Data in defence

Weaving digital threads across multiple domains

Digital
Intelligence

BAE SYSTEMS

Introduction

Every year, advancements in digital technology change the way we live and work. This impacts everything from how we communicate, to how we digest news, attend appointments and much more. The same can be said for all the UK's critical sectors, particularly defence, where the modern battlespace is digitally transforming rapidly across air, land, sea, space and cyber.

Against a tumultuous geopolitical backdrop, keeping up with this pace of change is a top priority for all defence organisations in the UK. They know that the ability to embrace new technologies is vital for succeeding not only today, but in tomorrow's information battlespace. Our adversaries understand this too. "They are also innovating at pace and are determined to build faster and more effectively, while finding new ways to jeopardise the safety of citizens, allies and democracy."

In this report, we take a closer look at the urgent requirement for defence to gain a digital advantage over adversaries, exploring some of the findings from our recent research, **Unlocking digital advantage in high trust sectors.** As part of this, we look at how defence organisations can effectively use and share data across domains to augment the decision-making process - something that is vitally important as the sector moves towards a Multi-Domain Integration (MDI) approach.

Outlined in the UK government's **Digital Strategy for Defence,** MDI sets out to enable seamless collaboration between all parts of defence, government departments, allies and partners. Crucially, it requires data to flow between interoperable systems, creating digital threads between multiple domains to provide the right people with the right information in a timely way.

Unsurprisingly, this is easier said than done, especially within a complex environment like defence. Innovation is therefore crucial. The adoption of new, next generation technologies is helping the sector to connect and share information, enabling it to make MDI a reality, both now and in the future.

In our research, senior defence decision-makers underlined the importance of adopting new digital capabilities to gain an advantage:

87% of senior defence leaders in the UK said having a digital 'advantage' was important or crucial to their organisation

61% of UK defence organisations said failing to embrace digital technology and ways of working would leave them unable to protect and serve democracy amidst an increased threat from adversaries

The criticality of defence data

What would be the impact of the defence sector failing to use data in the right way?

55%

An inability to solve complex challenges within society

48%

A failure to meet security and compliance requirements

45%

An inability to share data driven insights effectively and securely across the organisation

45%

An inability to share data driven insights effectively and securely across sectors

The digital thread for a stronger defence

With future battles being fought across multiple domains, defence needs to be able to integrate data across air, land, sea, space and cyber, so that it can be used by humans and machines in a timely and secure way.

The effect of bringing together data from multiple domains is like weaving digital threads, as Mivy James, Digital Transformation Director at BAE Systems Digital Intelligence, explains:


Mivy James

"In a world shaped by technological advancement, having a bigger picture view of digital and data networks and devices is critical to defence's ability to safeguard the nation's security and stability. But getting this holistic view is only possible if information is used effectively and collaboratively, which involves safely weaving threads between digital capabilities across multiple domains.

By working together to create these digital threads, the sector will be able to make better decisions at the right time and ultimately unlock an advantage in the digital age."

According to 44% of defence organisations, using data more intelligently will help them become more digitally mature

The UK government is already taking key steps to make this a reality. Data is a central component of the Digital Strategy for Defence, which highlights the importance of having secure access to information "anytime, anyplace, anywhere" across all domains, headquarters and for people working in home offices.

To enable this data to flow between systems, the strategy proposes the creation of a secure, singular, modern **'Digital Backbone'.** This will enable safe access to defence information, empowering end users to make faster and better decisions using data. It needs to "connect sensors, effectors and deciders across military and business domains and with partners, driving integration and interoperability across domains and platforms".

The concept at the centre of the strategy is **Multi-Domain Integration (MDI)** – the idea that every part of defence is able to work seamlessly together, along with other government departments and the UK's allies and partners. Igniting this change is as much about people and processes as it is technology. The sector requires individuals to be able to use the technology intuitively, while ensuring that its processes are agile enough to keep up with the constant pace of change.

Mivy James looks at how 'weaving digital threads' between multiple domains works in practice within the context of the 'Digital Backbone' and MDI:

"Weaving digital threads involves securely forming connections with data across a complex environment, joining dots between multiple digital domains to bring together different sources of information. In practice, it allows intelligence to flow safely between interoperable systems, seeing data seamlessly transferred from a satellite to decision-makers on the ground and then the end user.

"Importantly, achieving greater visibility with data does not mean bringing it into one single location. Instead, it is about creating several interconnected threads to give the correct people access to mission-critical information at the right time. The data flow needs to be audited, trackable and organised, creating a controlled ecosystem where people retain their ownership.

"This is why the government's 'Digital Backbone' aims to standardise networks and information exchange to enable data to be transferred safely between systems. By connecting intelligence in this way, defence organisations can identify patterns, spot problems, and ultimately make better and faster decisions."

