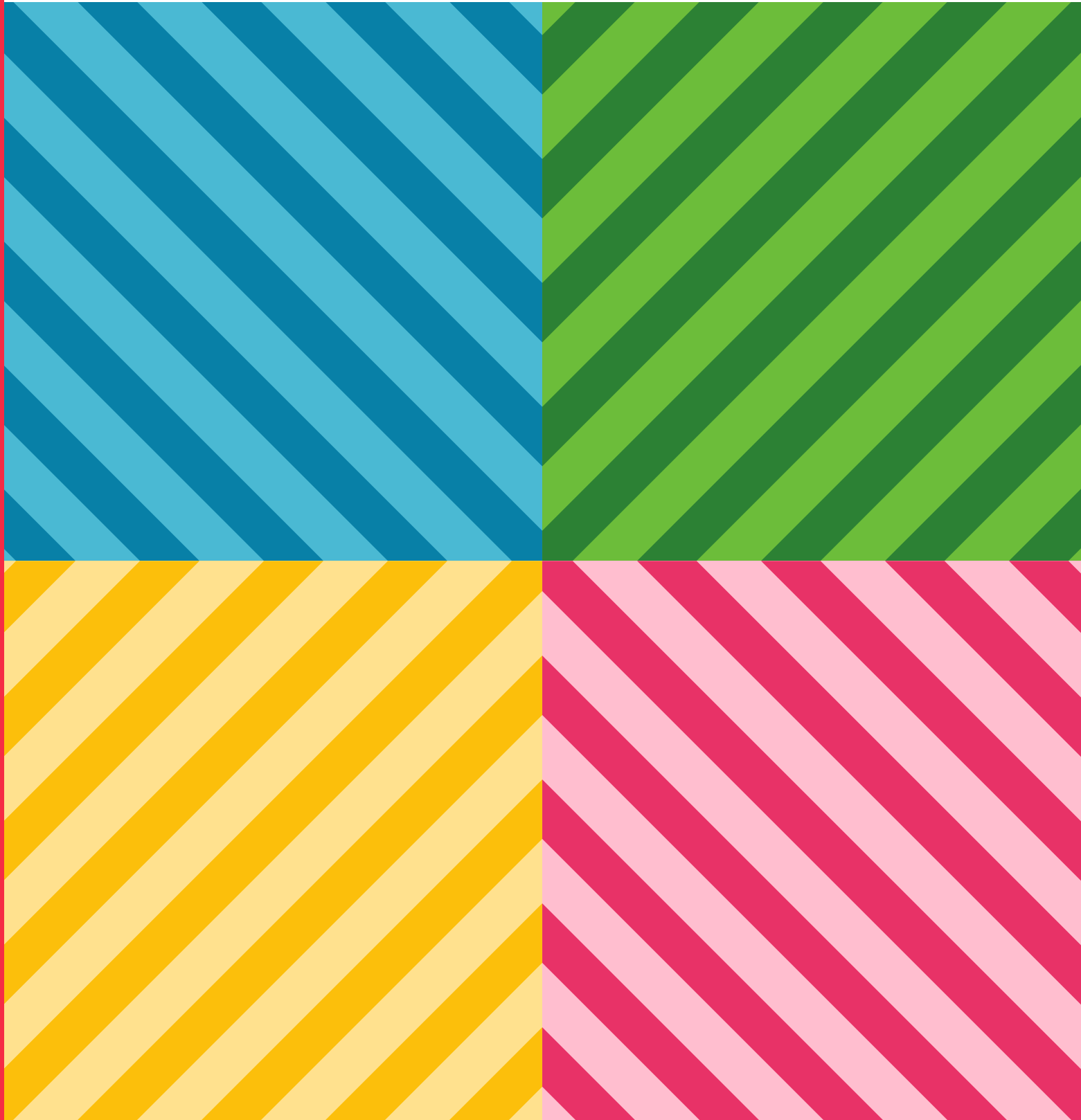# Secure Futures

PA

Bringing
Ingenuity
to Life.

Building a safe,
secure, sustainable
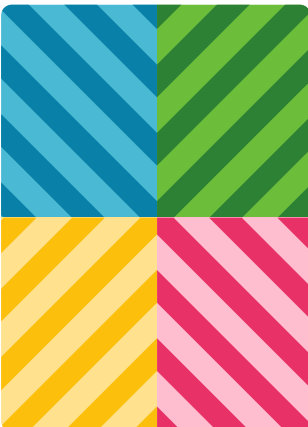future for all

Contents

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Our thought leadership

At PA, we believe that shaping global conversations is core to our purpose. Our subject matter and research experts bring inspiration and insight as, together, we tackle the world's toughest challenges and seize its greatest opportunities.

Secure Futures

What is a secure future?

Rapidly evolving threats and opportunities are changing the global security ecosystem, including (but not limited to): the climate emergency, increasing societal pressures, technological shifts, and the role of the space domain in security. Their importance has intensified over the past 24 months, alongside ongoing military and politic al turbulence. With complexity and risk set to increase, the pressure is on senior defence and security leaders to balance seemingly competing objectives and create a secure future.

