

Mariner's Workshop

Digital Seaway Breakout Session

The National Research Council (NRC) held a breakout session to socialize their internal research plan: The Digital Seaway. The intention was to validate NRC's research direction and solicit collaboration in areas of mutual concern.

Session:

NRC's internal research vision (Digital Seaway) was presented to the group. The concept brings together NRC's expertise in marine engineering in a holistic way by focusing on the future of Canada's longest, and most economical inland waterway. NRC's role is only one sliver in a larger picture. Policy development/Regulations, large-scale demonstration projects (and associated funding), training, etc. are all necessary for the realization of a Digital Seaway. Collaborations are critical for success.

NRC's role is to support the development of technologies with industry, provide evidence for other government departments to develop policies, and the advancement of knowledge. The NRC would like to provide the necessary science and technology for the broader federal development. However, there is no current mandate under any one federal department.

In order for Canada to truly realize a Digital Seaway, collaboration is essential across the technology value chain (academia, other government departments, and industry). NRC has capacity in the following areas, and has a desire to partner where possible:

- Ice and harsh environments
- Work being done to support the development of maritime autonomous surface ships (MASS)
- NRC's capability in developing the next generation of marine transportation decision-making tools
- Real-time monitoring, new sensor technologies
- Suite of predictive models (AI and physics-based)
- Integration & analysis of large amounts of data to support planning and real-time operations and decision-making using AI platforms
- Cyber by design

Topics for which NRC has active projects, or projects are in various stages of development:

- Reconfigurable Control Centre for Operations and Cybersecurity
 - Working collaboratively to develop the proper multi-informational tools for operation and control of autonomous systems
- Improving ETA at the Port of Montreal (currently ~ 70 hours)
 - Integrating ice forecasting, currents, draught, ship performance, etc. in different conditions
- Medium term (better than 30+ days) ice freeze-up and break-up using AI
 - Avoidance of stranded assets within seaway before winter shutdown
- Situational awareness

- Development of a tool that would situate vessels based on optical recognition of surrounding to overcome poor GPS coverage
- Autonomous cargo vessels/barges to support short sea shipping
 - Integration of data to investigate use of autonomous barges, operating in convoy in ice-covered waters

Discussion:

It was clear within the first 15 minutes of the discussion, that the Digital Seaway as NRC presented, was too far in the future for discussion. The conversation turned to a need to integrate the various relevant organizations from the mouth of the St. Lawrence to the tip of the Great Lakes.

Attendees of the session spoke of a lack of ability to predict ship movements in a highly variable environment; natural and asset based. There was also discussion related to how each organization is very knowledgeable about their own systems (technical) and jurisdiction (human relations), but the links between systems and jurisdictions are either weak or non-existent. Should there be any effort to integrate those systems, interoperability is necessary as is a need to factor in chain reactions.

It was suggested that one traffic management tool would need to be in place. An organization without direct economic benefit to the management of traffic would be desirable if it was properly developed. No consensus on who should be responsible for oversight for such a tool. NRC could act as conduit to developing the proper evidence via technological systems to support such an idea. Any such effort should ignore intermodal transportation at the beginning, however, it would be important to know how land based systems interoperate (ITS reference architecture).

- Stakeholders to be engaged in a project of this sort include, but are not limited to:
 - Shipping Federation of Canada
 - Chamber of Marine Commerce
 - Pilotage authorities
 - Federal government (Canadian Coast Guard; Transport Canada; Innovation, Science and Industry)
 - US Government
 - Provincial Governments
 - Indigenous Governments
 - Shipping Companies
 - Ports/Port Authorities
 - Researchers (government, private sector and academic)
 - Cybersecurity experts

Further, lessons should be learned from the EU's Sea Traffic Management Sea Traffic project, which connects and updates the maritime world in real time (click [here](#) for more information).

Next Steps:

NRC to connect with participants to initiate a project that can start to connect different systems.