

# The new port infrastructure: strategic design of a container data platform for Port of Rotterdam

Appendix A. Digital innovations in sea-ports  
Appendix B. DBS future vision  
Appendix C. Confidential  
Appendix D. Scenario's  
Appendix E. Interview connected ports  
Appendix F. Ideation and validation  
Appendix G. Data exchange  
Appendix H. The benefits of data exchange  
Appendix I. Confidential  
Appendix J. Port decision makers  
Appendix K. The archetypes  
Appendix L. Confidential  
Appendix M. Competing platforms

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Appendix

# Appendix A.

## Digital innovations in sea-ports

Heilig, Schwarze and Voß (2017), have done extensive research about the digital transformations in sea ports. In their paper they explain that there can be found three main generations of developments: first sea ports adopt paperless procedures, then they adopted automated procedures, and are now working towards smart procedures.

Starting with the development of paperless procedures in the 1980's, the first generation was aimed at the reduction of paper-based processing in inter-organisational business processes. Many standards for inter-organisational communication, still used today, were developed and agreed upon. These standards were also the enablers for the start of the first Port Community Systems (PCS) and Terminal operating systems (TOS). However, port operations are still reliant on printed versions of those documents for handling terminal and other administrative procedures.

The second generation of digital transformation was in the 1990's and 2000's, new IT/IS solutions were built to automate container handling procedures, in particular in container terminals. The terminal of ECT located in the port of Rotterdam was the first terminal on the world to use automated guide vehicles on the terminal for container transport. Furthermore, many new technologies were introduced like, RFID tags to identify objects such as trucks and also the automatic identification system (AIS), one of the most used technologies for tracking a vessel's position. It was short after this period that terminals were also starting to make use of optical character recognition (OCR) systems (PEMA, 2013). These systems are able to capture and recognize machine-readable codes, like a container-specific serial number, present on all sides of containers (Heilig & Voß, 2017). On this code a lot of information about the container is stored, like the owner, its weight, its destiny and previous journeys and more. In this way a container terminal can identify a container automatically and knows where this specific container has to go to or who is assigned to pick it up. These scanners are present at the gates and cranes of the terminal. Unlike RFID which can also be used for the track and trace of containers, this is the worldwide standard how containers are tracked and traced by knowing which scanner has last scanned the container number.

# Appendix B. DBS

## future vision: the digital maturity model

Most tangible vision PoR has developed is the digital maturity model. This vision describes the development of a worldwide network of smart ports and is mainly aimed at port authorities. These ports can exchange structured and digital information with each other and other logistics players. In this model PoR also translates the meaning of smart ports to connected ports. The Digital Maturity Model shows the steps ports have to take to gradually develop into smart ports, it also provides practical guidelines where this challenge is sub divided into smaller goals. The goal of sharing data between ports is to make processes smarter, more efficient and by doing this adding value to the supply chain.

### Level 1 Digitalisation of individual parties in the port

As described earlier, there are many different parties involved in the port when it comes to port calls and other port operations. When their processes are digitalized the cooperation between parties could be more efficient. This level starts with the perspective that there is a lack of automation in the processes of these parties, to make this more explicit there are still many Port Authorities that work with programs like excel to administrate port calls and calculate port dues, some even have a printed map of their port on the wall where they can add sticky notes containing information of the current moored vessels and berth availability. A solution to bring a parties to the first level of automation is to implement what is known as a Port Management System (PMS), this is done for all parties separately and the development is kept under own control. A PMS support parties in the administrative and financial processing of port calls and facilitates the digitalization of port calls, dock planning and cargo handling. Automating the individual parties in the port enables data collection. This is the first step in order to run port more cost-effectively, more safely and more sustainably.

### Level 2 Integrated systems in a port community

The digitisation of individual processes as described in level 1 is required in order to execute the digital exchange of information within a port community, which could lead to reliable, efficient and paperless data flows between parties. Given that the number of parties in a port can be high, one could argue that bilateral linking of systems is inefficient. A solution is to link all individual systems to one central platform, a Port Community System (PCS), enabling the port to operate as a single entity. A PCS forms a neutral base for the digital exchange of information within the port community, containing two different types of communication, business-to-government (B2G) communication and for communications between companies (B2B). Arrangements about data ownership, usage and sharing must be clear for all parties. Often port authorities are in charge of the development and maintenance of the PCS because they can have a neutral part

in this and so offer added value to the whole port community. Besides sharing data smart functions and analytics could be built upon this data to make the PCS more valuable.

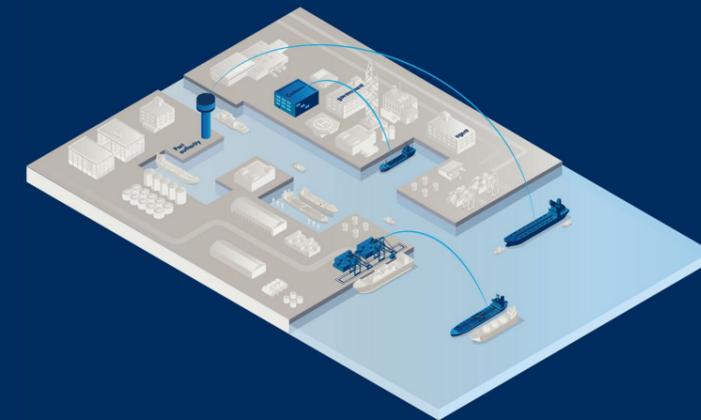
### Level 3 Logistics chain integrated with hinterland

The next step after the integration of a PCS in a port is to connect this system with the hinterland parties. This step is needed to either create or use tools for supply chain visibility, network planning and tracking and tracing of cargo and modalities. Shippers, forwarders and other hinterland parties can in this way, have real-time insight in visiting cargo and vessel data. Which can be used for various purposes such as, guiding cargo over available transport modes and transshipment hubs, selecting the most efficient routes for their cargo and having insight into the expected transit times, location and status of their cargo, on transport mode and individual container level. Alike the previous level the arrangements about used standards, data ownership, usage and sharing must be clear for all parties in order to make the system work. Furthermore, indirect benefits like signalling and prevention of congestion could result in faster cargo handling without additional investments in infrastructure. For both parties in the port community and hinterland, digital sharing of information could lead to competitive advantages.

