

An update for defence decision makers

# INFORM

September 2017



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Agility in Capability  
Acquisition



Support to Complex  
Acquisition



Industry Engagement  
Guide



Experimentation:  
Wargaming



# Accelerating Defence Capability



# Introduction



**Simon Jewell**  
Managing Director

Welcome to the fourth edition of Inform – and the first digital publication of our magazine. This and our previous editions are all based on actual experience gained during Niteworks projects and have majored on collaboration, innovation and experimentation. Niteworks has been a powerful and useful tool in Defence’s decision support toolkit over the years enabling a pan industry perspective to be brought to bear on complex Defence issues in short timescales. This edition exemplifies this utility by describing a ‘typical’ Niteworks project and then, using a series of case studies, shows how Niteworks can assist in providing support in two ‘classes’ of work: complex acquisition and those where agility is crucial to successful delivery of capability.



**Samantha Page**  
Head of Commercial and Partnering

The Niteworks partnership has grown significantly during the current contract. It is currently 175 – MOD plus 174 members who range from large prime companies to small medium enterprises and academia. It continues to grow, with six companies in the pipeline as possible new participants. The growth of the partnership has been a deliberate policy. It allows us to maintain as broad and inclusive a presence as possible to provide an impartial environment where we can bring together teams of uniformed staff, civil servants, defence scientists, industrial experts and academics to address complex capability, enterprise, system-of-systems and system issues. The partnership is able to get involved in a variety of ways, from participating as part of a project team to attending workshops or providing advice through red reviews. If you wish for more information please contact [enquiries@niteworks.net](mailto:enquiries@niteworks.net)



**Mike Wilkinson**  
Technical Director

In this fourth issue of Inform, the theme is Accelerating Defence Capability. Many of Niteworks projects are focused on accelerating outcomes as a key objective. How this is achieved is explored here in the context of agile capability acquisition and complex capability acquisition, both of which depend on ‘cutting through’ to determine quickly the nature of a problem space and the potentially viable solutions. In both cases the ‘trick’ to sustaining momentum and avoiding procedural blockers is to work ‘with the grain’ of MOD’s existing practices but in an optimised way. Several case studies are presented illustrating how this has been done within typical Niteworks projects. Access to appropriate expertise and methods is critical to all such projects. This issue includes a description of how expertise is brought into Niteworks projects via partnership engagement methods and it includes an exposition of the use of war gaming to explore the utility of future concepts and capabilities. Readers whose interest in these topics is stimulated by these short articles are invited to consult the Niteworks White Papers, which provide additional relevant information.

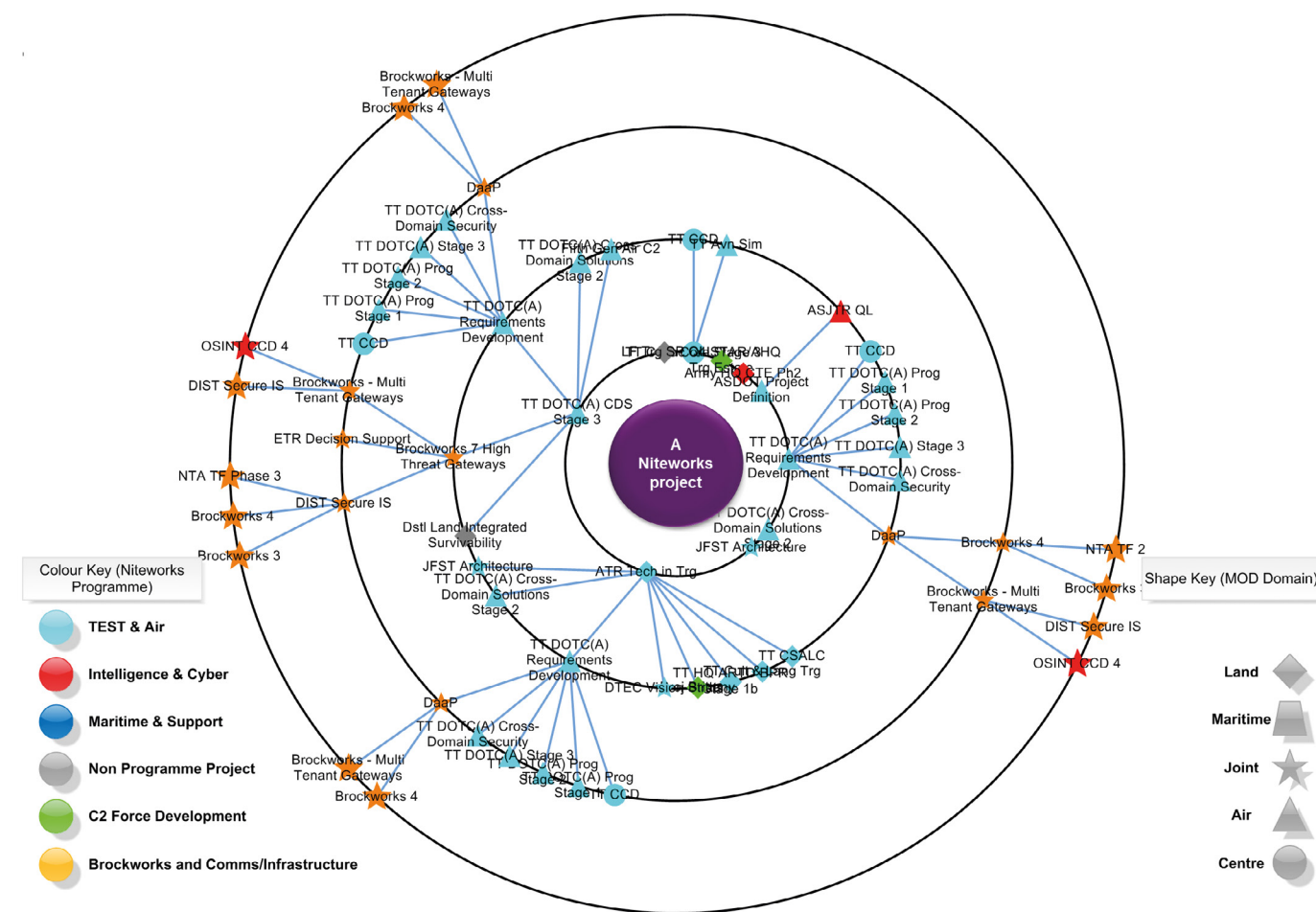
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# Anatomy of a Niteworks project

**Simon Jewell**  
**Managing Director**

In Niteworks, we pride ourselves on putting as much emphasis on defining and contextualizing the question as to we do on generating the answer. This is not to say that the time allocation is equal, however, it recognizes that there is no such thing as a good answer to a bad question. As a result, being able to manage high levels of ambiguity and having an open mind-set are essential components at the early phase of a project lifecycle.



The Niteworks approach is optimised to deal with challenges that involve high degrees of uncertainty, where multiple perspectives exist, where stakeholders are distributed across multiple organisational and functional

boundaries, where the solution is not immediately obvious, where trade-offs are required, and where the problem requires either evidence, experience or innovation - or a combination of all three - to resolve a way forward.

As often as not, it is less about brute-force problem solving than it is about navigating the challenge, for example, by designing the approach such that the problematic situation is no longer manifested in the proposed solution.

Achieving this requires a detailed understanding of the complexity of the environment and the actions and motivations of the participants within the system. This is why the partnership construct is such an important feature of the Niteworks way. To exemplify this, it is helpful to look at the anatomy of a typical Niteworks project.

The project in question was undertaken over five months in late 2016/17. The team's first challenge was to agree the single statement of user need as the formal expression of the question, to understand the benefits that were required and therefore the outputs and outcomes needed to realise the ambition. A stakeholder map was developed that identified 19 different stakeholder groups. The project also needed to understand the prior knowledge that existed and could be brought to bear to the benefit of the problem from within MOD, academia, industry and from within the partnership. Within Niteworks alone this involved drawing upon over 60 prior project outputs (see figure).

The project team was staffed by eight people from eight different companies, several of whom were involved for only a few days to transfer their knowledge to the project. A workshop was held with 84 attendees representing MOD and 46 different companies, six of whom were from outside the partnership. A request for information was sent to 2,000 companies asking them to contribute, leading to 26 responses. Three focus groups were held to explore in greater depth the technical, architecture, and business model options, before the findings were consolidated and presented to a review panel. Five project outputs were prepared and independently assured before being delivered back to the project sponsor. In this instance one of the outputs was releasable only to MOD as it contained commercially sensitive outputs from across the partnership; the other four are reports that are due for release to the partnership one month after the end of the project to give time for MOD to approve their content.

Each Niteworks report is subject to Crown copyright and released under the terms of the IPR agreement that gives rights of reuse to the partnership. These reports are placed into the Niteworks collaborative working environment, Athena and the MOD DII making them widely accessible and available to inform any future MOD tasks.

Throughout, the challenge for a project is to be sufficiently immersed within the project environment in order to understand it, but to retain a clear sense of purpose and focus on the task it is there to achieve. This is understandably challenging, as there is a temptation to get too close to the problem, which can, if not controlled, act like a black hole drawing in everything within its vicinity. Fortunately, warning signs of this threat are detectable, such as the decay in effective communications with the rest of the partnership or the core team, which typically flags a project at risk.

In the last four years, over 200 Niteworks projects have been conducted, each with multiple outputs. Curating and sharing the knowledge from these is a sizeable task, though this is one made more satisfying when we observe curiosity and a ‘thirst for knowledge’ culture within projects and partnership members. The danger persists that organisations, and people, as they mature, especially where they have been successful in the past, fall into the trap of only seeing the world from their own perspectives. The Niteworks environment is deeply satisfying as such presumptions are laid bare, where beliefs need to be articulated and justified in front of equally passionate and articulate advocates who may believe something else. What results is something rather special; something that is a privilege to observe and contribute towards.



