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Crafting a Successful Vessel Data Strategy:
A Comprehensive Guide for Shipping Companies

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Leveraging Vessel Data for Enhanced Decision-Making and Becoming Data-Driven with Vessel IOT Platforms

This white paper is designed for decision-makers, managers, and technology professionals within the shipping industry who are interested in leveraging the power of digital transformation and data-driven decision-making. By reading this comprehensive guide, you will gain valuable insights into the advantages of implementing a state-of-the-art IOT Edge platform, adopting a holistic vessel data strategy, and how working with best-of-breed vendors can assist you to unlock the full potential of your vessel data. With practical recommendations and key principles for a successful vessel data strategy, this white paper will equip you with the knowledge to optimize operations, improve crew performance, drive innovation, and maintain a competitive edge in the rapidly evolving shipping industry.

Executive Summary:

- The rapidly evolving landscape of the shipping industry requires companies to adopt a holistic approach to vessel data management, focusing on data quality, standardization, and compatibility across systems.
- Implementing a state-of-the-art IOT Edge platform is essential for handling data capture, quality, and standardization, ensuring a solid data foundation that enables data-driven decision-making.
- Separating the data layers and selecting a separate data cloud for storage allows shipping companies to maximize the value of their data and focus on the application layer to unlock its full potential.
- The key principles for a successful data strategy include assessing and standardizing IOT capabilities, developing a unified data strategy, implementing robust data infrastructure operations, embracing data-driven decision-making, and continuously innovating and adapting.
- By following these principles and investing in the right technology and infrastructure, shipping companies can optimize operations, improve crew performance, drive innovation, and maintain a competitive edge in a rapidly evolving industry.

I. Introduction

In today's data-driven world, shipping companies face numerous challenges as they strive to become data-driven organizations. To unlock the full potential of digital transformation, a coherent data strategy, backed by a state-of-the-art vessel IOT platform, is essential. This white paper discusses the importance of a holistic approach to vessel data management for shipping companies, including the advantages of an IOT Edge platform over traditional data loggers, and offers guidance on how to develop and implement a successful data strategy.

II. The Value of an IOT Edge Platform for Vessels

Shipping companies looking to become data-driven must adopt a holistic approach to vessel data management. Traditional data loggers are limited in their ability to provide standardized data across the fleet, which is essential for digitalization. A vessel IOT Edge platform, on the other hand, can offer several advantages:

1. **Standardization**: An IOT platform can standardize data across the fleet, ensuring compatibility across systems and maintaining high data quality standards. This means that regardless of the vessel type or the data sources onboard, the IOT platform can translate and unify the data, making it easily accessible and useful for analysis.
2. **Scalability and flexibility**: IOT platforms can easily scale to accommodate an increasing number of vessels, onboard systems, as well as other sensors and data sources, ensuring flexibility as the number of use cases grows and evolves. As shipping companies continue to invest in digitalization, the ability to integrate new technologies and onboard more data sources without disrupting existing operations are invaluable.
3. **Local data processing**: IOT platforms can process data locally on the vessel, allowing the crew to leverage real-time data for various use cases and improving onboard decision-making. By enabling local data processing, IOT platforms can support a wide range of applications, from energy efficiency optimization to predictive maintenance, enhancing vessel operations and crew performance.
4. **Remote management and operation of the onboard infrastructure**: An IOT platform can be remotely managed, making it easier for shipping companies to monitor and maintain their vessel data infrastructure. This allows for seamless updates, troubleshooting, and support, ensuring that the platform remains up-to-date and secure.

By adopting an IOT Edge platform, shipping companies can overcome the limitations of traditional data loggers and benefit from standardized, scalable, and flexible data management. This enables them to make data-driven decisions, optimize vessel operations, improve crew performance, and stay competitive in a rapidly evolving industry.

III. A Roadmap to a Holistic Data Strategy

To transition from digital chaos to a holistic data strategy, shipping companies need to consider the different layers of the data ecosystem and implement a coherent data strategy, adopt a state-of-the-art IOT platform for vessels, select a separate data cloud, and focus on the application layer to maximize value.

1. **Define the Data Layers**: Shipping companies should recognize the importance of separating the data layers, ensuring maximum flexibility and security. Key layers include the data generation layer (OEMs and sensor systems), the data processing and standardization layer (IOT platform), the data storage layer (cloud solution), and the application layer (various software solutions and tools leveraging the vessel data).
2. **Implement a Coherent and Holistic Data Strategy**: Shipping companies must first acknowledge the need for a unified data strategy, which will streamline vessel data

collection, storage, and analysis, leading to more efficient decision-making and optimized operations. A key element in this Data Strategy is a diligent focus on data quality and ensuring that data is comparable across vessels.

