DATA AND DIGITALIZATION FORUM

The IUMI Data and Digitalization forum was established to build awareness of opportunities and advise on challenges that could arise from the use of data and digitalization in marine insurance. We also exist to create a common understanding that will promote data standardization efforts in the maritime ecosystem and facilitate dialog and the formation of mutually beneficial collaborations.

The Data and Digitalization forum is comprised of marine insurance professionals from various facets of the business, professional partners active in the digital space and representatives from leading tech companies. This ensures a broad range of views is represented in the Forum.

INTRODUCTION TO THE DATA OPPORTUNITY

Big data and digitalization are a unique opportunity to transform the marine insurance industry and make it attractive for investors, corporations and the next generation of underwriters. This document presents a comprehensive introduction to the topic and serves as an ideal starting point for newcomers to marine insurance or the topic of data and digitalization as it applies to our industry.

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I. Introduction

As the maritime industry begins to catch up with developments that have been proven in other sectors, data and digitalization is playing an increasing role in marine insurance.

1. **The increasing role of data in marine insurance**
    Advances in tech and digitalization that have impacted a wide range of industries are now beginning to affect marine insurance. The ability to collect, analyse, and leverage vast amounts of data is of growing significance for improving productivity, generating contextual and risk insights and developing new business opportunities.

    System complexity and traditional business practices tend to make the marine sector a late adopter of new tech. But as the benefits of new technologies for capturing, sharing or processing large amounts of real-time data have been proven in other industries, companies across the maritime world are increasingly interested in big data and digitalization.

2. **An industry catching up**
    Marine insurers who used to rely on their own historical data for underwriting are now exploring new sources, types and volumes of data in order to improve decision-making or automate processes across the marine insurance value chain. Data-driven business models are set to drive significant changes in the competitive landscape. Meanwhile, meeting ESG targets will increasingly require insurers to gather more operational data about the assets at risk in their portfolios. This will accentuate the need for better quality data and common reporting standards.

3. **Navigating the data transformation**
    IUMI's Data and Digitalization forum was established to monitor trends and developments and thus help our members understand the key trends and opportunities arising from data-related and tech developments. The Data and Digitalization forum is comprised of marine insurance professionals from various facets of the business, professional partners active in the digital space and representatives from leading tech companies. This ensures a broad range of views is represented in the Forum.

II.   The Data Revolution in Marine Insurance

The data revolution in marine insurance is being driven by the influx of new types and sources of data as well as the availability of new data processing options and the rise of artificial intelligence.

1. **Influx of new sources of data**
   Until recently, the data available to marine insurers was mainly their internal historical risk experience supplemented by a narrow range of external retrospective data sources. Now, digitalization of business processes, advances in sensor technology, the rise of the Internet of Things (IoT), and the growing number of commercial data brokers have resulted in a new wealth of data available to marine insurers.

   Sensors connected to the internet attached to ports, vessels, containers, packages, satellites and weather stations have all become sources of real-time data. More than 500 million signals are now generated and used daily for commercial fleet operations, world-wide. To supplement their own internal customer and risk data, marine insurers can now consider using:

   - **Public data** including government statistics, published research and crowd-generated data
   - **Commercial data** from new and established sources – including all types of sensor or satellite data
   - **Industry data** from vessels, logistics players or ports or from industry consortia
   - **Customer data** from fleet owners, freight forwarders, maritime infrastructure operators and manufacturers

   Working with new sources of data raises a variety of commercial, legal and strategic considerations. For example, cheaper data may be of lower quality while some of the most valuable data sets may only be accessible through strategic partnerships.

2. **Facilitating the shift to real time data**
   All these changes are the result of advances in new cloud technologies for the storage and distribution of data and powerful new cloud-based processing possibilities led to what is known as the big data revolution. This in turn contributed to new breakthroughs in artificial intelligence because the constraints of rules-based systems could be overcome with AI solutions trained on the growing volumes of available data.

   Today, we have entered an era where data is increasingly being used to optimise operations, mitigate risks through timely interventions and provide more cost-effective insurance services. In the near future, with increasing system interconnectivity, the adoption of real time computing and artificial intelligence, dynamic data-driven decision making will become a day-to-day reality across the entire maritime ecosystem – sparking new levels of competition and spawning new business models.

III.   The Need for Digital Innovation in the Maritime Sector

In the face of both familiar and emerging challenges, the maritime sector needs to address a variety of inefficiencies. While individual companies can seek incremental benefits, truly disruptive innovations will depend on collaborations.