# Agility In Capability Acquisition

Mike Wilkinson  
Niteworks Technical Director

## Introduction

In June 2014 Niteworks published a White Paper promoting the concept of Continuous Capability Evolution (CCE)<sup>1</sup> as a ‘strategic systemic’ response to problems in Defence acquisition. The paper drew on best practice from several Niteworks projects to describe a practical way of evolving capability through small-scale, low-risk increments. The benefits claimed for the approach were:

- The radical compression of acquisition timescales;
- Exploitation of technologies at their optimum maturity point, and;
- The ability to incorporate operational lessons with minimal delay.

Since 2014, the CCE approach has been tested and refined across the capability acquisition lifecycle via further Niteworks projects, and the concept has been taken up and applied more widely by the Defence community. There is now robust evidence for the efficacy of the approach, as well as substantial case studies illustrating how CCE can be achieved in practice.

This article begins by outlining the underlying problems that typically frustrate capability acquisition, particularly agile acquisition, then it explains how CCE addresses these problems and finally three case studies are provided illustrating different types of CCE tailored for different contexts.

## Strategic-systemic problem space issues

To set the scene, we need to define a generic capability acquisition process that might be deployed within Defence. Figure 1 shows a CADMID-like lifecycle, with rising levels of maturity over time and sequential lifecycle stages with coherence managed between them. In Defence, the lifecycle prior to Operate/Sustain can easily extend over several years – which is fundamentally incompatible with the idea of agility.

To understand why problems arise in the standard lifecycle, Niteworks conducted an historical problem space analysis<sup>2</sup> of projects, which highlighted a series of five generic root causes and four additional root causes specific to rapidly

changing IT-rich systems. These are captured in Table 1 – and most of them are likely to be very familiar to readers having experience of Defence acquisition.

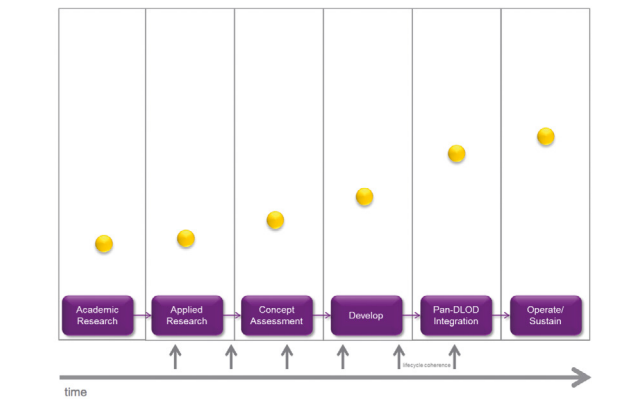


Figure 1 showing a traditional ‘standard’ acquisition lifecycle (time across the page)

## Addressing root causes

The strategic systemic approach proposed to address these problems (CCE) includes four key acquisition system architecture structuring principles and an organisational construct.

The first principle is **adopt continuous change**: The existence of fast-spin lifecycles means that a more fine-grained and compressed understanding of time is required – essentially converting each of the stages in the traditional lifecycle to a set of parallel continuous processes (see Figure 2). There are knock-on effects on most of the elements of acquisition.

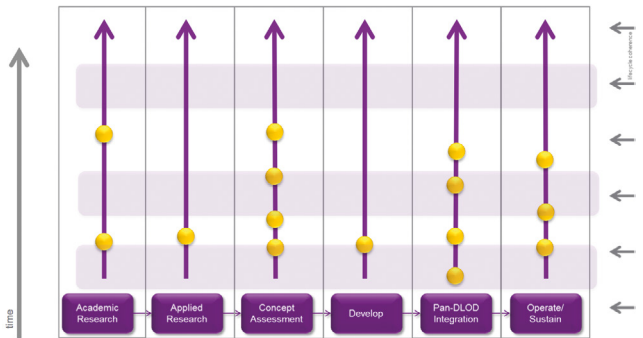


Figure 2 showing a continuous-time lifecycle (time up the page)

Generic Root Cause	Description
Fragility to changed circumstances	The standard acquisition process can be a ponderous affair, punctuated by a competitive tendering process, which has little flexibility to respond to changes to external circumstances or to increasing maturity of understanding of the nature of the problem or its potential solutions.
Challenge of technology exploitation	The standard lifecycle imagines that novel technologies are matured via a research-driven process that delivers them in good time and ready for exploitation in acquisition projects. A variety of factors frustrate this process, including slower maturation than expected, funding mismatches and ‘not-invented-here’ syndrome.
Susceptibility to poor requirements	There are numerous types of requirements employed in Defence, including those used in a commercial contract with a supplier. Requirements authors are prone to over-specification, under-specification, mis-specification and being ignorant of the ‘art of the possible’. Cost drivers are often ‘baked-in’ at the outset and become difficult to remove.
Commercial strait-jacket	A commercially taut contract normally exists at the heart of acquisition. This can be inflexible and when based on a policy of ‘cheapest compliant bidder’ in an international market it also tends to drive the ‘conspiracy of optimism’. The difficulty of getting on contract can encourage unhelpful ‘aggregation’ of requirements into a contract and the competitive process can squeeze out suppliers, creating a ‘lock-in’ situation.
Capability incoherence	Acquisition tends to focus on the equipment Defence Line of Development (DLOD) and equipment interoperability. Loose couplings between elements of the enterprise responsible for the other DLODs tends to result in intra- and inter-capability level incoherence.
IT-Rich Root Cause	Description
Hybrid fast-spin/ slow-spin lifecycle incompatibilities	The rates at which fast-spin and slow-spin technologies evolve are fundamentally different. Current acquisition methods do not readily support multiple lifecycles within a single framework.
Presumption of requirements and design freedom	Traditional top-down acquisition is not well-matched to the digital age, when commercial investment in high technologies vastly outweighs what defence can offer, and Defence increasingly relies on re-purposed Commercial Off The Shelf (COTS) elements.
Changing locus of innovation	With significantly reduced entry costs to developers of digital solutions, and the preponderance of innovative new entrants, the traditional acquisition system, based on prime contracting, is unable to keep pace with innovations.
Operational decoupling	This is a special case of Capability Incoherence, exacerbated by the presence of fast-spin technologies and the limited relationship between users and developers.

Table 1: Root causes of issues in Defence acquisition

The second principle is to **exploit external research and existing OTS plug and play capabilities**: An opportunity-driven approach to exploitation of existing OTS elements ensures technology maturity, ease of integration via standards conformance/adherence to de facto integration architectures and significantly reduced development/ manufacturing stages. It also allows MOD-sponsored research to be focussed on areas not addressed by the open market. The impact on the lifecycle is shown in Figure 3.

1. Wilkinson, M. (2014) “Continuous Capability Evolution - A Practical Approach to the Acquisition of Modern Defence Capabilities”, Niteworks  
2. As reported in Wilkinson, M., Jordan, C., and Currie, F. (2016) “Developing Strategic Systemic Solutions to complex problems in the Defence Enterprise”, INCOSE International Symposium (IS2016)

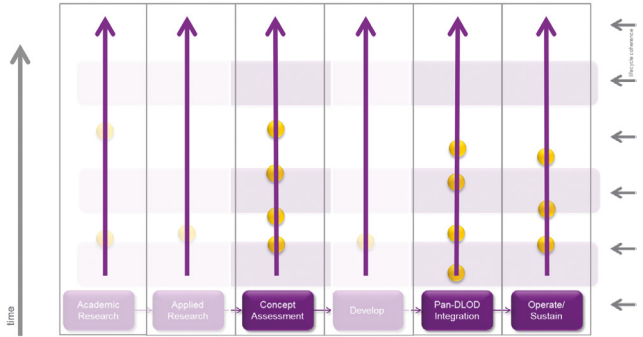


Figure 3: Continuous time activity exploiting external research and OTS capabilities



Case Study

# Open Source Intelligence (OSINT)

The third principle is **coalesce Capability Concept Demonstrations (CCDs) and pan-DLOD integration activities**: A series of synchronised (drumbeat-driven) events combine traditional concept demonstration and pan-DLOD integration to support a high-momentum open innovation process. Events are prioritised according to user need/achievability and they result in highly specific and low risk requirements for capability enhancements, which are then spun out into MOD's standard acquisition and pan-DLOD actions. Figure 4 illustrates the concept.

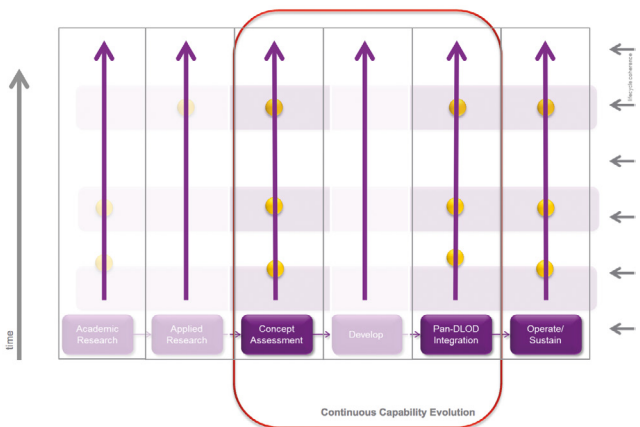
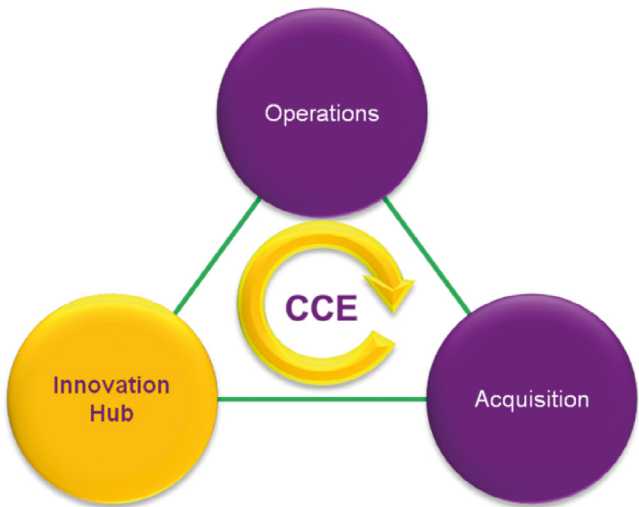


Figure 4: Coalescing of CCDs and pan-DLOD integration at specific drumbeats

The final element of the CCE concept is an organisational construct that supports close coupling between Operations, Acquisition and an Innovation Hub. In this structure, the Operations and Acquisition roles are undertaken by MOD's standard organisational constructs, namely military 'users' with recent operational experience for Operations and MOD's acquisition professionals for Acquisition. The traditional prime contract becomes a systems integrator and a new role, the Innovation Hub, is responsible for innovating within a 'safe to fail' environment.

