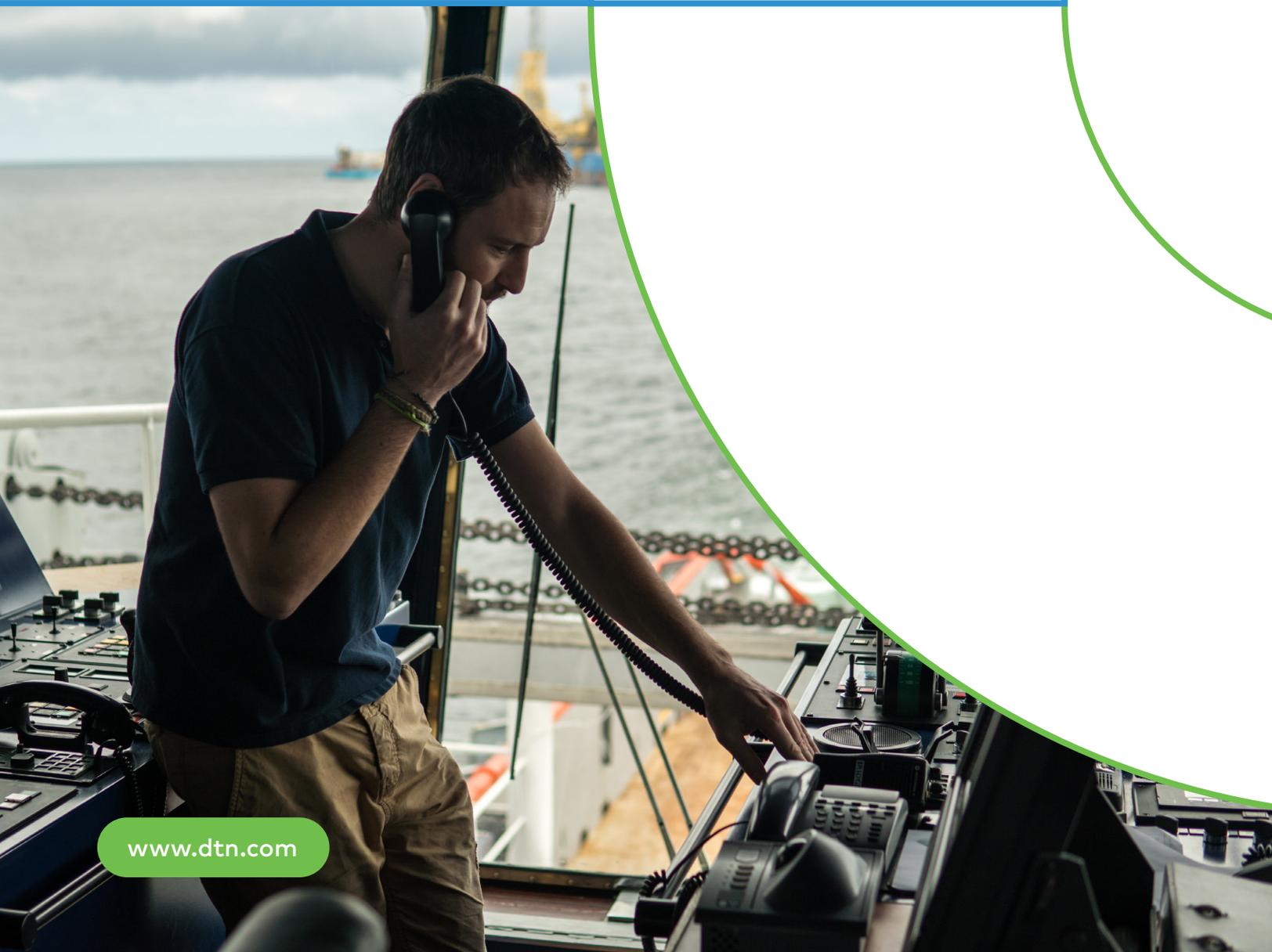




Digitalization in Shipping is Accelerating

Learn how weather
data helps



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Introduction

As a shipping professional, your goals already likely include digitalization. In recent years, the industry has seen the practice transition from theory to reality. Technology like autonomous shipping and the Internet of Things (IoT) connected vessels — once lofty ideas — [are being implemented](#).

