

THE IMPACT OF SHARING IN SHIPPING

Report by Critical Future for OrbitMI



Dear Colleagues,

We are delighted to sponsor this independent research by Critical Future. This rigorous research includes an economic model, built by Critical Future, in order to quantify the economic value which can be unlocked through sharing in shipping.

By now, you have likely heard about the concept of the collaborative or sharing economy, roughly defined as a host of activities based on acquiring, providing, or sharing access to goods, services and data, often facilitated by online platforms that connect buyers, sellers, partners and other stakeholders. Those ideas sound largely positive and progressive, but for a traditional industry such as shipping they may sound alien, if not intimidating. How do we move from secrecy to sharing?

We sought answers. Our purpose in sponsoring the paper was two-fold. First, we wanted to get a deeper understanding what it even means to 'share' in the shipping industry. This paper helps bring clarity to that question.

Yet, it's just as important to articulate what sharing does NOT mean as much as what it does. Sharing does NOT mean complete transparency where sensitive company information is exposed to everyone. Sharing does NOT mean losing control over information. In fact, sharing requires confidentiality, control and security. It is only with these in place that firms will feel comfortable with collaboration.

What benefits are achieved through sharing? That was the second purpose of this paper. We asked Critical Future to quantify the benefits of sharing. Those benefits include realizing significant economic value to the industry but more importantly, the ability for us to meet the aggressive sustainability goals we want to achieve. Without sharing—without, first, thinking differently about sharing—we will struggle to meet IMO benchmarks.

This paper is meant to stimulate discussion, not end it. We share it with you as an invitation to an ongoing conversation. Indeed, let's share with each other our thoughts and best practice on how we can take advantage of sharing in shipping.

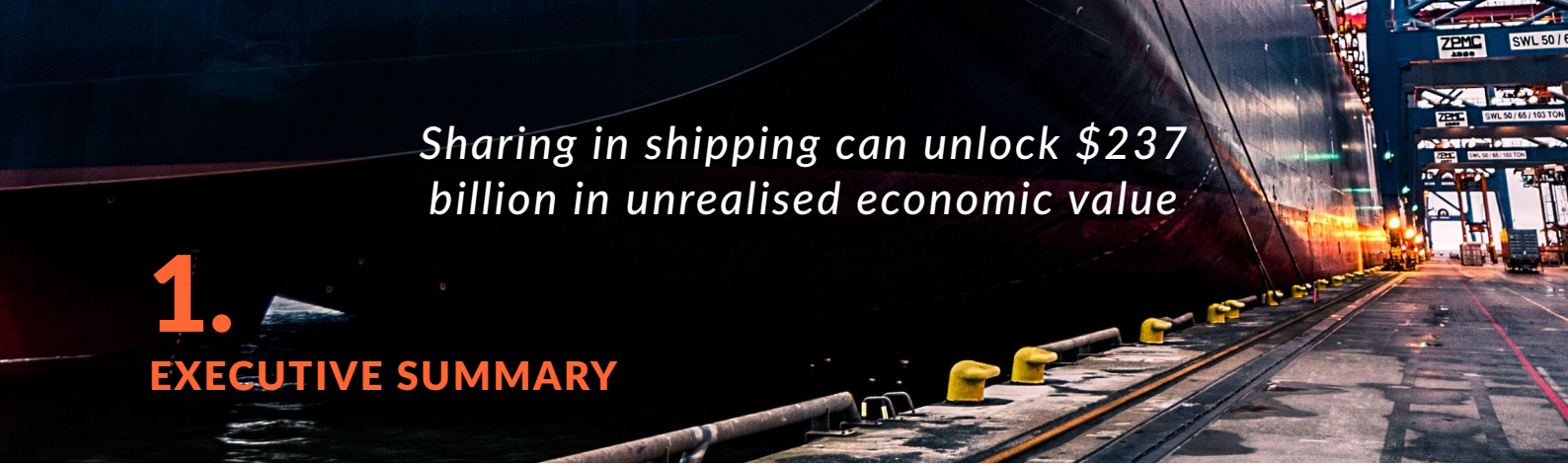
Ali Riaz

Chief Executive Officer
OrbitMI



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Sharing in shipping can unlock \$237 billion in unrealised economic value

1.

EXECUTIVE SUMMARY

The sharing economy creates value for society through the efficient use of resources. While this model is now widely deployed in the case of B2C (business-to-consumer) relations, sharing is less developed in the B2B (business-to-business) environment. This is largely due to perceived issues around security, legality, and confidentiality.

Nonetheless, sharing has proven powerful advantages in the business world, from healthcare, to travel and logistics. This White Paper assesses the opportunity for sharing in the shipping sector and finds there is the opportunity to unlock billions of dollars in value for the industry.

Generate economic value

Sharing is an enormous opportunity for the maritime sector to unlock economic value. Sharing non-confidential data, such as fleet management information, could unleash substantial productivity gains. The benefits would include improved vessel operations efficiency, with increased net revenue for shipping firms, and broader societal gains in terms of sustainability. Our economic model shows sharing data can unlock to \$237 billion¹ in economic value for the shipping industry over the next seven years.

Meet sustainability goals

This opportunity presents itself at a time when the shipping industry is under increasing pressure from international regulators to support sustainability and the fight against climate

change. In the future, the air emissions project will require validated and reliable industry-wide data on emissions. This will be essential for the modeling required to deliver insights for driving efficiencies in terms of global vessel carbon footprints. Sustainability imperatives will make sharing in shipping a prerequisite.

Stave off competitive threats

Sharing in shipping may be the mechanism to preserve the market share of key players. A go-it-alone mentality puts the shipping industry at risk from formidable companies outside the sector, such as big tech. Players such as Amazon have signaled their intentions to move more deeply into logistics and the shipping freight market. Our research suggests the risks for shipping industry lie in inaction, as tech players could capitalize on the convergence of key trends such as big data, IoT, connectivity, GPS, AI, and blockchain. This could pose an existential threat to current shipping owners and operators, and unleash large scale disruption as has occurred in many other industries. From media to music, incumbent players' market share evaporated in the face of competition from untraditional technology players.

To fend off this external industry competitive threat, ship owners and operators will need to work together to leverage the power of their most valuable untapped commodity: data. Sharing in shipping will increase market size and spur profitable growth, in an industry which is vulnerable to macro-economic challenges.

1. Critical Future Economic Analysis, page 17, 2020



2.

HOW DOES SHARING WORK IN BUSINESS?

The sharing of ideas is a long-standing trend in business. Through roundtables, networking, events, and forums industry leaders collectively tackle the key topics of the day. For example, the Global Maritime Forum² in 2019 brought together maritime leaders to discuss issues such as decarbonizing shipping. Interestingly, the leaders of this forum agreed, key to solving their problems was sharing more than ideas; they also needed to embrace sharing data and digital technologies.

2. Global Maritime Forum, Decarbonization, 2019
3. Cohealo, About the company, 2020

B2B Sharing Assets

The concept of the shared economy applied to industry has often focused on sharing assets as a method for maximizing utilization rates and achieving cost savings.

Healthcare

Sharing medical assets is used in healthcare, for example with the Cohealo platform³. This software platform utilizes data analytics to serve logistics, enabling hospitals to track in real time

costly medical devices. Cohealo's collaboration with logistics providers allows hospitals to share capital-intensive equipment based on demand, reducing total cost of ownership.

