



Digitalization in the Marine Sector is Accelerating: How Weather Data Helps

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Introduction

Digitalization is likely already on your agenda. In recent years, the shipping industry has seen digitalization transition from theory into reality. For example, a few years ago, talk of autonomous shipping and IoT-connected vessels seemed far off, today it's already happening. But, as part of your digitalization journey, are you considering the impact of weather data? Shipping companies using weather data to optimize routes and improve performance have a higher chance of becoming winners.

Shipping companies are already using digital technology and data to improve knowledge on customer behaviors, competition, and future trends. They're using this information to optimize their processes and match their offerings to customer demand. But through all this, the weather remains an unpredictable factor. If you manage to forecast its impact on your business, you have a competitive advantage.

Monitoring for and reacting to adverse weather conditions reduces safety threats to the crew. It also prevents damage to the ship itself, from excessive ship motion, slamming, or seas washing over the decks. But understanding and effectively navigating the weather is a critical part of planning efficient, economic journeys. In particular, fuel consumption — which can account for up to 50% of operating costs — can

be controlled and managed using weather data. When vessels encounter heavy weather, wind and wave resistance it causes 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 find the best balance between cost, fuels, and time, without putting the vessel at risk of damage or crew injury. Operational cost savings come through reduced transit times and, therefore, fuel consumption.

Digitalization opens new opportunities for route optimization and fleet monitoring. This guide explores why digitalization is accelerating and how you can benefit. It covers real-life examples of companies that have successfully integrated weather data into their corporate strategy. Finally, we'll tell you how you can incorporate weather data into digitalization with the business success formula.

Chapter 1. Why Digitalization in Shipping 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 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 combining 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 that pass on the gathered information and

translate it into the right format, which, in turn, has to fulfill several requirements:

1. Scalability: the platform needs to be scalable because you never know which data sources you may need to add in the future
2. High availability: communication will be non-stop, so your platform should be up and running 24/7
3. 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 to you as clearly as possible

Platform collaboration

The great thing about digitalization is that it facilitates collaboration. As businesses become more dependent on one another, it's a welcome side effect. In your platform, you can invite external developers to join and connect their applications to yours — bringing together more data and delivering more insights.

Chapter 2. How Digitalization Helps Shipping Companies Achieve 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 impacts 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 duration.

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 traits you can calculate its vulnerability to adverse conditions and how conditions will affect fuel efficiency.

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

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 fleets bringing new level of value to the industry.

Goal #2

Improve Route Optimization by Opening Up Waters for Routing

In a simplified view of a route, the inshore waters — TSS, safety corridors, bathymetry, 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 the route based on their vessel and goals. The Weather Optimize Route Network brings together the benefits of automatic identification system trends to identify route behavior changes and checks this against the latest electronic navigational charts 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.

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

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 [recent 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.

Impact on shipping: 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

[Analysis of ocean temperatures](#) reveals that the last five years are also the five warmest on record. Increased ocean temperatures can result in more storms. This development is [backed by research](#) that reveals increases in average wave heights and wind speed in the last three decades.

Observations of conditions in the Southern Ocean show an 8% increase in average wind speeds and a 5% increase in average wave heights. Over time, this pattern would mean weather conditions become more extreme and make conditions more challenging for shipping companies.

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.

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 on operations.

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

Chapter 3. In Practice: Weather Data and Digitalization in Shipping

Achieve Goals

The previous chapter demonstrates the opportunities available to shipping companies that embrace digitalization. As weather conditions have an increasing impact on their success, modern shipping companies have to work hard to maintain their competitive edge — something which embedding weather data as part of digitalization can help them achieve. However, many companies in the industry are not yet unlocking the full potential of weather data. Here are two examples that demonstrate innovative uses for weather data.

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 operating 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. Pre-built 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.

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 voyages' profile (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 Estimated Time of Arrival:** Ensures that ships sail the optimum speed and route based on the fixed arrival time.
- **Optimum Costs:** The optimum 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 it can use weather data to ensure routes are optimized to its priorities.

Chapter 4. Digitalization + Weather Data: The Business Success Formula Shipping Achieve Goals

Weather data alone is only a part of the solution. Integrating it into your systems is the 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. This chapter introduces the digitalization and weather data success formula.

To put strategic weather data into practice, these are the ultimate ingredients:

1. Confidently streamline decision making with the right marine data
2. Save money through predicted performance optimization without compromising safety
3. Support the data with weather experts that 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.

Utilizing the latest cloud technology, it's possible to tune a global suite of marine forecast models to match your needs. Models and forecast data are continuously validated, calibrated, and tuned to the latest observations, using 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 our data into your systems
- Unburden your crews at sea with improved communications and streamline internal data distribution
- Incorporate our marine-specific forecasts into your existing setup
- Build trust in your decisions via high quality data resulting in improved situational awareness and workflow efficiency

Save money through predicted performance optimization, without compromising safety

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

A routing API also needs to 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 the real expected arrival times, as ETA calculations include 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 speed.
- Ports can see actual ETAs for inbound vessels and benchmark arrival times with better estimates to avoid congestion and maximize port logistics.
- Commodity traders can model the cost of changing vessel speed and port 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. Realistically there are an endless number of “grey” decisions with 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, the meteorologist’s keen insight on weather models and forecasts combined with master mariners navigational experience with global vessel characteristics in countless wind and sea conditions, can give you the competitive advantage.

Conclusion

We’ve shown the opportunities that arise when weather data is integrated as part of your drive toward digitalization by improving your strategic decision-making process.

It’s a turbulent time for the world with a pandemic, climate change, and economic hardships, but the digitalization of the shipping industry has been a long time fantasy for many that is finally getting some momentum as a means of solving industry challenges.