Digital technology and data are opening new doors for shipping companies, improving their knowledge of consumer behaviors, competition, and upcoming trends. However, when it comes to weather data implementation, the industry falls across a broad spectrum, shown in the breadth of organizational maturity, from highly-connected vessels to on-demand systems.

Shipping companies using weather data to optimize routes and improve performance have a higher chance of becoming winners. Many are already using data and digital technology to optimize processes and match offerings to customer demand. But through all this, the weather remains an unpredictable factor. If you can forecast its impact on your business, you'll have a competitive advantage.



The impact of weather data on digitalization

A 2021 research study conducted by DTN analyzed how shipping industry experts in Europe and Asia were addressing digitalization challenges and opportunities in conjunction with their adoption of weather data.

Considering the factors that help facilitate digitalization, 57% reported a collaborative, data-sharing culture, and 37% stated their data collection process. Interestingly, however, these factors also ranked high on the obstacles to digitalization; 30% of respondents cited poor data management as a barrier, and 29% reported issues with data silos and lack of integration. One respondent said, "Companies are focused on protecting their data instead of sharing it widely in the maritime sector, which causes barriers to collaboration."

When respondents were asked to rank their barriers to digitalization, 45% reported the single biggest obstacle is a poor data collection process. One in five also identified a lack of leadership buy-in as a top barrier. It was higher for lower-seniority respondents, with 28% of managers finding this a key concern.

Respondents were also asked to qualitatively comment on their biggest frustrations, and 35% included the technologies themselves in their responses. Cost and budget were also frustrations for 27 respondents. Several commented on budgetary constraints and shortfalls in available money. Concerns also remain regarding the safety and cybersecurity of digitalization. Many respondents included cybersecurity concerns in their qualitative answers.

Monitoring and preparing for adverse weather conditions helps reduce safety threats to crews and vessels from excessive ship motion, slamming, or seas washing over the decks. But understanding and effectively navigating the weather is critical to planning efficient and economic journeys.

In particular, weather data can help manage and control fuel consumption — which can account for up to 50% of operating costs. Encountering heavy weather, wind, and wave resistance can cause speed reductions. The opportunity to manage routes around these adverse conditions using weather-optimized routing improves safety and reduces operational costs — including fuel consumption.

Weather-optimized routing helps balance cost, fuel, and time without risking crew injuries or vessel damage, as operational cost-savings come through reduced transit times and, thus, fuel consumption.

The research indicates that digitalization opens new opportunities for route optimization and fleet monitoring. Let's further explore why digitalization is accelerating and how you can benefit from weather data. We'll cover real-life examples of companies successfully integrating weather data into their corporate strategies and share ways to incorporate weather data into your digitalization with the business success formula.

47% of surveyed shipping experts believe the impact of COVID-19 accelerated digitalization.

Chapter 1: Why digitalization is accelerating

Until recently, the shipping industry relied heavily on traditional analog methods. However, it's changing fast, with [crewless vessels](#) crossing the Atlantic and new [blockchain platforms](#) already coming online.

Digitalization in weather means APIs can connect systems and enable in-house access to forecasts and weather data. This advancement supports a complete situational analysis and integrates different data sources into the decision-making process.

Digitalization explained

Digitalization is a buzzword that means [using digital technology](#) to change a business model or process to provide new value or revenue. The connected systems provide thousands of insights and observations that may not have been available or are too massive to manage separately.

