The Canadian Experience

E-Navigation Underway 2013 - Copenhagen
Overview

- Canada’s Vision
- Overall Principles
- Historical Development
- Key Accomplishments
- Development & Implementation Process
- Concept of Operations
- Moving Forward
- IMO vs Canada process
Canada’s Vision

“Widespread use of e-Navigation in Canada by mariners and shore authorities for greater marine safety, security, efficiency and environmental protection.”
“Accurate and reliable navigational information [provided by electronic means] used by vessels and authorities ashore to support effective decision-making, minimize human error, and enhance communications.”

Groundings were the most frequent type of shipping accident reported in Canada during 2005-2009

The MV Clipper Adventurer grounded near Kugluktuk, Nunavut, in 2010

Photo: The Canadian Press (Internet)
Six principles apply to the development and implementation of e-Navigation in Canada:

1. Safety-of-Life, Property, and the Protection of Marine Environment
2. Applicable to all Categories of Mariners
3. Cooperation with the International Community
4. Contribution to Marine Transportation Efficiency
5. User Consultation
6. Inter-departmental Coordination
Bottom-up approach: CCG along with its partners first consulted mariners to identify their needs and priorities.
A number of e-Navigation initiatives have already been conducted in Canada to improve marine safety, security, and efficiency.

Initiatives were successful because of the collaboration of various key players:
- Port Authorities
- Government Agencies
- St. Lawrence Seaway Corporation
- Canadian Maritime Pilots Association
- Shipping Industry
- Private Sector
**SmartBay – Placentia Bay**

- AIS buoys
- Seabed mapping view
- Real-time and archived data available to develop weather and sea-state forecasts
- Website with public access

www.smartbay.ca
• Continuous monitoring of bridge heights using tide gauges and differential GPS.

• Port of Halifax calculates the air gap clearance of vessels and provides info to pilots.

• In addition, an AIS unit is located at the center of the bridge for better positioning of ships.
Marinfo on the St. Lawrence River

- Use of common navigation software shared by pilots and Coast Guard using Portable Pilot Units (PPU’s).
- Pilots download up-to-date operational data from website on the state and conditions of the waterways:
  - Notice to Shipping (broadcast and written)
  - Shoals and Bottom surveys
  - Buoy-tending
  - Icebreaking
  - Coast Guard Fleet operations
- Real-time water level info broadcast via AIS message.
AIS Messages on the St. Lawrence Seaway

Each lock within the Seaway broadcasts real-time information on:
- Lock order
- Water levels
- Weather data including visibility

Information is available via AIS Messages and from the Internet (i.e., both ‘push and pull’)

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Avadepth in the Pacific Region

Website provides info to mariners:
- Determination of maximum draft and best sailing times.
- S-57 ENC updates
- Forecasts of available water depths
- Water current flow

Available to river pilots, Port Metro Vancouver, and shipping companies
Development & Implementation Process

2008/09
CCG Vision / Strategy

2009/10
User-Needs Study / Consultations

2010/11
Required Services Matrix (annex A)

2010/11
Vision for Canada

2011/12
Gap Analysis (annex B)
National e-Navigation Webpage

2012 +
Definition of Concept of Operations
National Implementation Plan
National Portal
Communication Framework
Standardization of Data Sources & Services
National AIS Policy
Concept of Operations

• User driven !!
• ‘Open Government’ concept
  • Concentrating our effort to offer services and data in electronic format for specific Maritime Service Portfolios
  • Data available 24/7
• One national portal
  • Single point of access
  • Confirmation of ‘official’ information
  • Posting info, data and links
• AIS Network
  • Broadcast data and up-to-date information
• Technology / tools to be developed by Industry
e-Navigation will be a reality in Canada and abroad, sooner or later…

but mariners in Canada want e-navigation NOW

• During consultations, mariners communicated that the development and implementation process at the international level is far too complicated and cumbersome.
  – Canadian mariners believe we can make it happen -- now, without waiting for IMO and IALA.

• Canada intends to work in parallel - moving forward to implement e-Navigation, but will continue to work on the international side to ensure that our system is in line with international direction.
## IMO vs Canada process

