

Unified Bridge

- a unified graphical expression

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The challenge

- Increasingly more technologically advanced equipment
- Increasing amount of equipment for the operators to relate to with complex user interfaces
- Too much equipment in the consoles causes poor ergonomic placement
- Increased load on the operator's working memory and less capacity to handle critical situations
- Small degree of standardization



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The goal

To increase operational safety in demanding maritime operations through:

- A complete re-redesign of the ship bridge environment, including consoles, levers and software user interfaces.
- User-centred design process where the human factor, ergonomics and user friendliness is the basis for development
- Introducing a more comfortable and safe working environment for both operators and service personnel



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The Unified Bridge

Give the operator a complete package including:

- Well preserved human factors, ergonomics and user friendliness from the physical aspect (consoles, levers and chairs), to the mental aspect concerning well designed and consistent user interfaces.
- Common alert management and dimming of lights reduces stress and mental load



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The Unified Bridge development



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Project development

January 2011:

Designing a new bridge concept for PSV

Usability, Human Factors and & Ergonomics

To make a difference:

“ If we want any changes? Well, I’m mostly happy. Yes, really! However... I’m not sure it is worth to mention... It is probably just a silly detail... A luxury problem?”

Taking all the “silly details” and “luxury problems” into account we came up with a concept that will improve operational safety and comfort onboard during demanding offshore operations.



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Bridge concept design decisions

Main goal:

To design a bridge concept that suits the operator's needs by supporting:

- Good ergonomics
- Variation of work position
- Proximity to monitoring and controls (touch interfaces and levers)
- Flexibility suited to support operational preference
- Improved view of the aft deck to support a safer operation



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Methods used

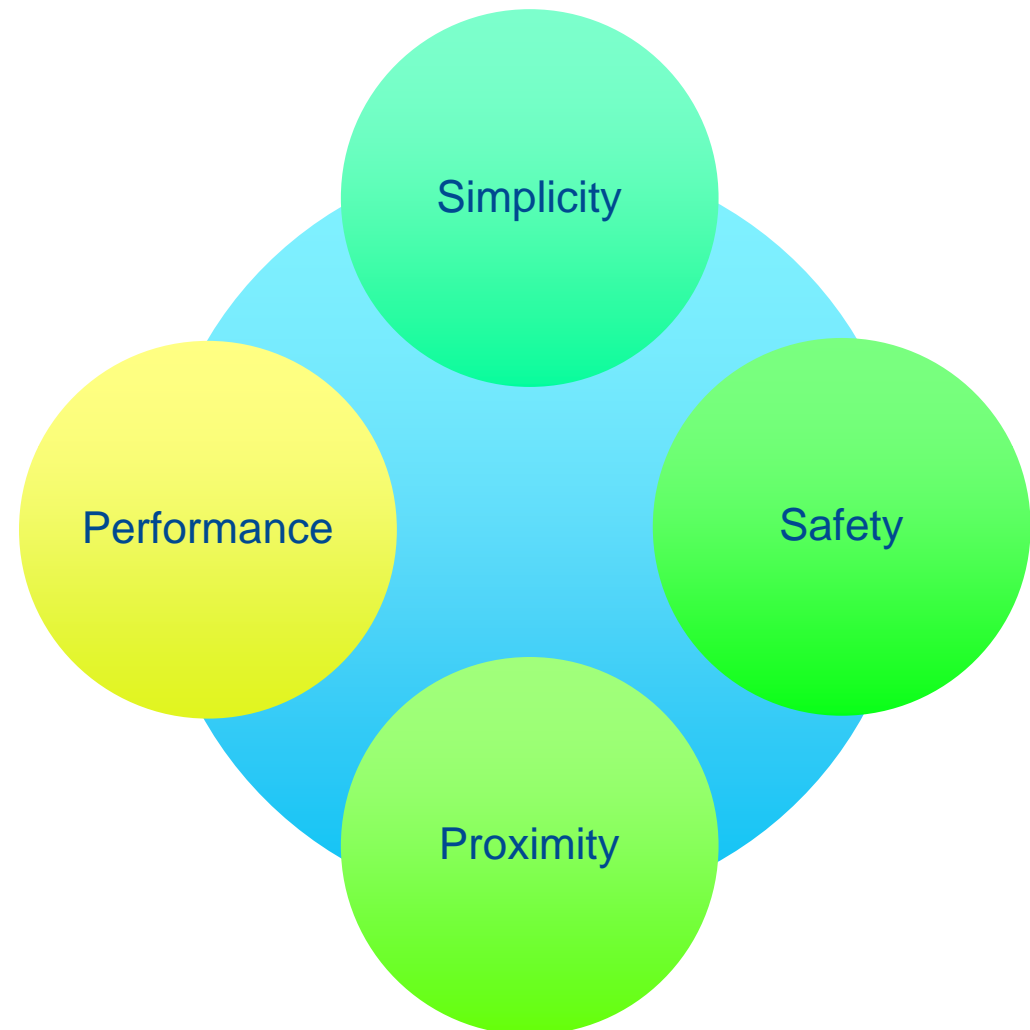
- Preliminary Interviews with operators
- Observations of authentic operations
- On-site interviews



