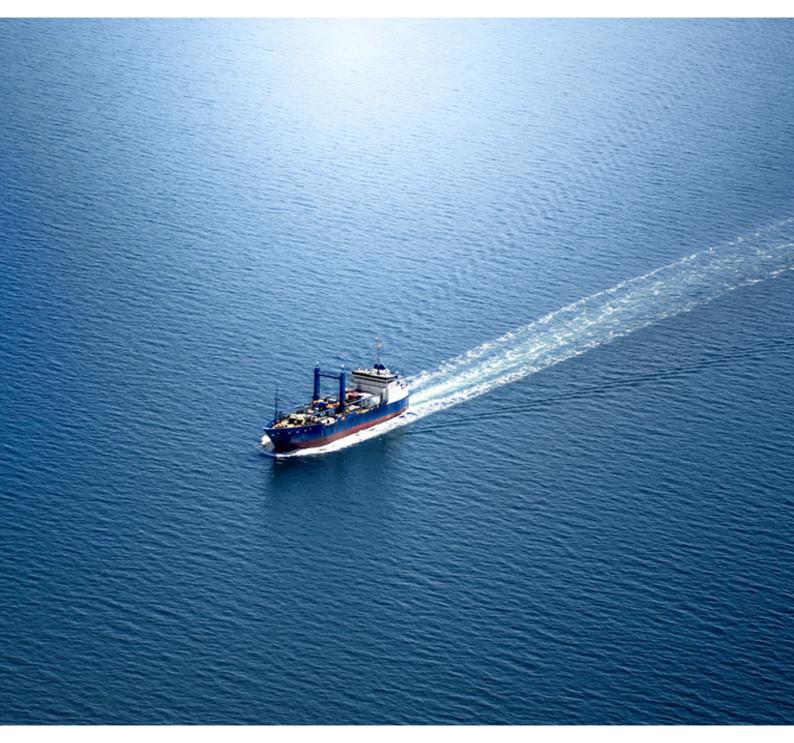# New Technologies and Smart Things in the Maritime Sector

Results of a survey conducted in October 2018

Introduction

In 2018, FORCE Technology has been focusing on how new technologies and *Smart Things* can strengthen transport and logistics for Danish companies. Together with Danish Shipping we have conducted a survey amongst their members through a questionnaire to assess the potential for technological innovation in the maritime sector. This note presents the results.

In June 2017, Danish Shipping sent out a survey regarding the future of shipping to the top executives in 37 Danish shipping companies. The response rate corresponds to 84% of vessels, sailing under the Danish flag, participating in the survey. In this research, when participants were asked about technological opportunities for innovation in the maritime sector, 60,7% answered that new technology can encourage better streamlining of operations at sea. In the other end of the scale, only 10.7% thought that new technology could give access to new markets or market segments. This shows a general belief of a technological potential for optimizing on the existing everyday practice but also a common disbelieve that technology can act as a tool for accessing new business. With this survey we would like to elaborate on these results.

FORCE Technology's focus on innovation in the maritime sector in 2018

IdemoLab is a unit within FORCE Technology focussing on early stage hardware-technology innovation. Through deep knowledge in eg. sensor technologies and wireless communication in parallel with specialist competencies in design research, we help companies' ideas become successful in the market and in everyday life of users and customers. In 2018 IdemoLab has been focussing on strengthening technological innovation and development for Danish companies in transport and logistics. Especially how hardware technologies like sensors, smart devices

and Internet of Things can support the future of maritime transport and logistics. The research has been conducted with support from the Danish Agency for Science and Higher Education.

Study design

Together with Danish Shipping this survey was conducted to gain more knowledge about the general attitude in the business towards new technology. In particular the goal was to elaborate on the two extremes from the survey conducted in June 2017 and get more specific answers to why, how and where technology could strengthen operations at sea - and opposite, to find out why only 10,7% believe that technology can support access to new markets for the maritime sector. The survey was designed with a quantitative section and a qualitative section:

Quantitative section
Regarding new technologies' potential for streamlining operations at sea in the future.

Qualitative section
Regarding the potential of new technologies giving access to new markets/segments for the maritime sector.

Questions in the first section were intended to find out in which specific categories of the operations the participants are seeing the biggest potential for reaching better performance through technology. Questions were formulated to reflect on which operation areas have the biggest challenges, where people have seen the biggest technological progress in the past, where they see it now and where they

see it in the future. Questions were either multiple choice or scales from 1-10. Participants were able to choose four different operation areas via the multiple choice questions.

> **Example**
> In which of the following categories have you experienced the most technological development in the last 10-15 years?
>
> - Navigation
> - Machine operation
> - Route optimization
> - Administration optimization

Scale questions were formulated to access the individual categories' technological potential (10 being very high potential).

