

NEWS



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Inside

- ② **3G on the battlefield**
Next generation naval communications architectures
True open systems
- ③ **12 month extension delivers research for future weapons**
Consortium for logistic research delivering real benefits
Helicopter Hostile Hit Indicator moves a step closer
- ④ **Enhanced DECKsim product offering from SEA**
Training Needs Analysis and Instructional Design
Common Simulation Framework: Q&As
- ⑤ **ROADflow Flexi – Level Crossings**
Bus lane enforcement for Hertfordshire
SEA Information Systems, Simulation and Training
- ⑥ **EarthCARE, BBR and SEA.**
The story so far
- ⑦ **A sharp eye on the world's weather**
Clean Sky initiative leads the way to greener aircraft
Can ultra low power sensors save industry time and money?
- ⑧ **Briefing**





3G on the battlefield

In both the commercial and military domains, telecommunications infrastructure is evolving at a rapid pace in order to satisfy the consumer's increasing demand for data services. Bringing commercial technology into the military domain, however introduces the additional complexities of security, assurance, resilience and limited resources.

SEA has been researching on behalf of the MoD the opportunities that exist for the military to gain advantage from technology advances in the telecoms industry, specifically in the field of 3G cellular Smartphones and Femtocell development.

By leveraging such consumer technologies the defence sector can implement step changes in communications performance whilst at the same time reducing the development cycle time and research costs. There are of course trade-offs between equipment designed for commercial markets and that required for defence use; but bridging the gap to provide capability need not automatically mean a fundamental redesign to turn COTS into MOTS. SEA has developed and



3G on the battlefield. SEA could provide a low-cost COTS-based solution that solves both voice and data discontinuity issues

trialled 3G systems that offer ultra-low latency, high-bandwidth, reliable data pipes that provide a low-cost and flexible acquisition route to the commercial technologies. These commercial technologies provide cutting-edge

performance whilst security and robustness issues can be solved for the military user without drastically increasing cost.

Please contact richard.deighton@sea.co.uk to learn more.

Next generation naval communications architectures

Communications systems have traditionally evolving by adding or replacing independently developed stove-piped sub-systems, resulting in an incoherent overall system architecture which consists of a muddle of incompatible sub-systems.

SEA's network-based communications architecture, currently deployed on in-service submarines and planned for future UK submarines, with the SEA Network Interface Unit (NIU) at its core, is designed to overcome this problem. Openness and standardisation are key features, and the use of networks at the heart of the infrastructure enables centralised control and management and allows a flexible office layout.

Short-term affordability constraints often limit the scope for the redesign of a complete communications system, however the flexibility in the SEA design is able to accommodate legacy subsystems alongside newer components and thus enable an incremental evolution towards the ideal architectural



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solution. The NIU architecture also allows for multi-vendor supply of communications components and therefore provides an open industrial landscape.

NIU-based systems are also easily upgradable and scalable and this allows for the rapid introduction of the advancements necessary to maintain interoperability with other parties as communications technologies and methods evolve, particularly for network-based systems. This combination of features offered by the NIU will achieve significant fleet-wide through-life cost savings.

True open systems

SEA is the independent Sonar Architecture Advisor (SAA) supporting MoD DE&S UEW. The company assists by monitoring and assessing S2054(IR), the Sonar 2054 inboard replacement. It also reports on the suitability of the open architecture design and implementation for obsolescence avoidance, cost-effective support, and the ability for third parties to engage for algorithm insertion.

Suitable 'firewalls' are in place to ensure that the rôle is implemented as an independent and impartial delegated body that is not party to any sonar related product development within SEA.

The SAA uses the same methodology employed elsewhere for S2087 SDE and for the Osprey S2087 OATD, which includes a formal scoring method for assessing and monitoring the openness of the architecture. SEA provides advice regarding selection of technology and standards to ensure openness is maintained and to provide advance warning of obsolescence. The SAA will also take responsibility for managing the configuration control of the Sonar Generic Open Architecture (SGOA) when it has been delivered from the System Integrator at the end of development.

12 month extension delivers research for future weapons

Future Dismounted Close Combat 2 (FDCC2) has just delivered a 12 month extension to the original 3 year FDCC contract (2007 – 2010).

