering own services/products</p> <p>Lessons-learned for a maritime data platform</p> <p>Support and cooperation for market entry</p>	<p>Placement as a provider</p> <p>Placement as a developer</p> <p>Content creator for newsletters, blogs, etc.</p> <p>Expert for solutions in the maritime sector</p> <p>collaborative working in hubs/creative spaces</p>	On request

Initiative	Keywords	Location	What does the initiative offer?	Why is it interesting?	How does it connect do DataPorts?	Participation type
<u>Gaia-X AISBL</u>	Open-source ecosystem data infrastructure	Germany	<p>Open, transparent, and secure digital ecosystem, where data and services can be made available, collated and shared in an environment of trust</p> <p>Based on the principle of decentralisation</p> <p>The organisational structure of Gaia-X is built on three pillars: the Gaia-X Association, the national Gaia-X Hubs, and the Gaia-X Community</p> <p>Different domain working Groups within the Gaia-X Hib Germany: Agriculture, Energy, Finance, Geoinformation, Health, Industry 4.0/SME, Mobility, Public Sector, Smart City/Region, Smart Living</p>	<p>Gaia-X becomes leading standard of many platforms</p> <p>Network from many different industries with many potential customers</p> <p>Collaboration on new product/service development</p>	<p>Placement as a provider</p> <p>Placement as a developer</p> <p>Content creator for newsletters, blogs, etc.</p> <p>Expert for solutions in the maritime sector</p> <p>Collaborative working in hubs/creative spaces</p>	<p>Membership in the Gaia-X Association</p> <p>Participation in the German/other national Gaia-X Hub</p> <p>Involvement in the open-source Gaia-X Community</p> <p>Costs are unknown</p>
<u>IDSa</u>	not-for-profit Open-source infrastructure architecture	Germany	<p>Vision of data sovereignty and realizing the full value of data in secure, trusted, equal partnerships</p> <p>IDS grounded in European values of trust and the self-determination of data usage by data providers</p> <p>A standard based on European values</p> <p>IDSa's coalition, consisting of some of the most respected and innovative companies and research organizations in Europe, enables to develop a broad, open standard for data</p>	<p>Contributing knowledge and technology to high-impact projects</p> <p>Providing data-infrastructure services to the nine European data spaces</p> <p>Providing advice, knowledge and expertise to the European Data Act</p> <p>Establishing a network of hubs across Europe and beyond</p>	<p>Placement as a provider</p> <p>Placement as a developer</p> <p>Content creator for newsletters, blogs, etc.</p> <p>Expert for solutions in the maritime sector</p> <p>collaborative working in hubs/creative spaces</p>	<p>Annual Sales [Mio. EUR] (group based) -> Annual Fee [EUR]</p> <p>> 10.000 -> 35.000</p> <p>2.500 to 10.000 -> 25.000</p> <p>500 to 2.500 -> 15.000</p> <p>50 to 500 -> 7.500</p> <p><50 -> 2.500</p> <p>Universities, NGOs, etc. -> 1.000</p> <p>Start-ups (younger than four years) -> 1.000</p>

Initiative	Keywords	Location	What does the initiative offer?	Why is it interesting?	How does it connect to DataPorts?	Participation type
			marketplaces and data platforms			
<u>Silicon Economy (IML)</u>	ecosystem for platforms Logistics Open-source	Germany	<p>Strengthening the logistics industry in Germany and Europe</p> <p>Creation of new business potential</p> <p>Supporting companies with sustainability goals</p> <p>Supporting companies in building a platform today still involves enormous costs</p> <p>Creation of software and hardware environment for autonomous logistics controlled by artificial intelligence</p> <p>Operating system will meet the highest data protection requirements and can be used by any company, regardless of size</p> <p>To avoid isolated applications and dependencies</p>	<p>Summary of various supply chain information</p> <p>Individual supply chains become networked and self-orchestrated ecosystems</p> <p>Real-time and simultaneous access to information</p> <p>Synchronized demand and supply planning</p> <p>Stronger customer focus through use of multiple channels</p> <p>DataPorts gains pooled insight into supply chains</p> <p>DataPorts can provide information itself</p>	<p>Placement as a provider</p> <p>Placement as a developer</p> <p>Content creator for newsletters, blogs, etc.</p> <p>Expert for solutions in the maritime sector</p> <p>Collaborative working in hubs/creative spaces</p>	on request
<u>Blockchain europe</u>	Blockchain Open-source platform	Germany	<p>It is a project to establish the European Blockchain Institute in Germany</p> <p>It will be created to drive digitalization in science and practice</p>	<p>DataPorts also uses blockchain technology</p> <p>Network for those interested in and using blockchain</p> <p>Europe-wide network operated by science</p>	<p>Provider of a platform and services</p> <p>Expert for blockchain interested parties from the maritime sector</p> <p>Content creator for newsletters, blogs, etc.</p>	on request