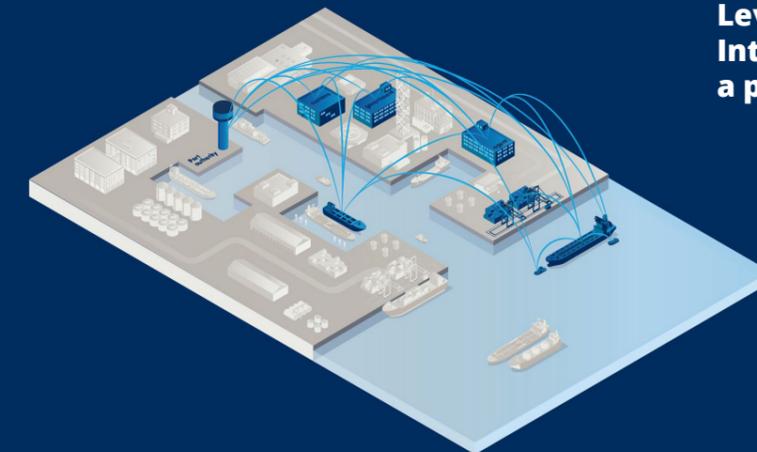
### Level 4 Connected ports in the global logistics chain

At this level, the linked communications are expanded to other ports, and these in turn are digitally linked to their own hinterland. This makes so called door-to-door digital logistic chain possible on a global scale. It also addresses problems occurring when since sea-going vessels that call at several ports have delays, which also affect the available capacity at the next port and increases emissions when a ship thereby has to increase its speed. Given that almost 30 percent of sea-going vessels are delayed more than 24 hours, this is a significant problem. Having the ability to respond to real-time to changes in schedules, could cause fewer delays, more Just-in-Time operations and a more seamless cargo flow from manufacturer to the customer. This highest level of digital maturity also brings challenges. For example, ports will have share information with their competitors and international standards for data sharing must be developed. (Port of Rotterdam, 2019c)

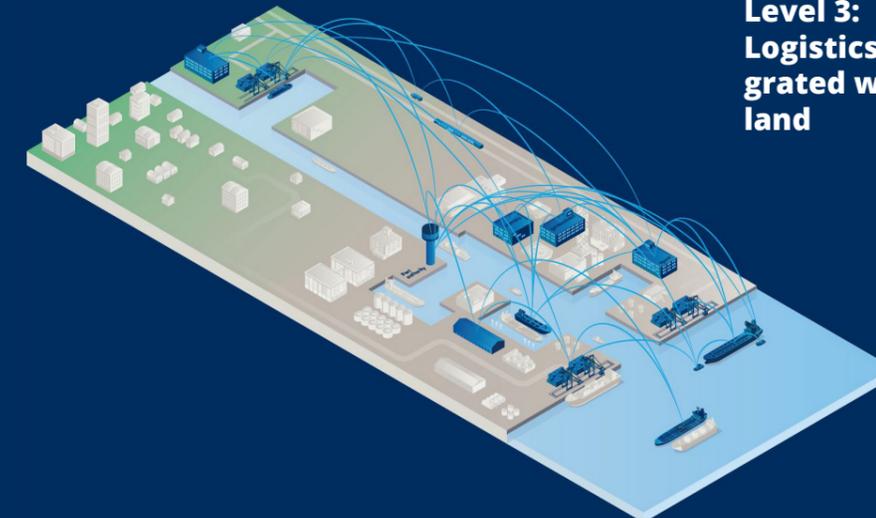
*"We believe in the development of a worldwide network of smart ports, which can exchange structured and digital information with each other and other logistics players. In our view, smart ports are connected ports."* - Port of Rotterdam (2019f)



**Level 1:**  
Digitisation of individual parties in the port



**Level 2:**  
Integrated systems in a port community



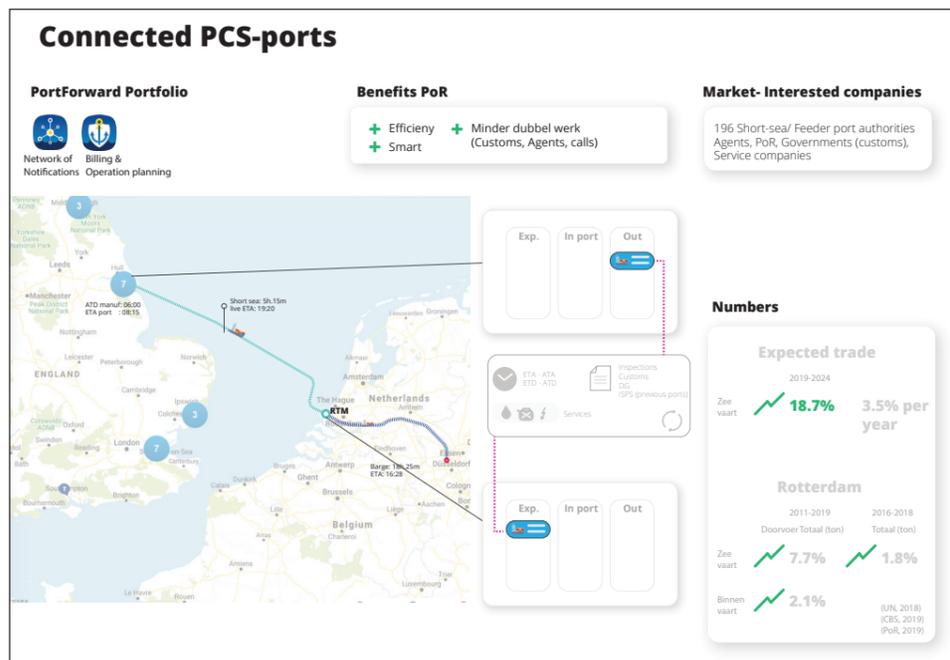
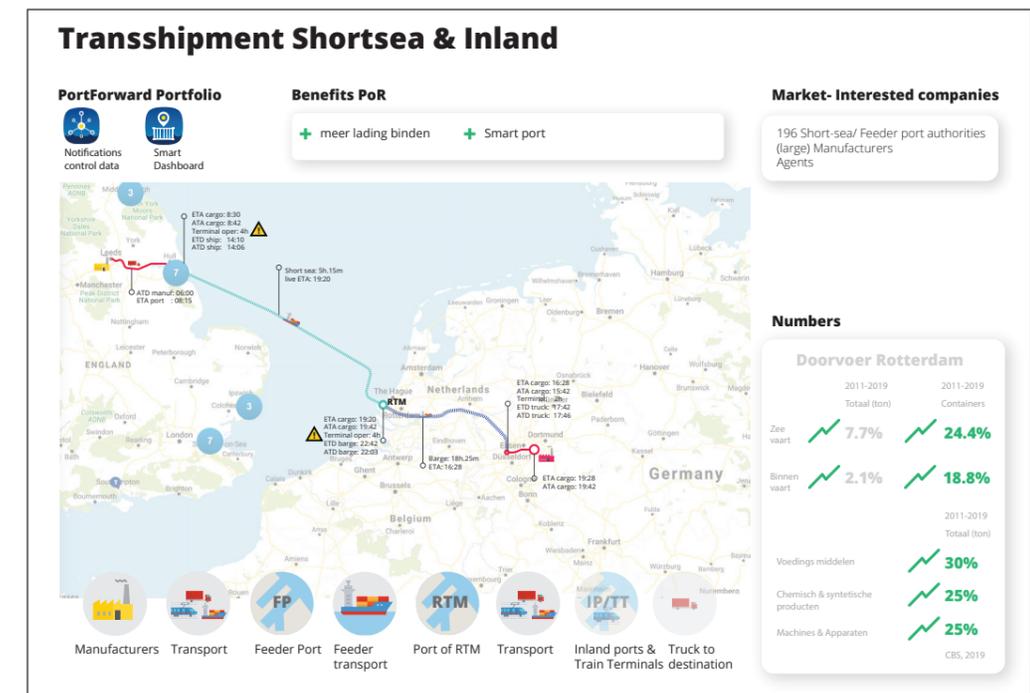
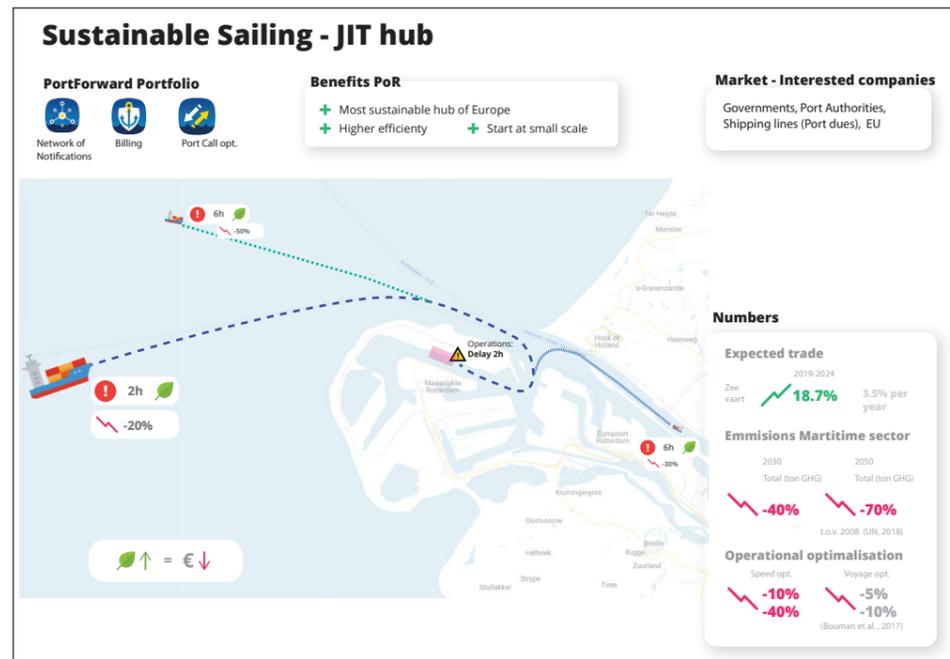
**Level 3:**  
Logistics chain integrated with hinterland



