Vessel Forecast Summary application

https://www.portofhalifax.ca/port-operations-centre/#!/vessel-forecast

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Introduction

"When will the vessel arrive?"

Every person in the marine transportation supply chain has asked this question, whether they be port users (pilots, tugs, terminal operators, rail service providers or truckers) or cargo owners, NVOCCs or freight forwarders. As but one link in a long and complicated supply chain, it is in the best interest of port authorities to make the supply chain as transparent as possible to serve its customers and grow its business.

This fundamental question is fueled by a port user's and cargo owner's need for supply chain visibility and predictiveness to fulfill its customer promise of delivering the vessel to the berth or being in-stock on the retail shelf.

Knowing where *a vessel is and* when *it will arrive at one's port is the foundation for answering all subsequent questions (When will my container arrive at my distribution center? When will my cargo be available for sale?). And, from a port service provider's perspective, knowing exactly when a vessel is predicted to arrive will help answer their key questions (When should the pilot boat be dispatched? At what time should longshore labor be deployed to the terminal?).*

The Port of Halifax has developed an accurate and effective application to answer our customer's fundamental questions.

As a discretionary port, the Port of Halifax has built its customer value proposition on consistency and reliability to grow its business (since 2016 the port's TEU growth has been 14%). The port's hinterland (central Canada and the US Midwest) is effectively served by many North American container ports and so the Port of Halifax must differentiate itself from its competition to continue its growth trend. By developing unique and effective tools to streamline a customer's supply chain, the Port of Halifax has succeeded in harnessing IT innovations to improve its bottom line. The **Vessel Forecast Summary (VFS)** *application is a leading example of this innovation.*

1. Summary of Project

The Halifax Port Authority's (HPA) **Vessel Forecast Summary (VFS)** application was launched on June 10, 2019 to the Port Operations Centre of its corporate website https://www.portofhalifax.ca/port-operations-centre/#!/vessel-forecast The objective of the VFS application is two-fold:

- To provide an accurate forecast to port service providers (terminals, pilots, tugs, rail service provider, truckers) of a vessel's arrival at Halifax to optimize resources, and
- To demonstrate Halifax's value-proposition as a "consistent & reliable" port to cargo owner customers (importers, exporters, NVOCCs, freight forwarders) to grow its business.

Through an innovative two-pronged partnership with Copenhagen-based **eeSea ApS**, the Halifax Port Authority has harnessed eeSea's global vessel scheduling data for inbound vessels scheduled to arrive at port *up to 28 days prior to arrival*, thus providing ample visibility for customers to make key, fact-based decisions on when their cargo will arrive at destination. The customer-facing VFS interface was developed in partnership with **Nicom IT Solutions,** a local Halifax full-service IT professional services company.

While *phase one* of the project has visibility for container vessels only, the port recognizes that certain service providers (such as tugs and pilots) need accurate visibility on all vessels requiring their services and, by August 16, 2019 the following vessels will be included in *phase two* of the VFS application:

- Container ships
- Cruise ships
- Pure car carriers
- Oil tankers
- Breakbulk and dry bulk vessels

2. Description of the Port

The Port of Halifax is a full-service port, and offers a variety of facilities for bulk, breakbulk, ro/ro and container cargo, as well as modern cruise facilities. Halifax is Canada's fourth largest container port (by TEU throughput), with container operations located in its South End and Fairview Cove container terminals.

The Port of Halifax boasts the deepest berths on the east coast of North America, capable of accommodating the largest vessels that cross that Atlantic Ocean. Closer to Europe than any other east coast port-of-call, the first destination for carriers sailing from Asia through the Suez Canal, and with

seamless intermodal connections to and from the heartland of North America, the Port of Halifax is Canada's Atlantic Gateway to the world.

The Halifax Port Authority (HPA) is an agent of the Government of Canada created in 1999 pursuant to the Canada Marine Act. The mandate of the HPA includes: the administration of Halifax Harbour; the regulation of port operations; the management and development of port facilities; the provision of port services; and, the promotion of trade through the Port of Halifax.