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Design objectives

- Increase operational safety
- Ergonomics
- Improved User Experience
- Simplify Operation
- Integrate 3rd party equipment
- Use available technology
- Flexibility to ship operations
- Required information at the right time

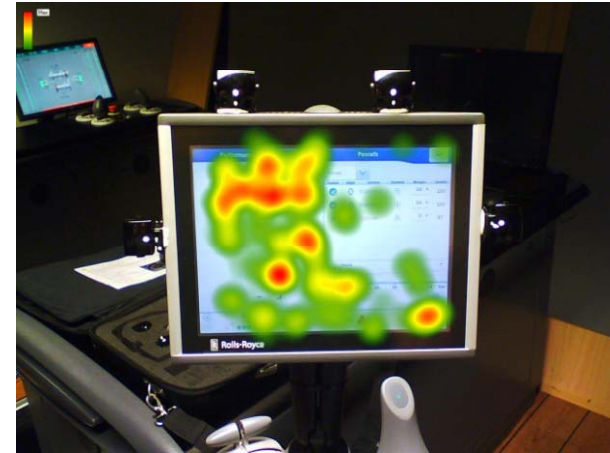


Methods of verification

Hierarchical Task Analysis

Checklists

User studies utilising concept



- Realistic studies carried out in a ship simulator using state of the art eye tracking equipment
- Holistic bridge evaluations comparing interaction between operators and equipment
- Testing novel software and concept



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The workstations on the aft bridge are designed to:

- **Optimize** the operator's comfort
- **Situation awareness:** focus on the operation rather than on how to operate
- **Visibility and reduced reflections:** low reflections of sunlight and good visibility during daytime operations
- **Night vision:** reduced illumination to maintain good night-vision and a common dimming philosophy has been incorporated
- **Easy access and exit:** spacious passages between the windows and the workstations



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Consoles - varying height to support seated and standing working positions

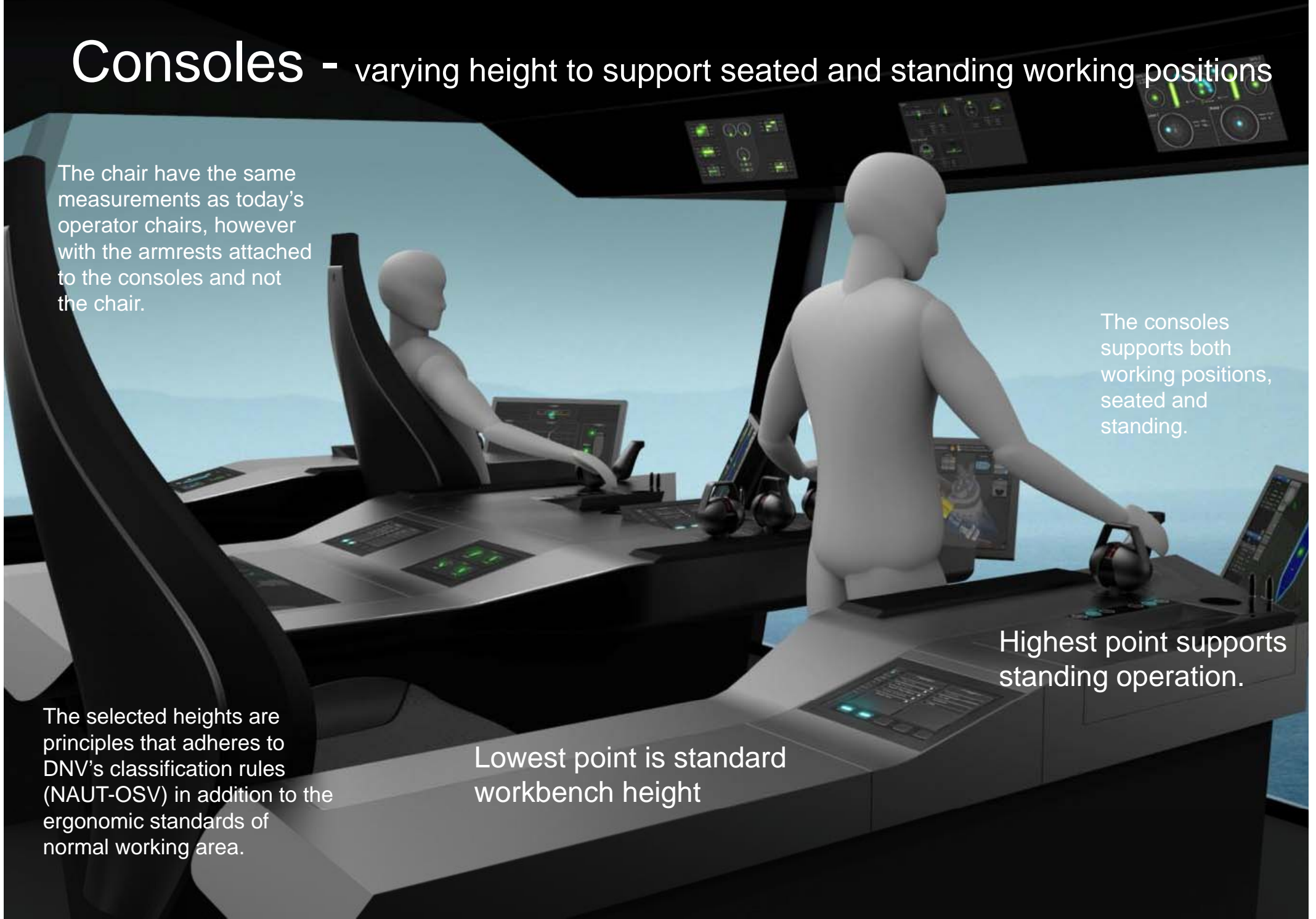
The chairs have the same measurements as today's operator chairs, however with the armrests attached to the consoles and not the chair.

