Accidents will happen...
## Risk reduction rate

<table>
<thead>
<tr>
<th></th>
<th>Flow Management by flow optimisation</th>
<th>Flow Management by enhanced monitoring</th>
<th>Dynamic Voyage Management by route exchange</th>
<th>Weighted combined rate</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Collisions</strong></td>
<td>58%</td>
<td>5%</td>
<td>52%</td>
<td>81%</td>
</tr>
<tr>
<td><strong>Groundings</strong></td>
<td>6%</td>
<td>64%</td>
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<td>69%</td>
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Source: *ML2 D2 FSA – Formal Safety Assessment*
Ja, jeg hørte ikke navnet. Vet du hvilken båt som kommer mot oss her?
Da går vi for nærme blokkene.
Det kan være en krigsskip.
Jeg traff den.
Intention
FU SHAN HAI
Left Ventspils in Latvia on 30 May 2003 at 1620 hours. Destination: China

Course 235°
speed 12.7 kn

Collision 31 May at 1218 hours

Course 281°
speed 13.8 kn

National

FDYNIA
Left Gdynia, Poland on 30 May 2003 at 2325 hours
Destination: Hull, UK
The map shows the shipping routes of two vessels:

- **FU SHAN HAI** left Ventspils in Latvia on 30 May 2003 at 1620 hours. Destination: China.
- **GDYNIA** left Gdynia, Poland on 30 May 2003 at 2325 hours. Destination: Hull, UK.

The vessels are indicated with markers on the map:
- **Course 235° speed 12.7 kn** for **FU SHAN HAI**
- **Course 281° speed 13.8 kn** for **GDYNIA**

A note on the map indicates a **Separation lost** event.
Reconstruction incl. approx. positions for every minute in the period from 1200 to 1219 hours based on radar tracks received from Radar Central Malmö.
Do we have the necessary information?
One of the main challenges in VTS and anti-collision navigation is in predicting the future...

- One way of doing this is to have a common understanding of the present.

Voyage Plan example...

• Solas Chapter V - Regulation 34
  – on Safe navigation and avoidance of dangerous situations
  – "Prior proceeding to sea, the master shall ensure that the intended voyage has been planned ............., taking into account the guidelines and recommendations developed by the Organization *"

• *IMO RESOLUTION A.893(21)
  – Guidelines for voyage planning
  – “Prior to departure the navigating officer will prepare detailed planning of the whole voyage or passage plan from berth to berth”
- One way of doing this is to have a common understanding of the present.

Creating a common situational awareness

Common situational awareness
NEED TO SHARE
• S-421, included in IEC 61174 ed4 for ECDIS
• Both Geography and time/speed
• Last waypoint ETA is used for ETA optimization, easy communicating desired ETA from port to ship in real time during the whole passage.

Create ETA window and/or timeslots very early.
Route
Leg (straight segment between two waypoints) Contains a speed
Waypoint (geo-referenced anchor points for the route) Contain long, lat., ETA, turn radius, WOP

Slot
“Safe Haven” time slot visualizing the position where the ship must be to respect the ETAs of the route. Size of slot may vary in with depending on channel with, traffic density, cargo, manning, waters etc. Length of box may vary depending on how tight the time regime is. Green: inside box; yellow: part of ship outside box; red: ship outside box

Cross Track Margin, channel width (dynamic)
Green: agreed route.

Speed advice: target speed to keep position in box. Green: speed within 0.2 kn of target speed; yellow: 0.2-1.0 kn; red > 1 kn. (13.2 kn) = actual speed. Box dynamically positioned behind ship

WP14, ETA 13.25
WP13, 12.58

STM
SEA TRAFFIC MANAGEMENT
Co-financed by the European Union
Connecting Europe Facility
Vessel routes

- Hide all routes
- Hide all geographical message features

<table>
<thead>
<tr>
<th>Vessel</th>
<th>Delivery Status</th>
<th>Destination</th>
<th>ETA</th>
<th>Action</th>
<th>Last updated</th>
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</thead>
<tbody>
<tr>
<td>MASTERA</td>
<td></td>
<td>FINLI</td>
<td>2017-09-13 12:23</td>
<td>Details</td>
<td>2017-09-05 16:21</td>
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<tr>
<td>SILJA SERENADE</td>
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<td></td>
<td>2017-09-07 09:56</td>
<td>Details</td>
<td>2017-09-05 16:20</td>
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<tr>
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<td></td>
<td>2017-09-07 09:56</td>
<td>Details</td>
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</tr>
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<td>SILJA SERENADE</td>
<td></td>
<td></td>
<td>2017-05-30 09:55</td>
<td>Details</td>
<td>2017-09-05 16:13</td>
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<tr>
<td>EMIILE</td>
<td></td>
<td></td>
<td>2017-09-01 17:42</td>
<td>Details</td>
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Remember these?