**Level 4:**  
Connected ports in the global logistics chain

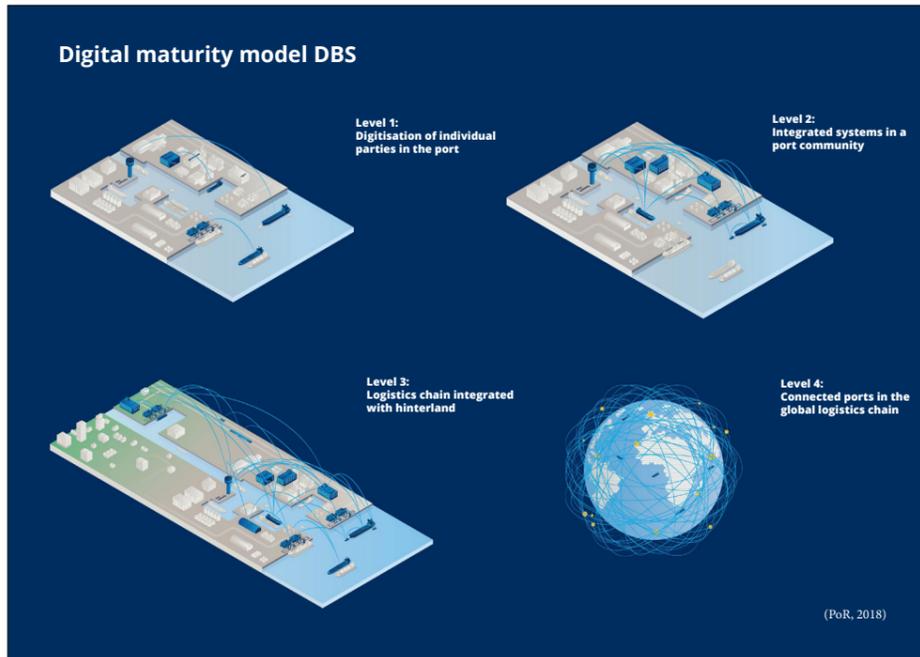
# Appendix D. Scenario's

For the strategic analysis an open interview guide and three different future scenarios presented as an infographic are prepared. Those scenarios are used because, according to Mullins & Walker (2015), many researchers question the ability of interviewees to articulate the deeper meaning of what they say. Scenario's are used to get on a deeper level of information retrieval in the short period of time and to see if a certain direction would trigger the interviewees.

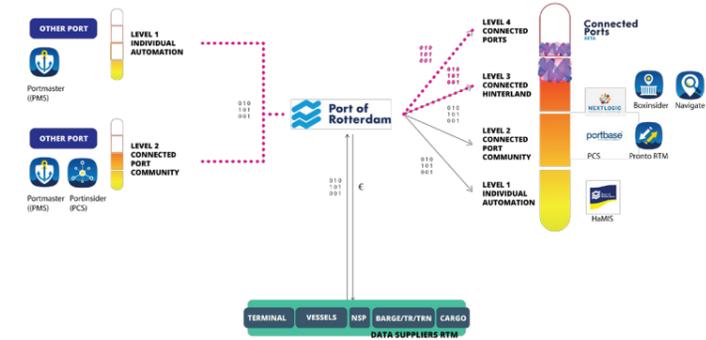


# Appendix E. Visual communication interview connected ports

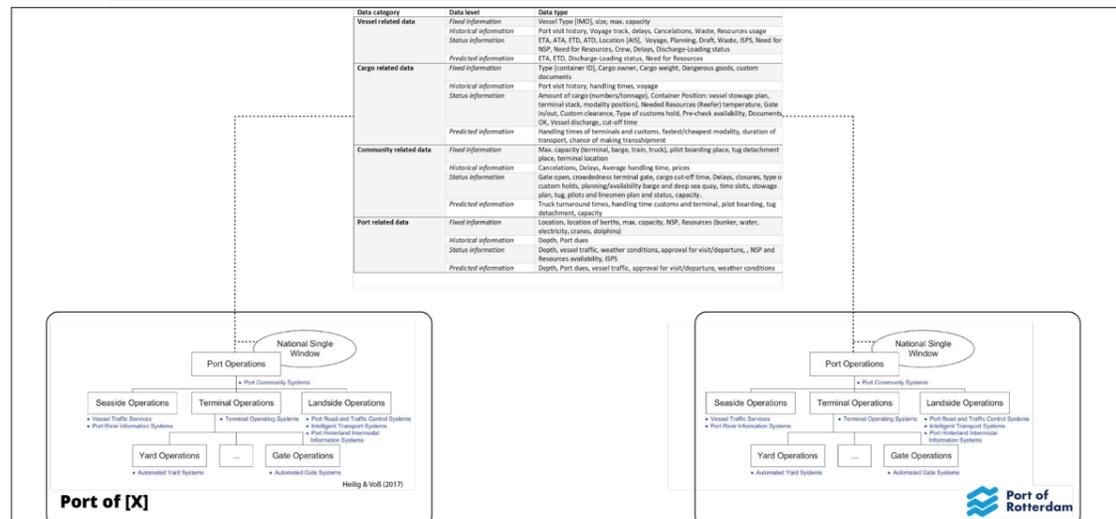
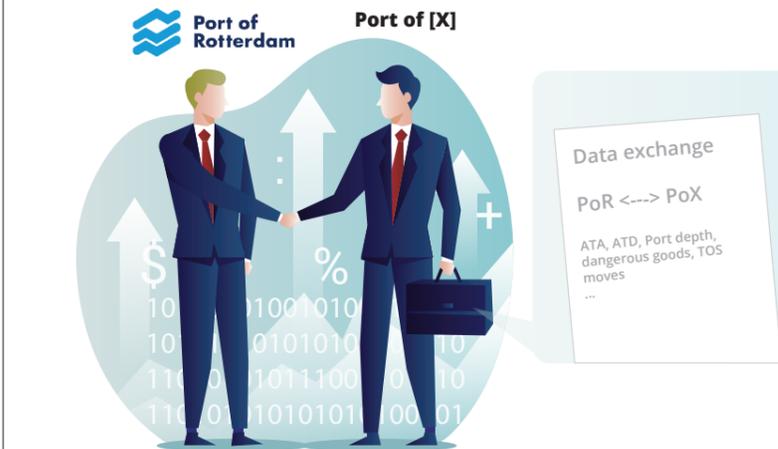
For the strategic analysis an open interview guide and visual communication was prepared.