3. Goals & Objectives / Business Problem

As a discretionary port, the Port of Halifax understands that supply chain reliability is a major advantage to attract and retain business at our port. We also recognize the value and importance of having precise and current vessel arrival information, allowing the port community to make informed decisions in support of an efficient port and an effective and reliable supply chain. A primary way the port markets and demonstrates this value proposition is through the Port Operations Center on its website.

Problem: How can the port encourage synergies in the port user community (including pilots, tugs, terminals, terminals, rail provider, truckers) by developing an accurate measure of vessel arrival predictiveness that will improve supply chain reliability for port users and cargo owners?

Solution: Develop a **Vessel Forecast Summary** application which provides carrier schedule reliability and accurate visibility for vessels arriving at the Port of Halifax.

The Port Operations Centre was created with the following vision:

> *To provide a single place where local and global members of the port community can find current operational and reporting information.*

This vision has been realized through the presentation of several tools – including the **Vessel Forecast Summary (VFS)** application - which provide valuable information to diverse audiences in the supply chain. The Port Operations Centre supports a global port community, providing current information so that users can make operational decisions and track performance.

4. Discussion

a. Background

We wanted the VFS application to be timely, accurate and relevant to the port community. It needed to solve a real problem facing our customers. And, it needed to be groundbreaking thus solidifying the Port of Halifax's reputation as a consistent and reliable data-driven port.

The VFS application is an industry-leading application available in the palm of one's hand (we have developed both a desktop and a mobile version) that provides a proactive planning solution for port users and cargo owners. The result is less time spent on verifying a carrier's ETA at Halifax and more time spent on improving each user's core competencies.

b. Objectives and methodology

Prior to the public launch of the VFS application on the port's website on June 10, 2019, the HPA engaged in an extensive testing and pre-launch consultation phase. Not only did we want to ensure that the data being depicted was accurate and timely, we wanted to confirm that each user group's needs would be met with such a application. Heretofore, port service providers and cargo owners alike had been using a variety of techniques to collect the data they required to determine an accurate forecast of a vessel's arrival at Halifax. Such techniques included consulting ship line websites (to obtain a vessel pro forma schedule), calling local vessel agents, and consulting with generic AIS-enabled websites to determine a vessel's location. The resulting estimates would often be inconsistent or unreliable and didn't provide a reliable predictive forecast.

We also wanted to base the input data for the VFS application on more than simply an AIS location of a particular vessel en route to Halifax (AIS data sets are very common in the industry and provide an

