The g a p

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Lieut Navy, MM, Capt Marines,
engineerer, own company: instruments, GIS, charting

Royal Swedish Navy 1986 – 2011

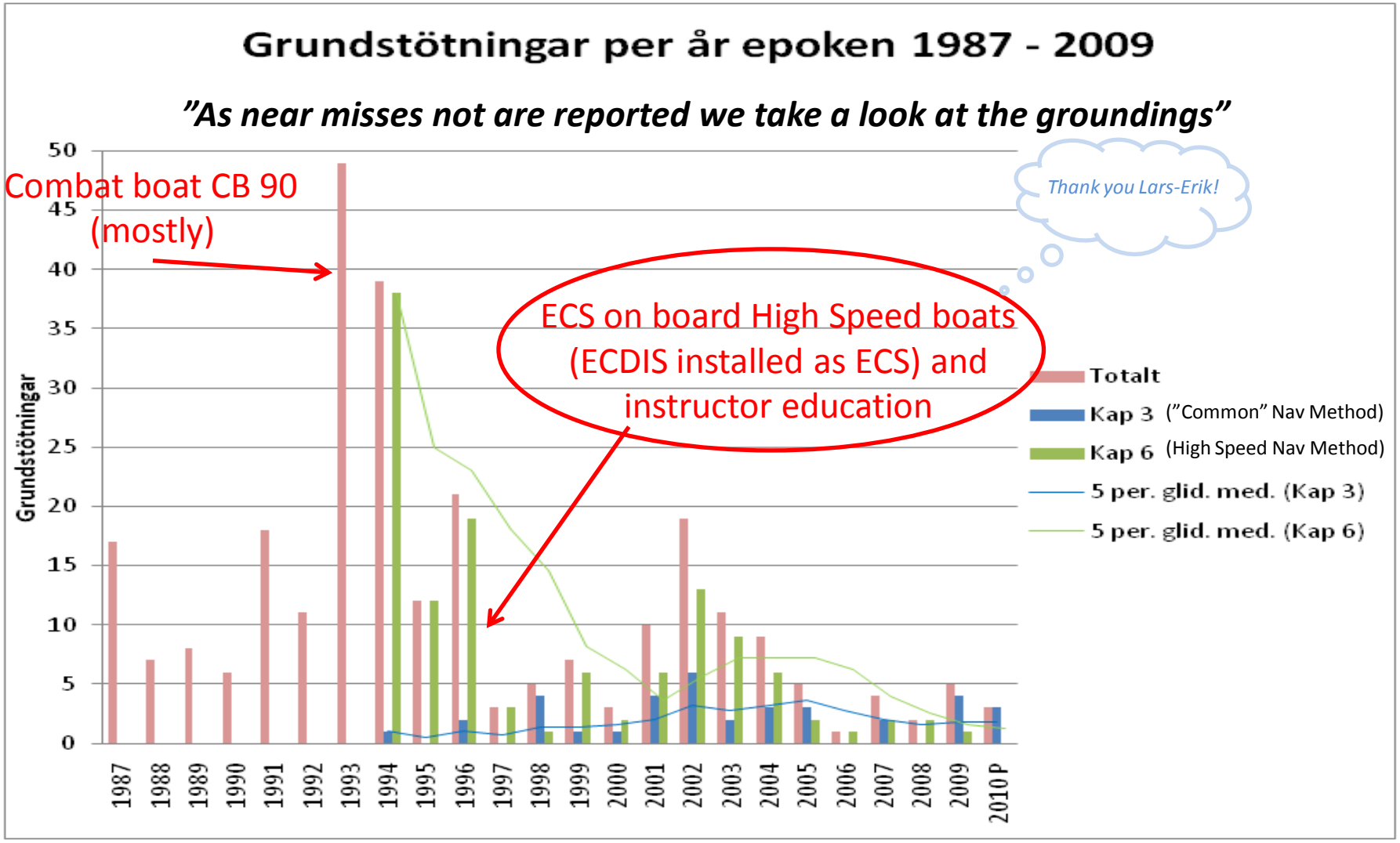
Teacher in nautical science.

Service on various sizes of ships. In command for 7 years, mate and DP-operator for 3 years. ECS/ECDIS development work since 1994.