Logistics

Sharing freight space is used in logistics, for example through the German ELVIS AG association. The forwarding agents of this cooperative association save on storage, downtime and resources with a loading system software.

Shipping

Sharing assets in shipping has also been considered by the Boston Consulting Group, whose 'Bringing the Sharing Economy to Shipping'⁴ proposed a digital container marketplace.

B2B Sharing Data

A more exciting trend is the B2B sharing of data which, rather than just maximizing asset utilization, can unlock tremendous value for the wider industry, such as through drug discovery in medicine.

In 2019, 10 pharmaceutical companies agreed to share data to aid drug discovery. These pharmaceutical companies have agreed to collaborate to apply artificial intelligence, in the form of machine learning, to mine shared data for drug discovery. The Machine Learning Ledger Orchestration for Drug Discovery (Melloddy) project is the first time these companies have shared data with one another. Owkin, a Google Ventures-backed start-up based in New York and Paris, has developed the AI, and a secure blockchain-based system. Importantly, security and confidentiality are assured, as the algorithm is programmed to analyze data that the companies input without revealing trade secrets to competitors. The project is funded to the tune of €18.4 million⁵ from The Innovative Medicines Initiative (IMI). This is a partnership

between the European Union and the European pharmaceutical industry, represented by the European Federation of Pharmaceutical Industries and Associations (EFPIA).

Sharing Drivers

The rapidly growing importance of artificial intelligence has led organizations to be increasingly aware of the need to expand access to data through third-party partnership ecosystems. Individual enterprises, on their own, simply do not generate the necessary levels of data to derive the unbiased, key insights required to spur growth, redesign operating models, and unleash the productivity gains promised by AI.

The growing imperative for sharing data was captured in a recent Accenture C-suite survey⁶, where 71 percent of executives anticipated the volume of data exchanged with ecosystems to increase, and 36 percent of executives reported that the number of organizations they partnered with had doubled or more in the last two years.

These findings were mirrored in the Harvard Business Review Analytics Services Survey⁷, where 78 percent of companies highlighted the ability to easily access and combine data from a variety of external sources as very important for a data-driven enterprise. Nonetheless, the current gap between intention and action was captured with only 23 percent reporting they were presently effective in this arena, and only 15 percent currently sharing data with key vendors and suppliers.

"Enterprises do not generate the necessary levels of data on their own to derive the unbiased insights required." *Harvard Business Review*

4. Ulrik Sanders, Jens Riedl, Johannes Schlingmeier, and Christian Roeloffs. 'Bringing the Sharing Economy to Shipping.' Boston Consulting Group. Online: <https://www.bcg.com/en-gb/publications/2016/transportation-travel-tourism-bringing-sharing-economy-to-shipping.aspx>

5. Victoria Rees (European Pharmaceutical review), Ten Big Pharma Companies Collaborate On Data Sharing AI, June 2019

6. Accenture, Maximize Collaboration Through Secure Data Sharing, October 2019

7. Companies Are Failing In Their Efforts To Become Data Driven, Randy Bean 2019

3.

WHY IS MARITIME DATA SO IMPORTANT?

Sharing data in shipping offers the tantalizing prospect of bringing powerful financial gains to an industry of fundamental importance to global commerce. Despite the digital transformation of the past 25 years, and the rise of e-commerce, products ordered online still rely on the shipping sector to physically deliver. Some 90% of global trade volumes are carried by ships, making maritime the most efficient and most vital method of delivering cargo⁸. The United Nations Conference on Trade and Development (UNCTAD) estimates that the operation of merchant ships contributes about \$380 billion USD in freight rates within the global economy, equivalent to

about 5% of total world trade.

The maritime industry is steeped in data ranging from:

- Noon reports on vessel performance progress and fuel consumption at sea
- Bills of lading detailing cargo histories and receipts to international trade
- Static data - Vessel specification information and performance benchmarking
- Dynamic data - The majority of data require updates to remain valid and relevant

Outlines of the multitude of data flows in a single ship (Figure 1):

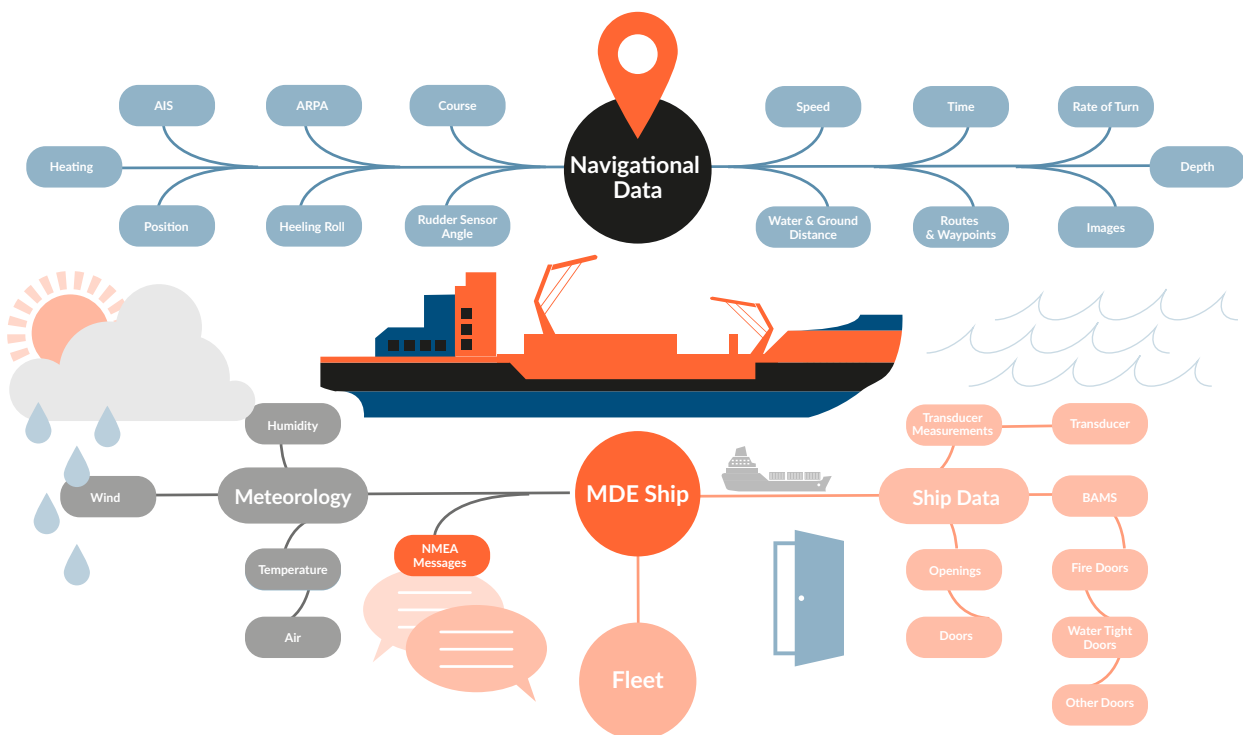


Figure 1 – Data flows in a single ship⁹

8. UN, Review of maritime transport, October 2019

9. Critical future image based on: Lokukaluge Prasad Perera, Data flow chart in ship performance and navigation information, 2016

