



Maritime Innovation Challenge

Short-listed Small to Medium-sized Enterprises (SMEs)





This document introduces the nine short-listed Small to Medium Sized Enterprises (SMEs) and their submissions to the Maritime Innovation Challenge.

Each submission applies innovation to one or more of the three Categories of the Challenge: *Peer-to-peer Knowledge Sharing*, *Data Visualisation* and *Knowledge Capture*. The short descriptions here are those provided by each SME as part of a more detailed submission.

The SMEs are listed in the order that presentations to be made to the Maritime Innovation Challenge Judges on 13th April 2016 at Royal Navy Command Headquarters, Portsmouth.

The overall winner and Commended entrants are to be announced on the second day of the Defence Information '16 held at the Defence Academy, Shrivenham. The UKCeB organises this event in conjunction with Cranfield University¹. The winner of the Maritime Innovation Challenge will receive a prize of £50,000. All entrants have been successful in raising their profile in the defence sector.

We're delighted that the Maritime Innovation Challenge has attracted a healthy number of quality entrants. It provides a great showcase for SMEs and also helps them better understand the market opportunities in defence. This Challenge has given SMEs an attentive audience and it opens the potential for business opportunities, regardless of whether an SME is the prize winner.

Please review these interesting innovation proposals and use the links to find out more about these companies.

*Phil Williams – Chair of Judging Panel for the Maritime Innovation Challenge
and UKCeB Managing Director*

¹ The flyer for DI'16 can be downloaded at <https://secure.ukceb.net/filerequest.php?id=1004802>
Maritime Innovation Challenge – Short-listed Small to Medium-sized Enterprises (SMEs) www.ukceb.net 2

What is the Maritime Innovation Challenge?

This exciting competition was open to Small to Medium Enterprises (SMEs) regardless of whether they operate in the defence sector. Entrants were given a maximum of 2 months to prepare their submissions to this Innovation Challenge which provides excellent market exposure and publicity to SMEs as well as the chance to win a £50,000 prize and award.

The Innovation Challenge was for SMEs that have relatively high-readiness technologies and solutions that could offer innovation to the Maritime and the wider Defence sector. The solutions to the three Challenge Categories need to aid predictive, near-real time and evidence-based decision making in order to:

- a. Improve asset performance (availability, capability and readiness)
- b. Be 'safe to operate and operate safely'
- c. Reduce through-life costs

In collaboration with Navy Command, Babcock Marine & Technology were sponsors for the competition. This Challenge is being managed by the UKCeB with support from major trade organisations [ADS](#) Group representing Aerospace & Defence and Security and [techUK](#) for suppliers of Information & Communications Technology. Collectively, with UKCeB, they represent 100s of companies, including SMEs. UKCeB provides a trusted forum for MOD and Industry to work together on Secure Information Sharing across Team Defence, both in the supply chain and support network.

Capt Paul Marshall said, "The Royal Navy's fleets use sophisticated technology and, increasingly, the Navy seeks to leverage information technology to exploit data to improve predictive, near-real time and evidence-based decision making. In this Maritime Innovation Challenge, we are keen to discover where and how SMEs can help the Navy make a real difference. This exciting Challenge provides an excellent opportunity to help us to capitalise on different approaches to gathering and exploiting data."

"I look forward to helping judge the SME's entries. Whilst there can only be one winner of the £50,000 prize, I'd like to think that all entrants are 'winners' in terms of them having the opportunity to showcase their innovative products and services to an attentive Navy Command, with the possibility that we take forward great ideas into the Fleet."

The SME winner of the Maritime Innovation Challenge will be announced on the second day (21st April 2016) of the [Defence Information 2016](#) Event.

STS Defence Ltd - IConIC – Intelligent Condition monitoring with Integrated Communications®

<http://www.sts-defence.com>

Summary

Project IConIC (Intelligent Condition monitoring with Integrated Communications) will provide the marine industries with an advanced automated condition monitoring system for a range of engines; from direct-drive diesel, through to decoupled electric propulsion configurations. Crucially it is being designed in consultation with marine industry end users to ensure maximum impact spanning the whole marine sector.



The innovation in the IConIC project lies in two key areas. Firstly, faults on the diesel engine are being detected in a noninvasive way and retro-fittable way, providing a quantifiable measure of engine health as opposed to simple threshold based systems. Secondly, the project is developing a model of a maintenance decision making system to identify the optimum response to faults, including scheduling of spares.