A secure future is a future in which people feel safe, and live freely according to their values and aspirations. In this future, we acknowledge the uncertainties we collectively face, balance the security of present and future generations in a fair and sustainable way, and strive for continuous improvement and innovation.

Leaders will have to be mentally agile, comfortable with complexity, and able to find practical ways forwards despite ambiguity. Through collaboration, leaders can achieve connection over competition, impact over inputs, and delivery over theory. This will spark new perspectives, bold innovations, and confident results.

This report sets the scene for our Secure Futures series, a programme of insights, events, and conversations emphasising the importance of collaboration in delivering a secure future. It speaks primarily to future senior leaders who will shape security strategy, policy, and investment decisions in the next 10 years. Our findings, validated by senior security leaders at a roundtable in February 2024, result from in-depth research combined with the insights of over 70 security experts from all corners of the global defence and security landscape.

Nobody alone has all the answers, but through positive, integrated exploration and collaboration, we can navigate this new future together.

Guy Neale
Defence and security expert
PA Consulting

Safe, secure, sustainable

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A safe, secure, and sustainable future is the ultimate goal of an effective approach to national and international security. But, due to the evolution of major global shifts, creating this future has become more and more complicated.

The following major global shifts are placing new pressures on defence and security leaders:

- The climate emergency – including the impacts of accelerating climate migration, the direct impact of sea-level rises on populations and government estates, and the energy transition.

- Increasing societal pressures – stemming from shifting population dynamics due to factors such as aging and migration, and a changing relationship between government and society.

- Technological disruption – including quantum, artificial intelligence (AI), mixed reality, and synthetic environments.

- Space and security – considering space as central to critical national and international infrastructure, sparking the development of skills and systems.

All four shifts are interlinked, increasing their intensity and the speed at which leaders have to react. In this world of connections, collaborative and globally unified strategies reframe challenges into opportunities.

Drawing on combined knowledge and experience from across the breadth of defence, security, and the wider public sector, we explore five paradoxes that span the major shifts and introduce five solution areas for practical progress now. Exemplar case studies are featured throughout.

Five paradoxes to unlock opportunity

Psychologists and organisational scientists have found that people who embrace opposing demands are more creative, flexible, and productive. But, when preparing for major global shifts, and in the day-to-day running of their organisations, leaders wrestle with perceived paradoxes. These paradoxes, at first glance, force a choice. This binary, 'either or' thinking can heighten stress levels and obscure opportunities.

Building unified responses to shared challenges starts with holistic, not binary, thinking. By contemplating connections between perceived paradoxes, leaders can find unity in opposites and inspire new answers.

Current and future security leaders can shift from binary to holistic thinking across five key paradoxes:

- Paradox one: Focused + Broad
- Paradox two: Strategic + Tactical
- Paradox three: Global + Local
- Paradox four: Technology + People
- Paradox five: Autonomy + Protection
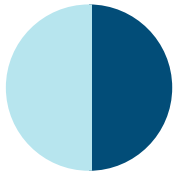
Paradox one: Focused + Broad

Priorities look very different at individual, team, organisation, national, and international levels. Pursuing focused goals can open doors to tackle broader aims, and addressing broad goals can alleviate focused challenges. How can leaders give enough attention to the core while meeting demand across a wide range of outcome areas?

The binary challenge

Security organisations with previously focused remits – such as an intelligence agency tasked with countering state threats – now tackle a much broader range of challenges from crime to climate change. With so many responsibilities, it can be tempting for leaders to optimise operations for either 'focused' or 'broad' goals.

The holistic opportunity

By moving from 'dancefloor' to 'balcony' perspective, leaders can see the interplay between areas and identify where to apply influence to drive change. This joined-up, systems thinking approach recognises and appreciates relationships and dependencies between priorities.

Sweden's Total Defence approach links societal values to defence, making it the responsibility of all those aged 16 to 70 living in Sweden to defend against the threat of war and, if necessary, support preparations for actual war. This obligation is called 'Total Defence Service'. It draws together every element of society, each with their own broad range of security outcomes and goals, to keep Sweden safe. The focused yet broad view empowers organisations and individuals to collaboratively defend the country, guided by accessible information including a 'What can you do?' leaflet. Now Sweden has joined the North Atlantic Treaty Organisation (NATO), the focus remains on Total Defence, protecting national resilience.
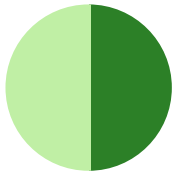
Paradox two: Strategic + Tactical

Underpinned by a strong overarching vision, deliberate tactical choices fuel the success of long-term strategy. How can defence and security organisations tackle issues in their own backyard, and globally, while battling split responsibilities, in-year challenges, and urgent requests?