3. **Adopt a State-of-the-Art IOT Platform for Vessels**: A state-of-the-art IOT platform is crucial for handling data capture, quality, and standardization, ensuring compatibility across systems and maintaining high data quality standards.

4. **Select a Separate Data Cloud for Storage**: A separate data cloud is essential for securely storing and managing the company's data, allowing for easy access to information, facilitating data analysis and collaboration across the organization.

5. **Focus on the Application Layer to Maximize Value**: With a solid data strategy in place, shipping companies can focus on the application layer to unlock the full potential of their vessel data, tailoring the applications to their use cases, based on their specific needs and objectives, and fostering an environment that supports innovation and continuous improvement.

IV. Key Principles for a Successful Vessel Data Strategy

In this section, we present a comprehensive table outlining the key principles that form the foundation of a successful vessel data strategy for shipping companies. For each principle, we offer guidance on how to deliver on them, explain why they are important, and highlight potential pitfalls that companies may encounter. This table serves as a valuable reference for shipping companies aiming to create and execute a data strategy that addresses essential elements and avoids common issues.

Table 1: Key principles for a successful vessel data strategy

#	Principle	Description	How to Deliver on This Principle	Why Is This Important	Common Pitfalls
1	**Prioritize Data Quality**	Establish data validation and cleansing processes within the data infrastructure to ensure accurate and consistent data is collected from IOT devices on vessels, which is crucial for effective decision-making.	Implement a sophisticated vessel IOT platform to automate data validation and cleansing processes. Ensure manual intervention, with dedicated personnel interacting with stakeholders to address data quality issues.	Ensures accurate and reliable data for decision-making, preventing costly mistakes.	Inadequate validation processes, leading to poor data quality and errors in decision-making. Discarding poor-quality data instead of addressing the root cause, resulting in a smaller dataset and loss of valuable information.
2	**Standardize Data across Vessels**	Implement standard data formats and protocols across all vessels, facilitating seamless integration and comparison of data, as well as enabling more efficient analysis and decision making.	Develop and enforce standard data protocols and formats across the entire fleet. Implement data standardization onboard through the IOT platform, making it usable on board.	Streamlines data integration and analysis, improving efficiency and consistency of decision-making.	Inconsistent data formats across vessels, leading to difficulties in data integration and analysis.
3	**Ensure Flexibility in Data Connections**	Design the data infrastructure to be compatible with a wide range of onboard systems, and platforms, as well as protocols, allowing for easy integration of new technologies and data sources as they emerge. The IOT platform should have broad capabilities to capture data from any digital signal and share data locally.	Develop an IOT platform with flexible data connections, allowing for easy integration with various digital signals and local sharing to maximize compatibility and interoperability.	Facilitates the adoption of new technologies and data sources, supporting future growth and innovation.	Relying on proprietary systems, limiting compatibility and flexibility.
4	**Capability to Work Asynchronously**	The IOT platform must be able to operate within the constraints of maritime – with varying internet connectivity and buffer data locally when it is not possible to upload to a cloud storage.	Implement an IOT platform with asynchronous communication capabilities and local data buffering.	Asynchronous operation ensures the IOT platform can function effectively even with intermittent connectivity.	Relying on synchronous communication, causing disruptions and data loss when connectivity is lost (which often is the case for vessels).