IConIC as a product will realise the benefits presented by these innovations by using existing satellite and hybrid communications solutions to coordinate information on a cloud based server, such that when first faults signs are identified, spares and engineers can be prepositioned and scheduled for optimal response.

By early 2017 IConIC will be a beta product utilising multiple graphical user interfaces (GUIs) designed for engineers and crew, and ship's operators in fleet management offices shore side, to enable optimisation of vessel performance based upon the information generated.

MyOxygen Ltd - Press/ Mobile Communication App

<https://www.myoxygen.co.uk/>



Summary

Press/ is a Mobile app platform that MyOxygen has developed, initially, as a sector-specific news app, bringing in related news feeds through a backend aggregator so people in that sector can get a focused look at the latest news that's specifically relevant to them. The app has been developed for Android and iOS as well as a website allowing content to be pushed out to the apps.

Press/ has since been developed further to also function as an internal communication tool, allowing organisations to publish news to their employees through the Content Management System (CMS), along with brief shots of information through mobile push notifications.

Currently Press/ is effectively a straight forward news app, allowing users to scroll through and read the latest news. As we engage with more potential users of the platform our roadmap for further additions continues to grow and the feature set moves forward. Some of the plans on our roadmap include the ability to read the articles via a web browser (rather than just in the mobile app), receive email digests of articles and extended support for videos and other media.

In order for Press/ to be a suitable solution in respect to the innovation challenge we would propose at least the following additions:

Allow publishing of 'articles' from within the app, with optional video/photo(s), such that engineers could share their own knowledge with others or reach out for assistance.

Support for commenting on articles to provide users the ability to make and answer queries on an article. This feature is already on our roadmap.

Estatom Systems Limited - Fornax Engine & Polymach API & Programmer

<http://www.estatom.com>



Summary

Estatom offers a proprietary, powerful and intelligent Object-based Operating System (O.S.) integrated with a programmable Object database. Estatom has written every line of code, making no use of open-source code or other applications. Estatom's technologies are the Fornax engine and the Polymach API and Programmer. They are hardware, software, network and windowing independent, delivering machine-2-machine communication without need for 'translation'.

The software is extremely fast and flexible, and delivers efficiency, correctness, security and usability in and for current and future technologies. Data are understood by all Fornaxes, regardless of the computer, computer chip or operating system in/on which it resides.

A Fornax port provides the hardware interface to the OS or processor on the one side, and the Universal Virtual Computer on the other. The footprint is c.250KB makes it suitable for the smallest chips and micro-devices, through to phones/tablets, pc's, servers and advanced architectures. For embedded systems it is an O.S. or it can co-reside with the incumbent operating system in larger systems.

Extremely fast, scalable and robust, the system is able to handle unstructured data, and is 'machine independent', highly programmable and able to be embedded in hardware and silicon. Security is inherent – it cannot take viruses and cannot crash.

The technologies have significant applications in disk sub-systems, processing systems, artificial intelligence, robotics and systems integration.

The technology delivers cost savings because:

- Data is always readable; addressing backwards compatibility and future-proofing systems.
- Software development, configuration and maintenance of systems is reduced by many magnitudes.
- The technology deskills programming, as it does not require a programming language.
- It is easily integrated into existing device configurations owing to the Universal Computational Environment.
- The footprint provides significant savings in processing, memory, network and storage and the intelligent reuse of Objects in data transmission provides power, network and bandwidth savings.

Eurostep - ShareAspace Nova (version 8)

<http://www.eurostep.com>

Summary

Eurostep propose to apply their ShareAspace product to provide a consistent, connected data set across the full information space that is required by the

Maritime Innovation Challenge: from specialist systems managing and diagnosing sensor data to recording accurate configurations of vessels and their systems together with the supporting technical documentation and other information such as warranties, and from on-board to on shore. This consistent data set will provide the basis for lower risk decision making and for presentation of current status alongside correct reference information such as design data.