Figure 5 (right): CCE organisational construct



The Niteworks engagement in OSINT (later known as Project PROMETHEUS) is perhaps the most complete example of 'CCE in practice' currently available. The story began with a deceptively simple question from the C4ISR Joint User – would it be possible and practical to generate useful intelligence from Open Source Information? A three year long CCE-based journey followed, ending with a fielded capability itself adopting CCE principles for its ongoing operation. Although three years might sound like a long time to some, it is in fact very rapid in Defence for this kind of capability. Not only that, the journey and its outcomes incorporated many significant innovations. The overall schedule of activities and key events is shown in Figure 1.

Key points relating to the use of CCDs during the journey are:

- CCD Phase 1 and 2 provided evidence that enabled the C4ISR Joint User to re-profile funding from 2020 to 2015, bringing forward capability delivery by five years;
- CCD Phase 3 provided evidence that 'sprints' are an effective, user driven, means to rapidly develop and introduce new capability;
- CCD Phase 4 was able to hand over validated processes to support Operations and Innovation at a critical point in standing up the OSINT capability.

The process view of the innovation cycle and how it relates to rapid capability insertion and operations is shown in Figure 2.

Key points are as follows:

- The innovation lifecycle fits within an 'alpha-beta-live' capability evolution cycle;
- Innovation and operations are intimately linked;
- There is a prime role for MOD as design authority for the overall capability, with ownership of the capability architecture.

Figure 1: Niteworks OSINT Programme

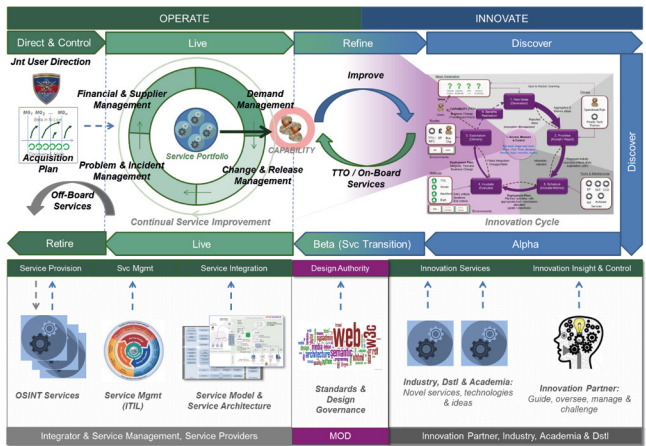
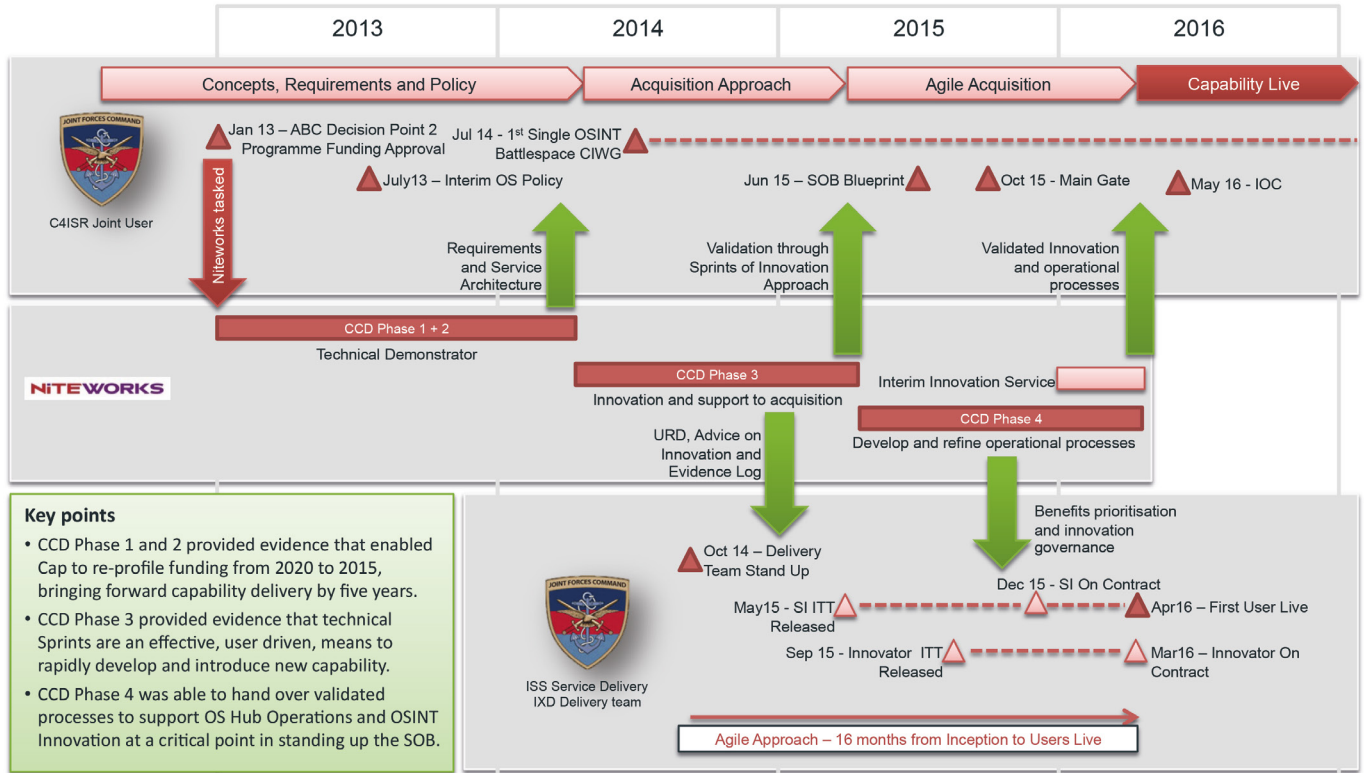


Figure 2: OSINT Operating Model and Innovation Lifecycle



## Three case studies of Continuous Capability Evolution in action

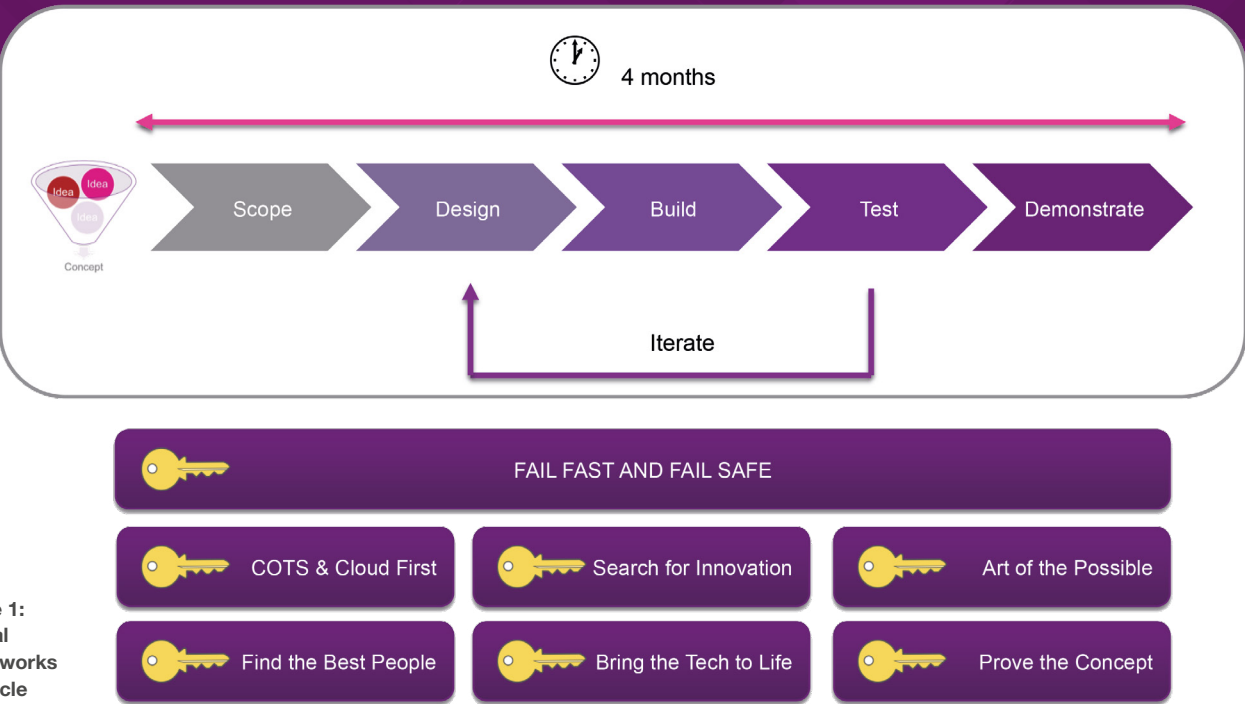
Although the original CCE concept drew on best practice, its true potential could only be really understood by its conscious application and refinement

in further case studies. What follows describes three different case studies to show how CCE has been applied in different contexts.



Case Study

Brockworks



The Niteworks ‘Brockworks’ programme supports MOD’s Information Systems and Services (ISS) activities through a series of CCE-based assignments. About twenty assignments have now been through the Brockworks process, and in each case the primary outcome is a robust understanding of how to accelerate acquisition.

