2024 DIGITAL@SEA NORTH AMERICA
FINAL REPORT OF THE CONFERENCE

EXECUTIVE SUMMARY

The 2024 Digital@Sea North America conference was held 08-09 May 2024 at the One Ocean Resort and Spa, Atlantic Beach, Florida, U.S. Organized by the International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA) and the Radio Technical Commission for Maritime Services RTCM, the conference was attended by 67 delegates, representing 12 countries. Sponsorship was provided by 2 firms and 2 Exhibitors. In addition to IALA and RTCM, three organizations supported the conference as identified below. 20 Presenters covered a wide variety of digitalization topics which were grouped in seven sessions.

Session I – Welcome, Introduction, and Keynote
Session II – Regulatory and Industry Updates
Session III – IALA/IHO S-100 Operational, Technical and Training Gap Analysis
Session IV – Fall 2024 IALA/IHO S-100/200 Joint Workshop Update
Session V – State of Navigation Service Digitalization
Session VI – Panel: Transition Priorities and Challenges of S-100 Services
Session VII – Final Report Development & Closing Remarks

In the Closing Plenary Session a draft set of conclusions and recommendations, collected throughout the conference, were presented to the plenary. All participants were provided an opportunity to review, comment upon, modify, and amend the list of conclusions and recommendations. A summary of these appear in Section 10.

1. CONFERENCE OVERVIEW

The 2024 Digital@Sea North America was organized by IALA and RTCM as the third Digital@Sea North America conference and the ninth North American regional version including the preceding ***e-Navigation Underway*** series. The venue for the meeting was the One Ocean Resort and Spa, Atlantic Beach, Florida, U.S. and the conference theme was ***Navigating our Digital Waterways: Evolving Navigation through eNavigation***. Presentations addressed digitalization and implementation plans in the U.S. and Canada by government agency representatives, technology experts, mariners, international coastal administrators, and creators of maritime safety information. The agenda delved heavily into the maritime information landscape from various angles, presenting insights into pertinent trends in both digitalization and the shipping sector that impact North America with a focus on S-100.

We explored diverse facets of digitalization, alongside insights into implementation strategies and perspectives from senior leaders and key stakeholders hailing from the U.S., Canada, and overseas. These stakeholders play pivotal roles in creating, disseminating, and receiving maritime safety information through digital means. The shift from traditional paper charts to electronic formats, including the introduction of S-100 and other innovative products, commands significant attention and necessitates meticulous planning and effective communication for success.

Conclusions and recommendations were generated by the session moderators and delegates through question and answer sessions, workshops and a panel. These are submitted as part of this Conference Final Report for further consideration and dissemination by IALA to the appropriate international and national authorities.

2. CONCLUSIONS

The following set of conclusions resulted from the conference proceedings:

- Harmonization is underway but not complete. (S-100, API's, MRN, MSW, Etc.)
- What is most critical is that the chart on board and the chart on shore are harmonized and use the same names for locations, with the same data, especially for depths.
- S-100 Standards have yet to be finalized, but ECDIS vendors have already started development and testing of new S-100 based products and services.
- Development of new S-100 services requires joint efforts of multiple Government Agencies which complicates their development/testing/implementation and issuance of the required associated rules and regulations. This is further complicated in shared waterways.
- Government Agencies need to plan for transition and delivery of new S-100 based services while continuing delivery of current services ("Dual Fuel") for the foreseeable future for both SOLAS and Non-SOLAS users.
- Participants preferred fully automatic delivery of S-100 services without end user intervention. Additionally, Government Agencies would like to receive confirmation of delivery of S-100 services by end users and are particularly interested in knowing that the delivery system is operating.
- Government Agencies noted the importance of being able to collect data and field observations including weather observations, icing conditions, and marine mammal sightings from mariners. Crowdsourcing was identified as a potential source.
- Implementation of new S-100 based services will require update of associated "Model Courses".
- Authorities and industry will have to articulate the cost and safety benefit to encourage transition and additionally manage the impacts all in the maritime ecosystem.
- The delivery of real time information through digital means is a critical component of managing dynamic changes such as changes to speed regulations in marine protected areas. The

continued diminishment of natural resources such as protected marine mammals will make these capabilities more and more important in the future.