5	**Advanced Edge Capabilities**	The IOT platform must be able to perform compute, run applications, algorithms, and transform the data locally in various ways, prioritize traffic, and adjust sampling rates.	Design and implement an IOT platform with advanced edge computing capabilities, enabling local data processing and decision-making.	Edge capabilities allow for faster decision-making and better resource management. In situations without internet access on board, the crew can benefit from locally generated analysis and decision support.	Failing to leverage edge capabilities, leading to slower response times and inefficient use of resources. Transferring unnecessary data to the cloud puts significant strain on the VSAT limitations. Additionally, the crew is often overlooked, whereas they often are the ones that can have the largest impact when acting on data.
6	**Build Scalability and Adaptability**	Implementing and managing the IOT platform at scale is critical for shipping companies with many vessels and different setups.	Design infrastructure with modular components and scalable cloud resources.	Enables the company to implement the solution across their fleet and evolve use cases without being constrained by data infrastructure limitations.	Inflexible infrastructure that cannot scale or adapt to changing needs.
7	**Commit to Infrastructure Management and Uptime**	Engage a dedicated team or partner to efficiently manage and operate the infrastructure onboard vessels, ensuring uptime and meeting service level agreements (SLAs).	Hire dedicated in-house staff or outsource to a specialist vendor with experience in maritime data infrastructure management.	Ensures continuous availability of data and infrastructure, supporting smooth operations and decision-making.	Insufficient focus on infrastructure management, leading to downtime and operational disruptions.
8	**Leverage Deep Maritime Domain Expertise**	Collaborate with experts who possess extensive knowledge of the maritime industry to understand how to work with data as well as operating the infrastructure on board ships.	Partner with companies with extensive maritime domain knowledge and not generalists from outside industries.	Domain expertise leads to better understanding of data and that it can be trusted.	Ignoring the need for domain expertise, leading to misunderstandings and incorrect interpretations of data.
9	**Ensure Security Measures and Compliance**	Implement robust security measures and adhere to data protection regulations to safeguard sensitive information and maintain the trust of stakeholders.	Develop and enforce strict security policies and procedures and ensure compliance with relevant data protection regulations.	Protects sensitive information, maintains stakeholder trust, and prevents legal and financial repercussions.	Insufficient security measures or non-compliance, leading to data breaches and loss of trust.
10	**Centralize Cloud Storage for Vessel Data**	Utilize a single cloud storage platform for all vessel data to avoid multi-cloud situations, simplifying data management and analysis.	Develop an in-house cloud data storage or outsource the cloud data platform layer to a specialist vendor.	Facilitates streamlined data management and analysis, reducing complexity and potential errors.	Fragmented data storage across multiple cloud platforms, leading to inefficiencies and integration challenges.
11	**Foster a Data-Driven Culture**	Encourage a company-wide culture that values and leverages data in decision-making, promoting continuous improvement and innovation.	Implement training programs and promote data-driven decision-making at all levels of the organization.	Enables the organization to fully capitalize on the potential of data to drive improvements and innovation.	Lack of focus on data-driven culture, leading to suboptimal utilization of data in decision-making.

By adhering to these key principles and incorporating them into your vessel data strategy, your shipping company can successfully transform the way data is captured onboard vessels, transmitted to the cloud, and used for analysis. Implementing these principles will help you optimize operations, drive innovation, and maintain a competitive edge in the industry. By combining an IOT platform on vessels, standardized data in the cloud, and outsourcing data management to specialized service providers, your company can unlock the full potential of your data while maintaining flexibility and scalability.

V. The Advantages of Working with Best-of-Breed Vendors
Shipping companies must carefully evaluate whether managing different technology layers in-house or outsourcing them to specialized vendors would be the most beneficial approach. In most cases, companies can gain significant advantages by outsourcing the IOT platform, the data cloud layer, and utilizing a combination of third-party and in-house applications. Here, we explore some of the advantages of working with best-of-breed vendors across IOT, cloud, and applications, focusing on data standardization, quality, deep domain experience, continuous service management, and high return on investment (ROI) from having a solid and flexible data foundation.

A) **Data Standardization, Quality, and Deep Domain Experience:** One of the key advantages of working with a specialized vendor for the IOT platform is their ability to ensure data standardization and quality. Deep domain experience in the shipping industry is crucial in achieving this. A proper data foundation is essential for shipping companies as they expand their data-consuming applications. This involves:

a. **Uniform Data Formats**: Vendors with domain expertise can implement uniform data formats across the fleet, making it easier to integrate data from different sources and reducing the complexity of data management.

b. **Quality Assurance:** By utilizing a vessel IOT platform, shipping companies can benefit from built-in quality assurance measures that validate the accuracy and reliability of the data collected, ensuring a high level of data integrity.

c. **Continuous Improvement**: Specialized vendors, with their deep domain experience, are committed to staying up-to-date with the latest industry standards and best practices, which enables them to continuously improve the data standardization and quality processes for their clients.

B) **Outsourcing Data Cloud for Storage**: By working with specialized cloud vendors, shipping companies can ensure secure and scalable data storage, along with easy access to information, facilitating data analysis and collaboration across the organization. Advantages of outsourcing the data cloud layer include:

a. **Scalability and Flexibility**: Cloud storage can easily scale to accommodate the growing amount of data generated by the shipping industry, ensuring that the company's data storage infrastructure can adapt to changing needs.

b. **Efficient Data Sharing and Control**: A good cloud solution facilitates efficient sharing of data with third parties, including applications, while allowing the shipping company to maintain full control and transparency over what they are sharing. This enables seamless integration of various software solutions and tools, fostering collaboration and innovation across the organization, without compromising data privacy or ownership.

c. **Security and Compliance**: Cloud vendors specialize in providing secure data storage solutions that adhere to industry standards and regulations, giving shipping companies peace of mind.

