THEIA: The British Army's Digital Transformation

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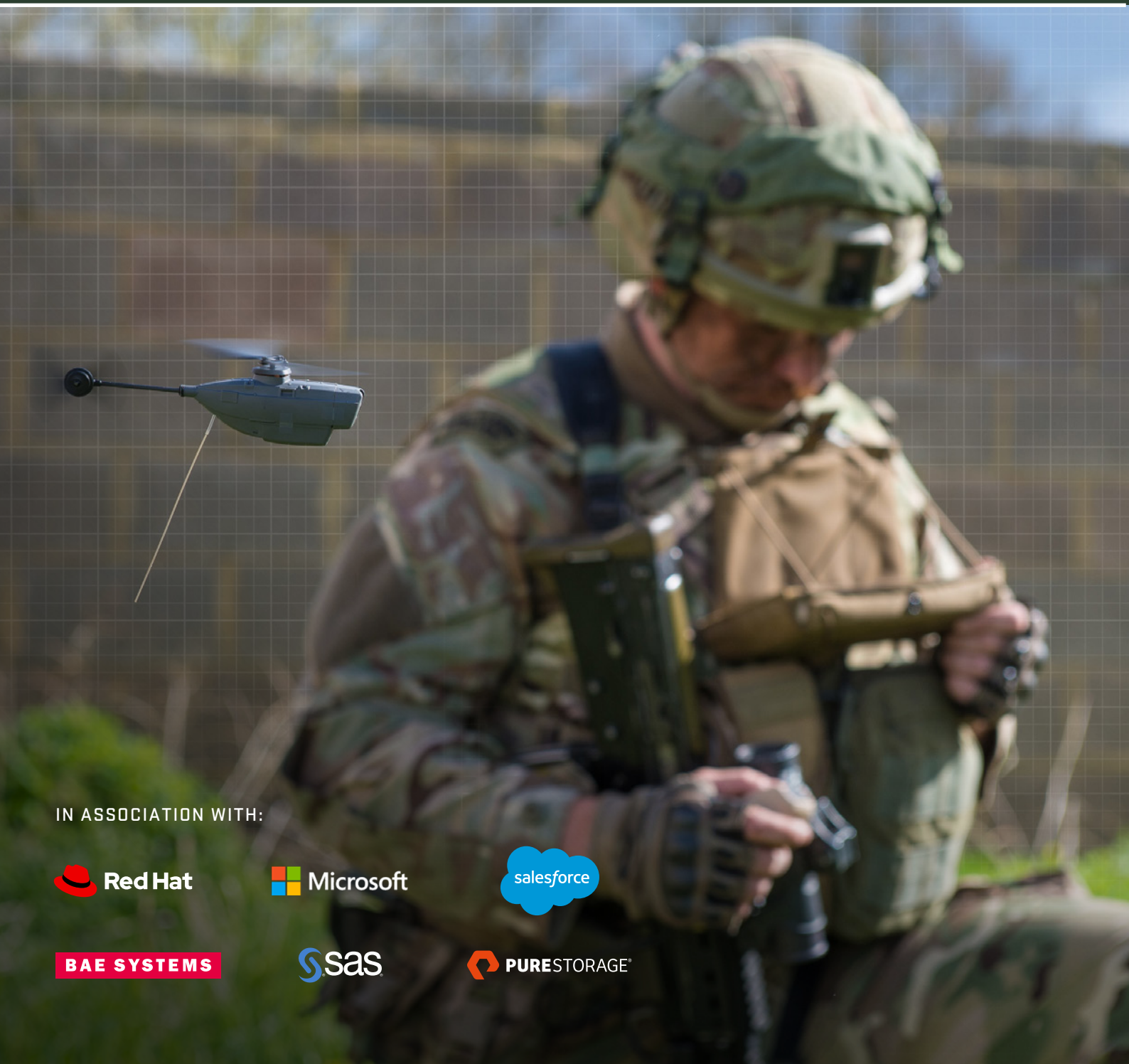

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THEIA:

THE BRITISH ARMY'S DIGITAL TRANSFORMATION

WRITTEN BY:
SCOTT BIRCH

PRODUCED BY:
KRIS PALMER

Senior staff from the ***British Army*** discuss **THEIA** – the Army's digital transformation programme preparing the Army for the future of warfare

In March, the UK Government announced the findings of its Integrated Review of defence, security and foreign policy, ushering in a new era for a high-tech British Army. While popular media focused on the fact that Army personnel numbers would be cut by 10,000 to 72,500 by 2025 – making it the smallest it has been for 200 years – it was also clear that the world, and warfare, has changed.

While 'boots on the ground' still has a place and vital role to play, there is an increasing need to develop and utilise leading-edge technology to wage 21st-century warfare – from cyber space to outer space.

The Integrated Review saw conventional hardware spending cut, some 'heavy metal' programmes scrapped, and a distinct pivot towards high-tech capabilities including cyber, artificial intelligence, unmanned vehicles, and space.

Announced towards the end of 2020, THEIA (pronounced THAY-A) is the name of the Army's ambitious Digital Transformation programme, which aims to make use of digitised information and digital technologies to improve operational and business decision making across all Army functions.