Welke waarde kan hiermee worden toegevoegd



Als er over connected ports word gesproken, over welke data uitwisseling gaat dat dan?



Vraag naar informatietypes

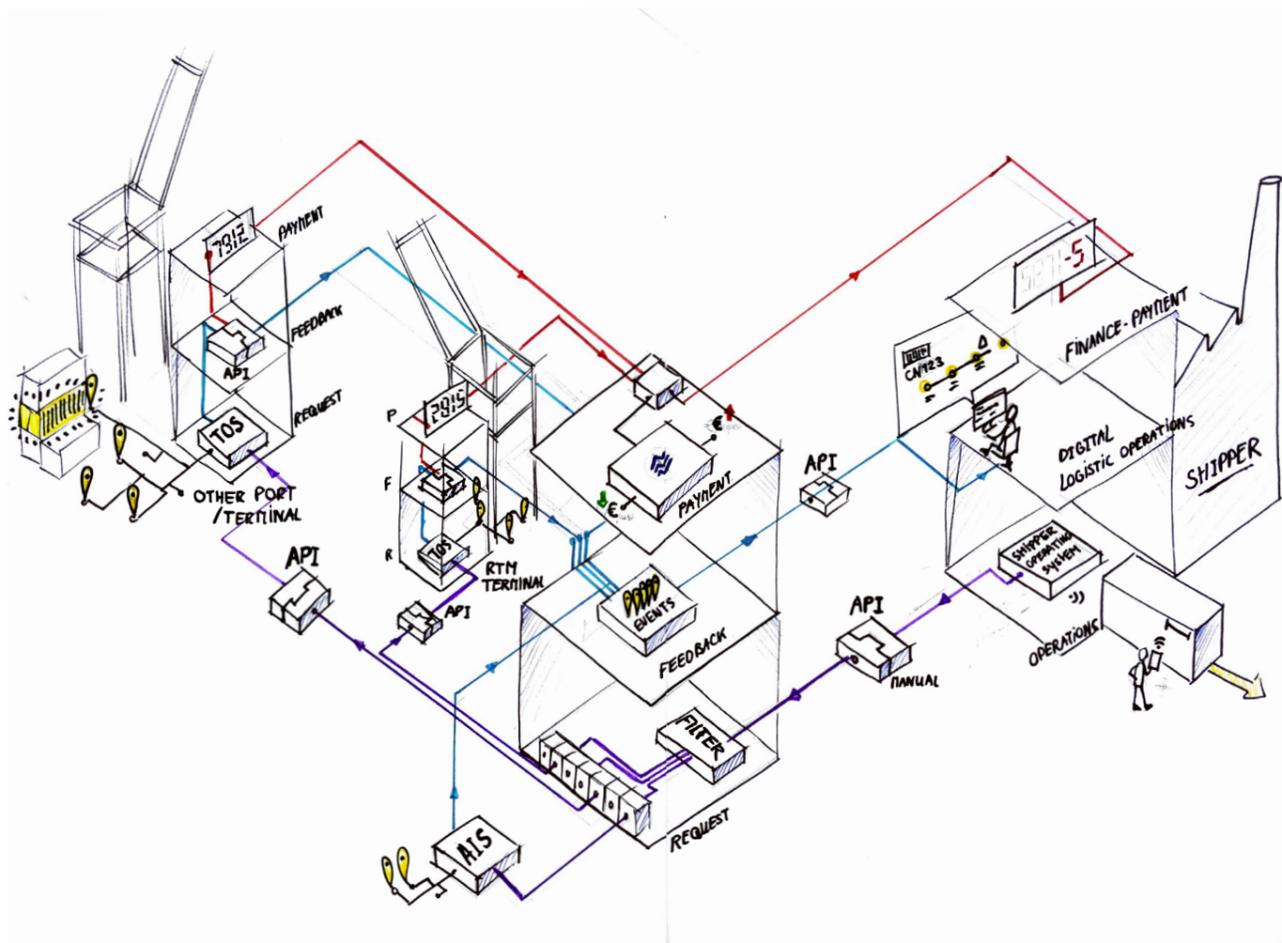
TABLE 4.11 MOST IMPORTANT INFORMATION TYPES