- Internet Protocol (IP) based communications is the most widely available current means for delivering those digital services requiring high bandwidth. The use of RESTful API's seems to be a promising way for Government Agencies to facilitate delivery of digital products and services to industry and the mariner both directly and indirectly in a way that can then be transferred to mariners' ECS/ECDIS over the "last mile".
- There should be provisions for delivering data to air-gapped systems and the use of other bandwidth systems (i.e. VDES and NAVDAT) should address and support Machine to Machine and Machine to Human to Machine transfers.
- Equipment manufacturers should not implement S-100 at the products specification level, but as an overall framework.
- There is no IHO identified end date for the production of S-57 based ENC's and related products.

3. RECOMMENDATIONS

The following recommendations are forwarded for consideration by IALA and are derived from Paragraph 2. Conclusions.

- Updates to S-100 standards should be published periodically and users should be provided with change notices. There should be a means for pertinent entities to be notified of updates to the standards.
- Government Agencies should make S-100 services easily and readily available to all users.
- North American countries and their respective agencies should continue to coordinate efforts related to S-100 development and deployment.
- Renewed emphasis on the development of S-128 to provide end users the ability to validate that they have the most current version of available products. The preferred implementer for this feature is the ECS/ECDIS vendor.
- Develop a means to collect end user feedback on tests of automatic delivery of S-100 information to the end user screen.
- Develop a mechanism to collect user field observations. (Ex. weather conditions, endangered species sightings, and others.)
- Update Model Courses on consuming S-100 information.
- IHO and IALA should provide relevant training on the development of product specification and production of S-100/200 data.
- Market the benefits of S-100 to Ship Owners/Operators.
- IMO should consider adoption of a transition and training plan and timeline for the deprecation of S-57.
- IHO should set an end date for production of S-57 based ENC's.

- IALA should continue to develop products within their remit and provide assistance and resources to sister organizations. Operational versions of all products should be a minimum of edition 2 by 2029.

4. CONFERENCE DETAILS

Instructions for obtaining the conference proceedings and a list of attendees are provided in Annex A to this report. The compressed proceedings file is too large for most email systems, but easily downloaded.

5. FINAL COMMENTS

The ***2024 Digital@Sea North America*** conference was deemed highly successful based on feedback received from the attendees and the Steering Committee members. Much of the positive feedback was a result of the direct interaction of speakers, attendees and other guests during the plenary, newly added workshops, panel, breaks, meals and the reception. All are in favor of continuing the conference, however there is concern regarding overlap with the Digital@Sea International and Southeast Asia conferences. The Digital@Sea North America Steering Committee is evaluating options for 2025 and beyond.

SUPPORTING ORGANIZATIONS

Comité International Radio-Maritime (CIRM) is the principle non-profit international association for marine electronics companies, promoting the application of electronic technology for the Safety of Life at Sea and efficient conduct of vessels; fostering relations between all organizations concerned with electronic systems for maritime navigation and information technology.

International Hydrographic Organization (IHO). The International Hydrographic Organization is an intergovernmental consultative and technical organization established to support safety of navigation and the protection of the marine environment. The mission of IHO is to create a global environment in which states provide adequate and timely hydrographic data, products and services and ensure their widest possible use.

Nautical Institute. The Nautical Institute is an international representative body for maritime professionals, providing a wide range of services to enhance the professional standing and knowledge of its members who are drawn from all sectors of the maritime world.