Essential requirements for digitalization

First of all, you need a platform. This platform should have different layers: one where gathered data comes in. One that combines data from various sources and one where it's analyzed. Second, you need data, which could come from internal or external sources. Third, you need APIs to pass on the gathered information and translate it into the right format, which, in turn, must fulfill several requirements:

1. **Scalability:** the platform needs to be scalable because you never know which data sources you may need to add later.
2. **High availability:** communication will be non-stop, so your platform should run 24/7.
3. **Reliability:** your platform should have a reliable API manager that deals with all API requests and potential external API developers.
4. **Expertise:** you'll need analysts who know how to interpret the data and communicate the information as clearly as possible.

Platform collaboration

The great thing about digitalization is it facilitates collaboration. It's a welcome side effect as businesses become more dependent on one another. In your platform, you can invite external developers to join and connect their applications to yours — bringing together more data and delivering more insights. From the survey, nearly half of the respondents (47%) use both a single system and an internal proprietary system for vessel performance and maintenance, compared to 37% that only use an internal proprietary system and 19% that use a single system.

Companies can employ internal proprietary systems, using customized data integration, bespoke and built for the organization. Or they can use single systems that are typically a standard, purchased platform with pre-integrated data — or a combination of both.

The pandemic effect

Considering the impact of COVID-19, the industry was divided on if the pandemic accelerated digitalization; 47% of surveyed shipping experts agreed it had. But that leaves more than half that disagreed. Among the respondents who identified their organizations as weather data mature, 79% said their organization saw the pandemic as an impetus to evolve their digitization strategy. It indicates that the event enabled more mature organizations to enhance their digitization.

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Weather directly affects an estimated 80% of vessel performance calculations.

Chapter 2:

How digitalization supports goals

While digitalization is about technology, [digital transformation](#) encompasses the strategy and processes required to achieve goals and stay competitive.

Goal 1

Bring together multiple data sources to improve vessel performance and manage costs.

Weather directly affects an estimated 80% of [vessel performance calculations](#). These impacts can significantly change the vessel's ETA, causing potential voyage delays and increasing operating costs for the voyage's duration.

It's important to note that every ship has a unique performance signature. Vessel sizes, types of cargo, engine types, propeller characteristics, etc., all affect how ships respond to weather conditions. By knowing a ship's individual traits, you can calculate its vulnerability to adverse conditions and how those conditions will affect its fuel efficiency.

Thanks to digitalization, it's easier than ever to bring together multiple data points to evaluate an individual vessel's performance in different weather conditions and the different outcomes.

The impact

Integrating predicted vessel performance with weather data and weather routing helps shipping companies achieve their goal of managing costs, safety, and efficiency. The process, called weather-optimized routing, harnesses the value of thousands of data points and can be applied to individual vessels or entire fleets, bringing a new level of value to the industry.

The incredible value of the Weather Optimized Route Network comes from opening navigable waters for routing.

Goal 2

Improve route optimization by opening waters up for routing.

In a simplified view of a route, the in-shore waters — such as TSS, safety corridors, bathymetry, and other restrictions — give little room for optimization. However, open waters provide freedom and flexibility to avoid hazardous weather. New approaches, such as the route network available in SPOS, treat oceans and coastal areas as broad highways. The incredible value of the Weather Optimized Route Network comes from opening navigable waters for routing.

Shipping companies do not have to stick to common or best-practice optimization by utilizing the routes. Instead, they can optimize routes based on their vessels and goals. The Weather Optimize Route Network combines the benefits of automatic identification system trends to identify route behavior changes and checks against the latest electronic navigational charts created by master mariners to ensure the legs are safe.

Routes can be optimized for:

- **Single speed:** select a set speed through the voyage to support charter party agreements.
- **Flexible speed:** choose the best speed, based on a provided range, with the returned speed optimized to reach a destination with a flexible ETA.
- **Fixed ETA:** use a variable speed, which optimizes the voyage to avoid weather impacts, but reach your destination at the specified time.

The impact

Digitalization unlocks greater insight into routing options and enables companies to optimize their route, without compromising safety.

60% of respondents list tropical and extratropical cyclones, hurricanes, or typhoons in their top three concerns.

Goal 3

Keep people safe and protect cargo from damage.