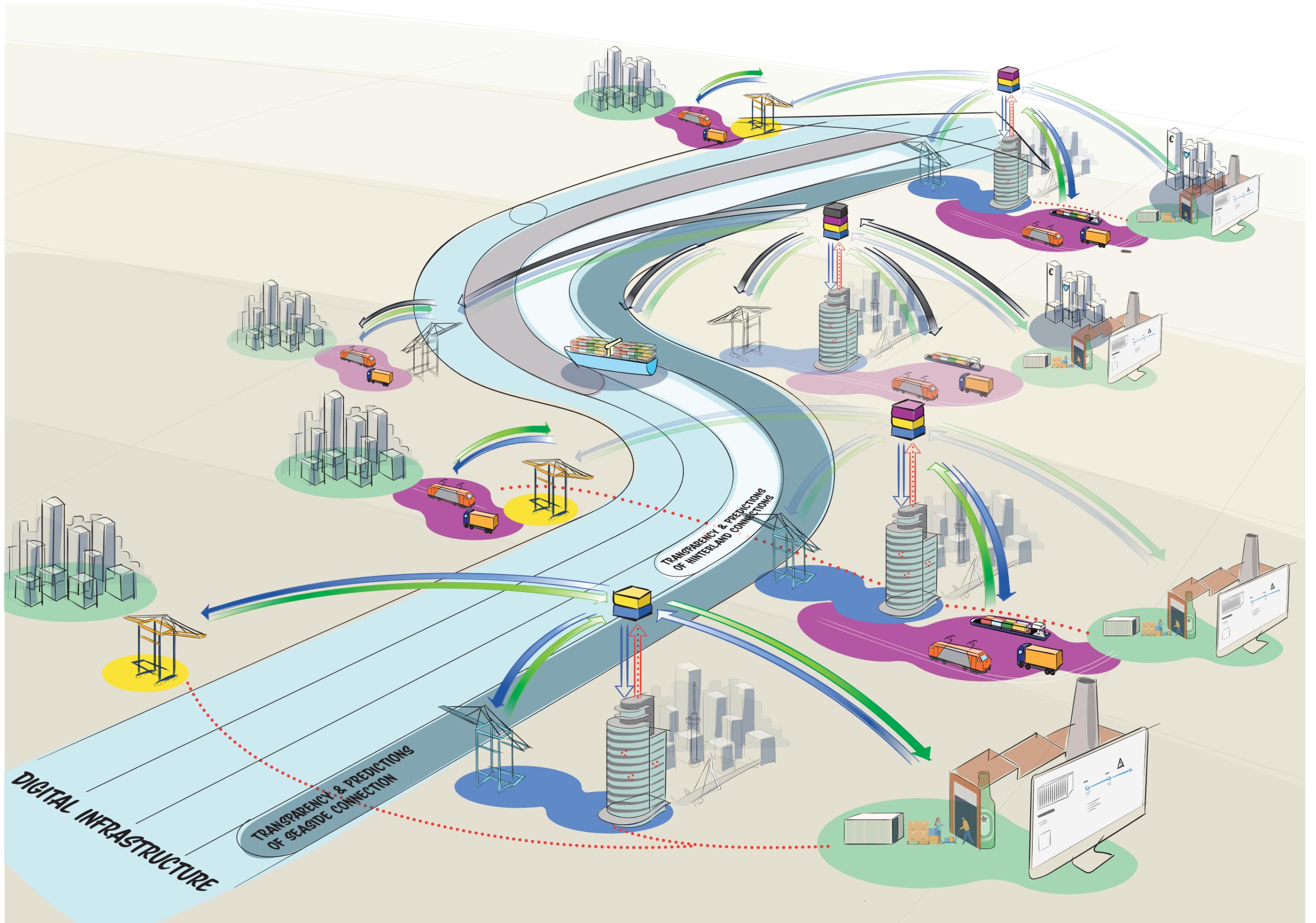
	All actors	Truck operators	Barge operators	Importers
<b>Containers</b>	<ol style="list-style-type: none"> <li>Confirmation import container discharged from (deep) sea vessel (6,7)</li> <li>Container status for custom holds (6,6)</li> <li>Co</li> <li>Documents OK (6,7)</li> <li>Pre-check container available (6,8)</li> <li>Presence container at deep sea terminal (6,6)</li> </ol>	<ol style="list-style-type: none"> <li>Confirmation import container discharged from (deep) sea vessel (7,0)</li> <li>Container status for custom holds (6,6)</li> <li>Documents OK (7,0)</li> <li>Pre-check container available (7,0)</li> <li>Presence container at deep sea terminal (7,0)</li> </ol>	<ol style="list-style-type: none"> <li>Confirmation import container discharged from (deep) sea vessel (6,2)</li> <li>Container status for custom holds (6,2)</li> <li>Type of custom holds (6,2)</li> <li>Documents OK (6,8)</li> <li>Pre-check container available (6,6)</li> <li>Presence container at deep sea terminal (6,6)</li> </ol>	<ol style="list-style-type: none"> <li>Confirmation import container discharged from (deep) sea vessel (6,7)</li> <li>Container status for custom holds (6,2)</li> <li>Type of custom holds (6,5)</li> <li>Documents OK (6,5)</li> <li>Pre-check container available (7,0)</li> <li>Position container at (deep) sea vessel (6,5)</li> <li>Expected time of discharge from (deep) sea vessel (6,5)</li> </ol>
<b>Transportation means</b>	<ol style="list-style-type: none"> <li>Delays (deep) sea vessels (6,8)</li> <li>Estimated time of arrival (deep) sea vessel (ETA) (6,5)</li> <li>Actual time of arrival (deep) sea vessel (ATA) (6,4)</li> <li>Progress of discharging/loading (deep) sea vessel (6,0)</li> <li>Changes in cargo cut off time (5,7)</li> </ol>	<ol style="list-style-type: none"> <li>Delays (deep) sea vessels (6,9)</li> <li>Delays yard opening time (6,9)</li> <li>Estimated time of arrival (deep) sea vessel (ETA) (6,7)</li> <li>Changes in cargo cut off time (6,4)</li> <li>Progress of discharging/loading (deep) sea vessel (6,4)</li> </ol>	<ol style="list-style-type: none"> <li>Actual time of arrival (deep) sea vessel (ATA) (6,6)</li> <li>Actual time of arrival (deep) sea vessel (ATD) (6,6)</li> <li>Actual times of departure barges (6,6)</li> <li>History (deep) sea vessel (e.g. changes in ETA, CCO, YOT) (6,4)</li> <li>History barge (e.g. changes in ETA, ETD, cancellations) (6,4)</li> <li>Delays (deep) sea vessels (6,4)</li> <li>Estimated time of arrival (deep) sea vessel (ETA) (6,4)</li> </ol>	<ol style="list-style-type: none"> <li>Actual time of arrival (deep) sea vessel (ATA) (7,0)</li> <li>Delays (deep) sea vessels (7,0)</li> <li>Estimated time of arrival (deep) sea vessel (ETA) (6,5)</li> <li>Progress of discharging/loading (deep) sea vessel (6,0)</li> <li>Changes in cargo cut off time (5,7)</li> </ol>
<b>Terminal</b>	<ol style="list-style-type: none"> <li>Closures at deep sea terminal (6,8)</li> <li>Malfunctions at deep sea terminal (6,5)</li> <li>IT outage at deep sea terminal (6,7)</li> <li>Explanation of different types of custom holds (6,2)</li> <li>Barometer for crowdedness at the truck gate deep sea terminal (5,9)</li> </ol>	<ol style="list-style-type: none"> <li>Closures at deep sea terminal (6,9)</li> <li>Explanation of different types of custom holds (6,7)</li> <li>Malfunctions at deep sea terminal (6,7)</li> <li>IT outage at deep sea terminal (6,6)</li> <li>Barometer for crowdedness at the truck gate deep sea terminal (6,6)</li> </ol>	<ol style="list-style-type: none"> <li>Closures at deep sea terminal (6,8)</li> <li>Malfunctions at deep sea terminal (6,8)</li> <li>Free time slots barge quay (6,6)</li> <li>IT outage at deep sea terminal (6,4)</li> <li>Planning barge quay (6,4)</li> </ol>	<ol style="list-style-type: none"> <li>Closures at deep sea terminal (6,5)</li> <li>Explanation of different types of custom holds (6,3)</li> <li>Malfunctions at deep sea terminal (6,0)</li> <li>Barometer for crowdedness at the truck gate deep sea terminal (6,0)</li> <li>Predictions truck turnaround time deep sea terminal (6,0)</li> </ol>

(Menger, 2016)

# Appendix F. Visual communication for ideation and validation

For the ideation and validation of Cadex visual communication was prepared.





# Appendix G. Data exchange

Table G1, shows also different types of data that are divided over the categories and levels. It might be good to mention that in practice there probably will be some more data types than showed in the figure. Though, the showed ones give a good impression about what data could be exchanged between parties related to the marine and logistics sector.