Project Manager for navigation simulators and course developer, in particular "e-navigation". (Naval Warfare Centre, 2006-)

3.35.20

Is the ”new” technology safe for navigation in coastal waters and archipelagos?



Sw Navy: E Sandberg

The answer is yes…

?

… if it be done the right way

What is the problem?

ESC (serious installed) is a good help for situational (position) awareness…

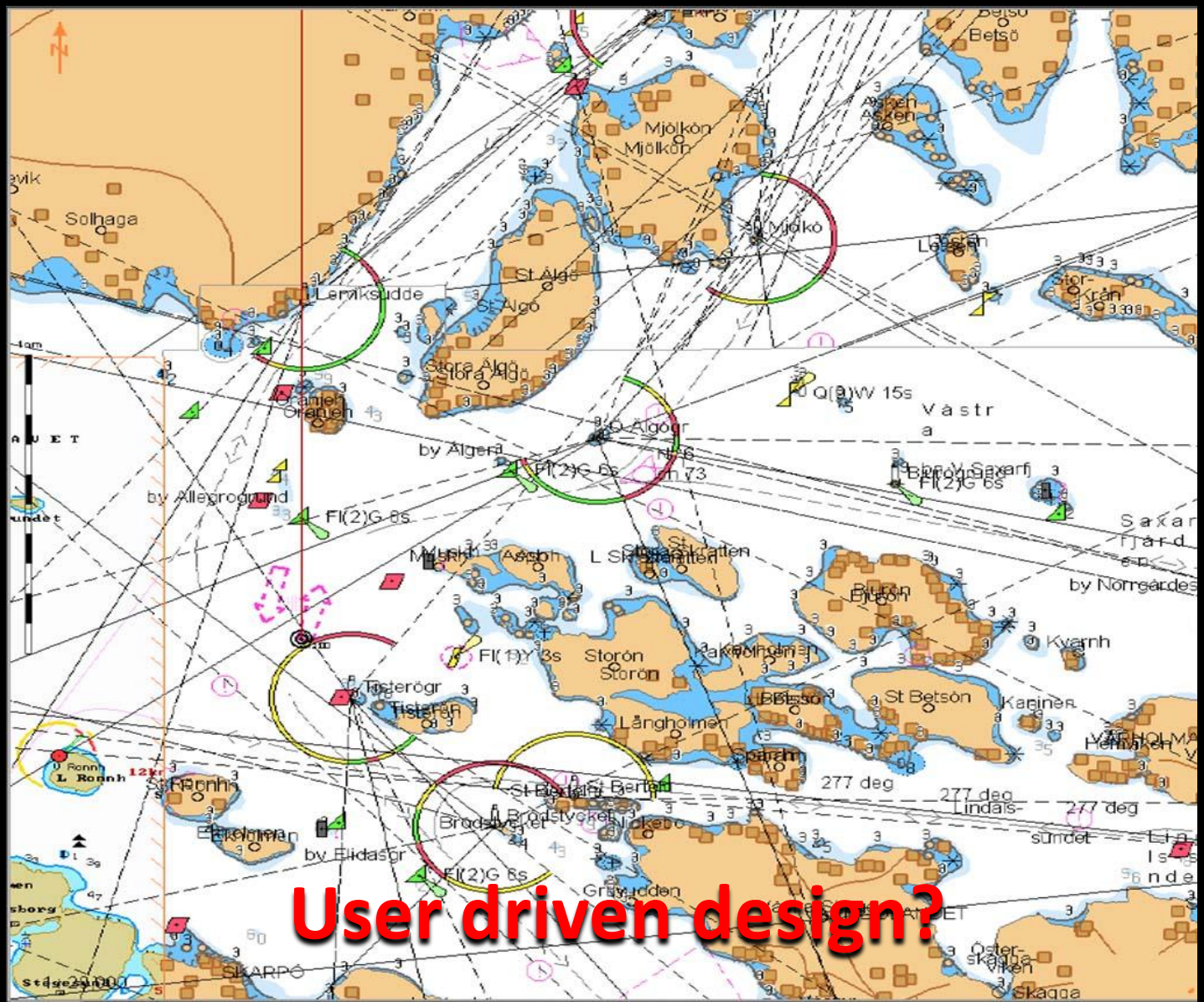
… but what happens when ECDIS is the main system when navigating in archipelagos?

