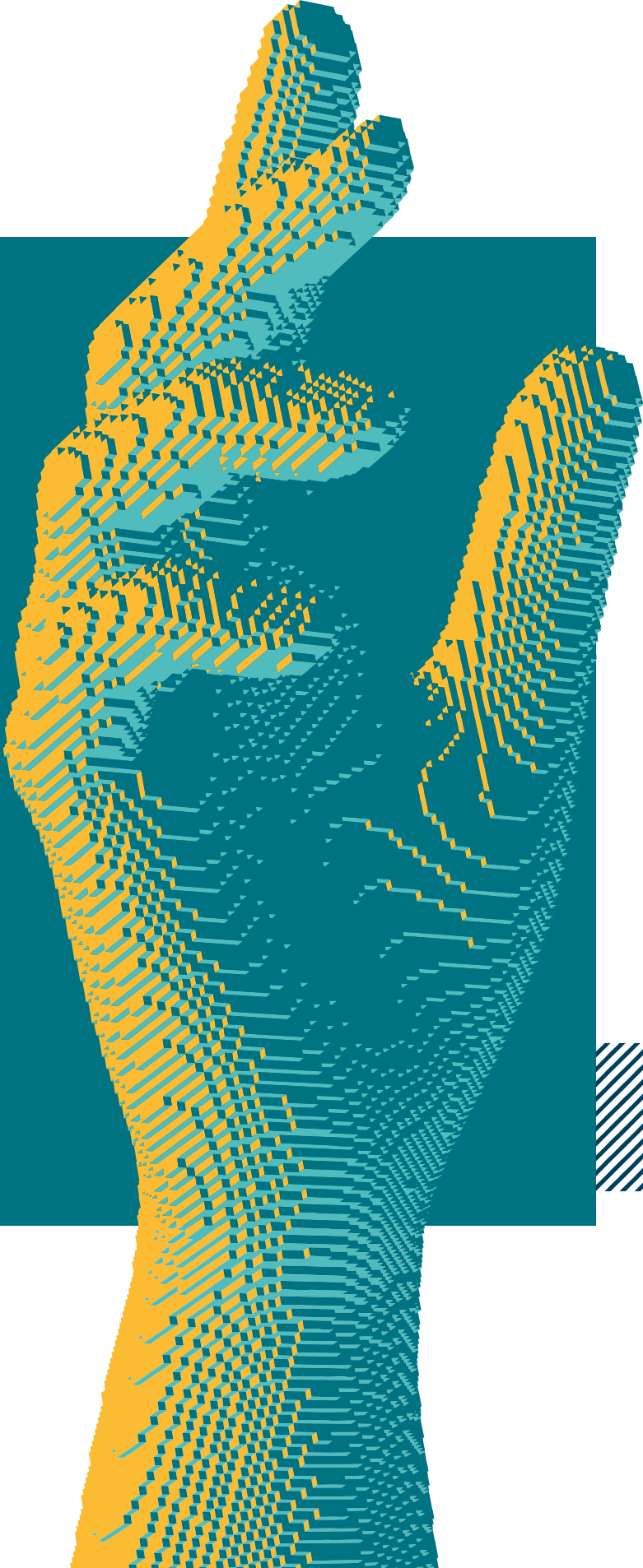



Unlocking digital advantage in high trust sectors



Digital
Intelligence

BAE SYSTEMS



“In every sector, the effective use of digital technology and approaches is key to staying ahead of the competition, whether that be through delivering seamless customer experiences or using technology to drive innovation and bring new products to market.”

James Hatch, Chief Digital Officer
BAE Systems Digital Intelligence

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Foreword

Dave Armstrong MBE, Group Managing Director, BAE Systems Digital Intelligence

The last few years have been the most disruptive in many of the global population's lived memory. The COVID-19 pandemic resulted in significant, tragic loss of life alongside completely revolutionising how we live and work. Alongside this, numerous geo-political and socio-economic factors – from the conflict in Ukraine, to climate change, Brexit, inflation and a labour market crisis – have together served as a stark reminder of the role that nations have to play in tackling the vulnerabilities we all have, especially in the digital age

In this kind of environment, citizens and the societies they inhabit lean heavily on organisations operating in high trust sectors - including our customers in government, defence and space. In order to manage this increased pressure in the modern age, high trust organisations must embrace digital technology to achieve an advantage. However, sector by sector, this comes with its own challenges.

Digital Intelligence, which I'm honoured to lead, was formed at the beginning of 2022 to help high-trust sectors navigate this landscape. As part of BAE Systems Group, we have a long history of powering innovation and supporting organisations on their journeys towards digital advantage. The business brings together 4,800 world-class data, digital, cyber and intelligence experts to do just this: helping organisations stay ahead of adversaries and solve some of the biggest digital challenges of our time.

Coming together as Digital Intelligence is allowing us to weave digital threads across multiple platforms such as C5, cyber, intelligence and satellite systems. We envisage a world where these digital threads can enable intelligence sharing for rapid and accurate decision making; where satellite systems are so advanced that they can inform agencies of moving targets before they become cyber threats; and where digital transformation teams are focused on making a difference across multiple domains. Together, we work to tackle challenges in leveraging opportunities in a fast moving digital world.

This report investigates what those challenges and opportunities are. Bringing together a combination of quantitative and qualitative research, we can lift the lid for the very first time on the concerns of those working in high trust sectors, the barriers they are working to overcome and their perceived digital maturity.

I hope you find this report valuable. Please reach out if you would like to discover more about how to empower your organisation to achieve a digital advantage.



"Coming together as Digital Intelligence is allowing us to weave digital threads across multiple platforms such as C5, cyber, intelligence and satellite systems."

With thanks to our contributors



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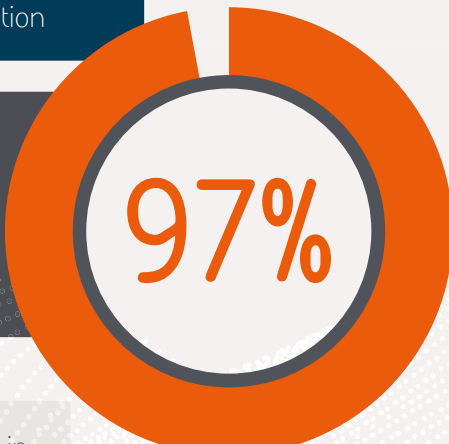
The story in numbers

We invited 120 digital transformation decision makers from across aerospace, defence and government to talk to us about the importance of using digital technology to gain an advantage.



84%

84% of respondents said that having a digital advantage is crucial or very important to their organisation




97%

97% admit they face barriers to achieving a digital advantage, across data, people and technology



21%

Today, only 21% of organisations in high trust sectors are completely digitally mature




54%

54% believe they will be completely mature in 10 years time

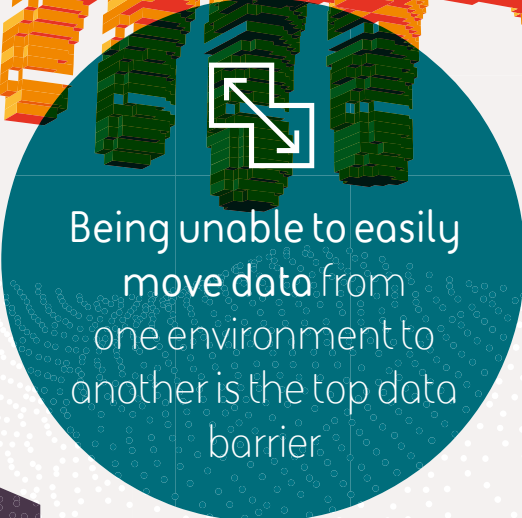



83%

83% of organisations agree that while there are challenges to overcome to achieve digital maturity, the reward in doing so is worth it



Adopting a digital culture that employees are onboard with is the top people barrier



Being unable to easily move data from one environment to another is the top data barrier



Concerns over the security of new technology is the top technology barrier

Introduction

Defining 'high trust sectors' and 'digital advantage'

Over the last four decades, new technologies have ricocheted around us at a rapid pace, resulting in an increasingly complex digital landscape where data has become extremely valuable.

In this report, we'll be reviewing the current state of play within three high trust sectors' digital landscapes: government, aerospace and defence. By gathering insight from UK-based senior business and IT decision makers with a role in digital transformation across these sectors, we will examine why having a digital advantage is so crucial and the challenges they face in achieving it. We will then conclude with recommendations of tangible solutions to overcome these challenges, and what the future could look like if we do.

120 respondents from organisations in the UK who were involved in their organisation's digital transformation were interviewed in May and June 2022, split in the following ways...

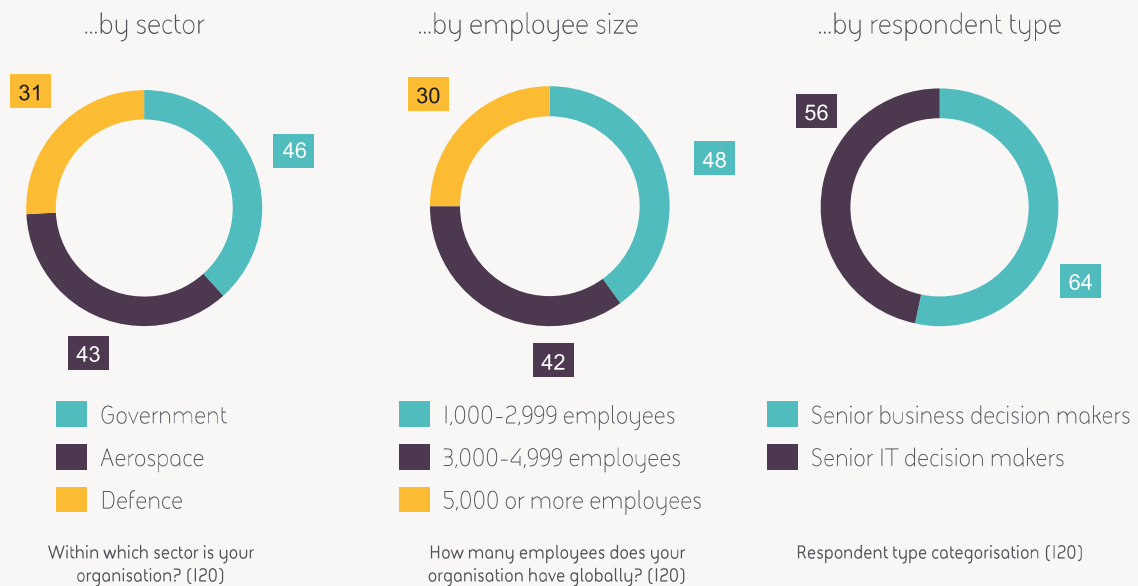


Figure 1



James Hatch

James Hatch, BAE Systems Digital Intelligence's Chief Digital Officer:

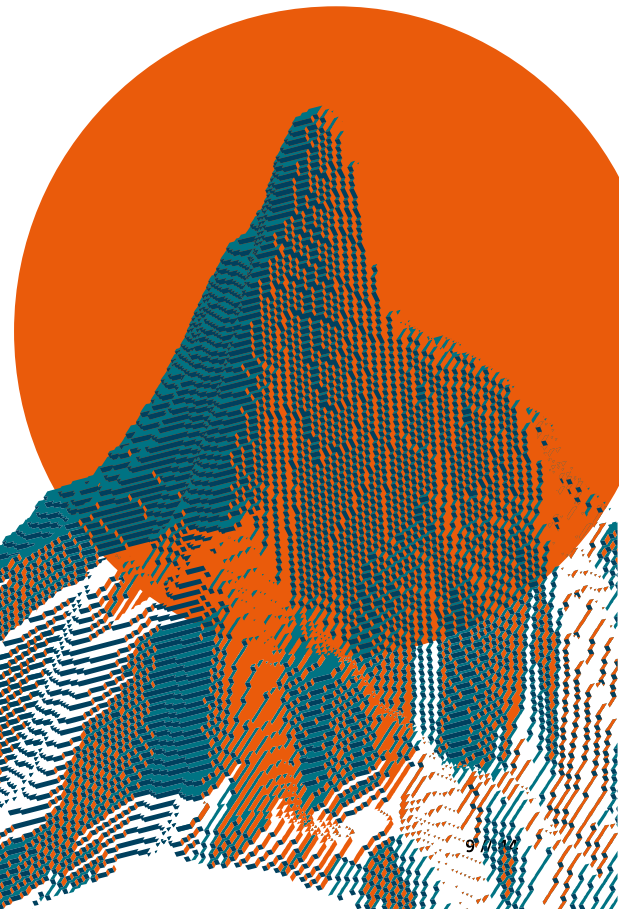
"In every sector, the effective use of digital technology and approaches is key to staying ahead of the competition, whether that be through delivering seamless customer experiences or using technology to drive innovation and bring new products to market.