The binary challenge

Addressing complex, systemic problems takes multi-generational, multi-year commitment – there is no single 'right way' forward. Strategic progress requires a longer-term view complemented by small tactical changes. Constant firefighting distracts from strategic forward-thinking, while squinting too far into the distance can scupper time-sensitive, tactical plans. During a roundtable event hosted by PA in February 2024, senior leaders across the UK security ecosystem identified the Strategic + Tactical paradox as particularly relevant, intensified by limited bandwidth, sub-optimal success measurement, and inefficient workforce planning.

The holistic opportunity

Taking small steps forwards today can deliver bigger impacts tomorrow, as shown in the world of elite sports, where every millisecond counts. This is the magic of marginal gains – accumulative improvements lead to monumental wins. It's also important to know when to take big strategic moves that enable smaller, iterative developments.

The Metropolitan Police Service Counter-Terrorism Command (CTC) has implemented a strategy of continuous, small improvements in areas ranging from intelligence gathering to community engagement. Innovative surveillance technologies, refined coordination between intelligence agencies, and trust-building community outreach programmes have all collectively enhanced the CTC's counter-terrorism efforts, showing how the magic of marginal gains can contribute to significant strides in national security.

Almost every organisation does some kind of future-oriented studies. But there's also a need to deal with the here and now, and build alliances and partnerships for today as well as in the future.

National security expert

We have innovative teams that think in the future space, but we struggle to protect them when things get really busy, and we don't always translate innovation into long-term strategy because we aren't sure how to get from the near-term to where we want to be.

Defence and security leader
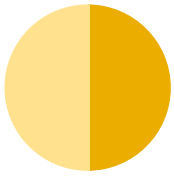
Paradox three: Global + Local

Organisations that accept the interconnectedness between global and local benefit from informed partnerships and combined expertise. So, how can leaders align real and perceived security postures – at system and individual level – to improve international security and local prosperity through levelling up and community growth?

The binary challenge

Viewing global and local issues as conflicting interests can lead to dangerous narratives of expansionism or isolationism. This is especially true in new domains such as cyber, the metaverse, and space – approaching these areas with a narrow mindset will curb potential for experimentation and innovation, and discourage collaboration.

The holistic opportunity

Almost all aspects of citizens' lives are internationally linked. Through a shared system view, leaders across the security ecosystem can understand how different groups effect important change. Rather than speaking about 'national interest' and 'critical national infrastructure', it's more valuable to consider wider benefits and interlinked infrastructure.

AUKUS is a landmark defence and security partnership between Australia, the UK, and the US that supports peaceful international order through collaboration. It reflects the unique trust and cooperation between the three countries, which are also linked through the Five Eyes alliance. The first AUKUS initiative is a collaboration on future nuclear-powered submarines for the Royal Australian Navy, promoting stability in the Indo-Pacific. By integrating science, technology, industrial bases, and supply chains, AUKUS will strengthen relationships, set shared goals, and enhance capabilities to keep people safe and secure.
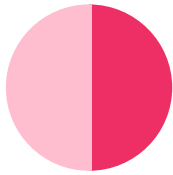
Paradox four: Technology + People

Technology and people can work together to achieve far more impactful outcomes than isolated technical or human effort. How can leaders augment human ability with promising new platforms and deeper data insights?

The binary challenge

The emergent technology space is crowded with conflicting narratives, from 'AI will change everything forever' to 'technology will never replace human creativity and emotion'. Investing purely in tech without considering the all-important people elements limits positive impact. As emergent technologies such as generative AI change current ways of working and living, binary thinking can fuel fear about adverse impacts such as unemployment and privacy concerns.

The holistic opportunity

The marriage of technology and people opens up a rich opportunity space characterised by human-to-machine teaming, augmentation, data-backed decisions, and reduced talent gaps as people shift to higher value tasks. Viewing the adoption curve of technology in a realistic, staged way aids sustained development.

Working with a national law enforcement agency, we're jointly exploring the use of communications intelligence to disrupt serious crime. Reimagining how the agency accesses and analyses criminal communications (specifically internet-based) requires skilled people, adapted processes, cultural change, and emerging technologies such as AI and quantum. We're helping the agency to address disconnects, build technical and operational capability, and share capabilities across government.

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We're still seeing the evolution of technology, and early adopters will reap the benefits. But it's not just about delivering the tech, it's about shaping the regulations for its use.

National security expert
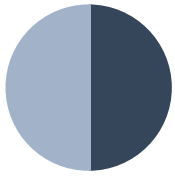
Paradox five: Autonomy + Protection

The relationship between citizens and security plays out across communities, nations, regions, and the world. In the right conditions, autonomy and protection exist in harmony. How can leaders foster positive, trusting relationships across a wide range of expectations that shift quickly in a crisis?

The binary challenge

While some citizens prefer total 'laissez-faire' autonomy and privacy, others expect protection from all shocks. Security leaders can face a false dilemma of choosing minimal intervention or overt protectionism. From a citizen perspective, this perceived chasm was reinforced by the COVID-19 'lockdowns' of 2020-21, when the need to protect society necessitated strict controls on public freedom and mobility. Additionally, leaked intelligence – including classified National Security Agency information publicised in 2013 – has revealed the existence of global surveillance programmes, creating nervousness about state infringement on peoples' lives.

