UK Defence & Security Exports

Border Security

An introduction to UK capability

Part of

Department for Business & Trade

Contents

Executive Summary

One of the first responsibilities of government is to protect and safeguard the lives of its citizens. To do this, countries must balance their security needs with the need to maintain the legitimate flow of people and goods across their borders.

In a globalised world, the continued increase in the number of these movements poses new challenges for border security organisations. This is in addition to the existing challenges posed by rising levels of migration, whether from war, climate change or economic conditions. The increasingly sophisticated cross-border criminal activity and the threats posed by terrorism also need to be addressed.

To achieve this new equipment, procedures and strategies will be necessary, but this cannot be done in isolation. Cross-border cooperation, along with alignment of strategies and capability between neighbouring states is also required.

The aim of this brochure is to introduce potential customers to the UK's diverse range of Border Security capabilities, as follows:

- Protection – Perimeter protection, both physical and electronic, and the provision of equipment to enable border agents to carry out their duties effectively
- Observation – Employing surveillance, monitoring and situational awareness.
- Detection, Identification & Tracking – Deploying assets that can evaluate and classify potential threats and then locate and track them
- Response – Equipment to engage with and stop targets
- Investigation – Comprehensive and accurate investigation and evidence gathering/cataloguing tools
- Command, Control & Communication – Mission-critical communications devices and networks and tools to facilitate information and intelligence sharing
- Training, Capacity Building & Contracting – Delivery of classroom training, exercises, and validation to enhance the capability of officials
- Services – The full range of expert services including areas such as risk management, audit, design, analysis and research

Each capability area is complemented by case studies that illustrate the range of products and services that can tackle these complex problems. At the end of this brochure, you will find further information on how UK Defence & Security Exports can link you to appropriate UK expertise, including resources and contact details.


PASSPO

A Forward Look – Industry

Tony Smith is Managing Director of Fortinus Global Ltd, and chair of the International Border Management and Technologies Association (IBMATA). He is a former Head of the UK Border Force, and previously Head of Ports and Border Management for Canada. Here, he offers his industry view on the future of border security.

Border agencies around the world will come under increasing pressure over the next century as we travel more. If the growth in air travel returns its pre-pandemic rate, this will mean double the number of passengers over the next 20 years, with the volume of cargo quadrupled by 2050. There is a 70% chance that the global population will rise from 7 billion today to 11 billion in 2100.

Migration is a challenge for many countries around the world. The United Nations predicts that 2.2 million migrants will seek new homes in new countries each year between now and 2050. Meanwhile the huge growth in international e-commerce is placing unprecedented pressure upon customs agencies who are struggling to cope with the sheer volume of cross-border consignments.

The pressure to emigrate from poorer to richer countries has never been greater. Instability in some parts of the world will also continue to fuel the number of globally displaced persons seeking refuge elsewhere. International organised criminal gangs will continue to try to exploit weaknesses in border security, including trafficking in human beings, smuggling dangerous and prohibited goods, and facilitating terrorist travel.

To cope with such demands, it is vital that border agencies around the world invest in strategies, technologies and processes that will facilitate the legitimate flow of people and goods across their borders. This support to economic growth must simultaneously prevent and disrupt harmful and non-compliant movements and protect the security and well-being of the local population.

Such pressures mean embracing the three key principles of modern-day border management:

a) Multiple borders strategy, whereby transactions to check goods and verify identities take place away from the physical border and preferably upstream to ease the passage of passengers and freight at ports of entry and exit

b) Integrated border management, which ensures that data is captured as accurately and as easily as possible (via a single window) and is interoperable so that it can be shared across multiple departments and agencies for intelligence-led risk assessment.

c) End-to-end identity, where identity is validated prior to travel and transmitted to ports of arrival for biometric validation. The concept of "identity" could apply to those goods that are secured, sealed and tracked from point of loading to point of unloading.

These principles must be underpinned by an effective perimeter strategy that inhibits the unlawful entry and exit of people and goods by unauthorised routes.

On the need for a multiple borders strategy, public expectations of mass transport solutions will be framed around improvements in 'seamless transport' so that international journeys can proceed without interruption. This will require closer integration and coordination across infrastructure, transport providers and borders, demanding increasingly automated systems, rapid data analysis and secure data management.

Future risk assessment models will incorporate not just immigration and security credentials but health credentials too. Of course, any effective border security strategy must take account of the relative geo-political circumstances of the country concerned. Specific responses will vary between air, maritime and land border entry and exit points and the management of the border zones between those points.