THEIA has got three headline outputs – to out-compete the adversary, to partner better and integrate with partners, and to improve efficiency. Or, to put it another way, it's transforming the Army's capabilities to make it faster, leaner and more efficient from the base to the bayonet. It is both

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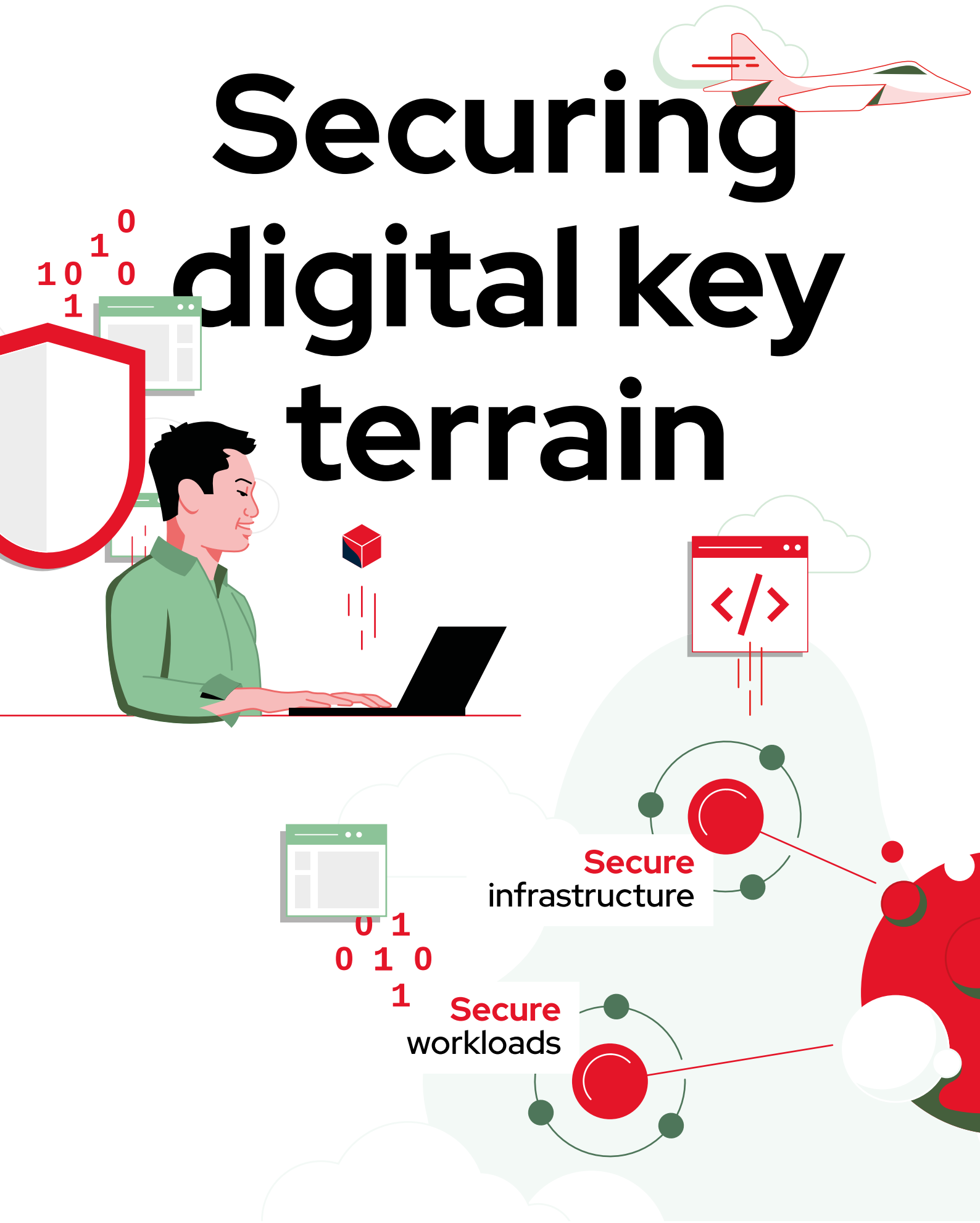
Securing digital key terrain



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The fate of competing forces has always been determined by balancing exposure against opportunity, risk versus reward. The digital landscape of today and tomorrow is no different, and it is the discerning leader who captures, then holds, key terrain that shapes the battlefield to his or her benefit. Securing infrastructure, establishing a trusted supply chain, and creating capability at the edge provides this commander with a common operating picture and the unique ability to seize an advantage against his or her opponent.