The consoles supports both working positions, seated and standing.

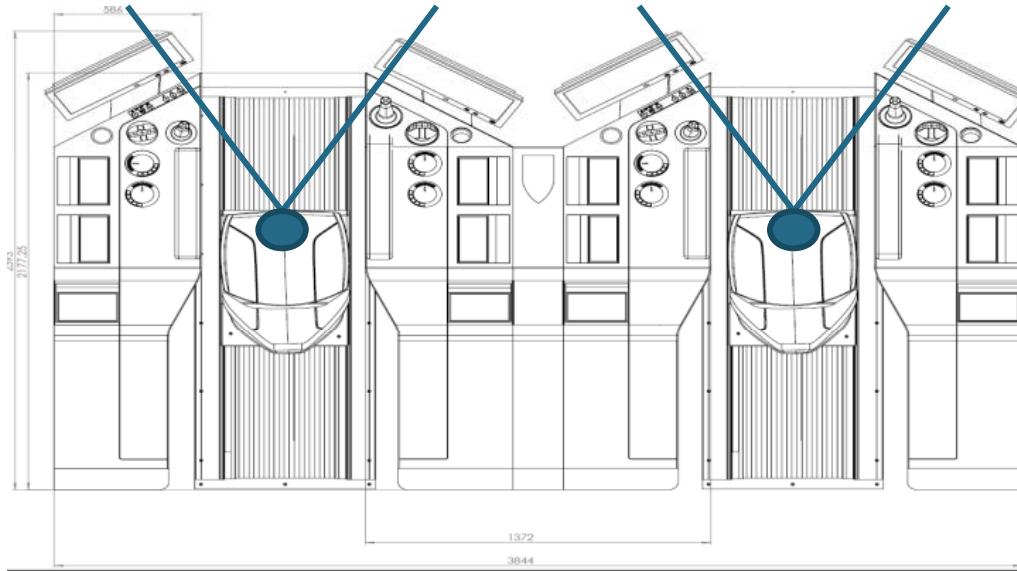
Highest point supports standing operation.

The selected heights are principles that adheres to DNV's classification rules (NAUT-OSV) in addition to the ergonomic standards of normal working area.

Lowest point is standard workbench height



Field of vision (FOV)

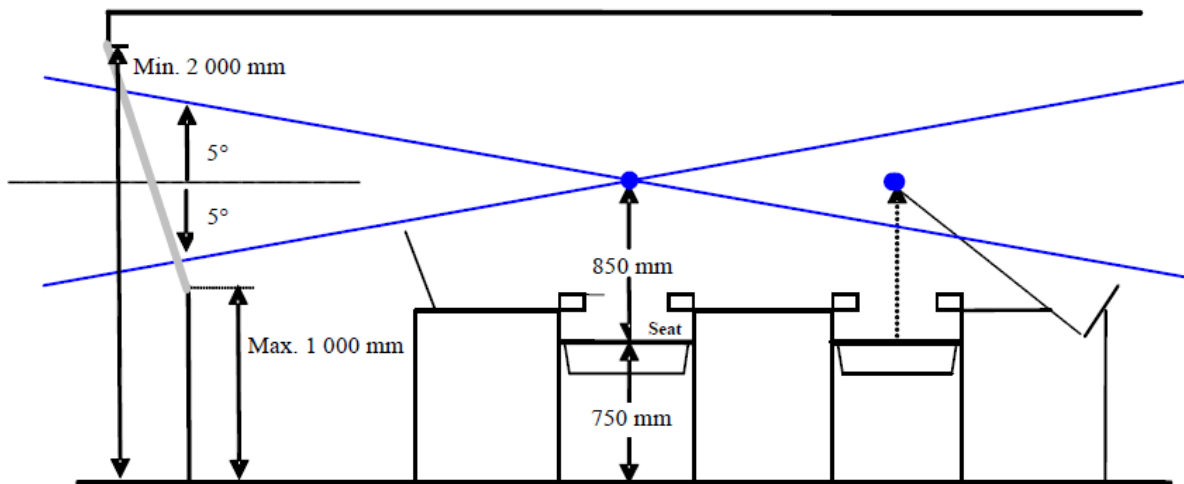


Removed displays from FOV.

Increased size of large displays from 19" to 24".

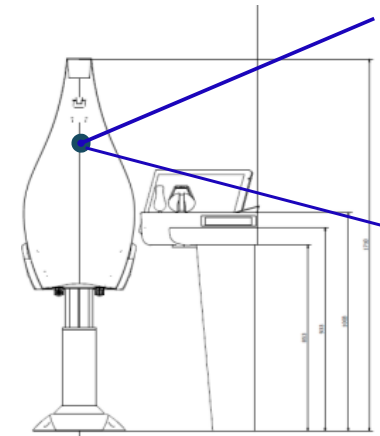
Large displays are now within reach for operation.

