



Case Study

Information exploitation for operational advantage

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Overview

Systems Information Exploitation (SIE) is an analytical tool developed by BAE Systems to securely capture raw data from a naval platform, process the data in real time and transfer it from the ship to shore, even when the ship is deployed away from its home port. It provides immediate assessment, diagnosis and prediction of potential faults so that they can be resolved before they become an operational issue.

SIE provides enhanced decision support to both the on-board maintainer/operator and onshore support staff through the acquisition and analysis of machinery and equipment performance and health data. This allows the user to take swift and corrective action in response to emergent engineering issues, as well as support activities such as maintenance planning.

Working with the Royal Navy, we have demonstrated how our platform knowledge, data science and analytics expertise, coupled with our engineering know-how provides a high-value service which has helped to improve ship performance, reliability and most importantly availability to the fleet.

Examples

A number of active SIE trials have been installed across several Royal Navy vessels, including: Type 45 Destroyers, an Offshore Patrol Vessel (OPV), and a hydrographic survey ship.



1. While being trialled on-board an OPV, SIE detected a fault with an alarm on a temperature sensor, which was causing unexpected issues on the ship. This resulted in a new sensor being designed and subsequently installed across the class of ships. This change reduces the exposure of the engine to high temperature running which may increase the lifespan of the equipment. It also provides the crew with key information to manage their ship appropriately, improving their lived experience and enhancing the reliability of the class.



2. SIE has also been used to find alternative solutions to engineering challenges. A six-week lead-time on a new OEM part for the power system of a complex platform would have resulted in the ship missing its return to service date and significant cost overruns. The SIE project team performed an analysis of historical data, and modelled the behaviour and performance of the component in various scenarios. With the support of this data, a short-term solution was put in place to enable the ship to safely and confidently begin its testing programme, reducing the delay by two weeks and saving substantial overrun costs.



3. Working collaboratively with the Royal Navy, SIE has been used to detect anomalies in the system performance of complex platforms, and has provided insights into the material state of ships during overseas deployments.

Outcome

Providing real-time material state data to help predict and avoid faults, and alert the crew of any potential early warnings, presents a huge opportunity to reduce spend on materials and labour, improve long-term planning capabilities and increase ship availability.

SIE can help to reduce the volume of unplanned maintenance. For example, over the lifetime of a complex platform, data from 16 systems indicates that failure avoidance could result in substantial cost savings, and task automation could amount to significant time savings for the maintainer.

Key SIE capability

- **Assuring operational capability** - continuously characterising and assessing system behaviour and performance, with additional efficiency through automating or prioritising maintainer tasks
- **Risk management** - understanding when failures are likely to impact on operational capability to enable preventative action
- **Design management** - easily integrated on new and legacy platforms, interfaces to multiple and diverse data sources, informing future design decisions and planning for future classes
- **Maintenance planning** - moving to on-condition maintenance, identifying anomalous system behaviour to deliver long term decision support and design intent management
- **Failure avoidance** - detecting equipment degradation and predicting failures for prevention through system degradation and material state
- **Supply chain optimisation** - more effectively manage the forward material demand on the supply chain through improved understanding of material state
- **Diagnostics** - providing rapid test, trials and diagnostics outputs
- **Energy management** - fuel and load optimisation
- **Training management** - feedback from ship operation informs training decisions
- **Deployed support** - enabling engineering support overseas

Conclusion

Ultimately, SIE helps deliver cost savings realised through improvements to ship performance, reliability and availability.

Deployed appropriately, SIE can help to inform future information requirements, provide greater decision support and timely material state awareness to optimise on-condition maintenance and the provision of continuous engineering and deployed support.



SIE is part of PropheSEA Prognostics, which forms part of the PropheSEA toolkit - an integrated suite of capabilities and tools for digital asset management.

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