

## **Optimising Operator Attention on the Maritime Platform Human Computer Interface**

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**Abstract:** The ‘dark and quiet’ interface principle has been embedded in the design of the Platform Management System for the Royal Navy’s (RN) future maritime platforms. The aim is to minimise attention-getting features that could distract an operator and/or affect situational awareness. The Human Factors Team has worked with a range of stakeholders to design the content and presentation of system information to optimise operator attention during routine, abnormal and emergency operations.

**Keywords.** Human computer interface (HCI), situational awareness, alarms, attention

### **1. Introduction**

BAE Systems are the industry lead in designing a new generation of maritime platforms. Their Platform Management System (PMS) design is optimised for Royal Navy personnel doing real-time operational tasks whilst at sea. Learning from experience on current class showed that elements of the PMS could be improved to optimise operator attention. One important focus was the number of alarms and warnings generated and their presentation.

Alert systems are important for attracting the attention of users; however, generation of excessive alerts is a well-documented problem that can lead to operator overload. This may in turn impact operator situational awareness and performance by reducing effectiveness of the alerting system, distracting the operator from other tasks and masking potentially important information.

In developing the new PMS, two of the design principles related to attention-getting elements of the human computer interface (HCI) were to:

- Reduce workload and optimise attention; by removing clutter and enhancing relevant information.
- Increase speed of operation and reduce errors; by simplification, error resistance and error tolerance.

### **2. Methods**

The main approach has been the application of the ‘dark and quiet’ interface principle, an established concept aimed at reducing visual and auditory ‘noise’. It has been adopted by Airbus (and subsequently other airlines) and referred to as the “dark cockpit”. It is a requirement of Defence Standard 00-250, the Human Factors guidance for designers of systems provided by the Ministry of Defence (MoD).

The reasoning behind the principle is that if the normal condition is less noisy (in visual or auditory terms) then workload is reduced and cues associated with abnormal conditions are easier to separate from the background.

Design strategies utilised that are compatible with a dark/quiet philosophy focused on the content of PMS and how this information is presented.

*Reducing content on pages*

- Simplification of system information and layout and inputs.
- Creation of a detailed design process for rationalisation of alarms and warnings.

*Presentation*

- Reducing use of colour and colour intensity.
- De-emphasising positive indications of health. The interface does not show specific 'healthy' alerts e.g. "on", "ready".
- Reducing flashing and flashing frequency.

Development of a Style Guide has facilitated a consistent approach to the look and feel of the PMS software pages. Pages are drafted by system engineers and are subsequently adapted and assessed by the Human Factors Team in accordance with the Style Guide. The creation of use cases which consider how the page will support normal, abnormal/infrequent and emergency operations aids this process and final static reviews are via discussion with Controls & Instrumentation (C&I) Engineers. All pages including the alarms and warnings browser are assessed following build within an Agile Engineering Capability (AEC) facility. Low fidelity trials are utilised and dynamic reviews and high fidelity user trials will follow with RN crew.

### **3. Results**

*Simplification of system information and layout:* PMS only permanently displays information useful to operators and representative layouts that are considered most operable rather than slavish reproductions of the technical/geographical drawings.

*Rationalisation of alarms and warnings:* The detailed design process has successfully assisted system engineers with:

- Justification of alerts to confirm or establish that they are required.
- Prioritisation of alerts.
- Specification of alarm/warning conditions and settings to avoid spurious alerts.
- Detailed design of alerts, their location, groupings and inhibits.

*Colour:* Colours reduced from 81 to 14. Content has low saturation and just enough contrast.

*De-emphasising healthy state:* Lack of obvious healthy indicators enables the page to retain the dark and quiet look and feel. Some reassurance required to trust that the system is healthy and that a fault has not occurred with resultant data loss. .

*Reduced flashing:*

- Rationalisation of alerts, automatic reset and eclipsing of lower level settings of the same alerts and 'shelving' function reduces the number of flashing alerts.
- Flashing is limited to the place where action is required and stops on acceptance of the alarm.