The extension focused on providing pre-concept phase research into the future Soldier System Lethality programme (SSL). This programme relates to the replacement for the SA80 weapon family in the 2020 timeframe.

Sid Keyte, SEA's Project Manager said: "Heading up a consortium that included Cranfield University, Roke Manor Research and Lockheed-Martin, we have successfully

delivered research that ranged from establishing capability requirements and firepower mixes from 2020 to 2040 through to low-level research into electrically initiated weapon systems, human firing dynamics and weapon networking."

The success of the FDCC project over the last 4 years has ensured a further year's extension and FDCC3 will be on contract shortly.

Image: Copyright MoD

Consortium for logistic research delivering real benefits

SEA continues to lead a large consortium of companies which deliver the UK MoD's Expeditionary Logistic Research. The Consortium task is to deliver cost-effective, high-quality and responsive, research across the Maritime, Land and Air environments.

As the MoD's logistic programme of research covers a wide variety of areas the consortium includes companies and academic institutions with expertise in modelling, vehicle development, power generation, ship design and building science. By working closely with Dstl and the logistic operational staff, the consortium is able to deliver applied research by some of the country's leading research scientist. In the last year the ELS Consortium has conducted research into medical support, maritime sustainment and logistic support to current operations. In 2011 this broad programme of research is continuing with the consortium conducting research into maritime, medical and land logistics.

The strong relationship between SEA, its industry partners and Dstl, which has been developed over the years, ensures value for money research delivers benefits that would otherwise not be easily available to the MoD.

Helicopter Hostile Hit Indicator moves a step closer

In the noisy and task intensive world of military helicopter operations it is not always possible to detect strikes by incoming rounds.

Following the success of Hostile Hit Indicator (HHI) Phase 1, in which SEA demonstrated the use of existing sensors to indicate hostile hit detection, the company has been awarded a second round of funding from

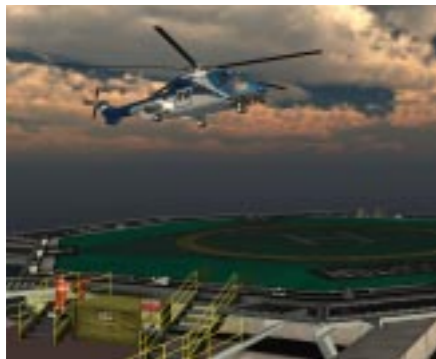
Dstl to develop enhanced capabilities and support more extensive trials. Phase 2 will take HHI from TRL4 to TRL level 5 (on aircraft real-time) by providing an indication of shooter direction. HHI will utilise SEA's Continuous Vibration Monitoring (CVM) Unit and existing sensors on aircraft, minimising the cost of aircraft integration providing an urgently needed capability that can be deployed quickly.





Enhanced DECKsim product offering from SEA

SEA has recently completed development of a commercial variant of its DECKsim system. The system, which enables immersive Helicopter Landing Officer (HLO) training on commercial oil and gas platforms, adds to the portfolio of the Training and Simulation capability at SEA.



DECKsim is a high-fidelity, immersive flight deck operations (FDO) training solution offering a broad range of instructor-led training scenarios including marshalling, fire fighting, passenger and cargo transfers and VERTREP.

Powered by the SEAviz visualisation engine, it provides a realistic, virtual training environment within which the FDO procedures can be safely and effectively taught, whilst

dramatically reducing the flight hours and associated costs.

Historically, DECKsim has been focused on military naval customers; however our recent product developments support a broader range of platforms, assets and training scenarios, enabling SEA to compete successfully in the civil and commercial training domains. The commercial variant of DECKsim can be deployed both on- and off-shore.

Training Needs Analysis and Instructional Design

SEA has extensive experience in the Training Needs Analysis (TNA) and Instructional Design domains. SEA is conducting TNA among various MoD projects in accordance with Defence Systems Approach to Training (DSAT) principles for platform systems including work for the new Queen Elizabeth Class aircraft carriers.

Following the principles of DSAT, SEA is able to fully analyse training needs and recommend the final training solution thus

ensuring the most cost-effective method is chosen to meet the training requirement.