**Table G1**

Data category	Data level	Data type
Vessel related data	<i>Fixed information</i>	Vessel Type [IMO], size, max. capacity
	<i>Historical information</i>	Port visit history, Voyage track, delays, Cancelations, Waste, Resources usage
	<i>Status information</i>	ETA, ATA, ETD, ATD, Location [AIS], Voyage, Planning, Draft, Waste, ISPS, Need for NSP, Need for Resources, Crew, Delays, Discharge-Loading status
	<i>Predicted information</i>	ETA, ETD, Discharge-Loading status, Need for Resources
Cargo related data	<i>Fixed information</i>	Type [container ID], Cargo owner, Cargo weight, Dangerous goods, custom documents
	<i>Historical information</i>	Port visit history, handling times, voyage
	<i>Status information</i>	Amount of cargo (numbers/tonnage), Container Position: vessel stowage plan, terminal stack, modality position), Needed Resources (Reefer) temperature, Gate in/out, Custom clearance, Type of customs hold, Pre-check availability, Documents OK, Vessel discharge, cut-off time
	<i>Predicted information</i>	Handling times of terminals and customs, fastest/cheapest modality, duration of transport, chance of making transshipment
Community related data	<i>Fixed information</i>	Max. capacity (terminal, barge, train, truck), pilot boarding place, tug detachment place, terminal location
	<i>Historical information</i>	Cancelations, Delays, Average handling time, prices
	<i>Status information</i>	Gate open, crowdedness terminal gate, cargo cut-off time, Delays, closures, type of custom holds, planning/availability barge and deep sea quay, time slots, stowage plan, tug, pilots and linesmen plan and status, capacity.
	<i>Predicted information</i>	Truck turnaround times, handling time customs and terminal, pilot boarding, tug detachment, capacity
Port related data	<i>Fixed information</i>	Location, location of berths, max. capacity, NSP, Resources (bunker, water, electricity, cranes, dolphins)
	<i>Historical information</i>	Depth, Port dues
	<i>Status information</i>	Depth, vessel traffic, weather conditions, approval for visit/departure, NSP and Resources availability, ISPS
	<i>Predicted information</i>	Depth, Port dues, vessel traffic, approval for visit/departure, weather conditions

# Appendix H. The benefits of data exchange

A simple example to illustrate the value of (international) data exchange is the process of the International Ship and Port Facility Security Code (ISPS), ISPS assigns responsibilities to governments, shipping companies, shipping personnel, and port/facility personnel to detect security threats and take preventative measures against those threats affecting ships or ports used in international trade. This declaration has to be filled in by the ships and provided at every port a ships calls. One of the elements in this declaration is to list the last ten ports of call. It is obvious that nine of the ten names on the list stay the same and only the last visited port is added every time the declaration is provided to a port. In the situation that one of the parties of the ecosystem establishes an international data exchange with another port the list of the previous port can be reused an automatically be provided to the ships or their agent responsible for sending the declaration or even direct to the party responsible receiving this declaration in Rotterdam, this case Portbase. This could work similar to the pre-filled tax forms (VIA), the Dutch tax authority uses for people to fill in their taxes. The pre-filled tax forms are an example of administrative simplification. According to Arendsen (2016), this simplification is mainly visible and felt by taxpayers in direct saving of time and money: less time to fill in and send and possibly less (paid) support from third parties. Since this could also be the case for ISPS declarations, it could reduce the administrative load attended with port calls for ships and their agents, when visiting the port of Rotterdam. Besides, since this data exchange could be bidirectional, the next port of call could receive this information as soon a ship leaves the port of Rotterdam, making this data exchange beneficial for both parties. The data exchange is not only limited to ISPS information and could be extended to more information. So, are the eco-system parties already aiming for or are they already involved in this potential opportunity called international data exchange.

# Appendix J.

## Port decision makers

A lot of research has been executed in the field of port competitiveness and decision makers. Martínez Moya and Feo Valero (2017) did an extensive literature review on the available literature in these fields. They argue that it is hard to determine the real decision-maker and that next to that it also varies between countries and industries. Also in literature seems to be no consensus on who should be considered the decision-maker, the shipping lines, the shipper or the freight forwarder and that it can be seen from two perspectives; the sea-side and land-side perspective.

Meaning that the attractiveness of a port is determined by the sea-side stakeholders, that are responsible for the sailing routes and schedules and that cargo will go to the port with the best connections and schedules. Or from the land-side perspective; that the stakeholders responsible for cargo will influence the attractiveness of a port and that sea-side stakeholders will adjust upon their preference and location.

According to Martínez Moya and Feo Valero (2017), most literature indicate that the shipping lines are the decision makers, the sea-side perspective. In the last decade large individual shipping lines have formed strategic alliances, resulting in a domination the shipping world by the four biggest alliances. In this way individual carriers are taking advantage of economies of scale and greater geographic coverage. They decide whether a port will be the first port of call (FPOC) or just the last port of call (LPOC), which is essential for import and export. Moreover, an imported container that is unloaded in a FPOC will be able to reach its final destination quicker than, if it would be unloaded in the second port. The same goes for export and the LPOC, but than the other way around, this port is the latest option to export goods to get on board of the ship.

However, Martínez Moya and Feo Valero (2017) also mention others state that the ultimate decision makers are shippers, since they generate the cargo and again others mention that also freight forwarders play an important role. Since shippers' port choices are sometimes restricted by their contracts with freight forwarders or shipping lines.

So, from literature there is no clear and single answer on the question who is the decision maker, but what is important to know is that these parties influence the amount of throughput in a port.

### Target group selection

The party that is legally allowed to request data around a specific container, is the owner of the container, the one who makes the shipment. In most cases this is the Shipper or the forwarder. For this project there focussed on shippers. This choice is based on findings from literature and a comparison with an industry trend. Martínez Moya and Feo Valero (2017) found literature that state that the ultimate decision makers are shippers, since they generate the cargo. Therefore they will always stay relevant in the supply chain. Aronietis, Van der Voorde and

Vanelslander (2010), state that although seaport selection is always done by the shipping company, there is a trend that the big shippers become more powerful in the decision on seaport selection because of their increased importance in the market.

The future role of the forwarder is less certain than the shipper's role. According to Jeremy Rifkin, an American economist, the role of middlemen like forwarders and shipping agents disappear, because chains will become totally transparent so data may be shared by all the parties in maritime logistics networks. Currently, 15 percent of added value in transport chains is related to the work of middlemen and they are defending their positions by counteracting information sharing and transparency in maritime chains and for their own partial interests (Erasmus Universiteit Rotterdam et al., 2015). This role of the middle men in maritime chains can be compared with a middle men of another industry that became transparent due to the rise of the internet, the travel industry. Travel agents used to be the connection between travel suppliers and consumers, with information as their primary resource. Already in 2006, Cheyne, Downes and Legg (2006) wrote a paper on how the rise of the internet would influence consumer choices in the travel industry and what influence it could have on the role and importance of travel agents. They stated that internet allows travel suppliers and consumers to interact directly, which threatens the existence of the travel agent. Many advantages come in by the 'do-it-yourself' travel arrangements using the internet. Internet provides travel consumers more information, quicker responses and often lower prices, than a travel agent could offer. More than a decade later there can be seen many travel agents did not make it, however some survived and now also have another role and offer different added values.