"But high trust sectors - those that deliver critical value to society, contributing to the smooth running, physical safety and general freedoms enjoyed by citizens in the UK - have the double challenge of accelerating their digital advantage while continuing to deliver critical value to society reliably and responsibly.

"These organisations cannot risk failing in the way a start-up can; the cost would be too great, impacting security at both a national and international level. Society fundamentally needs, and expects, to be able to trust these organisations. They are responsible for handling the country's most sensitive and secret data, delivering services to citizens and safeguarding democracy.

While the barriers are numerous, unlocking digital advantage in a high trust context is significant imperative, enabling organisations to solve some of today's most urgent problems and defend against adversaries who are always innovating."

"These organisations cannot risk failing in the way a start-up can; the cost would be too great..."



What is a high trust sector?



The business and IT decision makers we surveyed come from organisations within the government, defence and aerospace sectors. We define these sectors as 'high trust' because of several key factors:

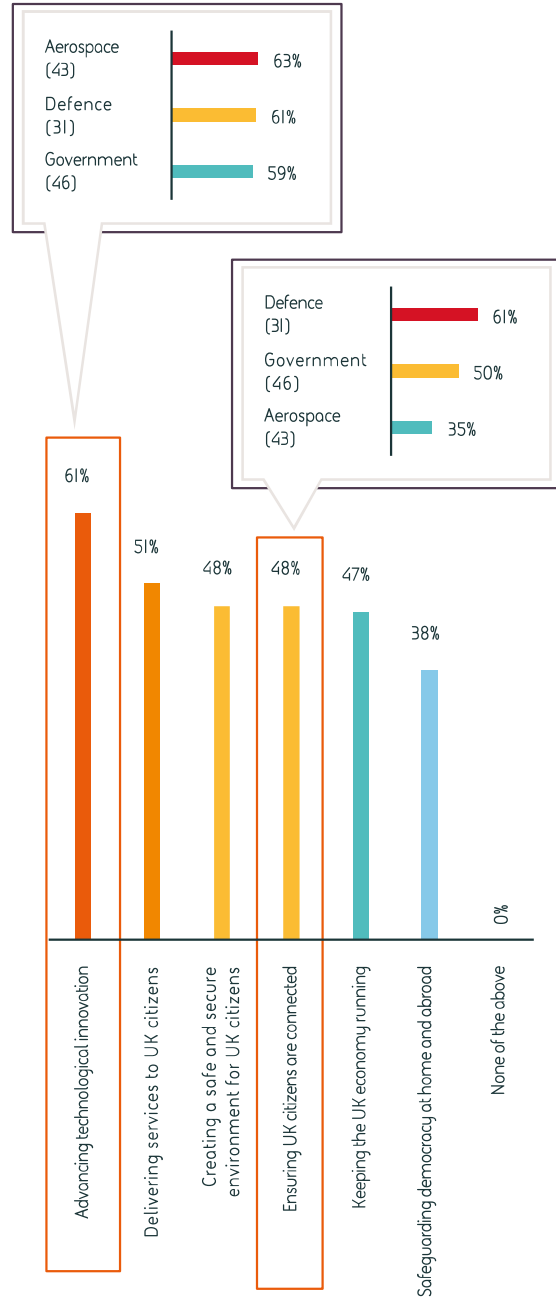
- Their fundamental importance to society
- They are a trusted part of society (and proving this trust to society is one of their ongoing business objectives)
- Security and control of data is central to their business model
- They are highly regulated to minimise risk

Government, defence and aerospace organisations are fundamentally important to society because of their purpose, and the would-be impact on society if they failed to operate. Decision makers recognise this, with 98% of respondents across our sample saying that their organisation delivers either critical or high value to society.

The impact on society if a high trust organisation fails to operate is another reason why they are fundamentally important. Respondents said failure would result in a damaging impact on citizens' rights and freedoms, a failure of services that would affect the day-to-day running of society and a significant impact on the UK economy.

...98% of respondents across our sample saying that **their organisation delivers either critical or high value to society.**

Technological innovation is a key purpose for high trust sectors



Which of the following are reflective of your organisation's purpose? (I20)

Figure 2

High trust sectors are a trusted part of society



88% of respondents said it is either critical or very important that **their organisation is trusted by society**

Respondents said **failure would result in a damaging impact** on citizens' rights and freedoms, a failure of services that would affect the day-to-day running of society

For many of these organisations, cementing this trust through what they achieve with their work, as well as how this is communicated back to society, are key business objectives.

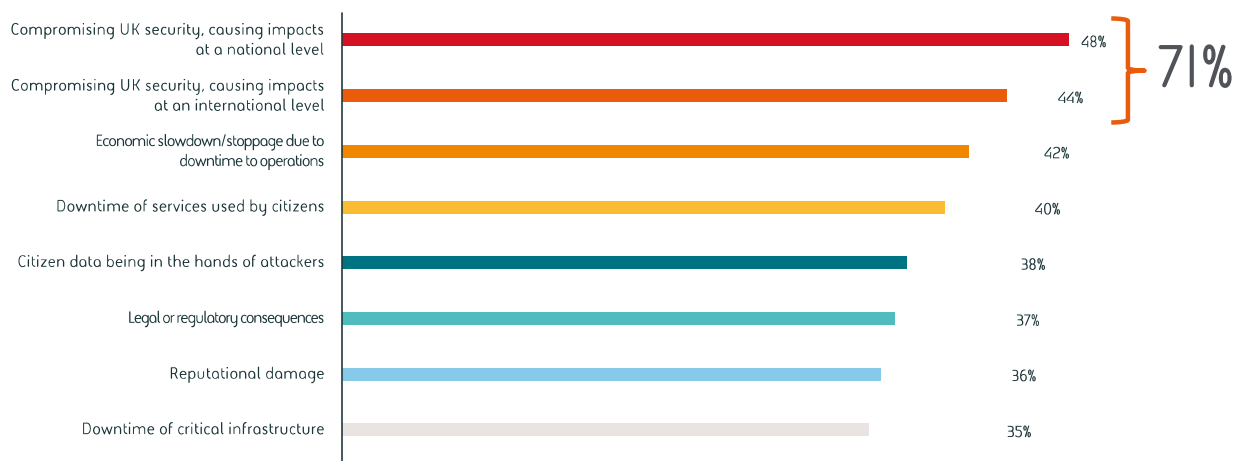
Security and control of data is central to high trust sectors' business models

High trust sectors' importance to society means that much of the data they work with is secret and top secret. This means that the security and control of this data is not just central to their business models, but also to the safety and security of UK society more broadly.

Alongside secret and top secret data, all respondents also work with official data (government business and public service delivery information, including information that is sensitive and must not be shared freely) and official-sensitive data (information of a particularly sensitive nature, where loss or disclosure would have damaging consequences for the organisations and/or government or cause significant distress for an individual or group of people).

As illustrated in Figure 3, the sensitive nature of these data types means that if these organisations experienced a breach of their official data, there would be significant consequences.

Compromising UK security would be the main damage from a breach on official data



If your organisation experienced a breach on its official data, what would the damage be? (120) not showing all answers