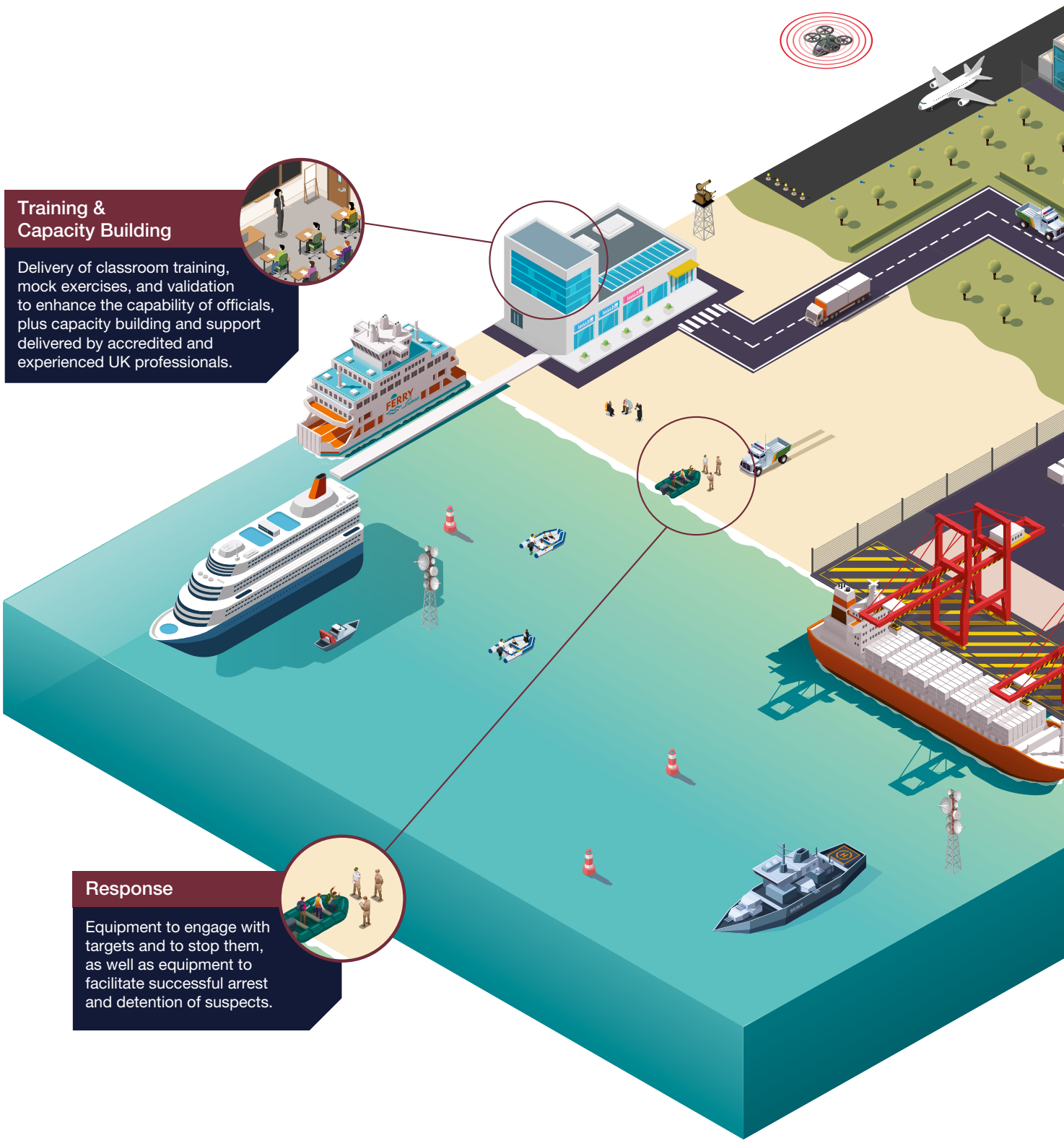
Ongoing developments in miniaturisation will enable vast networks of sensors to monitor areas or points of interest and detection of chemical, biological, radiological, nuclear or explosive agents. It is likely to become increasingly difficult for individuals to avoid the sensor and device-derived network of the 'Internet of Things' as technology advances.

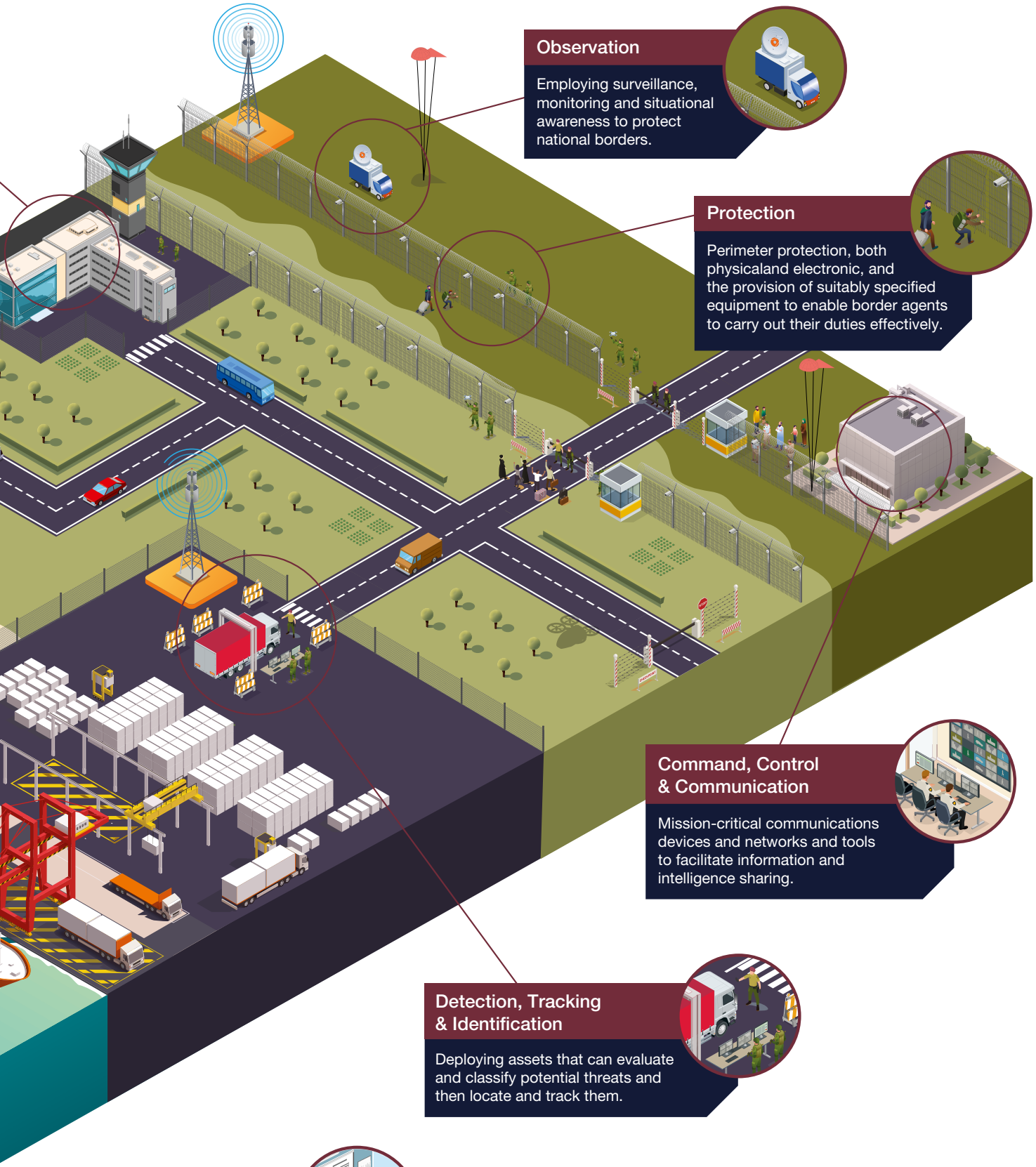
Additionally, sea lanes will also continue to play a key role in the global economy as a significant amount of the world's economy depends upon maritime trade. The collective challenges of illegal migration, criminal and terrorist activities that exploit the relative freedom of the seas to conduct their activities all present threats to border security.