Brett Osborne, SEA's TNA lead explains: "Once TNA is complete, SEA is able to design the bespoke training solution. Using our in-house expertise in the field of Instructional Design enables us to work with the customer's SMEs to design Scalars, lesson plans, electronic media and training devices to both meet the need and provide an interesting and challenging learning experience."



Common Simulation Framework: Q&As

Joint Battlefied Training, Simulation and Synthetic Environment (JBTSSE) IPT's John Brookes (CSF Project Manager) and Katherine Ferguson (Section Lead – Command and Staff Joint Training) with Andy Whitfield (SEA's CSF PM) take a look back at the Common Simulation Framework (CSF) Project's concept, solution, capability and benefit.

Andy: "The extent of the benefit of CSF was not entirely understood at the beginning of the project. What did you expect the CSF System would deliver as its key requirements?" **John:** "From the JBTSSE PT point of view, CSF is a means to deliver wider training capability closer to 'theatre' environment in a cost effective way. It will allow us to run exercises combining several of the existing large Army training facilities which will give more diverse training from a collective training environment which is already heavily used."

Katherine: "...and it will achieve this by providing the flexibility and adaptability to join together systems that previously couldn't speak to each other and also bringing operational systems into the training environment without modification such as the Command and Control System and Joint Automatic Deep Operations Control System."

Andy: "...so CSF provides a platform to better "train as you fight", but what other benefits do you see from CSF integration?"

Katherine: "We are starting to see the value of joining other training systems together. Currently the requirement spans some key areas of Land training but there is interest in CSF interoperability from Artillery, Support and Attack Helicopters and Naval training as well."

John: "In trials, we (MoD) have found that CSF gives us more opportunity to expose trainees to integrated systems as they would use in theatre. This will have a huge benefit on their early value to operations."

Andy: "So there will be a clear benefit to Operations. What about other efficiencies?" **John:** "There are benefits in saving us (MoD) money but more realistically it is enabling us to do more with the same budgets. Training serials can achieve wider training requirements and introduction of operational systems into training has proved, through CSF, to be vastly more cost-effective."

ROADflow Flexi – Level Crossings

Once again SEA has successfully demonstrated the versatility of the new ROADflow Flexi platform.

So far this re-deployable system has been proven for bus gate and bus lane enforcement. The latest development by SEA's engineers has successfully proven that this all weather solution can effectively improve safety on level crossings.

Without the need for user intervention, as required by traditional 'Attended' systems, Flexi is able to automatically detect vehicles attempting to skip lights and barriers using complex, yet robust, video analytic algorithms. The system generates compelling evidence packs which are securely sent to a back office system for processing. This intelligent system is able to avoid the expensive and time-consuming process of integrating with existing rail infrastructure and can be re-deployed in a matter of hours.

This latest development by the SEA team is yet another example of our commitment to improving safety on roads across the UK.



Network Rail statistics show that there were 3,446 recorded incidents of misuse at level crossings across Britain in 2010. Top image: ©Network Rail



Bus lane enforcement for Hertfordshire

Hertfordshire County Council has selected SEA as prime contractor to provide a complete end-to-end bus lane enforcement system using the ROADflow traffic enforcement product.

Working with Imperial Civil Enforcement Solutions, SEA will provide a seamless traffic enforcement solution providing the full managed service, from infringement detection to the issue of penalty charge notices and the management of notice appeals.

To assist Authorities in achieving more for less, SEA is offering ROADflow Fixed and Flexi units on an efficient per event service basis, providing an Authority the following capability as standard without having to raise a capital spend application:

- A fully installed and commissioned ROADflow Fixed or Flexi system
- 3G Wireless communication of evidence pack data
- VCA Certification

- Back office evidence review, PCN issuing and claims handling procedure in accordance with the Traffic Management Act 2004
- Flexibility to provide a fully managed service or part choice of in-house staffing with full system training for operators
- Remote system availability monitoring and maintenance
- Simple incorporation of ROADflow Mobile units if subsequently required

Greg Udall, SEA's ROADflow Product Manager, said: "SEA has integrated the ROADflow product suite with all major back office providers, allowing Authorities freedom to adopt ROADflow without being tied into a single back office provider. We would be pleased to conduct a free site survey to establish the type of installation required and undertake demonstration of the deployable Flexi system."