The ISS domain is characterised by rapid technology change and high degrees of complexity. The primary role of Brockworks is to help MOD to explore how to turn good ideas into fielded capability; this is done via focussed CCDs, de-risking and accelerating acquisition.

A typical Brockworks assignment is shown in Figure 1. The process begins with a scoping exercise to understand the parameters and boundaries of the problem space. A collaborative design activity is then undertaken, followed by build and test, with iteration applied as necessary to resolve issues encountered during design and build. Every assignment ends with a demonstration to the partnership to show what has been achieved and, importantly, to share how it has been done. The written outputs of an assignment will include input to standard acquisition documents like URDs (User Requirement Documents) and SRDs (System Requirement Documents), along with high level architecture and detailed designs.

The key concepts embodied in the process include:

▼ **Fail Fast and Fail Safe.** This is something of a misnomer as none of the Brockworks activities has ever failed – the point is to identify quickly which approaches will not work so that more promising avenues can be explored.

▼ **COTS and Services First.** Agility is a driving requirement within ISS, so Brockworks solutions build on mature or near-to-market technologies and services. Some development is usually required but this is kept to a minimum.

▼ **Search for Innovation.** As Niteworks is entirely impartial it can search for the best ideas, irrespective of the source or the degree of disruption they might cause to some stakeholders.

▼ **Understand the Art of the Possible.** Above all, Brockworks assignments need to home-in on what is achievable quickly, which requires deep systems and technology expertise to both avoid over-ambition and gold-plating. Going through the full Brockworks lifecycle is essential to finding the achievability ‘sweet spot’.

▼ **Finding the Best People.** The kind of deep expertise required to solve complex ISS problems rarely resides within a single organisation or company – hence the Niteworks partnership model is essential to delivering a suitable ‘rainbow team’.

▼ **Bringing the Technology to Life.** Experience in Niteworks has shown the value of bringing ideas and technologies to life in a representative demonstration. Seeing ‘how it works’ is important for all stakeholders, including acquirers and potential solution providers.

▼ **Proving the Concept.** Showing exactly how a problem can be addressed and bringing it to life provides hard evidence of the viability of an idea. This supports communications and de-risks acquisition.

Case Study

Submarine Combat Systems – New Operating Model

In order to continue to protect the Royal Navy and merchant fleet against new threats, Submarine Combat Systems (SMCS) need to be updated frequently to be able to take advantage of new innovations and technologies. The existing process for upgrading them is restrictive both in cost and timescales and needs to be improved and simplified. It is also necessary to understand what the operators need from the systems, to respond to lessons learnt from operational situations and to quickly apply this learning.

The DE&S Submarine Combat Systems Group (CSG) had become aware of the Niteworks CCE White Paper and concluded that it should be possible to develop a similar approach that would apply to the SMCS. The challenge in this case was tailoring the agile CCE approach to be compatible with the hybrid fast and slow timescales present in traditional boat engineering in the context of an extant technical assurance and governance ecosystem.

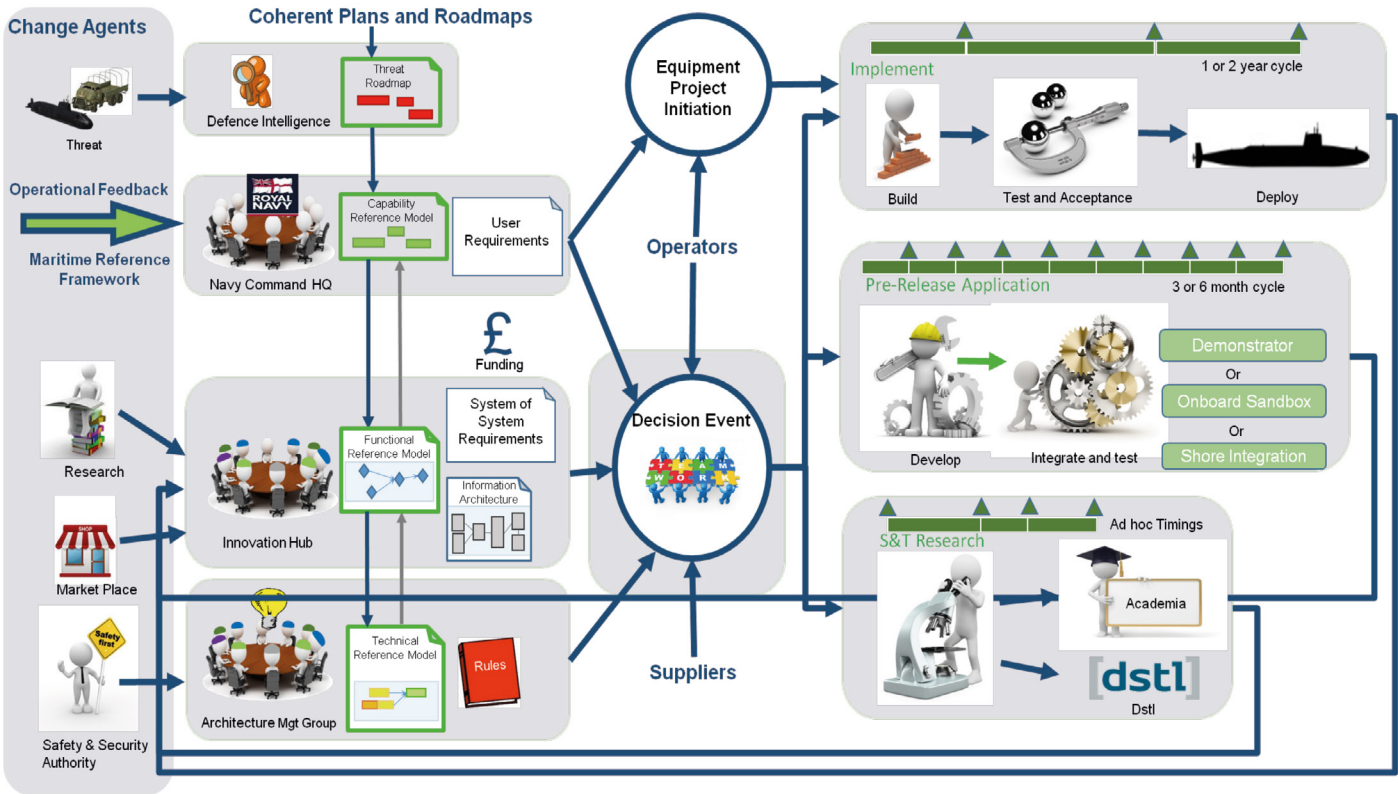
Niteworks used CCE concepts as a backdrop to develop a set of operating principles and policies in conjunction with key suppliers. Following this, a collaborative activity between MOD and industry was used to design a new

hybrid slow-spin/fast-spin operating model. This was extremely complex, but Niteworks was able to visually represent this in one rich picture design (below).

The operating model was tested through a simulation exercise and workshops involving the entire supply chain, Navy Command and Dstl, and was then refined. The validation and testing events indicated that the operating model was feasible and could be used to realise the vision.

The operating model introduces a new approach that changes:

- ▼ How MOD interacts with the supply chain via an Innovation Hub
- ▼ How new technology and ideas are prototyped and brought into service using agile and evolutionary techniques, exploiting hundreds of identified innovations and associated funding
- ▼ The way MOD prioritises and procures new technologies and innovations, enhancing the influence that front-line users have over the requirements





# Support to Complex Acquisition

Rick Bounsall  
Niteworks Delivery Director

It is quite typical that Niteworks projects require complex acquisition strategies and governance to bring them to fruition. This has become ever more important in the post Lord Levene era, where Service Commands have more delegated powers but arguably, when it comes to acquisition, fewer suitably qualified and experienced personnel to manage these responsibilities. Further, DE&S is, rightly, concentrating on delivering successful projects and has less capacity for doing the other elements of capability integration it once did on behalf of its customers. Dstl, the other main provider of support to the Commands, has been under intense pressure to reduce headcount, increase the percentage of extramural contracts and transform into a new business structure. As a consequence, Niteworks has been an important component in the Defence landscape, alongside the DE&S Tech Office, Dstl and many others, in transitioning ideas into practice by: leveraging work done in industry, Dstl and elsewhere; assisting Commands in the construction of their requirements in the light of industry good practice; providing DE&S with input to a range of acquisition artefacts; suggesting appropriate governance regimes; and helping prepare Service Users for the eventual receipt into service of new capability. All of this has been done by ‘rainbow teams’ of experts drawn from across the partnership on an as required basis, supported by full partnership and broader engagement. Underpinning all projects is the bespoke Niteworks Intellectual Property model, which has been designed by MOD to allow safe and effective dialogue with industry whilst protecting MOD’s ability to compete downstream.

Complex acquisition tasks typically involve the following features, which will be evident in the case studies that follow:

- The synthesis of extensive source data such as research outputs, analyses, academic papers, policy documents and international comparators;
- Combinations of novel ideas alongside traditional methods;
- A system of systems approach;
- Appropriate architectural support;
- Multiple phases;
- Migration or sharing of responsibilities such as the Design Authority;
- The integration of outputs from multiple contracts;
- Significant transformation in the way capability is delivered.

MOD today places great emphasis on innovation and re-investment of efficiency savings to increase capability. Both are laudable goals in delivering ever better defence output, which have galvanised planners in the search for new ways

of delivering ‘more bang for the buck’. In many cases this is not just about doing things better, but is also about doing better things. So in complex acquisition the soft aspects of transformation – persuading sceptical stakeholders, agreeing the direction of travel and aligning intent – are all important precursors to success. Niteworks’ experience is that such transformations are best effected when there is compelling objective evidence in support of any proposition and not surprisingly we have seen that the early stages of such work involve the collation of as much data as is practicable for the task in hand. Here we frequently draw on our Dstl colleagues, partner organisations, such as our Allies, the partnership itself and those beyond who we believe have something to offer. This collection of ideas is complemented by a now extensive library of visualisation methods, which helps us present sometimes complicated ideas in readily understandable formats.