T*here are a lot of human element aspects to be resolved. Today the system design and architecture may overload and confuse, rather than help the mariner, especially in coastal and archipelago waters. Other situations with short decision times and many "happenings" can develop critical shortcommings.*

Blue water design and complexity are some of the major problems that must be solved with "best practice", education and researchwork.

I will show some examples in the area of gaps…

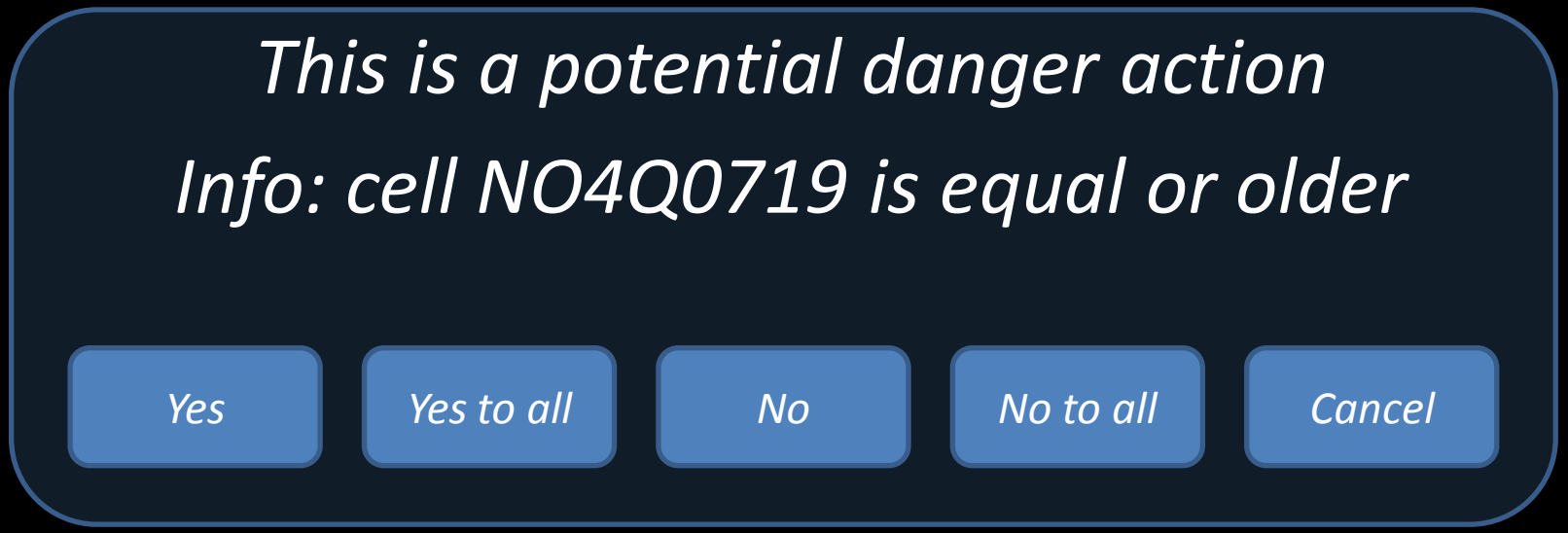
From the small peoples* wiew



User driven design?

*© BP

An example from a semiautomatic ENC update



?

Where is the help bottom?

The Of Course Alarm

”Our of course alarm allways sounds…”

The autopilot handled +/- 15 degres diff and aligning in ECDIS was a unknown function as well as the systems ability to autocorrelate with actual declination

29 degrees deviation, but – was +

This will result a ***58*** *degree wrong heading for the actual course*

The actual ship have

- 1 st fiber optical gyro
- 2 st std gyros
- 1 st GPS-kompass
- 1 st magnetic compass with a TMHD sensor

…with connections to

- ECDIS
- Track holding
- DP class 3 (with shifted wires)
- AIS
- VDR
- INMARSAT…

… none onbord understod the architecture and which sensor who was 1st, 2 nd…

…and no one know what source the steering display showed

… at least we found the documentation for the equipments (at different places)

..at last the most fundamental instrument was OK and many problems are solved!

