

# TRANSFORMATION IN DEFENCE

2019

The background of the cover is a collage of three images. The largest image, on the left, is a close-up of a jet engine. The top right image shows a tank. The bottom right image shows a ship. The collage is divided by diagonal lines.

## EMBRACING INNOVATION IN THE DEFENCE SECTOR

Building towards  
a digital future

How open  
should you be?

Protecting assets –  
why language matters

**ATKINS**

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# From the editor

The UK Defence sector is experiencing an unprecedented pace of change. It's now more important than ever to ensure we have the right strategies, the right tools and the right skills to not just keep up, but to thrive in this transformational environment.

For Atkins, this has meant putting our core services under the microscope to explore how we can embed this transformative approach into the way we work - be that with the adoption and creation of new digital tools or by looking at other sectors and seeing how their tools and innovations can be applied to the Defence sector, to deliver transformational and lasting value.

In this magazine, we've gathered together some of our experts' thoughts and opinions on the future of UK Defence, and the importance we place on helping clients maximise the value of their investments and assets.

The articles are intended to challenge and inspire, so please do get in touch if you have any comments or questions.



David Clark  
Aerospace & Defence  
Market Director

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With over 30 years' experience in leadership roles in Defence and Security, David has spent his career at the forefront of innovation. He spent 12 years with the Defence Science and Technology Laboratory, where he pioneered new technologies and enjoyed success delivering user-centric design and agile procurement – before they became buzzwords.

Joining Atkins in 2002, when innovation was becoming an integral part of business models, service delivery and value engineering, David saw himself involved in major programme delivery, operational management and latterly, business leadership. He is passionate about diversity, agility and value as the drivers of innovation, and ultimately of business success.

A graduate of the Universities of Bath and Nottingham, David is a Chartered Engineer as well as a Fellow of the Institute of Engineering and Technology (IET) and the Royal Institute of Navigation.

# Contributors



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Andy is a Chartered Engineer with an Aerospace Safety Engineering MSc. He is a member of the IET's Functional Safety Technical and Professional Network steering group, and the ADS Defence Systems Safety group. He is currently working on autonomous safety, including machine learning and artificial intelligence, and digital twins for Defence.



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Vanessa is the Technical Authority for Data Analytics and Visualisation. As a former statistician, Vanessa specialises in enabling organisations to improve their analytical maturing and benefit from evidence-based insights.



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Chief Systems Engineer

Ian is a Chartered Systems Engineer and Enterprise Architect with 20 years' experience, primarily in the Defence and Aerospace Industry on both customer and supplier sides. He has worked on projects covering Land, Maritime, Air, C4ISTAR, unmanned systems, infrastructure and rail, and has also undertaken business transformation initiatives within UK MOD and Rolls-Royce. He is currently the President-Elect of INCOSE UK, and has been active within the international systems engineering community for several years.



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Lead Consultant

Pierre is a Strategic Asset Management Technical Authority, responsible for promoting the adoption of ISO 55000 in Defence. He has over 20 years' experience of providing supportability engineering (ILS), support solution architecture and in-service support in the Military communications and Land domains. He is a Chartered Engineer, a member of the IET and also the Industry co-chair of the Supply Chain & Supportability Engineering Working Group (SCSEWG) in Team Defence Info.



**Alistair Roxburgh**  
Solution Architect

Alistair is the RAPID (Rapid Assessment and Planning for Infrastructure Design) product owner and has driven its development over the past two years. He joined Atkins' Land & Weapons team as a Client Manager in 2012, having served in the Army for 31 years.



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Junior Engineer

Robert is a safety engineer who specialises in aerospace engineering. He has worked closely on the designing, manufacturing and testing of fixed-wing unmanned aerial vehicles, as well as writing mathematical models and testing the software for unmanned aircraft.

# Protecting assets – why language matters

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## A changing world

I began my engineering career in a simpler world. We developed and designed with dependability in mind, the idea being that even when a failure occurred, the platform would continue to operate in a safe and predictable way.

But in the 21<sup>st</sup> century something fundamental changed. Systems became even more complex and – more importantly – interconnected. Our critical national infrastructure began moving away from the use of physical assets and turned to digitalisation, becoming increasingly reliant on data and networks to operate.

The information about these assets also moved into the digital realm. A project workflow can now be managed online, with multiple users able to dip in and out of asset information – which ranges from assessments and certification updates, to a complete replica of an asset created in the form of a digital twin.

Assets for which we previously didn't have to worry about being vulnerable to cyber attack are no longer secure and safe. The Black Hats have seen this shift, and over the past decade attacks on critical industrial control systems have, in turn, become increasingly common.

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**The term black hat hacker is derived from old Western movies, in which the bad guys wore black hats**

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## Our systems are joined up, but what about our engineers?

Previously, the design, development, testing, operation and maintenance of assets would all be completed by different individuals – with different specialisations. But, in today's interconnected world, this blinkered approach leaves gaps in understanding, and if engineers aren't talking to the right people and using the right language, they run the risk of only partially solving a problem – or partly protecting a system from a cyber attack.

## Language does matter

Part of the solution to this can be found in the way we think about job roles. Previously, engineering roles were defined by the type of risk or technology being managed; be that security, maintenance, safety or asset management.