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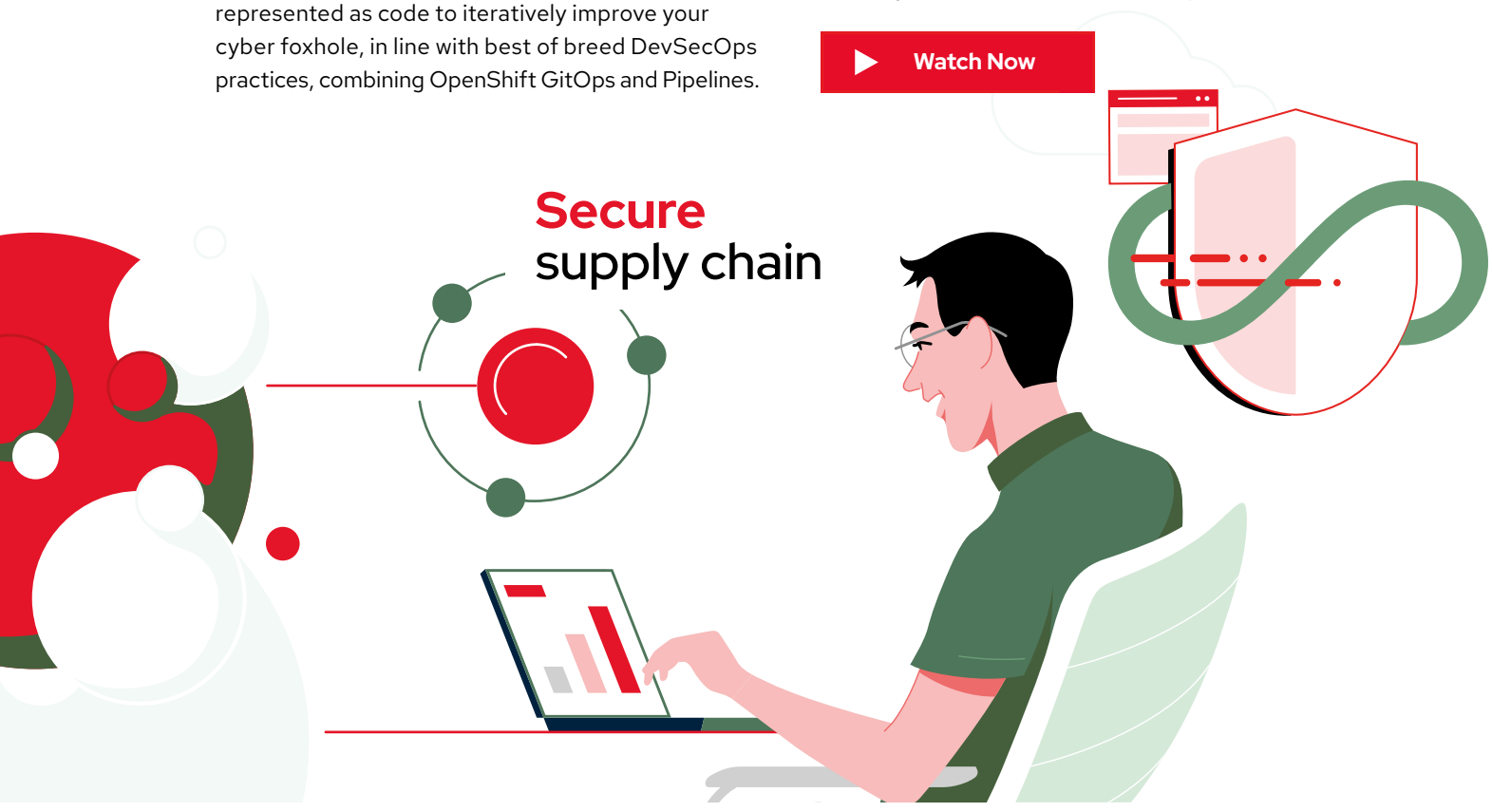


ambitious and exciting, and signals a genuine change of direction that is being embraced from the top down.

Lieutenant General Chris Tickell is Deputy Chief of the General Staff (DCGS) of the British Army, a role he was promoted to in August 2019 and which involves representing the Army Top Level Budget (TLB), direction on personnel policy, and oversight of the future development of the Army.

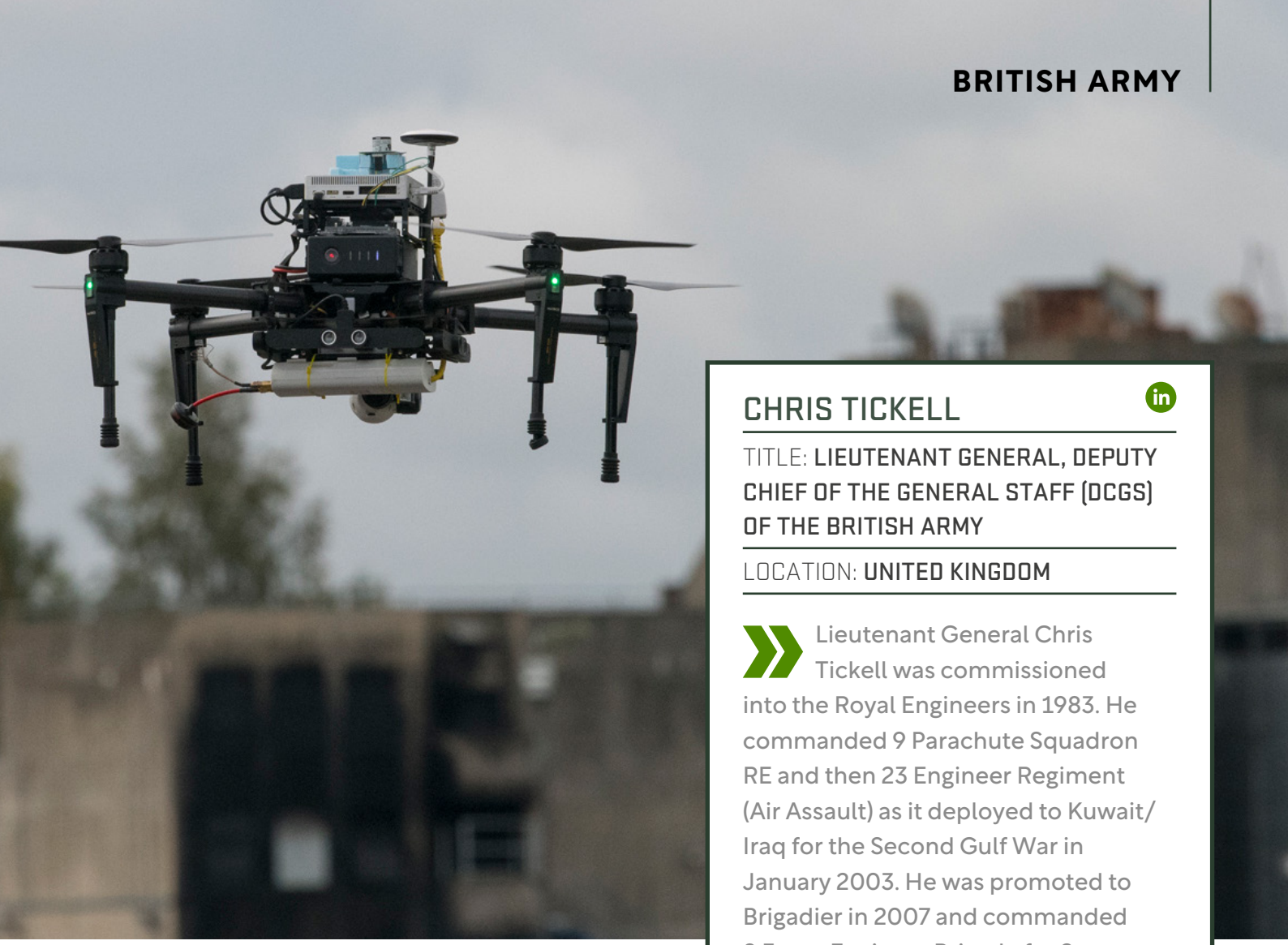
So how does Lt Gen Tickell believe THEIA will change how the Army operates?