Regarding the progress being made in using digital and biometric data to verify the identity of individuals in advance of travel and the authenticity of goods as they pass through distribution channels, anonymity and obfuscation will be increasingly difficult to maintain. This will enable smoother cross-border movement for the majority of people and enable more straightforward transportation of goods that have been verified to be legally compliant

Overall, this means that embracing best practice in international border management and innovation will be necessary if countries are to deliver borders of the future that can withstand these evolving challenges in the landscape.

Border Security





Observation

Employing surveillance, monitoring and situational awareness to protect national borders.

Protection

Perimeter protection, both physicaland electronic, and the provision of suitably specified equipment to enable border agents to carry out their duties effectively.

Command, Control & Communication

Mission-critical communications devices and networks and tools to facilitate information and intelligence sharing.

Detection, Tracking & Identification

Deploying assets that can evaluate and classify potential threats and then locate and track them.

Services

Expert services available to overseas buyers including risk management, audit, design, analysis and research to support better border security outcomes.

Protection

Protection

Given how porous these environments are, the maritime domain poses challenges for island nations and those with extensive coastline. It is crucial that the core elements of the maritime border security environment are protected. This includes commercial ports, offshore facilities, harbours and naval bases.

In the air, systems that enable early identification and geolocation of Unmanned Aerial Vehicles (UAVs) engaged in hostile, disruptive, disabling or intelligence-gathering actions as well transporting illegal goods across borders are also required.

The nature of diverse terrain, extreme climatic conditions on land and in the maritime environment and the wide variety of threats that can be encountered place demanding requirements on deployed security forces themselves. These span routine patrols to intelligence-led responses, including the possibility of hostile action. In order to work safely, security personnel require adequate protective clothing, hardened vehicles, agile maritime craft and suitable response capabilities to maximise their effectiveness in tackling criminal activity.

On land, hard physical access control measures include hostile vehicle mitigation (HVM) using bollards, gates or barriers, blast protection screens and smart fencing as part of perimeter and compound security are also essential elements of a secure border. In order to provide a complete unbroken system cameras and opto-electronic detectors that enable tighter and more effective security, matched with ruggedised night vision devices for personal, vehicle-mounted or long-range border surveillance equipment are also required. In terms of more advanced solutions that can reduce the burden on security staff, machine learning systems and virtual tripwires to monitor sanitised zones in areas such as airports and rail and road crossing points can also be employed. These minimise false alarms and reduce the need for physical checks of remote or obscured locations by security staff.

Security forces must also be able to rely on their equipment to work faultlessly in the harshest climatic conditions, from body protection and equipment harnesses to tactical and helmet-mounted thermal imaging displays. Specialist designs of counter-improvised explosive device (C-IED) and electronic disruption technologies to provide protection to border security forces and first responders from IED threats must also be tried, tested and robust.

Physical Protection Case Study

Establishing robust physical protection is a crucial aspect of border security, particularly in areas that are subject to high traffic or in locations where illicit border crossings have taken place repeatedly in the past.

Following an agreement between the British and French governments to enhance border security, Barkers Engineering were engaged in the late summer of 2015 to introduce improved perimeter fencing and access points for the controlled area at Coquelles near Calais. This is the location of the continental railhead for the cross-channel link between the UK and France. Working with the French authorities and operator Eurotunnel to agree the design and specification of the solution, manufacturing of the system's components began in September 2015 and the enhancements were fully introduced by December of that year.