Now, assets that previously weren't vulnerable to a cyber attack are now at risk. In turn, the technology, assets and system-of-systems approach has blurred the edges between the different engineering roles.

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**A system of systems is a network of programmes that pool their resources and capabilities together to create a new, more complex system which offers more functionality and performance than simply the sum of the constituent parts**

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Rather than continuing with the focus on dependability, resilience engineering needs to become the norm. It would see engineers adopt a more holistic approach to managing assets, with a generalist understanding of how an attack on one asset could have a far-reaching impact. The result would be assets that are safe, secure, reliable and maintainable – all by one individual.

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**A Resilience Engineer would ensure the system can cope with both external threats and internal faults**

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**Andy German**  
Professional Head of  
Discipline – System Safety  
and Asset Management

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## Business Strategy

Innovation  
Branding  
Solution  
Marketing  
Analysis  
Ideas  
Success  
Management

### Remaining agile

Changing the language we use to describe an engineer's role is only one step on the journey to ensuring our critical national infrastructure is protected. Thanks to the current pace of technological change, it is difficult to predict whether this will be enough.

As we look to adapt alongside the world around us, we need to be mindful that the invention of a resilient engineer doesn't result in the loss of the specialist skills previously held by different individuals in the engineering field; creating a jack of all trades and a master of none.

However, this is a fine balance we need to maintain, to ensure we don't get caught up in protecting skills that are no longer of use in the modern world. Indeed, the role of resilient engineer may not even be completed by a person in the future, but a system.

# 5 steps to demystify data in Defence

Data has created vast new technology corporations as powerful as any company in history; enabled huge leaps in efficiency from healthcare through to transport and retail; and transformed our day to day lives for the better. And it's only just getting started.

Yet despite the obvious advantages to be gained from data-enabled decision making, harnessing data is far from straightforward. Across all industries, organisations are grappling with similar challenges: how is data best collected? And once we have it, how is it best analysed, stored and deployed?

The Defence industry is no different. If anything, the sensitive nature of information in Defence makes these challenges are even more acute. Here are five ways to demystify the data and get yourself closer to the benefits it can bring:

## 1. Wait – what's the question?

Before you dive into data, it's vital to understand what you're trying to get from that data set in the first place – what problem are you trying to solve? Without knowing this, it's very easy to get lost in reams of information, with no overarching strategy to guide you.

This might be shaped by a specific key issue that you're trying to address ('Which capability development should be prioritised?' or 'Where do our strategic risks originate?'). It could be driven by departmental objectives and key performance indicators, such as a desire to increase efficiency, or by organisational strategy as a whole.

## 2. Manage data volume

Data can be surprisingly seductive. When dealing with it, organisations often become entranced, wanting more and more. Having vast data sets can – of course – lead to important insights, but for many organisations the problem isn't having too little data: it's having too much.

Everything we do potentially generates data. But not all data yields the same value. While it's tempting to gather as much as possible and deal with its deciphering later, this merely postpones and prolongs the headache of actually deciding what you want from it. By mapping data points to the business problem, you're able to focus efforts to identify which gaps need to be plugged.

## 3. Make quality your priority

It's easy to get fixated on the power of data. But if the underlying data isn't accurate, any insights derived from it can be dangerously misleading.

In the public sector, where national reputation is on the line, it's absolutely vital to ensure the highest possible data quality. A 2019 National Audit Office report ('Challenges of using data in government') lists the misunderstanding of data quality in the public sector as one of its three most substantive problems. To solve this, identifying data owners and undertaking regular reviews will result in higher quality data.





**Vanessa Fernandes**  
Senior Consultant

#### **4. Consider your capabilities**

Data is demanding. The process of sourcing, analysing and storing it requires a high level of expertise. New regulations such as GDPR are making the legal penalties surrounding data mishandling much tougher, making it more important than ever to have the right people and principles safeguarding your data.

And despite years of growth, there's still a shortage of qualified data professionals. According to a recent IBM report, 'The Quant Crunch: How the Demand for Data Science Skills is Disrupting the Job Market', demand for data scientists will grow by almost a third in 2020.

So when developing your data strategy, be sure to understand your organisation's grasp of the relevant skillsets. And if you're in-house capabilities aren't able to process data the way you need, external resourcing can be the answer.

#### **5. Get big backing**

It's easy to assume that everyone will see the importance of harnessing and safeguarding data properly. But like most projects, data analytics can fail without the explicit support of senior leaders. According to McKinsey, the level of support (or lack of it) from senior leadership teams is a critical factor in the success of a data analytics project – more so than even technology or tools.

So what can you do to get them on board? First, approach senior figures as early as possible. It's tempting to wait until you have some tangible benefits, but given that significant challenges are likely to emerge early on, their support could be crucial in the inaugural stages.

Aligning your analytics strategy to wider business goals also helps with senior backing. Since it's often senior leaders who develop this strategic vision in the first place, aligning your strategy can help to engage them in the project, while simultaneously demonstrating its importance to key organisational goals.

#### **See you data**

It might be tough at first, but following these steps can help you to take control of your data. So don't be overawed or put off by the size of the task. Start small with your data efforts, fail early and learn from it, and remember that it usually gets easier in the long term.