One to four 10" displays are available after preference from users and vessel specification.



Maritime classification FOV requirement

No occlusions in FOV

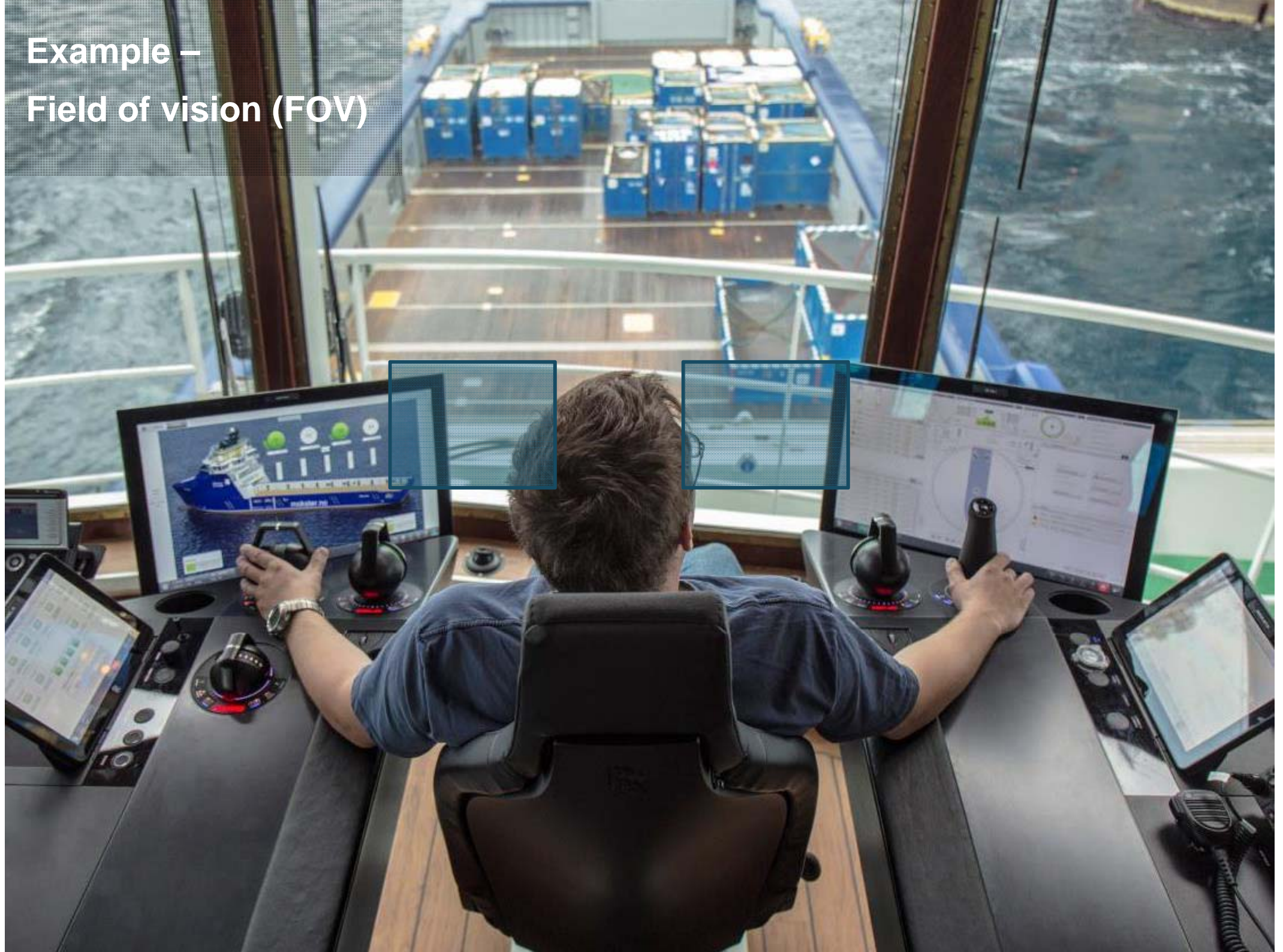


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Example –
Field of vision (FOV)



