White paper: clarity and flexibility in maritime operations

Designing an operator-centric maritime control centre

The lack of integration and consistency between maritime control centre systems causes difficulties and delays for operators. Completing even a simple task typically requires the operator to know and execute the precise sequence of commands within multiple different interfaces, wasting precious time and causing stress in emergency situations.

To put operators back in control, Frequentis proposes a design approach for maritime control centre solutions that prioritises the user experience. This approach calls for a unified graphical interface complete with optimised workflows that make it easy for operators to understand events, make decisions, and follow organisational best practices.

From the architectural perspective, the need for openness and flexibility demands a modular approach based on micro services. A solution built on these principles will be easy to adapt to future requirements and integrate with existing control centre technologies. No differentiation should be made between internal and external interfaces, permitting full integration with existing systems and new third-party software modules.

By adopting an open, flexible, operator-centric solution, maritime control centres can further enhance operator performance, while protecting today's investments in technology as a foundation for future demands.

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Today's challenges

Most maritime control centres have a diverse array of old and new systems for managing communications and operations. Even where legacy systems have been phased out, control centre solutions are typically composed of heterogeneous modules that are only loosely integrated with each other. Not only does this approach increase costs and limit the speed of adaptation to new requirements; more importantly, it means that operators have neither a consistent user interface nor a clear, standardised way of working through tasks.

To complete even a relatively simple task, operators will typically need to have a complex 'mental map' of how to navigate through several distinct systems. The lack of commonality in interfaces and the limited integration between systems mean that new users require considerable training to reach the point where they can work rapidly and effectively. Even for experienced users, the requirement to continually switch between systems introduces unwanted latency at every step, raising operator stress levels and potentially hindering accurate and timely decision-making.

During complex and stressful (e.g. emergency) scenarios, the accumulated seconds spent refocusing on each system in the chain could make the difference between a successful outcome and a disaster. And during standard operations, it is easy to understand how operators can end up feeling as though it is their task to serve the machines, rather than vice versa.

Equally, with multiple disparate systems in the maritime control centre, it is difficult for managers to allocate workload across teams, to assess team performance, and to ensure safe and efficient collaboration with other centres. It is also hard for IT professionals to manage integration and security across all systems, and functional upgrades are likely to be slow and costly.
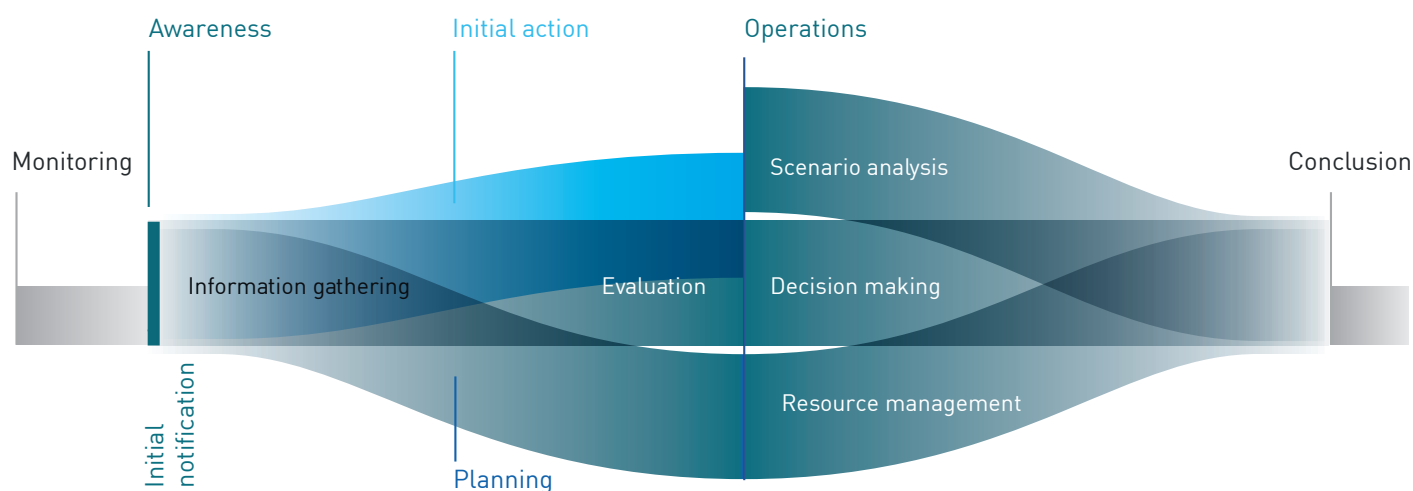

Figure 1: Achieving workflow clarity and control for the operator

Putting the operator in control

Based on deep operational analysis conducted with multiple clients, Frequentis believes that maritime control centre solutions should focus on the needs of operators—with no restrictions from the architectural point of view. The goal is to create a unified user experience and interface, in which functionality is not compromised by any perceived technological challenges.

