Human Centered Design for an Integrated Navigation System

Raytheon Anschütz

Bjoern Schroeder, Product Management

November, 2019

Raytheon Anschütz – The Navigation Company

Raytheon Anschütz

35,000
ships with Anschütz equipment

25,000
heading management systems

1,200
integrated bridge systems

600
skilled and committed employees

236
qualified service stations

95%
highest first-time-fix rates in worldwide service

CIRM IMO INTERNATIONAL MARITIME ORGANIZATION
Leading role in central maritime associations and R&D projects

DNV·GL
MANAGEMENT SYSTEM CERTIFICATION
ISM=ISO 9001
ISO 14001=OHSAS 18001
Hands on core products within certified processes

R6σ
Raytheon Six Sigma
Continuous improvement model

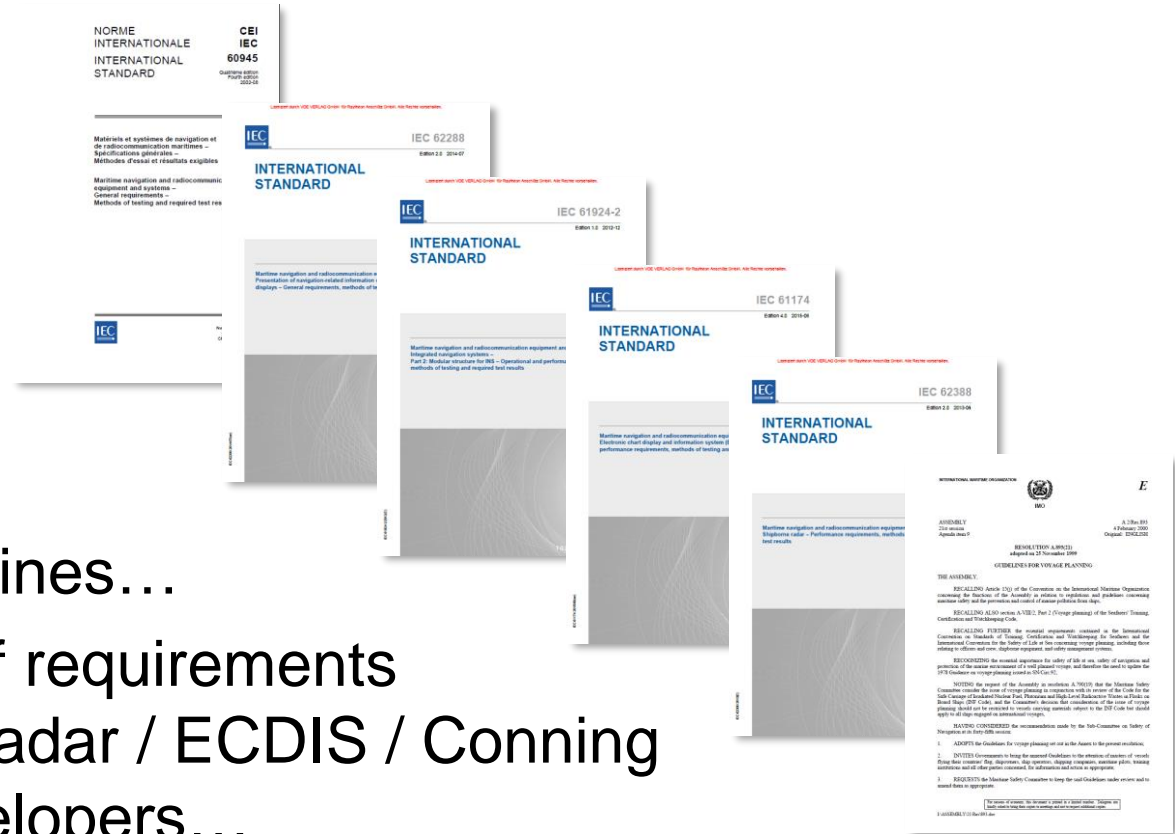I just want to park…

IEC 60945
IEC 62288
IEC 61924_2
IEC 62388
IEC 61174
IEC 62923-1

Additional IMO Guidelines…

Rough 1.000 pages of requirements
to build an INS with Radar / ECDIS / Conning
are thrown at the developers…