Adapting technology to the information battlespace

In our study, defence respondents told us that the ability to use data to make intelligence decisions is an important component of their digital transformation journey (45%). Decision making is therefore a key factor in technology innovation for the sector, particularly when faced with ever-growing volumes of data spread across disparate systems.

Fortunately, work is underway in the public and private sectors to meet the requirements of the future battlespace. New technologies are being developed to enable defence to break down silos, allowing data to move securely across domains so that military users can make the right decisions at the right time.


Rob Wythe

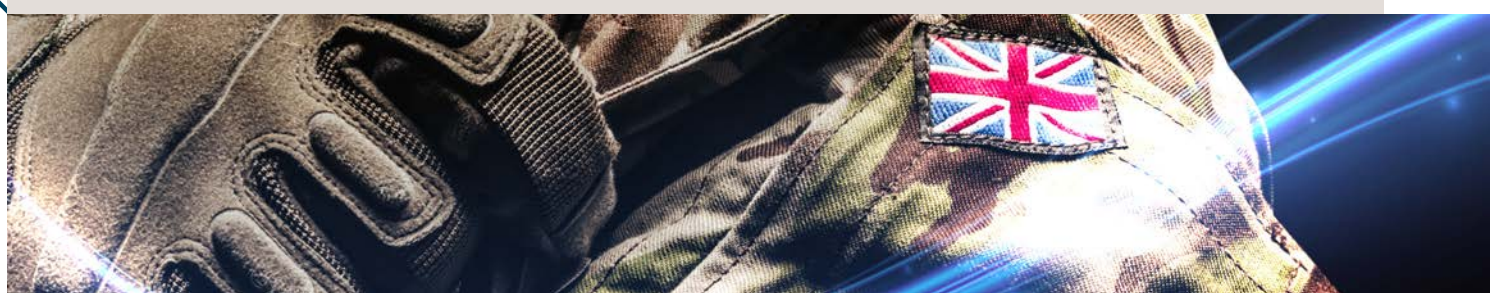
Rob Wythe, Chief Technologist, C5ISR at BAE Systems Digital Intelligence, looks at why continuous innovation and securely deploying commercial technology is crucial:

"The battlespace of tomorrow is an information battlespace. Warfare will be driven by data derived from sensors on manned and unmanned platforms operating in all domains. Decisions will need to be made in milliseconds, and they will involve the need to consider many factors across air, land, sea, space and cyber.

"To meet these demands, multiple forces need to work together to generate a greater decision advantage, pushing boundaries and driving innovation while remaining secure. With technological evolution in commercial markets surpassing that of traditional defence markets, it will become increasingly important for defence applications to adopt - and adapt to - these developments. This involves embracing solutions from across the whole SME ecosystem - something that is especially key for countering future threats like hypersonic weapons and Cyber and Electro Magnetic Activity (CEMA)."

While in the past technology has struggled to provide this decision advantage across multiple domains, increased investment and collaboration are helping to bring the 'Digital Backbone' and MDI to life. According to Wythe:

"Until now, many solutions have lacked the coherence, connectivity and intelligence to allow decision-makers to visualise, exploit and disseminate data at a speed that can outpace their adversaries. However, as modernising defence moves to the top of the agenda to protect national interests and navigate an ever-increasing threat landscape, organisations, governments and academia alike are working together to supercharge product development and research."



The BAE Systems journey – what are we doing to help?

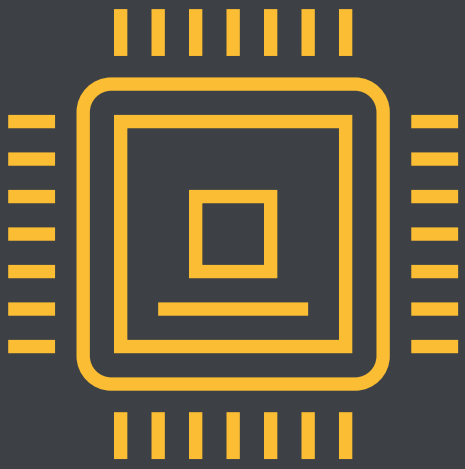
To provide our forces with actionable intelligence when they need it most, BAE Systems Digital Intelligence is creating innovative solutions that enable better information sharing within the defence sector.

Our decades of experience and research across every defence domain - and beyond - have gone into developing these solutions. This includes:

Our work to deliver integrated C2/C4I network solutions across air, land and maritime

Our development of cloud, CEMA and intelligence systems for government

Our applied research and development for defence and space



In practice, our experts are building solutions that enable the defence sector to achieve multi-domain operations – from delivering an AI / machine learning C2 system that provides situational awareness and decision support by combining and visualising data, to networking capabilities that provide secure, multi-domain connectivity.