Severe weather conditions can develop quickly, bringing dangerous sea conditions, high winds, and life-threatening storms.

Early awareness provides valuable time to enact safety protocols, re-route vessels away from dangerous conditions, ensure crew safety, and prevent costly cargo damage.

Additionally, the English court ruling in *Alianca Navegacao e Logistica Ltda v Ameropa SA (The Santa Isabella)* case has provided fresh guidance on the owner's responsibilities to ventilate and care for cargo. The ruling set a precedent where "owners must show that they have a sound system for cargo care in place, including ventilation and disinfection where necessary." Severe weather can disrupt and delay voyages that may impact cargo care.

The impact

Sudden weather changes can disrupt planned routes. Employing digital shipping processes, including weather-optimized routing, helps you plan the best route, ensure crew safety, and prevent costly cargo damage.

Goal 4

Manage the impact of more extreme weather conditions.

Weather impacts every part of the shipping industry — from fuel efficiency and CO₂ emissions to crew, ship, and cargo safety. [Scientific research validates](#) that extreme weather-related events have a business impact, yet 74% of respondents didn't think the industry is impacted by changing weather patterns and warming oceans.

The industry may not immediately perceive it, but there have been gradual changes over many years. Increased sea surface temperatures and rising sea levels aren't connected to the impact — they're catalysts for the most widely-known and accepted developments in conditions.

Shipping companies must deal with growing pressures to improve performance and route optimization while coping with the increased likelihood of adverse weather conditions — without compromising safety.

Per the DTN-led research results, the industry is most concerned with the potential business impacts of extreme tropical weather. When asked to name their top three concerns, 61% of respondents listed tropical and extratropical cyclones, hurricanes, or typhoons. The IPCC report shows no clear change in the number of cyclones, but those developing into a major hurricane or typhoon will become even stronger. Some hurricanes may survive until mid-latitudes, and in transitioning into an extratropical system, they may regain intensity more often, with the risk of severe winds and rain in mid-latitude oceans.

The research also reports that the second and third highest weather-related concerns were monsoons and heavy rains, selected by 53%, followed by lightning and thunderstorms, chosen by 42% of respondents. The IPCC report shows that higher moisture content in the warming atmosphere brings more heavy precipitation events, with more heavy snowfalls in winter in arctic areas and disruptive precipitation in regions of tropical cyclone landfall. It also shows more heavy thunderstorms in autumn over the Mediterranean.

Alongside this, environmental awareness has increased among the general public, which, in turn, puts pressure on businesses to reduce atmospheric emissions and adopt a greener approach.

The impact

More extreme weather conditions, combined with growing environmental awareness, demand you to become more sustainable and lower your impact on the environment. In the future, weather is more likely to impact operations.

Goal 5

Comply with recent IMO and BIMCO CII regulations.

The International Maritime Organization (IMO) 2023 regulation will likely impact the global shipping industry significantly. By introducing new energy-efficient fuels and implementing stricter carbon emissions regulations, [IMO 2023](#) helps reduce the environmental impact of sea freight transport on a global scale. At the same time, BIMCO added a [new clause](#) to its Time Charter Parties contract to reflect the new IMO carbon intensity indicator rules.

**IMO 2023
regulation
introduces
mandatory
carbon
emission
reductions for
both new and
existing ships.**

The IMO 2023 regulation affects both commercial and non-commercial vessels. It introduces mandatory reductions in carbon emissions for both new and existing ships, using energy efficiency indicators to determine these levels.

The measures include the following:

- The Energy Efficiency Existing Ship Index (EEXI)
- The Carbon Intensity Indicator (CII) rating scheme

The impact

Compliance with CII regulations is required, and reliable data is key to achieving a good rating and avoiding pricy penalties. In addition to supporting compliance, focusing on efficiency can help reduce voyage costs, boost profitability, and protect crews, cargo, and equipment.