Common Look & Feel

GUI Style Guide v2.0

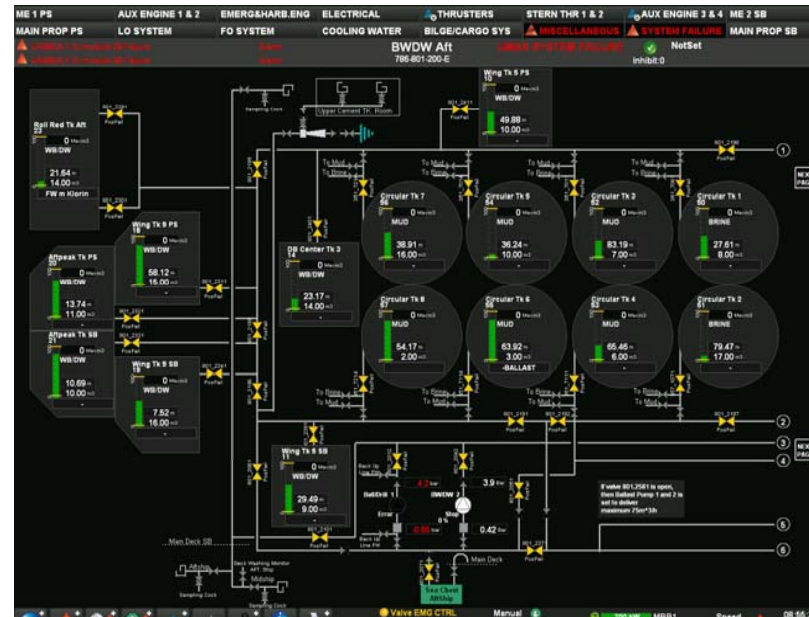
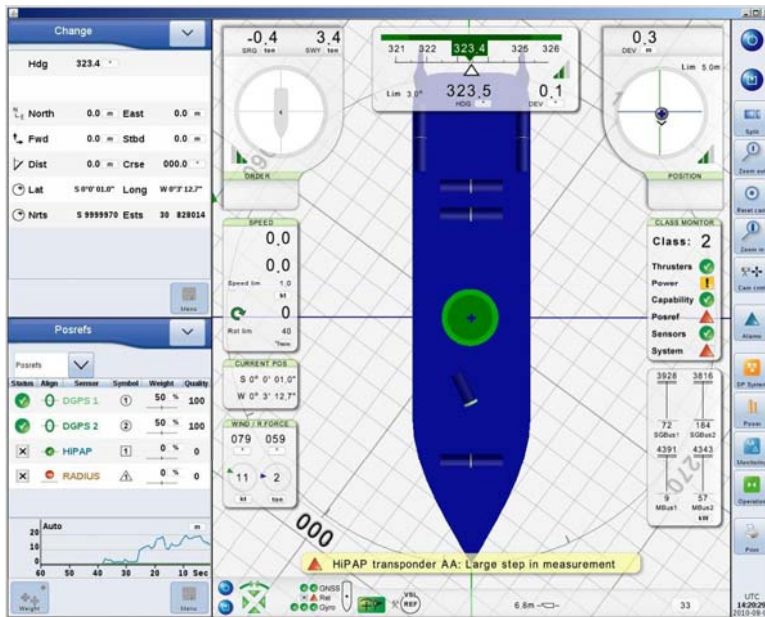
- **A common platform for software**
 - Across applications and screen sizes
- **The goal:**
 - Define guidelines for the graphical user interface
 - Principles for interaction and usability



The challenge

Variety of different applications

- With different users and requirements
- With different user interfaces
- Living in different environments

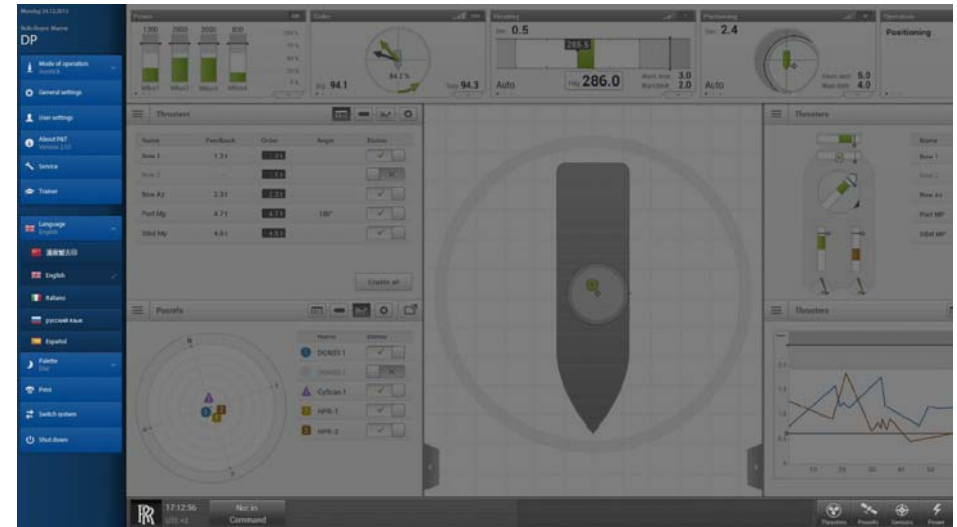


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Finding common denominators

Common principles - a unified way of:

- Navigating
- Handling and displaying alerts
- Unified application dimming and palettes
- Unified method for standard application settings.



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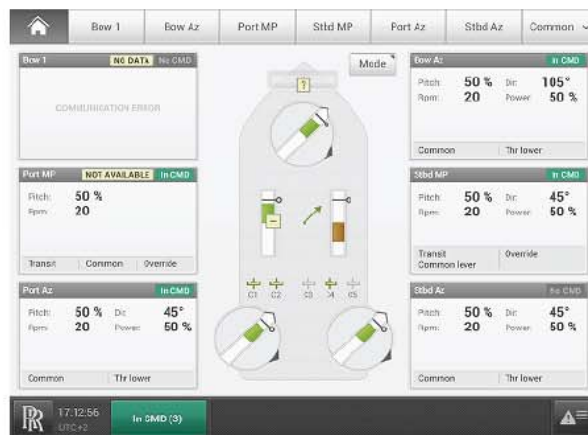
Design philosophy