The holistic opportunity

Autonomy and protection don't work in isolation. Achieving this balance means empowering citizens to take ownership of their risk posture and play an active role in matters of national security, contributing to goals that are close to their hearts. Systems that are 'secure by design' and 'secure by default' uphold personal freedoms and choices within protective environments. For example, driving lessons and tests create a controlled competency framework that protects drivers, road users, and transport infrastructure.

The UK government is incentivising the development of secure by design software, with effective cyber security practices and controls that enable people to use systems freely but safely. The approach, co-developed by the Government Security Group, National Cyber Security Centre (NCSC), and industry experts, reflects the government's strategic priorities to increase cyber resilience, improve data sharing between organisations, and promote a positive security culture in which cyber security is everyone's collective responsibility.

In a world of paradoxes, linear solutions will fall flat. By taking a holistic view, leaders can reframe apparent opposites into critical opportunities across a range of solution areas.

Five solution areas for practical progress now

All major global shifts – the climate emergency, increasing societal pressures, technological disruption, and the expansion of space as a security domain – call on security leaders to adopt a holistic, collaborative approach. Investing in five key solution areas can strengthen the security ecosystem, rethink regulations, and open a world of possibility.

1. **Take an integrated world view**
   Put collaboration first, embracing partnership approaches to whole-system change

2. **Communicate purpose, make it personal**
   Reconnect with citizens, build trust, and bring them with you as national security partners

3. **Unlock insight through the power of data**
   Use relevant knowledge and insight to enable better decisions

4. **Reimagine critical infrastructure**
   Reimagine critical national infrastructure in light of changing global dynamics

5. **Optimise the talent opportunity**
   Build critical cross-sector skills, harness aptitude, and scale

1 Take an integrated world view

Put collaboration first, embracing partnership approaches to whole-system change

As state and non-state adversaries stretch traditional security apparatus, and ideological, economic, and geopolitical tensions test international alliances, an integrated approach is vital. A single, shared understanding and awareness can move the needle in the right direction.

Alliances are familiar territory for parts of defence and security – examples include NATO and the International Criminal Police Organisation (INTERPOL). However, organisations can struggle to work together due to different and sometimes competing goals. Rarer still is when traditional adversaries come together, especially in times of state-on-state crisis, to respond effectively to shared challenges.

However, whole-system collaboration is possible, as demonstrated by ongoing cooperation on the International Space Station, the 35-nation ITER nuclear fusion project, and the crucial work of international aid agencies. Here, the high cost of failure and huge potential benefits incentivise collaboration. Identifying commonalities, with flexibility for different priorities, provides strong foundations for integration. Nudging and rewarding the right behaviours across ecosystems can help to eliminate barriers.

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The structures currently in place are not right for promoting accountability in certain areas. We build in more functionality and ability, and work in a joined-up way, but thinking in the long-term is almost indulgent. You don't get a chance to think about 'wouldn't it be great if'.

Security expert, Ministry of Defence

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Sweden's air force studied how Formula 1 teams achieved peak performance, including their 'pit stop' scenario. These learnings enabled Sweden's air force to make incremental changes to make the operational turnarounds for their front-line fast jets much faster.

Director of Defence Studies, Royal Air Force

CLIENT STORY →

Team Protect: Partnering to protect soldiers from new risks

In 2022, Leonardo UK, Leidos UK, Marshall Land Systems, and PA created Team Protect, a defence and security consortia that agreed a systems integrator contract with the Ministry of Defence (MOD) to deliver Project CRENIC. The project develops new capabilities to keep soldiers safe from remote and radio-controlled Improvised Explosive Devices (IEDs), representing a move from a transactional relationship between the MOD and industry to one of collaboration and trust. To date, 110 UK businesses have joined Team Protect – over half operate in the innovation space, demonstrating enthusiasm and engagement from forward-looking, opportunity-focused organisations.

WeProtect Global Alliance: An integrated approach keeps children safe

WeProtect Global Alliance brings together over 300 governments, private sector entities, and children's charities, as well as intergovernmental organisations, to develop policies and solutions to protect children from sexual exploitation and abuse online. Its purpose and mission to protect children transcends regional and organisational differences, allowing the development of a broad range of tactics. This higher purpose enables the Alliance to create a whole picture of worldwide threat assessment and protect children from online harms.

CLIENT STORY →

The UK Ventilator Challenge: Collaboration saves lives

During the COVID-19 pandemic, integration and collaboration powered the provision of 30,000 life-saving ventilators in just eight weeks for patients all over the country. This led to a six-fold increase in the number of ventilators available in the UK. A feat of this scale was only possible by integrating teams, departments, sectors, and nations. Working with organisations across the public and private sectors, our multi-disciplinary teams drew on the design and logistical expertise of ventilator manufacturers and industry partners including Ford, Rolls Royce, and aerospace company Meggitt. To achieve our shared goal to save lives, we sourced 40 million ventilator parts from 21 countries during unprecedented supply chain disruption. Testing organisation MD-TEC provided rapid, robust tests to secure regulatory approval. We then distributed ventilators to hospitals nation-wide, training thousands of medical professionals on their use.