The innovation in Eurostep's approach is to recognise that it is possible to collect information and manage change across the information held by the collection of systems used by the Royal Navy. The approach, using a collaboration hub based on the ISO standard for Product Life Cycle Support, allows for existing diverse systems, management of change, and creation of consistent information within one ship and across the fleet. The use of a collaboration hub is robust to IT systems obsolescence as well as changes to vessels configuration. It also allows for synchronisation on a 'when possible' basis between on-ship and on-shore and across the fleet. This can include both design information and experience from encountered issues and actual maintenance. Lastly, by virtue of organization and individual access controls, the hub can be used to give access to partner organizations such as the members of the Surface Ships Support Alliance.

The proposed approach does not explicitly address one of the Maritime Innovation Challenge areas. Solving one in isolation adds to the problems unless consideration is given to how to create a joined-up capability which is the focus of this proposal. Providing consistency, managing feedback and change across all challenge areas is where Eurostep can bring standards based innovation to the Royal Navy.

Virtual Reality Simulation Systems Ltd - Virtual Reality visualisation suite

<https://vrsimulation.co/>

Summary

Our proposed solution seeks to replicate the operation of key processes and equipment from a ship and visualise this content across multiple virtual reality platforms. The use of Virtual Reality then allows a user to interact in a virtual world using the tools and equipment which are available in the real world.



The aim being to create the capability to allow the crew to undertake real time risk assessment, decision making and ongoing continuity of operations. The use of virtual reality can replicate a situation very quickly and ensure crew are able to make an informed decision. For example, maintenance issues could be virtualised with an actual database used to inform the user as to which parts are available. The actual maintenance requirement could first be undertaken in a virtual environment allowing a far more efficient and effective solution to be carried out on board the ship.

The proposed use of virtual reality will improve the understanding and material state of a ship and help assess asset condition. The use of Virtual Reality could also eliminate unnecessary maintenance checks, avoid unexpected downtime, reduce in-service support costs and importantly reduce operating costs.

Aspire Consulting Ltd - Enabling the Engineer – Pragmatism and Innovation

www.aspirecl.com

Summary

The proposal focusses on the activities of the RN maintainer. Robust and extant technologies are brought together in order to facilitate the engineer's task, to improve job satisfaction, to facilitate the effective collection, collation, and utilisation of data in order to improve maintenance, to reduce TLC and increase operational availability.



The aim of this proposal is to eat the elephant in small bites, to initiate a process of continuous evolution and development. Extant, low risk and affordable technology will be deployed to deliver immediate benefits. This establishes a virtuous cycle, by demonstrating the technical and financial feasibility of such approaches.

The technologies deployed are:

- Radio Frequency Identification Devices [RFID]
- Bluetooth beacons
- Portable Devices, i.e. tablets or mobile phones, which are used to provide a simplified, portable front end to complex back-end systems, such as a ship's Maintenance Management System [MMS]
- XML/XSLT technology to render the movement and collation of data from and to support IT systems such as the ship's MMS to portable devices virtually transparent to the user.
- The Internet of Things [IoT] – basically allowing any number of devices, providing they have an IP address and a connection to the internet (or intranet) to communicate with each other.

In combination these technologies allow a great deal of data to be captured automatically, manual data entry is minimised, that required is performed immediately at the time and the location that maintenance tasks are performed. The approach facilitates the sharing of each engineer's experience and insights when performing maintenance tasks using social networking techniques.

Limitations, e.g. imposed by the installed MMS for example, will be addressed by implementing practicable workarounds in order to maintain momentum.

The entire concept can be trialed, using a physical and software demonstrator on a 'desktop' before deploying on an active vessel.

Warwick Analytics - MAPM - Maritime Automated Predictive Maintenance

<https://warwickanalytics.com>



Summary

MAPM – “Maritime Automated Predictive Maintenance” – is a proposed solution from Warwick Analytics developed using proprietary algorithms spun-out from the University of Warwick. MAPM is a solution which takes both the live and static data from maritime fleets to automatically predict issues, and also recommend how to obviate or resolve them with live corrective actions and/or maintenance. The key benefits are increasing availability, saving costs and improving safety. It also has the advantage of not overloading the Monitoring Team with a plethora of new dashboards, or endless alarms. The interface is simple and intuitive, and raises alerts only at appropriate confidence thresholds, which can then be investigated and validated accordingly providing potential solutions i.e. sets of business rules (aka ‘regions’) that define the problem and recommend actions.