NetVIPR™

Building deployable communications networks

It is vital that militaries are able to communicate consistently in a challenging, hugely contested environment. To help defence avoid being solely reliant on satellites or fixed infrastructure which are often targeted by adversaries, we have developed a whole new communications network. NetVIPR™ provides intelligent and secure military communication networks, weaving digital threads between everything from small reconnaissance drones to combat vehicles, fighter jets, aircraft carriers and military commands.

"While traditional military networks rely on hardware being set up and then maintained by specialists, NetVIPR uses software to perform functions usually carried out by hardware. This means that it can be updated from remote locations instead of the frontline, providing uninterrupted network access and data transmission. Importantly, the network is flexible, meaning it can be deployed from Command Headquarters all the way down to uncrewed air vehicles or other new autonomous platforms."

Mark Todd
Head of Product Development
BAE Systems Digital Intelligence, C5ISR

Click here for more information

Azalea™

Delivering secure space intelligence

Space-based intelligence is critical to every domain - whether that is informing strategic command, alerting an in-area warship, or providing real-time intelligence to forces on the ground. That's why we are set to launch our first multi-sensor satellite cluster into Low Earth Orbit in 2024 to deliver high-quality information and intelligence in near real time from space to military customers.

Known as Azalea™, the group of satellites will use a range of sensors to collect visual, radar and radio frequency (RF) data. This will be analysed on board by machine learning and edge processors. The resulting intelligence can then be delivered securely, anywhere in the world, while the Azalea cluster is still in orbit.

Click here for more information

"In support of the UK Government's **Defence Space Strategy** - which names Earth Observation from space as a top priority - we have created a solution that is able to deliver timely and assured intelligence for military operations and disaster response to users on the ground. With the functionality to identify activities of interest on board and directly communicate with decision-makers, it will enable us to better equip domains with actionable intelligence - marking a fundamental step forwards for the UK's space capabilities."

Elizabeth Seward
Head of Space Strategy
BAE Systems Digital Intelligence

Looking ahead:

Advanced battlespace management, deployable cloud infrastructure and secure communication

Some other examples of how we're innovating to help the defence sector adapt to the information battlespace include:

Location-agnostic battlespace management

Managing battlespace assets and being able to plan across multiple domains in any location is a top priority for defence organisations. That's why we have created a new cloud-native application and feature-driven product portfolio that enables the sector to effectively use all its assets. The products will provide advanced decision support, information exploitation and enhanced visualisation for mission planning, management and multi-domain situational awareness.

A deployable cloud infrastructure

To enable our advanced battlespace management system, we have built a deployable cloud infrastructure. Not only will this host our product portfolio, but it will also deliver data analytics and support continuous integration/continuous deployment (CI/CD) DevOps pipelines.

Secure multi-domain communications

Information sharing relies on having a secure communication system. To help, we have developed a software-defined radio that will provide safe communication and CEMA, enabled by AI / machine learning processing at the edge from a single box.

Conclusion

Amid an uncertain and harsh geopolitical landscape, defence organisations must double down on creating greater visibility to gain an all-important digital advantage.

Over the coming years, we will see the sector move away from siloed systems to adopt a new, integrated way of working. **This will involve forming digital threads and safely linking data across domains** to enable greater collaboration and advanced decision-making.

Like any significant transformation, it will require a huge mindset shift and it won't be easy. However, by working together to support and implement public and private sector innovation, defence will be able to continue safeguarding the UK's security, stability and prosperity - both now and in the future battlespace.

Methodology

This research commissioned for this report was led by independent market research agency Vanson Bourne, on behalf of BAE Systems Digital Intelligence. The study, which was in the field between May - June, 2022, surveyed 31 senior IT and business decision-makers from defence organisations with 1,000 employees. All interviews were conducted using a rigorous multi-level screening process to ensure that only suitable candidates were given the opportunity to participate.

References

Unlocking digital advantage in high trust sectors (August, 2022)
BAE Systems Digital Intelligence

Digital Strategy for Defence (25th April, 2022)
Ministry of Defence

Multi-Domain Integration: Demystified (11th October, 2021)
Strategic Command

Defence Space Strategy (1st February, 2022)
Ministry of Defence

We are Digital Intelligence

BAE Systems Digital Intelligence is home to 4,800 digital, cyber and intelligence experts. We work collaboratively across 16 countries to collect, connect and understand complex data, so that governments, nation states, armed forces and commercial businesses can unlock digital advantage in the most demanding environments. Launched in 2022, Digital Intelligence is part of BAE Systems, and has a rich heritage in helping to defend nations and businesses around the world from advanced threats.

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