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e-Navigation on the St.Lawrence river in Canada: Past, Present and Future

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e-Navigation on the St.Lawrence

1. Background & Marine user requirements
2. e-Navigation concept & test bed
3. Partnerships
4. Test bed & results
5. St.Lawrence e-Navigation phase 2
6. Conclusions, WIFM



Electronic Navigation on the St.Lawrence

1. Background & initial user requirements

★ Improve onboard navigation safety:

- ◆ Electronic chart display
- ◆ Navigation Notices (waterways conditions, shoals emplacement, buoys positioning...)
- ◆ Own ship position on the chart
- ◆ Water level (tide) information (observed & forecast)
- ◆ Other ships movements (vessel traffic)

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Electronic Navigation on the St.Lawrence

1. Background & Marine user requirements

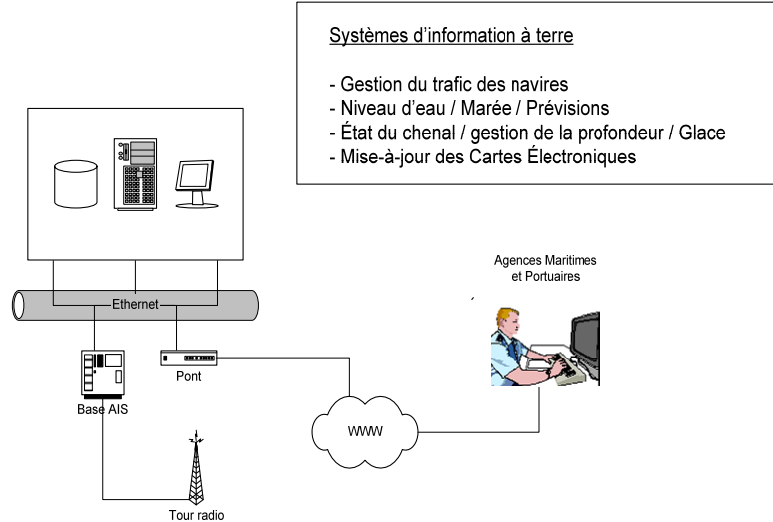
★ Optimize vessel transit

- ◆ Night winter navigation, according to available information and system
- ◆ Display detailed depth and bathymetry
- ◆ Optimize use of available water level for vessel transit
- ◆ Review applicable rules for waterways usage including Under Keel Clearance (UKC)

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2. e-Navigation test bed, concept of operation



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2. e-Navigation concept & test bed

★ E-Navigation test-bed (2006-08):

- ◆ Use of portable pilot units (PPU) with portable GPS
- ◆ Updated with most recent chart & navigation data
- ◆ Connected in real time to onboard AIS pilot plug for vessel data and shore data update

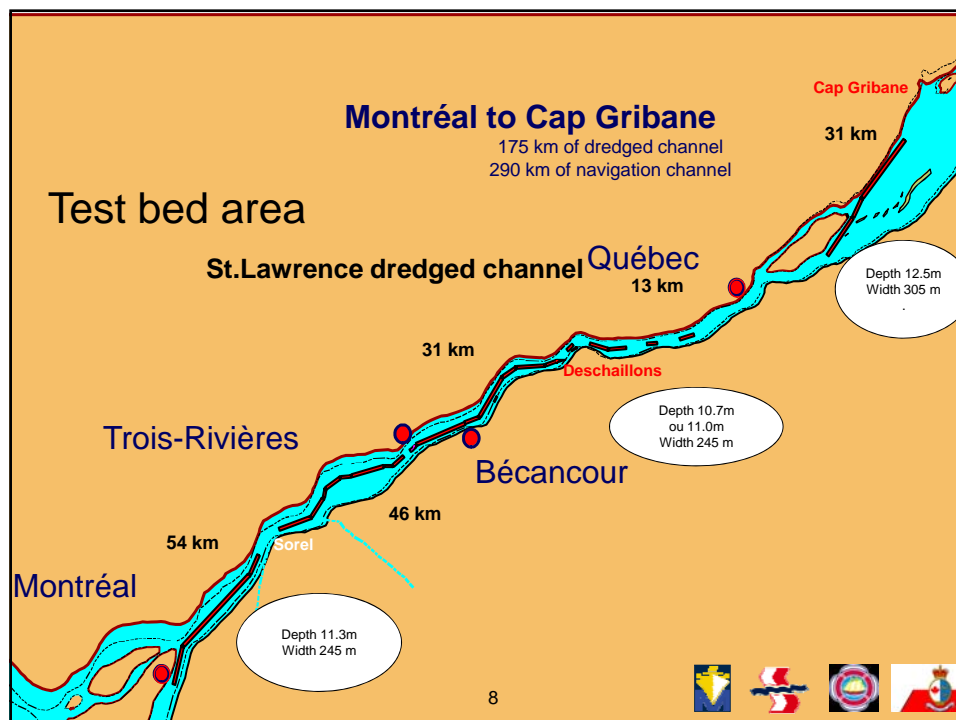
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3. Partnerships, this project was only possible because the users have a **common interests and purpose:**