1. **Existing and emerging challenges**
   While consumer demands and global trade volumes continue to grow, many companies in the maritime industry are battling stagnating revenues, volatile margins and incessant cost pressures. As a whole, the sector faces increasingly stringent environmental and climate-change related regulations, workforce issues, operational inefficiencies, and huge capital requirements to maintain assets and infrastructures.

   Addressing these challenges requires a coordinated effort from industry stakeholders, investment in new technologies, and adaptation to changing conditions to ensure a sustainable and resilient future for the maritime operations that underpin the global economy.

2. **Addressing inefficiencies**
   Despite the obvious successes of digitalization in land logistics and aviation, the marine sector has yet to really embrace the opportunity that going digital poses. Here are some examples of the inefficiencies in the maritime sector that can be addressed with digital solutions:

   - **Insurance cover** is an increasing need for the majority of shipments. Traditional cargo insurance products and processes are generally paper-based, slow and inefficient. Digitalization of insurance document handling will streamline administrative processes, reduce errors and eliminate time-consuming manual handling, while improving customer service and satisfaction.

   - **Physical bills of lading,** customs forms and shipping manifests require significant handling efforts. Sending a physical bill of lading by courier to the importer could be replaced by a secure blockchain-protected electronic bill of lading system, making operations leaner and more secure.

   - **Claims** notification, handling and settlement are still iterative manual processes that take too long by modern standards. Digitalization and advanced analytics can significantly accelerate claims services to facilitate faster payouts and greater customer satisfaction at lower cost.

   - **Port congestion** means that vessel owners need to optimise their time of arrival at the port and minimise berth time, but traditional contracts often optimise for individual parameters to the detriment of the overall voyage efficiency and carbon footprint. Big data and digitalization solutions that integrate ship positions, weather and port data could address this challenge by allowing optimisations across multiple dimensions to optimise the total cost of voyage.

3. **Collaborative or disruptive innovation**
   Many companies are working on operational efficiency measures especially in the area of data and transparency however the systemic complexity of the maritime sector means that while big data and digitalization can capture incremental short-lived competitive advantages for individual companies, truly disruptive changes depend on broader-based industry-wide collaboration.

   Legitimate business and security concerns will need to be addressed and contractual regulatory norms will need to evolve to foster data sharing, joint action and ultimately an industry wide shift to safer and more sustainable maritime operations.

IV.   Varieties of Data and Perspectives

While data availability is increasing, the fundamental differences between Hull and Cargo raises questions about where to focus and how to create a centralised view.

1. **Increasing varieties of data**
   Today, marine insurers manage a growing variety of data types:

   - **Hull data** – the administrative, legal, technical, and operational aspects of vessels
   - **Cargo data** – the type, volume, carrier, temperature, dryness, location, and value of shipments
   - **Risk data** – losses recorded by insurers, brokers, and authorities
   - **Peril data** – climate, sanctions, high-risk routes or zones, ownership info, maintenance history

   They may also use **shipping data** – movements, positioning, trade flows, market indices, and freight rates allowing the assessment of trading and market patterns or **maritime infrastructure data** – ports and passages allowing one to assess usage and operational risks. Finally, there is environmental or **weather data** and **industry or market data**.

2. **Emerging data sources**
   Sensors mounted on vessels, containers or even high value cargo items are new sources of real-time data that insurers and insure-tech companies are beginning to exploit. Applications span the insurance value chain from underwriting to claims and include more accurate risk pricing, proactive risk mitigation and the streamlining of claims processes.

   Furthermore, IoT-data will pave the way for novel products and business models. It will also fuel the trends towards either more standardised contracts or more tailored contracts depending on the risk type.

3. **Centralised hull and fragmented cargo data**
   Marine insurance is basically divided into hull and cargo coverage. For obvious reasons, like ship registration requirements and longevity, hull data is relatively centralised, well-standardised, stable and consistent. On the other hand, cargo data is as diverse as the goods being shipped, as changeable as the weather and as fragmented as the number of different parties involved in the logistics process.

   For insurers seeking to develop truly data-driven business models, the sheer volume of cargo transactions and number of manual processes involved, pose a variety of data quality and integration challenges. In this context big data and analytics can deliver significant improvements.

4. **Digitalization benefits using the example of Bills of Lading**
   Initiatives are underway to develop the regulatory frameworks, data standards and tech solutions that will allow the widespread adoption of **Electronic Bills of Lading** (eBLs). EBLs will make it much easier to centralise cargo data and use it to optimise insurance processes. At the same time, eBLs will permit straight-through paper free processing that will reduce administrative delays and errors and lower operational costs while making international trade and marine insurance less vulnerable to fraud.