Use of colour

- Restrictive
- Always represent the same

Interface palettes

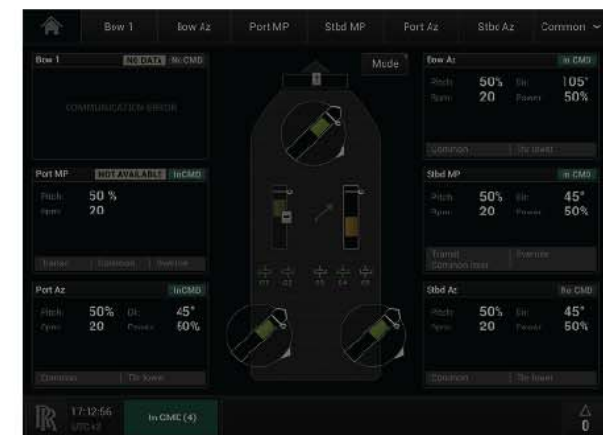
- Adjustable to various light conditions
- Dark room tested



Day palette (for bright daylight)



Dusk palette (for dusk and dawn)

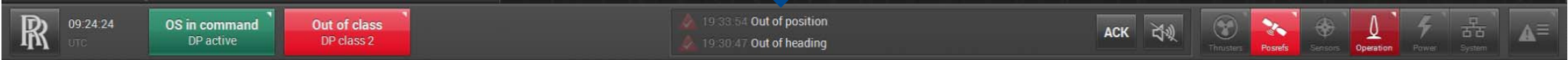


Night palette (to maintain night vision)

Navigation

- Touch- screen friendly
- Clearly visible clickable objects
- Direct drill down
- Keeping hierarchy small
- Different navigation bar patterns
- For large and small applications