Contact Greg at greg.udall@sea.co.uk

SEA Information Systems, Simulation and Training

SEA has recently combined its Information Systems, Simulation and Training capabilities in to a single capability area that addresses all of SEA's domains. SEA has a long track record of delivering Information Systems design and development services to transport clients such as Network Rail and Transport for London and simulation services for operational evaluation and training purposes to Defence clients.

SEA's information Systems range from Asset Management to Train Routing through to CCTV analysis using video analytics to a diverse collection of transport clients. Our simulations have de-risked the activities and equipment involved in helicopter landing on naval ships and the recovery of submersibles in high sea states. SEA has trained operators and maintainers in the handling of high-risk situations.

This capability grouping is ideally positioned to take the cost and safety benefits of simulation to the transport market and the benefits of tailored Enterprise Information Systems to the UK MoD and beyond.



Image: EADS Astrium



t is in its final phase.

EarthCARE, BBR and SEA.

EarthCARE is a major European and Japanese satellite programme. With a mission cost in excess of £500M it is one of the world's most significant space programmes. On board will be an imaging lidar (ATLID), a multi-spectral imager MSI, an mm wave radar (CPR) and a broad band radiometer (BBR).

SEA's contribution is considerable – the company being involved in the development of all instruments.

Dr Nigel Wright, SEA's Project Manager, has the latest...

The story so far.

SEA is Prime Contractor for the BBR and the programme is advancing towards the Critical Design Review later this year following completion of the key technology proving, engineering and qualification milestones.

The BBR is planned to be the first instrument to be integrated on to the satellite, providing images of the Earth from space with multiple viewing angles and unprecedented precision across a spectrum from the ultra-violet through the visible spectrum and out to the mid-infrared.

Scientists will use this information to significantly improve their understanding of the physical processes in the Earth's atmosphere and improve their models of radiative transfer processes particularly in clouds and aerosols.

A sharp eye on the world's weather

SEA is pleased to announce that it has been awarded the maintenance contract for EUMETSAT's ASCAT Calibration Transponders. The ASCAT systems are expected to be in operation for 15 years to support the Metop series of satellites, the second of which is due to be launched next year. The value to SEA in this first year is approximately 250,000€ including initial setup tasks to secure long-term operational calibration activities.

This needs extremely high accuracy and stability in the radar performance which is assured by periodic calibration and regular monitoring by three calibration transponders in Turkey, these were designed and installed by SEA and QinetiQ with the operation of the transponders now transferred to EUMETSAT in Darmstadt.

Due to their high accuracy, these transponders have helped to calibrate and maintain the high value of the ASCAT scientific products, EUMETSAT has recognised the need for their continued operation and engaged SEA to maintain the systems using a combination of remote monitoring and annual on-site inspection.

Eric Pritchard, SEA's project manager and technical lead for the calibration transponder maintenance commented: "The quality of the results obtained from ASCAT show how accurate ground-based calibration and monitoring through radar's life can be a very cost-effective way to enhance the value of meteorological satellite data, which is often overlooked in the overall system design. SEA is proud to have contributed to making ASCAT the best calibrated and most accurate space-based radar in service, and look forward to the continuation of this excellent working relationship."



ESA - AEOS Medialab

The Metop series of satellites monitor wind speed and direction around the world for forecasting and climate models, using the Advanced Scatterometer Radar ASCAT.

Can ultra low power sensors save industry time and money?

Most readers will be familiar with wireless communications, such as the WiFi systems that provide network access without a cable. They work best where the supply of power is not an issue and there is a minimum of competition for the available bandwidth, conditions that are not always guaranteed in an industrial environment.

SEA has just completed a technology development study for the European Space Agency for the development of an ultra low power proximity network of sensors for use in spacecraft testing, planetary surface communications and even internally to a satellite or launcher. Key issues were to assure that the signals arrived within defined time scales, without interfering with other data and that they could operate at sufficiently low power to survive for the required lifetime. The UK Space Agency has now tasked SEA to look at possible spin-offs into other environments where the characteristics for space high-reliability, determinism and minimum risk of electromagnetic interference are required.