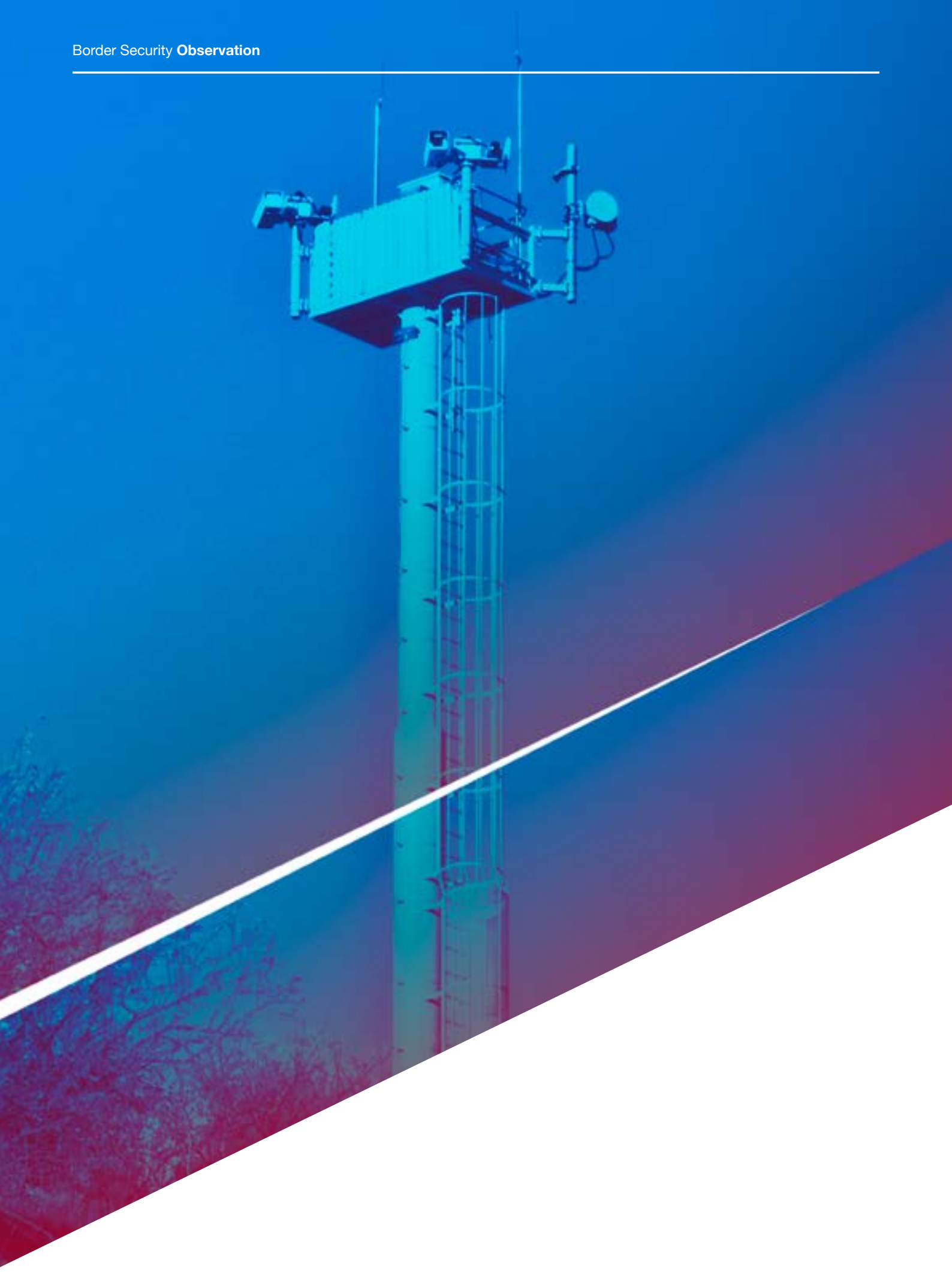
Established in 1861, Barkers Engineering is one of the UK's largest fencing manufacturers. The company's products, which include high-performance fencing, gates and railings, are accredited under the stringent BSI domestic standards as well as conforming to ASTM International standards. They have supplied solutions for clients across many sectors, including the UK's National Health Service, energy utility companies and rail providers.

Protective Equipment Case Study

Agents protecting borders can work in very hostile environments, including rugged mountainous terrain, deserts and in rough seas. They need protective clothing that is durable and suitable for both hot and cold climates, but which also has sufficient storage capability and offers sufficient flexibility so that they can carry out their roles effectively and efficiently.

The VAULT torso system by UK company Crib Gogh is an all-in-one solution designed to increase operator manoeuvrability and reduce trauma. It includes a protective helmet with flexible accessories, eye protection and tactical vests that can be paired with fully compliant integrated life preservers. These products are designed to work effortlessly together in a manner which enhances rather than inhibits the performance and function of each system component, whatever the operating terrain.

Crib Gogh Ltd is currently the only UK company that has achieved certification to NATO's demanding STANAG 2895 standard, and currently supplies its products to border agencies, law enforcement and military operators in Europe, Southeast Asia, India and the Middle East.



Observation

Observation

Effective observation has many different facets, from space-based surveillance, airborne assets, surface and sub-surface vessels to mobile land and river capabilities and static surface and underwater systems. Advanced solutions also involve systems that have the capability to make sense of intelligence gathered by multiple surveillance sensors, delivering real-time situational awareness that enables the targeted application of human and technical resources.

Surveillance of a country's land mass and its Exclusive Economic Zone is necessary to ensure its people are protected and natural resources are not exploited illegally. This can be delivered through an array of rugged, self-powered and cost-effective and persistent solutions to provide both overt and covert capabilities to build up and sustain situational awareness. Tied to machine-learning solutions, these systems can augment and enhance decision-making.

Maritime domain awareness can be generated from satellite-based remote-sensing technologies and airborne intelligence, surveillance and reconnaissance capabilities. Augmented by information from vessels, cameras and radar this enables governments to maintain security while increasing sustainability of ocean resources and the environment including monitoring and enforcement of marine protected areas to counter illegal fishing and assess compliance risks.

Coastal surveillance, often conducted in extreme haze or fog, is challenging however radars and optical sensors capable of withstanding hostile climatic conditions can provide surveillance of coastal areas and inshore waters. When linked with automated detection, tracking and identification capabilities the effectiveness of this surveillance can be enhanced. Unmanned surface vessels can also provide a persistent presence in a specific maritime area, without the added risk or cost associated with a manned vessel. Combined with surveillance architecture and solutions such as ultra-endurance hybrid air vehicles, fixed wing airborne intelligence, surveillance and target acquisition (ISR) assets or coastal helikites/aerostats they offer significant potential for cost-effective surveillance.

Land border surveillance typically requires powerful, long-range sensors and bespoke optical products to detect conspicuous activities, complemented by airborne assets and roving ground forces on patrol. New technologies including vehicle-mounted ANPR (Automatic Number Plate Recognition) and facial recognition systems, as well as networked body-worn cameras are now becoming available, as are next generation unattended ground sensors with tamper, seismic and tripwire sensors. Monitored centrally these technologies can enable security forces to monitor hundreds of miles of border simultaneously. Products such as rapidly deployable or permanently fixed helikites/aerostats, capable of staying aloft for weeks at a time are also beginning to appear. They can supplement traditional surveillance methods by acting as a virtual fence along a border as well as presenting a visual deterrent. Deployed in coastal locations or aboard ship they can also support maritime surveillance.

Affordable electromagnetic spectrum surveillance also plays an important part in delivering border security, such as countermeasures to protect airports from drones and flexible software-defined cellular surveillance and counter-surveillance capabilities. In addition, passive monitoring of satellite communications, whether space-based, aboard aircraft or mounted on UAVs can help maintain border security as well as support signals intelligence.