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Source: ML2 D2 FSA – Formal Safety Assessment
• 500+ officers in simulation testbeds

• Officers at 170 live ships (to this date)

• A large number of experts in Safety of Navigation
“Creates a unprecedented increase in SA”

1st officer product tanker
“Gives me the ability to look into the future and de-conflict situations even before it even ends up in a situation”

- VTSO Sweden
“Have the potential to speedup SAR events considerably, but not only that, at the same time greatly reduce the risk of misunderstanding. Both is critical in SAR operations”

-JRCC Operator
“Relevant NAV Warnings directly in our ECDIS depending on our Voyage Plan is a blessing.”

- 2nd officer RoRo vessel
“This will take VTS to VTS 2.0, finally a very powerful tool which gives me the power of looking into the future”

-VTSON
However...

- Still lots and lots to do in user interface, HMI, Portrayal and usability
- Could easily create information overload, greater amount of automation is needed, specially on the shore side
- *Radar assisted accidents*...
- Critical mass of users?
IALA GUIDELINE

1089
PROVISION OF VTS SERVICES
(INS, TOS & NAS)

Edition 1.0
December 2012
Helcom recommendation 34 E/2 - amended by HELCOM Maritime 17 (October 2017)

- RECOMMENDS the Governments of the Baltic Sea countries to bring forward/develop concrete solutions suitable for testing and validating e-navigation services in the Baltic Sea region and to take necessary actions to support the technical developments, including defining the relevant performance and technical standards, and potentially define the regulatory framework.

- RECOMMENDS FURTHER that the Governments of the Baltic Sea and other relevant parties bring the BALTIC STM test and other Baltic Sea region e-navigation developments to the attention of IMO to enable further global progress.

- ENCOURAGES the Governments of the Baltic Sea and other relevant parties to take part in the coming test period for Sea Traffic Management (STM) exchange of voyage plans in shore-based systems and services e.g. VTS, ice-breaking, Search and Rescue and pilotage.
Berth to Berth Navigational Assistance
Improved Efficiency – Just in Time / Right Steaming / Green Steaming (IPCC #SR15)

New hull designs ≈ 2-5% But fleet lifespan over 20 years so to slow.
- Propeller and paints ≈ 2%
- New engines not feasible in short and middle term,
- New Fuels, LNG, Ammoniac no infrastructure, no large commitment, expensive.
- Electrification, good but not feasible on large scale and longer transports at the short and middle perspective.
- Management and traffic control to archive Right/Green/JIT – stemming via digitalisation and regulations ≈ 15-25%
Voyage Plan example…

• Solas Chapter V - Regulation 34
  – on Safe navigation and avoidance of dangerous situations
  – ”Prior proceeding to sea, the master shall ensure that the intended voyage has been planned ……………, taking into account the guidelines and recommendations developed by the Organization *”

• IMO RESOLUTION A.893(21)
  – Guidelines for voyage planning
  – “Prior to departure the navigating officer will prepare detailed planning of the whole voyage or passage plan from berth to berth”
Just a couple of small amendments...

• Solas Chapter V - Regulation 34
  – on Safe navigation and avoidance of dangerous situations
  – ”Prior proceeding to sea, the master shall ensure that the intended voyage has been planned AND SENT DIGITALLY TO RELEVANT TRUSTED PARTIES SUCH AS VTS, SRS, PORTS, CUSTOMS etc. OR ELSE!

• IMO RESOLUTION A.893(21)
  – Guidelines for voyage planning
  – “Prior to departure the navigating officer will prepare detailed planning of the whole voyage or passage plan from berth to berth AND PUBLISH IT DIGITALLY GODDAMMIT!!”