Navigating the major shifts through an integrated world view

The climate emergency demands a new kind of collaboration grounded in necessity, not choice. The annual Conference of the Parties on climate change (COP) represents a willingness of countries to engage in joint conversations and strategies – a record number of 80,000 attendees at COP in 2023 made it the largest UN climate summit ever. However, greater integration is needed to turn intent into action.

Viewing technological disruption as an arms race between nations reinforces combative interactions and places a blanket of tension over international relationships. A different perspective, grounded in collaboration and skills-sharing, will improve government and organisations' ability to use tech to genuinely benefit citizens. Building ethics frameworks and guardrails for AI-infused systems is especially important.

Increasing societal pressures call for new attitudes. The movement of people across borders and oceans fundamentally challenges outdated concepts of 'us' and 'them' as people become less defined by their country of origin.

Integrated approaches are key to ensuring space remains neutral, particularly as nations set their sights on other planets. NASA's Artemis programme, for example, quite literally aims for the moon. An integrated view sees this as a positive leap for humankind rather than a space race. Underpinned by the incentive to get things right in a high-risk environment, space collaboration achieves great things at lower cost and effort than sovereign capability alone. Space blocs, such as the European Space Bloc, demonstrate enthusiasm and ability to drive investment and innovation.

'No regret' actions for leaders

To take an integrated world view:

- Focus on common purposes to gain commitment and support from all parties. Research potential collaborators in advance to aid collaboration based on similarities rather than differences.

- Build capabilities to enable architectural design and systems thinking, understand interdependencies, and optimise response actions to maximise whole-system benefit. Work collaboratively with partners to test and analyse responses.

- Design systems that enable appropriate, secure data-sharing to understand the whole-system impact of approaches to global shifts.

Taking an integrated world view can create ecosystems where collaboration is the norm, partnerships are prioritised, and global crises are treated as exactly that – global, and shared. By working with global partners for mutual gain, organisations and people can answer challenges more effectively.

2 | Communicate purpose, make it personal

Reconnect with citizens, build trust, and bring them with you as national security partners

Citizens play a key role as security partners; knowingly or otherwise, they can strengthen or undermine security efforts. Citizens operate in different communities and sub-communities, with personal priorities and purposes. And they use a range of different communication channels, including social media sites that may not always emphasise the positive purpose of security organisations.

Finding commonalities between citizen communities is no easy task, particularly as governments and security organisations increasingly use AI, machine learning, and large datasets.

Our recent AI pulse survey found that over half of US consumers (58 percent) don't trust the US government with data that might be used for AI. This demonstrates the need for trust between citizens and leaders around how decisions are made.

When citizens are bought into a core purpose, and organisations, nations, and global alliances take action to fulfil it, all parts of society pull together to create a secure future.

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There is a need for ongoing work on communicating with the public about risks and emergency preparedness.

Cabinet Office representative

CASE STUDY →

SGSecure: Citizens strengthen national security

Singapore's SGSecure movement seeks to address terrorism threats to the country – primarily online self-radicalisation and youth radicalisation – by sensitising, training, and mobilising Singaporeans to play a part in prevention. Since 2016, the SGSecure movement has raised public awareness of the terror threat, and boosted institutional and individual readiness. According to a 2019 survey, the campaign led to a 91 percent awareness rate among Singaporeans, and a 75 percent confidence level in responding to a terror attack. In July 2023, the Singaporean Ministry of Home Affairs (MHA) introduced the next phase of the SGSecure movement. This phase, titled What's Your Role?, encourages Singaporeans to play an active part in safeguarding society.

Navigating the major shifts through purposeful, personal communication

The climate emergency is already impacting communities across the world, especially in the global south, where drought and flooding challenge local livelihoods.

Disruptive technologies, including new ways to interact with citizens, necessitate charters of trust and transparency. The growing number of touchpoints between citizens, corporations, and conglomerates across the world also increase the potential for data sharing, emphasising the need for thoughtful digital interactions.

Societal pressures, particularly the influx of different nationalities, can cause tension between new and existing citizens. Understanding the shared priorities of different citizen communities can help to ease tension, finding commonalities. By demonstrating that they are a force for meaningful good, aligned with citizens' personal concerns, security organisations can strengthen relationships with the people they protect.

Due to the many crucial applications of satellite-sourced data, space is a critical investment area. Purposeful, personal communication can help citizens understand the benefit of this investment, and how space-based infrastructure supports a safe, secure, sustainable future.

'No regret' actions for leaders

To communicate purpose and make it meaningful:

- Understand public priorities to find the golden threads that align citizens and other stakeholders, bringing them together to achieve the same purpose.

- Trust citizens to understand complex messages, considering how to bring them into decision-making and planning to support a whole of society response to shared challenges.

- Substantiate goals with metrics, celebrating successes and telling positive stories.