- ❑ Joint financing and management between the Port of Montreal, the Canadian Coast Guard Saint Lawrence River Pilot Corporations (Central and Lower);
- ❑ Partnership project realization with:
 - ★ Canadian Hydrographic Services supplied on-line Electronic Chart (ENC) service in S-57 format

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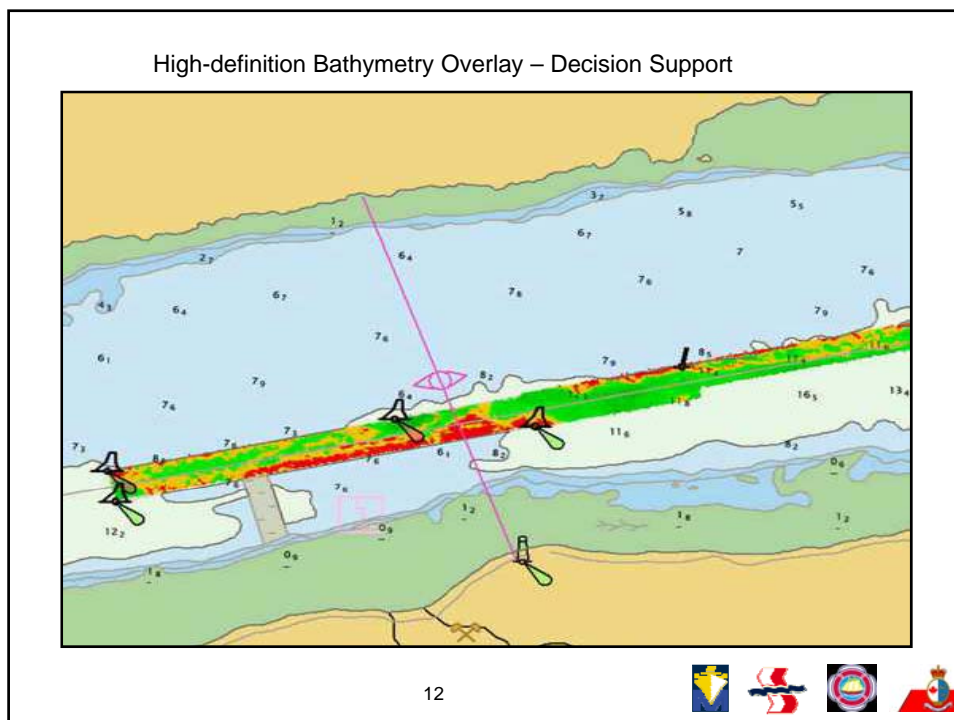
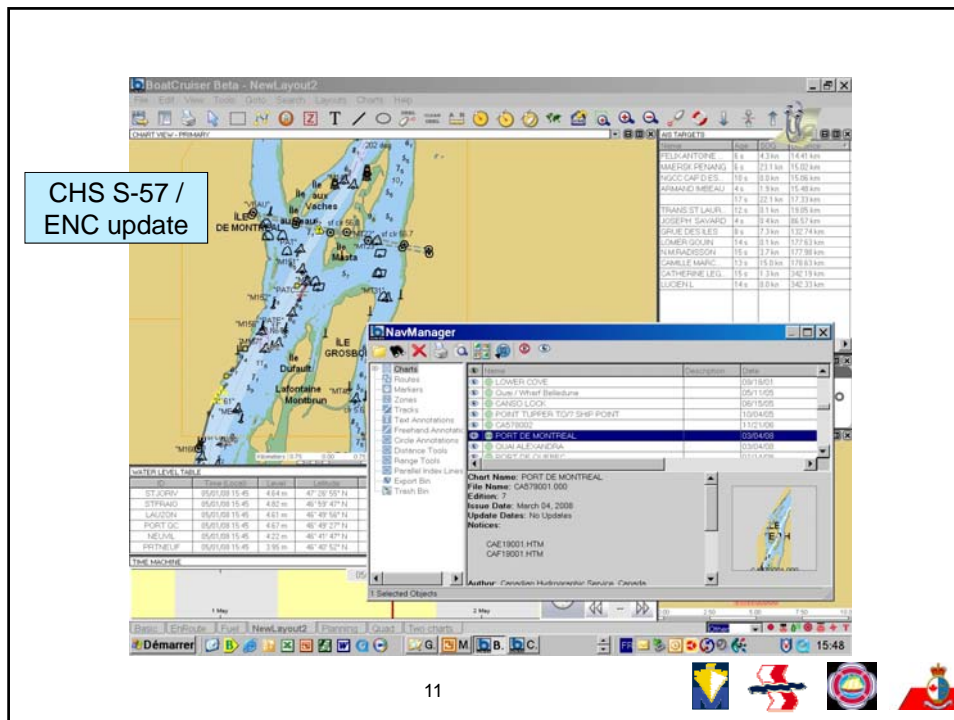