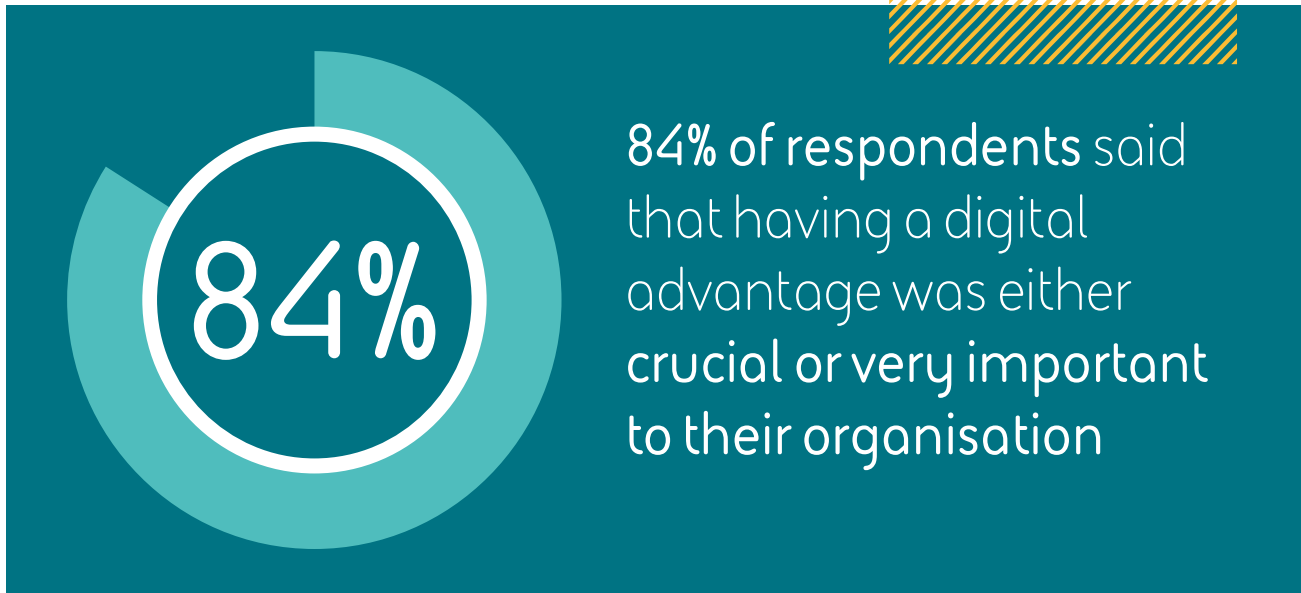
Figure 3

High trust sectors are highly regulated to minimise risk

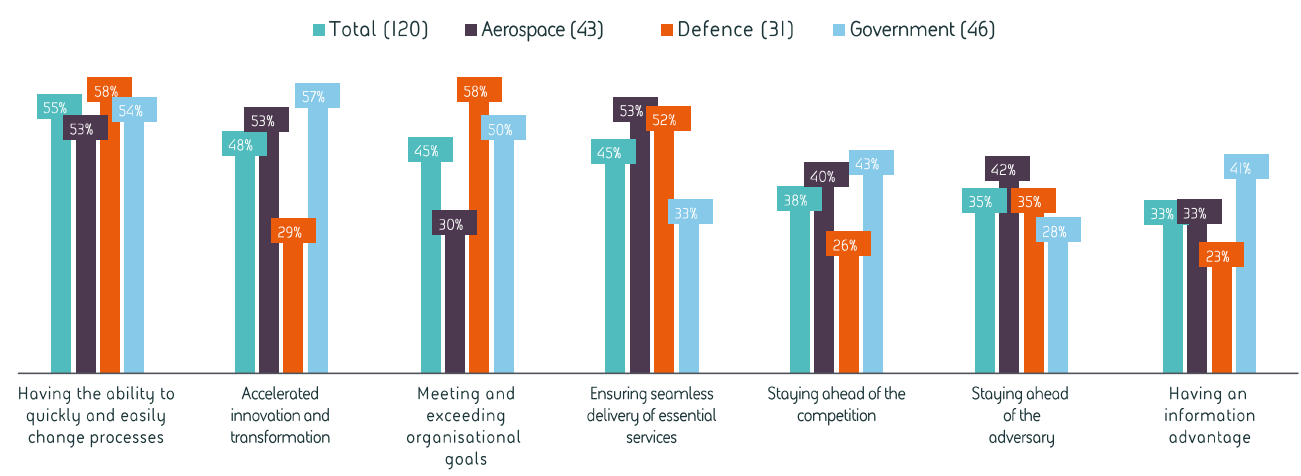
All the above means that high-trust sectors are heavily regulated to minimise risk. In the defence sector, for example, the [Data Strategy for Defence](#) has set rules across the sector whereby data is to be treated as a strategic asset, second only to people.

While these regulations are essential due to the sensitivity of the data high-trust organisations are handling, over a third of our respondents (36%) flagged stricter regulations and policies were a key reason why it is harder for their sector to become more digitally mature compared to those in more commercially-focused sectors, like retail and consumer technology.

What is 'digital advantage' and why is it important?

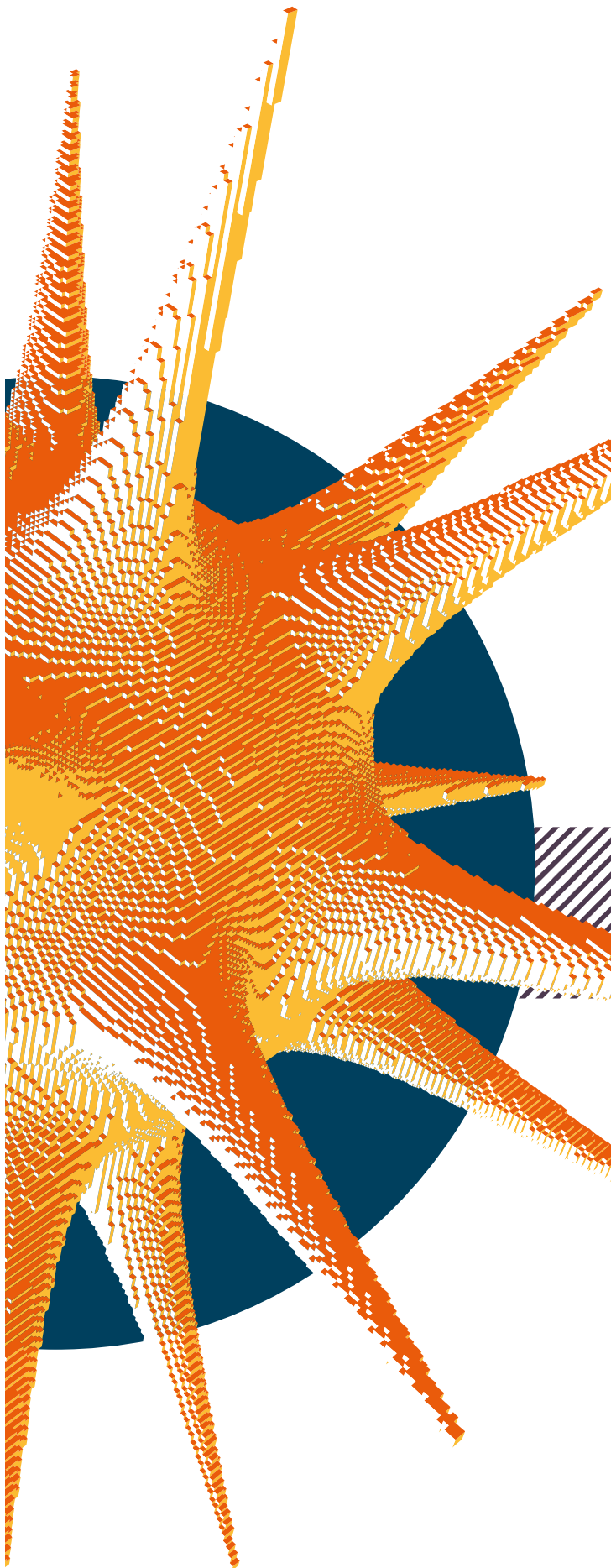


While there was nuance per sector, for most respondents having a digital advantage aligned directly with agility - namely the ability to quickly and easily change processes to keep up with advances in today's connected world. Several potential advantages followed, from accelerated innovation and transformation to meeting and exceeding organisational goals.



What does having an 'advantage' in today's connected, digital, world mean to your organisation? (base numbers in chart) not showing all answers, split by sector

Figure 4



Rich Barrow CBE, Information Advantage Business Development, BAE Systems Air:

“Advantage is a state which is achieved by utilising data and information more efficiently and effectively than your adversary. It means you’re able to make better, quicker decisions because you understand the environment and context you are operating in and are able to identify patterns and anomalies which allows you to predict likely outcomes and react faster to changes.

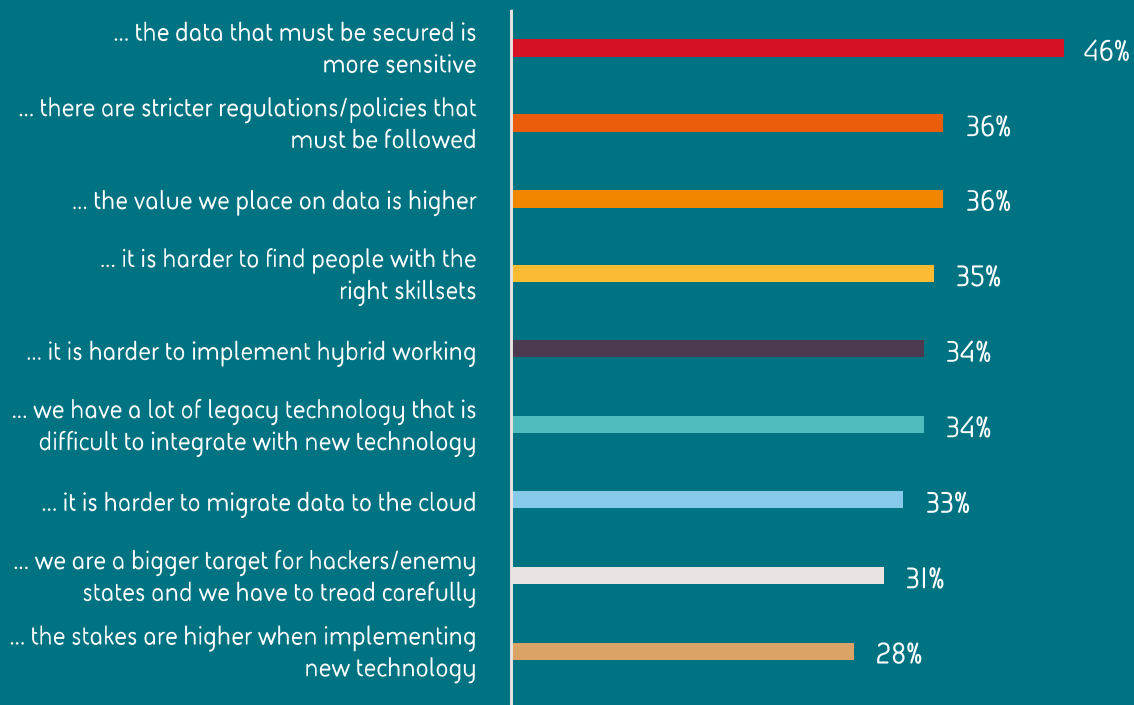
“Information Advantage requires continuous sensing, testing and feedback. A mature system will be continuously improving and in military capability terms we aspire to update our warfighters and their equipment almost instantaneously.

“If we get it right, we will be able to understand our data and act upon what we’re seeing in a more targeted manner, making the best use of our assets and ensuring we are one step ahead of our adversaries.”

Digital advantage in a high trust context

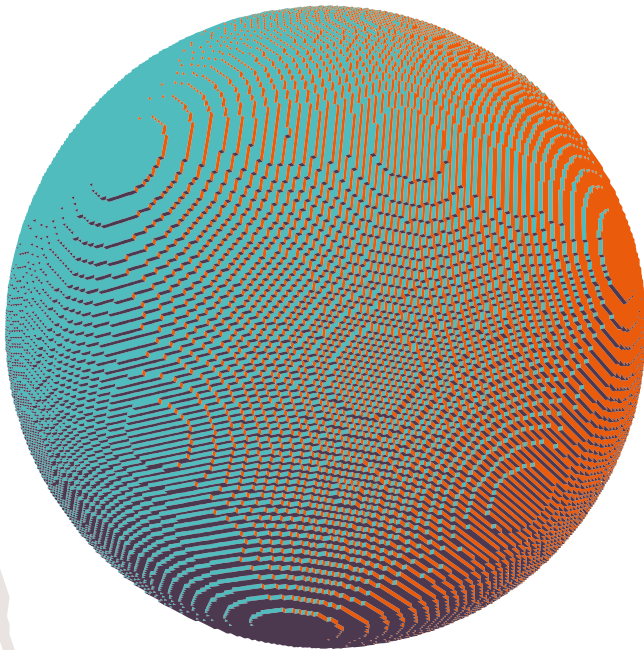
Achieving a digital advantage is different for organisations operating in high trust sectors due to the important impact they have on society and the high sensitivity of the data they are working with daily.

The sensitive data factor was cited as the top reason for 46% of respondents, when asked why it is harder for their organisation to become more digitally mature, versus lower-trust sectors.



Which of the following statements do you agree with?
Compared to other organisations in other sectors (such as commercially focused sectors including retail or consumer technology), it is harder for organisations like mine to become more digitally mature because...

Figure 5



James Hatch, BAE Systems Digital Intelligence's Chief Digital Officer:

"Being a high trust organisation and achieving digital advantage should be self-reinforcing, not at odds with each other. An organisation that is more trusted can do a better job, and an organisation that is more digital can do a better job. What we're trying to achieve is not a bunker mentality - we're working towards becoming strong, trusted, digitally modern organisations that contribute innovation to our ever-evolving world."