In a future where purpose is communicated in a personal way, security leaders maintain a moral licence to operate on behalf of society. They tackle challenges close to citizens' hearts. As a result, citizens understand the work that organisations do to make the world a safer place, and are less resistant to share personal data due to an awareness of how it is used. This increases trust and confidence, capturing positive citizen energy for the benefit of all.

3 Unlock insight through the power of data

Use relevant knowledge and insight to enable better decisions

As nations and organisations increasingly deliver towards common security goals, the need to share and combine insight is vital. This requires good tooling, confident data handling, strong data interpretation, and a rebalanced approach to intelligence risk. The most data-driven, digitally mature organisations adopt an experimental, curious attitude, investing in new systems and skills. Achieving maximum benefits from data insights relies on skilled data analysts and correct user judgement. Embedding in these capabilities alongside new tech is paramount.

Sharing data, particularly personal data, presents dilemmas. Citizens regularly consent to give personal data to private companies – often in return for online services – but their attitude towards security organisations can differ. Nevertheless, security leaders will increasingly rely on citizen data to feed AI and quantum systems that enhance decision-making. How can organisations build trust with data subjects? Where does responsibility lie for inaccurate decisions? And, where harm is deliberately caused by nefarious actors, how can risks be reduced? These questions call for whole-system collaboration before data is even shared, unlocking global common good from datasets while protecting privacy and autonomy through purposeful, transparent, open source approaches.

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When thinking about the value of data and AI adoption, the real issue is that the underpinning data is such a mess. Another big issue is that senior leaders now don't necessarily understand the detail behind the headline terms. The younger people, as digital natives, have these skills, but they aren't appreciated. There's a generational and technological AI and digital gap.

Director of Defence Studies, Royal Air Force

Trafikverket: Data insights keep transport on track

Within the Swedish Transport Administration (Trafikverket), transport planners, politicians, and officials rely on forecasting models to get critical decisions right. A fusion of data insights, analytics, and IT help to forecast population needs and behaviours, and the impact on transport planning. The forecasting models, recently upgraded in partnership with PA, assess the value of infrastructure investment, including potential customer benefits such as shorter travel time, lower costs, reduced carbon emissions, and fewer traffic accidents.

CLIENT STORY →

The Ministry of Defence: Quantum-powered decisions for safer societies

The UK's Defence Science and Technology Laboratory (Dstl) aims to advance UK security capability through innovative science and technology. Partnering with Dstl and the MOD, we're defining opportunities for quantum computing to address global challenges in two key areas – communications assets for a resilient network, and resource optimisation. Our hybrid solution used a classical computer for data formulation and presentation, with calculations made using quantum techniques. This allowed MOD users to produce a range of possible cross-sector applications to improve decision-making, reduce risk, optimise resources, and maximise citizens' safety.

Navigating the major shifts through the power of data insights

Data insights, especially when shared between nations and entities, can help to map changes in our environment at a granular and global scale. These insights can also chart and predict climate migration and the impact of global warming on health.

Societal shifts are monitored and managed through a huge swathe of different data sources, helping to pinpoint areas where additional or different resources and services are needed to meet evolving population needs. In healthcare, for example, developing health conditions can be proactively prevented based on data about related conditions in specific geographies.

Advanced technologies can help to understand and navigate evolving situations. AI can make intelligent predictions, while digital twins show likely impacts on real-world systems or assets. However, there are risks. Generative AI creates outputs by amalgamating old content, prompts, and learning, but its outputs aren't always correct. To be effective, these tools need high quality training data. Data protection law mandates how long personal data can be held, and requires there to be a legitimate purpose for retention. But what is a legitimate purpose? It doesn't take a data scientist to see the need for tighter definitions.

Data from space is predicted to increase 14 times over the next decade. Position, navigation, and timing (PNT) services – the most well-known is the US Global Positioning System (GPS) – underpin all digital location and timing services. Satellite communications connect people and things outside of standard terrestrial telecoms, including ships, aircraft, and land-based assets in remote places, disaster zones, and areas of conflict. They also provide a back-up for terrestrial services. Earth observation data informs global and local decision-making across defence, climate, disaster management, and more, presenting a huge opportunity to improve lives. Using earth observation data in African irrigation strategies could save 176 billion cubic metres of water per year, representing a $880 million reduction in water abstraction costs. The benefits of sharing data in the right way are boundless.

'No regret' actions for leaders

To unlock insight through the power of data:

- Explore new technologies such as quantum and AI and create a roadmap for adoption, collaborating across supply chains to speed growth.

- Design robust infrastructures, security models, risk protocols, ethics frameworks, and governance for trustworthy data-sharing and experimentation.

- Attract, retain, and train in-house data science experts while upskilling existing employees.

If the world was a forest, data would be the mycelium layer below the surface, transmitting information and alerting organisms to threats. When data is shared, exchanged, and properly managed, the ecosystem thrives. Careful cyber controls and data privacy frameworks will protect the ecosystem, rooting out potential risks.