Data Flows in Maritime

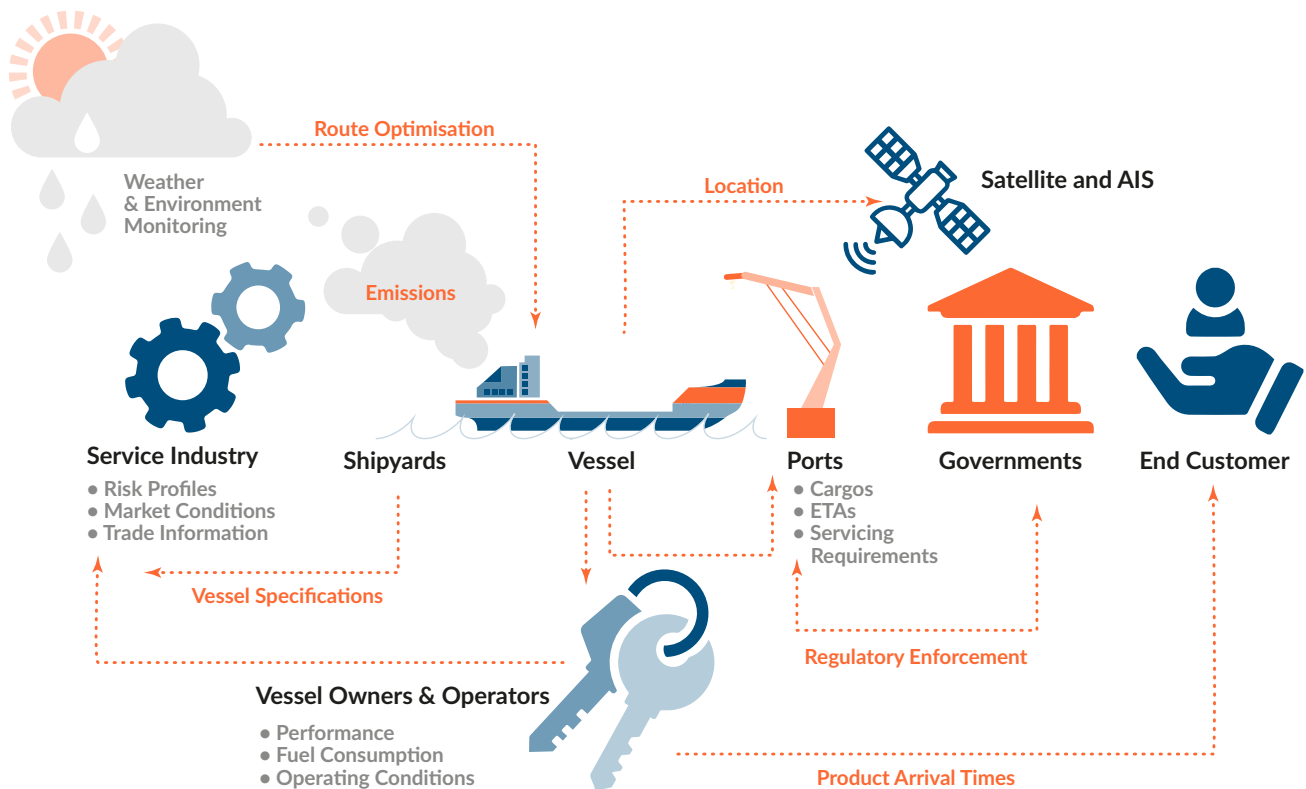


Figure 2 - The Future of Data in the Maritime Sector¹⁰

Maritime data is currently not shared by key stakeholders, and therefore shipping operators can fail to gain the full picture. This has implications for risk management, vessel efficiency, and sustainability as fuel consumption increases.

There are complicated networks of communications transacting data currently (Figure 2), leading to potential issues of leakage, miscommunication and mistakes. There is ample scope to improve the exchange of information across value chains.

“The biggest challenges smart shipping has today is the availability of necessary data layer to allow for big data analysis to enable optimization and execute on the necessary activity to make smart shipping a reality. Without the data layer... smart shipping is simply not possible.”

Andreas Chrysostomou, CEO, Marine Fields¹¹

10. Geospock, The Future of Data in The Maritime Sector: Driving Change Through Geospatial Data, 2019
11. Andreas Chrysostomou, Data Sharing Vital for a Digital Culture In Shipping, September 2019

Benefits of Increased Industry Collaboration on Data Sharing

1. Digital Standards

Creating digital standards related to the exchange of digital information across the value chain improves the potential for digital interoperability and efficiency. There are already a number of initiatives, such as the Digital Container Shipping Association and the International Taskforce Port Call Optimization, assessing the potential for creating digital standards for the maritime industry. In fact, standardization is the key first step towards data sharing initiatives and building more advanced solutions.

2. Benchmarking and Increased Transparency

The proliferation of sensors and data collection related to safety, emissions and operational efficiency opens up new possibilities to share data, which can be used to increase transparency and create benchmarks around key performance indicators. Such benchmarks can be used internally, to improve performance; and externally by investors, lenders, insurers and customers, to prioritize companies with environmentally friendly or safer business practices, thereby driving productive industry change.¹²

3. Predictive Analytics

The spread of sensor and data collection technologies, combined with the rapid expansion of computing power and AI, makes it possible to analyze very big data sets, which can be used to optimize

operations and predict potential risks. A prerequisite for reaping these benefits is having access to large amounts of data. In fact, greater amounts of analyzable data, across the supply chain, creates better and more comprehensive analytical results. Obtaining this data can be achieved by sharing anonymized data from several operators, which is beginning to take place in several maritime initiatives.

4. Logistics System Optimization

Optimizing a system consisting of independent actors is generally difficult, as the rational action of an individual can lead to suboptimal outcomes for the system unless all involved actors are able to coordinate their actions. Similar challenges can be identified in the maritime industry. However, through industry collaboration, digitally supported data sharing across a relevant set of actors can be used to improve the coordination and efficiency of the whole system, thereby reducing waste and driving down operational costs.

5. Streamlined & Trusted Information Flows

Another potential benefit of digitalization and data sharing is to reduce transaction costs by automating the exchange of information between different parts of the value chain. A common prerequisite for this is the ability to trust and validate the information being exchanged. Technologies such as blockchain offer a way of ensuring trust and transparency.¹²

12. Digitalization and Data Sharing: Making The Maritime Industry, Safer, Cleaner and More Efficient', Kasper Soegaard & Ian Wheeler, Global Maritime Forum, June 28 2019

4.

INDUSTRY LEADERS ARE RECOGNIZING THEY NEED TO SHARE MORE

Ineffective data sharing and poor cross-industry collaboration is costing the maritime industry dearly, according to a new report released by the Business Performance Innovation (BPI) Network in collaboration with Navis and XVELA, both part of Cargotec.

The study, entitled ‘Competitive Gain in the Ocean Supply Chain: Innovation That’s Driving Maritime Operational Transformation’¹³, reports that importers, exporters, container carriers, terminal operators, vessel owners and other stakeholders suffer from poor visibility and predictability around shipments. In short, they are losing money due to a lack of partner synchronization and insufficient data insight.