"An organisation that is more trusted can do a better job, and an organisation that is more digital can do a better job"

"...COP26, the climate change summit in Glasgow, saw world leaders commit to take measures to curb methane emissions, halt and reverse forest loss and deliver a net-zero future. **Digital transformation is recognised as a key** tool to enable these changes."

Chapter I

The barriers to achieving digital advantage

Our research identified that 97% of organisations have faced barriers to achieving a digital advantage. These barriers tend to follow under the categories of data, people and technology and while they are significant, so too are the benefits on society if they are overcome.

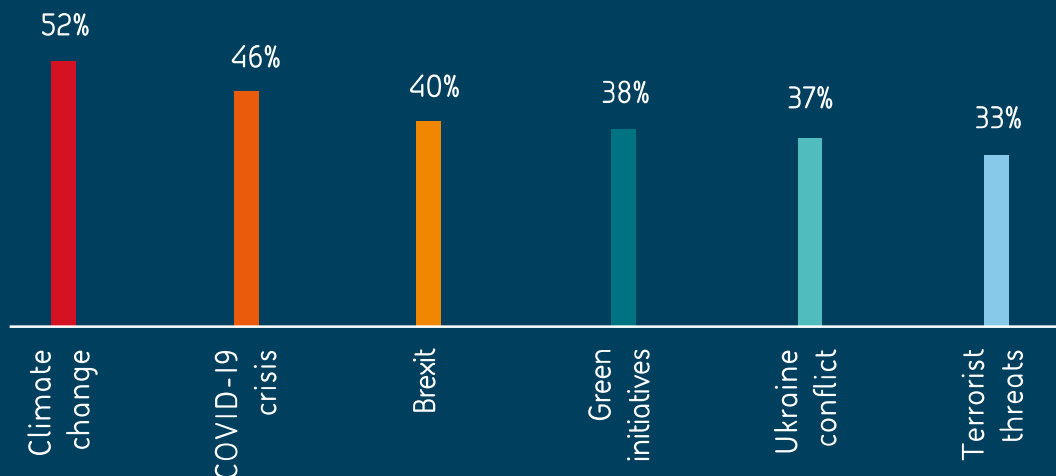
Why digital advantage is so important for high trust sectors in 2022

Which factors are hastening digital transformation?

Digital transformation has been ongoing for some time but was **accelerated by the COVID-19 pandemic** and related restrictions, pushing the planet to adopt a more digital-first mind-set.

In the wake of the pandemic, another factor is motivating over half (52%) of high trust organisations to accelerate their digital transformation strategies: climate change. **COP26**, the climate change summit in Glasgow, saw world leaders commit to take measures to curb methane emissions, halt and reverse forest loss and deliver a net-zero future. Digital transformation is recognised as a key tool to enable these changes.

What is the impact of not having a digital advantage?

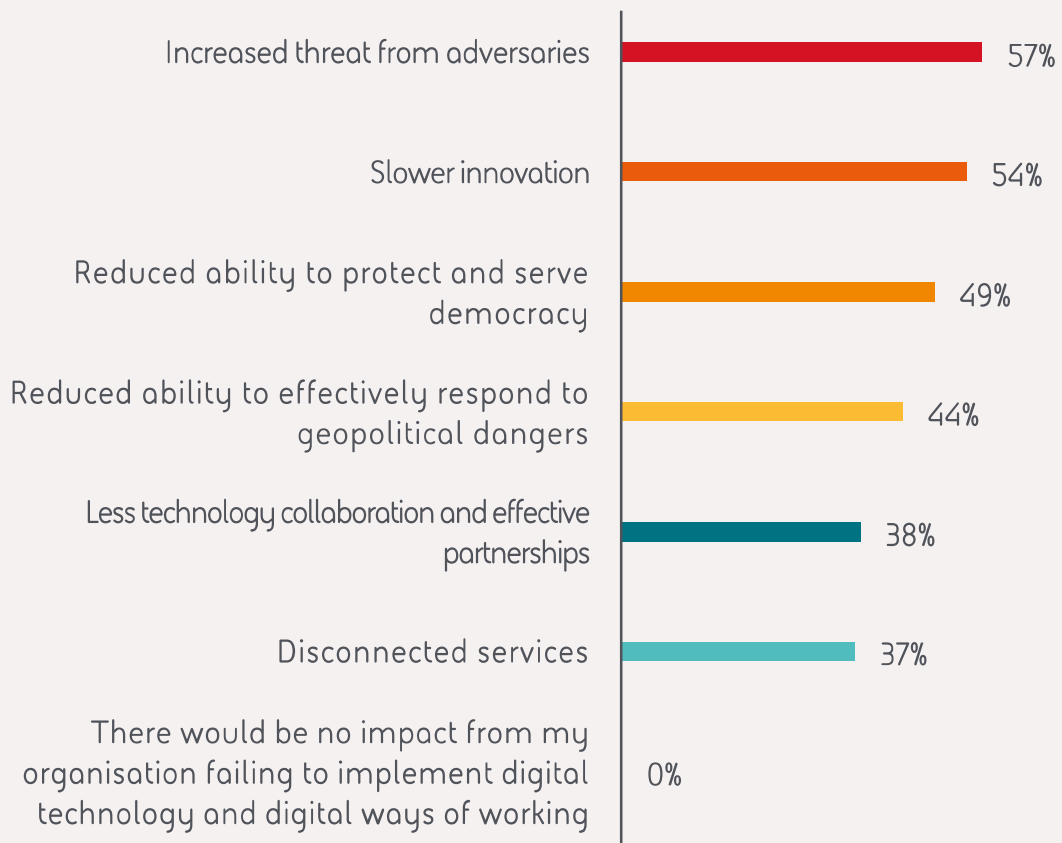


Which of the following geopolitical factors have resulted in your organisation accelerating/attempting to accelerate their digital strategies over the last 12 months?

Figure 6

Considering the majority of high trust organisations are currently working to accelerate their digital transformation strategies, many recognise that the impact of not doing so, and therefore losing out on having a digital advantage, is severe.

For these organisations, digital advantage is not considered a 'nice to have'. Rather, it is seen as mission critical to protecting UK society and maintaining the public's trust in today's landscape.



What are/would be the impact(s) of your organisation failing to implement digital technology and digital ways of working?

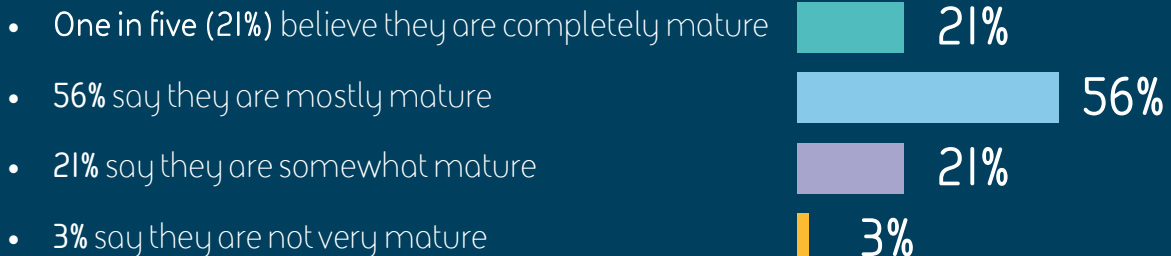
Figure 7

What is holding high trust sectors back from becoming digitally mature?

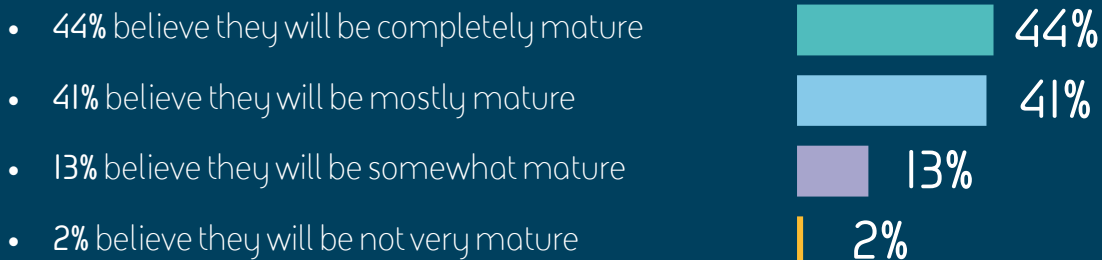
Digital maturity is defined as a measure of an organisation's sustained ability to create value through data and digital. It is the ability to quickly respond to or take advantage of opportunities in the market based on digital technology and remain sustainably and efficiently digitally agile.

So, how digitally mature are today's high trust organisations?

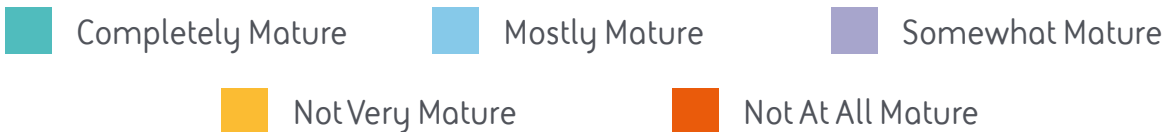
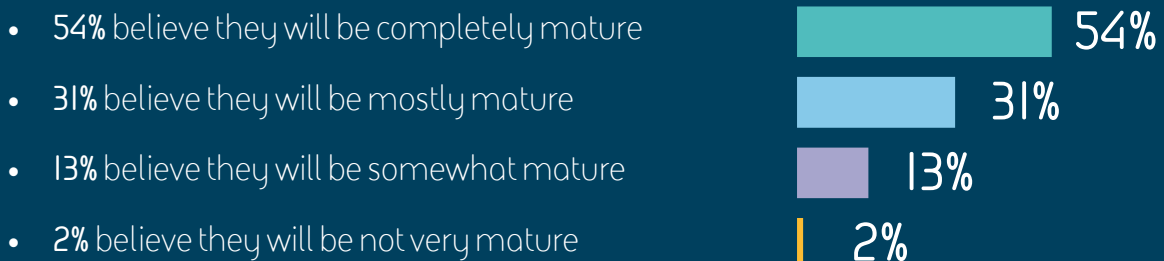
Today:



Five years time:



Ten years time:





James Hatch, BAE Systems Digital Intelligence's Chief Digital Officer: "Many organisations may not feel digitally mature due to the sheer volume of technological change happening constantly, even if they themselves are operating within the digital domain. For example, there's a whole new branch of physics and information science that is changing the way things are done; blockchain is changing the way processes happen; quantum technology is changing the mathematics behind computing; and the metaverse could be pushing our society towards a virtual reality.

"However, change isn't happening as fast as it may seem, rather what we are observing is a huge volume of inexorable, incremental change; tomorrow's new technology innovation leveraging today's software and platforms. Everything builds on everything, so rather than worrying about the pace of change, we need to be building our systems and organisations to talk to and adopt new technologies so we can welcome advancement with open arms."



"Everything builds on everything, so rather than worrying about the pace of change, we need to be building our systems and organisations to talk to and adopt new technologies so we can welcome advancement with open arms."

To achieve digital maturity there are a number of areas high trust organisations believe they need to improve on.



Innovation: Two-thirds of organisations think they need to either 'completely overhaul' or 'significantly improve' their ability to easily innovate. Aerospace organisations are the most likely (42%) to say their innovation function needs a 'complete overhaul'.

2/3

67%

Security: 67% of organisations think they need to 'completely overhaul' or 'significantly improve' their security savviness.