SEA's Dr Alan Fromberg explained: "Potential benefits to industry particularly during maintenance could be significant. For example the next generation of nuclear power development will require prognostics to meet UK regulatory requirements without impacting the fundamentals of existing certified design. Given that the cost of down-time on a nuclear power station is up to £500k per day, a demonstrated sensor suite reducing outages by even a few days per annum is known to be of great interest to generators."

1 Detectors Key to development

With the requirement to image the Earth from 0.2µm to 50µm wavelengths the detectors are a key item in the development programme. The custom MEMS-based bolometer array incorporates a specially developed 'gold black' coating which ensures a uniform response over the complete spectral range. MEMS technology has enabled the miniaturisation of bolometric detectors in order to achieve the custom area array format required for the measurements. Performance of the detector array and the special coating processes has been demonstrated and the qualification model programme is nearing completion.

4 Telescope Assembly and structure

Other key elements of the instrument include the Telescope Assembly and Structure and the Instrument Control Unit (ICU) which provides the interface to the satellite, controls the mechanisms and interfaces with the detector and focal plane electronics. Following board-level testing and hardware/software integration, the Engineering Model integration has been fully assembled for the start of unit level testing with the platform interface simulators. The ICU incorporates the radiation hardened LEON 2 processor together with several bespoke FPGA developments that have been designed and developed in compliance with the new ECSS-Q-60 standard.

2 Long-life mechanisms Improving detector performance

Detector performance has to be further improved by a well known 'chopping' technique which exposes the detector alternately to the scene and to a controlled temperature background. This requires a mechanism that will run in the vacuum of Space for more than 600 million revolutions without stopping and this requires a special 'dry lubricated' bearing technology that has to be demonstrated through an accelerated life test. The life test replicates all aspects of ground handling, launch and in orbit operations using identical electronics and control laws to those that will actually fly. Having completed the initial stages including vibration testing the life test is in its final phase.

5 Atmospheric Lidar and Multi Spectral Imager

SEA's specialism in high integrity electronics has enabled it to become the supplier for instrument electronics for both the Atmospheric Lidar and Multi Spectral Imager instruments. Each of these instruments has very specific requirements to ensure that maximum performance is achieved and SEA is able to provide a custom solution for each instrument whilst leveraging the benefits of a common processing architecture and power conversion and conditioning. These ICUs have completed PDR with preparations underway for the build of the Engineering Models.

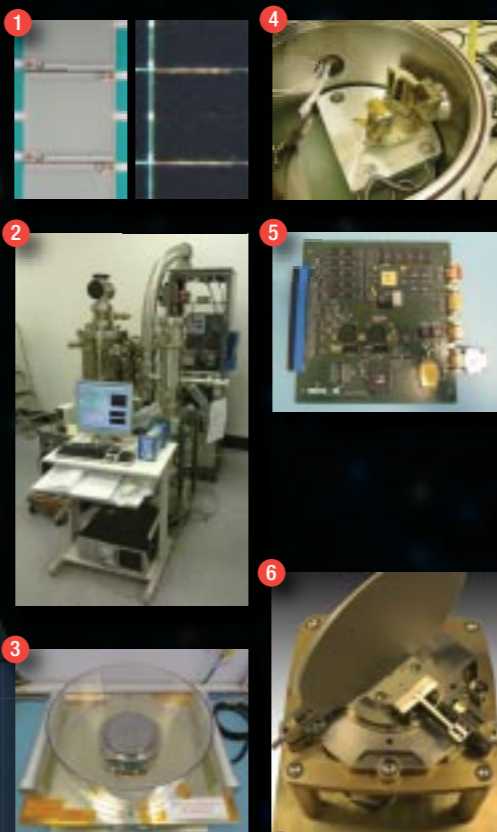
3 Black Body Precise data calibration

For any instrument, precision is only useful if the data can be calibrated and traced to definitive source standard. The calibration of the BBR depends on 'black body' sources. To ensure the precise alignment of the black bodies, the upgrading and qualification of an airborne optical encoder has recently been accomplished.