Observation Case Study

Effective border security relies on being able to observe vulnerable border areas 24 hours a day. Satellites and fixed-wing aircraft cannot always be tasked to perform this role and some locations are too remote for fixed installations to be installed and maintained. In such environments air vehicles with the capability to maintain a fixed position for extended periods of time can offer a suitable solution.

For example, Hybrid Air Vehicles Ltd designs and manufactures the flight proven, sustainable and efficient Airlander 10 hybrid aircraft. This offers a unique combination of low emissions, fuel burn, noise and operating costs, but with a high payload capacity of up to 10 tonnes, complemented by continuous airborne endurance of up to 5 days. It can carry multiple large sensors and mission systems to conduct persistent wide area surveillance so that even the most remote areas typically used for illicit border crossing and illegal activity can be readily observed.

With no need for a runway and with minimal dependency on infrastructure, Airlander 10 can operate continuously from the most rugged and harsh locations. With a common-core design that is scalable and adaptable the company can design future aircraft to meet specific civil and military security needs.

Hybrid Air Vehicles Ltd is a leading air vehicle developer in the quest for zero-carbon aviation, in recognition that sustainability is no longer a ‘nice to have’ but a global imperative. Their innovative Airlander products address this challenge while significantly enhancing multi-sensor airborne surveillance options via a modern technological solution to deliver extraordinarily cost-effective, conceptually proven lighter-than-air ultra-persistence.

Detection, Tracking & Identification

Detection, Tracking & Identification

Ports and airports continue to be targeted by organised crime groups who traffic illicit goods, often employing mules who are ignorant of what they are transporting. However, as screening capabilities improve these relatively crude methods are becoming less viable. Therefore, criminals are increasingly turning to the use of informal landing sites, particularly along coast lines and maritime borders.

Sensor systems are now available that can detect explosives and weapons before passengers pass through conventional fixed security screening areas. These sensors can be coupled with video monitoring systems that use machine-learning to highlight suspicious individuals. This allows security forces to screen people from a safe distance, effectively extending the security perimeter and providing additional time for responders to act.

Cargo and vehicle screening at border entry points require a high throughput to maintain the flow of people and goods. Innovative solutions combine X-ray and backscatter technologies to address threats, contraband and illegal immigration in both cargo and passenger vehicles with extremely low false alarm rates.

In areas that have large numbers of visitors, such as airports, high quality imagery is an essential element of the security portfolio. Able to cover large areas, CCTV systems can be linked with thermal imaging, radar and machine learning to highlight motion, alert operators and support effective decision-making. Drone detection is also a crucial capability, and the most sophisticated solutions provide a protective dome over a restricted area which includes automatic alerts and video tracking that overcomes the limitations of conventional ground/air surveillance radars and human spotters.

Increasingly identity verification is undertaken digitally, based on advanced passenger information system (APIS) and machine-read biometric data. This may be supplemented by digital seal, track and trace technology for goods in transit. This is helping create smart borders that simplify entry of legitimate travellers and goods while allowing officials to focus on higher risk traffic.

In the maritime environment, tracking of vessels is a crucial element of securing borders effectively. New machine-learning algorithms use vessel identification and monitoring systems to highlight unusual activity. This can be followed up by physical intervention from security forces to enforce border controls and ensure environmental protection. These systems also provide additional benefits such as preservation of maritime cultural heritage and the prevention of illegal salvage of wrecks and maritime sites.

The need to track law enforcement assets and personnel can be addressed through innovative surveillance solutions such as Iridium, GSM and radio frequency technologies. However, systems that are deployed need to be dependable and rugged because of the harsh and difficult environments in which they operate.

Contraband Detection Case Study

With many products entering countries in densely loaded containers, inspection that uses non-intrusive methods such as x-ray imaging are required in order to expose fraudulent goods and prevent threats being smuggled across borders. Given the number of high-traffic and congested environments in which they need to operate these systems also need to be capable of rapid deployment and maximum throughput in order to minimise delay to the legitimate movement of goods.

Rapiscan's Eagle M60 system can operate in a drive-through mode and was key in helping a Middle Eastern Customs Authority to address the problem of contraband and illegal goods entering the country through its borders. The system is stationery and drivers remain safely in their vehicles, proceeding through the tunnel created by the system's detector boom creating a high-throughput solution. The Eagle M60 also offers material discrimination, where scanned objects are colour-coded to show what substances they are made up of.

The company's imaging system can detect organic threats, contraband and smuggled goods. Its small footprint, manoeuvrability, and easy-to-interpret X-ray images allow operators to scan cargo and vehicles in space-constrained locations, delivering a versatile, effective screening solution. A West African country required an inspection system to help stem the flow of smuggled goods at a remote border. Given the location, space constraints and pedestrian traffic, they sought a compact system that could be safely deployed. The ZBV® mobile cargo and vehicle scanner can successfully detect concealed items such as elephant tusks, undeclared alcohol and stolen vehicles. Owing to its success and manoeuvrability, the Government redeployed the ZBV vehicle to one of its ports which, during a three-month period, scanned over twelve thousand containers resulting in 183 seizures and the collection of over $9m in revenue and fines.

Rapiscan Systems | AS&E is a global leader in cargo and vehicle inspection, helping governments, military, corporations, and law enforcement to secure borders, ports, and high-threat locations.

Bio-Security Detection Case Study

Today, biosecurity is one of the greatest issues of concern for border agencies. Having an elevated level of confidence in the health of passengers and travellers is of increasing importance when working to limit the spread of infectious diseases across national borders.

UK-based thermo-imaging specialist Thermoteknix Systems Ltd offers an elevated temperature screening and face mask detection technology called FevIR Scan 2 which supports this important activity. The system is helping to fight the spread of CoVID-19 and enabling borders and businesses around the world to reopen safely. FevIR Scan 2 offers rapid triage screening of individuals in high traffic pedestrian areas including airports and border crossing points. The face mask detection technology identifies individuals wearing a face covering, distinguishing them from those not wearing a mask or not wearing a mask correctly at temperature screening stations under various levels of ambient lighting. Comparable temperature-checking systems do not include mask detection and depend on high illumination of the subject for effective operation.