Initiative	Keywords	Location	What does the initiative offer?	Why is it interesting?	How does it connect do DataPorts?	Participation type
			<p>Provision of initial information through to joint implementation</p> <p>For people interested in blockchain who want to learn more about the technology and its possibilities (Starters), community partners who have already made their first experiences with blockchain and its added value (Advanced) or experts who are deep in the topic (Experts)</p>		<p>Expert for solutions in the maritime sector</p> <p>collaborative working in hubs/creative spaces</p>	

8.3.2 Appendix B: Template Survey Certification

No.	Question	Relevance					Comment
		1	2	3	4	5	
1	How important is the certification of DataPorts for generating trust with customers in general?						
2	Per definition compliance is not a part of certification, but there are huge intersections. How important do you rate the issue of compliance for DataPorts?						
3	Various Certifications have a different geographical scope. How important are the following regions for the success of a certification of DataPorts:						
	- EU						
	- USA						
	- Asia						

	- International						
4	How important is the certification in the following areas for generating trust:						
	- Cloud Systems						
	- Software as a Service						
	- Platform as a Service						
	- Functionality as a Service						
	- Data Security						
	- Privacy						
	- Compliance						
	- Management Systems						
	...						
5	Certificates can be issued according to various (international) standards (e.g. ISO, IEC) or individual requirements of accredited certification organizations (usually private companies). How important is a certification according to these two domains?						
	- According to standards						
	- According to certification organizations						

6	Depending on the intended certificate and (sometimes) the certification level there are in general two different types of certification processes. On the one hand, you can get your certification by self-assessment, which usually produces a weaker certificate. On the other hand, you can get your certification by an external organization that conducts an audit in the target organization, which is usually more costly but generates a stronger certificate. How high do you assess the impact of each?					
	- Certification through self-assessment					
	- Certification through audit					

8.3.3 Appendix C: Result Survey Certification

No.	Question	Score	Relevance				
			1	2	3	4	5
1	How important is the certification of DataPorts for generating trust with customers in general?	3,8			3	4	1
2	Per definition compliance is not a part of certification, but there are huge intersections. How important do you rate the issue of compliance for DataPorts?	4,1				7	1
3	Various Certifications have a different geographical scope. How important are the following regions for the success of a certification of DataPorts:						
	- EU	5,0					8
	- USA	2,6	1	2	4	1	
	- Asia	2,6	1	3	3		1
	- International	3,8			3	4	1

No.	Question	Score	Relevance				
			1	2	3	4	5
4	How important is the certification in the following areas for generating trust:						
	- Cloud Systems	3,8			3	4	1
	- Software as a Service	3,4		3		4	1
	- Platform as a Service	3,8		1	2	3	2
	- Functionality as a Service	3,5		2	1	4	1
	- Data Securitiy	4,8				2	6
	- Privacy	4,5				4	4
	- Compliance	3,6			3	5	
	- Management Systems	3,9	1		1	3	3
	...						
5	Certificates can be issued accoding to various (international) standards (e.g. ISO, IEC) or individual requirements of accredited certification organizations (usually private companies). How important is a certification according to these two domains?						
	- According to standards	4,0			2	4	2
	- According to certification organisations	3,5		1	4	1	2

No.	Question	Score	Relevance				
			1	2	3	4	5
6	Depending on the intended certificate and (sometimes) the certification level there are in general two different types of certification processes. On the one hand, you can get your certification by self-assessment, which usually produces a weaker certificate. On the other hand, you can get your certification by an external organization that conducts an audit in the target organization, which is usually more costly but generates a stronger certificate. How high do you assess the impact of each?						
	- Certification through self-assessment	2,8	1	1	5	1	
	- Certification through audit	4,5				4	4

No.	Comment
1	In general, a consumer/customer trusts more easily a product that is certified. However, many ICT components are preferred, based only on the producer's brand name.
2	Although compliance is not a part of certification, there is a number of National or International legislation/regulations (i.e. GDPR) that DataPorts must comply with.
3	Stronger markets in my perspective. Depends on the market that DataPorts wants to infiltrate. Different parts of the world have different certifications; DataPorts was developed and will be adopted (at least at first) by EU countries. However, considering that DataPorts is a universal solution, it would make sense to have an International certification.