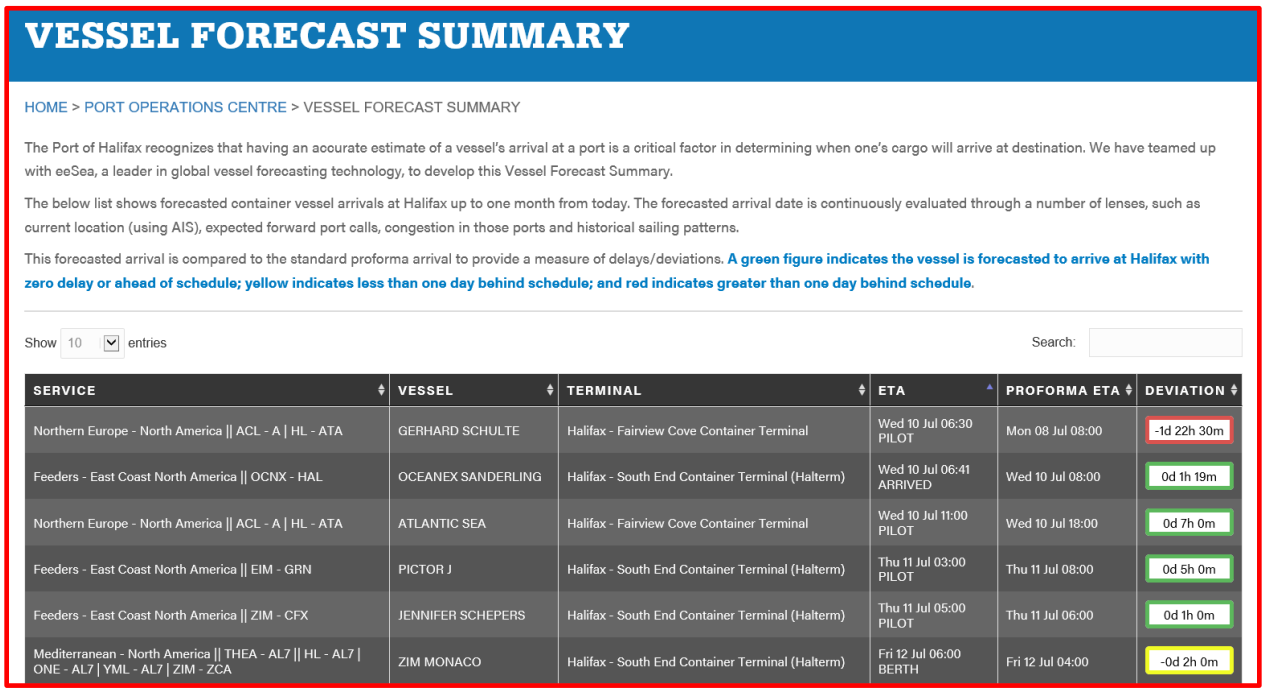
excellent real-time *current location* of a vessel but they do not accurately *predict the actual time of arrival [ATA]* of a vessel into a port); it needed to encompass a deeper and broader algorithm to take into account port congestion risks, carriers' historical accuracy, past sailing patterns, port stay times, and omissions that only eeSea could provide.

Moreover, we wanted to extend the visibility afforded by the VFS application far beyond the typical 2 or 3-day predictive window seen with other similar tools. **Our solution needed to be groundbreaking** and so we worked with eeSea to provide a full 28-day ATA forecast for vessels calling at Halifax.

We also wanted to develop an application that would provide vessel arrivals forecasting for all vessels serving the port, including container, cruise, car carrier, ro/ro, breakbulk and bulk vessels.

Finally, the VFS application needed to be customizable for individual port users and cargo owners. Thus, we have worked with eeSea to develop an API-data interface to allow others to integrate the VFS application data directly into their own systems.

Desktop version of the VFS application:



VESSEL FORECAST SUMMARY

HOME > PORT OPERATIONS CENTRE > VESSEL FORECAST SUMMARY

The Port of Halifax recognizes that having an accurate estimate of a vessel's arrival at a port is a critical factor in determining when one's cargo will arrive at destination. We have teamed up with eeSea, a leader in global vessel forecasting technology, to develop this Vessel Forecast Summary.

The below list shows forecasted container vessel arrivals at Halifax up to one month from today. The forecasted arrival date is continuously evaluated through a number of lenses, such as current location (using AIS), expected forward port calls, congestion in those ports and historical sailing patterns.

This forecasted arrival is compared to the standard proforma arrival to provide a measure of delays/deviations. **A green figure indicates the vessel is forecasted to arrive at Halifax with zero delay or ahead of schedule; yellow indicates less than one day behind schedule; and red indicates greater than one day behind schedule.**

Show 10 entries Search:

SERVICE	VESSEL	TERMINAL	ETA	PROFORMA ETA	DEVIATION
Northern Europe - North America || ACL - A | HL - ATA	GERHARD SCHULTE	Halifax - Fairview Cove Container Terminal	Wed 10 Jul 06:30 PILOT	Mon 08 Jul 08:00	-1d 22h 30m
Feeders - East Coast North America || OCNX - HAL	OCEANEX SANDERLING	Halifax - South End Container Terminal (Halterm)	Wed 10 Jul 06:41 ARRIVED	Wed 10 Jul 08:00	0d 1h 19m
Northern Europe - North America || ACL - A | HL - ATA	ATLANTIC SEA	Halifax - Fairview Cove Container Terminal	Wed 10 Jul 11:00 PILOT	Wed 10 Jul 18:00	0d 7h 0m
Feeders - East Coast North America || EIM - GRN	PICTOR J	Halifax - South End Container Terminal (Halterm)	Thu 11 Jul 03:00 PILOT	Thu 11 Jul 08:00	0d 5h 0m
Feeders - East Coast North America || ZIM - CFX	JENNIFER SCHEPERS	Halifax - South End Container Terminal (Halterm)	Thu 11 Jul 05:00 PILOT	Thu 11 Jul 06:00	0d 1h 0m
Mediterranean - North America || THEA - AL7 || HL - AL7 | ONE - AL7 | YML - AL7 | ZIM - ZCA	ZIM MONACO	Halifax - South End Container Terminal (Halterm)	Fri 12 Jul 06:00 BERTH	Fri 12 Jul 04:00	-0d 2h 0m

The solution was to develop the **Vessel Forecast Summary** application, a simple and easy-to-use application for all port users and customers to consult with on-demand. Users see a vessel's *"Proforma ETA"* compared to a predicted *"ETA"* with a color-coded *"Deviation"* output for at-a-glance interpretation. One can use the "Search" and re-ordering arrows to quickly sort and seek out vessel and service names.

An extensive post-launch consultation and demo phase with the port-user community and cargo owners provided the port authority with valuable feedback to modify the prototype to optimize the user experience. The consultation phase was successful in achieving buy-in from users to adopt the new application as an effective and reliable application and to discontinue their current data gathering regime, thus eliminating any inconsistencies in predictive forecasts among port users.

Mobile version of the VFS application:

c. Hardware/Software Used

The Port Operations Centre (POC) was developed as a WordPress plug-in and is hosted on the Port of Halifax website. As this plug-in is loaded, it bootstraps a Single Page application (SPA) built using AngularJS. This SPA itself uses a custom-built API running on the Microsoft platform of .NET and Microsoft SQL server.

The POC was expanded to include vessel forecast information from eeSea's API. This was done by modifying the POC API to allow it to communicate directly with eeSea. The data from eeSea is provided in a JSON response format. This is parsed and formatted by the POC API so that it is consistent with the POC branding and provides visual cues, so users can quickly identify delayed vessels.

To provide uninterrupted data access, the Port Operations Centre API provides a caching mechanism that will always make available the most current vessel forecast data available, even if eeSea is not transmitting data at the time of access.

The POC implementation provides additional features to help users such as a search mechanism, pagination and column sorting.

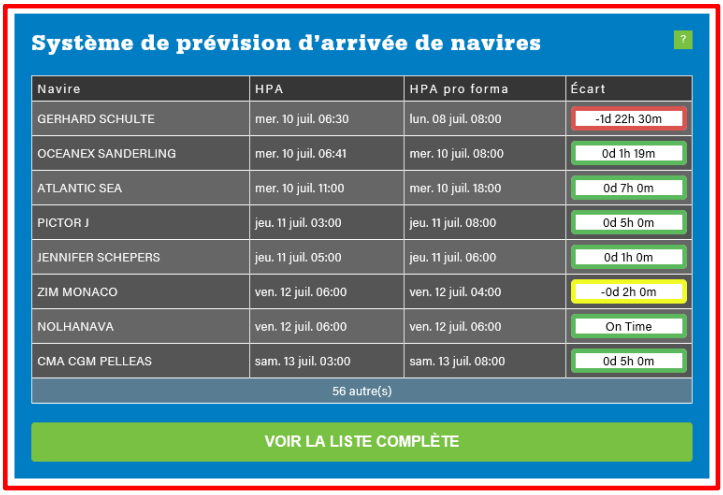
Great care was taken to ensure the vessel forecast information was properly formatted for mobile devices as well as tablets and desktop browsers.