4. Test bed results

☐ River and waterways bathymetry:

- ★ Actual services:
 - ◆ CHS supplied ENC's and weekly updates on their web site
 - ◆ CCG publish and daily updates the status of the waterways and notices to navigation (e.g., shoals in PDF format)
- ★ Test bed results:
 - ◆ Automatic and integrated S-57 electronic charts update service directly into the portable unit (example)
 - ◆ Shoals notices publication in GML digital format on www.marinfo.gc.ca and automatic download in the portable unit (example)

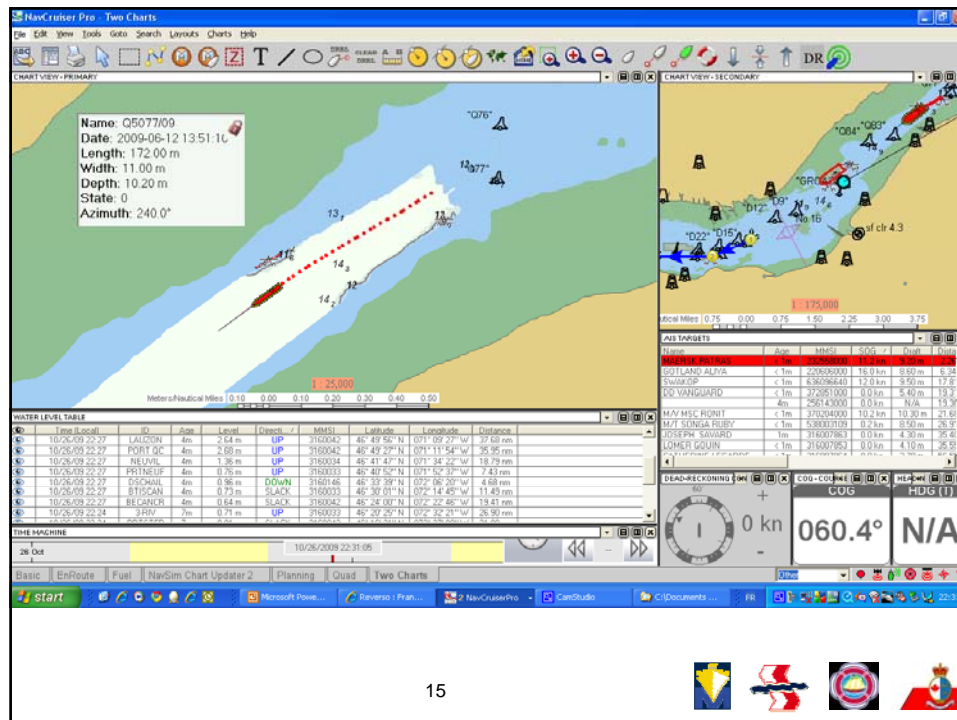




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CCG Notices / Shoals update

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4. Test bed and results

❑ Connexion to vessel equipments and navigation condition update:

✱ Test bed results:

- ✦ Use of the vessel AIS pilot plug to obtain position (DGPS) and azimuth (Gyro)
- ✦ Ship-ship communication capacity to receive surrounding traffic information (VHF range)
- ✦ Ship-shore communication capacity to Tx and Rx shore information through AIS link
- ✦ Use of the AIS regional network to broadcast CHS SINECO water level (via AIS ASMs)