# How open should you be?

Open standards are becoming the norm. Instead of designing systems that are heavily regulated by the controller of the hardware or software, businesses are choosing to make their platforms open for their supply chain to access, to understand and to propose upgrades. The benefits to this method are clear. It leads to easier integration, speedier upgrades, improved flexibility and – crucially – long-term value for money. But how do organisations decide how open their platforms should be?

## Openness in Defence

For the Defence sector, adopting open standards is no longer just a preference; it has become a central driver in system design.

For UK Defence, while architecture may be open technically, the Ministry of Defence (MOD) often subject to 'vendor lock-in' to limit the commercial freedoms to publish and compete for upgrades to the architecture. This could mean having commercial openness designed into a system from the outset to create a 'freedom of action' for future upgrade bids, across all levels of the supply chain. So Prime and Tier 1 level suppliers could change, while still retaining control of the underlying architecture. Such a system may be more costly to design than its closed counterpart but would result in significant cost savings over the life of the system.

Deciding just how open a system should be is imperative not just for finding the right degree of technical openness, but crucially from a commercial perspective to ensure the system can be managed, upgraded and maintained efficiently and affordably. So, how easy is it to determine how open a system should be?

## How much is enough?

In April 2018, the MOD introduced a mandatory Open Architecture Key User Requirement (KUR) for all future equipment purchases to ensure that due consideration be given to the subject of openness. The requirement was kept purposefully broad to ensure its applicability across defence domains. However, in many instances – such as transition issues or a legacy lock-in – significantly more guidance and consideration is required to determine the most appropriate level of openness.

A prime example of this can be found with the current land communications system MORPHEUS, which created its own 'Evolve to Open' approach, employing a strategic phased transition from the current closed Bowman system towards a more open approach. Meanwhile for the British Army's armoured vehicle fleet, a detailed analysis of options was undertaken to measure through-life benefits to the fleet against the upfront investment required.

The latter was greatly supported by the UK Land sector's long-standing Land Open Systems Architecture (LOSA) initiative; a more detailed, evolving set of Generic Architecture Defence Standards created by working closely with industry.





## The need for more guidance

Looking at the successes enjoyed by the Land sector thanks to its hands-on approach to assessing openness, the importance of creating authoritative guidance on how to determine the most appropriate degree of openness is clear. The Land sector has the LOSA initiative, but where are the air and maritime equivalents? Or is a broader but more detailed version of the MOD's KUR the answer?

Regardless of how the Defence sector chooses to upgrade its existing guidance, collaboration must play a central role. Industry input was a key consideration when creating the LOSA initiative for the Land sector and played a central role in its success. Now, we must bring together the thoughts and expertise from across Defence and the industry to more clearly define openness for the remainder of the MODs domain.

*This article covers a section of David's talk at DSEI on The Future of Open Systems in Defence Procurement. You can also find more of his thoughts on how we make better open architecture guidance a reality in his longer report, also entitled 'How open should you be?' which you can read at [atkinsglobal.com/cyber](http://atkinsglobal.com/cyber)*



**Dave Clark**  
Aerospace & Defence  
Market Director

# Building towards a digital future

## The future is digital

The future of engineering is digital. Digital toolsets are creating digital models of assets, providing not only the 'as designed' information but also following them throughout their lifecycle to capture the 'as built', 'as operated' and 'as maintained' status of an asset in the form of a digital twin. Meanwhile, health, usage and configuration data are being exploited to enable enhanced forms of maintenance:

- › Using big data techniques to gain insights that enable a paradigm shift from preventative maintenance to prescriptive maintenance.
- › Providing maintainers with digitally enabled inspection, diagnostic and repair technology, which will significantly reduce average repair times and hence drive up availability.
- › Comparing scanned data against 'as designed' or 'as last scanned' data to look for physical defects and changes; reducing inspection and diagnostic times.
- › Enabling faster design loops around post-design service modifications where the 'as designed', 'as operated' and 'as maintained' data is available for engineering analysis.
- › Improving asset tracking and configuration control through automated processes.

Many industry sectors are already relying on digital tools – now it is time for the UK Ministry of Defence (MOD) to be an active participant in shaping the direction of travel, rather than being a passenger or a bystander. In particular, given the wide supply base across the UK Defence industry, it is essential that the development of future digital military solutions conform to a set of guiding principles and open standards to ensure integration and interoperability. Otherwise, there is a significant risk of multiple versions of digital engineering emerging, which may not fit together. Many of the prime contractors and key providers of support solutions have already started on their own digital journey. It is time for the MOD to embark on its own digital engineering transformation.

## Embarking on a digital journey

But where to begin? Digital transformation is widespread across Government and covers a much wider scope than just offering digital services such as online road tax payments. In particular, the UK Government has invested significantly in promoting digital engineering in infrastructure and the built environment, setting up the Centre for Digital Built Britain, and promoting Building Information Modelling (BIM) as a key enabler of common data standards and interoperability.

The BIM approach goes beyond 3D computer aided-design to consider aspects such as cost, project timescales and a parts catalogue reference for each element in the model. It includes the management of information through the whole lifecycle of a built asset. This approach delivers value by facilitating the creation, collation and exchange of shared models and corresponding intelligent structured data. Another core feature of the BIM approach is the avoidance of information loss when progressing between different lifecycle stages and transitioning management responsibilities.