The FevIR Scan 2 system combines thermal and visual imaging cameras in conjunction with a blackbody temperature calibration unit. On-screen and audible alerts, as well as visible temperature tracking, rapidly identify individuals requiring further screening. Over 2,000 FevIR Scan systems have been deployed around the world in response to the Covid19 pandemic, and systems already installed are capable of being updated to allow for visual mask detection technology.

Thermoteknix Systems Ltd is a global technology leader in thermal imaging and night vision systems, having pioneered thermal imaging technology for more than 30 years. Thermoteknix first introduced elevated skin temperature screening systems in response to SARS in 2003.

Tracking Case Study

Monitoring of the marine environment is an essential aspect of controlling borders given that sea crossings are one of the primary routes for illegal migration. Governments and agencies including fisheries authorities, coast guards and naval units all require this surveillance capability.

UK provider OceanMind's system combines satellite data and artificial intelligence solutions for shipping & logistics. It enables effective management of access and approaches to ports as well as marine environment surveillance and provides confidential direct support, training and capacity building to governments and Inter-Governmental Organisations.

Their services include capacity building and training to optimise remote surveillance, intelligence gathering and patrol support, investigation into suspected non-compliance in support of prosecution, end-to-end support for effective case management as well as evidence preparation and testimony advice. OceanMind can provide cutting-edge technology for 'dark vessel' detection, automated tools for vessel compliance analysis with a real-time alert feed, a global database of current and historic vessel identity and fishing authorisations and technology assessments and training plus policy and regulation review and reform. Their solutions provide a cost-effective alternative to traditional enforcement methods.

They have successfully partnered on projects with governments around the world, including the UK, Thailand, Philippines, Chile and Costa Rica.

Identification Case Study

There is a rapidly expanding requirement for international air carriers to provide Advance Passenger Information (API) and Passenger Name Record (PNR) data to authorities at the destination, which in most cases is achieved today by border authorities carrying out assessments of the data provided by the passenger when checking in online. However, unless these passports are subsequently machine-read there is no guarantee that this data is accurate.

Zamna Technologies' 'Identity Rails' product enables data provided by passengers to be securely validated against known accurate sources in order to inform the airline carrier whether the passenger data is verified, accurate, contains errors or is previously unknown and so should be subject to further verification. Their proprietary software ensures that data accuracy and integrity can be checked, holding the data securely and flushes it from the system once a transaction is completed.

This system is currently in use by a major UK airline and has been proven to work at scale, having achieved one hundred thousand checks against sixty million passport sets. This innovative product is helping to inform the airline industry's development of the international 'One ID Initiative', which aims to develop a document-free journey based on identity management and biometric recognition that will be fast and accurate.

Zamna Technologies Limited was born out of academic research by Oxford University graduates and experts in cryptography, and now provides the world's first biometric & Application Programming Interface (API) validation platform for airlines & governments.

Response

Response

Drones are an increasing concern at both land and air borders, and in particular along the approach paths to runways. Comprehensive electronic disruption capabilities to mitigate these threats, using integrated systems employing radio frequency and optical disruption technologies that are capable of detecting, tracking, classifying & disrupting targets are now commercially available, as are various vehicle-based and hand-held wearable devices.

Other security issues which have raised levels of concern include IEDs aimed at causing harm and disruption at the pinch points that land borders represent. Countering threats from IEDs and remote-controlled explosive devices requires a range of technologies, including robotics, chemical residue detection and radio frequency jamming.

The threats emerging from the underwater environment can also go unnoticed as monitoring and intervention are often considered too difficult and too expensive to implement. However, as the use of autonomous vehicles for criminal activity becomes more commonplace this area demands closer attention in certain circumstances and environments. In order to tackle these threats effectively, solutions including communication and diver detection systems that use sonar arrays to detect and track underwater and surface security threats can be implemented at reasonable cost. In some locations increasing use of 'narco-subs' with unknown or undetermined destinations may necessitate an even more layered approach involving air, surface and sub-surface solutions to counter these emerging security challenges.

Forces responding to threats require reliable and secure end-to-end communication and sensor solutions. For example, the adoption of mobile ad hoc network (MANET) radios which offer advanced, scalable solutions that do not rely on a central network to operate. Sometimes known as 'on-the-fly' or 'spontaneous networks', these provide a secure voice, video and high bandwidth data network anywhere, uniting critical sensor and data sources in real time. Rapid response teams also require high quality situational awareness feeds comprising voice, video and sensor readouts throughout the chain of command, provided by quickly deployable, reliable broadcast communication systems.

Developments in radio frequency innovation can also provide solutions to bring moving targets to a controlled stop across the land, maritime and air environments, such as disabling the engine of a vehicle in a high threat situation. Directional radio frequency equipment to disrupt drones, unmanned ground vehicles and surface vessels is also available.

The increasingly challenging security environment is also introducing the potential for robotics to be used to tackle advanced threats. Robots are an appropriate fit for the toughest missions, where a new generation of agile robotic devices are available which can disrupt a broad spectrum of threats, from small drones to heavy vehicles.

In the maritime environment, in order to counter illegal fishing vessels, piracy, smuggling and terrorist or hostile boats, purpose-built arrest systems disable a vessel's manoeuvrability through an entanglement device. Deployable from boats or helicopters these provide a non-lethal solution to embargo-breaking surface vessels.

When boarding a vessel or making an arrest, law enforcement agencies increasingly rely on high-quality output, low power and secure recording equipment that enables them to generate large volumes of evidence. In addition, forces engaged in detaining suspects also require suitable protective equipment including body armour, rapidly deployable roadblocks, crowd-control apparatus and, in more hostile environments, non-lethal systems to prevent ambush. In each of these scenarios UK companies can provide a suitable solution.