Questions in the second section were designed to gain qualitative statements and concrete examples around potentials for accessing new markets. Answers were given in free text and the results of this section are therefore an analysis conducted by FORCE Technology.
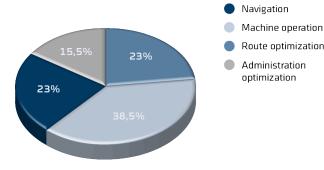The survey was sent out to 30 members of Danish Shipping, primarily responsible for innovation, digitization, and business development. 11 members have participated in the survey which therefore only qualifies this as an indication of tendencies in the maritime sector with vague validity.

Results
Regarding new technologies' potential for streamlining operations at sea in the future
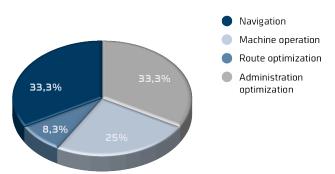
In which of the following categories do you experience the biggest challenges for reaching the best performance at sea?
The question regarding locating the biggest challenges for gaining better performance at sea is relatively equally distributed, although, as expected, most participants see machine operation as the hardest area. Vastly and rapidly changing legislations and requirements for better environmental performances are most likely the reasons for this.

In which of the following categories do you experience the biggest challenges for reaching the best performance at sea?

- Navigation
- Machine operation
- Route optimization
- Administration optimization

23% (Route optimization)
23% (Navigation)
15,5% (Administration optimization)
38,5% (Machine operation)

In which of the following categories have you experienced the most technological development in the last 10-15 years?
Navigation and administration optimization are the areas in which the participants find the most development in the last 10-15 years. Especially fast evolving hardware, development for more accurate positioning, and expansion of number of vessels in the network due to dropping hardware prices, can be some of the reasons for this.
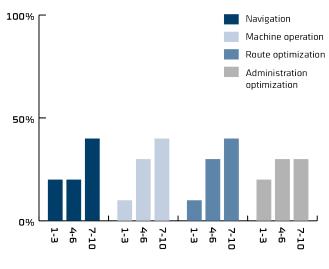
In which of the following categories have you experienced the most technological development in the last 10-15 years?

- Navigation
- Machine operation
- Route optimization
- Administration optimization

33,3% (Navigation)
33,3% (Administration optimization)
8,3% (Route optimization)
25% (Machine operation)

On a scale from 1 to 10, how do you assess that the individual categories, have achieved their potential of being improved, through the use of new technologies?
The results in this question are not corresponding to some of the other results about the future potential in the different areas. This might be due to a misinterpretation of the question. Eg. several responses showed that *Route optimization* might have a great impact on the future of maritime. In this question most respondents answered between 5-10 which shows that the area has reached its potential greatly. It can also mean that most respondents think that there has been great improvement in the field over the last few years and it just needs to be implemented in real life. Either way, this question would need to be elaborated or re-done for better validity.

On a scale from 1 to 10, how do you assess that the individual categories, have achieved their potential of being improved, through the use of new technologies?

- Navigation
- Machine operation
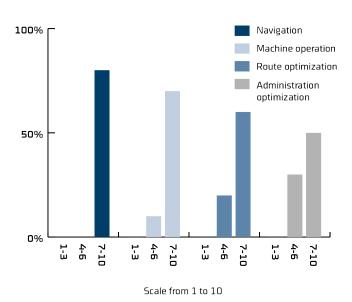- Route optimization
- Administration optimization

Scale from 1 to 10

On a scale from 1 to 10, to what extent do you think the following categories will achieve technological change within the next 10-15 years?
In general the results show a common understanding that all of the categories are likely to achieve technological change in the near future. This is a relative definition of the understanding of "change" but shows a wide agreement that all four areas will reach new potentials in the near future. Especially machine operation and route optimization are subject for technological change, which might be of the same reason as in question 1.

On a scale from 1 to 10, to what extent do you think the following categories will achieve technological change within the next 10-15 years?

Scale from 1 to 10

Regarding the potential of new technologies giving access to new markets/segments for the maritime sector
The intention of the qualitative section of the survey was to give the respondents room to reflect freely on the topic and to express concrete opinions and examples. The following results are all of the main responses with 11 repetitions and non-relevant answers (eg. "see above" or "don't know") are removed for simplicity.