"THEIA is what I would describe as an ambitious but critical transformation programme for the Army, which will take us from a relatively analogue approach to our activity at the moment, into the digital space," says Lt Gen Tickell.

> **"THEIA is what I would describe as an ambitious but critical transformation programme for the Army"**
>
> CHRIS TICKELL
> LT GEN,
> BRITISH ARMY

Much talk following the Integrated Review focused on those reduced troop numbers, but isn't a reduced 'workforce' inevitable across most industries these days, as technology and automation help humans become more efficient?

"The Integrated Review reduced some of our numbers within the Army based on what



technology offers us now and in the future," admits Lt Gen Tickell. "At the moment, we are focused on the future – linking the man and the machine.

"So manned and unmanned teaming, artificial intelligence and machine learning – which will allow us to make decisions faster than our enemy or our adversary. We're therefore able to act faster than them as well, which confers an advantage. And when you're doing that, and you're integrating across the domains – across the land environment, maritime, air, cyber, and space – then that really does start to become a battle-winning idea."

The changing role of the soldier

It is inevitable given technological advancements that some aspects of soldiering will change, and modern warfare in the next

EXECUTIVE BIO

CHRIS TICKELL

TITLE: **LIEUTENANT GENERAL, DEPUTY CHIEF OF THE GENERAL STAFF (DCGS) OF THE BRITISH ARMY**

LOCATION: **UNITED KINGDOM**

Lieutenant General Chris Tickell was commissioned into the Royal Engineers in 1983. He commanded 9 Parachute Squadron RE and then 23 Engineer Regiment (Air Assault) as it deployed to Kuwait/Iraq for the Second Gulf War in January 2003. He was promoted to Brigadier in 2007 and commanded 8 Force Engineer Brigade for 2 years; deploying with his Headquarters to Afghanistan for the final 6 months. He was promoted in 2013 and commanded the Army Recruiting and Training Division and was then the Army's Director of Capability. He was promoted to Lieutenant General and became Deputy Chief of the General Staff in August 2019. He was appointed MBE in 2000, OBE in 2003 and CBE in 2010.

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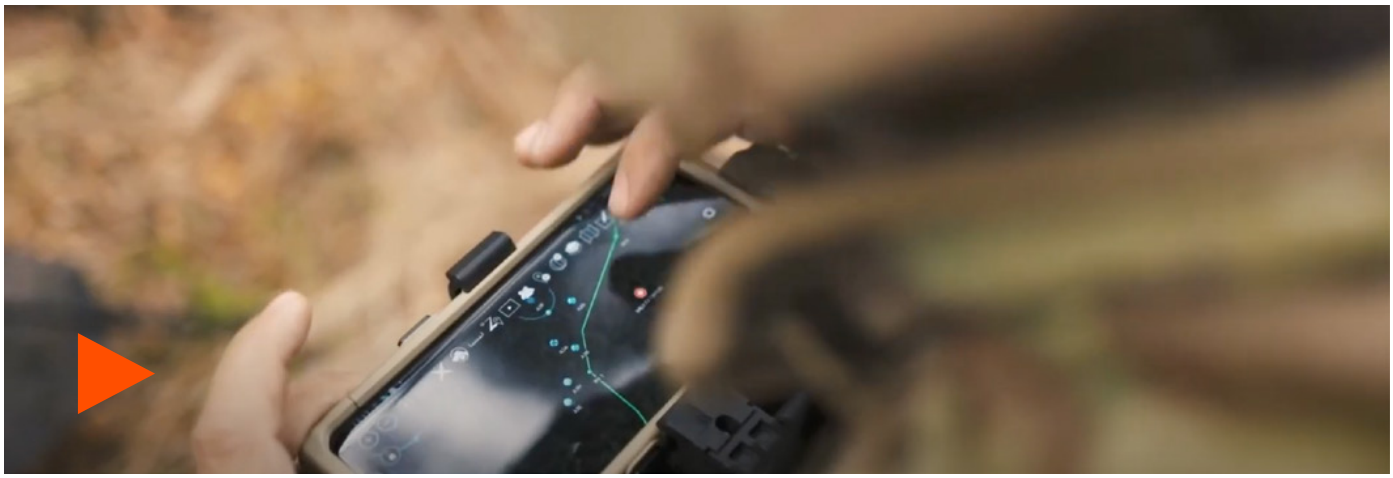
Pure Storage: Supporting the digital transformation journey