SPONSORING ORGANIZATIONS

Inmarsat has been powering global connectivity for millions of people, governments and industries when it matters most for over four decades – on land, at sea and in the air. We live in a highly connected global society, where the smart devices we carry everywhere give us constant access to our digital lives. Inmarsat's global mobile satellite communications services and solutions answer the demand for reliable connectivity – wherever and whenever it's needed. We work with our customers to solve their hardest connectivity challenges.. We allow vessels to navigate the oceans safely. We enable wardens to safeguard against forest fires. We support governments coordinating disaster relief efforts. We keep aircraft in constant communication at 35,000 feet. From connected cities, ships and planes to remote IoT operations, our satellite broadband services are transforming whole industries and creating better futures.

ORBCOMM provides a number of services including marine solutions for the smart, connected supply chain. ORBCOMM is a company that uses IoT technology to manage assets worldwide. Their products are used to track,

monitor, and control assets in many industries, including transportation, heavy equipment, maritime, oil and gas, utilities, and government.

EXHIBITORS

FURUNO

TIMEZERO by NOBELTEC

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- End of Report -

ANNEX A – DIGITAL@SEA NORTH AMERICA 2024 PROCEEDINGS

Available for download by registered attendees by

- Log in to www.rtcm.org,
- Selecting the Meeting & Events Tab
- Selecting submenu 2024 Digital@Sea Information
- Scroll down to the blue buttons to download individual components or the entire proceedings as a .zip file
- Additionally, individual presentations may be downloaded within the Day 1 Program and Day 2 links.

ANNEX B – DIGITAL@SEA NORTH AMERICA 2024 PARTICIPATING ORGANIZATIONS

(see attached document)

2024

DIGITAL@SEA NORTH AMERICA CONFERENCE

May 6-10

ATLANTIC BEACH FLORIDA

PARTICIPATING ORGANIZATIONS

AGENCE DE NAVIGATION MARITIME (ANAM)
www.anam.gouv.sn

AIVeNautics Corp
www.aivenautics.com

AMERICAN RADIO ASSOCIATION
www.araunion.org

BERMUDA MARITIME OPERATIONS CENTRE
www.marops.bm

BM BERGMANN MARINE
www.bergmann-marine.com

CANADIAN COAST GUARD
www.coast-guard.gc.ca

CIRM
www.cirm.org

CLEAR SEAS
clearseas.org

EUROPEAN UNION AGENCY FOR THE SPACE PROGRAMME (EUSPA)
www.euspa.europa.eu

FEDERAL COMMUNICATIONS COMMISSION
www.fcc.gov

FREQUENTIS USA INC.
www.frequentis.com

ESRI, INC.
www.esri.com

FURUNO FINLAND OY
www.furuno.fi

FURUNO USA INC
www.furunousa.com

GME PTY LTD
www.gme.net.au

More information

https://www.rtcm.org/2024-digital-sea-north-america-conference

2024 DIGITAL@SEA NORTH AMERICA CONFERENCE

May 6-10

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PARTICIPATING ORGANIZATIONS

IALA - International Association of Marine Aids to Navigation and Lighthouse Authorities
www.iala.org

ICAN INC.
www.icanmarine.com

ICOM AMERICA, INC.
www.icomamerica.com

IMANNA LAB INC
www.imanna.com

JOECEL ENGINEERING AND CONSULTING LLC
joe@joecel.com

MARINE EXCHANGE OF ALASKA
www.MXAK.ORG

KOREA RESEARCH INSTITUTE OF SHIPS AND OCEAN ENGINEERING (KRISO)
www.kriso.re.kr

MARITIME PILOTS INSTITUTE
www.maritimepilotsinstitute.org

MARINELABS
www.marinelabs.io

MINISTRY OF INFRASTRUCTURE AND WATER MANAGEMENT
www.government.nl/ministries/ministry-of-infrastructure-and-water-management

NET FORCE LLC
www.enetforce.com

NOAA NATIONAL OCEAN SERVICE - OFFICE OF COAST SURVEY
www.marinenavigation.noaa.gov

NOBELTEC
www.mytimezero.com

ØRSTED WIND POWER A/S
www.orsted.com

REC, INC.