## Similar challenges

Whilst BIM has been created for use in the built environment, the digital journey behind the adoption of BIM includes many useful lessons that the MOD could benefit from. Looking to the built environment, aspects that resonate strongly with the MOD's digital engineering and support solutions approach include:

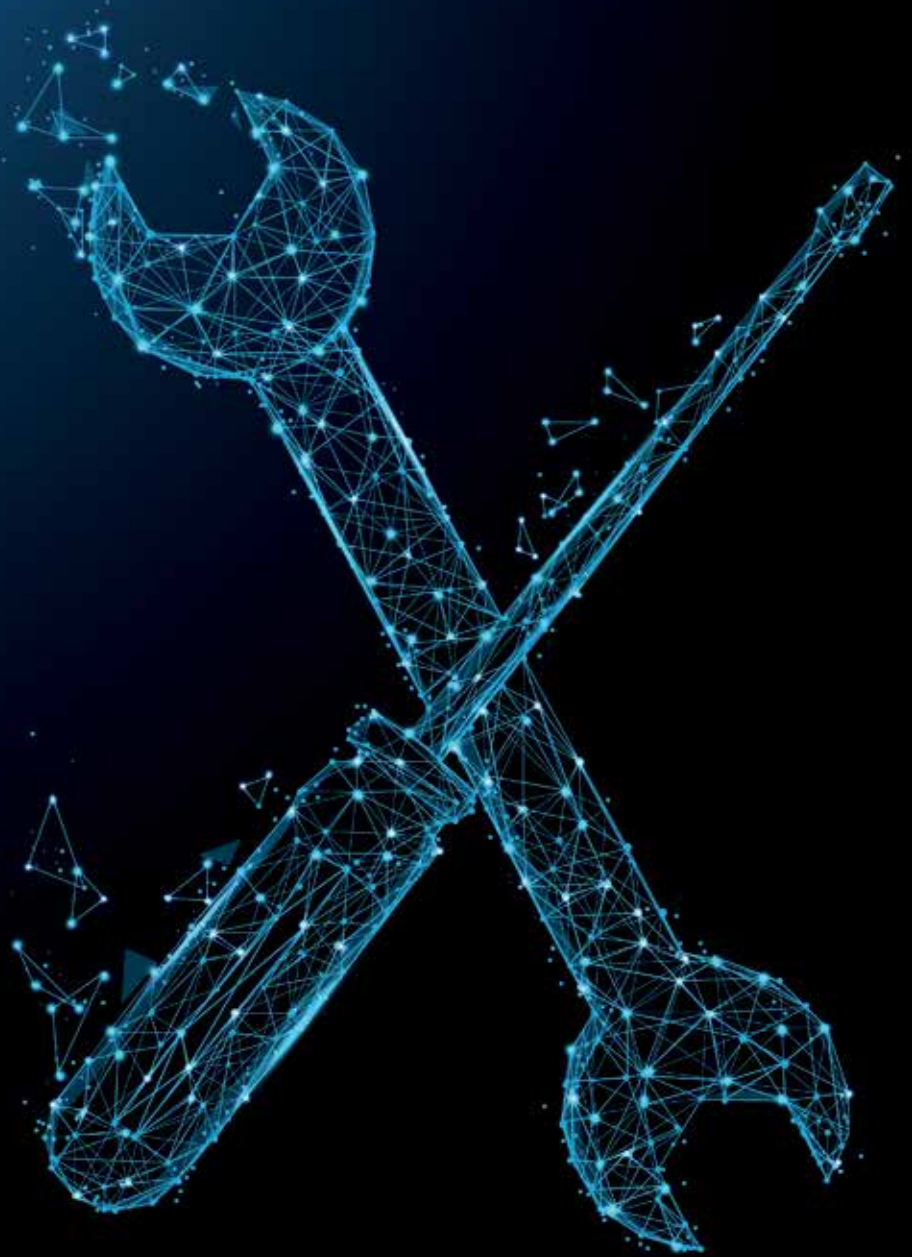
- › The definition of common data standards throughout the supply chain and across the whole lifecycle.
- › Moving beyond 3D design data to include linkages to asset identifiers, parts catalogues, project timescales, risks and technical maturity.

- › Enabling better operations and maintenance through serving up digital twin data into augmented reality devices and using it to generate improved management information.
- › Aligning digital BIM data with asset management best practice to provide clear line-of-sight between business value and decision-making about how to operate and maintain assets.

### Foundations for the future

There is already a convergence of international standards taking place, both in terms of product lifecycle management and support solution design. But this is primarily a bottom-up process driven by tool vendors and engineering specialists. What is needed is direction and guidance to move the major Defence industry players and wider supply chain towards a common shared understanding of what the digital engineering future looks like.

The UK Government has already developed a great deal of experience in digital transformation in the built environment. This is the moment for UK Defence to take a look at some of the hard lessons and good practice that has emerged from similar efforts in other parts of Government and use them as a springboard towards becoming a truly intelligent and informed digital customer.



**Ian Gibson**  
Chief Systems Engineer

# Adopting asset management standards: taking inspiration from Australia?

Asset management is now growing in popularity in the Defence sector, with Australia and the U.S. Army Corps of Engineers leading the way. The Australian Department of Defence has mandated that all support arrangements need to be “ISO 55001 convergent” in the future. Indeed, their 2030 Material Logistics Roadmap states that by 2025-2030 “informed asset management decision making frameworks [will be] business as usual” and that “the organisation and the individuals [will be] unconsciously competent in the new ways of working”. Will the UK follow suit and embed asset management standards into the Ministry of Defence?