In line with the Accenture and Harvard Business Review research cited earlier, there was also recognition in this study, particularly among industry leaders interviewed, that digitization and mindset shifts are happening, and will be a boon to all players in the industry. Maritime industry leaders accept the need to realize the potential of data through sharing, despite this not having not yet been actualized:

- Some 90% of shippers and consignees say there’s a need to improve visibility in the ocean supply chain.
- Just 12% of respondents said their partners were “very effective” at collaborating and sharing data, although 38% said their partners were improving and 32% said they were “somewhat effective.”
- Respondents said the top five most promising technologies for the maritime industry are: data analytics, automation, the internet of things, new software management solutions and cloud solutions.

“Everyone benefits from collaboration and data sharing,” says Andreas Mrozek, Global Head Marine & Terminal Operations for the Hamburg Sud Group, one of the world’s largest container shipping lines. “It starts with the customers and moves to the carriers, then the terminal operators, vendors, freight systems, truck companies, and keeps going down the line. Closer collaboration is a compelling value proposition for each supply chain partner.”¹⁴.

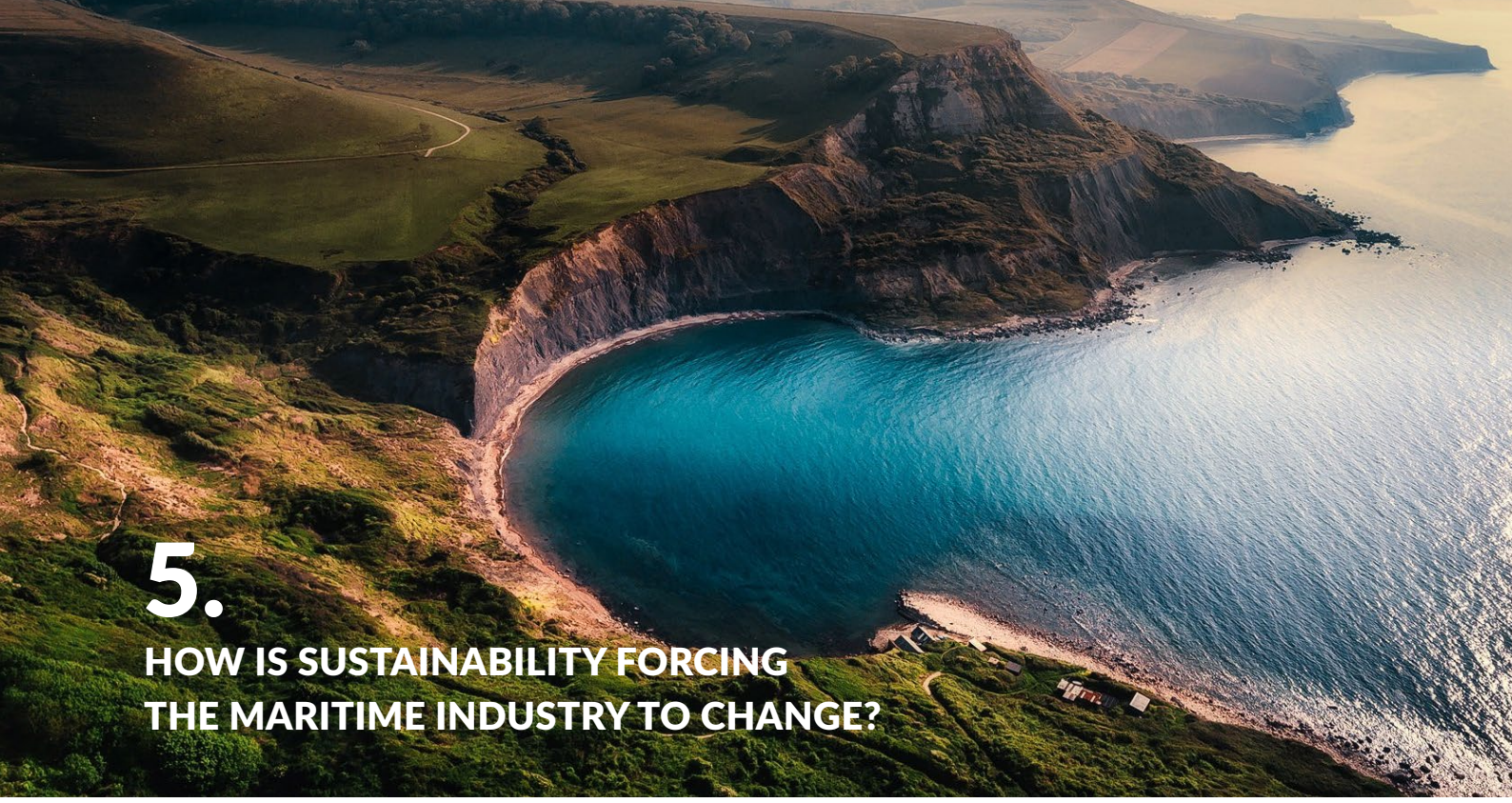
On average, surveyed executives estimated that each of a wide range of ocean supply chain processes could be improved by as much as 66%, and no less than 55%, if the industry updated its IT systems and improved its ability to share data with other members of the supply chain.

“Ninety percent of survey participants said real-time data access and information sharing was important to increasing the efficiency and performance of the shipping industry.”

Business Performance Innovation (BPI) survey report

13. BPI, *Competitive Gain in the Ocean Supply Chain: Innovation That’s Driving Maritime Operational Transformation*, 2019

14. Andreas Mrozek, *Global Head Marine & Terminal Operations for the Hamburg Sud Group*, June 2018



5.

HOW IS SUSTAINABILITY FORCING THE MARITIME INDUSTRY TO CHANGE?

The rewards promised by sharing in shipping comes at the time when they are most needed. The shipping industry is under substantial pressure in regard to sustainability, which could be significantly alleviated through sharing data.

The international maritime regulator, IMO, aims to reduce the sulphur content from fuel by 85% globally through a new cap in 2020¹⁵. Shipping operators need to not only adapt to deal with today's regulations, but be prepared for increasing regulatory pressure in future. The prominence of the shipping industry, and over 90,000 shipping vessels operating, mean it is a key government target in the fight against climate change. For example, the UK has a plan to achieve zero-emission shipping by 2050, and the IMO aims to achieve a 50% reduction of greenhouse gas emissions by 2050.

The costs to the shipping industry of decarbonization could be enormous. A report, published by University Maritime Advisory Services (UMAS) and the Energy Transitions Commission (ETC), found the industry will

need to invest at least \$1tn in land-based and ship-related infrastructure in order to meet the International Maritime Organization's (IMO) targets to cut greenhouse gas emissions by 2050. The cumulative investment needed between 2030 and 2050 to halve emissions would amount to circa \$1.4tn. A further \$400bn will also be required in order to fully decarbonize the sector, bringing the total capital needed to \$1.9tn.¹⁶

Shipping is actually the most sustainable form of global transport, especially in comparison to airline travel. However, the maritime industry cannot be allowed to struggle on in the dark without shining the light on efficiency gains through shared data. The industry will be expected to provide validated reliable independent sources of the emissions. This will be aggregated into a data lake enabling analytics and to drive efficiencies. Such modeling will require sharing data amongst shipping operators and owners, the enforced collaboration of key players for the common good.