More information

https://www.rtcm.org/2024-digital-sea-north-america-conference

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PARTICIPATING ORGANIZATIONS

ROSE POINT NAVIGATION SYSTEMS
www.rosepoint.com

SAAB AB
www.saab.com/products/security/maritime

SAAB AB (PUBL) TRANSPONDERTECH
www.saab.com/products/security/maritime

SERCO, INC.
www.serco.com/na

SEV1TECH
Sev1Tech.com

ST. LAWRENCE SEAWAY MANAGEMENT CORP.
www.grandslacs-voiemaritime.com/fr/la-voie-maritim

STERNULA A/S
www.sternula.com

TRELLEBORG - NAVIGATION AND PILOTING
www.trelleborg.com/en/marine-and-infrastructure/products-solutions-and-services/marine/navigation-and-piloting

U.S. COAST GUARD HEADQUARTERS
www.gocoastguard.com

U.S. COAST GUARD HEADQUARTERS - USCG OFFICE OF BOATING SAFETY
www.uscgboating.org

U.S. COAST GUARD OFFICE OF C5I CAPABILITIES
navcen.uscg.gov

U.S. COAST GUARD RESEARCH AND DEVELOPMENT CENTER - RDCEN
USCG RDCEN Website

More information

https://www.rtcm.org/2024-digital-sea-north-america-conference

2024

DIGITAL@SEA NORTH AMERICA CONFERENCE

May 6-10

ATLANTIC BEACH FLORIDA

PARTICIPATING ORGANIZATIONS

UK HYDROGRAPHIC OFFICE

WARTSILA NORTH AMERICA, INC.

www.wartsila.com

WSDOT- FERRIES DIVISION

wsdot.wa.gov/travel/washington-state-ferries

More information

https://www.rtcm.org/2024-digital-sea-north-america-conference

ANNEX C – 2024 Digital@Sea North America Conference
Final Report
Workshop – Session 3 Results

For Mariner, Captured Feedback **Submitter (Dave, Christian, Natasha or Ed) Dave L.**

- Full Replacement of existing MSI
- Duplicate delivery methods make it more difficult "Dual Fuel"
- Catalog of products --> Both S-IXX & traditional services
- Must have multiple delivery methods and data formats
- JNIC should act as a "RENC" for N/A
    - --------> API ---> Standardized JSON
    - -------> Adopt maritime standards; E.G. WGS-84/N88
- TRNG "User Focused" ---> S100 for the maritime ship owner
- Establish public/private partnerships
    - ----> Establish dialogue with industry
- Private/Industry Developed S-100 products: -Governance? -Validation?
- Harmonization of classification societies relate to TRNG
- No maritime resource S-IXX PS
    - E.G. Fishing areas ----> must be dynamic
- Regional products specified to environment and mission
    - ----> Must be harmonized to fullest extent
- JNIC should be a hub for MSI intake
- E.G. "Sub cable has been installed here"
- JNIC must provide API for industry to pull what they want and when they want.

Group - Christian

What should JNIC Provide Mariner?

- One Stop shop, regardless of class (SOLAS / non-SOLAS), It should include marine information from govt and quasi-govt (e.g. St Lawrence Seaway) sources.
- Discernable authoritative source
- consistent user interface (as much as possible)

What should JNIC Provide Industry?

- Partnership and Groundwork for ECS/ECDIS providers to consume data and begin to automate transfer to mariners (final mile)
- Collaboration w/ govt for dissemination of data by other means (e.g. AIS & VDES)

What should JNIC Provide National Authorities?

- Monitoring of health of authoritative source data feeds
- harmonization within shared waterways (e.g. great lakes)

- confirmation of data receipt to track failures and to learn how mariner behavior is affected by various products.

How should JNIC services be provided?

- Satellite
- LTE and 5G
- AIS
- VDES when available

How effective are websites?

- not sure how effective websites are, but they are currently available transitional solution.
- The goal should be automation with as little "muscle movement" and action by mariner as possible, one reason why ecs/ecdis providers is so important.