ISO 55000 is the international standard for the optimal management of assets. Originally named PAS 55, the standard was created in response to industry demand for guidance around good practice, following the advent of the formal discipline of asset management 20 years ago. Updated to ISO 55000 in 2014, the guidance ensures sufficient focus is placed on deriving value from assets. ISO 55000 defines good practice across the whole life of assets and was initially applied in the utilities, rail and infrastructure sectors, before being subsequently adopted by the highways and nuclear industries.

## MOD and asset management

The UK Ministry of Defence (MOD) needs to exploit its assets to their full, to deliver its demanding missions within a challenging budget. To make the matter more complicated, the UK MOD is composed of multiple organisations, such as Front Line Commands, Defence Equipment & Support, and Information Systems & Services, and engages with a complex stakeholder network to acquire and maintain their assets.

To do this successfully, MOD has chosen to adopt more and more international standards recognised in industry to support its business. However, it has not yet adopted an international standard for its assets.

### The benefits of asset management

#### Improved performance

Strategic asset management helps to target investment in the right place. The asset performance is measured and analysed, and optimised asset management plans can be developed to achieve improved performance.

#### Reduced whole life cost of ownership

Thanks to the strategic alignment of efforts and collaborative working across the organisation, optimised asset management planning helps to reduce costs while improving performance.

This is a benefit that UK MOD want to achieve through the principles of TLCM and Through Life Finance. However, the reality of programme affordability, budget split (between Acquisition and In-Service) and contract negotiations may sometimes work against these principles.

#### Reduced risk

Identifying and assessing both short- and long-term risks, and targeting investment to those deemed the biggest danger helps to reduce overall risk and assures compliance with legal requirements. This could lead to refocussing part of MOD investment towards the key support chain assets that are critical for sustaining the department's capabilities and ensuring mission success.

#### Improved user satisfaction

Effective service delivery and improved value-for-money will lead to increased user satisfaction.





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### Long-term financial visibility

Long range asset management planning results in work that is balanced and timely. This will ensure that not only CAPEX, but also OPEX expenditures are fully considered through life, as part of the acquisition strategy for new or upgraded military capabilities.

### The right time to consider ISO 55000

The MOD is already actively managing its assets and therefore implementing many aspects of ISO 55000. But is now the right time to implement a standardised asset management framework?

The MOD is transforming its Support organisation through the Defence Support Transformation programme, based on three pillars:

1. Defence Support Operating Model: this will bring greater clarity to the rules and responsibilities for support.
2. Business Modernisation for Support: this will modernise digital support, and fundamentally change the way the MOD operates its Support business. It will involve the harnessing of new technologies and the introduction of standardised business processes, metrics and a suite of digital services.
3. Defence Support Network (Transformation) DSN(T) Portfolio: this will capture, cohere and report on ongoing and planned transformational activity from the existing network, for front-line commands and top-level budget holders.

Based on this ongoing transformation programme, now is the right time for the MOD to determine how asset management should be defined and implemented for their organisation. The engineering support (Transformation), part of the DSN(T) Portfolio, has already identified this opportunity in its Discovery Phase Report, stating that "doing different things is where the genuinely disruptive changes occur, potentially bringing in new capabilities or achieving different effects." In short, the time for ISO 55000 "to provide a business-focussed wrapper around the maintenance, repair, overhaul and supply chain activities" is now.



**Pierre Delamotte**  
Lead Consultant

# 5 ways virtual site planning is solving fast-moving construction challenges

Organisations are operating in an increasingly uncertain and resource-constrained world. They're often required to respond – at short notice – to fast-moving military, humanitarian and construction challenges. And they need to be able to act with certainty whenever and wherever the need arises.

For clients across the civil and defence sectors, this may include the design of temporary infrastructure, such as bases for military operations or sites to provide humanitarian assistance and disaster relief. Or it could mean establishing remote camps to enable mining and resource extraction or the building of our roads and rail lines.

## Design temporary infrastructure from your desktop

The design process is becoming increasingly enabled by digital technology. Innovative geospatial and design tools enable the design of infrastructure in a virtual environment. Through the capture of data using unmanned and manned aerial platforms – such as drones – a site can be geotagged, in order to create a realistic replica of its terrain, geology, flood risk and more. All of this information can then be used to sketch out concepts and find the most suitable asset – and location – for the likes of accommodation tents, storage and power supplies.

Multiple options can then be developed to explore the optimal solution for the site.

Using virtual site planning, designs can be rapidly produced, shared and assessed in 2D. By including the site's schedule and the cost for different options, building information modelling (BIM)-style dimensions can also be added. The final concept design can then be viewed in 3D thanks to virtual reality technology and exported into detailed design BIM tools as required.

## There are five key benefits to this approach:

### 1. Optioneering

In the Defence sector, organisations are often designing and constructing infrastructure in remote and austere locations, or in constrained brownfield spaces mixed with fixed infrastructure. And yet, you need access to the right information and advice to scope sufficiently robust concept options early in the design lifecycle.

Virtual site planning can help you explore and assess options for such sites, while also finding ways of overcoming construction road-blocks by simplifying logistics, maximising energy efficiency and reducing the site's carbon footprint.