When they come back:

„All requirements are covered…"

May 2014 – approached by our customers:

"ECDIS looks outdated like Win2000"

"Route Planning Workflows not intuitive"

"Information overflow"

"Missing Functions e.g. AIO"

"No touch support"

"Chart update complicated & takes too long"

"Not aligned with user needs"

"Menu Bar & shortcuts confusing"

"No Online-Help"

Raytheon
Anschütz

Main Goals:

- **comply to the rules and standards**

- **be intuitive and easy to use**
- **reduce workload of the user**
- **incorporate customer feedback**

2015: Data collection

- sort and prioritize customer feedback

- market research and benchmarking

- workshop with selected customer / stakeholders

- Bachelor Thesis "Usability and Workflow of Navigation"

- ECDIS Workshop with stakeholders at Navigation School

- Concept Study:
  - members of R&D with HMI-Design background
  - nautical students with practical experience
  - Industrial Design company specialized in HCD & Workflow
  - Product Management

2015: Data collection
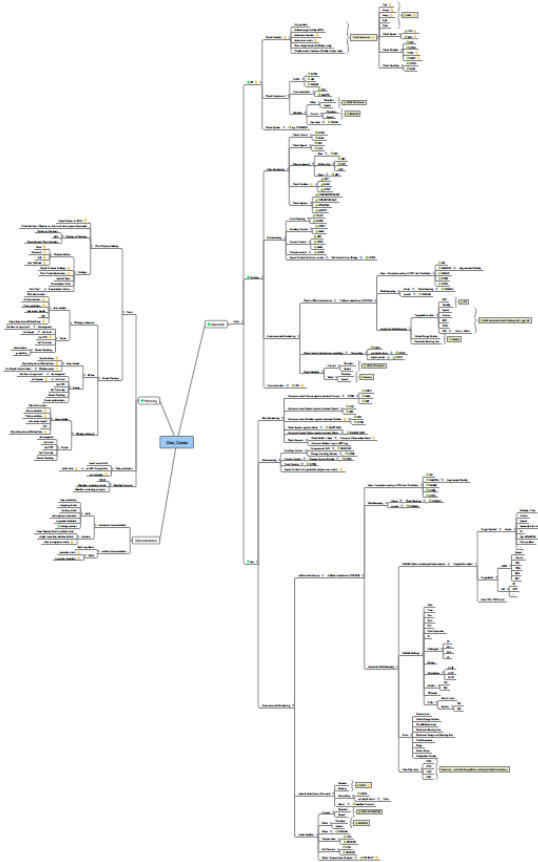
Approx. 300 Use Cases sorted based on which one is used…

- several times per hour   -> single click

- multiple times per day   -> max three clicks

- once per journey   -> multiple clicks

- only for generic settings   -> settings mode
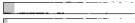
UI Design - Magnet Puzzle