Data-driven: 69% of organisations think they need to 'completely overhaul' or 'significantly improve' their ability to gain insights from data and make informed decisions.

69%

68%

Agile: 68% of organisations think they need to 'completely overhaul' or 'significantly improve' their ability to be fast and agile in everything they do.



Infrastructure: 75% of organisations think they need to 'completely overhaul' or 'significantly improve' their infrastructure to accelerate their digital strategy. 39% of government organisations flagged that a 'complete overhaul' of their infrastructure is needed.

75%

64%

Value stream driven: 64% of organisations think they need to 'completely overhaul' or 'significantly improve' their value stream driven approach.



Customer experience: 73% of organisations think they need to 'completely overhaul' or 'significantly improve' their approach to improving customer experience.

73%

68%

Constant improvement: 68% of organisations think they need to 'completely overhaul' or 'significantly improve' their approach to constantly reviewing and improving work.

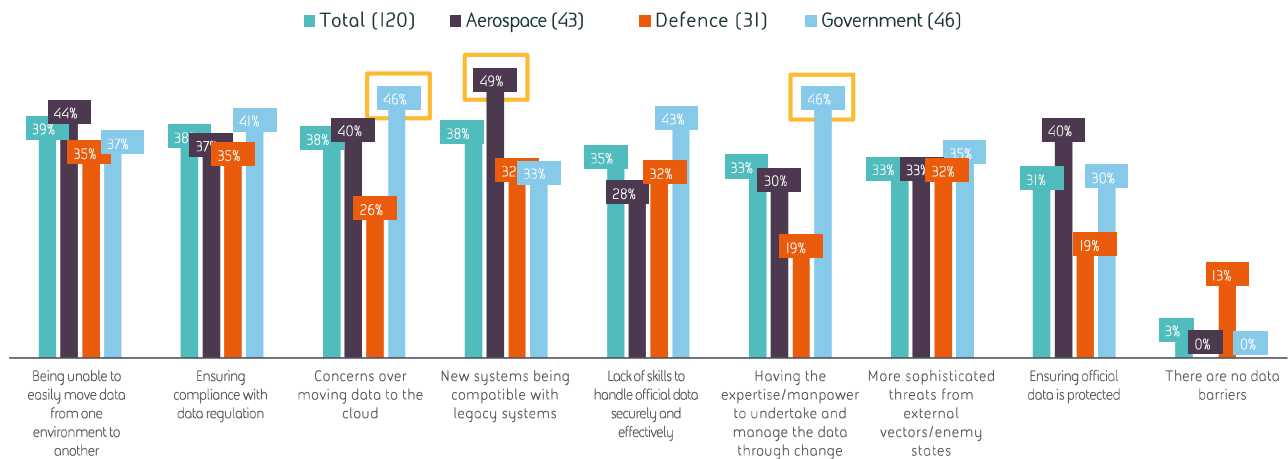


Data, people and technology barriers

Data

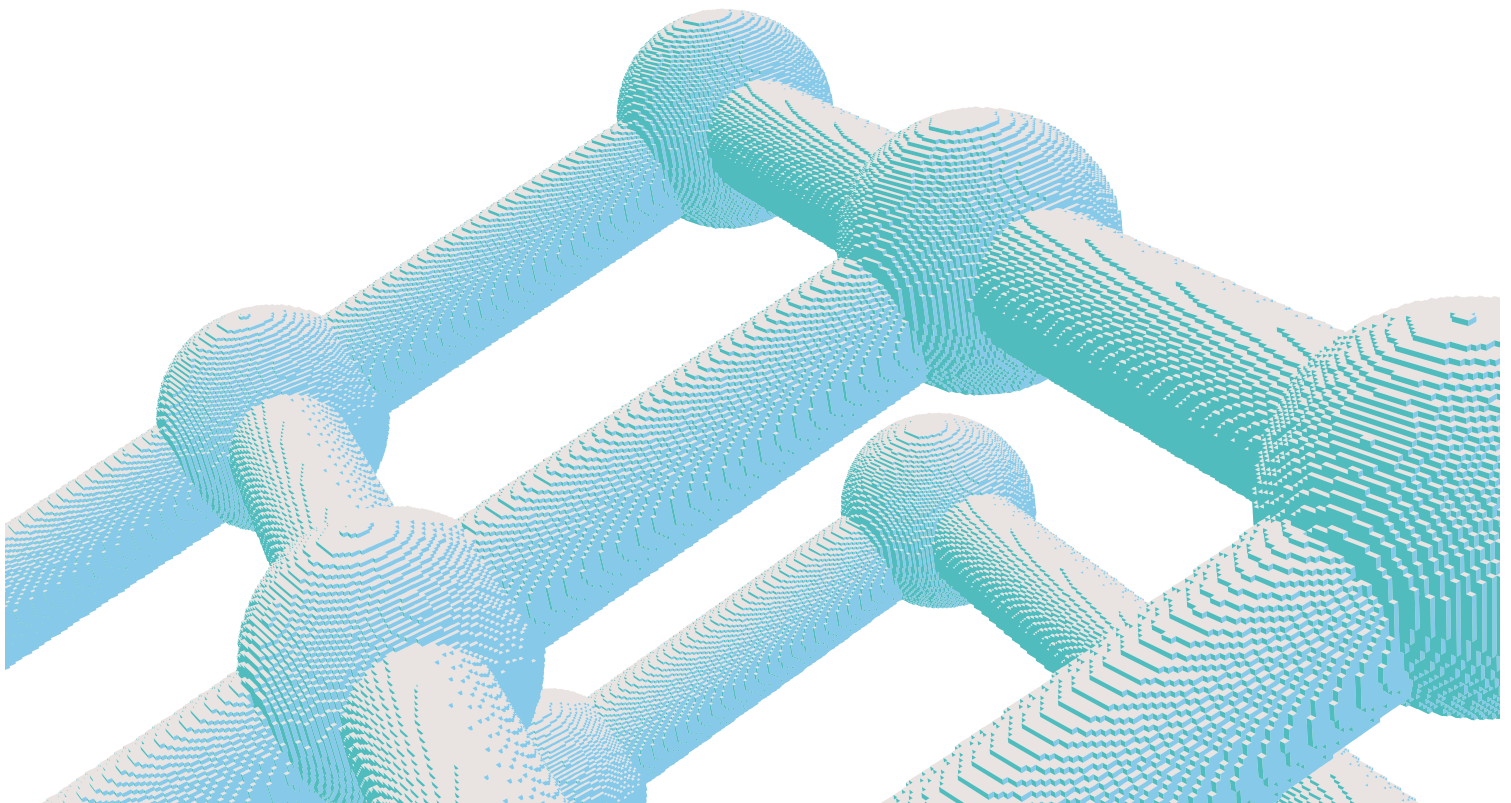
The intelligent use of data is essential to achieve digital maturity, especially considering the volume of sensitive or classified data high trust organisations work with. 53% of organisations highlighted that the incorrect use of data would prevent their ability to solve challenges within society, followed by not being able to quickly and easily change processes (51%) and not being able to share data-driven insights across the organisation (47%).

Yet, several key challenges exist when it comes to handling data in high trust environments, with organisations seeing these as barriers preventing them from becoming more digitally mature. (See Figure 8)



What data barriers have held/would hold your organisation back from becoming more digitally mature?

Figure 8

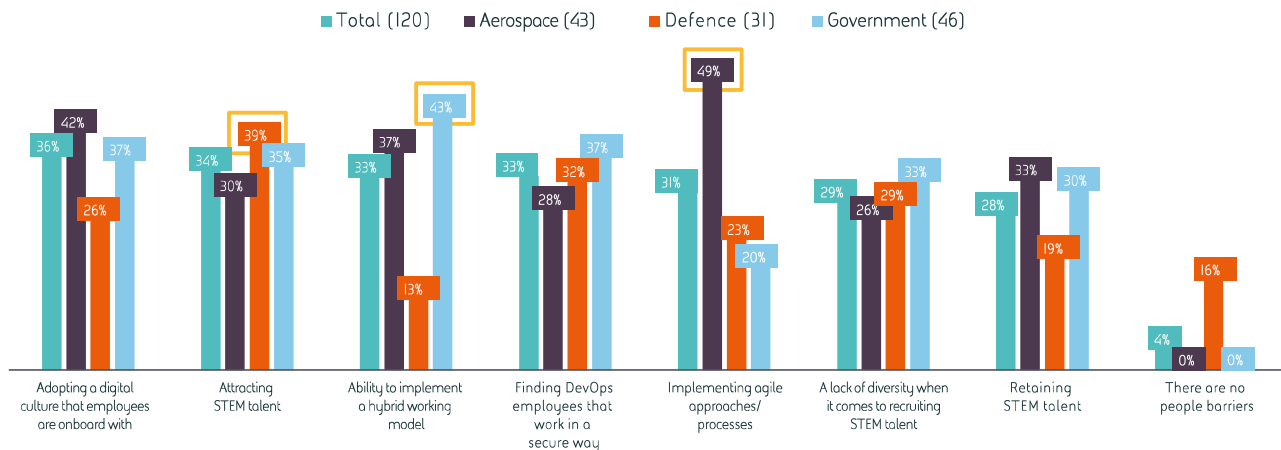


People

From implementing hybrid working policies, to attracting and retaining talent amid [digital skills shortages](#) and the [Great Resignation](#) (where a fifth of UK workers have said they expect to leave their job for a new employer in the next 12 months), organisations in high trust sectors are also navigating a number of significant people-focused challenges.

Adopting a digital culture that employees are onboard with was highlighted as the top roadblock in the people pillar, revealing that [change management and internal communications](#) around digital transformation could be lacking in high trust sectors.

The people barriers faced to becoming more digitally mature differ by sector



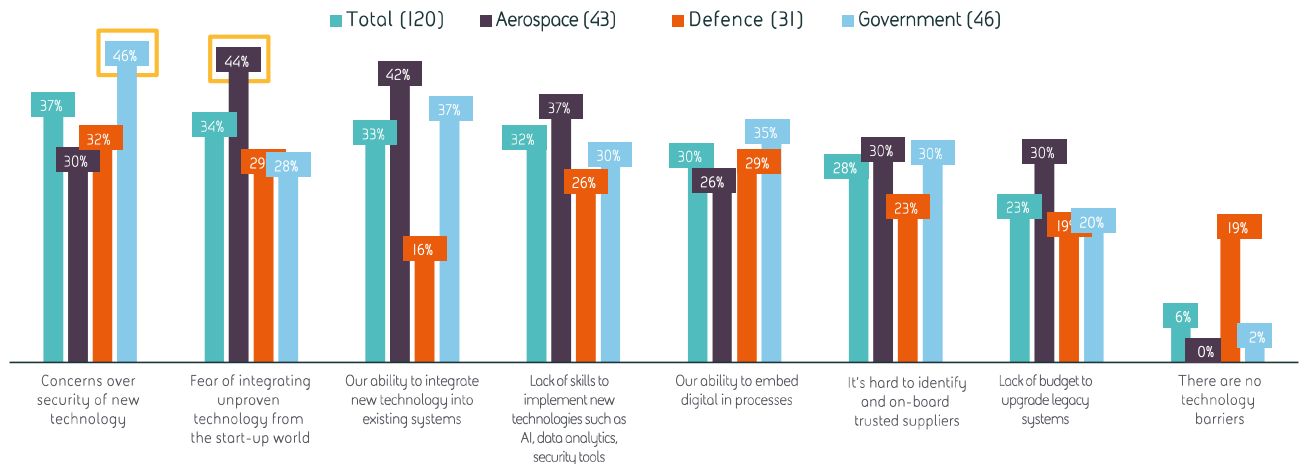
What people barriers have held/would hold your organisation back from becoming more digitally mature?