It is often suggested that innovation is the sole preserve of the SME. This, in our experience, is simply not the case in complex acquisition and Niteworks has been particularly adept at bringing OEMs (Original Equipment Manufacturers), SMEs and others together in highly productive teams to accelerate understanding and thus the delivery of new ways of doing business, all with the benefit of working alongside MOD. This multi-faceted approach helps break down barriers, build trust and enables difficult issues to be addressed at pace. With DE&S Delivery Teams alongside too, the acceleration continues long after Niteworks involvement has reached its natural conclusion. In each of the following case studies these characteristics have been apparent and whilst they all, to an extent, remain work in progress, it is already clear that MOD has been able to make great strides forward in delivering new capabilities.

Recent examples that typify complex acquisition are the Niteworks projects in support of the extensive portfolio of RAF transformation projects: Defence Operational Training Capability (Air) (DOTC(A)), Future Ground Based Air Defence (FGBAD), Common Defensive Aids Suite (CDAS) and industry support to Air C2ISR and Programme Athena. In each case Niteworks was able to look at industry best practice and, working across the stakeholder community, tailor pragmatic solutions to assist the delivery of what are ambitious but much needed capability improvements.

What follows are three examples of where Niteworks, working alongside others, has been able to safely bring an integrated MOD/industry/academia perspective to a complex problem space, utilising the bespoke Niteworks Intellectual Property model, to collaborate and accelerate the introduction of innovative new approaches to the delivery of military capability.

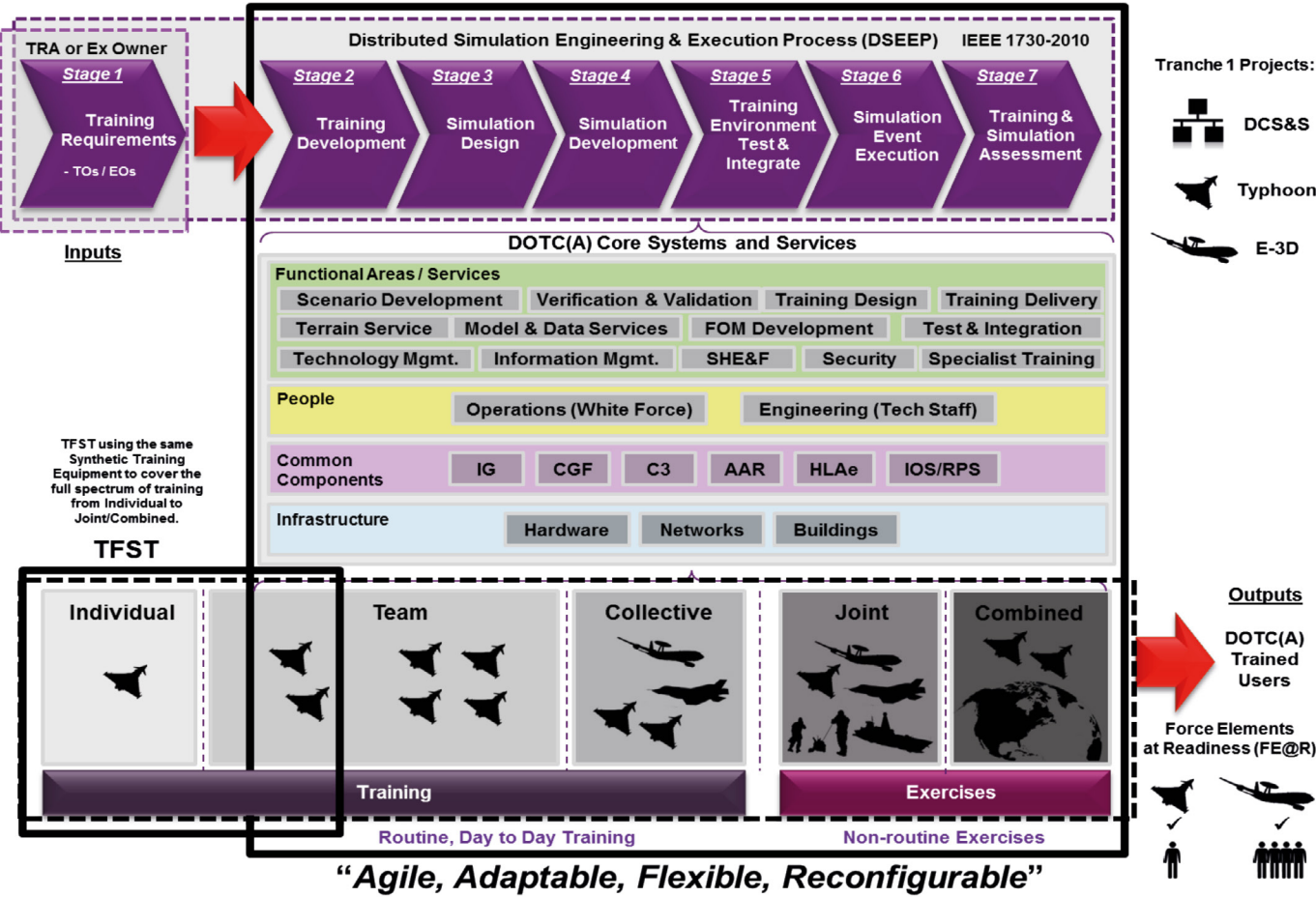
# Defence Operational Training Capability (Air) (DOTC(A))

DOTC(A) has its genesis in SDSR 2010 and a paper that explored the potential operational improvements to be gained by shifting the live, virtual and constructive training balance based on the premise that civilian virtual reality and gaming technologies offered a real opportunity for improved simulation. Niteworks’ early work involved garnering the extensive research done by others into a coherent narrative to inform the SDSR debate. We then worked with Dstl, DE&S Delivery Teams and Air Command to validate the hypothesis through demonstrations and, having done so, assisted in providing candidate artefacts developed during extensive engagement with users and trainers, all informed by learning from industry and international examples. While the theory appeared straightforward, it became apparent that translating this into effective, manageable and agile capability strands, each underpinned by appropriate commercial constructs, would be challenging. While the work is still on-going, the journey so far has been a productive one. Niteworks has helped leverage the

work undertaken over the years in Dstl, the ideas across a wide range of industry (many of whom would not be considered as traditional Defence suppliers) and a number of Delivery Teams eager to put in place the contracting mechanisms and governance necessary to effect these new ideas. Crucial to the success of the work has been a fully engaged Customer within Air Command willing to assist by acting as the decision maker and interlocutor with the extensive stakeholder community of trainers, operators and commanders within the RAF. Alongside this, the FsAST Delivery Team has shown a readiness to embrace new ways of defining and delivering a complex set of requirements and activities which, when combined, will deliver an interrelated capability.

The resulting capability is underpinned by a model-based approach to understanding the requirement and extensive architectural support to what will be a sophisticated acquisition plan. The diagram below gives some feel for the way in which DOTC(A) will be delivered.

## Defence Operation Training Capability (Air)





# Air C2 and ISTAR Industry Support & Programme ATHENA

Over the last decade it has been clear that the effort devoted to Airborne Command and Control, Intelligence, Surveillance and Reconnaissance (C2ISR) has been significant. SDSR 15 further reinforced the prominence of this capability with important announcements of new or extended platforms. However, many of these capabilities have been, for good reason, delivered as ‘stove-pipe’ solutions. So 2016 provided an excellent point to look at alternative Force Operating Models, applying a Whole Force Approach to operating, training and support, blending emerging findings into the

RAF Waddington ‘Programme Athena’. Using the ability to reach across industry and an Outcome Relationship Model (ORM) to track potential benefits, Niteworks was able to provide data to the MOD so it could consider a range of potential avenues all underpinned by a well-founded vision and strategic context. The desired end-state will seek to provide greater operational outputs, efficiency both in terms of provision of ISR services and operation, improved agility in sustainability and support and command options for further consideration. The work is summarised below.



## Background

Niteworks was tasked with providing industry informed and researched decision support to the Programme Athena pre-concept phase. This included defining the baseline, identifying options for the ISTAR Force Operating Model (FOM) with the adoption of a Whole Force Approach (WFA) to training, support and sustainability, personnel and infrastructure, as well as advice on potential commercial constructs.

## Action

A benefits-led ORM was used to capture the programme information and align this with the required Defence outcomes. These outcomes were articulated in the context of a draft vision and strategic context.

## Result

Nine Potential Projects that would potentially transform the Force within the 2025 timeframe were identified and outlined.

Four ISTAR Force options were put forward to better manage its complexity within an enterprise approach.

The Niteworks task concluded that it is feasible to deliver an enterprise approach with an integrated ISTAR Force operating model that:

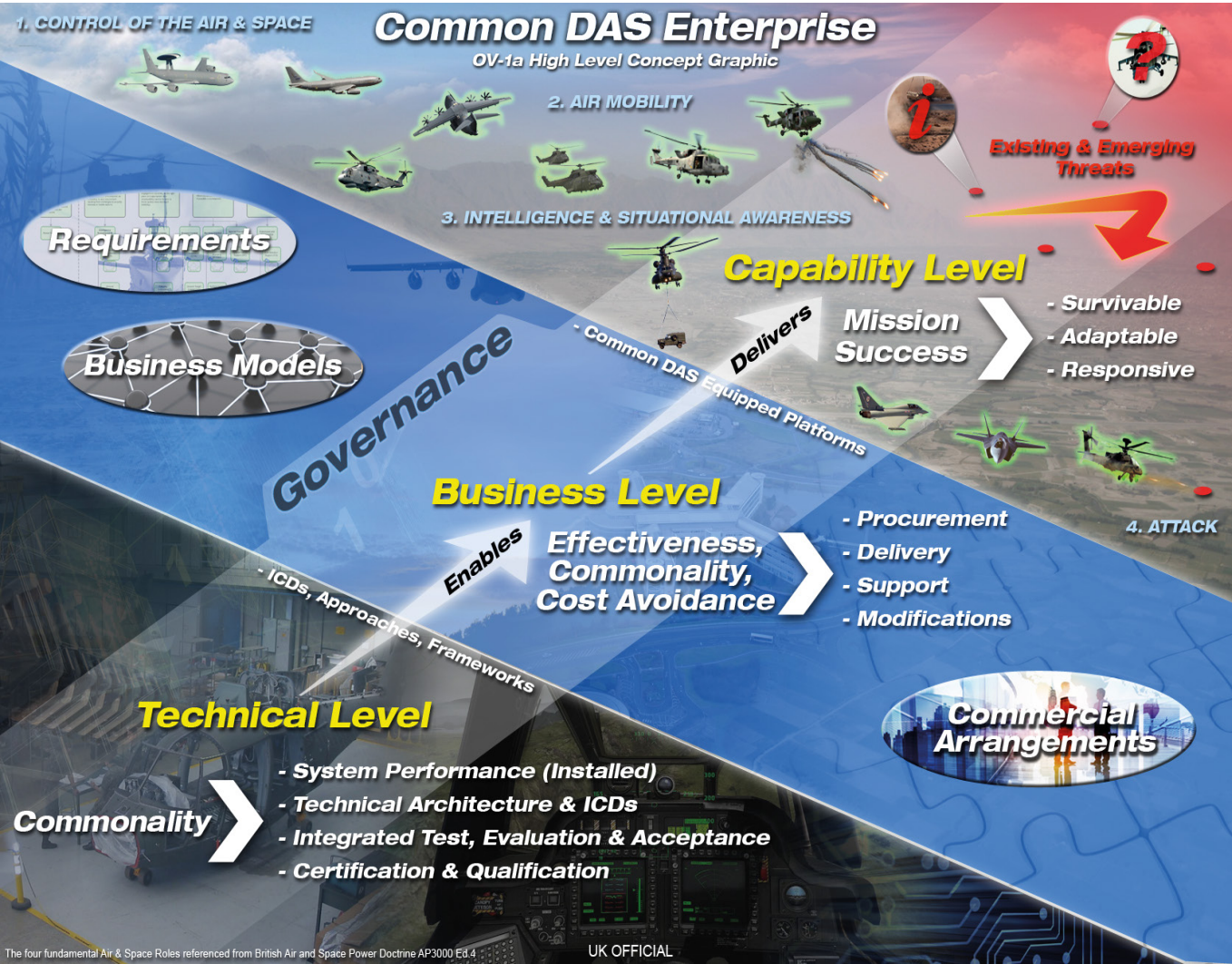
- Realises the Programme Athena draft Mandate Benefits
- Meets the 2025 timeframe
- Meets the manpower liability challenge with a Whole Force Approach
- Is likely to be affordable within Defence Air ISTAR provision.

## Potential Benefits

- A strategic vision, supporting blueprint and plan provides a path for transforming delivery of Air ISTAR capability;
- Increased availability of Mission Capable Aircraft;
- Increased operational effectiveness and efficiency with reduced operational risk;
- Agile incentivised support and sustainability whole force approaches;
- Potential Projects allow the benefits in the draft Programme Athena mandate to be realised;
- A more efficient and effective ISTAR Force Operating Model.

# Common Defensive Aids Suites (CDAS)

Against competent adversaries the threat to our air assets is significant and ever changing. Defensive Aids Suites (DAS) have been designed, developed and delivered across a multitude of platforms with little or no eye to commonality. The CDAS concept is to seek those elements of this defensive capability that are susceptible to greater standardisation, with the aim of improving operational effectiveness, being more efficient in terms of support and having the ability to more rapidly update threat data across the fleet.



Niteworks addressed this problem under three categories: technical, business and capability. In the technical area topics such as system performance, DAS architectures, interface requirements, test and acceptance strategies and certification and qualification were all examined. The business analysis level considered appropriate governance

models, commercial arrangements, procurement, delivery and support, all underpinned by broad order cost analysis. At the capability level the aspects of adaptability, survivability and responsiveness across platform types as the goals of the CDAS philosophy were viewed as the drivers for success.



Niteworks Methods and Techniques

- Industry Engagement Guide

Fleur Currie, Niteworks  
Chief Systems Engineer

Niteworks Methods and Techniques are born out of previous projects that have successfully used a method or technique in order to deliver an output or outcome. They have usually been used several times and therefore have been refined over time.

Industry Engagement is a key part of the Niteworks Way as shown in Figure 1 and forms part of all Niteworks projects.



Figure 1: Niteworks Way Principles

Planned and considered engagement with industry is a mandatory part of all projects as it:

- Ensures that Niteworks Projects obtain the best resources and advice available;
- Reinforces the unique Niteworks strengths of impartiality and full industry engagement within a ‘safe’ collaborative environment;
- Justifies Niteworks’ privileged position as a supplier to MOD outside of normal competition;
- Ensures that our industry Partners and Associates can take maximum benefit from their involvement in Niteworks;
- Strengthens the partnership.

Importantly, it improves the quality, robustness and value of Niteworks advice to the MOD.

Engagement activities are tailored and scaled appropriately to each project and Industry engagement is considered when developing the project approach to:

- Identify critical sources of background IP/know-how;
- Define what industry inputs are expected and how these feed the project outputs;
- Understand what industry should gain through the engagement;
- Outline the mechanism(s) to be used;
- Identify any potential cost implications of the engagement.

The use of appropriate industrial engagements within the project approach is assessed at Niteworks Gate reviews. All the formal aspects of engagement with Niteworks Partners and Associates are covered by extant terms and conditions. Engagement with non Niteworks organisations is covered by non-disclosure agreements (NDAs) on a project-by-project basis.

A number of established mechanisms exist but others can be used. The established mechanisms are shown in Figure 2. These established mechanisms do not preclude preliminary or ad hoc discussions with industry stakeholders as required.

Engagement Mechanism	Partners	Associates	Invited Non-Members
Red Reviews	✓	✓	
Review Panels	✓	✓	
Industry Workshop	✓	✓	✓
Information Request	✓	✓	✓
Industry Consultation	✓	✓	✓
Innovathon/Hothouse	✓	✓	✓
Survey/Questionnaire	✓	✓	
Capability Concept Demonstrator	✓	✓	
Bilateral Discussion	✓	✓	✓
Industry Reference Group	✓	✓	✓

Figure 2: Engagement Mechanisms

Along with the engagement at the project level, Niteworks uses a number of other methods to keep the partnership informed. For example regular partnership updates, publication of the pipeline, making available project reports, publication of the executive summary compendia, partnership days and bilaterals etc.

Red Reviews

A Red Review generally targets senior reviewers from the Niteworks partnership and gives them the opportunity to provide guidance to Niteworks projects and input to Niteworks deliverables. In addition, reviewers get an early view of MOD plans and Niteworks findings.

Red Reviews typically include a short review of a Niteworks deliverable. This process aims to give projects senior level insight into the variety of complex problems we address, so leveraging industry experience to better inform our deliverables (and hence better inform MOD).

Ideally Niteworks assigns reviewers to projects when they begin so that they can build knowledge of the project as it progresses, provide appropriate guidance along the way and maintain awareness of the project schedule.

Review Panels

A Review Panel aims to establish a small group of domain or subject matter experts to comment on or contribute to Project Outputs. The panel approach enables the exchange of ideas while being regulated through peer review. In addition, panel members get early insight into MOD thinking and Niteworks findings.

Members of the Panel can be drawn from Partners and Associates either through consultation with the customer, identification of specific individuals by the project or a written request to the partnership.

Industry Workshops

The use of an industry workshop is a key mechanism used by Niteworks to engage with industry and has repeatedly proven to be both an efficient and effective means to quickly focus a broad range of expertise onto the project, as well as allowing industry to be updated by MOD and/or Niteworks.

A dedicated facilitator will usually be assigned to the project to help structure, plan and run the workshop. A facilitated sessions aims to gather and organise information to help a group get to the heart of a particular issue. Importantly it enables the project team to focus on contributing to the content of the day rather than stage-managing the event.

Non-Niteworks members may, where appropriate, be invited to attend workshops but need a signed Non-Disclosure Agreement (NDA) in place.

Information Requests

A Request for Information (RFI) is a formal request from the Niteworks Commercial Team to the partnership. It can either be used as a general request to understand what expertise exists with the partnership or a focused request on a specific subject.

Industry Consultations

An Industry Consultation involves provision of detailed advice or guidance to the Niteworks project team from industry players with significant background Intellectual Property (IP) or know-how relevant to the project.

A formal tasking is issued by the Niteworks Commercial Team. If the organisation being consulted lies outside of the Niteworks partnership then an NDA will be put in place before engaging. Project teams are aware of the need to control background IP and/or any ITAR issues.

Innovathons/Hothouses

A ‘Hothouse’ or ‘Innovathon’ is a time-bounded and focussed activity drawing together a suitable range of experts/solution providers to address a defined challenge. Commonly, several teams are invited to address a challenge in competition with each other. These may be initiated via an RFI.

Surveys/Questionnaires

Surveys and questionnaires are a good way of capturing structured information (eg capabilities around service provision). They are not used to capture opinion, view or commentary. These may be initiated via an RFI.

Capability Concept Demonstrators

Capability Concept Demonstrators use equipment, technology, services and personnel (including subject matter experts) from across the Partners and Associates in order to develop a demonstration system.

This engagement method can test equipment, technology, processes, ways of working and training, as well as investigate other lines of development.

Involvement is initiated via a Request for Proposal (RFP) and Request for Quotation (RFQ) and formal taskings are issued to selected ‘suppliers’.

Niteworks Methods and Techniques  
- Industry Engagement Guide continued...