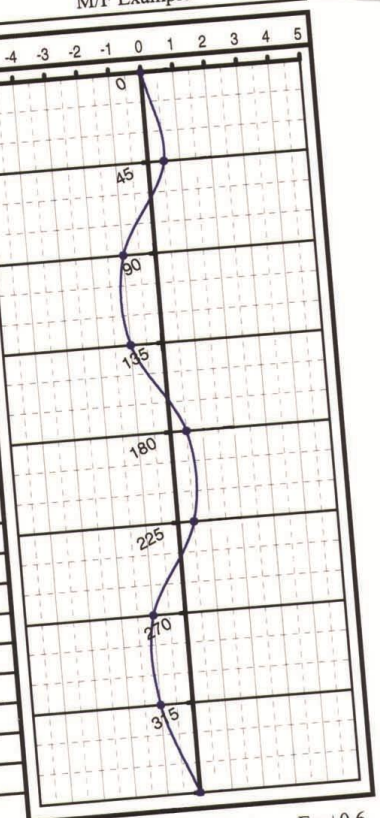
SWEDISH COMPASSADJUSTERS ASSOCIATION

TABLE OF DEVIATIONS

Styrkompassen

M/F Example

Magnetic Course	Compass Course	Deviation
N 0	0	0,0
15	15	0,0
30	29,5	+0,5
NE 45	44,5	+0,5
60	60	0,0
75	75,5	-0,5
E 90	91	-1,0
105	106	-1,0
120	121	-1,0
SE 135	136	-1,0
150	150,5	-0,5
165	165	0,0
S 180	179,5	+0,5
195	194,5	+0,5
210	209,5	+0,5
SW 225	224,5	+0,5
240	240	0,0
255	255,5	-0,5
W 270	271	-1,0
285	286	-1,0
300	301	-1,0
NW 315	316	-1,0
330	330,5	-0,5
345	345,5	-0,5
N 360	360	0,0



Coefficients: A= -0,3 B= 0,0/ 0,0 C= -0,3/ 0,0 D= +0,8 E= +0,6

Remarks:

Issued: Ystads redd, 2006-02-18

55°22,6' N, 013°47,4' E

H= 17,3 Z= 46,8 I= 69,7

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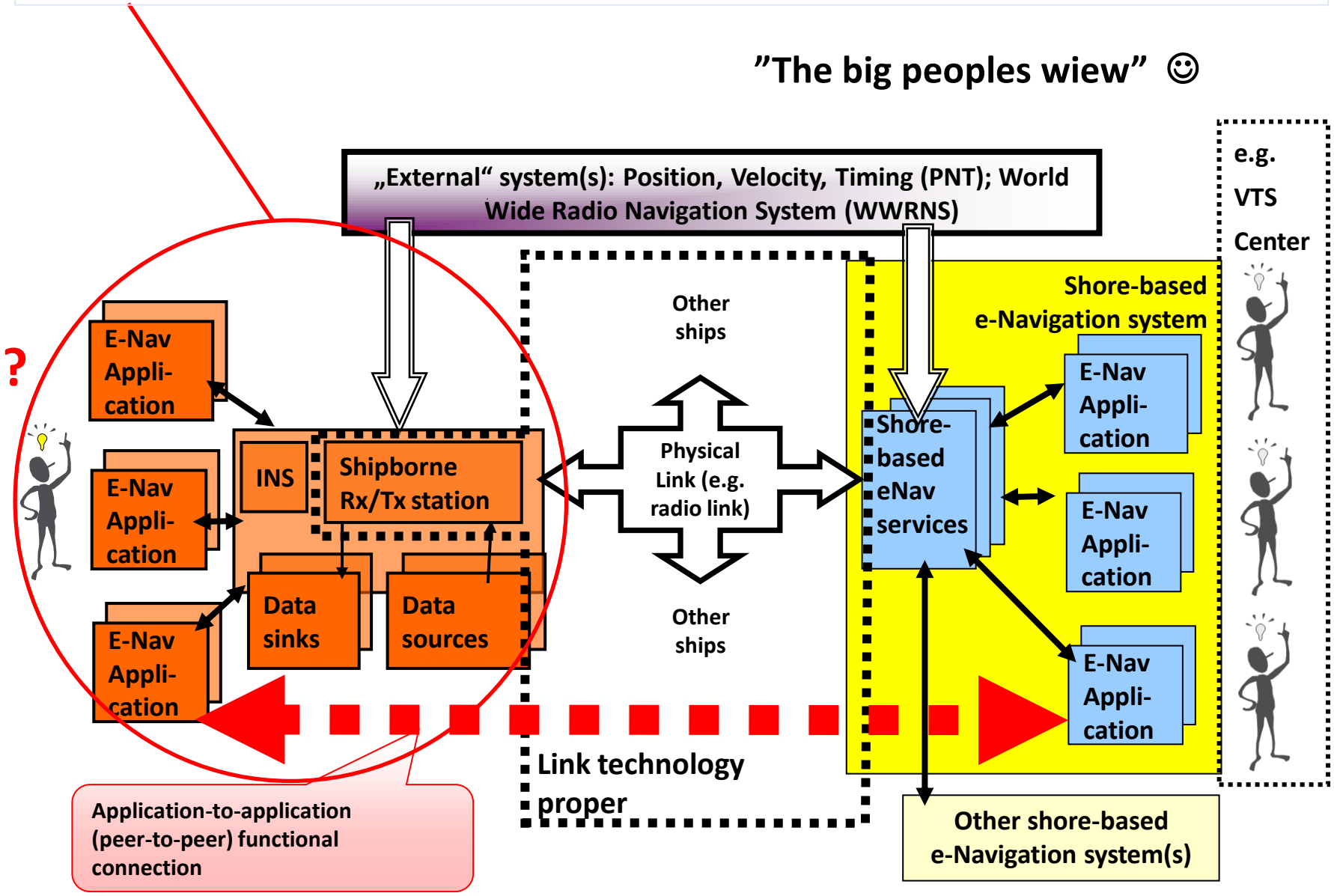
A closer look at the vessel and the decision support in critical situations