4	
5	However if a major port or a cluster of ports adopts DataPorts Platform, the rest will follow.
6	Self-assessment is usually the process prior to the audit.

Appendix D: Table of Potential Customers

Company	Location	Size	Branche	Customer Group	Source	Evaluation strategic fit: 1	Evaluation strategic fit: 2	Average evaluation strategic fit
1	London, United Kingdom	11 to 50 employees	Other	Nautical services providers	Posidonia Event	3	3	3
2	Limassol, Cyprus	11 to 50 employees	Other	Nautical services providers	Posidonia Event	3	4	3.5
3	London, United Kingdom	11 to 50 employees	Information and Communication community	Nautical services providers	Posidonia Event	1	3	2
4	Bad Oldesloe, Germany	1 to 10 employees	Other	Nautical services providers	Posidonia Event	3	4	3.5

5	Kallithea, Greece	11 to 50 employees	Automation Solutions and IT Services	Nautical services providers	Posidonia Event	3	3	3
6	Vienna, US	201 to 500 employees	Other	Nautical services providers	Posidonia Event	3	3	3
7	London, United Kingdom	1.001 to 5.000 employees	Other	Nautical services providers	Posidonia Event	3	3	3
8	London, United Kingdom	11 to 50 employees	Information and Communication community	Nautical services providers	Posidonia Event	3	3	3
9	Nicosia, Cyprus	201 to 500 employees	Other	Transport enterprise	Posidonia Event		2	2
10	Houston, US	51 to 200 employees	Other	Nautical services providers	Posidonia Event	3	3	3
11	Athen, Greece	51 to 200 employees	Automation Solutions and IT Services	Nautical services providers	Posidonia Event	1	3	2
12	Warsaw, Poland	1 to 10 employees	Information and Communication community	Nautical services providers	Posidonia Event	3	2	2.5
13	Singapore	201 to 500 employees	Other	Nautical services providers	Posidonia Event	3	4	3.5

14	Dubai, UAE	51 to 200 employees	Maritime Operation Management	Nautical services providers	Posidonia Event	3	2	2.5
15	London, United Kingdom	51 to 200 employees	Other	Nautical services providers	Posidonia Event	2	3	2.5
16	Piraeus, Greece	11 to 50 employees	Other	Transport enterprise	Posidonia Event	2	2	2
17	Athen, Greece	51 to 200 employees	Maritime Operation Management	Shipping Companies	Posidonia Event	3	3	3
18	Athen, Greece	11 to 50 employees	Automation Solutions and IT Services	Nautical services providers	Posidonia Event	1	4	2.5
19	Athen, Greece	11 to 50 employees	Information and Communication community	(Nautical) services providers	Posidonia Event	1	2	1.5
20	Qingdao, China	501 to 1000 employees	Maritime Operation Management	Nautical services providers	Posidonia Event	3	2	2.5
21	Athens, Greece	1.001 to 5.000 employees	Shipment and Logistics	Shipping Companies, Shipping lines & their local representatives (agents/forwarders, etc.) / Transport and Logistic enterprise	Global Use Case (TRX)	4	4	4
22	Thessaloniki, Greece	11 to 50 employees	Shipment and Logistics	Transport and Logistic enterprise	Global Use Case (TRX)	5	4	4.5
23	Piraeus, Greece	1.001 to 5.000 employees	Maritime Operation Management	Shipping Companies, Shipping lines & their local representatives (agents/forwarders, etc.)	Posidonia Event	5	4	4.5
24	Athens, Greece	201 to 500 employees	Maritime Operation Management		Online Research		3	3