Chapter 3

Weather data and digitalization goals in practice

The previous chapter demonstrates the opportunities available to shipping companies that embrace digitalization. As weather conditions have an increased impact on their success, modern shipping companies must work hard to grow their competitive edge — and embedding weather data as part of digitalization can help them achieve it. However, many companies in the industry are not yet unlocking the full potential of weather data.

The DTN research report indicated that 91% of respondents agree that weather data is necessary. However, only one in 10 capitalizes on the power of integrated data, and one-third do not currently have weather data feeding into their systems.

On the following pages are two examples that demonstrate innovative use for weather data.

1. Integrating weather-optimized routing with an in-house system

Biggest challenge: Optimize for voyage conditions.
Weather challenge: Ensuring each ship runs at peak performance.

At one of the largest shipping companies in the Netherlands, ensuring each ship runs at peak performance is critical. The crew, technical, and operational departments always strive to minimize both fuel consumption and air emissions of sulfur, nitrogen, and CO₂, by optimizing routes based on existing weather conditions. Integrated weather-optimized routing is vital to ensure sustainability and save time, money, and fuel.

In-house developed IT systems ensure smooth cooperation between fleet and office, providing the basis for full compliance. All vessels use advanced weather-optimized routing systems to track and avoid bad weather and optimize voyages based on conditions. Special attention is devoted to speed optimization.

Weather-optimized routing helps to save time, money, and fuel. Prebuilt ship models also assist master mariners to decide the best possible routing. Further innovation comes from the data itself, using it for verification to check how the weather forecasts and predictions were accurate and optimizing fuel efficiency — and reducing environmental impact.

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2. Insights in real-time: weather-optimized routing 2.0

Biggest challenge: Getting integrated access to real-time data.

Weather challenge: Accessing real-time weather data.

In the past, ship operators would have to send instructions for routing purposes to the RouteGuard team. However, through the RouteGuard API, ship operators can send their requests and updates directly through their system. APIs translate the gathered data into a uniform language, so different data sources can be combined and analyzed together on the platform in real time.

This approach includes but is not limited to, creating new voyages, updating voyage profiles (such as speed and fuel prices), inserting new ship profiles, and nominating vessels for data monitoring. The experts create and monitor the vessel's route to provide the company with three different services:

- **Routing based on charter party:** chartered vessels are guided and controlled based on charter party inputs.
- **Fixed ETAs:** ensures that ships sail at the optimum speed and route based on the fixed arrival time.
- **Optimum costs:** the best route, based on a flexible time of arrival, speed ranges, and cost of fuel ensures the vessel sails at optimum costs.

The ability to optimize routes by time, fuel, or cost means the operator can find the fastest way to the destination, use the least amount of fuel to reach the destination, or consider ECA fuels, daily hire, and additional costs in its routing calculation. This flexibility means the weather data ensures routes are optimized to meet specific priorities.



As a result, data has become an essential part of the industry. Working with facts and figures in shipping can be tricky, and there is no one-size-fits-all solution. However, there are a few fundamental principles that all shipping companies should follow to ensure that their data is effective for compliance and regulatory requirements.

The following are examples of how data fuels better-informed decisions. First, work with a data configuration and interface via a trusted marine weather API with multiple configuration options for temporal resolution, forecast ranges, location (shape) requests, and data format (such as XML or JSON). Here are some additional data-focused considerations.

- **Accuracy:** up-to-date data helps enhance decisions around ship routing, delivery schedules, and year-end compliance reports.
- **Completeness:** leads to better-informed decision-making about port capacity, cargo amounts, powering in-house resources, or building innovative upgrades to existing platforms.
- **Consistency:** this is especially important for things like nautical charting of a shipping lane and routing in inclement weather.
- **Accessibility:** improves decisions related to shipyard locations, vessels, ETAs, and destinations.

Lastly, data outcomes must be easily understood to support specific operational and compliance fulfillment procedures.