Lastly, the Vessel Forecast Summary application, like the other tools on the POC, is available in both English and French.

d. Project Cost

The creation of the Vessel Forecast Summary application on the HPA's Port Operations Center website represented an investment of approximately CAD $7,000. (Note: this cost does not include the subscription for the eeSea data that underlies the VFS application.) The cost components included:

- Updating the API feed between eeSea and Nicom to populate the VFS on HPA's website
- Updating the Port Operations Center (POC) by adding a new page to display the VFS data in table format
- Add a link on the POC to the new VFS page
- Design the VFS table
- Add "search and sort" capability
- Create a layout that is compatible with mobile phones
- Implement French language translation for the VFS application for the French version of the HPA website



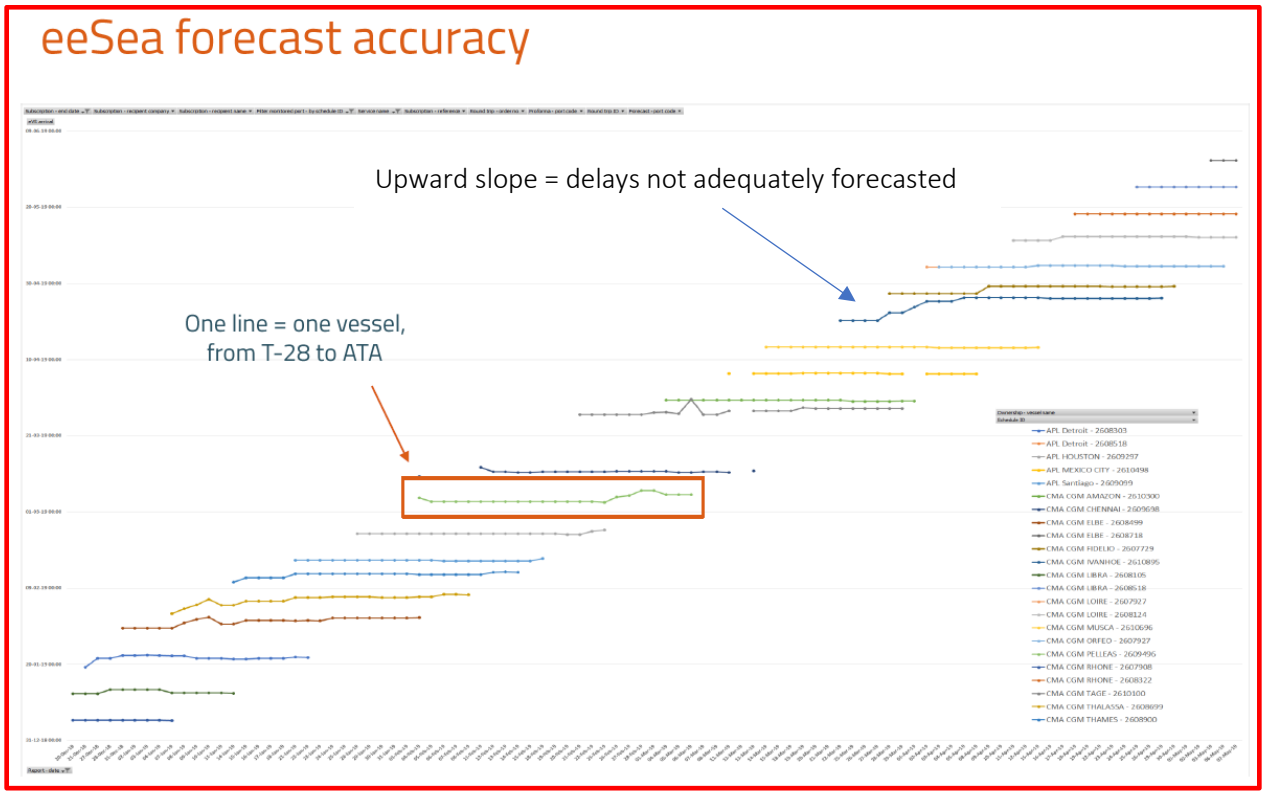
Translated version of the VFS application for the French version of the HPA website

e. Performance measures

There are several performance and success measures for the VFS application:

- Efficacy and forecast accuracy: Once launched, we needed to ensure that the application was, indeed, accurately forecasting the actual time of arrival (ATA) of vessels at the port. To measure

this, we engaged eeSea to develop an administrative application to track the predictive ETA against the ATA arrival of a vessel at the port. **The result was startling: over a three-month period, for all 13 container services calling at Halifax, the VFS has been only 0.72 days off (forecast vs. ATA) when forecasting 7 days before ATA at Halifax, and only 1.05 days off when forecasting a full 28 days (4 weeks) before ATA.** This data effectively quashed any skepticism on the part of port users as to the efficacy of the VFS.



- User acceptance: Since launching the VFS, **every single port user** (including the pilots, tug operators, the two container terminals, the rail service provider and the trucking community), **as well as dozens of customers** (including cargo owners, NVOCs and freight forwarders) **have adopted the VFS as their primary source of vessel arrival visibility at the Port of Halifax**.
- Analytics data: In the first 30 days of the VFS application's launch on the Port Operations Center, the application received 1,460 page views and 1,184 unique page views, ranking the VFS application in the **top five page views** for the Port of Halifax's website.
- Media coverage: Another success measure of the application was the **extensive media coverage** (Appendix B) given to the application following the issuance of a press release (Appendix A) by the Halifax Port Authority on launch day (June 10, 2019).

f. How the project fulfills the award criteria

i. Level and nature of the benefits

The VFS application provides:

- A single, authoritative source for all port service providers to access ATA arrival forecasts of vessels calling at Halifax (eliminating varying guesstimates among service providers);
- Improved synergies among port service providers which reduces costs and improves efficiency in port operations;
- An innovative, easy-to-use application which demonstrates the Halifax value-proposition as a consistent, reliable port which will help us to grow our business;
- Additional proof that Halifax is a digitally-driven port, open to innovative technology solutions that solve real supply chain challenges.

ii. Creativity of the solutions or programs

To address the challenges facing our port user community, as well as to help grow our business, the HPA needed to fully understand what could be improved. To do this, we engaged in extensive consultations with a wide spectrum of users and customers using our port. Then, we partnered with experts in the field who could provide us with an innovative solution. Finally, we communicated and marketed the solution widely which has validated the application's effectiveness. This 'ready, aim, fire' approach to launching the VFS application contributed to its success right out of the gate. The result is an industry-leading application that integrates an IT-enabled solution to a fundamental problem affecting our industry.

iii. Whether the project or program results are apparent

The results of developing and implementing the VFS application are clearly delineated in the Performance Measures section, above.

iv. Cost effectiveness of the activity or program

The total investment by the Halifax Port Authority in developing the VFS application on the Port Operations Center of our website has been very modest at CAD $7,000 (see the Project Cost section, above). The resulting confidence that port users and cargo owners have in the data provided to them – and the ensuing reinforcement of the port's value proposition as a consistent and reliable data-driven port - is immeasurable and will optimize port operations and grow the port's business.

v. The transferability of the technology idea to the port industry

The tools and organization of current operational and reporting information that make the POC valuable can be applied to other ports. Moreover, several port users and cargo owners are working with the

Halifax Port Authority to integrate the data provided in the VFS application directly into their companies' internal networks via an API data feed, thus further proving the efficacy of the information found in the VFS.

Conclusion

The Vessel Forecast Summary (VFS) application – as an integral part of the Port of Halifax's Port Operations Center - is our means of ensuring a high degree of data transparency while providing useful information to our port user community and cargo owner customers. In the four months since it has been operational, the VFS application continues to evolve, with the addition of new functionality and improvements in the quality of information. We believe that the VFS application clearly demonstrates the Port of Halifax's value proposition as a data-driven, consistent and reliable port that is eager to grow its business, while offering valuable solutions to its port users.