6 Cloud Profiling Radar CPR

The CPR is being developed by the Japanese; SEA is providing the flip mirror mechanism and Quasi Optic Front End (QOFE) electronics. Following completion of the functional model testing the Qualification Model testing programme has commenced.

Below (1): Uncoated 100 µm bolometers
Au-black coated and trimmed 100 µm bolometers



Clean Sky initiative leads the way to greener aircraft

The Clean Sky Joint Technology Initiative (JTI) is the European Union's largest ever Aviation research programme, with a total value of €1.6bn supporting demonstration of a wide range of technologies and leading to reduced emissions of CO₂, NO_x and noise.

SEA, working in partnership with Trackwise Designs of Tewkesbury, Rogers BVBA from Belgium and Victrex Manufacturing from Lancashire, has been awarded a €600,000 programme to develop high-temperature flexible Printed Circuit Boards (PCBs) to enable control and integrated interconnect systems to be introduced directly onto the core of an Aircraft Engine.

The project, led by Philip Johnston of Trackwise, will require new materials to be

developed, together with new ways of fabricating, testing and validating flexible PCB assemblies at temperatures as high as 400°C. The project is being undertaken on behalf of the Sustainable and Green Engine (SAGE) ITD, led by Rolls Royce, who is closely involved in all stages of the project.

Photograph reproduced with the permission of Rolls-Royce plc



Briefing

New director for Sensors and Information Systems

Mark Kirwan has joined SEA as Sensors and Information Systems Director.



Mark has over 20 years' experience in the management of multi-discipline technology based projects. Mark started his career in submarine acoustics before moving to Westland System Assessment Ltd, and then to the Vega Group where he progressed to Head of VEGA UK. Prior to joining SEA, Mark worked at Astrium as a Programme Director for the in-orbit validation phase of the Galileo programme and most recently on the ground infrastructure of a large satellite communication programme for the UAE.

Commenting on the appointment, Steve Hill, MD at SEA, said: "I am very pleased to welcome Mark to SEA; he brings considerable experience in programme delivery and a wide-ranging knowledge of our key markets."

More new faces

Anthony Buck
Field Service Engineer
Julian Denbury
Principal Consultant
Guy Newsome
Stores/Purchasing

Mark Rider
Senior Engineer
Anna Robb
PA/Secretary
Martin Walsh
Production Coordinator



Safety assurance

Whether the programme delivery is a single product or a complex system the provision of safety assurance is often a key requirement. SEA has significant experience in developing safety cases and in delivering Independent Safety Auditing (ISA) and advisory services. Examples of current work are the Lynx Mk9A, AW159 Wildcat and the Lightweight Multi-Role Missile (LMM) Programmes.

Current operations in Afghanistan resulted in an Urgent Operational Requirement to upgrade the existing Lynx Mk9A platform. SEA provided safety assurance for the processes involved in these enhancements to this highly successful programme.

SEA also provides ISA services to the Lynx Project Team for the AW159 Wildcat, a rôle that has involved close interaction with the MoD and AgustaWestland in developing the safety programme.

The Lightweight Multi-Role Missile (LMM) Programme will deliver the light capability of the Future Anti-Surface Guided Weapon (FASGW) Programme. SEA has been selected as the ISA to the Lightweight Missile System Project Team where it will conduct safety audits and provided safety advice in support of the programme.

Image: Copyright AgustaWestland



Preparing for the future

In January 2011, the UK Government announced it was to invest up to £2M through the Technology Strategy Board to stimulate innovation across the Space Industry.

SEA was successful in securing 3 studies under this programme. These are:

- Plasma Buoyancy, a novel concept in lighter-than-air flight that could radically change the way that climate science, communications and planetary exploration is undertaken in the future. The study is being led by SEA's Andrew Bacon, who was awarded UK Engineering Graduate of the Year in 2010.
- Assessment of the potential economic advantages of using contactless power and data in Spacecraft AIV, including testing equipment that has been environmentally sealed for Planetary Protection.
- Combining active cooling and sub-millimetre radiometry, two fields in which the UK has an international reputation, to develop new instruments for Earth Observation and Climate Science.

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