GUI-Maps
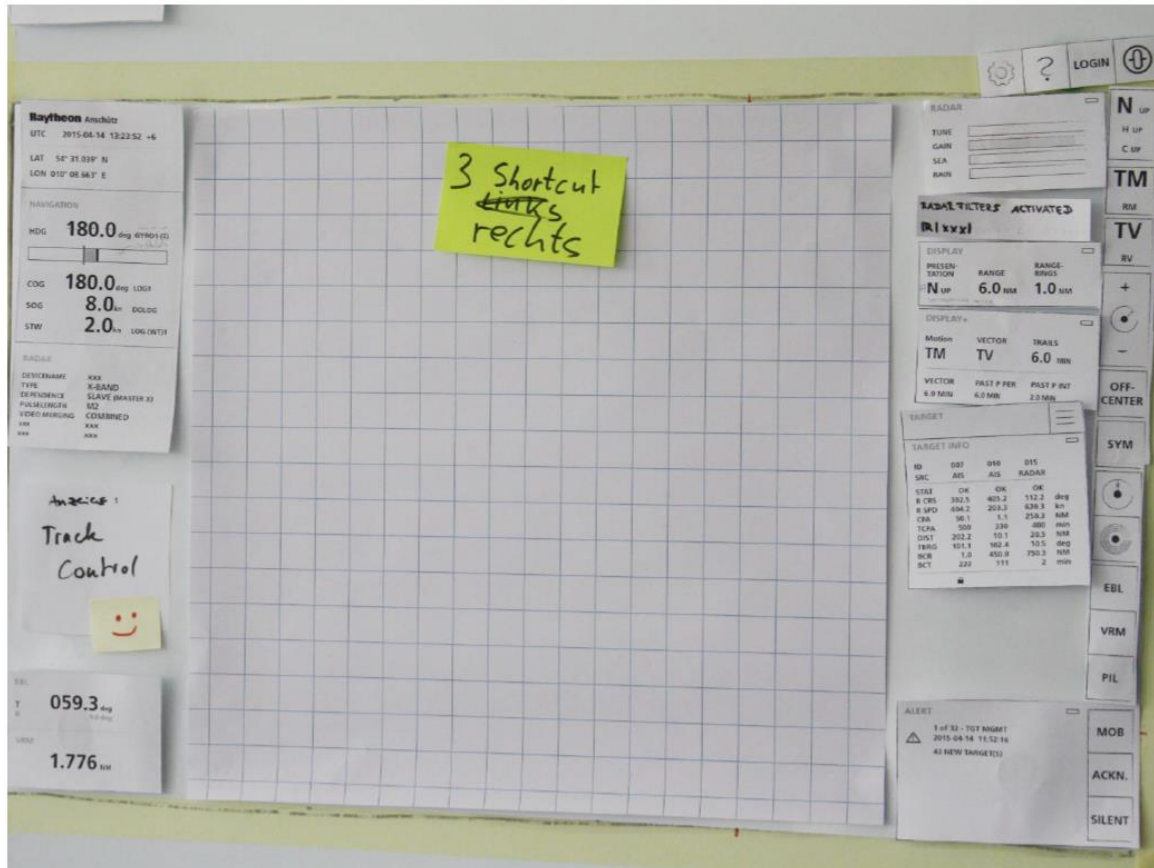
Basic Screen Layout Radar

Raytheon Anschütz

UTC	2015-04-14	13:23:52
LOCAL	2015-04-14	19:23:52

NAVIGATION

LAT	54° 31.039'	GPS1
LON	010° 08.663'	

HDG **180.0** deg GYRO1 (T)

COG	**180.0** deg	LOG1
SOG	**8.0** kn	DOLOG
STW	**2.0** kn	LOG (WT)1

RADAR

DEV NAME	XXX
TYPE	X-BAND
PULSE LENGTH	M2
VID MERG	COMBINED
XXX	XXX
XXX	XXX
DEPENDENCE	SLAVE
	MASTER XXX

LOGIN

RADAR

TUNE	
GAIN	
SEA	
RAIN	

RADAR FILTER **ACTIVATED**
IR | XXX | EXP | FTC | SART | XXX

DISPLAY PRESENTATION

RANGE	RR	
6.0	**1.0**	NM

TARGET PRESENTATION

	PAST POSITION	
VECTOR	PER	INT
6.0	**6.0**	**2.0** MIN

TRAILS	PER	INT
6.0	**6.0**	**2.0** MIN

AIS	ARPA	ASSOC	TGT

TRIAL	ZONE	ROUTE	SEA-SCOUT

FUNC	MAP	PIL	XXX

ALERT

⚠ **1 of 32 - TGT MGMT**
2015-04-14   11:52:16

43 NEW TARGET(S)

N UP / H UP / C UP

TM RM

TV RV

OFF-CENTER

UNDER-LAY

SYM

EBL

VRM

MOB

ACK

SILENT

Basic Screen Layout ECDIS

Raytheon Anschütz

UTC   2015-04-14   13:23:52
LOCAL   2015-04-14   19:23:52

NAVIGATION

LAT   54° 31.039'   GPS1
LON   010° 08.663'