V.   Big Data and Analytics Architectures and Methods

To exploit the full potential of big data and digitalisation in marine insurance a systematic investment in data analytics architectures and skills is paramount.

1.   Evolving data architectures

In the past, companies physically owned storage and processing hardware and provided access to data via company intranets. Then the rise of cloud computing led to the big data revolution. Now, both company and external data sources can be pooled and processed on the servers of cloud service providers. These services are elastic or scalable, meaning that companies can have access, on demand, to storage or computational power according to their varying business needs at a fraction of the cost.

2.   Analytics methods and purposes

Data stored in the cloud can be used for daily business processes, business reporting or smart analytics. The latter refers to the application of a range of mathematical and computational disciplines and methods to deliver descriptions, predictions or prescriptions: i.e. data analytics can be used to gain a fundamental understanding of a given phenomenon, predict future trends, or to recommend specific business decisions.

While artificial intelligence (AI) and machine learning are the most prominent methods for handling huge volumes of imperfectly structured data, analytics is built on a range of disciplines, including statistics, applied mathematics, signal processing, econometrics, operations research, data mining, simulation methods and structural modelling.

3.   Examples of application to marine insurance

Analytics applied to weather patterns, vessel performance, and route conditions allows insurers to qualify risks more accurately and set more appropriate premiums. Machine learning algorithms can identify anomalies in commercial or operational data sets, that can be an indication of fraud or deviations from standard operating procedures.

Such information may indicate a greater risk exposure, allowing insurers to adjust coverage or take preventive measures. Continuous monitoring of vessel and equipment conditions through sensors can provide insurers with detailed information on maintenance practices and the likelihood of equipment failure, aiding in more precise risk assessment.

VI.   Emerging Data and Digitalization Topics in Marine Insurance

Big data analytics and digitalization will change marine insurance creating wide-ranging opportunities for companies that develop appropriate strategies.

1. **Data standardisation and collaboration**
   While many standards have evolved over centuries of maritime trade, we are still a long way from the adoption of industry-wide data standards and formats. Before data analytics can be performed, the data needs to be standardised, which involves time consuming cleaning, transforming, and verification steps. To unlock the full potential of real time data analytics to boost safety, efficiency and regulatory compliance in maritime operations the industry must work towards the adoption of common protocols, formats, and definitions. This would help to ensure that information is consistent, accurate, and easily interpretable across different systems and platforms.

2. **Risk management and mitigation**
   The future of insurance is about much more than covering losses. It is about understanding and mitigating risks through the use of real time data monitoring and predictive analytics. Combining data from satellites, logistics assets and IoT sensors, to monitor vessels, cargo, weather or port conditions will give rise to data-driven risk management and mitigation solutions that allow underwriters or risk managers to predict and avoid overexposure through risk accumulation on multiple dimensions in quasi real time.

3. **Operational efficiency and environmental impact**
   Data and digitalization are significant topics for improving operational efficiency. In a recent published survey of maritime companies, the majority of measures to improve operational efficiency were focussed on the topics of data and transparency. Such measures don't just reduce administrative efforts. They translate directly into fuel savings and reduced greenhouse gas emissions. Another interesting aspect of this report was the observation that one third of the actions involved a collaboration between two or more parties, such as shipowners, charterers and ports. At the same time, the need for stronger top-down leadership was highlighted as it is not uncommon to find companies struggling with data silos or conflicting interests across different departments.

4. **Digital insurance addressing the protection gap**
   As the value of shipped goods has risen and the needs of cargo owners have evolved, standard approaches to insurance are increasingly inadequate. The gap between standard third-party liability insurance and the true value of the goods is increasing while the volume of goods in transit is steadily rising. This results in a growing global protection gap that can be addressed by digital insurance solutions. Using digital platforms and predictive analytics, insurers can offer tailored coverage options, streamline claims processing, and enhance transparency and communication resulting in better informed and protected clients.

5. **Smart contracts**
   Blockchain is being used to enhance transparency and security in marine insurance contracts and claims. It allows for the creation of immutable, tamper-proof records that can be accessed by all parties involved. Blockchain technology has the potential to streamline processes by offering brokers, insurers and third-parties access to distributed common ledgers that store data about identities, risk and exposures, and connect this information with insurance contracts.