The operator-centric solution concept should provide an intuitive interface and optimised workflows. This makes it easy for both new and experienced operators to rapidly grasp the situational picture, make the correct decisions, and take the required actions. They can work either on their own, or in collaboration with local or remote operators and other networked control centres from different authorities.

A graphical interface will provide context-sensitive information and tools, giving operators fast and easy access to what they need to know and what they need to do at each natural decision point at each step of the process. Rather than requiring operators to memorise complex paths through multiple systems, the solution should provide an intuitive working environment that enables users to focus on the outcomes they want to achieve.

Open for interoperability and evolution

Beyond user-centricity, the second core design principle is architectural openness. Organisations should be able to start by deploying whichever module or modules they require alongside their existing control centre solutions. The interfaces that connect the new functional modules with each other should be exactly the same as those that connect them to other solutions. This agnostic, open API approach to extending functionality will significantly extend the lifespan of the solution, while also securing its seamless integration with any existing technologies in the maritime control centre. It will also enable organisations to deploy the technology at their own pace and according to their own requirements.

An architecture based on micro services will provide modularity from the ground up, making the new solution easy to customise to specific requirements, and highly adaptable to future functional demands or the addition of new modules. The use of micro services will also reduce the cost of customisation and extension, enabling new functions to be deployed once and used by many different workflows and modules.
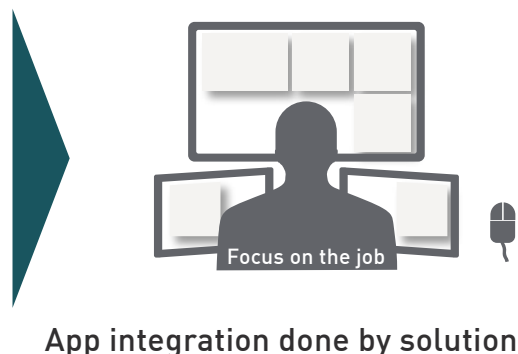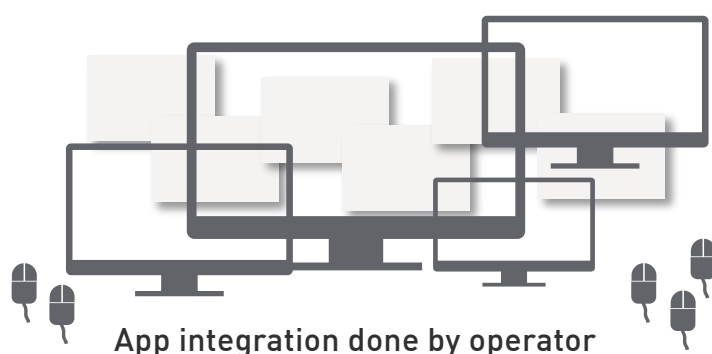
App integration done by operator

Focus on the job

App integration done by solution

Figure 2: User-centric, intuitive working environment

A key requirement is that the new solution be flexible at all levels: operators should have the ability to customise the interface and workflows to their individual needs, and maritime control centres should be able to adapt the entire solution to support their precise requirements. By integrating communication capabilities that enable operators to interact with local and remote stakeholders from anywhere and anytime within the solution, support for seamless multi-centre and multi-agency operations will be assured.

The modular nature of the solution also means that it could be tailored to satisfy the particular needs of the different maritime market segments, such as search and rescue, vessel traffic services and coastal surveillance systems.

Creating a comprehensive solution

Frequentis proposes that solutions for maritime control centres fully integrate voice and data communication capabilities to give operators everything they need for rapid decision-making and collaboration.

With a user interface designed free from technological or architectural limitations, operators are put back in the driving seat. By using system intelligence to promote the most likely functions without limiting what operators can do, such a solution will optimise the workflow and user experience.

Providing critical information and tools via a unified graphical interface will help operators focus on the most important tasks during pressured situations. This will enable them to prioritise their activities, avoid stress, and make sensible decisions. The overall impact will be to improve the speed, quality and efficiency of operator workflows.

For managers, system-wide KPIs will make it easier to monitor performance within and across teams, and to gain insight into the effectiveness of cross-centre/agency coordination. Extensive customisation options—both through user-defined parameters and through the open and modular architecture—will enable the rapid, cost-effective adaptation of the solution to local requirements. Finally, the use of thin-client technology that works on any standard device, from smartphones to workstations, will help keep the total cost of ownership low.

Control centre managers interested in improving the efficiency and effectiveness of operations are invited to speak with Frequentis about modular architecture and practical first steps towards implementing it.