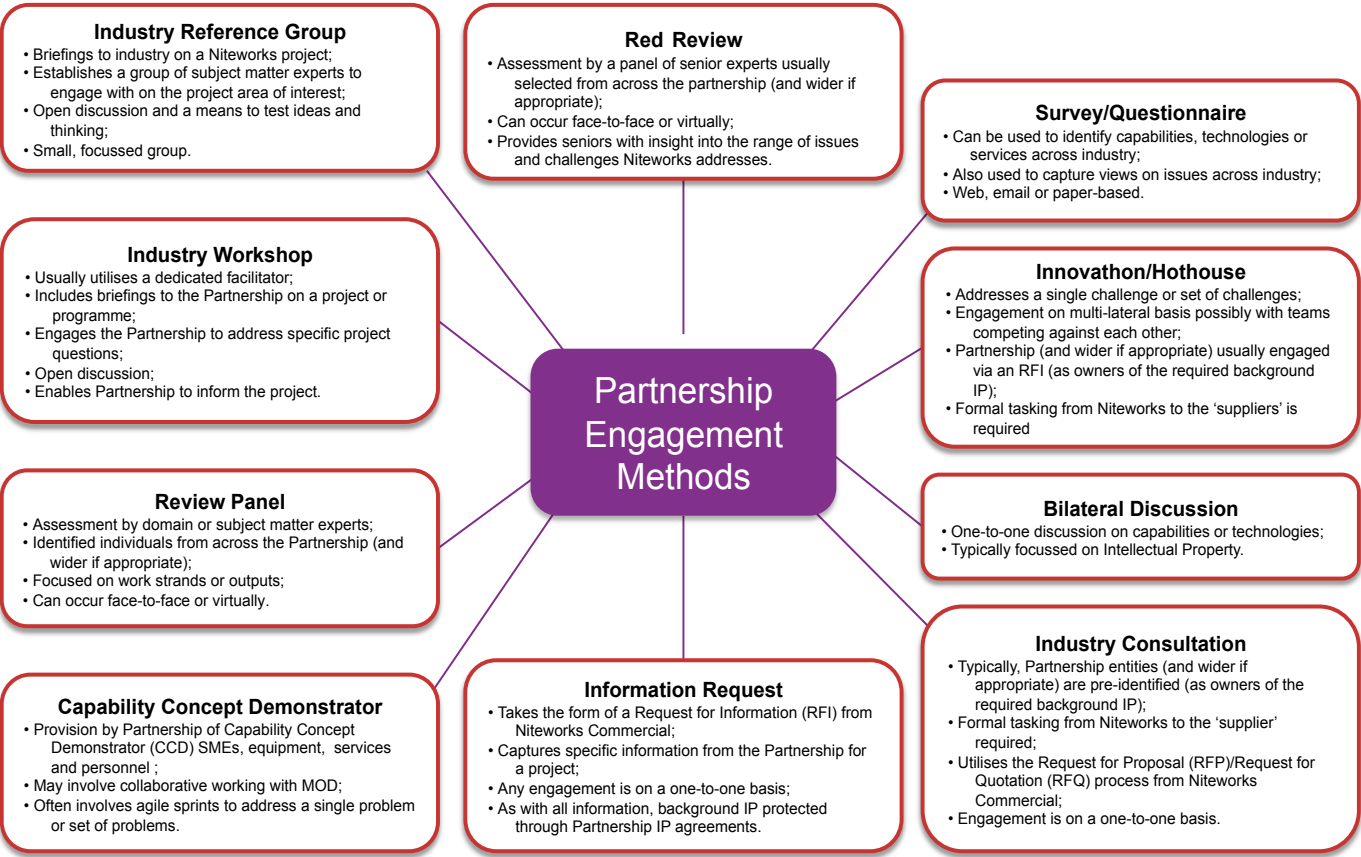
Bilateral Discussions

Bilaterals are often used in conjunction with one of the other engagement mechanisms. They are particularly useful when the material or subject being discussed includes background IP or other commercially sensitive information (eg future technologies or research activities).

Bilaterals can be undertaken with any of the Partners, Associates and, with non-members, under an NDA. The background IP processes are adhered to for all material gathered.

Industry Reference Groups

Industry Reference Groups can include Partners, Associates and non-members (under an NDA). These will usually be small and focussed groups (less than ten individuals). They are based around individual subject matter experts coming together to engage on a subject or project area of interest. Usually the Industry Reference Group will be repeatedly engaged on a project in order to test ideas and thinking.



This guide is one of several available guides developed by Niteworks. If you would like further information about Niteworks Methods and Techniques, or would like more information on Niteworks in general please contact [enquiries@niteworks.net](mailto:enquiries@niteworks.net).

Niteworks Methods and Tools for experimentation: Wargaming

Chris Jordan  
Niteworks Chief Analyst

Wargaming has been around for a long time (at least since the development of the Prussian Army Kriegsspiel in 1811) and it has recently seen a resurgence in importance. For example, in 2015 the US Deputy Secretary of Defense Robert Work and the Vice Chairman of the US Joint Chiefs of Staff General Paul Selva wrote an article in 'War on the Rocks'<sup>1</sup> that examined the case for revitalising wargaming within US military acquisition and operational decision making. Since then wargaming has become a critical tool in the US for testing concepts, capabilities and plans in support of its so-called 'third offset strategy'<sup>2</sup>. The UK MOD is also increasing its emphasis on wargaming, particularly through the Defence Academy, Royal Military College Sandhurst, the Centre for Historical Analysis and Conflict Research (CHACR), and most recently, the Development, Concepts and Doctrine Centre (DCDC) with the publication of the Wargaming Handbook<sup>3</sup>.

So what is wargaming and why is it a useful tool?

Major Tom Mouat (a UK wargaming expert at the Defence Academy, Shrivenham) outlined a useful definition of wargaming at the Connections UK 2016 Wargaming Conference (reportedly based on Peter Perla's definition from 1990<sup>4</sup>):

Adversarial by nature, a Wargame is a representation of conflict activities not involving actual forces, using rules, data and procedures, in which the flow of events shapes, and is shaped by, the decisions made by the players during the course of those events.

This definition distinguishes a wargame from other activities such as training exercises, which employ real forces. Consequently there is great opportunity within a wargame to explore alternative futures without the constraints of real world equipment or policy.

Application of wargaming by Niteworks

As part of concept and capability evaluation, Niteworks has been employing wargaming techniques in various forms since its inception in 2003. More recently, Niteworks projects have applied a combination of map-based table top wargames, with symbols to denote particular military force elements, and computer-aided simulation, where soldiers can view a simulated outside world from within a particular military vehicle.



Map-based wargame



Simulation based wargame

Niteworks has often employed wargaming as part of an integrated analysis and experimentation approach. Examples of Niteworks projects using wargames include the Light Forces Battlegroup, Scout Experimentation, Wide Area Persistent Messaging (WAPM), Information Activities and Outreach Operating Model and STRIKE Experimentation.

Who is involved?

Wargames typically involve different factions, to provide a rich context for any interaction within the played operational environment. These factions are usually given a colour coding, for example: friendly forces (blue), enemy forces (red), civilian population (green), non-government organisations (yellow) and criminal factions (black) may be involved. Much discussion has taken place within the wider wargaming community on what actually happens when people participate in wargames. The key observation is that people get involved in the wargame in a much deeper way than might be expected. They become part of a constructed narrative, similar to an actor in a play, as they make decisions that shape the next steps of the game. The difference with a play is that there is a script to control what happens. Often wargames will have no script and players are left to innovate and improvise.



Are there different types of wargame?

There are several different types of wargame and numerous contexts within which wargames can be applied. The following are some examples of types of wargame:

- ▼ **Open Games** involve a god-like overview with all forces in view and all rules and assumptions known to all.
- ▼ **Closed Games** reflect the ‘fog of war’ with limited information (enemy, own troops, etc). Not all the rules may be known or they might be different for different sides.
- ▼ **Seminar Wargames** focus on discussion and generation of insights.
- ▼ **Analytic Wargames** focus on generating evidence based on analysis of conflicts between military elements.
- ▼ **Course of Action (COA) Wargames** embody a systematic method of analysing a plan to visualise the ebb and flow of an operation or campaign (e.g. see the Staff Officers Handbook (SOHB)<sup>5</sup>).
- ▼ **Matrix Wargames** focus on adjudication between two sides proposing reasoned arguments.
- ▼ **Deductive Games** test a plan before action or consider particular options.
- ▼ **Inductive Games** involve the discernment of patterns following a number of games. This can typically be used in the concept development process.
- ▼ **Alternative Futures Games** provide participants with an activity to be conducted in multiple scenarios. With different outcomes provided, the participants need to

determine specific indicators that would determine which alternative future is developing.

While wargaming has often been thought of as a tool for strategic decision making, it can be used at any level; whether it be a tactical team, a battle re-enactment, a business problem, a political challenge or disaster relief, wargaming techniques can be applied. The challenge is determining what is appropriate for a particular problem and how to apply it.

An example application of wargaming: STRIKE Experimentation Wargame

The Niteworks Army HQ experimentation project, investigating the employment of the STRIKE Brigade, has used several wargames to explore the concept.

The STRIKE wargame events were based on Course of Action (COA) Wargaming processes and best practice as articulated in the Staff Officers Handbook (SOHB) 2014. According to the SOHB a COA Wargame is “a visualisation technique that enables a structured discussion among SMEs to elicit their views and inform (your) military judgement”. The COA Wargaming doctrine in the SOHB was adapted to support the experiment aims. The observations below on getting the most out of wargaming derive from the STRIKE wargaming experience, having applied a particular wargaming technique, but they apply to a broader range of wargaming contexts.

Getting the most out of wargaming activities from the STRIKE experience

- Ensure a sufficient gap between wargames and any subsequent activities such as a virtual event.
- Encourage innovation. If truly innovative outcomes are desired, pitting approximately equal sides (in terms of numbers of participants and in-game capabilities) directly against each other in a genuinely competitive ‘anyone can win’ scenario is a proven way of unleashing creativity.
- Robust enemy (red) play is required. Once the appropriate threat profile is established, this needs to be played robustly. Enemy actions should not be tabled as a suggestion of what the enemy might do; they should be presented by an authoritative ‘Red Cell’ in a definitive statement of ‘this is what the enemy are doing’.
- Ensure that mapping is started early. The lack of good quality mapping can pose a serious risk to any wargame. Sourcing and printing mapping invariably takes longer than is commonly assumed.