This comparison cannot be seen as scientific proof that forwarders will soon disappear, however it's more a scenario which can become reality if transparency in supply chains will increase. Since platform is part of this transition towards transparency, forwarders might be harmed by the platform and are thereby not included as target group.

# Appendix K.

## More information about the archetypes

### Ruler

According to Mark and Pearson (2001) a Ruler thinks that the best thing to do to avoid chaos is to take control. Opposite to the Innocents that assume others will protect them from chaos. Rulers do not have this faith. Their primary motivation is to gain and maintain (their) power. The Ruler archetype, helps individuals to become wealthy, more powerful, and better established in their fields and communities. The strengths of Ruler organisations can be defined as being stable, productive, orderly, function smoothly with timely procedures and policies.

### Public appearance

Ruler environments are often substantial and impressive, for example large scale buildings with big columns made out of materials that are meant to last and suggest its timelessness. These impressive possessions and surroundings are desirable for rulers, because they represent power. Moreover, they are concerned with issues of image, status, and prestige, because they think the way things look can enhance power.

There is also a connection to patriotism. Rulers like their country and are proud on their, written and unwritten, laws and traditions of their societies and cultures. They often take leadership in this role and become role models for proper behaviour and are enforcers of the status quo. In the rulers behaviour there is a natural sense of authority, which makes it easier for others to follow them. Most Ruler organisations set or are involved in setting standards that govern how things are done. Rulers have great political skills, so they are able to gain the support of diverse constituent groups. Furthermore, they have an extensive relationship with their customers and large understanding of its customer needs. Their brand identity needs to work within the whole ecosystem not only with their primary customers. Also they see their consumers more as constituents. Since their existence prospers in a symbiotic relationship with customers. Moreover, if a ruler's product does not enhance its customer's lives or business, they will not continue to purchase it and even may not be able to afford the product. Therefore, it is essential to understand their needs, so products that enhance their lives can be produced. This understanding goes beyond simple market surveys, and moves towards a position where they know their customers so well that they know what might help them before they know. Successful ruler companies often own loyal customers.

### Company culture

The Ruler archetype have the preference for hierarchical structure. Within hierarchical organisations, people know their job description, where they stand, what they supposed to do and who their boss is. Roles and relationships in these organization are stable and defined as well as some checks and balances between and among divisions. Making mistakes are considered to depreciate the

sense of power. For this reason, decisions often have to be approved by a chain of command up the hierarchy. Since the currency of such organizations is power, people know and care who has the corner office. Power even can be reflected in the way people dress, which is sometimes formal and conservative. Furthermore, politics play an important role in ruler organisations:

“Politics, of course, exists in every organization, but following the politics in Ruler organizations is the major spectator sport.” - Mark and Pearson (2001)

Consensus is often reached within the company, although this process slows things down, it functions well to come to terms with one another and make thinks work between managers from different areas work.

### Brand examples

This archetype often can be found at regulatory and government agencies, old-style banks, software companies who build software for executives, insurance companies, and high-status law and investment firms. Ruler brands include the White House, Microsoft, IBM, American Express, CitiBank, Rolex and Ralph Lauren

<p style="text-align: center;"><b>The Ruler</b></p> <p><b>Desire:</b> control  <b>Goal:</b> create a prosperous, successful family, company, or community  <b>Strategy:</b> exert leadership  <b>Fear:</b> chaos, being overthrown  <b>Trap:</b> being bossy, authoritarian  <b>Gift:</b> responsibility, leadership</p>	<p><b>The Ruler identity might be right for your brand if you have</b></p> <ul style="list-style-type: none"> <li>• a high-status product used by powerful people to enhance their power</li> <li>• a product that helps people be more organized</li> <li>• a product or service that can offer a lifetime guarantee</li> <li>• services that offer technical assistance or information that helps maintain or enhance power</li> <li>• an organization with a regulatory or protective function</li> <li>• a product at the moderate to high price range</li> <li>• a brand seeking to differentiate from a more populist (Regular Guy/Gal) one or that is the clear leader in the field</li> <li>• a field that is relatively stable or a product that promises safety and predictability in a chaotic world</li> </ul>
<p><b>Figure K1. Levels of the ruler (Mark &amp; Pearson, 2001, p.245)</b></p> <p><b>Figure K2 The ruler main characteristics (Mark &amp; Pearson, 2001, p.245)</b></p> <p><b>Figure K3 The ruler identity fit (Mark &amp; Pearson, 2001, p.262)</b></p>	<p style="text-align: center;"><b>Levels of the Ruler</b></p> <p><b>Call:</b> lack of resources, order, or harmony  <b>Level One:</b> taking responsibility for the state of your own life  <b>Level Two:</b> exerting leadership in your family, group, organization, or workplace  <b>Level Three:</b> becoming a leader in your community, field, or society  <b>Shadow:</b> Tyrannical or manipulative behaviors</p>

## DBS and The Creator archetype

The creator is known for being the artist, writer, innovator, or entrepreneur that tries to tap into the human imagination. Since DBS can be seen more as an innovator than the other professions like the artist, the innovator kind of creator is further described. The innovator turns away from business as usual, using its unique ability to imagine a different way. Ultimately, they desire to create products so special that it will endure. This is something what is definitely one of the main drivers of DBS. During internal interviews there explicitly stated that:

*“PoR looks more at business as usual, whereas DBS tries to look at business as unusual in order to create new products to provide a new sustainable revenue streams here to stay for the coming decades”* - DBS (2020)

The self-expression of individuals and authenticity of products is important to creators. When the Creator archetype is present in individuals, they often are compelled to create or innovate, if not they will feel stifled. According to Mark and Pearson (2001), when looking at research and development, a Creator provides the impetus to develop new products and services. Creator organizations often appear in arts, design, marketing, and other fields that require a high degree of imaginative and out-of-the-box thinking. Furthermore, worker's autonomy is seen as very important in the creative process, the employees often can control their own times and task approach. And employees love the process of dismantling old organizational structures and create new ones.

*“Freedom reigns as long as the result is a high-quality product.”* - Mark and Pearson (2001)

The employees of DBS show many similarities with the above mentioned characteristics, many have a huge intrinsic drive to innovate and create new products which add value to their customers. They have a think out-of-the-box mindset and are given the freedom to develop new products in their own way as long the product quality is excellent. Also they are often joking about the more formal organizational structure of PoR, something which typically fits the creators archetype.

Moreover when looking at DBS's customers, they show similarities to the typical creator ones. Both customers have a feeling of being out of control in a changing world. They have the feeling that they need to be constantly inventing and innovating to keep up. According to Mark and Pearson (2001),

*“At a deeper level, the process of creation requires the ability to focus and gives a sense of control. When you are creating something, you are generally completely engaged in doing so, and the process also allows you to form colors, or music, or data, or anything at all into a structure that gives you a sense of control and pleasure.”*

DBS's customers, other smaller ports without a digital department, own some of the same fear, they have the feeling they have to innovate in order to stay relevant in a more and more digitalising world. By making use of DBS's products these

customers are involved in this transformation, the cooperatively with DBS make this transformation happen, which gives them a feeling of involvement and thereby control.