15. IMO, *Low Carbon Shipping and Air Pollution Control*, 2019

16. Umas & Etc, *Study Puts Cost of Decarbonising Shipping by 2050*, January 2020

6.

WHY IS DATA SHARING KEY TO UNLOCKING VALUE?

By 2025, there will be 75 billion connected devices. This includes maritime sensors to feedback data in real time from engines to risk alerts, locations, etc. Vessels can now be monitored in real time, with central management enabling response to issues such as hazards and opportunities such as extra journeys. GPS data, combined with constant ship connectivity, allows ship operators to respond to events as they occur.

In the shipping world, vessels themselves generate tons of data. Unfortunately, this data is not being fully utilized. It mainly sits uncollected, dormant, disconnected or unintelligized. Shipping operators are waking up to the opportunity for leveraging this data to optimize vessel performance. Data available from the number of devices connected (*Figure 3*).

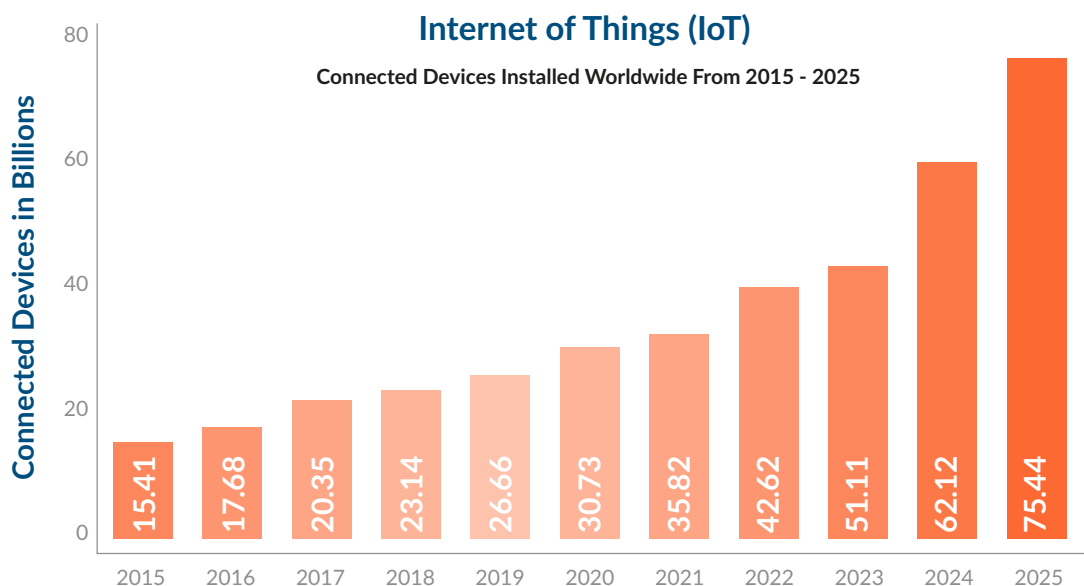


Figure 3 - IoT Connected Devices to 2025¹⁷

17. IHS, Forbes, Statista, IoT Connected Devices to 2025, 2020

“For the maritime sector, harnessing the potential of this data is now the industry’s greatest opportunity, but also its greatest challenge.

The dispersed, global nature of the sector, combined with strong competition between operators, does not easily facilitate the collaboration and cooperation required to fully harness value from data. In addition, a lack of effective methods of knowledge

communication risks damaging the reputation of the industry in the face of greater scrutiny from customers and governments.

The industry must therefore seize the moment itself and come together to unlock the full value of its pooled data, whilst demonstrating its credentials and importance on the global stage.”

*The Future of Data in The Maritime Sector: Driving Change Through Geospatial Data*¹⁸

The ship of the future may well be managed remotely, based entirely on data, and possibly even automated. Automated vessels would offer increased performance and transform the maritime industry, just as self-driving cars will do in automotive. While this is a longer-term view, there is the potential right now for massive operational gains through sharing. Data is like oil, unrefined it is of limited use. Gaining value from data requires platforms to aggregate, centralize, engineer, and learn from data with machine learning, backed by secure technologies such as blockchain.

How will blockchain technology help shipping share more?

Today, fintech remains a blockchain leader, but organizations in other sectors—such as technology, media, telecommunications, life sciences, health care, and government—are expanding and diversifying their blockchain initiatives. How will blockchain technology support sharing in shipping? Big Data (quantity), and blockchain (quality management), can interact in several ways:

- **Data integrity:** Data recorded on the blockchain has gone through a verification process thereby ensuring integrity. This also provides transparency and accountability as all activities and transactions on the blockchain network are traceable.
- **Real-time data analysis:** As demonstrated by the payment sectors, blockchain enables real-time cross border transactions. Major financial institutions are investing in blockchain because it affords real-time settlement of huge sums irrespective of geographic barriers. In the same manner, organizations in sectors such as maritime, requiring real-time analysis of large scale data across geographies can leverage blockchain enabled systems.
- **Data sharing:** Data shared by independent companies can be stored in a blockchain network. This enables anonymity, and confidentiality of data. A key aspect of privacy in blockchains is the use of private and public keys and cryptography to secure transactions between users.

18. Geospock, The future of data in the maritime sector: driving change through geospatial data, 2019



7.

WHAT IS HOLDING BACK SHIPPING FROM SHARING?

Legacy systems and infrastructure

The industry's aging and inflexible IT systems are key impediments to improving visibility and collaboration. 49% of executives surveyed cited the cost and complexity of legacy systems as an obstacle in the report released by the Business Performance Innovation (BPI) Network.

New infrastructure is also required for new technology. As mainstream industry underwent digitization, peer-to-peer data exchanges emerged between key partners with dedicated

communication lines. This development highlighted the need for scalability and flexibility to keep up with the demand. The introduction of the Internet, together with secure connectivity through this open system e.g. VPN, solved this issue. As the maritime sector begins implementing data sharing and collaboration, such challenges resurface, i.e. the use of peer-to-peer connectivity, such as from one ship platform to one Port Community System (PCS).

Industry inertia

Some 54% of executives believe the industry being “slow to change” is one of the biggest roadblocks to improving collaboration. 85% of shippers and consignees rate the industry as either “slow to change” (70%) or “far behind the curve” (15%) when it comes to innovation and next generation technology adoption. At the same time, many in the industry believe that change is coming. Some 46% of respondents said their companies were either investing significantly in new technologies or significantly increasing those investments.

Competitive Mindsets and Secrecy

Among the biggest challenges holding back shipping are narrow mindsets. Shipping is an old industry, steeped in tradition, governed by fixed mindsets. The Global Maritime Forum gathered representatives from a broad range of maritime sectors for a collaborative workshop on May 27, 2019 at the Swiss Re Centre for Global Dialogue. A key finding was that the competitive mindsets and secrecy is holding back positive change¹⁹:

“The relatively slow adoption of digital technologies and data sharing in maritime cannot be attributed to a lack of beneficial potential. On the contrary, several identified systemic problems could be solved using digital technologies, thereby, contributing towards making the maritime industry safer, cleaner and more efficient. Therefore, the key question became identifying the underlying causes that make data sharing and collaboration in the maritime industry a challenge, and how to overcome them.