25	Athens, Greece	11 to 50 employees	Other	Shipping Companies, Shipping lines & their local representatives (agents/forwarders, etc.)	Online Research	5	4	4.5
26	San Francisco, USA	1.001 to 5.000 employees	Shipment and Logistics	Shipping Companies, Shipping lines & their local representatives (agents/forwarders, etc.)	Online Research	5	3	4
27	Hamburg, Germany	11 to 50 employees	Other	Shipping Companies	Online Research	3	4	3.5
28	Greenville, SC	11 to 50 employees	Automation Solutions and IT Services	Nautical services providers	Online Research	3	4	3.5
29		11 to 50 employees	Other	Shipping Companies, Shipping lines & their local representatives (agents/forwarders, etc.)	Online Research	3	3	3
30	Athens, Greece	51 to 200 employees	Automation Solutions and IT Services	Transport and Logistic enterprise	Online Research	2	3	2.5
31	Chippenham, UK	11 to 50 employees	Other	Nautical services providers	Online Research	4	4	4
32	Athens, Greece	11 to 50 employees	Automation Solutions and IT Services	Shipping Companies, Shipping lines & their local representatives (agents/forwarders, etc.)	Online Research	1	2	1.5
33	Albuquerque, USA	51 to 200 employees	Automation Solutions and IT Services	Shipping Companies	Online Research	4	4	4
34	Piraeus, Greece	11 to 50 employees	Automation Solutions and IT Services	Shipping Companies, Shipping lines & their local representatives (agents/forwarders, etc.)	Online Research		2	2
35	Pareklisia, Zypern	11 to 50 employees	Other		Online Research		2	2

36	San Francisco, CA	51 to 200 employees	Other		Online Research		2	2
37	Margate, UK	11 to 50 employees	Other	Transport and Logistic enterprise	Online Research	4	4	4
38	Athens, Greece	11 to 50 employees	Automation Solutions and IT Services	Shipping Companies, Shipping lines & their local representatives (agents/forwarders, etc.)	Online Research	2	2	2
39	Athens, Greece	11 to 50 employees	Other	Shipping Companies, Shipping lines & their local representatives (agents/forwarders, etc.)	Online Research	3	3	3
40	Rotterdam, Netherlands	11 to 50 employees	Automation Solutions and IT Services	Shipping Companies, Shipping lines & their local representatives (agents/forwarders, etc.)	Online Research	2	4	3
41	Athens, Greece	51 to 200 employees	Automation Solutions and IT Services	Nautical services providers	Online Research	5	4	4.5
42	New York, USA	51 to 200 employees	Maritime Operation Management	Nautical services providers	Online Research	4	4	4
43	Sofia, Bulgaria	11 to 50 employees	Shipment and Logistics	Shipping Companies, Shipping lines & their local representatives (agents/forwarders, etc.)	Online Research	4	4	4
44	Miami Beach, USA	201 to 500 employees	Shipment and Logistics	Shipping Companies, Shipping lines & their local representatives (agents/forwarders, etc.)	Online Research	4	4	4
45	Athens, Greece	51 to 200 employees	Information and Communication community	Nautical services providers, Shipping Companies, Vessel Owners	Online Research	4	4	4

46	Attiki, Greece	11 to 50 employees	Maritime Operation Management	Shipping Companies, Shipping lines & their local representatives (agents/forwarders, etc.)	Online Research	3	3	3
47	Attiki, Greece	11 to 50 employees	Maritime Operation Management	Shipping Companies, Shipping lines & their local representatives (agents/forwarders, etc.)	Online Research	5	5	5
48	Patra, Greece	11 to 50 employees	Automation Solutions and IT Services	Nautical services providers	Online Research	5	5	5
49	Hamburg, Germany	201 to 500 employees	Shipment and Logistics	Shipping Companies, Shipping lines & their local representatives (agents/forwarders, etc.)	Online Research	5	5	5
50	Athens, Greece	51 to 200 employees	Shipment and Logistics	Shipping Companies, Shipping lines & their local representatives (agents/forwarders, etc.)	Online Research	5	5	5
51	Barcelona, Spain	51 to 200 employees	Shipment and Logistics	Shipping Companies, Shipping lines & their local representatives (agents/forwarders, etc.)	Online Research	4	3	3.5
52	Miami, USA	11 to 50 employees	Automation Solutions and IT Services	Shipping Companies, Shipping lines & their local representatives (agents/forwarders, etc.)	Online Research	5	5	5