Increasingly, artificial intelligence and machine learning can be used to improve the speed of this optioneering process, optimising and automating some of the workflow.

### 2. Safety and Security

Safety and security features can be designed-in from the outset with, for example, best practice safety direction and guidance being built into the workflow. The physical security of sites can be assessed using line-of-sight analysis and incorporating it into the developed designs. Blast engineering analysis of standard and bespoke temporary infrastructure can reduce the risk to people working on site.



### 3. Collaboration

Digital tools such as Atkins' Rapid Assessment and Planning for Infrastructure Design (RAPID) geospatial visualisation software enables designers, decision-makers and potential users to all access a 2D and 3D model of the site, creating a collaborative approach to the assessment and review of design options when it comes to safety, security and asset selection. It also allows for pre-deployment rehearsal to take place, meaning any issues can be sorted out before the real-life site creation takes place.

### 4. Speed

When temporary infrastructure becomes part of a demanding operating environment – such as a fast-moving humanitarian incident – time can be of the essence. Thanks to the collaborative approach and optioneering available through virtual planning, the timeline of a site's design and construction can be vastly streamlined.

### 5. Cost

Digital tools can optimise real estate and resource usage and limit project risk. A previous use of RAPID saw construction and maintenance costs reduced by approximately 5-10%.

RAPID also allows for the comparison of numerous options, and uses a scorecard to show their relative construction and maintenance costs, as well as time, water and power consumption. Other outputs that help decision-makers are bills of material, work and cost break down structures, and business case evidence.

### Data-based decision making across sectors

Virtual site planning can help improve efficiency and affordability across a range of civilian and defence sites, whether you're designing for major infrastructure projects or for the front line.

Examples include optimising compound design ahead of major engineering and construction projects; providing facilities such as management offices;

and managing upgrades to existing infrastructure such as roads, railways and airports, storage and vehicle workshops. Or even for major music festivals, where digital tools could help planners consider routes, sight lines, health and safety, logistics and stage locations.

By combining the use of these tools with a breadth and depth of engineering skills and detailed design BIM tools, clients and their delivery partners can change the way temporary infrastructure is planned, assessed, reviewed, designed, constructed and operated. Digitising asset management early in the lifecycle and maintaining civil and Defence standards, such the MOD's Generic Base Architecture, will also help to ensure open, modular and scalable designs are produced from the outset. Can we afford not to use virtual planning?



**Alistair Roxburgh**  
Solution Architect

# RAPID DEPLOYABLE INFRASTRUCTURE DESIGN



Rapid Assessment and Planning for Infrastructure Design (RAPID) is a web-based, collaborative and tailorable design and decision-support tool developed to meet the needs of Defence and Civil sector clients, who often need to design temporary, deployable infrastructure in remote or constrained locations.

RAPID aims to enable early master planning of options for these camps and construction compounds before detailed design BIM tools are needed; however it will interface with GIS, survey data and these BIM tools as required.





### Data can be collected and analysed from multiple sources

- › Remote survey data capture reduces risk
- › Enhanced exploitation of GIS

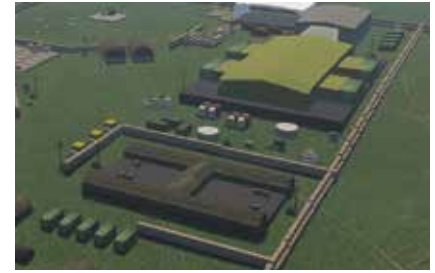
### Designs visualised in extended reality (XR) & explored in either 2D or VR

- › Exploitable by military and civil sector clients



### Scorecard dashboards allow easy analysis:

- › Construction and maintenance costs
- › Predicted construction times
- › Utilities usage
- › Environmental impact
- › Other metrics as required by the client
- › Feeding options into business cases
- › Other outputs include Bills of Material, Work and Cost Breakdown Structures



### Suitable for planning brown field sites with mixes of fixed (new and repurposed) and temporary infrastructure

- › Users can plan, assess and review designs. Connecting designers, users and decisions makers remotely for collaborative design
- › Enables compliance in terms of open, modular and scalable design as defined in the UK MOD's Generic Base Architecture DefStan 23-013A
- › A tailorable catalogue of over 300 assets allows users to access a variety of military and commercial off the shelf (COTS) assets and to match them to their needs



### RAPID Benefits

- › Enables users to optimise consumption of water, waste, power and fuel
- › Reduces costs, re-work and time to deploy, operate and recover camps and compounds
- › Improves safety and security
- › Improves collaboration across the enterprise
- › Assists early orientation of users prior to deployment
- › Allows designers to train for their role across the enterprise
- › Interfaces with BIM tools
- › Additional modules are planned for future capability growth (e.g. power, force protection and communications)

Find out more at [atkinsglobal.com/RAPID](https://atkinsglobal.com/RAPID)

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Member of the SNC-Lavalin Group

# Could blockchain help prove military airworthiness?

Blockchain has been making headlines in recent years as the technology that underpins the controversial cryptocurrency, Bitcoin. But does blockchain also have a place in proving military airworthiness?