“One identified factor was the traditional industry

mindset, where there has been some skepticism towards digitalization and its potential benefits for the maritime industry. Another barrier is a highly competitive attitude, which makes pre-competitive collaboration with competitors exceedingly difficult. However, these mindsets are shifting as there is a growing belief that digitalization and data sharing can be an enabler of positive and productive change.” The organizers of the forum conclude: *“The necessary technologies exist but the maritime industry must find ways to overcome its competitive mindset and increase collaboration if it wants to fully realize the operational benefits of digitalization... opportunities and challenges transcend any single company and can only be properly addressed through cross-industry collaboration.”*

The Risks of Inaction

The biggest risk for shipping owners and operators is inaction. Big tech players that understand the value of data, and have the resources, talent, and technologies to capitalize, are poised to disrupt the shipping sector. For example, Amazon signaled its intent to enter the shipping freight market when it gained approval from the Federal Maritime Commission in the US to act as an Ocean Transportation Intermediary. In January 2017, Amazon revealed it had started coordinating its own shipments from Chinese merchants to its warehouses in the US. In 2018, Amazon launched Shipping with Amazon directly in competition with FedEx and UPS. While it does not currently own any ships, it is functioning as a freight forwarder and logistics provider, and it could enter shipping fully in future, as the CEO of Maersk explains:

“Amazon is a threat if we don’t do a good job for them... If we don’t do our job well, then there’s no doubt that big, strong companies like Amazon will look into whether they can do better themselves.”

Soren Skou, CEO, A.P. Moller Maersk A/S²⁰

19. Kasper Soegaard & Ian Wheeler, Digitalization and data sharing: making the maritime industry, safer, cleaner and more, Global Maritime Forum, June 28 2019

20. Thomson Reuters street events, transcript A.P. Moller Maersk A/S, 2019

Industry and sector barriers matter less than ever before. Owning assets such as fleets of vessels, once an insurmountable barrier to entry, matters less in the digital age. Google Pay and Apple Pay compete with financial institutions; Facebook is one of the biggest media players without until recently producing any content; Uber and Airbnb sell mobility and accommodation without owning cars or real estate. Digital structures cut through previously segregated industries, enabling cross-functional products and services that can gain vast scale.

Examples of tech firms taking advantage of new technology opportunities to throw industries into disarray abound:

- Film and television - Netflix and Amazon Video took market share of video players like Blockbuster Video, sending them crashing into obscurity. While industry incumbents had every opportunity to launch streaming services, they failed to invest in new technology. Today over 55% of Americans watch an OTT (Over the Top Streaming Service), with Netflix having 158 million paid subscribers globally. Television and content providers are now rushing to launch their own streaming services, e.g. Disney Plus, Apple TV and HBO Max.
- Music – The music industry failed to take note when the Napster file sharing software caused an eruption. This was followed by the major music retailers such as HMV losing massive market share to new tech players: firstly, Apple's iTunes digital music sales platform, and more recently YouTube and Spotify. For example, HMV still managed to sell 31% of all physical music products in the UK in 2018, but had to call in the administrators for the

second time as consumers had moved en masse to streaming services. Today, Spotify has 232 million monthly active users and 108 million paid subscribers; Apple Music has over 60 million users and YouTube Music has over 15 million paid subscribers.

- Automotive – The global taxi industry was sent reeling by Uber, which now has 110 million users worldwide. Tesla emerged from nowhere in 2003 to its current market cap over \$80 billion, more than double that of Ford at around \$37 billion. Google and Apple are also investing heavily in autonomous cars, threatening to dislodge traditional OEMs in the automotive world of the future.

There are countless other examples of tech firms dislodging incumbent industry giants, none more ironic than Kodak which was sent into bankruptcy by digital photography - despite itself being the inventor of the first digital camera. What all these examples of disruption had in common was a lack of imagination by incumbent players. Industry leaders could only perceive competition in terms of their traditional rivals; they lacked the ability to change their mindsets to open up to new opportunities and realize the threat of tech players entering the market. The prospect of tech players disrupting shipping is real, as digitization becomes increasingly important. Lack of investment in technology, combined with industry inertia and internal competition concerns, prevents key players sharing data to unleash productivity gains. This leaves clear open space for players like Amazon with enormous cash reserves, to potentially enter the shipping sector and dislodge incumbent shipping owners and operators.

8.

WHAT WILL BE THE ECONOMIC VALUE OF SHARING IN SHIPPING?

Shipping owners and operators can act to stave off this competitive threat and realize enormous gains in the process. Our economic modeling shows that if the current key players in the maritime sector adopt a business model based on sharing data, they can unlock up to \$237 billion for the shipping industry over the next seven years. (Figure 4)

Economic Value Generated by Sharing in Shipping

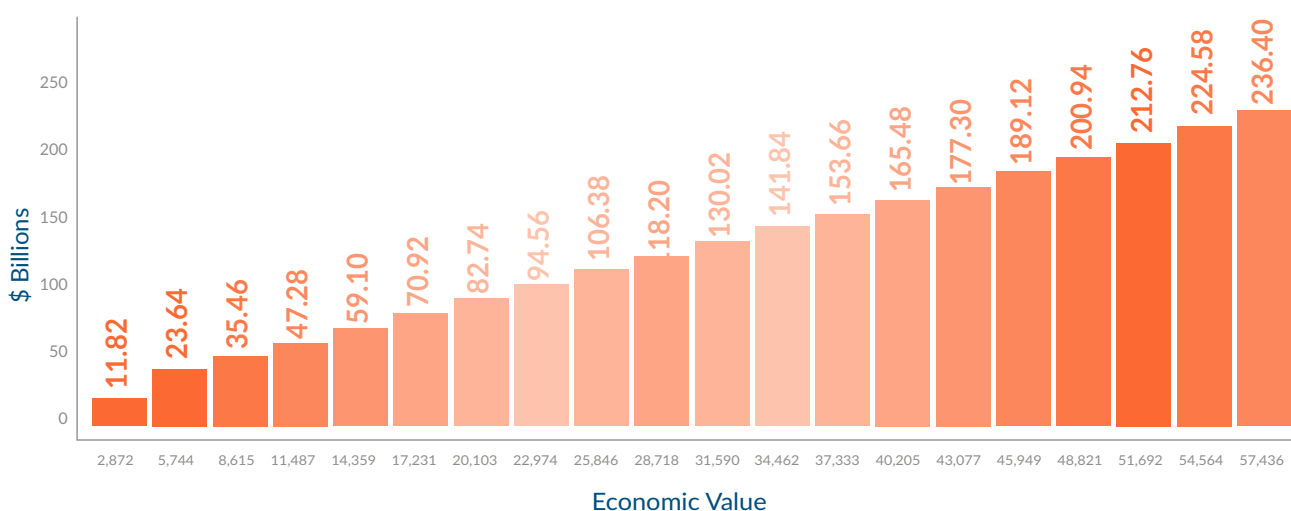


Figure 4 Economic value generated by sharing in shipping²¹

21. Critical Future Analysis, 2020

Model Parameters

In order to accurately calculate the added value of sharing in shipping, we developed an economic model (*Figure 5*) that takes into account key parameters, which include the following: the number vessels in the world fleet; average time those vessels spend at

sea each year; average expected industry profits without sharing; estimate annual value of unexploited data generated per ship and finally, a sensitivity analysis of industry adoption over the next seven years. Below, we explain our reasoning for each parameter in detail.