Figure 9

Technology

Finally, keeping up with the pace of technology evolution is a significant challenge for high trust organisations, alongside hesitations around adopting unproven tech from the startup world.

Concerns over the security of new technology was cited as the leading barrier to adoption (37%). With the data being handled by high trust organisations often being so sensitive, sticking with systems which have received years of security investment can understandably seem like the safer option over adopting new tech.



What technology barriers have held/would hold your organisation back from becoming more digitally mature? (base numbers in chart) not showing all answers, split by sector

Figure 10



Aerospace

Data

Aerospace organisations are more likely to cite new systems being incompatible with legacy systems (49%) and being unable to easily move data from one environment to another (44%) as barriers to digital transformation

People

The combination of attracting and retaining STEM talent is a bigger issue for aerospace than the other sectors (56%)

Technology

Fear of integrating unproven technology from the startup world (44%), and a lack of budget available to upgrade legacy systems (30%) are seen as significant challenges for aerospace organisations

Incompatible legacy systems

49%

56%

Issues attracting and retaining STEM talent

Nervous of startup tech

30%



Dr. Kathryn O'Donnell

Dr. Kathryn O'Donnell, COO and Tony Holt, CTO, In-Space Missions, said:

"Space is entirely digital; it can only provide, receive and import information through digital means. With this in mind, a barrier to creating a digital advantage for high trust organisations operating in space is getting interoperability right - different systems must be able to work together harmoniously.

"Cybersecurity is another challenge. Collaborating with SMEs is key to empowering innovation in the aerospace sector, but new businesses can find the level of cybersecurity required hard to navigate. Alongside determining the level of security that is appropriate for the applications they're designing, they should constantly also be aligning with the industry standard. This links to the people-based challenge - finding the right people to advise on all of these factors with the correct balance of knowledge, experience and pragmatism, can be really difficult as we're coping with a global talent shortage."



Defence

Defence organisations appear to face less blockers to a digital advantage than their peers in the aerospace and government sectors. Yet, key barriers still exist for the vast majority:

Data

Being unable to easily move data from one environment to another, and ensuring compliance with data regulation were the biggest blockers in the data pillar (both at 35%)

People

48% of respondents said the combination of attracting and retaining STEM talent was a critical people challenge

Technology

32% said concerns over the security of new technology was preventing digital transformation

Issues with keeping compliance and agility

35%

48%

Issues attracting and retaining STEM talent

Nervous of security level of new tech

32%



Air Commodore
Kevin S Cowieson

Air Commodore Kevin S Cowieson MA MBA MSc BSc RAF, Battlespace Management Force Commander (BMFC) said:

“Technology is definitely giving the defence sector a huge advantage. Just take a look at how flight plans have shifted from being all manual to all digital to see this in action; we can now get a whole picture by properly utilising data.

“However, for some reason, we don’t trust the systems at the moment. Part of this is a fear of automation and being replaced. But really having a digital advantage means our people should be using their brains to continue advancing our sector, rather than spending their time on manual processes. Younger entrants to defence understand this and will help empower us towards growth and staying ahead of the adversary.”

Rich Barrow CBE, Information Advantage Business Development, BAE Systems Air said:

“if not reinforced with a comprehensive communications plan, change can become fatigue for the people within any organisation. This is why change is as much a cultural challenge as it is a technical or structural challenge. This is no different in defence, communicating key objectives, alongside developing more intuitive technologies is important to take the people on the change journey and to ensure the right training is given at the right time.”



Government

Government organisations are the most likely to be held back by challenges across the three pillars of data, people and technology when working towards a digital advantage:

Data

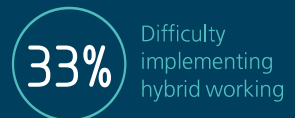
Government organisations are most likely to have transformation blocked by concerns over moving data to the cloud (46%); a lack of skills required to handle official data securely and effectively (43%); and access to the expertise, understanding and manpower to manage data through change (46%)

People

They are more likely to cite the ability to implement a hybrid working model (43%) and a lack of diversity when it comes to recruiting STEM talent (33%) as key challenges

Technology

The sector is also more likely to face concerns over the security of new technology (46%) and lack the ability to embed digital into business processes (35%)



Sneha Dawda

Sneha Dawda, Research Fellow in Cybersecurity and Cyber Threats, RUSI said: "Governments have traditionally struggled with a lack of digital agility and a large amount of bureaucratic processes that slow down innovation. Disjointed procurement has been another challenge, whereby different departments speak to different people and use different technology which not only slows down innovation but can also lead to cybersecurity issues. Whilst vendor diversity is extremely important for spreading cyber risk, there needs to be a degree of centralised management to accurately calculate and manage cyber security."

Chapter 2

Identifying solutions

While it's more challenging for high trust organisations to achieve a digital advantage, 83% of sector respondents agreed that if overcome, the results are extremely valuable to wider society.

Mivy James



Mivy James, BAE Systems Digital Intelligence's Digital Transformation Director: "High trust sectors are innovating at pace, using digital technologies and ways of working to transform. But so is the adversary; they are determined to build faster, more effectively, and find new ways to jeopardise the safety of citizens, democracy and allies.

"At the same time, organisations are under mounting pressure to solve critical societal challenges. From the threat of climate change, to the pandemic, and the cost of living crisis, the sheer scale of these challenges requires being able to see the bigger picture.

"To do this, we need to use data effectively and collaboratively, which involves safely weaving threads between digital capabilities across organisations and sectors. Embracing new digital transformation opportunities is vital for making this happen, helping us to generate a digital backbone based on people, process and technology.

"By working together to create these digital threads, we will be able to gain a better understanding of the bigger picture, innovate faster and ultimately unlock an advantage in the digital age."

"...we need to use data effectively and collaboratively, which involves safely weaving threads between digital capabilities..."

What solutions are needed?

Aside from bigger budgets, respondents recognised that a number of solutions exist to help them overcome barriers: cross-sector collaboration, more intelligent use of data, clearly defined strategies and more access to STEM talent.

Cross-sector collaboration



52% of respondents said greater cross-sector collaboration would help them overcome the barriers

Embracing secure openness

Sneha Dawda, Research Fellow in Cybersecurity and Cyber Threats, RUSI, explains how the introduction of the UK Cabinet Office's [Government Digital Service \(GDS\)](#) overcame some of government's biggest roadblocks, opening it up for more cross-sector collaboration:

"Public private partnerships and collaboration are essential in government because they can help advance digital maturity and, if managed properly, vendor diversity helps reduce cybersecurity risks because the organisation isn't just relying on one vendor for everything.

"In terms of examples of where this is happening successfully, the GDS has been transformative in the government sector because it reduced bureaucratic processes that were slowing down innovation, but also because it encouraged a cohesive, secure strategy around collaboration. There are learnings from this that can be applied across high trust sectors."

Intra-sector collaboration is also important. Nick Easton, Engineering Director, BAE Systems Digital Intelligence – C5ISR, refers to the concept of digital threads, saying that it empowers an openness which allows strategic collaboration between organisations working towards the same goal, in this instance in the space sector:

“By collaborating to connect disparate data points and weaving threads between them, organisations can enhance visibility and work together to solve some of the space industry’s most pressing challenges. Collaboration is key for tackling these challenges, so long as it’s done in a strategic way. Governments and organisations should view the space industry as one coherent network, and be open to sharing knowledge, skills and intelligence.”

Spotlight on startups

Once processes are in place to enable simpler and more secure collaboration, the next roadblock for high trust organisations may be choosing which organisations to collaborate with.

The UK boasts one of the most successful startup landscapes in the world, with UK tech startups and scaleups capturing

This is resulting in an ongoing influx of new services, software and hardware that have the potential to empower high trust organisations towards a digital advantage.

Sneha Dawda, Research Fellow in Cybersecurity and Cyber Threats, RUSI, explains how organisations need a clear strategy and objectives around what they want to achieve through collaboration in order to streamline approach:

“Collaborating with a mixture of different-sized organisations produces the best results, but identifying SMEs with solutions tying back to your digital objectives is essential because of small businesses’ ability to be agile to your needs. The UK is a hotspot for innovative startups, so as a well-established high trust organisation, having a strategy and process around collaborating with businesses from this landscape can help future-proof innovation.”



Tony Holt

But, the pressure to put the processes in place to enable collaboration shouldn’t just fall to individual organisations. Rather, stimulating collaboration should be a government priority, argue Dr. Kathryn O’Donnell, COO and Tony Holt, CTO, In-Space Missions:

“Inter-company collaboration is so important, and an essential step to empower the nation’s high trust organisations to achieve a digital advantage. This is happening on a small scale already so we need to take heed of the learnings from bigger players and SMEs already partnering over the last few years. This collaboration can be extremely complicated to bring to life, and an appropriate government-led, UK-wide, coordinated strategic approach will be essential to do so successfully.”

Intelligent use of data



48% of respondents said that more intelligent use of data would help them overcome the barriers

The digital thread

Optimising the management and secure use of official, official sensitive and secret and top secret data is of critical importance when working to achieve a digital advantage.

Mivy James, Digital Transformation Director, BAE Systems Digital Intelligence, explains the 'digital thread' concept in more depth:

"To solve critical societal challenges and make intelligent decisions, we can no longer look at data in isolation. Instead, we need to break down silos and form connections across complex ecosystems. The effect is like weaving threads. It requires joining the dots between multiple digital domains; bringing different sources of information together to create greater visibility. This way, organisations can work together as a community to identify patterns, spot problems, and ultimately, find solutions.

"With a clearer view of their organisation and the world they are operating in, businesses can also become more agile – an essential component of meeting the pace of change needed to create an advantage today. Failing to use data effectively not only has an impact on individual organisations, but society more widely."



Air Commodore
Julian Ball OBE

Air Commodore Julian Ball OBE, Head of Defence Space Capability, at the UK Ministry of Defence echoes the importance of prioritising data and creating a 'digital thread':

"When people look to deliver digital transformation, they still default to thinking about the hardware first. For example, in the space context, everyone will straight away start talking about how we can optimise the satellite. But it's not about the hardware, it's about the data that runs behind it.

"What I'm interested in is how we can get the information from the satellite to the ground and the end user safely and securely. We therefore need to optimise the data management layer first before we start thinking about developing sensors or getting the ship into space. Satellites are useless if the data isn't doing its job."



40% of respondents said intelligence sharing technology would be a key asset, allowing them to better share the insights derived from their data

Lieutenant General Tom Copinger-Symes, Director of Military Digitisation, UK Strategic Command discusses the creation of digital threads in the context of the UK defence sector's "Digital Backbone":

"The UK's defence sector is recognising that digital transformation and software is just as important as hardware - ships, tanks and planes - and the people operating it. While the latter will not become obsolete, gaining an advantage in the digital age depends on linking humans, hardware and software - something that is especially pertinent in the "new" domains of warfare, cyber and space.