Response Case Study

Coastal areas and estuaries are one of the most challenging environments for border security activity as they often lack sufficiently deep water for conventional vessels. Hovercraft offer an alternative solution as they can operate flexibly across both land and shallow water environments.

The UK's Griffon Hoverwork offers a range of solutions with their 2000TD model being the longest-running vehicle in their range, with over 50 sold worldwide. This craft has been deployed in South America and The Middle East as an effective counter to the smuggling of narcotics and other substances as well as aiding in rescue and medical operations. A fast, versatile and robust single-engine amphibious hovercraft, the 2000TD is capable of transporting 2000kg of payload at up to 35 knots over variable amphibious terrain; this equates to 18 passengers and stretchers.

Another advanced craft in Griffon Hoverwork's range is the electric diesel 995ED which offers precise maneuverability and a stable platform, providing just under 1000kg of payload and quick, direct and effective response. It operates at up to 30 knots over shallows, beaches and debris with 0.5m of hover height separating the hull from the surface. The craft uses two electric drives, giving the operator greater maneuverability and a tighter turning circle compared to rudders, whilst also reducing noise levels.

Griffon Hoverwork is a global market leader in the supply of custom hovercraft, having led the world in the design, manufacture and operation of these craft since 1956. The Company's purpose is to enable customers to operate in some of the world's most diverse and inaccessible amphibious areas, from the jungle rivers of South America to the desert coastlines of the Middle East and the vast tundra of the High Arctic.

Vessel Arrest Case Study

Once a vessel engaged in illegal activity has been identified the next challenge for border operatives is to slow and capture it. Drug smuggling operations in particular use fast vessels that are capable of speeds of more than eighty knots and can thus easily evade capture by slower vessels. Sophisticated solutions therefore need to be employed in order to counter their speed. Protecting certain areas from entry by unauthorised vessels is also key.

UK company RGES International Ltd offers tested and approved products that offer these capabilities, including their Vessel Arrest Launcher, Vessel Arrest Boom and Vessel Arrest Fence suite of products.

In order to stop larger vessels, the company's Vessel Arrest DHED (Displacement Hull Entanglement Device) can be deployed. These products can be used underway from boats and jet-skis or pre-anchored in a specific location to protect a sensitive area or secure zone. Whether the requirement is to detain individuals engaged in smuggling, terrorism, human trafficking, fishing illegally or other criminal activities, RGES International Ltd offers a range of safe solutions.

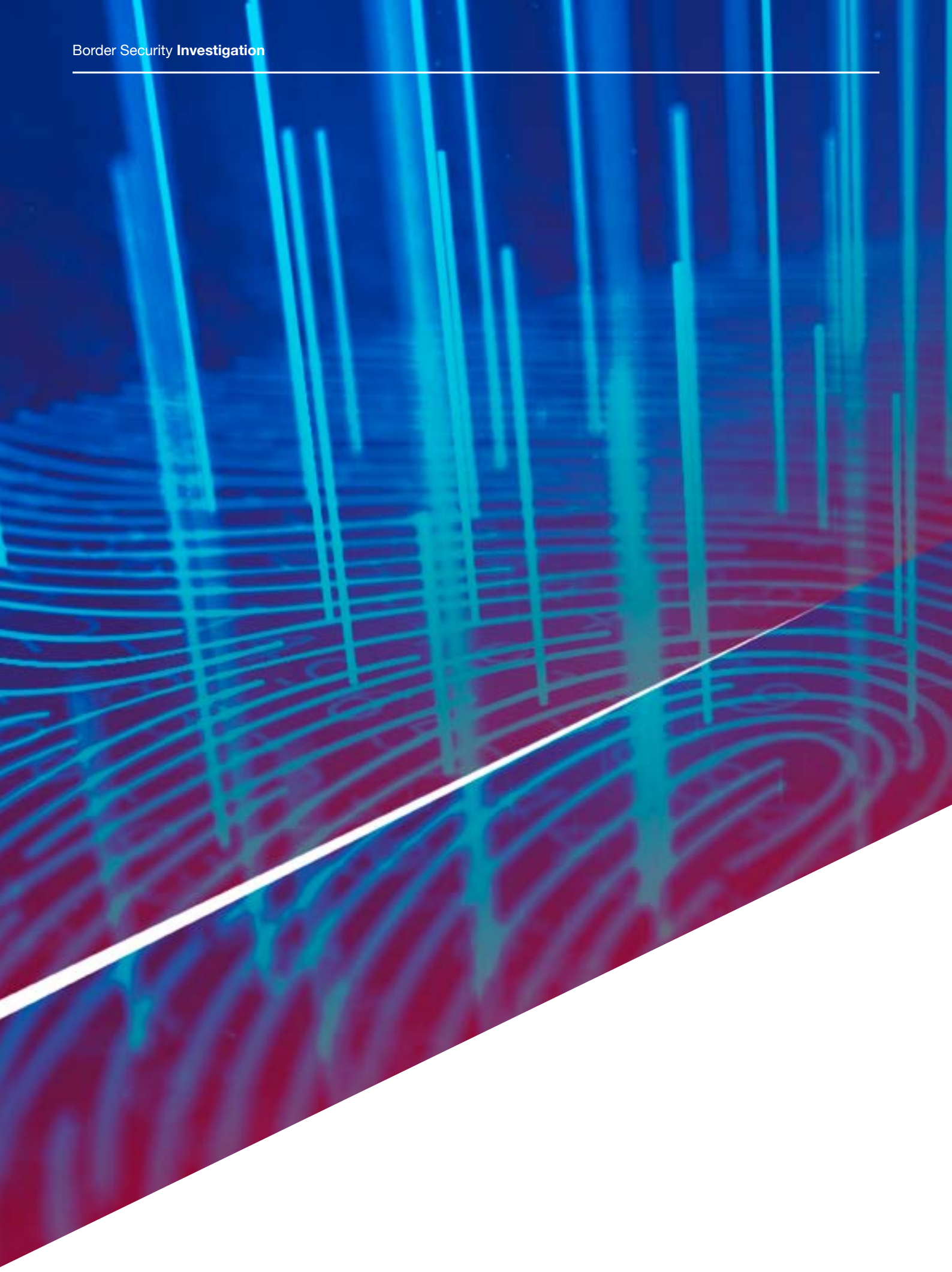
Amongst successful deployments of their equipment are the 2012 Olympic and Paralympic Games where they provided harbour protection to support boating activities at Weymouth on England's south coast, the Northern Ireland Police Service's marine perimeter for the 2013 G8 Summit as well as the 2014 Commonwealth Games and NATO Summits.