	General Cargo Ships	Container Ships	Bulk Carriers	Oil & Chemical Tankers	Passenger Ships	Gas & Other Tankers	Other Ship Types	TOTAL
Customers in Segment	16,246	5,202	11,748	13,431	7,155	2,041	1,613	57,436
Average time spent /days	131	148	97	137	171	125	153	132
Vessels in Segment	16,246	5,202	11,748	13,431	7,155	2,041	1,613	57,436
Average Profit	\$20.270	\$29.850	\$20.280	\$22.378	\$16.829	\$21.545	\$18.950	\$21.210
Value of annual unexploited data/ship	\$372.846	\$795.896	\$295.190	\$520.428	\$517.872	\$403.364	\$405.909	\$448.730
Total Sample percentage %	29	9	21	24	13	2.7	1.3	100

Figure 5 - Model parameters²²

The number of vessels in the world fleet

While the total number of vessels in the world exceeds 90,000²³ our analysis includes a subset thereof totaling 57,436. The vessel types included in the model are: General Cargo Ships, Container Ships, Bulk Carriers, Oil and Chemical Tankers, Passenger Ships, Gas & Other Tankers, Other ship types. Certain vessel types, such as warships and fishing vessels, were excluded from the model as they follow unique data sharing patterns as well as a different sub-market characteristics.

Average Time Spent at Sea 2019 / days

Using data published by the European Commission (June 30, 2019) for the annual total time spent at sea in days for all vessel types, we applied a weighted average for the vessels in our chosen sample.

Average Profit expected in 2027, \$ per day spent at sea

The average profit in \$USD per day spent at sea is calculated based on BIMCO, Clarksons and UNCTAD findings, as well as in macroeconomic predictions such as the expected growth of the global economy, the expected growth and investments in shipping, the course of freight rates and maritime costs and other relevant data.

Average Profit expected in 2027, \$ per day spent at sea

While certain major geopolitical events such as a trade war emerging between USA and China would impact the profitability of the shipping industry, for the model purposes no such event is considered. The historically depressed levels of 2016 are considered in the model due to their close time proximity.

22. Critical Future Analysis, 2020

23. Equasis, The World Merchant Fleet, 2019

Yearly unexploited Data Value / per ship

Our industry specific forecast for shipping is that both the direct & indirect impact of data sharing will boost profitability by 14% to 19%, with slight variations for each vessel type. Our model uses an average of 16%. This figure is supported by additional information. According to the latest publicly available evidence, the impact of data as a percentage of GDP is 4.5% of the total G7 economy. In some advanced countries such as Estonia, Ireland & India, the impact of data as a percentage is significantly higher at 8.9 %. According to UNCTAD, the current value of the data market is more than \$244 USD and its accumulative growth rate through 2027 is expected to be 19%. The model's forecast considers the data created

by vessels only during their time at sea.

Ships in port also create significant data -which will be used in the future -but pricing them is strongly subjective at the time.

Industry Adoption in the next seven years, Sensitivity Analysis

The number of ship owners and companies engaging data sharing services is on the rise. Many shipping companies will consider adopting new solutions only after the suggestion of one of their partners. That's why we place a rapid adoption data sharing in shipping approximately in 2027. We expect investments in data sharing aligned with the age and the competitiveness of the fleet. In this way, through data sharing, ship owners will recover more rapidly the required investment in reducing emissions.

What are the chances of an optimistic scenario? The Digital Future

Shipping faces interrelated challenges of digitalization and mindset shifts. A key factor is the digitization potential of the asset; assets like equities, which are digitally recorded and transacted, can be simply managed or integrated through application programming interfaces (APIs) with existing systems. However, connecting and securing physical goods in the maritime sector requires enabling technologies like IoT and biometrics, blockchain, and AI and the right mindsets and culture to successfully deploy them.

Maritime industry leaders, with deep vertical domain knowledge, have the opportunity to

act now to maintain their market positions and take advantage of the opportunity to set industry standards. Big tech does not have the in depth verticalised data required to optimize the maritime industry yet. For example, Google may have the most search engine query data, but data is also verticalised within industries. Dominant shipping players have within their grasp the potential to leverage industry data to establish unassailable market positions for the digital age. The risks for shipping leaders lie in inaction, with the growing threat of untraditional market entrants. The future of shipping is digital and data-driven, and the strategy of key players must embrace new ways of working.



9.

ROADMAP – HOW CAN SHIPPING CAPTURE THIS VALUE?

Ship owners and operators have the opportunity to act now to preserve their future. There are two main activities needed:

- Thinking differently – Challenging mental models developed in former contexts, which need to be reimagined for the digital age. As Einstein put it, “the world as we have created it is a process of our thinking. It cannot be changed without changing our thinking.” Using imagination to meet the big challenges of the 21st century is a key task
- Ecosystem development – Related to thinking differently, is throwing off the skeptical and secretive mindsets, and instead working together with partners in ecosystems. There is substantial gains to be achieved through leveraging the expertise, platform, and resources of partners.



10.

THINKING DIFFERENTLY

Organizations cannot transform without people transforming their thinking. As Leo Tolstoy, the Russian novelist, wrote, *“Everyone thinks of changing the world, but no one thinks of changing himself.”* Research from McKinsey found that half of all efforts to transform organizational performance failed either because senior managers did not act as role

models for change, or because people in the organization defended the status quo. In both cases, individuals and their mental models were the bottleneck, rather than technology or processes.

Mental models are frameworks consisting of our underlying assumptions from socialization, values, beliefs, education, and experience

that help us organize information. These frameworks dictate how we understand our world, heavily influencing how we receive information, and how we react to it. When the context changes, our pre-existing mental models can act as a barrier to the change we and organizations need to make.

For example, an established mental model held that human beings could not run a mile in less than four minutes. Then on May 6th, 1954, in Oxford, England, Roger Bannister ran a mile in three minutes and 59 seconds. Just 46 days later, John Landy broke the four-minute barrier. By 1957, 16 more runners had broken the barrier. Today, well over a thousand people have run a mile in less than four minutes, something previous mental models had considered impossible. Organizations are held back by mental models in the same way. Thinking differently can help companies break through barriers to growth.

Change has always been fundamental to the maritime industry. Over sixty years ago, the shipping container revolutionized trade and changed the way transportation, shipping, loading and unloading of goods was undertaken. It has even been argued that this change in shipping gave globalization its biggest push. Today, the maritime industry is on the verge of a great change, even a new era, driven by increased digitalization and innovation. But the mental models of yesterday are holding back maritime from embracing the mindset needed today. The key mental activity required in this thinking shift, is imagination.

The one common theme in all the examples of industry disruption we cited earlier was a lack of imagination from the incumbent players.

Industry leaders couldn't imagine new players entering the market. They failed to see that the market had changed, technology had made old operating and business models inefficient, and new ways of working were needed. Had the market leaders in these sectors been able to think differently, it would likely be them leading these markets today and enjoying the growth trajectory of digital players.