"At the heart of all of this is data. To maximise opportunities and manage risk, it's key that UK Defence organises its external and internal data, making it available to be used effectively by humans and machines in a timely way. This is why the "Digital Backbone", outlined in the Digital Strategy for Defence, aims to standardise networks and information exchange to enable data to flow safely between systems, seamlessly linking our sensors with our decision makers and our "effectors".

"The next few years will be pivotal when it comes to digital transformation in defence. But none of it will be possible without fostering a diverse range of skill sets and mindsets capable of bringing the vision - and data - to life."



Lieutenant General
Tom Copinger-Symes

A security-first approach to data

Considering the sheer volume of data high trust organisations have access to, alongside the security risks associated with managing this data, it's unsurprising that many are daunted by the task. Mivy James, Digital Transformation Director, BAE Systems Digital Intelligence, argues that building an intelligent data use strategy is possible in a high trust organisation:

"Importantly, achieving greater visibility with data does not mean bringing it into one single location. It is about creating a number of interconnected threads, giving the right people access to data at the right time. These threads need to be audited, trackable and organised, creating an ecosystem where people retain their ownership, and the flow of information is controlled."

Nick Easton, Engineering Director, BAE Systems Digital Intelligence – CSISR, goes on to explain the importance of a robust cybersecurity strategy within this approach:

"In the context of space technology, there is an overwhelming amount of data available. Putting trust in machines to select the right data, along with bringing these sources together in a secure and reliable way, is critical when organisations turn this information into actionable intelligence.

"Like any other digitised infrastructure, satellites and other space-based assets are vulnerable to cyber threats. As it becomes easier to download software onto satellites, attackers will use this to their advantage and the implications could be catastrophic. To mitigate these threats, cybersecurity needs to encompass space and all the assets within it. The New Space movement is centred around agility, speed and innovation, but to unlock a true advantage, organisations must ensure they have robust security capabilities in place."



59% of respondents said data analytics would give them an advantage through data science by, for example, using machine learning or artificial intelligence to help with data analysis

Air Commodore Nick J Hay OBE MA RAF agrees that building an intelligence or indeed, business or operational picture by pulling on multiple sources of data is key, but that we need high levels of security awareness to ensure that either the classified sources and/or an aggregated analysis of the data, does not get into the wrong hands:

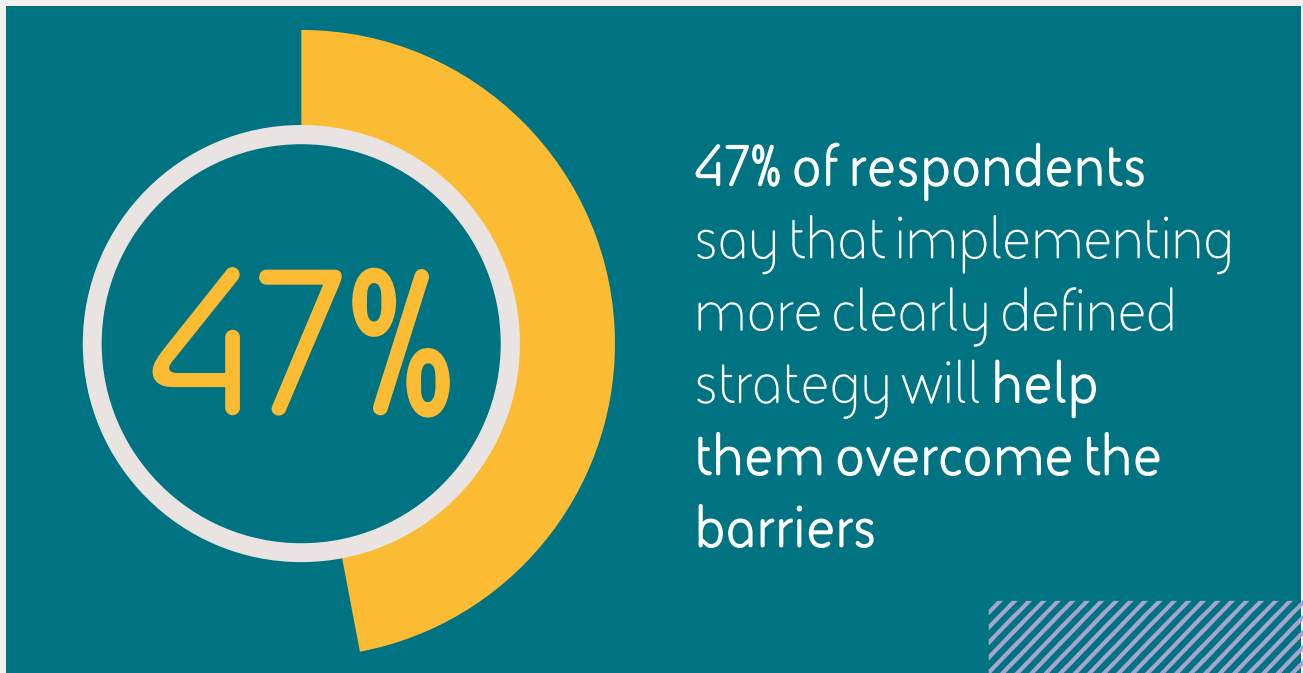
“A digital advantage is about pulling data from many sources and providing decision makers with a clear visualisation of the issue at hand. Data needs to show where the risks and opportunities are and depict change, either over a long or a short period of time.

“Security is a vital part of this picture. You want to fuse data across classification levels at pace, but you must also ensure that an appropriate security culture and processes are in place so the adversary can’t access elements of your data and build a similar picture which they could exploit to their advantage.”



48% of respondents said security services were key for improving their digital advantage through having robust services in place to protect against cyberattacks

A clearly defined strategy



With 41% of the sector claiming a lack of digital transformation strategy is holding them back from achieving a digital advantage, many are grappling with complex issues like an overload of unorganised and unsecured data and not having the right people in the job to lead the organisation towards digital maturity.

James Hatch, BAE Systems Digital Intelligence's Chief Digital Officer, suggests an approach built around making frequent, small changes towards bigger organisational goals:

"Creating greater agility and building a digital advantage is a game changer for high trust organisations, enabling them to up their pace of development and increasing their competitiveness in complex digital environments. This is about delivering more value for time and effort - and doing it in a secure and trusted way.

"There are a number of key components to digital agility, all involving bringing together technology, people and data. A major component is integrating processes, tools and information capabilities into one pipeline - a fundamental principle of the DevOps approach to software. This approach relies on making frequent, smaller and more high-quality changes to build systems and organisations that are safe to change.

"Effective use of data is vital for getting digital agility right, which is dependent on providing people with secure access to accurate data in a timely way. By giving employees visibility into activity across the organisation, they can make informed, data-driven decisions and use intelligence to solve critical problems.

“This is not about creating more work for people. Implementing automation to streamline business processes is also crucial for reducing the burden on teams, allowing them to focus on high value work and derive meaningful insights from data. Reusing rather than building is also key, and it requires both internal and external collaboration. Working across silos to find and implement a process and technology from another business function or organisation will ultimately save time and cost in the long run, meaning that organisations do not have to reinvent the wheel.”

He goes on to explain the importance of proper communications to achieve buy-in around a digital transformation strategy:

“The critical component of the change is the people within the organisation, who make up the backbone of digital agility. Creating an enduring advantage needs shared vision and requires us to give our people the tools and support they need to do their job successfully. In a landscape plagued by skills shortages, moving to a digitally agile approach helps to retain talented employees, as it creates a clearer understanding of roles and success, leading to better engagement levels across the board.”

Access to STEM talent

This year, [the UK Commission for Employment and Skills identified that 43% of STEM vacancies are hard to fill](#), mainly due to a shortage of applicants with the right skills and experience. With access to STEM talent selected by our study's respondents as one of the most important requirements needed to achieve a digital advantage, this is an issue that needs a solution immediately.



47%

47% of respondents say that greater access to STEM talent will help them overcome the barriers

Unifying talent under a common goal

Nick Easton, Engineering Director, BAE Systems Digital Intelligence – C5ISR, provides a solution for tackling the glaring skills gap in the space sector:

“Creating educational opportunities around space is crucial to building awareness. We need people from all backgrounds to recognise that working on space projects is an achievable goal. We also need to give employees a shared mission, otherwise their efforts can become scattered.”

Dr. Kathryn O’Donnell, COO and Tony Holt, CTO, In-Space Missions, explain this idea in more depth:

“To attract and retain talent, we need to give them a strategic path to work along. The efforts of skilled people can become scattered and less meaningful without a common goal to work towards. Empowering your people with a unified goal is a key part of gaining digital agility.”

A focus on education

Encouraging the next generation of STEM talent is the responsibility of education, government and organisations. To inspire people from all backgrounds into STEM careers as early as possible, we need to change the way these skills are taught at school, university and in the workplace.

Siân John MBE, Director of Security Business Development and Strategic Growth, Microsoft, flags that STEM education both at university and within organisations is lagging behind the pace of change in the technology world:

“The experts also need to retrain themselves. For example, some security experts could have been trained in IPv4 as opposed to IPv6, so it’s important to avoid teaching people older ways and training these behaviours into new joiners.”

Inclusivity in STEM to solve the talent gap

A well-recognised reason why the STEM talent pool is struggling to keep up is that the overwhelming percentage of individuals in the market hail from a very specific population group. **The British Science Association identified that STEM has a lower share of female workers (27% vs. 52%) than the overall workforce. On top of this, just 12% are from ethnic minorities and only 11% have a disability.**

Victoria Knight, Strategic Campaigns Director, BAE Systems Digital Intelligence, says this issue isn’t just preventing high trust sectors from having access to the volume of talent it needs to achieve a digital advantage, it’s also resulting in technology being built with significant flaws:

“Starting as early as nursery school, there is a clear pattern of disadvantage for STEM students based on race, ethnicity, gender and class. This is resulting in missed potential and failure to unlock a broad range of digital talent.

“The consequences of failing to foster diversity in STEM are extremely worrying. Facial recognition technology, for example, is currently failing to identify black females. With bias present in automated facial analysis algorithms and datasets, fundamental changes within STEM fields have never been more necessary.”

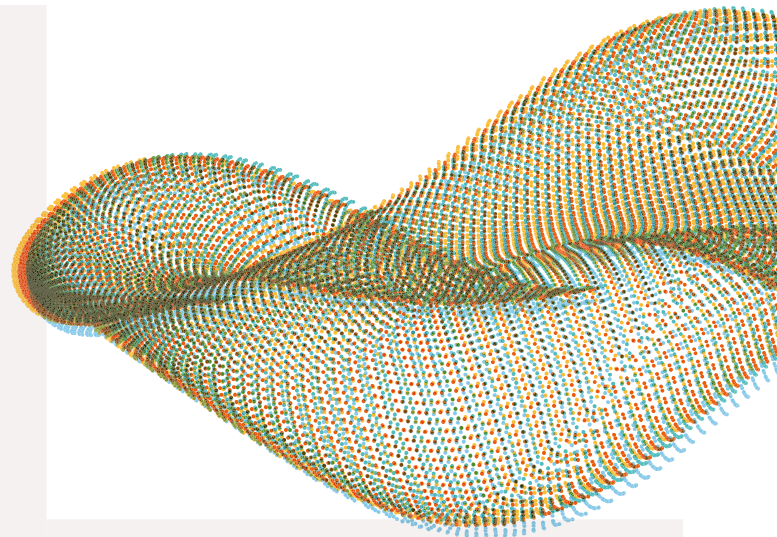




I. Encouragement and inclusivity in the early years

The national curriculum for STEM learning is growing, but there is still a lack of information, advice and role models out there to encourage young people from all backgrounds to consider a career in these fields.