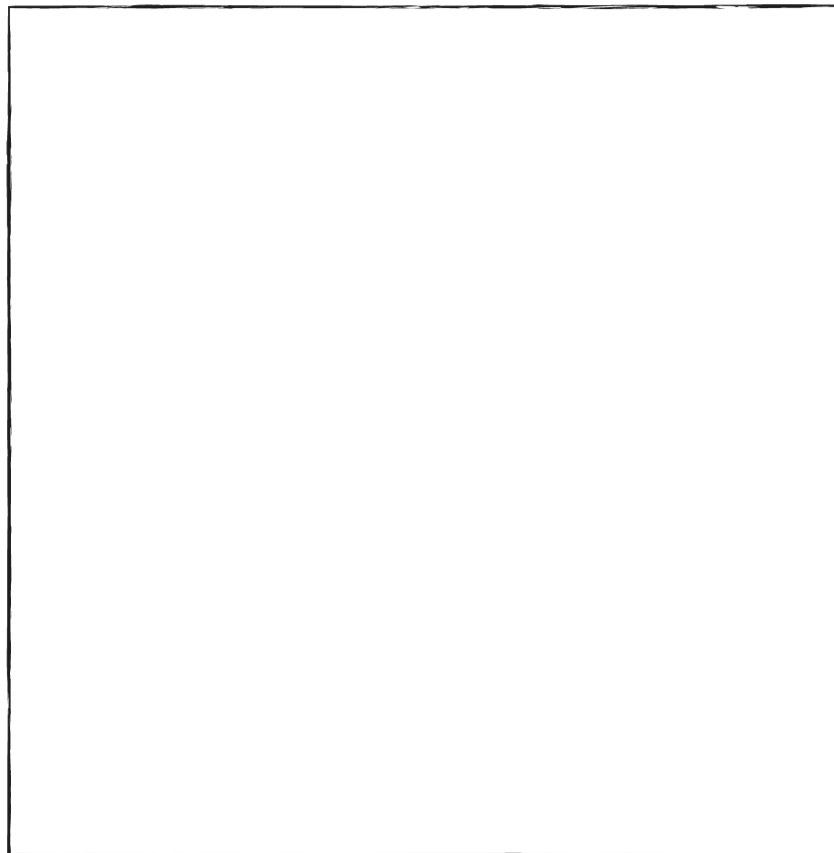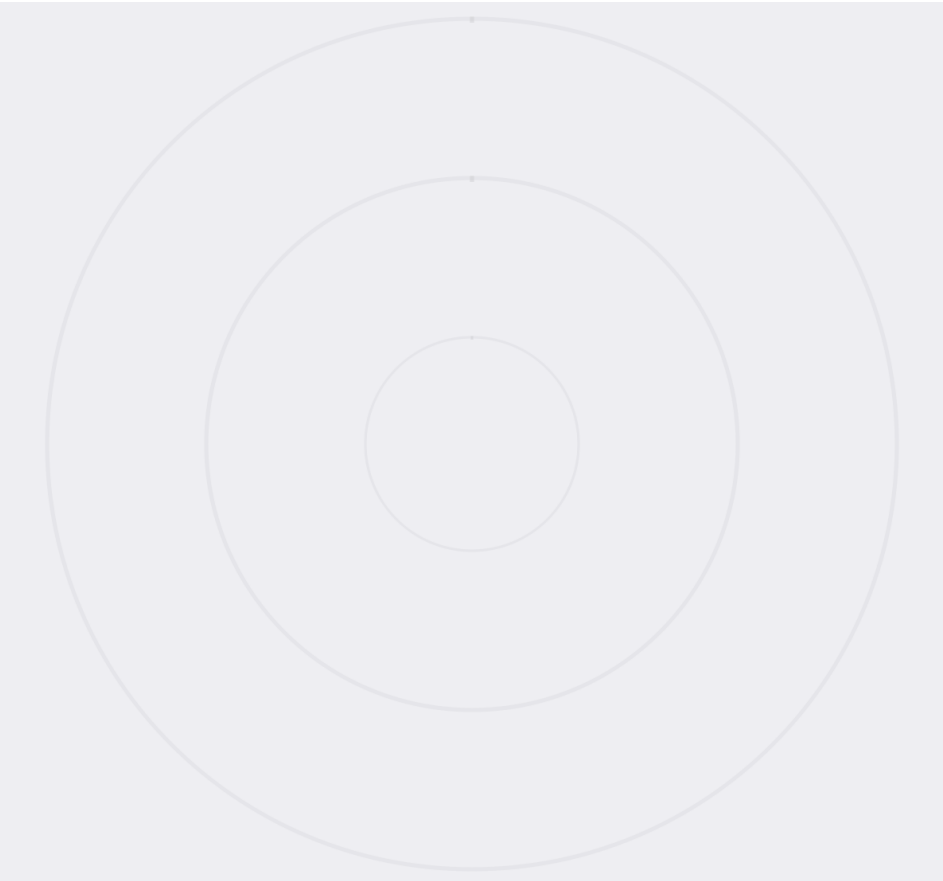HDG   **180.0** deg   GYRO1 (T)