4 | Reimagine critical infrastructure

Reimagine critical infrastructure in light of changing global dynamics

Critical infrastructure (CI) includes the chemicals, civil nuclear, communications, defence, energy, water, finance, food, government, health, space, transport, and emergency services that are fundamental to the effective and safe running of society.

Most CI elements are impacted by global dynamics beyond a single nation's control. While the recognition that CI is dependent on global dynamics isn't new, the speed of evolving shifts calls for new thinking. Alongside the major global shifts, political factors are deeply impacting supply chains. The war in Ukraine has highlighted the vulnerability of national energy supply, as well as fragility in food and water supply.

Energy demand from emerging economies is growing, and energy production is steering towards renewables, nuclear, and national or at least regional self-sufficiency.

The UK government's description of critical infrastructure includes essential workers – could this be expanded to include new, diverse skills needed to design, build, and operate advanced data-driven tools and technologies? Should these tools themselves be considered critical infrastructure? In a connected world facing shared challenges, the definition of CI, and the components within it, require a rethink.

JoeySat: Better connection, for everyone

Nicknamed 'JoeySat' for its ability to beam-hop between different coverage areas like a kangaroo, OneWeb's satellite will improve broadband internet connectivity from space by adapting rapidly to changing user demand. The satellite was developed with £52 million in funding from the UK Space Agency, awarded to UK satellite technology firms through the European Space Agency's Sunrise Programme. Communicating the purpose of the new satellite, UK Space Agency CEO, Dr Paul Bate, said: "OneWeb's JoeySat will be a game-changer for satellite communications, offering the chance to improve people's lives through reliable connectivity, whether that means better broadband services in remote places, or the ability to respond more effectively to emergency situations."

Navigating the major shifts by reimagining critical infrastructure

The results of climate change, including extreme temperatures, flooding, and storms, impact critical national and international infrastructure in various ways. This includes damage to physical assets, disruption to food and water supply, and new migration patterns. As stated in the 2023 Institute for Civil Engineers (ICE) report for infrastructure owners and operators, interconnectivity between systems can support an effective response through shared data, knowledge, and resources.

Population dynamics provide challenges and opportunities to national prosperity. Over the last 30 years, Europe has experienced the most consistent acceleration and largest scale of immigration globally. Scaled immigration requires changes in CI across health, transport, finance, housing, and other citizen services to meet the needs of diverse societies without prejudice or obstruction. By 2050, urban populations will double in size, at which point seven in ten people will live in cities. Other demographic changes, particularly ageing populations, call for an equitable approach to citizen services (such as online medical appointments), retaining offline options for less digitally literate people.

Technology and data can help leaders understand how today's CI decisions will impact future generations. Data can help to make unknowns known through real-time location data, space-based data, and global commodity supply and demand data already embedded in the finance industry. Fed by new and existing data, digital twins replicate complex systems such as power plants to predict the impact of macro and micro factors on CI. AI can assist CI decisions now and for the future, flagging risks and mitigations. Large Language Models (LLMs), appropriately trained with good data, have the potential to support equitable, balanced CI decisions. Global partnerships and alliances can enhance data sharing and predictions.

In space, new low-orbit satellites connect previously remote or underserved areas, and gather earth observation data to inform civil applications. While the deliberate destruction of satellites is deterred by the likelihood of aggressors also damaging their own assets, aggressors can intercept radio frequency signals or push satellites into other orbits, effectively decommissioning them. This emphasises the importance of defensive systems and protocols. Redefining CI to include space-based assets could accelerate regulation to keep space safe and secure.

'No regret' actions for leaders

To reimagine critical infrastructure:

- Understand how global dynamics do, and will, most impact CI, collaborating with partners to create win-win, allied relationships.

- Use data and technology including AI, digital twins, and computer-based human decision-making tools to support CI design and investment decisions.

- Consider new sources of data and insight as CI themselves, for example space-based data infrastructure and data modelling tools.

The connected challenges faced by nations across the globe suggest it's time to think more holistically about CI, taking an international infrastructure view that reflects the interplay between shared technology, data, people, and skills.

5 | Optimise the talent opportunity

Build critical cross-sector skills, harness aptitude, and scale

All organisations face a talent squeeze. Entities that keep people and nations safe are no exception. Across security-focused organisations, this has not been helped by outdated recruitment strategies, strict vetting procedures, prescriptive career paths, and a 'one way door' for leavers. Narrow perspectives lead to narrow answers – when challenges are diverse and fluid, the teams who pre-empt and respond to them must be too. This means bringing in different voices, and sharing knowledge and skills.

By re-assessing vetting procedures, clearances, and screening, recruiters can look beyond traditional talent pools and gain access to niche skills, language abilities, and cultural understanding. Another key and currently underutilised way to address the talent challenge is using technology to augment teams. Better incentives for tech-savvy, purpose-driven, flexibility-focused recruits will help to attract great talent.

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Sharing expertise is not encouraged because of the focus on rewarding short-term operational goals and territorialism.