Driving competitive advantage by enabling data to deliver positive business outcomes

Pure Storage helps clients drive their competitive advantage by enabling data to deliver positive business outcomes such as 'evidence-based decision making' using real-time analytics. "Working with the British Army, as part of an ecosystem of best in class solutions suppliers, Pure is providing private cloud services on-premise but also has offerings via AWS and Azure, and at container level," explains Colin Atkinson Pure's UK Public Sector Account Director.

Digitalisation

"Pure Storage is supporting the digitalisation of the army as part of Programme THEIA," reveals Colonel Mark Cornell, Assistant Head of Army Digital Services. "THEIA is how we change our ways of working to adopt more efficient digital processes. Technology is actually the easy piece of the puzzle; the challenge is cultural and behavioural change". The army is a conservative organisation by nature, so how do we get its people – civilian, military, and contractors – to adopt the appropriate ways of working we want to deploy?

"We move away from labour intensive processes, and move further up the value chain to get the human adding value where they should be in the decision-making process."

Data Revolution

We're in the midst of a data revolution highlights Atkinson. "We're seeing an exponential growth in data analytics, which can either create huge headaches for large organisations, or massive opportunities. Data will be the oil that fuels this revolution...."

It's a revolution that's been gathering pace; each year, since 2016 where 90% of the world's data has been created in the previous two years. Atkinson also points out that 99.5% of historical data goes largely unanalysed: "The corollary for large organisations is that if you don't have a data strategy, you could end up with very large, very cold data silos and miss the opportunity to create that competitive advantage. By partnering with Pure we can help clients develop a data-enabling strategy."

Learn more

“Conflict is frightening, it is visceral, and it is bloody – and nothing that technology brings to bear will ultimately take that away”

CHRIS TICKELL
LT GEN,
BRITISH ARMY

10 years may look very different from even a decade ago, but some fundamentals remain.

If you look at conflict through two prisms, one is the character of conflict and one is the nature of conflict. The nature of conflict is constant, whether you are a soldier in the 21st century or the 18th.

“Conflict is frightening, it is visceral, and it is bloody – and nothing that technology brings to bear will ultimately take that away,” says Lt Gen Tickell. “But what is changing is the character of conflict. In the land environment specifically, it

is no longer an issue about tank versus tank. It is absolutely about bringing capabilities to bear at a single point in time and need whereby the soldier will be able and will be required to integrate those different effects at the same time. And when I say those different effects, I'm talking about electronic warfare, I'm talking about offensive cyber, I'm talking about long-range fires. And of course, I'm then also talking about close combat.”

One popular conception of the changing face of conflict, and threat, is the increasing impact of cyber attacks – and these are usually not openly linked to state actors, but to shadowy groups and individuals that are harder to track, trace, and ultimately beat.

We often hear of state or non-state actors, but in reality is the situation actually that clear cut? The lines are usually blurred, certainly if we are to take media reports into consideration. The recent ransomware attack on the Colonial Pipeline in the US was the latest by a group called DarkSide, believed to be from Eastern Europe, according to the FBI. Whether that gang had any state backing or political agenda is impossible to know.

The SolarWinds attack which also caused data breaches at several branches of the US federal government, including the Department of Homeland Security, has since been blamed by the FBI and the NSA as being perpetrated by Russia.

There are no easy, or clear answers, so how does the British Army prepare for such attacks?