C) **Utilizing a Combination of Third-Party and In-House Applications**: By outsourcing specific applications or leveraging best-of-breed third-party applications, shipping companies can focus on their core competencies and save resources. Benefits of this approach include:

a. **Access to Expertise**: Third-party application vendors often have specialized knowledge and expertise in specific areas, which can enhance the quality and effectiveness of the application.

b. **Faster "Time-to-Market"**: Leveraging third-party applications can help shipping companies implement new solutions more quickly, reducing the time it takes to see a return on investment.

c. **Customization**: Some third-party applications offer customization options, enabling shipping companies to tailor the application to their specific needs and requirements.

D) **High Return on Investment (ROI)**: Working with best-of-breed vendors across IOT, cloud, and application layers can result in a high return on investment. Ensuring continuous service management, uptime, and support is vital for a solid and flexible data foundation. This enables companies to:

a. **Accelerate Digital Transformation**: With a standardized and high-quality data foundation, shipping companies can more quickly adopt new technologies and applications, driving digital transformation and enhancing their competitive advantage.

      b. **Scalability**: A flexible data foundation allows shipping companies to easily scale their data strategy as their business grows, reducing the time and cost associated with implementing new systems or expanding the fleet.

      c. **Data-driven Decision Making**: High-quality and standardized data enables shipping companies to make more informed decisions, based on real-time insights and analytics. This can lead to improved operational efficiency, reduced costs, and better overall performance.

      d. **Service Management and Support**: Best-of-breed vendors ensure continuous service management, uptime, and support, enabling shipping companies to rely on their data infrastructure and focus on their core business activities.

E) **Fostering Innovation and Collaboration**: Collaborating with best-of-breed vendors can also help shipping companies drive innovation and stay ahead of industry trends. By partnering with these vendors, companies can benefit from:

      a. **Access to Cutting-Edge Technologies**: Best-of-breed vendors often invest in research and development, ensuring that their solutions stay at the forefront of technological advancements. Shipping companies can leverage these innovations to gain a competitive edge in the market.

      b. **Enhanced Collaboration**: Working with specialized vendors can foster a collaborative environment that encourages knowledge sharing and learning, ultimately leading to improved decision-making and better overall performance.

In summary, working with best-of-breed vendors across IOT, cloud, and application layers can provide shipping companies with numerous advantages, including data standardization, quality, deep domain experience, continuous service management, and high return on investment. Furthermore, partnering with these vendors can drive innovation, foster collaboration, and help shipping companies stay competitive in a rapidly evolving industry. By leveraging the expertise and resources of best-of-breed vendors, shipping companies can focus on their core business activities while benefiting from a robust and flexible data foundation that supports their digital transformation journey.

VI. Conclusion

Shipping companies aiming to become data-driven must adopt a holistic approach to vessel data management. Implementing a state-of-the-art IOT Edge platform is crucial for ensuring data quality, standardization, and compatibility across systems. Moreover, by separating the data layers and selecting a separate data cloud for storage, shipping companies can maximize the value of their data and focus on the application layer to unlock its full potential.

Following the key principles of assessing and standardizing IOT capabilities, developing a unified data strategy, implementing robust data infrastructure operations, embracing data-driven decision-making, and continuously innovating and adapting will guide shipping companies in their journey towards becoming data-driven organizations.

By recognizing the importance of a holistic data approach and investing in the right technology and infrastructure, shipping companies can successfully navigate the digital transformation journey and harness the power of their vessel data. In doing so, they will be able to optimize operations, improve crew performance, drive innovation, and maintain a competitive edge in a rapidly evolving industry.

About Raa Labs

Raa Labs is a company solely focusing on being the leading provider of reliable, high-quality data to asset intensive maritime industries. We work in the intersection of deep maritime domain and technical expertise.

The company is based in Norway and are currently employing 20+ highly skilled employees and working with shipping companies across the globe and across all segments. Delivering the proven solution, RaaEDGE, for a wide range of use cases – while leveraging the same backbone infrastructure across all cases. Always focusing on delivering operational data and actively acting when required, interacting with a range of stakeholders, to ensure that the end users can trust that they will receive the quality data.

Established in 2018 the company has had a strong focus on having a positive impact on the maritime industry by enabling stakeholders with quality vessel data. Recognizing the need to focus on the data layer specifically and expanding the capabilities of an on board IOT platform together with forward leaning maritime stakeholders, makes Raa Labs an attractive maritime technology partner.

Through our origin from the Wilhelmsen Group, Raa Labs can tap directly into an immense global network and competence base. The Wilhelmsen Group is a leading maritime industrial conglomerate, being a global leader in maritime products and services, as well as offshore services and logistics. 160 years in the maritime domain has led to a strong vision of "Shaping the Maritime Industry" embedded in the group – which is at the heart of what Raa Labs was set up do to.