Appendix A – Press Release

Port of Halifax launches industry-leading Vessel Forecast Summary application

June 10, 2019, Halifax, Nova Scotia – The Port of Halifax is providing additional visibility on expected container vessel arrival times. A Vessel Forecast Summary (VFS) application is now live on the Port of Halifax Operations Centre; cargo owners and port service providers including terminal operators, pilots, tug operators, truckers and CN Rail now have access to an accurate estimate of container vessel arrivals at the Port of Halifax.

The application is powered by eeSea, a Copenhagen-based leader in global vessel forecasting. All container vessels serving the Port of Halifax are covered by the application which shows a vessel's pro forma arrival date, an eeSea-estimated arrival date, and any difference between the two which is listed in hours and minutes. Anyone can track an inbound vessel up to 30 days prior to scheduled arrival at Halifax.

"As a digitally-focused port, the ability for port service providers and importers to have an accurate forecast will build on Halifax's reputation as a consistent and reliable gateway," said Karen Oldfield, President & CEO, Halifax Port Authority. "Knowing exactly when a cargo vessel is due in port is the basis for other supply chain decisions, so we see this application as an important element in a shipper's choice of port."

Kim Holtermand, CEO & Managing Director, Halterm Container Terminal Ltd., notes, "There are many factors affecting vessel arrival at berth when compared to weekly pro forma schedules. As Terminal Operator, reducing the number of information sources that need to be checked and receiving reliable vessel forecasts will allow us to better schedule labour with our Ocean Carriers and to optimize our container yard planning and discharge operations while maximizing terminal efficiency."

"The vessel Forecast Summary report is a very useful application for everyone involved in our industry," said Calvin Whidden, President, Ceres Halifax Inc. "The sharing of real time information to allow business to react to supply chain data is the way of the future. It is great to see the Port of Halifax leading the way in this new era of electronic information sharing."

eeSea CEO Simon Sundboell has dedicated significant resources to building the data-set that powers the vessel forecasting application. "When the Port of Halifax approached us, we jumped at the opportunity to work in partnership to develop a solution required to meet Halifax's specifications," Sundboell said. "We are aware of no other provider that offers vessel forecasting in such a detailed – and accurate – way. eeSea's algorithm is unique, using a combination of AIS satellite tracking, along with additional attributes such as port congestion risks, carriers' historical accuracy, past sailing patterns, port stay times, and omissions that other competing products simply do not employ."

In the coming months the VFS application will be enhanced to include non-container vessel arrivals at the Port of Halifax as well as vessel departures. To access the Vessel Forecast Summary visit the Port of Halifax's Port Operations Centre at https://www.portofhalifax.ca/port-operations-centre/#!/vessel-

forecast

About the Port of Halifax

The Port of Halifax is Canada's Ultra Atlantic Gateway, connecting to more than 150 countries and generating $2 billion in annual economic benefit from a diverse cargo and cruise business. Offering a natural, deep harbour and world-class infrastructure, Halifax can accommodate large volumes of containerized cargo, bulk cargo and project cargo of any size. Collaborating and working with strong partners and stakeholders, the Port community in Halifax continues to deliver excellence.

About eeSea

Founded in 2016, eeSea is based in Copenhagen, Denmark with the goal to become the shipping industry's one-stop resource for relevant and actionable intelligence. Its services include real-time vessel tracking and forecasting, carrier reliability and transit time analytics, liner schedule normalization, as well as strategic market intelligence on global liner services and ports and terminals. Information is provided through a web app or directly into customers' systems through API integrations.

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Appendix B – Media Coverage

The following media outlets picked-up the VFS story following the issuance of the HPA press release on June 10, 2019:

1. American Journal of Transportation – June 11, 2019
2. Canadian Shipper – June 12, 2019
3. Journal of Commerce – June 11, 2019
4. Halifax Chronicle-Herald (Halifax newspaper) – June 12, 2019
5. News 95.7 (Halifax radio station) – June 12, 2019