“When one looks at the threats that we face, there is a temptation to put them in boxes whereby they describe state actors as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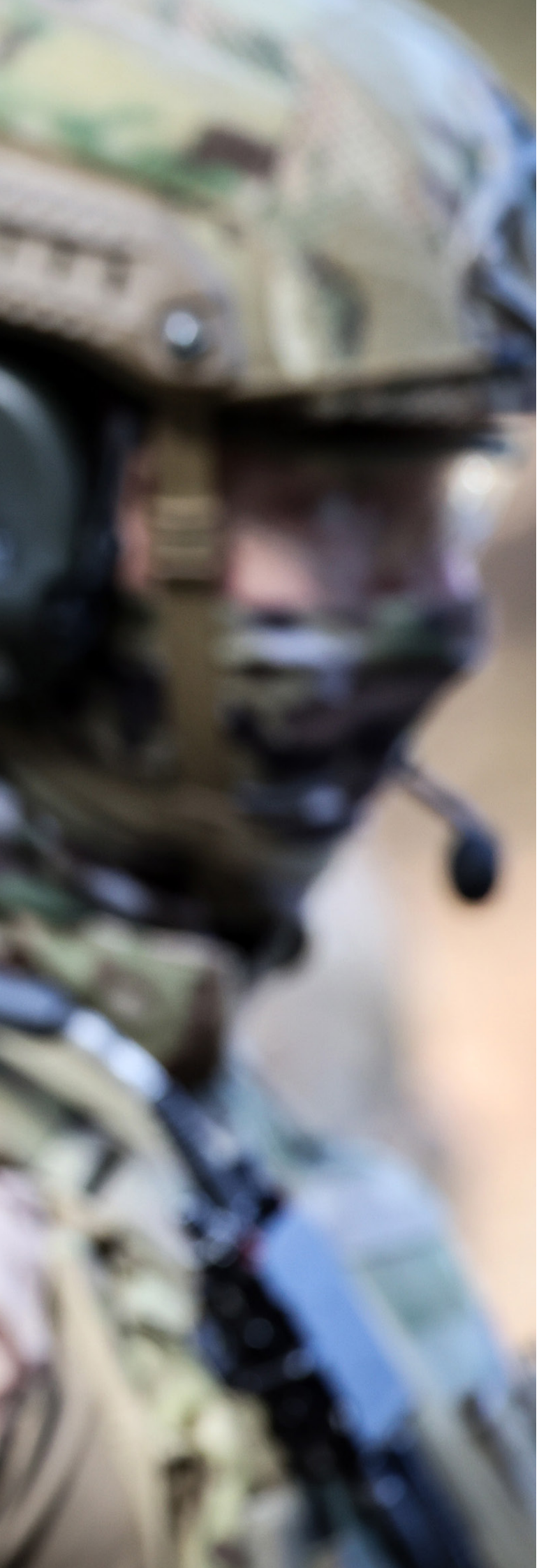

the preeminent threat or non-state actors. Of course, the reality is there is a blurring of the two," says Lt Gen Tickell.

"Therefore what we see is a movement of technology and capability that arguably may have been developed by state actors and the movement of that technology into non-state actors, or indeed proxies. So you can see some terrorist organisations or non-state actors being able to apply and use technology that one would imagine has come from a state actor's R&D focus. But you could also see groups

EXECUTIVE BIO

STEFAN CROSSFIELD

TITLE: **BRIGADIER, HEAD OF INFORMATION EXPLOITATION, DEPUTY CHIEF INFORMATION OFFICER, AND THE CHIEF DATA OFFICER (CDO) FOR THE BRITISH ARMY**

LOCATION: **UNITED KINGDOM**

Brigadier Stefan Crossfield is the British Army's Chief Data Officer and Programme Director of the Army's Digital Transformation. He was part of the Army 2020 strategic planning team and responsible as a colonel for maximising personnel talent planning. He commanded 6 Battalion REME on Operation Herrick 18. He is a Fellow of the Institution of Mechanical Engineers, holds an MSc in Information Systems and an MBA, and is an Associate Lecturer at the University of Exeter Business School.


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SAS: IMPROVING THE BRITISH ARMY'S DECISION MAKING WITH DATA

Roderick Crawford, VP and Country GM, explains the important role that SAS is playing in the British Army's digital transformation

Roderick Crawford, VP and Country GM for SAS UKI, states that the company's thorough grasp of the defence sector makes it an ideal partner for the Army as it undergoes its own digital transformation. "Major General Jon Cole told us that he wanted to enable better, faster decision-making in order to improve operational efficiency," he explains.

Therefore, SAS' task was to help the British Army realise the "significant potential" of data through the use of artificial intelligence (AI) to automate tasks and conduct complex analysis.

In 2020, the Army invested in the SAS 'Viya platform'. The goal was to deliver a new way of working that enabled agility, flexibility, faster deployment at reduced risk and cost.

Doing so facilitated "connect[ing] the unconnected." This means structuring data in a simultaneously secure and accessible manner for all skill levels, from business analysts to data engineers and military commanders. The result is analytics and decision-making that drives innovation and increases collaboration.

"As warfare moves into what we might call 'the grey-zone', the need to understand, decide, and act on complex information streams and diverse sources has never been more important. AI, computer vision and natural language processing are technologies that we hope to exploit over the next three to five years in conjunction with the Army."

Fundamentally, data analytics is a tool for gaining valuable insights and expediting the delivery of outcomes. The goal of the two parties' partnership, concludes Crawford, will be to reach the point where both access to data and decision-making can be performed qualitatively and in real-time.

"SAS is absolutely delighted to have this relationship with the British Army, and with defence in general. It's a great privilege to be part of the armed forces covenant."

JONATHAN COLE

TITLE: **MAJOR GENERAL, THE ARMY'S CHIEF INFORMATION OFFICER (CIO)**

Major General Jon Cole is the British Army's Chief Information Officer and the member of the Army Board who leads on information matters in all aspects of the Army's business – from barracks to the battlefield. Before this, he was seconded to BT as the inaugural Head of Employee Services IT, transforming the digital workplace for over 100,000 staff. Beforehand, he was the Army's Head of Information Services, the Chief Technology Officer.

He was commissioned into the Royal Signals in 1987. He commanded 2 Signal Regiment and subsequently 11 Signal Brigade. On operations he has led soldiers in Sierra Leone, Iraq and Afghanistan, and served on the staff again in both Iraq and Afghanistan, plus Non Combatant Evacuation Operations of Ivory Coast and Lebanon. A Chartered Engineer with the Institute of Engineering and Technology, he has a BEng(Hons) in Electronics, an MSc in Defence Technology, and an MA in International Security and Strategy.