Chapter 4

Compliance and regulatory goals in practice

The shipping industry is incredibly complex and subject to many different regulations worldwide. Its increasing reliance on data and technology and the rapid advancement towards digitalization compound this complexity. Regulatory compliance is enforced with monitoring and reporting requirements and inspections.

Based on the information published

"In accordance with Article 21(1), each Member State shall take all the measures necessary to ensure compliance with the monitoring and reporting requirements set out in Articles 8 to 12 by ships flying its flag. Member States shall regard the fact that a document of compliance has been issued for the ship concerned, in accordance with Article 17(4), as evidence of such compliance. In the case of ships that have failed to comply with the monitoring and reporting requirements for two or more consecutive reporting periods and where other enforcement measures have failed to ensure compliance, then strict sanctions are implied.



Chapter 5:

The business success formula

Weather data alone is only a part of the solution; integrating it into your systems is key to success. The more you know about weather patterns, forecasts, and advisories, the more strategic your decision-making will be in connection with other critical performance data.

Putting strategic weather data into practice allows you to:

1. Confidently streamline decision-making with the right marine data.
2. Save money through predicted performance optimization without compromising safety.
3. Harness the skills and knowledge of weather experts who understand your business challenges.

Confidently streamline decision-making with the right marine data

Integrated weather data can help you protect people, keep assets safe, and reduce the financial impact of weather. Improved access to accurate weather data also means faster decisions and streamlined internal communications. Integrating an advanced API portfolio for the marine, shipping, and offshore sectors puts the weather data you need into your systems.

By utilizing the latest cloud technology, it's possible to tune a global suite of marine forecast models to match your needs. They can be continuously validated, calibrated, and tuned into the latest observations with data from satellite, buoy, and private observation networks. Unlock site-specific weather data quickly, onboard new product features into your existing setup, and integrate high-resolution models into global and regional forecast runs on the fly.

With the right marine data, you can:

- Improve planning and situational awareness with fast access to the latest weather data.
- Support safer working conditions by integrating data into your systems.
- Unburden your crews at sea with improved communications and streamline internal data distribution.
- Incorporate marine-specific forecasts into your existing setup.
- Build trust in your decisions by using high-quality data that improves situational awareness and workflow efficiency.

Save money through predicted performance optimization, without compromising safety

APIs can supply a recommended route that is easily ingested into any application. This insight safely enhances situational awareness by improving ETA accuracy and reducing operational and logistical costs. APIs can also deliver critical metadata about each route, enabling easy comparisons with different route options. Because each voyage, vessel, and weather situation differs, a routing API solution must be flexible enough to create solutions for any situation.

A routing API must allow application builders to innovate beyond traditional use cases. It should offer simple integration into applications with minimal requirements, using scalable, secure, and reliable data architecture. As a result, it enables better decisions across multiple roles. For example:

- Charters can analyze all route options before and during voyages and see expected arrival times as ETA calculations, including weather resistance and avoidance data.
- Owners can minimize idle vessel time, maximize performance, adapt routes to reduce CO₂, optimize fuel consumption, and advise captains on ideal speeds.

- Ports can see actual ETAs for inbound vessels and benchmark arrival times with better estimates that help avoid congestion and maximize port logistics.
- Commodity traders can model the cost of changing vessel speeds and ports on market prices and see how storm systems affect commodity supply and prices in specific regions.

Support the data with weather experts that understand your business challenges

In the maritime industry, there is rarely a black-and-white decision, but there are countless gray decisions, which include uncertainty and sometimes data overload. This is where an experienced meteorologist, working in concert with a master mariner, adds tremendous value. Just like the combination of technologies in digitalization, a meteorologist's keen insight into weather models and forecasts, combined with a master mariner's navigational experience with global vessel characteristics in countless wind and sea conditions, can provide a true competitive advantage.

You've seen the opportunities that can arise from weather data integration as part of your drive toward digitalization, helping to improve your strategic decision-making processes.

Digitalization of the shipping industry has been a long-time coming for many, and it's gaining momentum to help solve growing industry challenges.

[explore our solutions](#)



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