Source: IALA

Where can gaps be found and what is critical in decision making?

VIDEO

What can be done in the shipping company and the ships?

Establish the Hazards, Determine the Risk, Decide if the Risk is tolerable and Controlling the risk

- Identify break down factors:
  - System errors
  - Human errors
  - HMI and procedure errors
- Bridge procedures and ISM manuals
- Short time decision/strategy
- Long time strategy – Shipping company policy
- Training and familiarization: onboard plan/external plan
- Understanding the architecture on board

Describe how – not what!

Training in E-nav environment

Sjöstridsskolan, Karlskrona


CallSign: SBEU
MMSI: 265975218

There is still many Q for the ECDIS implementation

- S-mode: enough?
- ENC coverage: as long as not 100% the bridge must handle all methods of navigation
- Is there capacity of training (simulators) for the implementation of ECDIS?
- Is ECDIS a navigation functionality or an information management system? (Warship ECDIS a combat system?) What and when are the limits and are they identified in a safety HMI perspective?
- Do we take all human factors, procedures and educating factors in account?
- There can be a need of better course syllabus in system architecture at the academies.

Checklists

Example of start up checklist of required features	**Complies?**
• New policies, rules or regulations (company, manufacturer, transport agency)	…….
• Updated electronic charts on board for entire voyage	…….
• Vector data (ENC) charts	…….
• Updating system for electronic charts and charts backup (specify)	…….
• Variable display modes (North up)	…….
• Route planning ability (waypoints use, etc…)	…….
• Route monitoring/planning station	…….
• Plot ships position by primary position sensor	…….
• DGPS Receiver present and integration with ECDIS	…….
• Equipment malfunction alarm	…….
• Safety depth and/or contour setting	…….
• Hazard proximity positioning alarm	…….
• Off-scale or over-scale chart alarm	…….
• Off track indication and alarm	…….
• Loss of primary positioning information alarm	…….
• Gyrocompass integration with ECDIS	…….
• Magnet compass and TMHD integration ECDIS/Trackholdning	…….
• Echo sounder integration with ECDIS	…….
• Radar image integration with ECDIS and/or ARPA targets /AIS targets	…….
• Speed log integration with ECDIS (STW)	…….
• Back up arrangements in case of ECDIS failure (specify)	…….
• Fall back sensors (specify)	…….
• Training bridge personnel in the use of ECDIS, including capabilities and limitations	…….
• Power supply (both emergency and changing supplies)	…….
• Track holding system/route to auto pilot	…….

Is checklists the only way?

Flexibility or rigidity as a result?

Thanks!