He is Colonel of the Regiment, Queen's Gurkha Signals, a Trustee of the Gurkha Welfare Trust, and a Colonel Commandant of Royal Signals. He is also Chairman of Army Ice Sports, a Vice President of Royal Signals rugby, and President of Royal Signals cycling and triathlon.

that are sponsored by a state. I would use the Wagner Group as a good example, whereby we're pretty clear that there is a strong link to Russia. So it is a blend of both."

The innovation opportunity

The military has always worked closely with carefully selected private companies, with close links between such British heavyweight businesses. However, that vital link between the public and private sector will see those strategic partnerships shift, as smaller businesses are invited to bring innovation to the table.

From nuclear power to satnav, microwave ovens to duct tape – innovations born out of the military environment have found

their usages in everyday life, but now there is an opportunity for SMEs to reverse that dynamic and help shape the Army's technological future.

"The phrase 'prototype warfare' is something that we're using more and more, whereby we are willing to take risks with technology and capability to put it in the hands of the user so that we can start to exploit those opportunities faster, thereby accelerating the procurement and acquisition process that we have used for many years," says Lt Gen Tickell.

"So later this year we're launching the Land Industrial Strategy, which is designed to be one of the mechanisms to get after that closer relationship. I think there is a real thirst in the

"We have the ability and willingness to test ideas with soldiers in demanding and arduous conditions"

CHRIS TICKELL
LT GEN,
BRITISH ARMY


HOLLYWOOD

“We're in a fourth industrial revolution. It's very emergent, there's an agility to it. THEIA in terms of delivering transformation is about getting to a tipping point”

STEFAN CROSSFIELD
BRIGADIER, HEAD OF INFORMATION EXPLOITATION, DEPUTY CIO, CDO, BRITISH ARMY

private industry to work closer together. SMEs hold fantastic opportunities for us, and often they don't realise the opportunities they offer because they've developed capabilities that they don't realise have military applicability.

“We have the ability and willingness to test ideas with soldiers in demanding and arduous conditions. We've learned that one SME may have a great idea to do X, but when you combine them with Y that we know about, we will more than double the opportunity that those capabilities offer.”

Developing the digital opportunity

Brigadier Stefan Crossfield is Head of Information Exploitation, Deputy Chief Information Officer, and the Chief Data Officer (CDO) for the British Army. For him, THEIA is all about orchestrating digital transformation and

how the Army can use data to its advantage, while also working with key international partners, commercial organisations, as well as the Royal Navy and Royal Air Force.

"It's a massive challenge. And I don't underestimate how big it is. I think we've got a long way to go, but we are on the road, which is a really good start," says Brig Crossfield.

"We're in a fourth industrial revolution. It's very emergent, there's an agility to it. THEIA in terms of delivering transformation is about getting to a tipping point. So THEIA's not about getting to the end of the road, it's about getting to the tipping point – maybe that is a better way to look at it."

Digital transformation was forced upon the world during the COVID-19 pandemic, and the Army was no exception. Brig Crossfield outlines how they were able to drive admin activity online to improve processes for "our people. And that means they can get back to doing the job they want to do – the reason they joined the Army."

THEIA is of course much more than removing friction from admin tasks like claiming expenses – it is about artificial intelligence, machine learning and autonomy. It's about quantum computing, cyber insecurity, synthetic environments, but also augmented reality. And lastly, analytics.

"We've got a lot of data out there to play with," says Brig Crossfield. "If you begin to put it on a pedestal or in some way, treat it differently, I think we missed the point. Yes, it's the new oil, yes it's the new black gold. In an operational sense, helping commanders make the right decisions at the right time with the right amount of information is the way to win."

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That is no easy task. As well as vast amounts of data to handle, the orchestration and connections required mean that Brig Crossfield has to delve deeper into organisations to reach the innovators who can match the Army's ambition and then connecting X with Y, as Lt Gen Tickell outlined.

Little wonder Brig Crossfield refers to himself as "digital matchmaker" and making sure the Army joins the dots to reach the best outcomes.

"That's really hard," he admits. "You know, it's just hard yards of constantly scanning, constantly connecting people up, bringing people back into lane where they've strayed out – and they don't do that through malice, it's just complicated.

"So what we really want to do is through the Digital Foundry, which is the Defence Digital initiative, we want to start giving [innovative companies] the opportunity to show what they can do, but also us to bring our problems to that environment.

"I am much more connected now with bigger organisations away from their business development teams, into their innovation teams. I've been hugely impressed with how genuinely engaged they are in helping us move forward here. They're on the journey, and we've got some great pilots running."

"Through the Digital Foundry, which is the Defence Digital initiative, we want to start giving [innovative companies] the opportunity to show what they can do"

CHRIS TICKELL
LT GEN,
BRITISH ARMY

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STEFAN CROSSFIELD
BRIGADIER, HEAD OF INFORMATION EXPLOITATION, DEPUTY CIO, CDO, BRITISH ARMY

Keeping cyber safe

The Army is being transparent in the Integrated Review that it will continue to examine in an operational sense where cyber has utility, both in terms of the need to protect from it but also use it. It can be weaponised where appropriate against particular adversaries.