Security expert, national defence organisation

CASE STUDY →

CYBERUK: Collaboration bridges the cyber talent gap

To address tech skills shortages, 150 organisations across the public and private sector participate in CYBERUK. As the UK government's flagship cyber security event, hosted by the National Cyber Security Centre, CYBERUK convenes over 2,000 cyber security leaders and professionals to support knowledge exchange and collaboration. As part of the scheme, cyber-savvy graduates can find out about placements and choose where they best fit in the ecosystem.

Navigating the major shifts by optimising the talent opportunity

The climate emergency has added a new dimension to the talent puzzle. People expect their employers to take a stance on environmental and social issues, demonstrate progress against benchmarked goals (as in the MOD's sustainability strategy), and empower their employees to have a positive impact.

Societal shifts can create larger, more diverse talent pools. Attitudes towards older employees are improving, with many people extending their careers into their 60s. Refreshed vetting procedures and a focus on whole-life careers will provide diversity and resilience, cultivating broader perspectives and skills. The ability to dial up and dial down commitments will make roles more accessible while supporting retention. Unlocking the golden handcuffs so people can move freely within cultures of collaboration, for example through secondments, will aid cross-pollination and help to fulfil organisations' increasing responsibilities. Breaking down barriers to entry encourages a whole society response, capturing citizen engagement as direct contributors of talent, and also through citizen-led initiatives. An example is Bellingcat, an independent group of citizen investigators exploring topics of public interest.

Technological disruption can alleviate talent gaps by augmenting human workers, shouldering selected decisions and admin tasks. Trained decision-making systems, underpinned by predictive analytics, can free up human power for critical, high-value tasks. Upskilling employees will improve comfort and confidence with new systems, platforms, and responsibilities. Individuals who want to work on the latest, greatest innovations in fast-paced environments are likely to be drawn to the private sector, while those driven by purpose may feel more aligned to security-related roles. So, there's a need to recognise the importance of tech adoption as a route to attracting the right talent, and articulate how technology can fuel purpose.

As space becomes more critical to national security, there's a need to source recruits with a strong knowledge of space-based systems and technology. NASA's STEM investment programme is an example of how upskilling initiatives identify and connect with potential recruits.

'No regret' actions for leaders

To optimise the talent opportunity:

- Cultivate collaborative, flexible workplace cultures to enable secondments and talent sharing, allowing employees to leave and rejoin without negative repercussions.

- Consider how vetting processes could be streamlined or softened for certain roles.

- Establish the right HR structures for genuine strategic workforce planning, informed by horizon scanning, to support agility in unpredictable times.

A personalised, flexible approach to recruitment and retention will incentivise and empower current and prospective employees, diversifying talent, experience, and the outputs they deliver.

The value of collaboration

Keeping societies safe, secure, and sustainable in a world of major global shifts relies on joint exploration and collaboration.

To turn imminent threats into opportunities now, it's incumbent on current and future leaders to:

1. Take an integrated world view
2. Communicate purpose, make it personal
3. Unlock insight through the power of data
4. Reimagine critical infrastructure
5. Optimise the talent opportunity.

Taking true advantage of these solution areas and the benefits they bring to society means moving from binary to holistic thinking. This integrated, connected approach is already part of the DNA of organisations across the world.

A secure future isn't a perfect future – there will always be challenges. In a secure future, uncertainty is accepted, risk is mitigated, and gaps are closed before they are exploited by adversaries. Societies continue to build and level up, and citizens are empowered to contribute to meaningful issues with autonomy and choice. Achieving this future relies on imaginative, integrated initiatives and deep connections strengthened by shared goals.

Our Secure Futures series is developed for, and with, the global security community. We invite you to share your feedback on the priorities for investigation, and join us as we continue to explore the practical creation of a secure future for all.

How we can help

Since PA was founded in World War II, we've been at the centre of defence and security innovation. Our experienced industry professionals and leaders build innovative systems and solutions that transcend traditional boundaries, bringing new ideas and bigger perspectives.

Underpinned by our unique cross-sector outlook, we help clients navigate new shifts by:

- Understanding whole-system thinking and activation, mobilising high-impact operational collaborations

- Embedding digital and data to inform decision-making and prioritisation, keeping nations safe in a digital world

- Applying deep scientific and technological knowledge to develop tech-enabled, science-based solutions for real-world scenarios

- Maximising value and sustainability in end-to-end supply chains

- Enhancing talent acquisition and retention strategies through people and change expertise

- Delivering excellence and innovation through complex programme delivery.

To learn more about how we can tackle complexity through collaboration, contact SecureFutures@PAConsulting.com.

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to build a positive human future.

As strategies, technologies, and innovation collide,
we create opportunity from complexity.

Our diverse teams of experts combine innovative
thinking and breakthrough technologies to progress
further, faster. Our clients adapt and transform,
and together we achieve enduring results.

We are over 4,000 strategists, innovators, designers,
consultants, digital experts, scientists, engineers,
and technologists. And we have deep expertise in
consumer and manufacturing, defence and security,
energy and utilities, financial services, government
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and transport.

Our teams operate globally from offices across
the UK, Ireland, US, Nordics, and Netherlands.

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