Any new strategy will fall short of its potential if it fails to address the underlying mental models, mindsets and capabilities of the people who will execute it. The danger of technological transformation is that leaders just look at the technical solutions, and fail to realize the internal people-focused changes, or what Alexander Grashow, Ronald Heifetz, and Marty Linsky call "the adaptive work", needed to achieve those solutions²⁴.

Leveraging technology is a key part of any roadmap, but it will not be achieved without the mindset shift required. Doing this adaptive work, thinking differently, leaders need to open up to change, share ideas, question core assumptions and take in fresh perspectives. This can include empowering staff at all levels of the organization to bring new ideas and ways of working. The important first step is the self-realization that thinking differently, and reimagining, is needed:

"We've become convinced that organizational change is inseparable from individual change. Simply put, change efforts often falter because individuals overlook the need to make fundamental changes in themselves."

*McKinsey, Change Leader, Change Thyself*²⁵

24. *Practice of Adaptive Leadership: Tools and Tactics for Changing Your Organization and the World: A Fieldbook for Practitioners.* Alexander Grashow, Ronald Heifetz, and Marty Linsky (2009).

25. *Change Leader, Change Thyself*, 2014, <https://www.mckinsey.com/featured-insights/leadership/change-leader-change-thyself>



11.

ECOSYSTEM DEVELOPMENT

Tied to thinking differently is to avoid categorizing other companies as 'us' and 'them', and instead developing collaborative ecosystems. In an ecosystem environment, today's competitor may be tomorrow's partner. No man is an island, and success in the digital age often requires launching ecosystems, rather than individual products and services. Ecosystems power seven of the 12 largest

companies by market cap; by 2025, they could account for more than \$60 trillion in revenue, or more than 30% of global corporate revenue, according to McKinsey.

Ecosystems bring together different players from local segment leaders, large incumbent players, innovative start-ups, and a tech giants. New technologies bring together

these different players to capture the opportunities. For example, autonomous driving in automotive has a range of different players from OEMs, to big tech, to startups, and segment leaders both collaborating and competing to grow the market.

It is possible for an incumbent to successfully leverage an ecosystem. For example, the Chinese company Ping An Group, an insurer, built an ecosystem which spurred growth. The Ping An ecosystem spanned across financial services in real estate and smart cities. It involved opening up to work with new partners and incubating tech companies, with two fintech players and a healthcare platform. All these new businesses in some way feed into the overall Ping An model. For example, the customers on the healthcare platform can use Ping An Good Doctor to buy insurance products. This ecosystem development saw the company's revenue grow by 200%.

Ecosystems do more than spur innovation. They can enable companies to provide end-to-end solutions which tap into new markets and customers. The maritime industry already has complex ecosystems. As a pillar of global trade, the maritime sector is part of a global transport system²⁶ which can be roughly divided into categories:

- Inter-regional deep-sea shipping and air freight between continents
- Short-sea shipping in coastal seas
- Land transport via road, rail and rivers

All the different players in the ecosystem are inextricably linked, making interconnectivity and cooperation between them crucial for effective and efficient operations of the transport system. The shipping industry also already acts

as a transportation and information ecosystem.

Traditionally, the shipping industry has been highly dependent on its various mini ecosystems, consisting of ports, authorities, ships, ship operators, ship-owners, cargo owners and many more.

However, over a decade ago, researchers noted that the traditionally conservative shipping industry *"is undergoing a change, where it is believed that the demands for increase in efficiency, safety and protection of the environment can be only achieved by more innovation"*²⁷. More recently, the Boston Consulting Group identified a number of emerging technologies, e.g. advanced analytics, autonomous shipping, robotics and artificial intelligence, that are set to change how planning, operations, commercial and support functions within shipping are performed²⁸. This requires shipping owners and operators to launch digital ecosystems. There are a number of key steps needed to launch an ecosystem, according to the authors of the report:

Five steps to launching maritime ecosystems:²⁹

- Define your role in the future ecosystem. Don't close your eyes to the developments coming your way
- Start experimenting. Think big, start small and begin building the required new competencies
- Create shared (data) standards and start sharing. Smart shipping is all about being connected.
- Design for autonomy, both physical and digital products. Don't forget the human factor.
- Evolve regulations to facilitate innovation.

26. Martimo, 2017

27. Perunovic & Vidic, 2011

28. Egloff, Sanders, Riedl, Mohottala, & Georgaki, 2018

29. Smart ships and Changing Maritime Ecosystem, 5 steps to launching maritime ecosystems, T. van Dijk, H. van Dorsser, R. van den Berg, R.R. Negenborn, 2018

12.

CONCLUSIONS & RECOMMENDATIONS

The global maritime industry is at an inflection point. The convergence of key trends and technologies such as big data, IoT, Blockchain, and AI offers a unique opportunity to increase industry profitability. Our economic modeling shows this could be as large as \$237 billion over the next seven years in increased profitability.

To achieve this financial boon, shipping companies need to do more than invest in technology. There needs to be a mindset shift, away from the competitive and secretive

approach of a traditional industry towards an open and collaborative approach of a 21st century company. Sharing in shipping is the crucial step to transform the industry.

The negative impacts of not making this leap into a digitally transformed industry is an existential threat to many incumbent players, with the real possibility of big tech entering the market. Tech players with the resources, talent, technological expertise could leverage key trends to reshape the industry.

Therefore, sharing in shipping is simultaneously the greatest opportunity and the greatest threat to ship owners and operators. This presents a Rubicon crossing, that appears at a time when the drive for sustainability places increasing regulatory pressure on shipping. The fight against climate change will ultimately require whoever leads the maritime sector, be that reinvigorated and tech-enabled incumbent players, or big tech that has taken control of a sleeping sector, to provide validated, shared, benchmark data. This shared data will become an essential prerequisite for AI-driven optimization to meet sustainability targets.

Just like the transformation of the music industry due to the innovation of streaming platforms, or the mobility of ride-hailing platforms, or the banking industry of fintech, sharing in shipping is inevitable. The question is whether this great opportunity will be seized on by those internal sector players leading the maritime market now, or those external players jealously eyeing the sector from afar. Sharing in shipping is the key to leading the maritime market of tomorrow.

We can't predict the future. But we do think it is important to think through the implications of current trends and potential future scenarios. (Figure 6)



Figure 6 - Shipping Sector Scenarios³⁰

This is a tipping point for the global maritime industry: be the disruptor, or be disrupted. A change of mindset is needed. Think differently. Use your imagination and embrace

new opportunities for shipping to leap forward, this will realize massive economic gain and meet the challenge of sustainability, before it's too late.

30. Critical Future Analysis, 2020



The Commissioner

OrbitMI is a maritime expert-developed technology platform to help you manage all key aspects of your global fleet more efficiently.

OrbitMI

David Levy, CMO

Email: info@orbitmi.com

www.orbitmi.com



The Author

Critical Future is a consultancy specializing in artificial intelligence, blockchain, and strategic development with a strong track record in maritime. Trusted by many of the world's biggest brands, Critical Future's white papers combine strategic planning, technology expertise, research, and industry insight to inform government, the media, and the business community.

Critical Future

Adam Riccoboni, CEO

Tel: 0044 (0) 207 443 8827

Email: chara@criticalfuture.co.uk

www.criticalfutureglobal.com