Blockchain is a type of distributed ledger technology (DLT), an umbrella term that describes a database that can be shared across multiple sites, geographies or institutions and is decentralised to eliminate the need for someone to 'process, validate or authenticate transactions'<sup>1</sup>. DLTs are well known in relation to Bitcoin but they can do more than manage a digital currency. The concepts and structures that underpin them and the blockchains that enable them can be applied to other areas of economic, operational and social activity. Some commentators believe the impact of DLTs on British society may be as significant as the creation of the Magna Carta<sup>2</sup>.

## Military aircraft

Across the Armed Forces, there are approximately 800 service aircraft that need to be proven airworthy, certified to fly, and ready to be deployed in an instant. A wide range of stakeholders are involved in achieving this level of operational readiness and certainty. They may come from different sectors, be based in other parts of the world and be working to another authority's standards. This is where blockchain technology could simplify the process of procuring and developing trust in their products and services.

## The benefits to blockchain

Blockchain could help organisations save time and costs, and optimise asset management – particularly in three key areas:

### Supply chain management

The technology could be used to verify the origin of products and services and reduce complexity across the supply chain.

For example, it's likely the materials required to develop and construct a single military aircraft will be outsourced from other countries; will have to be manufactured to a specific grade; and be handled in a certain way. The aircraft owner or operator must be able to trace the products back along the supply chain, through different tiers of suppliers, and be able to assure a part received for use in the aircraft has come from a reliable source.

### Certification and maintenance

Blockchain may be able to help authorities ensure documentation hasn't been compromised.

To do this, they could use quick response (QR) or radio frequency identification (RFID) codes and assign them to different parts, or even different shipments of materials, to validate their quality and integrity. These codes could then be stored in blocks on a blockchain.

The blockchain would assure owners and operators that the data or digitised product meets the requirements set out in the relevant purchase order and offer them assurance over a part or material sourced from a less regulated country or environment. If there was a problem, e.g. early failure of a part, the operator could determine where responsibility lies.

### Smart contracts

These are self-executing contracts that have the terms of the agreement written into lines of code.

Smart contracts have the potential to save the purchaser and its suppliers time and money. The contracts would execute automatically as items move through the supply chain. They could be introduced when exchanges are simple and higher in frequency. Each would save small amounts of time and money, but due to the frequency of them, the savings would accumulate. In addition, suppliers' performance and deadlines could be monitored through the contracts, and issues or inconsistencies could be flagged.

<sup>1</sup> <https://tradeix.com/distributed-ledger-technology/>

<sup>2</sup> Swan, M. (2015) Blueprint for a new economy, O'Reilly Media, Inc. doi: 10.1017/CBO9781107415324.004

# Blockchain

## Feasibility

There are questions that would need to be answered before solutions like these could be implemented. For example, how transparent should we be? What information should suppliers see? Another consideration is how far to take the digital solution. It might be more efficient to confine the manufacturing part of the process to its own blockchain, and the complexity of military aircraft may mean that trying to impose an overarching blockchain solution on the whole process becomes too cumbersome.

## Exploiting its potential

Establishing a framework around blockchain has the potential to transform the process of ensuring military aircraft are deemed airworthy. A number of industries are already exploring – and indeed benefiting – from the efficiencies and cost savings afforded by adopting blockchain. Now is the time to consider how it could be used to build trust and drive innovation for the Armed Forces.



**Robert Smithers**  
Junior Engineer



# Engineering Delivery Partner – the key points

## How EDP will make a difference:

- › EDP is the default route for procurement of Engineering services for DE&S, and is available to other MOD departments and agencies
- › EDP provides a strategic approach to the sourcing and provision of skills to meet current and projected demands, driving efficiencies and benefits.
- › EDP will help the MOD to reduce the costs of their engineering services while ensuring the UK's Armed Forces receive the best equipment and support.

## How EDP is delivered:

- › EDP is delivered through a single source partnering arrangement comprising QinetiQ, Atkins and BMT.
- › EDP is supported by a strong provider network of small and medium enterprise providers to tap into the best expertise in the UK.
- › All parties are committed to implementing longer-term, output-based programmes for engineering services over the 10 year contract.

## The benefits of EDP:

- › Quality assured
- › Efficient service delivery
- › Maximising value for money
- › Sustainable Provider Network
- › Incentivised on outcomes