Rest API?

- Seen as very promising.

How/when do email systems work?

- They are ok for now in transition period, as one form of automation.
- we don't know if mariner listened to radio for BNM, but we can know if they subscribed to and received an emailed eBNM
- On the negative side: emails are not integration into any other nav info system and require manual intervention and action by mariner.

Other JNIC delivery options not considered?

- A shared GIS portal (portrayal) that combines all available data layers managed by JNIC from various sources that can be used for shoreside portrayal and discovery.

Group: Ed W.

- **For Mariner**
  - -S100 Products
  - -SOLAS is different than others due to cyber security "encryption" need
  - -Sub. SOLAS can be fully serve by JNIC
  - -Make chart updates simpler for light commercial/rec. user
  - -Shoreside updates from one box
  - -JNIC could facilitate data visibility and discoverability
  - -Determining user priorities
  - -Validate/Resolve conflicts in data from the multiple sources
- **For Industry:**
  - -Single source of data
- **National Authorities:**
  - -Gov. Constraint - replacing is not allowed if authenticity markers are not carried forward
  - -Port closure data
- **Who should host S-128 to resolve discoverability?**
- **Delivery:**

- -Suggestion is that discoverability is important
- -NEX/Internet is ok but other means such as AIS/ASM's/VEDS
- -Must decide on level of validation/authentication
- -Industry should lend delivery (delivery could be beyond government scope)

- **Mariners (Cont.):**
  - -Different products are needed for different types

Group: Natasha M.

- Training
  - Anecdote (Proximity Sensors Dictate Action)
    - Learning to trust personal sense as opposed to screen.
- Operational
  - Safety Info - @ no cost benefit/production cost analysis
- Training
  - Change Mgmt:
    - -GOVT - Data Org.
    - -Industry should lend delivery (delivery could be beyond government scope)
    - -Printers
    - -Benefits/Dollars
    - -Efficient routes/fuel
    - -Ports
    - -Traffic Mgmt
    - -Just in time
    - -HO (phasing out/training tools)
- Training
  - Research Abilities:
    - -Validating is different for younger generations
      - Direct to look outside
- Training
  - IMO - Model Courses
    - -IALA ---> paper on TRNG considerations
- Operational
  - Adequate Coverage
    - -Transit traffic
    - -major ports
    - -back-up
- Technical
  - Manufacturer
    - -Cost of product dev.
    - -Common parts
    - -Cost of data
- Operational

- Cost of data: Consumer vs shipping company scale
- Technical
  - 2029- Mandate Hardware will be necessary
- Operational
- Technical
  - Data Capacity
    - -Push/Pull types of data
- Operational
  - Critical Considerations
    - -type of vessel - filter
    - -Avoid sensory overload
    - -Only want specific data
    - ---> more accessible details and background
    - -GUI/Text interface aspects
- Training
  - -Operators
    - Intuitive
    - Language barriers
    - Standard colors
- Technical
  - Meta Data on updates ---> S-128
    - -Validity of report
- Training -Operational
  - -research on human interaction with a device
    - "Safe Boater of the Year Award" for most valid reports
  - -Multiple reports
  - -Timestamp - when?
  - -Tiles -- Voyage at different times
    - -->without downloading; just the changes identified
  - -Pushing only change
- Technical
  - -Download mechanism is important
    - -VDES --- smaller bandwidth
    - -Big changes could take longer
    - Automated Date (verification/certification)
    - Algorithm -- triage/metrics
    - WAZE Model -- Expiry Date
- Operational
  - Communication
    - -layers/tiers: Gold/Silver/Bronze
    - -SOLAS/non-SOLAS
    - -commercial/Rec.