VII.   Impact on the Marine Insurance Value Chain

Big data analytics and remote sensing can be applied across the insurance value chain to enhance productivity, boost efficiency, generate insights or capture new business opportunities. Some use cases and their benefits are given below.

1. Risk Assessment and Underwriting

Insurers assess risks and set premiums based on their internal experience data and pricing rules. Acquiring additional data from external or commercial sources and using big data analytics on combined or enriched data sets delivers insights that allow for more accurate risk assessments.

Furthermore, data from land, ocean or satellite-based sensors can be used to enrich available data on vessels, cargo, route or weather conditions. With a clearer picture of the actual voyage conditions and the current state of the vessel or cargo, underwriters will be better equipped to price risks more appropriately. For example, dynamic vessel movement data is increasingly being used in marine insurance pricing models.

These approaches that take into consideration risk drivers that are beyond the scope of traditional underwriting methods, can be integrated into rules engines or presented in visual underwriting dashboards for a more comprehensive descriptive or predictive view of the underlying risk.

Business Impact
These approaches provide a solid data-driven basis for more comprehensive and accurate risk evaluation. Whether through a more selective risk appetite or improved costing. The net impact is improved long-term business portfolio profitability.

2. Policy Issuance and Documentation

The digital generation, processing and distribution of insurance policies and related documentation can yield major gains in operational efficiency. Digital insurance documentation also boosts transparency and speed along the entire service and logistics chain and supports compliance with changing regulatory requirements.

Various companies are working on implementing blockchain technologies for more secure and transparent record-keeping, enabling streamlined policy issuance and efficient verification of insurance documentation.

Business Impact
Digitalization of insurance distribution will reduce operational efforts for customers, logistics service providers and relevant authorities. This translates into an improved customer experience.

3. Smart Claims Processing and Settlement

Big data and analytics can enhance the efficiency of business processes by streamlining the processing of incoming claims. Sensors that monitor the environment, vessel or specific cargo containers can be taken into account when determining claims validity.

For example, using machine learning, claims processing can be streamlined for speed and efficiency. While normal claims are accelerated, anomaly detection systems highlight cases of suspected fraud for closer scrutiny.

Business Impact

Using big data and analytics to improve the claims settlement process cost-effectively will boost customer satisfaction, streamline operations for all parties and improve the overall efficiency of the insurance process.

4. Risk Management and Loss Prevention

Using big data and analytics can make providing risk services to insured parties more efficient by enabling insurers to identify trends and potential risks and facilitate the implementation of loss prevention measures that mitigate risks and minimize losses.

For example, some companies are implementing predictive analytics models that analyse historical and almost real time data to forecast potential risks and proactively recommend risk mitigation strategies at the portfolio or specific risk level.

Business Impact
Insurers that are able to use data to address more complex risks or to take on risks that were previously deemed uninsurable will be able to differentiate and enhance their value proposition, thus strengthening their market position and customer relationships.

VIII.   Sustainability

With the IMO targeting near net zero emissions by 2050, insurance companies and data play crucial roles in framing and achieving this goal.

1. **The importance of data in the pursuit of sustainability**
   Sustainability is a strategic imperative for companies that want to create long-term value, mitigate risks, enhance their reputation, drive innovation, and effectively engage stakeholders. Marine insurance companies can play an important role in driving positive change by:

   - Incorporating climate change considerations into risk assessment models.
   - Supporting green initiatives and the adoption of eco-friendly shipping practices.
   - Being transparent about their own carbon footprints.

   Data plays a pivotal role in our perception and collective response to the questions of climate change and sustainability. Without data, we merely have changing weather; with data and modelling we have evidence of climate change. Data allows us to set targets and assess our progress towards common goals. Data enables insurers to make informed decisions, while fostering transparency and accountability. Regulators are also increasingly using data analytics to assess, and enforce compliance.

2. **Marine decarbonization and the Poseidon Principles**
   The Poseidon Principles is an initiative driven by leading banks and insurers and the Global Maritime Forum that has resulted in an actionable framework designed to align financing and insurance decisions with low-carbon shipping goals.

   The Poseidon Principles are: *Assessment* – a commitment to annually measure carbon intensity and assess the climate alignment of hull and machinery portfolios. *Accountability* – a recognition of the important role played by impartial information in collecting data and reporting ship fuel consumption to meet decarbonization targets. *Enforcement* – a contractual requirement to include continuous compliance with the Poseidon Principles in all commercial activities through standard clauses. *Transparency* – commitment to publish the results of annual assessments.