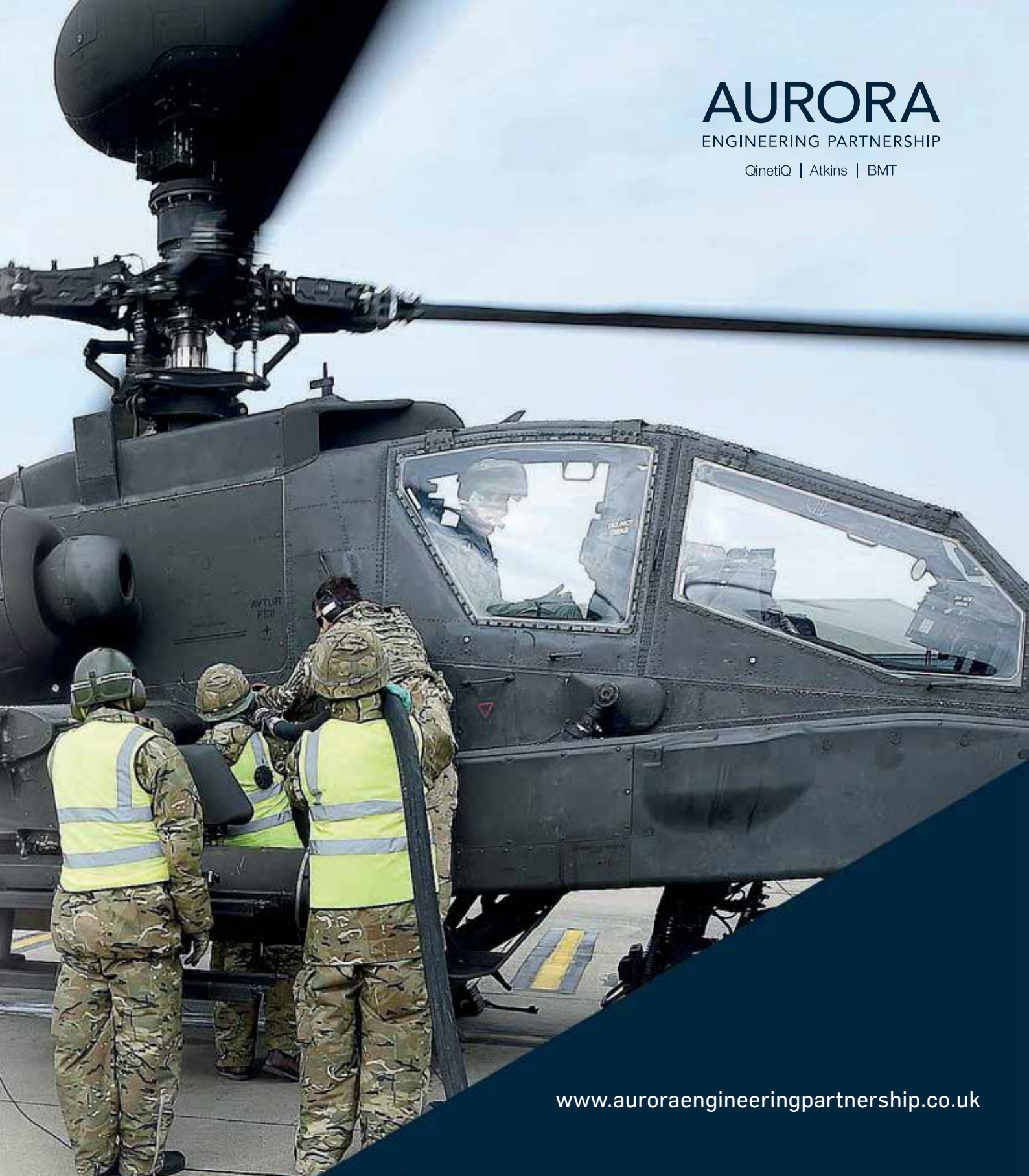




# AURORA

ENGINEERING PARTNERSHIP

QinetiQ | Atkins | BMT



[www.auroraengineeringpartnership.co.uk](http://www.auroraengineeringpartnership.co.uk)

# About us...

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## MILITARY AIR

- › Requirements engineering
  - › Safety and environment
  - › Composite structural design and analysis
  - › Training and human factors
  - › Integrated logistics support
  - › Availability, reparability and maintenance
  - › Business consulting
  - › Weapons
  - › Airworthiness certification
- 

## CIVIL AIR

- › Systems installation design
- › Fuselage nose – cockpit structure design and stress
- › Interior design and stress – crash & fire worthiness, cabin safety
- › Stress analysis
- › Landing gear
- › Wing design & stress
- › Maintenance repair and overhaul

As one of  
the world's most  
respected design,  
engineering and project  
management consultancies we've  
spent many years working with  
our clients to protect our  
national interests in  
an increasingly  
complex world



Working across the entire Defence lifecycle we work with our clients to help them maximise the value of their investment in vital infrastructure and equipment with expert advice and support, and cutting-edge technical solutions.

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## MARINE

- › Systems design and integration
- › Manufacturing support
- › Stress analysis
- › Naval shock and structure borne noise analysis/design
- › IPMS integration and upgrade
- › Software security and information assurance
- › Safety and environmental management
- › Substantiation
- › System Design
- › Mechanical handling and design

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## JOINT

- › Full lifecycle, quality-controlled, software systems assurance and development
- › Critical Systems Assurance and Integrated Information System Design
- › Communications and networks design and assurance
- › Industrial control systems design and development
- › Digital asset management and transformation
- › Cohesive Architecture of ICT systems and services
- › Cyber resilience and Secure by Design
- › Program Management and procurement support

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## LAND

- › Systems engineering
- › Safety and environmental management
- › People and training
- › Deployable infrastructure – RAPID
- › Communications and ICT
- › Asset management
- › Integrated lethality & survivability
- › Modelling & simulation
- › Systems integration

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## INFRASTRUCTURE

- › Maintenance, Operation and Training Facilities
- › Master planning of Military Bases
- › Infrastructure to support Platform Availability
- › Assessment Studies
- › Base security, Counter terrorism and blast design
- › Seismic / shock advisory services
- › Architecture and Design
- › Requirements capture and design for sensitive sites
- › Business case development
- › Clean sites
- › Technical assurance and design guidance
- › Nuclear defence facilities

Harnessing the power  
of technology to deliver  
transformational and  
lasting value, and  
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