- Operational
    - AIS
        - -tiles
        - -how to select what is required and delivered?
- Operational
    - REC --- Advise of wildlife
        - Example: Whale
        - -Social Media
- Training
    - Training for Mariners - maritime academies & manufacturer
        - Trust Information
        - -Generational
        - -Tools
- Training -Operational
    - Change lead/follow
        - Investment - Value added
        - Proof of value - benefit
        - Paper Chart/ENC (same time)
        - -Crowd sourcing (noted on paper charts not shared)

ANNEX D – 2024 Digital@Sea North America Conference
Final Report
Workshop – Session 4 Results

Group: Dave, Elvind, & Christian

Do symbols achieve goals?

- We have adv. notice & proposed that we need a "this changed" symbol.
  - Symbol: Circle with small "DC" fixed in top left, outside of circle] <-- symbol is too similar to existing symbols (radio)
  - Having "quick view" (Nature of discrepancy) always on screen will be too much info.
  - -Some mariners might want more symbol options
    - Much higher training load.
  - -Symbols do not have agreement yet

How long do agencies maintain Legacy (S57, analog) Products?

- At least 5-10 years of operation of S-XXX replacement for SOLAS; perhaps % of SOLAS fleet
- IHO propose equivalency of S-XXX products to current SOLAS requirements -- establish milestones for transition but not dates yet

How can IHO portrayal SME's provide support for development of S-2XX products?

How can IALA inform IHO of portrayal advice for ATON or ATON Admins to IHO?

- Authoritative source should have say in portrayal
- Isolation has failed process before.
- Now that WX, NAV, MSI chart are all competition, IHO cannot work in isolation.
- Need CIRM & IEC to identify gaps
- S-164 interoperability needs its own workgroup at IHO with all parties after S-98 & S-164 finished in 2025.
- Need to have $$ (from IHO; from IALA) to pay for someone to focus on and do actual work -- Collateral Duty Volunteer is not enough.

What is the preferred method of delivery?

- Depends on the user.
- IP comms to support bandwidth needs.
- IP comms need to be part of IMO/IHO milestones for CANX legacy products.
- Gout makes it available (industry)
- -->Vendor uses whatever method works best with their customer base
  - -->But Gout cannot forget inherent duty to make safety info available and accessible to public
  - --E.G. United States does it now because mariner has to have internet to get light list on NAVCEN website.

- -Amendment at MSC 108 could allow focus to be connected to internet

What is the preferred method of teaching mariners of new symbols?

- -Chart 1 inclusion
- -->Needs to be IHO Lvl version
  - ➔ Could be S-XXX product in itself or part of S-98

Group: Natasha

- PC - How long? How to track? How many changes at once?
- Status - Plan/En route moves in for a time.
  - -->Disappears
  - -Need to see
  - -Characteristic change of a fixed vs ALS
  - -Timing -- Competent authority to decide
  - -Snapshot -- refer to meta data
  - -Training on notification process
- Spec. for manufacturer
  - -Cannot ignore alarm or minimize sound
- Alarm alert fatigue
- Time/Date Stamp - repeat information
- Several different alerts to manage intervent by human.
- Permanent Change?
- 2D display to 3D
- Superusers -- confidence loop
- Level training based on role / user group.
- Coast Guard -- test bed.
- Cruise ships
  - -pushing env.
  - -how to make it work?
- Heads up display
- Scenario with symbols and meanings
- Simulation
  - -Video Game and get feedback
  - [S7] <---> [101]
- Manufacturer
  - -Hybrid System
    - -3 yrs (2026- 2029)
    - -Compatible but choose only 1
  - -5 years?
    - -Training?
    - -2029?
  - -Not known by the general public

- -Training from manufacturer schools
  - -Consistency in standard
    - ➔ -Green/Yellow/Red
- -Globally - same as S-57

- **Implementation:**
  - 3 Key Factors

1. Savings/Easier on the mariner
2. Mandated
3. Quantifiable safety benefit

- -Extra Cargo - UKC
- -Maritime Academies as soon as possible
  - -Manufacturer
    - -Have started
    - -Timelines important available & verifiable
- -Delivery - as automatic as possible