Port main winch

Stbd main winch

S.H. winch

Dual view

Pumps

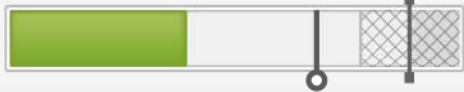
24

Port main winch

Length **2874 m**



Tension **278 ton**



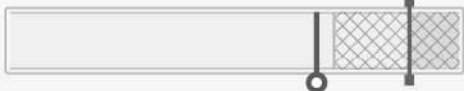
Oil temp: **40 °C**

Pressure: **6 bar**

Speed: **15 rpm**

S.H. winch

Length **0 m**



Tension **0 ton**



Oil temp: **0 °C**

Pressure: **0 bar**

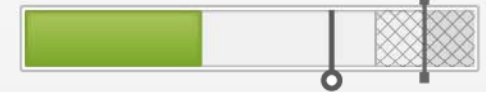
Speed: **0 rpm**

Stbd main winch

Length **2874 m**



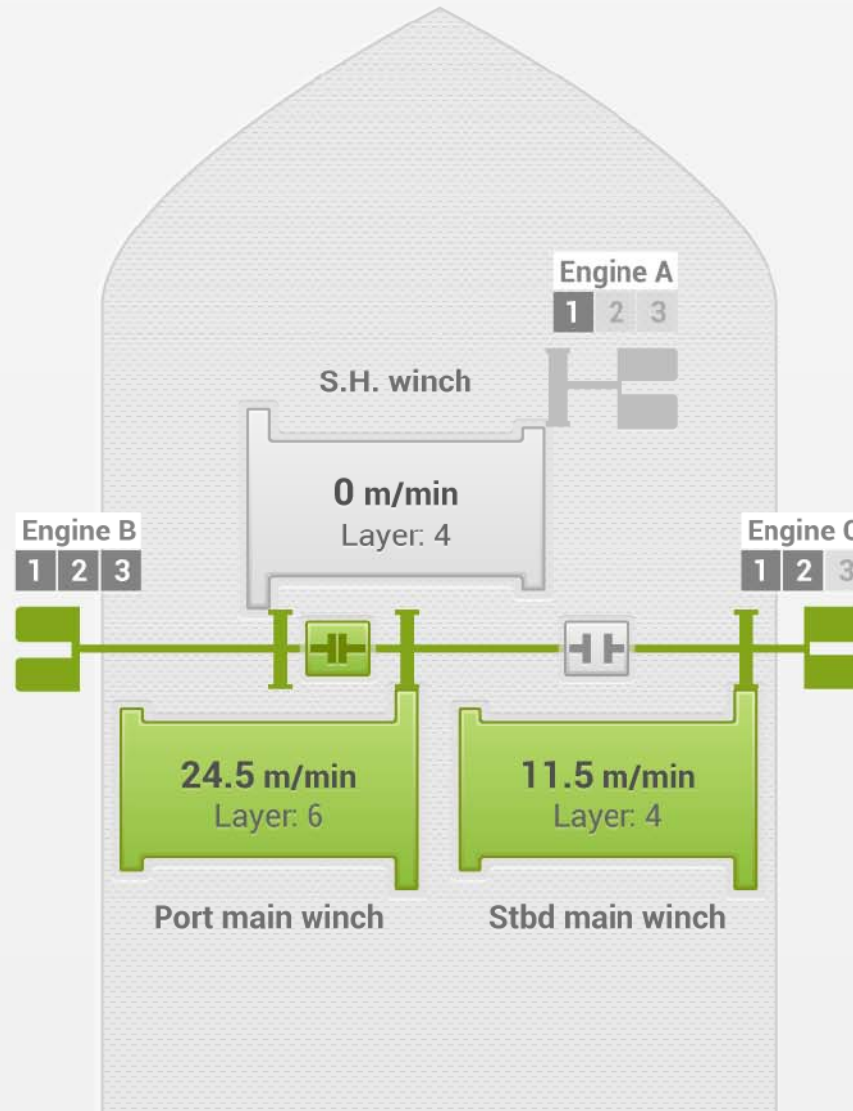
Tension **278 ton**



Oil temp: **0 °C**

Pressure: **6 bar**

Speed: **15 rpm**



Home screen

- Monitoring main parameters
- Starting point for navigation



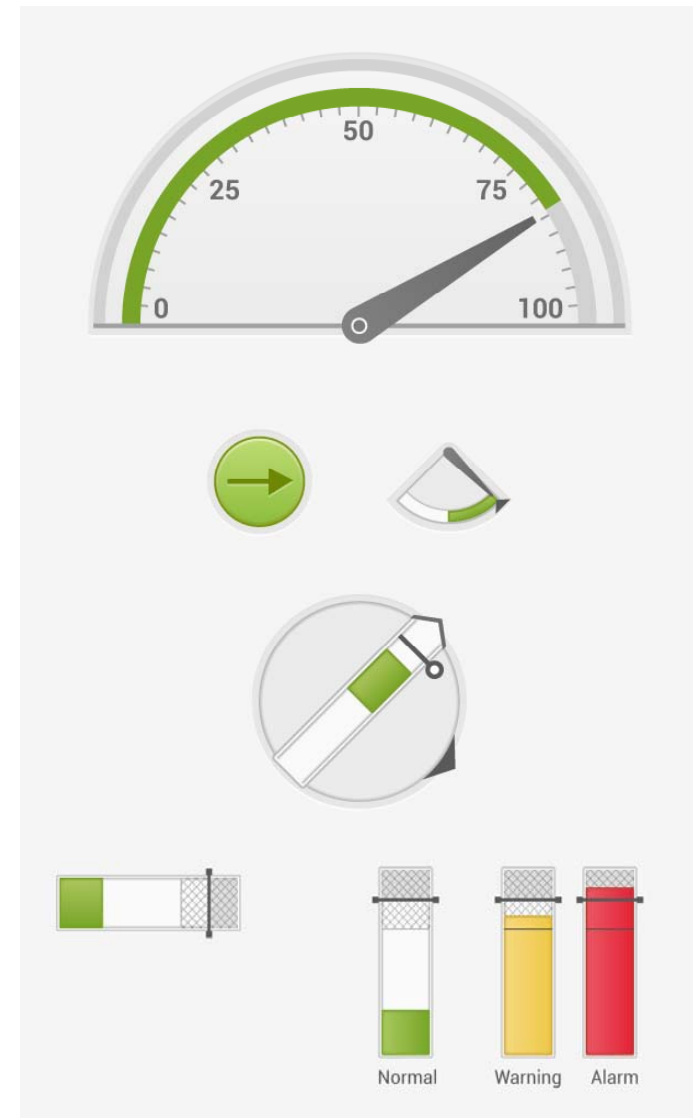
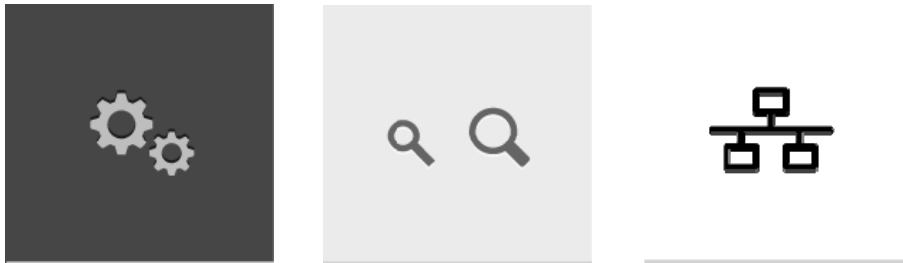
17:12:56
UTC +2

In CMD



Common symbols and icons

- Common graphic style
- Common visualisation of states on objects
- Common library of icons

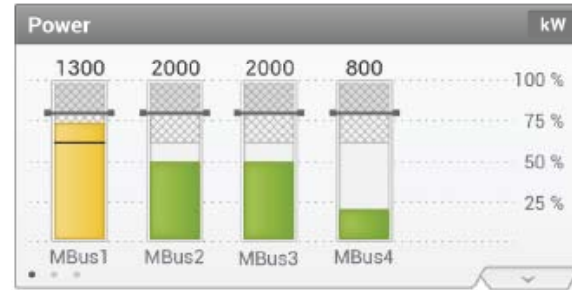


Alerts and notifications

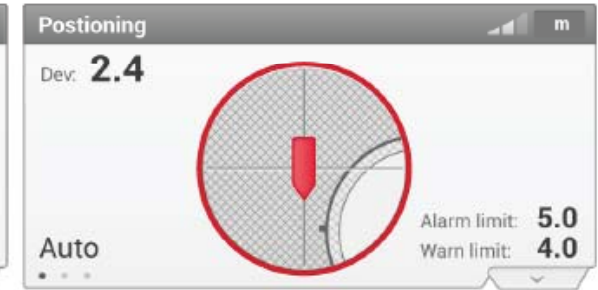
- **Alert philosophy**
 - Aggregated alerts
 - Visualisation philosophy for alert states
- **Consistent usage of colour**
- **Different list types**
 - Active alert
 - Notification
 - Alert history
- **Alert groups and filtered alerts**
- **IEC 62288/ IMO resolution A.1021(26) standard for icons**