The original algorithms were developed over a decade of academic research to handle dirty, incomplete, heterogeneous and unstructured data and automatically generate predictive signals without requiring a data scientist. The algorithms are ‘parallelised’, meaning that they can calculate predictions with any sized dataset in near real-time using, if required, more distributed processing capacity. It is understood that maritime data can sometimes be ‘small data’ as well as big data, particularly from older vessels. There are also unstructured data in terms of maintenance reports, often within which there is a great deal of insight.

MAPM is extended from existing commercially available technology which is used for predictive maintenance in the aerospace, rail, automotive, energy and other equivalent industries with similar business and data challenges. Users include Rolls-Royce, GE, Airbus, E.ON, JLR and VW. There are also synergies for the Army and Airforce, some of these capabilities indeed which have been validated in InnovateUK grants (viz. “ARCA” – Automated Root Cause for Aerospace where Airforce LITS datasets were used) and initial briefings with DE&S Land Vehicles.

One Network Enterprises (Europe) - The Real Time Value Network (RTVN™1)

<http://www.onenetwork.com>

Summary

The ONE cloud platform, the Real Time Value Network (RTVN™) plus a suite of business applications, is a proven and effective many-to-many multi-party capability. RTVN is built on a PaaS framework called Developer Network (DevNet) and is supported by a common data model tailored for a variety of industries including Defence, known as a Core. This is a Fit-to-Purpose Off-the-Shelf (FTPoS) rather than a traditional COTS approach. DevNet is also offered as a platform service to our customers, including the US DoD. This disruptive business model and technology allows us to price, deploy quickly and support solutions based on actual use of the solution. The resulting supported capability delivers a better solution in an average of half the time and at a fraction of the cost of the traditional model.



ONE has responded to Challenge 2 offering a RTVN based Internet of Things pilot developed for the USMC, which consumes a range of sensor data sources from platforms, in this case Amphibious Assault Vehicles (AAV), detects problems based on bespoke alerts and recommends a solution. The pilot supports multiple roles from an engineer on the ground (or at sea) to a fleet manager in the home base. For Challenge 3, delivering a 'Single Version of the Truth,' we have responded with 3 established capabilities. Using the RTVN as a platform, with embedded enterprise social applications (Enterprise Social Graph (ESG)) for group and / or point to point collaboration and up to 40 existing Enterprise Network Optimisation (ENO) agents, we can deliver real time enterprise wide collaboration and knowledge exploitation. Our submission for both challenges outlines the capabilities in conceptual and benefits terms using Defence, CPG and Automotive industry case studies where relevant, demonstrating our ability to improve asset performance and reduce through life costs.

BOXARR Ltd - BOXARR – One Platform | Multiple Applications

<http://www.boxarr.com>

Summary

BOXARR is an enterprise-class software platform; enabling users to effectively model, visualise, analyse, and optimise static/near/real-time information from disparate source across the military enterprise; on a “realworld” massive scale.



Users can collaboratively build and operate unlimited models, incorporating millions of objects – where each element can be assigned with multiple custom data fields. Users visualise information in multiple contexts, perform analyses and simulations, and solve challenges of complexity, inter-dependency and optimisation.

BOXARR enables the enterprise to efficiently aggregate information from virtually any source by leveraging the existing data/signals channels across the organisation (e.g. central IT; remote/forward operating commands; field, fleet and air vehicles/vessels and personnel; etc.). In turn, new data/signals technologies can be readily incorporated.

Models become effective organic knowledge-bases within which virtually any specialist knowledge and experience can be easily recorded and retained, in practical and inter-dependent context. Information can be readily shared and accessed across the organisation at the time/place where most benefit can be derived. Enabling problems to be solved locally encourages all aspects of the enterprise (and external partners) to capture and aggregate data.

BOXARR models can be “collapsed” to provide fully customisable holistic cumulative overviews of information within the model. This “data as a dashboard” represents ‘granular truth’ which can be immediately mined and analysed – enhancing the speed and quality of decision making. BOXARR’s value extends across the entire enterprise including (but not limited to): systems engineering; production methodology; supply-chain; operational process; programme & mission planning/execution; operational support; maintenance and logistics, intelligence, and in-theatre operations.

BOXARR has been adopted by many of the world’s leading defense and aerospace organisations to optimise their operational performance. BOXARR represents a powerful, proven, and scalable technology with the potential to deliver significant innovative and transformational value across the military enterprise; and effective collaboration with industry partners and global allies.