COG   **180.0** deg   LOG1
SOG   **8.0** kn   DOLOG
STW   **2.0** kn   LOG (WT)1

CHART

CHART NAME   DE S57: APPROACH
              OFFICIAL ENC DATA
CHART SCALE   1: 25 000
VIEW SCALE   1: 18 457
              300.3 NM
              OVER SCALE
EDITION   2015-05-26 - ED#7
UPDATE   2015-06-22 - UPD#20
SOURCE ID   (DE) - DE416020

LOGIN

DISPLAY PRESENTATION

RANGE
6.0   NM

AIS	ARPA	ASSOC	TGT
TRIAL	ZONE	ROUTE	SEA-SCOUT
FUNC	MAP	CHART	NAV
PIL	TRACK	DOC	XXX

ALERT

⚠ **1 of 32 - TGT MGMT**
   2015-04-14 11:52:16

   43 NEW TARGET(S)

N UP
H UP
C UP

+
−

TM
RM

SHIP-CENTER

OFF-CENTER

OVER-LAY

SYM

STD DISPLAY

DEF DISPLAY

EBL

VRM

MOB

ACK

SILENT

13

Sep. 2015 - first prototype of the next generation ECDIS

Sep. 2015 - first prototype of the next generation Radar

Customer Review Workshops

- Sep 2015 - Presentation of Prototypes
- Dec 2016 - Presentation of ECDIS NX / Radar NX

Radar NX

Left-hand side: Indication only

Right-hand side: Indication & operation

Navigation data, incl. source and quality indication

Function related menues

Target information (system level)