Can you give an example of a new market segment that could be interesting to explore for the maritime sector?
- In general collection of data. Trading patterns, vessel operations etc.
- Distributed autonomous maritime supply chain (huge amount of smaller vessels, as alternative to todays big vessels)
- Autonomous collection and distribution of liquid Hydrogen (from e.g. floating windfarms in trade wind areas)
- Collection/transfer of data in general incl. environmental data, performance data
- Floating emissions free energy / water / H2 production and distribution
- Ocean clean up and upcycling
- Vessel upcycling

- Shipping more equipment needed for wind and solar power. Low sulphur fuels
- Data of vessels performance. This could be linked to future commercial cases for clients who need insurance for the performance of services in order to operate and maintain their assets during construction and operations phases
- Auto docking / auto crossing (ferry operators)
- Battery developments

Which part(s) of the supply chain is interesting to focus on, in reference to, gaining access to new market segments?
- Last mile (in both pick-up and delivery end)
- Alternative clean energy sources. e.g. malten salt reactors, wind, wave, current and solar
- Vessel conversions/new buildings
- Data warehousing
- The receiving part - especially for the wet segment
- Full transparency of the entire chain from A to Z, especially at the beginning of the chain.
- Overall performance of the vessels motion movements and secondary all machinery components that are fundamental for providing uptime and reducing costs. This will on a even longer perspective be essential for taking the longer step change towards autonomous vessels
- All, research to end user

What are the current challenges for accessing these market segments?
- It does not make financial sense to use todays big expensive vessels to do these "first" and last mile deliveries
- Public/political opinion especially on nuclear power
- Collaboration partners will have to share data
- Low market activity - oversupply of ships
- Transparency
- Standardisation of components, sensors, people skills(AI) and development of software
- Positive business case

How will new technologies facilitate better access to these?
- Autonomy will allow for building of smaller and more flexible vessels
- Better understanding of new energy source technologies and their safety level
- Potential of utilizing e.g. fuel cells for clean power and propulsion
- Better understanding of the level of burning platform we are facing reg. climate change
- Better technology will optimize the operations enabling owners to extract more profit
- Big data - AI
- Higher performance of new software / hardware solutions

Can you mention some current examples of other market segments and technologies that do this in your business area, or will do in the near future?

- Safety
- If new safety products are launched, it is hard to justify not investing in it
- I guess the key is to re-use some of these performance systems in the maritime world and not develop it for this industry only as thjs would lead to costs increases. So re-use exsting software and sensors
- The car industry is far ahead of the maritime sector regarding human interface and optimization of the performance

What barriers do you predict there will be by using new technology to access the market segments mentioned in point 1 and 2?

- Legislation
- Insurance
- Class
- The shipping companies will become disrupted
- Nuclear, political and public opinion
- Energy storage capabilities
- Lack of regulations and standardization and business model for data sharing/storage and ownership
- Lack of lot installed on vessels for data capture
- Oil majors are very conservative and will not embrace new IT solutions such as a "market place" IT platform where all fixtures, freight invoices, demurrage claims etc are being made from. If such a "market place" platform could be materialized it would change the tanker segment significantly
- Industry readiness
- Manufacture of equipment that provide access to the data of each component as well as the technology for real time motion data
- Positive business case

Why is this a barrier?

- Manufacturers protect their IP rights
- Technology is not yet proven
- You will not have a "go" for a project without a positive business case

How do you imagine data playing a role in accessing new market segments?

- Data will be vital, in order to materialize point 1 and 2
- Positioning and distribution of e.g. H2, water data
- Implement on our own vessels to test and thereafter scale it up. We can also corporate with other shipowners who have entrepreneurial mindset and can take swift decisions. This will be very important

Do you have an example of data creating new opportunities for accessing new markets?

- Facebook, Google etc.
- Structured collection of data and analyzing will give true picture of the performance, and when you you're your exact performance, it will be possibly to optimize the performance, and make the right design / solutions based on facts, and not only in assumptions

Final reflections

In conclusion, the results of this survey match with the expectations around where the respondents have experienced the highest level of technology development in the last 10-15 years. As expected, it is regarded that the biggest challenges for reaching the best performance at sea is centered around machine operation.

There is a current central focus on further development in environmental upgrades, emission optimization and general sustainability in the maritime sector due to new legislation, and this is something that both the shipping industry and technology development stakeholders will have as a focus point in the near future. For this to be able to be implemented successfully in the real world there is a need for lowering the barrier of existing challenges. In this survey these could be convincing positive business cases, maybe through engagement in research projects. Industry readiness is also of major importance, which needs to be supported on administration level in the maritime sector.

Furthermore, this survey shows an interesting comparison between the survey results in 2017 and today. Even though only 10,7% of respondents saw a potential for the maritime sector to be able to reach new market segments through new technology in 2017, the respondents today generate many great ideas and examples of what these new markets could be. This could be an indicator of either higher industry readiness, better understanding of the potential of technology or both. Especially within data collection, machine operation/ optimization and entering new markets in a more transparent supply chain where data will become a commercial bi-product of the actual product.

In collaboration with:

DanskeRederier

Want to know more?

If you would like to learn more about FORCE Technology's work and focus in relation to this research or in general, feel free to contact us with any questions or inquiries you may have.

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