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<th>Year</th>
<th>IMO</th>
<th>Canada</th>
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| 2006 | - e-Nav concept first introduced  
- draft Strategy for Development and Implementation of e-Nav started | e-Nav Workshop of Federal Govt. Stakeholders  
- initial scope/development of Canadian e-Nav Strategy; CCG becomes lead agency |
| 2007 | - e-Nav WG and CG formed to define the scope of e-Nav, and to develop an e-Nav Strategy, implementation framework, and work program | Canadian e-Nav User Needs Survey  
- used same questionnaire as IMO, but included direct interviews with both providers & users |
| 2008 | - Germany & Canada develop/conduct Worldwide e-Nav User Needs Survey | Required Services Matrix  
- using results of User Needs Survey, identified what e-Nav services are required for the main navigation areas in Canada |
| 2009 | - “Strategy for Development and Implementation of e-Navigation” approved  
- review shipboard and shore-based user needs  
- identified functions and services to support shipboard and shore-based user needs | Gap Analysis  
- describes what are the current ‘gaps’ in electronic services that need to be provided in order to achieve e-Nav throughout Canada |
| 2010 | - e-Nav Gap Analysis process starts  
- review and consolidate process of completing initial Gap Analysis | “e-Navigation in Canada”  
- inter-departmental vision/strategy document approved |
|       | - conduct cost-benefit and risk analysis  
- investigate overarching e-Nav architecture  
- draft outline for final Strategy Implementation Plan | Concept of Operations drafted; includes 3 phases:  
- Voyage Planning  
- Voyage  
- Post-Voyage |
| 2011 | - continue initial Gap Analysis  
- conduct cost-benefit and risk analysis  
- investigate overarching e-Nav architecture approved  
- continue development of detailed architecture, MSPs, usability guidelines, risk control options, and guidelines for harmonization of testbeds | Maritime Service Portfolio (MSP) → National Portal  
- transition current e-Nav related services into a MSP that is provided via a National Portal |
| 2012 | - Gap Analysis finalized; continue conducting cost-benefit and risk analysis  
- overarching e-Nav architecture approved  
- continue development of detailed architecture, MSPs, usability guidelines, risk control options, and guidelines for harmonization of testbeds | Development of an National AIS Policy  
- determine what, how, and where e-Nav data and services will be provided via AIS. |
| 2013 | - continue current work program  
- develop detailed ship and shore architecture  
- draft Strategy Implementation Plan | Align national e-Nav services with IMO e-Nav Development and Implementation Plan |
| 2014 | Complete the process for Development and Implementation of e-Navigation | |
Next Steps

- CCG will create a national e-Navigation portal for Canada
- Continue to work closely with international organizations to develop and coordinate e-Navigation components
  - Equipment standards, regulatory framework, training, technical architecture, common maritime data structure, operational policies, communications technology, how to portray e-Nav information, etc.

- Canada’s success to date, has been due to collaboration and communication with key partners and stakeholders.

Continued progress is dependent on frequent communication with stakeholders.

- Canadian Maritime Advisory Committee (CMAC)
- 2013 Mariners Workshop (6-7 Feb 2013, Vancouver)
- National Marine Advisory Board (NMAB) – Sub-Comm on e-Navigation
Governance

**Interdepartmental Committee**
- Share and agree on high level directions, documents and vision.
- Membership: CCG, TC, CHS, EC, CBSA and St.Lawrence Seaway.
- Meets twice a year

**NMAB Sub-Committee on e-Navigation**
- Facilitate the development, orientation and prioritization on the implementation of e-Navigation. Provide strategic directions.
- Membership: CCG, TC, CHS, EC, pilots, shipping industry and ports.
- Meets twice a year

**Canadian Coast Guard**
- Develop national directions and objectives
- Prepare regular reports
- Lead implementation of national initiatives in collaboration with EC, CHS and TC
- Make recommendations to sub-committee & undertake tasks requested by the sub-committee

**Regional Committees on e-Navigation**
- Review regional needs and priorities. Oversee regional consultation with stakeholders and implementation of initiatives.
- Membership: Marine industry, navigators, pilots, ports and CCG.
- Meets on regular basis
Stakeholders

Federal Government
- Canadian Hydrographic Service
  - Charts updates, Hydrological data
- Transport Canada
  - Route, Traffic separation, Security
  - Regulations
- Environment Canada
  - Meteorological, Hydrographic & Ice data
- St. Lawrence Seaway Management Corporation
  - AIS info, Lock orders
- Canadian Border Services Agency
  - One stop reporting
- DFO Science
  - Restricted areas, Fish farms
- Canadian Coast Guard
  - Aids to navigation, Vessel Traffic Services
  - Restriction on navigation, survey results, Search and Rescue, Environmental Response
- Port Authorities

Maritime User Community
- Shipping Companies
- Pilots
- Masters and mates

Private Sector
- Navigation equipment manufacturers
- Software and equipment developers

International organisations
- IALA
- IMO
- USCG
## Annex A - Canadian e-Navigation Required Services Matrix

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<th>Navigation Safety Services</th>
<th>Category</th>
<th>Data to be available electronically</th>
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### June 2032

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**Note:** Rate → Rank → Prioritize by Navigational area
## Annex B - Gap Analysis – Ice charts (example)

### Canadian e-Navigation Users Needs Study → Required Services Matrix → Gap Analysis

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