Quick access bar with navigation tools

Drag and drop navigation tools

Chart radar function
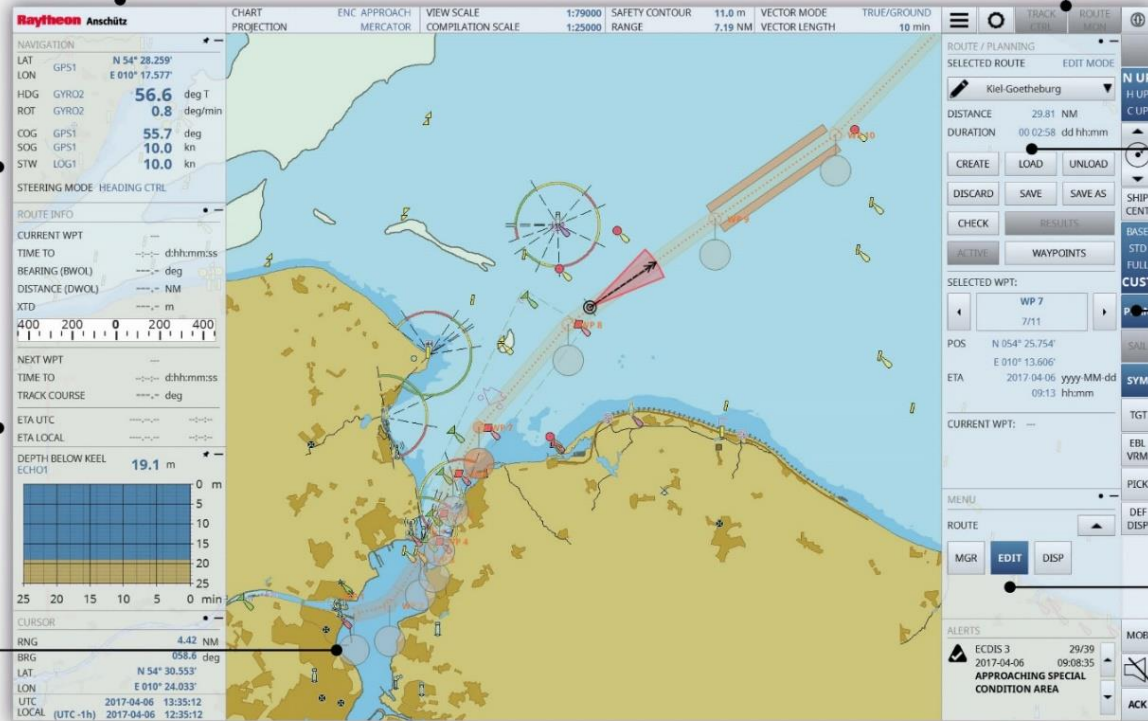
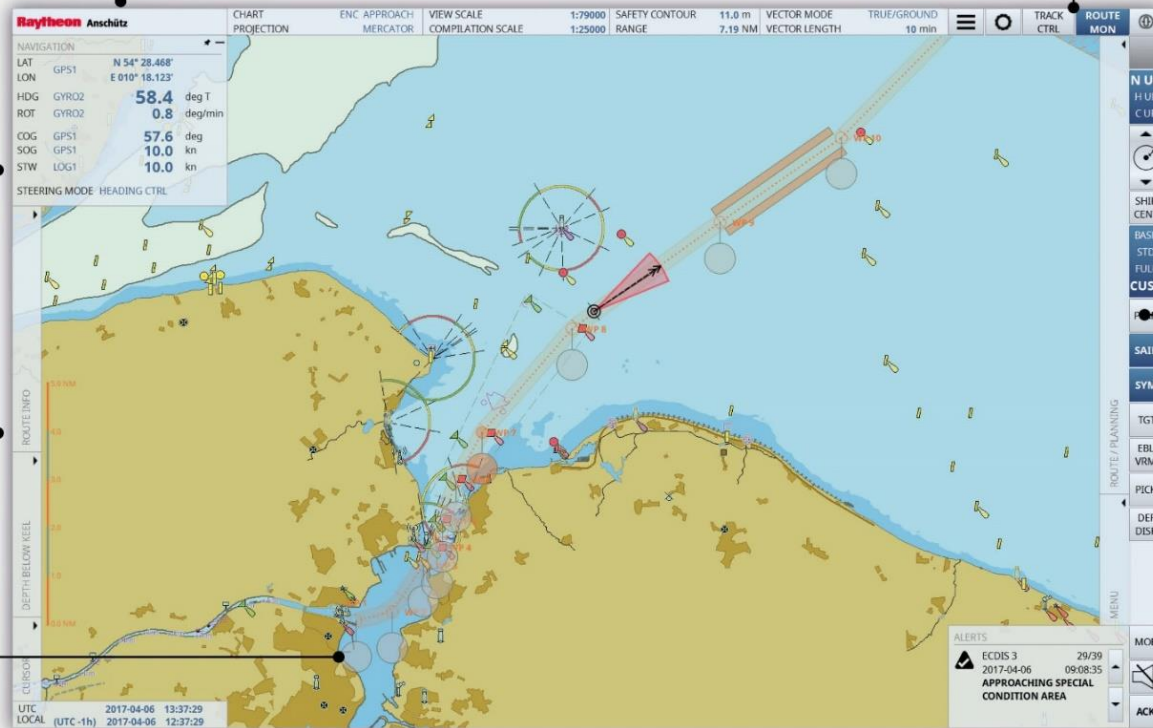Tile menu with flat hierarchy