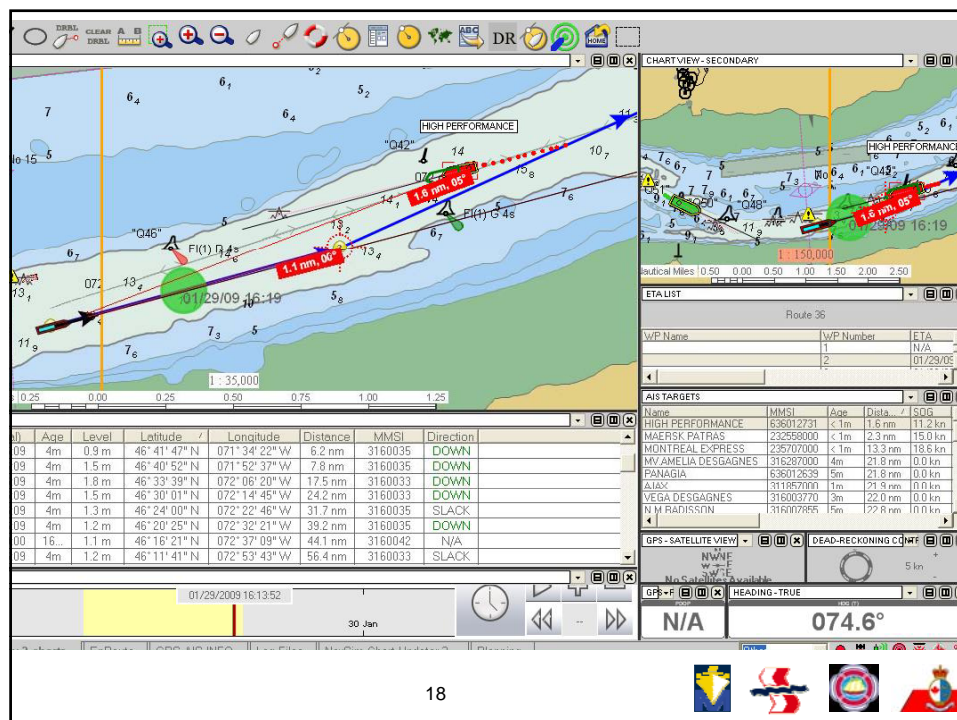
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At conclusion of phase 1 some user needs that still need to be addressed

★ There were some additional issues to address in phase 1, this created the opportunity for phase 2:

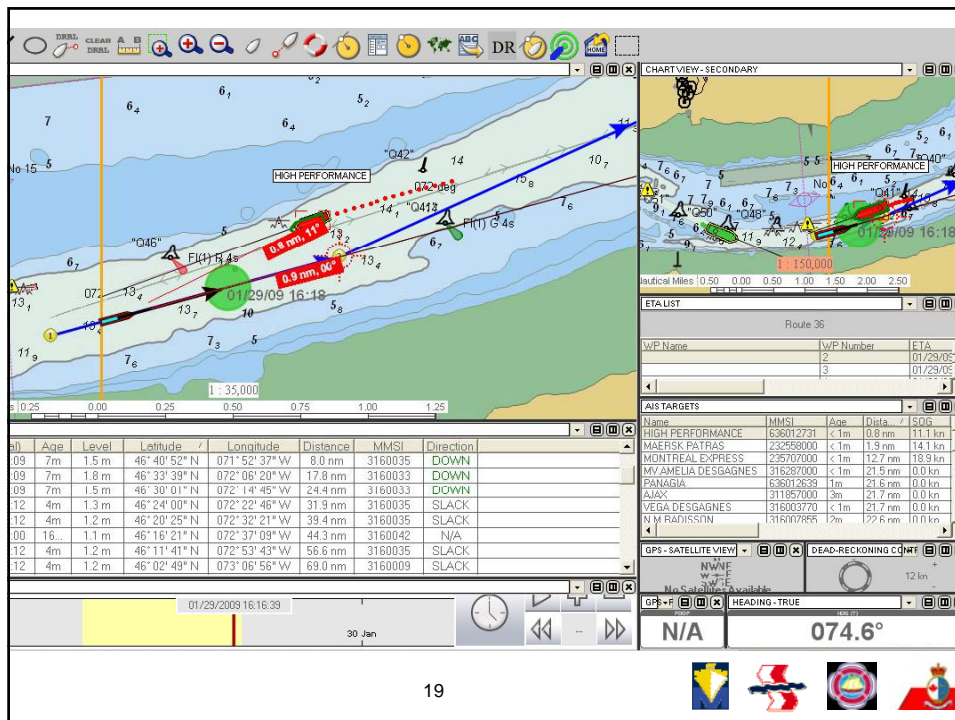
- ◆ No real communication network
- ◆ Air draft, static yet it is in a dynamic environment
- ◆ Post-panamax navigation
- ◆ Less than optimal projection tools

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5. Saint Lawrence e-Navigation phase 2:

★ requirements highlights:

- ◆ Tide forecasts, tidal-related passage windows
- ◆ On-going implementation of default settings
- ◆ High density bathymetry
- ◆ UKC calculation and monitoring
- ◆ **High speed cellular (G4-LTE technology)**
- ◆ **Air draft issues (e.g., overhead powerlines and bridges)**

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6. Conclusions

- ★ e-Navigation has gone from concept to practice
- ★ Both Pilot Corporations now use PPU's
- ★ Technical solution now allows for new ways to broadcast and transfer marine data (i.e. AIS-ASM)
- ★ **Partnership** between Port of Montreal and the saint Lawrence pilots was essential to make this project a reality and a success!