There are also a couple of characteristics of the creator archetype that does match to a lesser extent with DBS. Like the fact that a prototype organizational culture of the Creator is an artist's collective, where the people want great freedom in order to express their creativity. Their styles and behavior could be described flamboyant or simply unconventional. The Creator archetype combines innovation with beauty. For a Creator the experienced beauty and aesthetics of the product by the customer is equally or more important than the money it offers. For this part DBS is different since creating beauty is not their primary focus, further their products and culture can be seen as more conservative, introvert and money driven than a typical Creator is.

To conclude, DBS embodies a couple of characteristics of a Creators archetype. Which can be briefly summarized in its innovative character, providing products which makes their customers feel in control, much freedom of employees if this results in a high-quality product and focusing on business as unusual resulting in products that are here to stay.

## DBS and The Magician

According to Mark and Pearson (2001) Magicians can be known as the visionary, catalyst, innovator, charismatic leader or mediator. A Magician wants to find out the fundamentals of how things work and to apply these principles to getting things done. They want to discover ways to create and maintain prosperity, and are looking for win-win outcomes. They invent products that make things happen. The Magician archetype can be found in companies who for example are involved in corporate change strategies and other transformative services or products. Magicians are also often at the basis of radically new technologies, like personal computers, the Internet, genetic engineering, etc. Therefore they are sometimes seen as the scientists who try to work on modern miracles, which can even go in the direction of being a “mad genius-es” like Einstein. The DBS Lab, DBS owns can be seen as a kind scientist laboratory where they experiment with new promising technologies like block-chain and machine learning. When individuals in an organization are an active Magician, they are catalysts for change. They also share a strong sense of (own) responsibility, and belief that if you want to change the world, this begins with the change of your own attitudes and behavior. This requires a high doses of self-reflection. When looking at DBS there are a couple of key figures, mainly in the management, who show strong similarities with this archetype and are the drivers behind the vision DBS stands for. Being vision driven is also a characteristic of a Magician. Furthermore, they are seeking consensus about core values and desired outcomes, and then maximizing their flexibility in achieving these goals.

*“In the Magician organization, the secret of success is not the management of money, but the management of consciousness within a context that is now radically peer focused. Now that information is not scarce, company and societal decisions are often made not by the leadership alone, but out of a cultural conversation resulting in a quickly forming consensus.”*

- Mark and Pearson (2001)

DBS shows similarities with a Magician organisation, since an important aspect of DBS is that they tend to inspire and try to activate other parties so they will join the digital transformation. They do this by for example publishing whitepapers about future thoughts and how new promising technologies could change the current world. Because DBS believes this digital transformation cannot be done solely.

***“A connected port is needed because of the network effect, digitising you do together, alone you can’t make the difference and make it happen”***

-DBS (2020)

Like Magicians DBS can be seen as an learning system. DBS has build new digital products out of existing initiatives, sell and implement these at customers and learn from the obstacles faced during product development, challenges customers encounter and what they desire. Subsequently, DBS transforms these learnings into new solutions. Furthermore, many Magician organisations utilize cutting-edge technologies in consciousness, communications and organizational structures. This is also in DBS culture, a lot of DBS product teams use scrum as a way of working, and use new tools like slack to communicate. Also the hierarchy within DBS is more flat and less formal than compared to other departments of PoR. There are also weekly moments where different project teams come together and shortly present to another what they have accomplished and where they are working on, so others keep up to date and can learn from each other. Magician archetype promote their products by promising a magical transformation for the customer, like alchemist, seeking to turn lead into gold. Cleaning products, such as Ajax, promote their ability to make homes sparkle. DBS also promotes a kind of magical future state. They promote that every ports can become a smart ports, or connected port. And if they are a smart ports they will be part of transparent door-to-door logistics and can make use of port call optimisation like just in time sailing.

There are also a couple of characteristics of the Magician archetype that does match to a lesser extent with DBS. Many typical magician products have a spiritual or psychological component also their products can be seen as very contemporary products. For DBS these two elements are not the case, their products are aimed to stay for a long period and they do not include a spiritual or psychological component.

To conclude, DBS embodies a couple of characteristics of a Magician archetype. Which can be briefly summerised in its transformative and innovation catalyst character, its curiosity for new technologies and to bring radically new technologies to their customers, and providing products which enables every port to transform into a connected port and be part of the digital transformation and the benefits this will bring for them, a typical win-win outcome.

## **DBS and The Ruler**

Still there can be seen that DBS also incorporates characteristics of the Ruler archetype. This might not be a surprising discovery, since they were founded only two years ago, originating from a typical Ruler company, PoR. Some of their developed products help individuals to become wealthy, more powerful, and better established in their fields and communities, like the Ruler archetype. To make this more explicit, for some products DBS also offers a series of workshops and consultancies in order to help other ports to become digital. In this workshop their current workflow is mapped and a new digital purposed workflow is which would fit with DBS’s products. The customers, most of the time much smaller ports, are very eager to learn from the ‘great’ Port of Rotterdam. Thinking by themselves: “If this is the way it works in Rotterdam, it will definitely work in our port.” So there is a large sense of authority, which makes it easier for others to follow them. Hereby, DBS is maybe even unconsciously a role model of proper behaviour and are enforcers of the status quo. With DBS’s products and corresponding workshops is, it is involved in setting standards and direct how things are done. For DBS the Ruler archetype might be hard to separate from, since DBS always operates under the PoR brand since for the outside world they are seen as one.

# Appendix M.

## Competing platforms and solutions

Within the current cargo market, many new platforms and solutions are arising. For this thesis, the possible competitors for POR have been analysed. Below, the a couple of platforms and solutions that were found to be most relevant are discussed briefly.

### **Tradelens**

Tradelens is a platform developed by Maersk, world's largest shipping line, in cooperation with IBM. Tradelens is a block chain enabled data platform that makes container logistics more visible by connecting supply chain partners. The platform incorporates a community including shippers and cargo owners, 3PLs and freight forwarders, intermodal operators (trains etc), customers and government authorities, ports and terminals, ocean carriers and financial service providers. They advertise to enable efficient, transparent and secure exchange of information.

The implication, different interest, is likely to affect the platform. Since Maersk in main shareholder of APM Terminals, this integration was made easily. However, is not likely to go that easy when the platform wants to connect to other terminals that are not a part of APM Terminals. Those terminals see Maersk as a big competitor and are therefore suspicious about sharing their data with the platform.

### **Flexport**

Flexport offers a new way of forwarding cargo. Ordinary forwarders are often unable to offer their clients visibility and control. Flexport offers, together with their forwarding services, a platform that can be managed by their clients. Within this platform, users are able to track their shipments, get insights and analytics and predictable supply chain costs. Besides ocean shipping Flexport also includes air freight and ground transportation. Currently Flex port is currently connected with US sea-ports, but is planning to extend this to the European market.

### **GPS trackers**

Many companies also offer RFID trackers. Those trackers are used for real time GPS data. But, this only gives insight into the current location of the cargo. With only the location, it is hard to gain any predictions around the cargo.