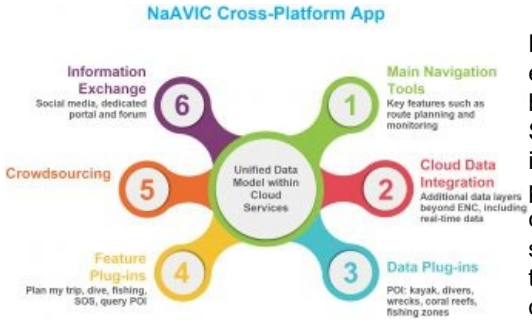
A CLOUD-BASED INFRASTRUCTURE SPECIFICALLY DESIGNED FOR MARINE NAVIGATION

Streaming Cloud-based ENC Data for a Real-time ECS



NaAVIC is a free and downloadable electronic voyage application that goes beyond the traditional Electronic Chart System (ECS) app whereby the data, including the ENC information, does not physically reside within the onboard computer. Instead, all the data is streamed from an up-to-date database that exists in the cloud. The on-demand data delivery model is not confined to conventional chart data. Whilst it includes ENC-derived data as a base layer, it is also designed to take additional data layers. These layers can be user-selected according to their needs to enhance the ECS capabilities. For example, the list can include raster satellite imagery, high-resolution bathymetry, weather radar imagery, predicted tides and currents, as well as real-time weather data streams along with domain-specific and local information. All data is streamed through an open source, open standards-based Nautilus Cloud system.

A Free ECS

The app functions on both Android and iOS devices, and offers a comprehensive range of essential features needed to maintain safety and situational awareness while making navigation easier and more reliable. There is no downloading of data – all data, including chart data, is streamed in real-time from a fully maintained and up-to-date database. The data comes from the Nautilus Cloud, a cloud-based infrastructure specifically designed for marine data. The technology is designed to provide the basis for maintenance and distribution services for any marine data supplier. The Nautilus Cloud adopts a ‘cloud-native’ approach where the technology is built from components designed to run in cloud environments as well as leveraging open standards and open source components throughout. The result is a flexible system with a much greater degree of interoperability. This can include the emerging S-100 framework, harmonized metadata, raster datasets and real-time sources. The NaAVIC ECS operates on up-to-date information from data providers. This can include government agencies looking to make the accessibility to their data more efficient without compromising its integrity. Figure 1 outlines the key features that NaAVIC offers.

Nautilus Cloud Framework

The data powering the ECS is supplied by the Nautilus Cloud, a cloud-based infrastructure for marine data, solutions and services for government organizations, industry and consumers. Nautilus Cloud is an enterprise-grade system which is both flexible and has a much greater degree of interoperability with pre-existing components and multiple data sources. As such, Nautilus Cloud is optimized for import, validation and data management, as well as commercial distribution of marine geospatial data for government organizations, the marine industry and end consumers. Figure 2 illustrates the many additional ECS features that are supported by the Nautilus Cloud framework.

Key Features

One of the key features of Nautilus Cloud is the expansion of data holdings into a much wider family of related geospatial data products. It is designed to handle the many forms of marine geospatial data under the emerging IHO S-100 framework, harmonized metadata, raster, predicted and real-time sources. The modular design allows front-end applications to access the spatial data on any platform, from desktop and mobile platforms to OGC-compliant web services and web map tile services for onward consumption of data by other organizations.

The NaAVIC ECS app takes full advantage of many advanced features provided by Nautilus Cloud making it possible for charting agencies to operate in real-time without the time-dependent updating and distribution process. This also includes being able to use real-

time tides, weather, currents and other oceanographic information to provide more advanced features and data views that otherwise would not be possible. Thus, achieving three important requirements for the ECS: content, quality and updating.

Maintaining Data Integrity

NaAVIC addresses the concern of reliable internet connection by providing a smart, user-controlled data caching functionality. It is capable of automatically caching to ensure reliable data availability. Users, based on their specific circumstances, will be able to set the app to auto-caching the required data ahead of time for a predefined area size. Alternatively, they can interactively define the area to cache before departure. Many users will likely use the app within nearshore coastal areas where modern data networks have the coverage readily available, so caching is an important fail-safe feature.

Enabling

The Nautilus Cloud innovation has the following features:

- A 'cloud-native' approach where the technology is built from components designed to be run in cloud environments.
- A strong integration between data distribution and storage/management.
- A system leveraging open source components as its base technology which utilizes open standards wherever possible to build a low-cost system which is flexible and has a much greater degree of interoperability with pre-existing components.

Engagement – Connecting the Producer and End User

The approach taken is a conscious attempt to connect the user with the producer of nautical data. This engagement between supplier and consumer is something happening throughout the various domains within the geospatial industry. Data holdings are ever expanding and becoming more accessible, and now includes the S-100 framework, as well as harmonized metadata, raster and real-time sources.

The approach facilitates 'pluggable' architecture and thus allows for extensible and customizable data import into the system and future-proofs it for a wide variety of organizations. Additionally, the metadata management sub-system will provide the functionality needed to allow individual customers to easily generate metadata records compliant with their national metadata profiles.

Voyage Intelligent Visualization

NaAVIC and the Nautilus Cloud also aim to support the next generation of Intelligent Visualization technology – the right information at the right time – which adds a new dimension of customization to traditional geospatial data engines. This will make data intuitively useable to end users and, through web services, to onward systems and derived applications.

Sharing the Journey

We are seeing it with land-based journeys and within recreational activities as a whole – people want to share. The desire to share experience comes with the desire to help and benefit from collective experience, particularly of like-minded people, with many people now relying more on social media than the more traditional commercial guides. Social media has facilitated collaboration, coordination and community.

Up until now, the ECS catered to the person controlling all aspects of the vessel, including its navigation. By utilizing a cloud-based approach with data streaming, the NaAVIC ECS enables all members of an expedition to more actively engage in the voyage as well as sharing that voyage to fellow 'marine friends'. It also provides ways for everyone to have a much more enjoyable boating experience, including providing an easy way to monitor the route along with the main navigator, see the basic boat information such as location, speed and heading, and exchange information about various points of interest with friends.

All users get access to community features, which include the ability to post messages, to share pictures, to share location, to record and share voyages, and to add user objects with location sensitive notifications. It also allows community members to effortlessly support crowdsourcing activities by allowing them to use a set of pre-defined icons to capture a variety of items of interest to their specific sub-communities. For example, marking a fantastic new diving spot for the user community is as easy as dropping a marker and the platform will automatically share it with all other users or a selected group, or the info can be kept private if users want to keep their findings to themselves!

Flexible Business Model

Nautilus Cloud's commercial distribution interface assists organizations who need to sell data as part of their operating model. By offering both free and paid access to data, the system gives organizations the ability to switch between free and cost-recovery models as their demands dictate. It allows the substitution of multiple disparate systems which may be already in place, with a system at substantially lower costs for implementation and support.

The system uses a highly standardized data output interface and a comprehensive approach to data integrity which is crucial in the modern marine data environment. By providing open and efficient access to marine data, the system facilitates social and environmental value (e.g. providing easy standardized access for data to be used for marine pollution prevention, alternative energy production and marine research).

Summary

NaAVIC is a free and downloadable mobile ECS that represents a new approach where the electronic chart data does not physically exist within the onboard computer. The app attempts to thrust the sailing experience several steps further with all the features it offers its users. The system provides a flexible business model by facilitating the ability to switch between free and cost-recovery models of data distribution as their requirements dictate.

---

https://www.hydro-international.com/content/article/streaming-cloud-based-enc-data-for-a-real-time-ecs

---