Steps must be taken from an early age to inspire underrepresented groups to pursue STEM careers. For example, it has been found that role models for minority students will help them to develop a greater sense of belonging, by enabling people with similar backgrounds to envision themselves working in these fields. [Data from Microsoft](#) found that young girls with female role models are 50% more likely to consider STEM subjects and careers.



2. Opening doors through alternative education

To help bridge the STEM skills gap, schools, universities and organisations must also focus on promoting alternative routes into STEM careers. Digital training courses, bootcamps, workshops and apprenticeship programmes have proven to be effective ways of nurturing high-level talent from an early age.

To attract talent from all backgrounds, organisations and institutions must also make simple changes, like watching out for exclusionary language in advertisements. They must also reposition their marketing strategies and make learning opportunities more accessible for all. When designing a training course, it is important to consider the diverse needs of a range of learners. This will include tailoring activities to various social and cultural backgrounds.



“At BAE Systems Digital Intelligence, we host a range of [seminars and events aimed at increasing diversity within STEM fields](#), as well as organising regular cyber courses to encourage women from different backgrounds to develop their digital skills. This includes our [partnership with Code First Girls](#), in which we are sponsoring its CFGdegree programme to encourage greater workplace diversity.

“Ultimately, a diverse and inclusive workforce not only stimulates greater innovation, but will also enable organisations to resolve problems swiftly with a wide range of skills to draw on.”

Victoria Knight, Strategic Campaigns Director, BAE Systems Digital Intelligence

The right technology

While technology underpins everything we've discussed, the key to enabling an advantage comes with adopting the right technology that clearly ties back to an organisation's digital strategy.

Rich Barrow, Information Advantage Business Development, BAE Systems Air, argues organisations must continue to optimise their capabilities throughout the whole life of a programme. Concepts such as design freeze and final operating capability are too rigid. Instead, programmes of the future must include a parallel workstream of continuous development, which embraces innovation and is alive to emerging technologies:

"A digital thread links digital design, test and validation through digital twins to virtual training, mission rehearsal, scenario test and operational decision support. Continuous development and feedback creates a live digital connection, which makes our battle winning capabilities evermore effective and efficient. This must necessarily be surrounded by the cognitive environment, which links human thought and trust with machines and technology."

Mark Todd MBE, Head of Strategy, Technology & Transformation, BAE Systems Digital Intelligence CSISR in a concluding remark for this section, reminds high trust organisations to put software before hardware when choosing the right technology:

"Building technology to help you achieve your goals is difficult because the tech landscape is advancing so quickly. A way to counteract this is to develop a more agile, software-defined environment that will enable you to more easily adapt and grow as society and its needs evolve. Software-defined everything then allows you to think differently about technology, and its role in giving you a digital advantage."

"A way to counteract this is to develop a more agile, software-defined environment..."

Chapter 3

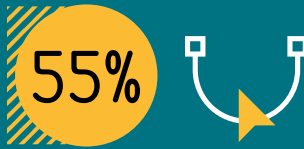
Looking ahead: If we unlock our digital advantage, what could the future look like?

“In short, if we unlock the country’s digital advantage, the future will host a richer and safer society and the UK will have an increased global influence, across defence, technology and science, and cybersecurity.”

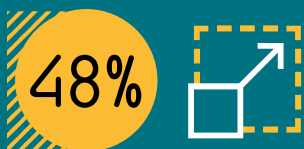
James Hatch, BAE Systems Digital Intelligence’s Chief Digital Officer

In the introduction, we explored what it means to have a digital advantage in the high trust sectors of defence, government and aerospace. There was nuance between sectors, but the top three cross-sector definitions were:

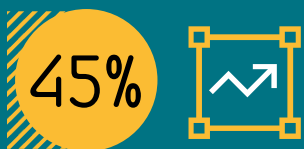
Having the ability to quickly and easily change processes



Accelerated innovation and transformation



And, meeting and exceeding organisational goals



Rich Barrow CBE, Information Advantage Business Development, BAE Systems Air, believes there will be several key implications if these advantages are achieved:

Leading as a global superpower

“The UK must secure its position as the vanguard of technology development. Achieving this requires big defence and technology companies to work together with smaller, agile start-ups and innovative SMEs to capture the intellectual horsepower of the UK and pull ideas through and into the hands of the warfighter.

“SMEs need help to navigate the complexity of defence procurement and defence needs help finding and connecting great ideas to real programmes.

“A culture of wildfire innovation is nice but needs structure to draw together the disparate strands and make something of them.

“Defence needs to learn to articulate its problems and desired outcomes more coherently and industry must learn to work together to find the best solutions.”

“To unlock digital maturity, we need a wildfire of innovation that gives us an information advantage in this country.”

Better decision making

"As we evolve to manage and analyse data more effectively we should aspire to develop decision support tools, which draw together the digital threads from different programmes to create environments where we can test or thinking and make clear eyed decisions. This will ultimately influence everything for support solutions for platforms, to basing decisions and future acquisitions plans."

Efficiency and productivity

"High trust organisations will achieve unparalleled levels of efficiency and productivity, gaining the ability to test all systems virtually, to understand challenges and adversary strengths and weaknesses as quickly and effectively as possible.

"This links back to the previous points on setting the pace and achieving an edge with innovation. Once we achieve this, high trust organisations will be able to think faster than the adversary, feel confident that the data they're using and sharing is accurate and secure, and ultimately anticipate and prepare for challenges before they happen."

"High trust organisations will achieve confidence through information..."



Aerospace

The space industry has already been undergoing a large transformation over the last few years, as the dawn of the New Space movement reinvigorates the globe's passion for exploring and understanding the cosmos. Dr. Kathryn O'Donnell, COO and Tony Holt, CTO, In-Space Missions, reflect on this and what the future holds:

"The recent reinvigoration of space means that it is becoming a completely independent entity, not reliant on other nation states or ground-based infrastructure. Sovereign capability in space interests both the aerospace and defence industries, and will provide a real next frontier for both sectors. Achieving a true digital advantage is key to this."

In aerospace more broadly, Air Commodore Kevin S Cowieson MA MBA MSc BSc RAF, Battlespace Management Force Commander (BMFC), sees the future of the industry shifting to a largely virtual world:

"We need to tackle the resource premium and move away towards using what sets them apart from machines - their brains. We need to shift to a model where we train talent to solve problems rather than just running systems manually. A lot could happen if the Air Force adopted a more problem solving mentality."



Defence

Rich Barrow CBE, Information Advantage Business Development, BAE Systems Air, considers a holistic shift to virtual being what the future holds:

"In defence, achieving a true impact is about using cutting-edge technology and innovation to enable the human mind to think faster and act faster than your enemy. The adversary is also human and also wants to win, therefore they too evolve and so must we, constantly thinking ahead and adapting quickly. We have never predicted a war before it's happened, but by thinking about possibilities and training at a very high standard we have always been able to adapt rapidly. The digital world accelerates this further, allowing us to think through more options and assess the best course of action to achieve the desired outcome. A military commander's world is full of complexity and the better use of data and emerging technologies can help provide clarity by bringing to the fore the most important information needed to make the most pressing decisions."



Government

In the government sector, Sneha Dawda, Research Fellow in Cybersecurity and Cyber Threats, RUSI, feels optimistic about the future because of successful measures that are already enabling the government to reach a digital advantage, such as the Government Digital Service. She argues that to reach its full potential, however, government must do more to incorporate the private sector in decision making:

"There's still a long way to go to discover how public and private can work better, particularly in critical areas like cybersecurity. In policy making, we should be including people from a variety of stakeholder groups more often, and earlier in the process, alongside a much more integrated review process."

"To achieve this, we need to get better processes in place to understand what the private sector needs and wants. This isn't happening to its full extent at the moment due to a lack of resources, but also because government organisations aren't able to move fast enough."

"If we're able to overcome these challenges and introduce a system where public-private collaboration is happening seamlessly, this will enable the government to act with more agility when society needs it most, for example in the event of a war or if we're cut off from critical resources, like natural gas."

Conclusion

Achieving a digital advantage is imperative for enabling high trust sectors to stay a step ahead of the adversary, **accelerate innovation, deliver connected services, protect democracy** and, ultimately, **solve some of the greatest challenges of our time.**

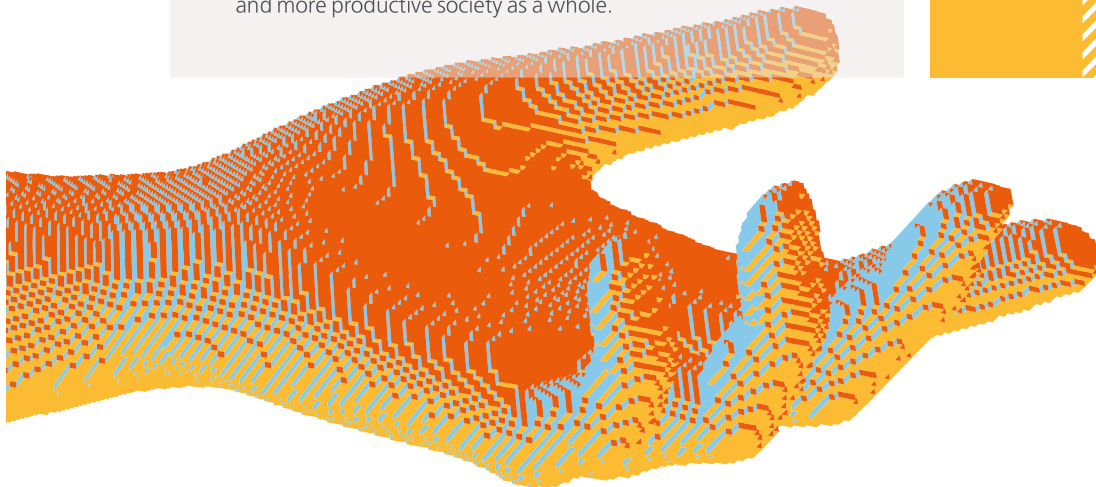
But gaining this advantage is different for organisations operating within a high trust context. The stakes are higher because the data they are handling is more sensitive, the IT environments are more complex and the digital skill sets needed are becoming increasingly harder to find and retain. Across data, people and technology, key obstacles are standing in the way of high trust organisations becoming more digitally mature.

As our research and contributors have highlighted, however, solutions do exist. From fostering greater cross-sector collaboration, to using data intelligently, widening and diversifying the STEM talent pool and implementing an agile digital strategy, there are key ways high trust sectors can unlock advantage in demanding environments.

None of this would be possible without working together. High trust sectors can no longer afford to work in silos. Instead, they need to be open to collaborating with industry, SMEs and allies, securely weaving digital threads between data, people and processes to get a view of the bigger picture.

While the road to getting there will not be easy, when digital advantage is achieved the impact will be extremely significant on a national and international scale, resulting in a richer, safer and more productive society as a whole.

“High trust sectors can no longer afford to work in silos. Instead, they need to be open to **collaborating with industry...**”



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 **120 senior IT and business decision makers** from organisations with **1,000 employees within the aerospace, defence and government sectors**.

All interviews were conducted using a rigorous multi-level screening process to ensure that only suitable candidates were given the opportunity to participate.

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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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