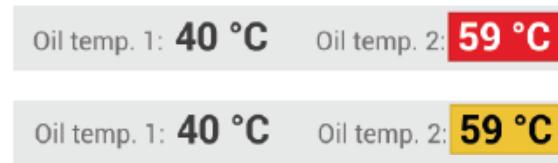
Alerts



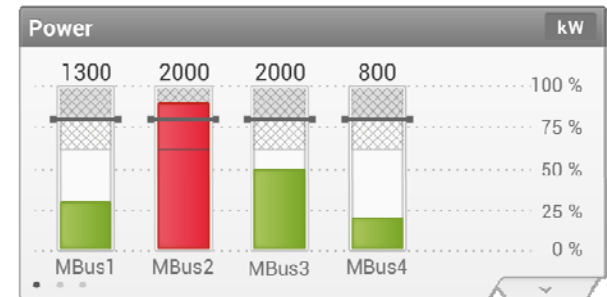
Warning on bar graph



Alarm on graphical representation



Alert indication on single value



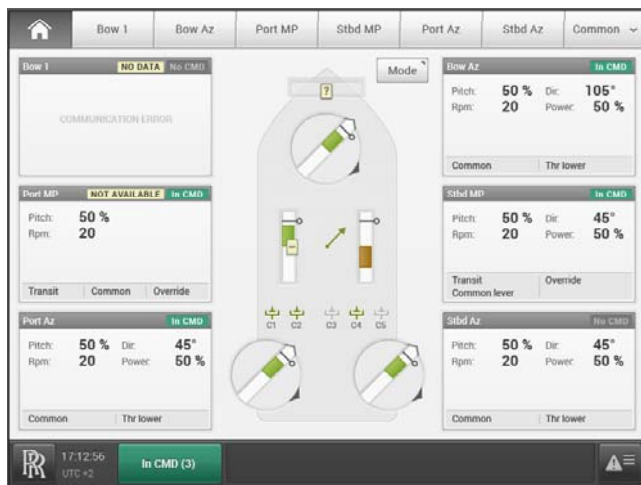
A selection of GUI examples



Auxiliary system running on 10" screen



Dynamic positioning system, 24" screen

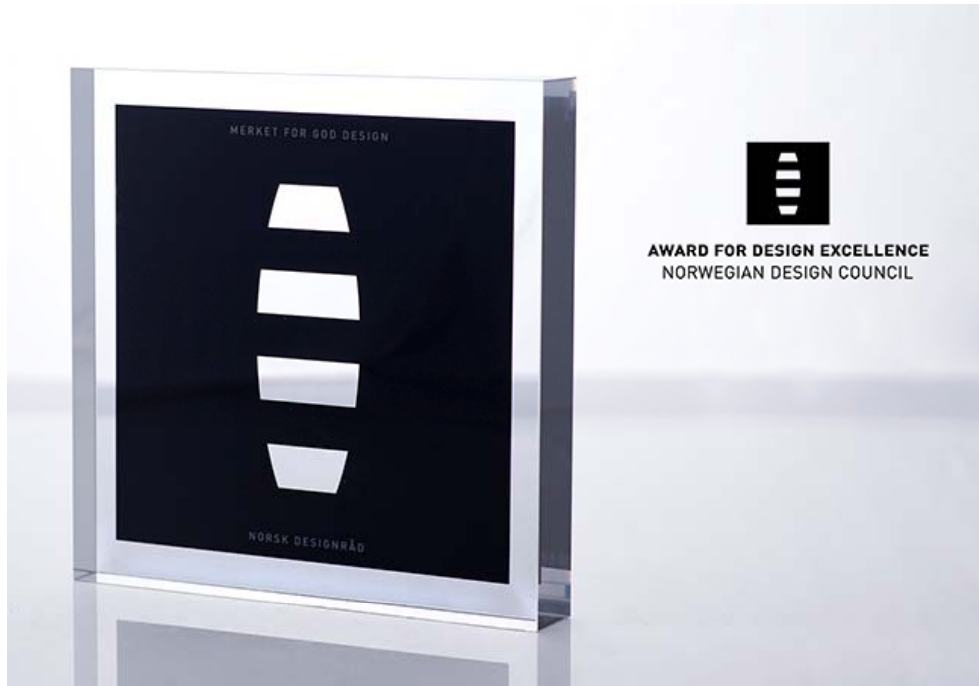


Propulsion and thrust control running on 10"



Automation system, 24"

Award winning design



Interaction design



WINNER
ERGONOMICS
DESIGN AWARD
2015

Ergonomics design award
For the innovative and user
centred design of a ship bridge



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End

Thank you for your attention