- Player engagement requires that no event be held in the location of participating units. The temptation for participants to return to their everyday work place to get on with routine tasks must be avoided.
- Ensure the entire senior management is present. If the CO is not fully supportive of the wargame, there is a greater risk that his staff will not fully engage.
- The time and effort to generate realistic context and material through Operational Staff Work (OSW) to frame and set the context for the wargame should not be underestimated. At its simplest, the OSW needs to be just enough to get the participants into the scenario; ideally it should be an entirely realistic and representative OSW, and the supporting scenario, to enable realistic and appropriate planning.
- Provision of Operational Analysis (OA) to wargaming is essential, both in advance of, and during, the event.

Wide Area Persistent Messaging Wargame

COA wargaming is only one of many forms of wargaming that could be applied to the STRIKE problem. The Wide Area Persistent Messaging (WAPM) project took a different approach to wargaming that employed an Open Game, with teams of blue participants working against a set of scenario based stressors (the stressors representing a form of adversary).

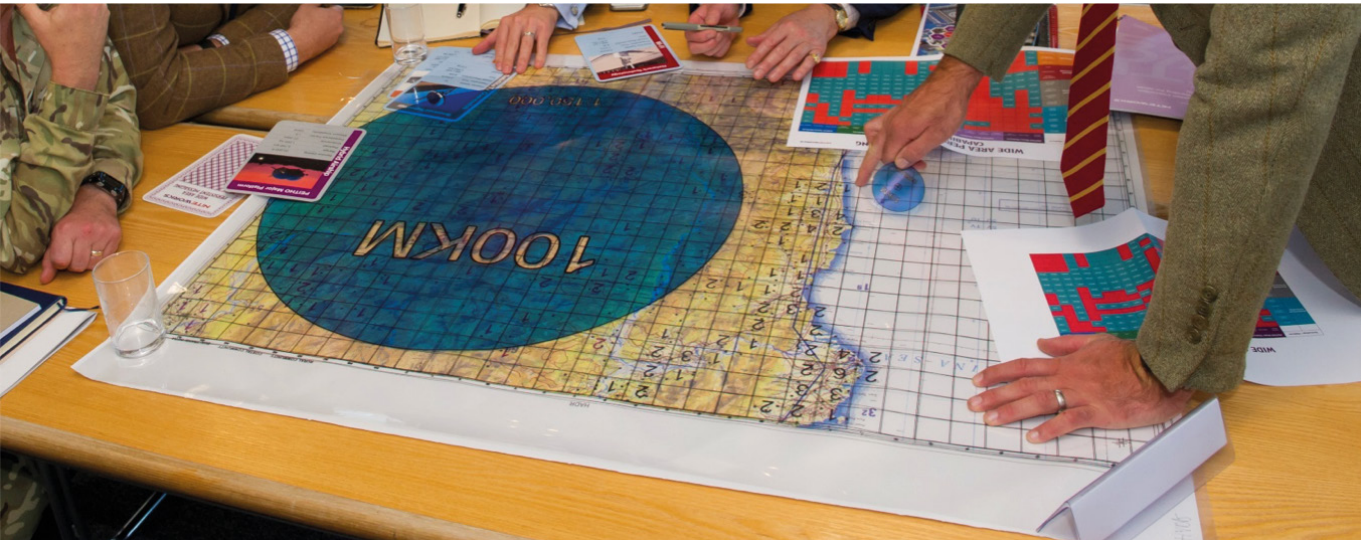
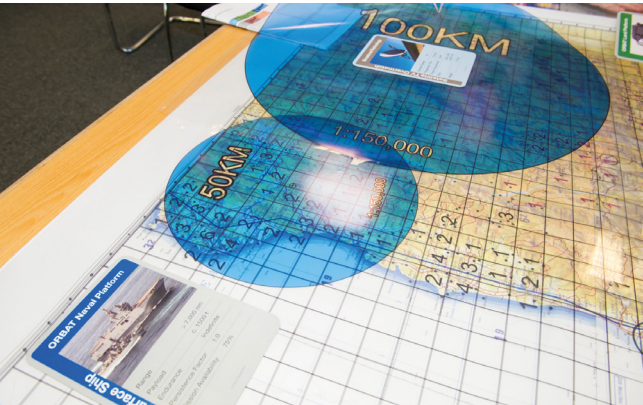
At the Niteworks Technical Symposium in 2016 the benefits and processes associated with the WAPM wargame were demonstrated in a wargaming workshop. Lasting just over an hour it was expected to be a challenge to brief the participants and get them to a position where they could

participate meaningfully in the discussion. In reality the level of engagement was impressive and demonstrated just how versatile and innovative wargaming can be. While the workshop only covered one of three scenarios and provided limited opportunity to change capability sets, as an illustration of how the wargame was used in the project, it was able to highlight the strengths and weaknesses of different technical options in a particular scenario.

Future application of wargaming

So what should the focus of wargaming be over the next few years given the impetus in the Pentagon and UK MOD institutions? The wargaming community is continually innovating as it thinks about how to tackle a particular problem. Potential adversaries are also employing wargaming techniques to develop tactics and strategy, so the emphasis should be on how to get the best out of wargames to counter future threats. The use of 2D and 3D displays, Virtual or Augmented Reality and broader use of simulation is where wargaming can further evolve to increase participation and immersion, however care must be taken to ensure that the attraction of simulation as potential ‘eye-candy’, does not take away from the actual business of wargaming – that of providing support to decision making. For an in-depth appreciation of wargaming in MOD, please consult the DCDC Wargaming Handbook.

WAPM wargaming tools (map, trump card and range rings) – from Niteworks Technical Symposium 2017

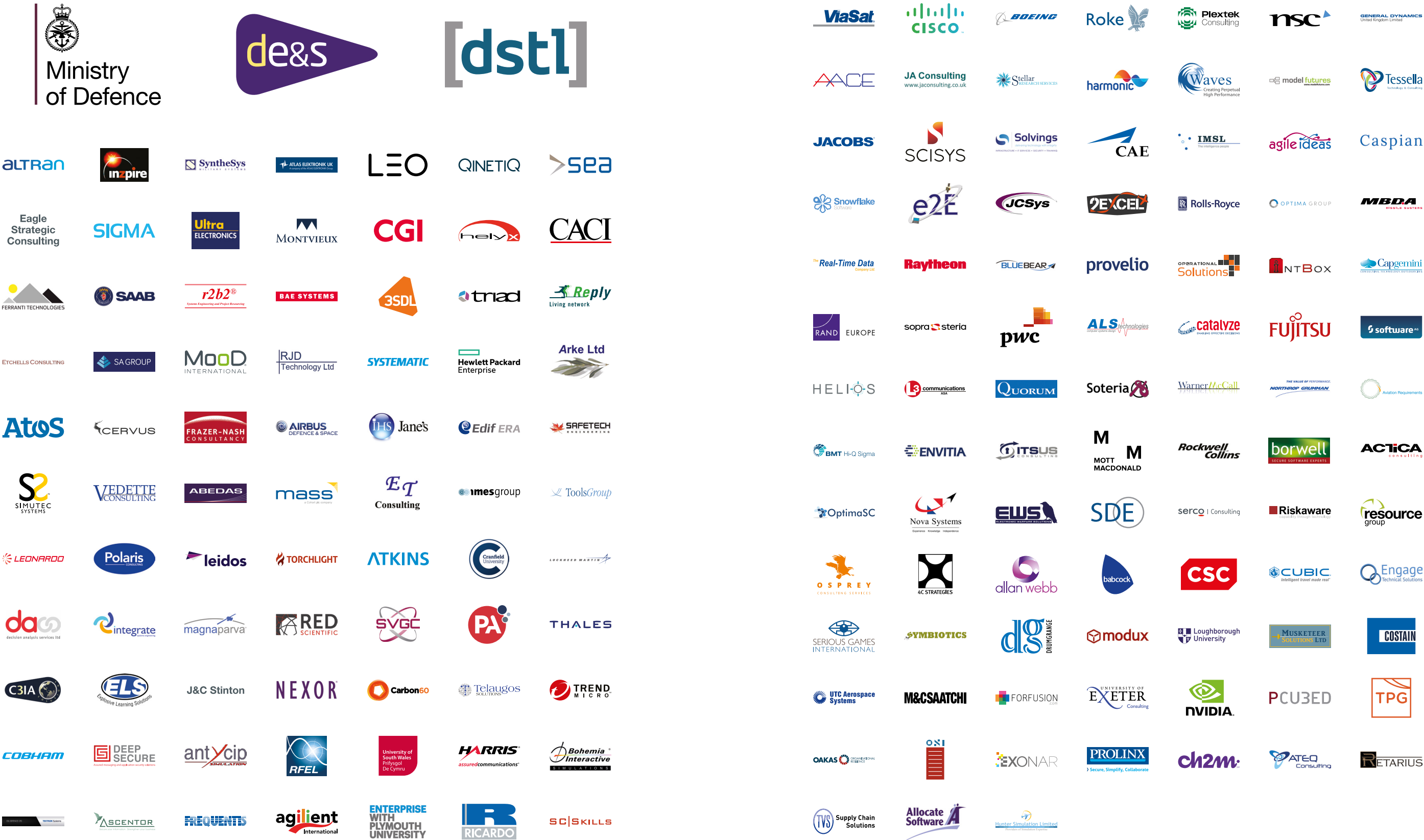


1. “Revitalizing wargaming is necessary to be prepared for future wars.” War on the Rocks Deputy Secretary of Defence Bob Work and General Paul Selva. December 8, 2015  
2. The US Third Offset Strategy focuses on pursuing next-generation technologies and concepts to assure US military superiority.  
3. Wargaming Handbook, 2017, DCDC,MOD.  
4. Peter Perla, The Art of Wargaming. Naval Institute Pres. Dec 1990.  
5. Staff Officers Handbook 2014. Director Land Warfare. MOD.



# The Niteworks Partnership

The Niteworks partnership embraces more than 170 organisations as well as the MOD and continues to grow.







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