   IUMI is a partner of the Poseidon Principles and has made decarbonization of the maritime industry and the Poseidon Principles recurring themes in past conferences. Signatories can be insurers offering hull and machinery insurance (H&M) products. Affiliate members are stakeholders who support and contribute to the insurance ecosystem, such as insurance brokers and collective groups, including insurance associations, captives, syndicates, and P&I clubs.

3. **Marine insurers and the future journey**
   By integrating the Poseidon principles into their underwriting practices, insurers are beginning to leverage their unique position to drive environmental responsibility within the maritime industry. Through the implementation of rigorous underwriting criteria, insurers are incentivizing shipping companies to adopt greener technologies and practices, such as reducing emissions and increasing fuel efficiency.

   Additionally, marine insurers are starting to incorporate climate risk assessments into their risk management frameworks, which helps identify and mitigate potential environmental impacts. By offering incentives or preferential terms for vessels that meet certain sustainability standards, insurers not only encourage the adoption of eco-friendly practices but also support the broader goals of reducing carbon footprints and promoting long-term environmental stewardship.

   Shipowners will face enormous costs to finance the transition, so to remain relevant insurance companies must be able to accompany their clients on this journey and be willing to assume new and as yet unknown risks.

IX.   Looking Ahead to 2030

Future developments and trends in data and innovation will shape the marine insurance industry, and industry stakeholders are urged to stay ahead of the curve by embracing digital innovation and adapting to the evolving landscape.

1. **Past predictions, present realities**
   According to various trend reports, the marine sector will be transformed by advances in big data analytics, communications, sensors, advanced materials, robotics, ship building, smart ships and propulsion and powering. This will significantly change the maritime ecosystem and related risk landscape.

   While truly transformational developments in the marine sector have yet to emerge from these technologies, significant advances in digital communications and data analytics are facilitating evolutionary improvements in the areas of operational efficiency, risk management and sustainability.

   Nevertheless, tech is already creating new business opportunities. For example: data and analytics solutions that offer insurers 360° views of the customer, vessel or cargo in real time are paving the way for new types of insurance or products that bridge the traditional hull/cargo divide.

   Meanwhile, recent advances in AI have rekindled hopes that self-learning intelligent systems for real-time ad-hoc decision making will transform our industry by redefining our approach to risk evaluation and the insurance of standard risks. Furthermore, artificial general intelligence could contribute to the development of innovative solutions for more complex emerging risks or more accurate risk scenarios.

2. **Daily concerns versus future visions**
   IUMI's ambition is to be an influential and trusted professional voice to the industry. This short introduction to big data and digitalization serves as a first step towards raising the profile of this important topic and we hope that it will trigger interesting conversations between our members.

   While self-driving smart ships propelled by carbon free technologies make good keynotes or press articles, in daily conversation, companies in the marine sector are often most interested in practical and easy to implement ideas that will help them to stay profitable in increasingly competitive markets.

   That said, the maritime world has always been about big visions. A ship is a huge long-term investment and the high seas demand people with courage. This is why the future of shipping will be dominated by those who understand and tenaciously invest in the opportunities that advances in tech, big data and digitalization offer.

3. **Call-to-Action – courage and collaboration**

   Considering the changing risk landscape, increasing system vulnerability and exposures, risk data will become a common denominator to build new solutions to support customers in de-risking and insurers to remain relevant and profitable. In this light, IUMI can play an important role in driving data standardization with a joint approach, without compromising the positioning, strategy and differentiation of our members.

   We believe that the true value of data analytics will only be realised when regulators and the industry begin to collaborate. A first priority would be to push standardised digital reporting methodologies and data taxonomies. This would remove an obvious barrier to data sharing, mining and real time analytics.

By looking at technology developments we can know what kind of changes to expect in shipping technology, we just don't know when they will arrive. However, big data analytics and digitalization of business processes are already changing our sector. Every individual company needs to think about how to leverage tech to achieve their own goals.

Those who embrace the opportunities will capture the advantages, although it will hardly be a predictable journey. Technology, like evolution, depends on trying something new and seeing what works. Often it works through new partnerships or symbiotic relationships. How will you adapt your business and will the market find you fit for purpose? Who will you partner with? Will you emerge as a leader in tomorrow's marine insurance marketplace?

X.   For further information

For more in-depth information or to connect with other marine insurers exploring how data and digitalization can add value to your business, reach out to your fellow forum members. Let's connect, learn, and grow together!

Contacts are available on the IUMI Website

https://iumi.com/committees/data-and-digitalization-forum

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