Defence Digital works closely with British Telecom (BT) and other key partners to deliver a resilient and secure network which really showed its mettle during the lockdown when the workforce had to adapt to work from home.

Defence Digital is also leading the way when it comes to the Digital Backbone – the data highway that runs right from the individual soldier all the way back to HQ, or base to bayonet.

"We're going to produce a backbone and we're going to tell you how to plug into it. Here's the architecture, here's how you plug in, off you go. I think that's a fundamental difference in how we do this and probably the thing that will make this work," says Brig Crossfield.

"Why is it important? Well, if in the business space, we can be much more efficient about when and how we fix our equipment, we'll get much more uptime from that equipment, and it will be cheaper to run as a result.

"Take that to the battlespace – now more uptime on that platform means more war fighting capability. It means out-competing our adversary. So when we talk about out-competing them, it's not just about in the decision action cycle. It's not just about how quickly we do it. It's about using the data in every way we can to be in a better place to fight.

"Ultimately, warfare will remain the bloody visceral, dangerous business that it is. And if you've got your platforms live and someone else hasn't, I know you're going to win nine times out of 10."

Speed is essential

That sentiment is echoed by Major General Jonathan Cole, the Army's Chief Information Officer (CIO) who says in the military environment, speed is so essential.

"You just have to look at examples like the way that the Russians fought in Ukraine when they were using unmanned aerial systems networked into their artillery systems. And they were able to provide targeting information so quickly that the Ukrainians were unable to respond fast enough," says Maj Gen Cole.

"It's often a linkage between what we call the sensor to the effector and the faster you can deliver that cycle of intelligence to delivery of effects then the more likely you are of being able to out-compete and beat your adversary."

Speed is of the essence, and that is true of the rapid digital transformation the Army is undergoing, while also recognising that a lot of its capital equipment is legacy equipment – some of which has been in service for decades. That is why the open architecture is so important.

A good example is the Land Environment Tactical Communications and Information Systems (LE TacCIS) programme, where the Army has taken legacy radios, computers, data terminals, and is gradually swapping those out.

"We are building an open architecture, which enables us to inject new digital technologies, predominantly applications, artificial intelligence tools," says Maj Gen Cole. "We are paving the way for those in the future, but we have to do the hard yards of the backend work, which is about open architectures.

“We are building an open architecture, which enables us to inject new digital technologies, predominantly applications, artificial intelligence tools”

JONATHAN COLE
MAJ GEN,
BRITISH ARMY

“It's about really good control of your data. And it's about having an infrastructure, including a hosting environment, which enables the power of those digital services. So we have to do so much of that under-the-bonnet activity in order to deliver the top end.”

That under-the-bonnet activity is essential, and it’s often tempting to become distracted by digital transformation’s dazzling user interfaces and functionality, but there is no room for complacency. There is no point having a dazzling digital solution if it is not built on rock-solid foundations – especially when it comes to cyber security.

Maj Gen Cole says that while the threat of cyber attacks is undoubtedly on the increase, physical attacks are just as much a threat as they always have been. If anything, those physical attacks are more dangerous as they are often coupled with a cyber element.

“Often physical threats and cyber threats come together,” says Maj Gen Cole. “The most sophisticated adversary will seek to use physical and virtual means to attack us, and they will do that in a complimentary way.

“So I think it's fair to say that cyber threats and physical threats between them present a very serious risk. And we have to deal with both together.”

“THEIA in particular is demonstrating that we don't necessarily partner just with our big traditional defence prime contractors. We need to also partner with Silicon Valley-type tech companies to get the best of breed of all of the technologies available”

JONATHAN COLE
MAJ GEN,
BRITISH ARMY

Putting people first

Of course, cyber threats have to be anticipated on a daily basis, even when operating on a day-to-day level “below the threshold of warfare”. Maj Gen Cole says that in many ways COVID-19 and the remote ways of working have been a good opportunity to shift the Army’s culture – and something that should be embraced.

However, remote working does have some downsides.

“There is inevitably a security risk that we need to address through the use of increased commercial technologies,” says Maj Gen Cole. “We also have to look at what that does for behavioural activities.

“The Army is used to working in close proximity to other people. So we have to find a way to get the best out of all the technology, but at the same time, recognise the fundamental human nature of an army.

“For an army where you might ask teams of people to go into war together, where they're putting their lives on the line, where they're fighting for each other's lives, it is very important for them to be able to operate and function as a team. And that is ultimately a very human endeavor. As much as technology enables people to work remotely, to be able to explore the power of data, we must never forget the human nature of warfare.”

The human element is often something that comes secondary when considering any digital transformation, but even the most sophisticated systems and deepest data would be rendered near useless without the skilled people that make up the British Army. With transformation comes the need to retrain and upskill, as well as seek out private sector innovators to partner with.

“I think THEIA, in particular, is demonstrating that we don't necessarily partner just with our big traditional defence prime contractors. We need to also partner with Silicon Valley-type tech companies to get the best of breed of all of the technologies available,” says Maj Gen Cole.

“And the trick for us really is to be able to work with an ecosystem of technology providers across those sorts of communities and being able to work with them in a collegiate way.

“I couldn't imagine a more exciting time to be the Army's CIO and Director of Information – every day for me is different. I learn something new every day, and I know that I have the support of the Chief of the General Staff as he wants to deliver an asymmetric army for the digital age.”

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