ECDIS NX

ECDIS NX

Left-hand side:
Indication only

Individual
retractable panels:
● fixation or
✈ retraction

Customizable by
user profiles

Route planning by
drag and drop
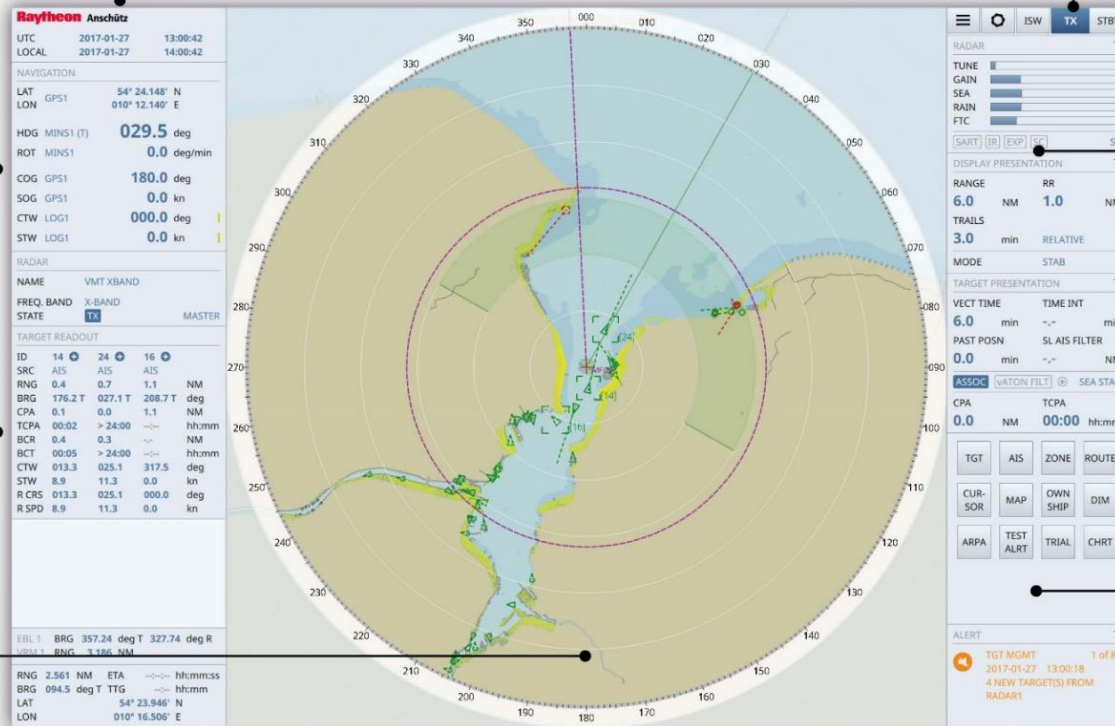
Right-hand side:
Indication & operation

Function related
menues

Quick access bar

Tile menu
with 2 layers only

THE NAVIGATION COMPANY