Disruption Case Study

Drones and unmanned aerial vehicles have many positive applications, but they also pose an increasing threat to effective border management. When programmed to ignore no-fly zones they can be used to observe sensitive border areas in order to gather intelligence on activity, carry illicit goods across borders and pose genuine threats to the safety of aircraft.

One of the leading solutions to counter these devices is a comprehensive defensive system (AUDS®) that combines the technologies of three UK companies; Enterprise Control Systems (ECS), Chess Dynamics and Blighter Surveillance Systems. Launched in 2015 and recognised as the world's first fully integrated, purpose-designed counter-drone system, AUDS® has been in continuous operational use since 2016. ECS's Claw radio frequency disruption technology has been attributed to over a thousand drone defeats, including in the most demanding environments. Major users are the US Department of Defence (including operations in Iraq), airport and airfield customers and other users and alliances with similar security challenges.

More broadly, ECS provides RF Data Link and RF Inhibition countermeasure systems for security, policing and military customers globally while Blighter Surveillance Systems provides best-in-class electronic-scanning (e-scan) ground radar systems for border, perimeter and coastline security, as well as wide area surveillance and to counter drones. Chess Dynamics Ltd provides precision stabilised and non-stabilised platforms, directors & positioners for electro-optical, radar, communication, security and surveillance systems, including thermal & daylight cameras and special sensors for naval, land and commercial customers.



Investigation

Investigation

Successful deterrence and prosecution are key components in reducing illegal cross-border criminal activity, and this is only possible if comprehensive, accurate and reliable investigation capabilities are in place. This may include recording and archiving capability, covert monitoring as well as GPS time-stamped evidential recording and review capability. Audio and video interview recordings may also be supplemented by covert evidence gathering solutions as well as video gathered by body-worn cameras.

Systems are now available that offer the ability to carry out sophisticated analysis techniques such as voice biometrics, audio fingerprinting and enhancement on video material that is gathered as part of an investigation process.

Law enforcement agencies are increasingly dealing with an avalanche of data, which will continue to increase in volume and complexity in the future. This has necessitated novel approaches to digital investigation that maximise people, processes and technology. For example, situational awareness and alert systems augmented by machine learning can provide insight beyond human capability, such as systems that allow for hundreds of cameras to be monitored simultaneously with risks assessed in real time. These tools can also augment officials' ability to minimise risk and to investigate crimes. Case material that was impossible to review in a reasonable timescale in the past can now be analysed using digital solutions.

Online investigation and intelligence platforms for professional investigators can also collect, analyse and visualise open-source data. This can support the day-to-day activities of law enforcement investigators by enabling them to conduct whole open-source intelligence investigation using one platform, with the added benefits of increased speed, accuracy and security. As an example, specialist mobile laboratories are already operational in more than 60 countries, offering reliable, high quality specialist forensic equipment for crime scene processes, disaster victim identification, hazardous material analysis and counter-terrorism investigations.

Post-event investigation and forensic analysis, supported by high fidelity data captured before and at the time of an incident, are essential investigation capabilities. Novel and innovative forensic science equipment and crime-scene examination tools enable operatives to expose falsified documents, detect and identify chemical and biological traces and reveal latent fingerprints and other evidence. Digital forensic software, data mining and database extraction also provides a new generation of tools that can scan electronic devices, finding evidence many times faster than before. These tools are fast enough to use for triage on-site, helping to prioritise analysis of devices that are known to contain illegal or illicit content.

Investigation Case Study

The falsification and forging of passports, identity documents and transit papers continues to be a serious problem at international borders. Sophisticated and dependable forensic examination tools that can offer rapid and accurate results are essential in order to detect these forgeries, while at the same time maximising the throughput of passengers at entry points in order to minimise delays.

UK-based Foster + Freeman's products can be found in airports, at border crossings and immigration controls, in banks and forensic investigation laboratories worldwide. Specialising in the forensic examination of passports, ID cards, security documents and other evidential material Foster + Freeman manufacture advanced workstations, such as their VSC models, which can detect alterations, counterfeiting and trace residues.

These technologies also authenticate genuine documents at each stage of the examination process, delivering significant improvements in document-based security checks.

Established in 1978, Foster + Freeman export their products to over 160 countries worldwide. Foster + Freeman Ltd is a recognised leader in the field of questioned document examination and produces industry-leading associated technologies specialising in counterfeit detection, forensic-level imaging, 3D examination and facial comparison

Command, Control & Communication

Command, Control & Communication

Good border security management practice relies on strong inter-agency and international cooperation, underpinned by command-and-control systems that make effective use of information and data.

The amount of data available to a modern security agency is now significant given the growth in the number of sources that are available, such as an individual's digital footprint, communications traffic, video feeds and so on. Bringing this material together to create a single intelligence picture is vital; however, handling this volume of information creates new challenges to connect and combine data in right-time across the domains of intelligence, knowledge management and operations while at the same time controlling access to the sources. Coordination of command-and-control systems across international borders is also vital in detecting and disrupting organised crime, identifying terrorist financing, people trafficking operations and so on. Today, industry offers complete solutions that combine physical infrastructure through to software tools, guaranteeing that distinct parts of the system can talk to each other.

Software solutions can also provide a single point for management of all data gathered, combining surveillance, analysis and reporting of video streams, satellite data and cellular data for example and can deliver these on both fixed and mobile tablet or smartphone platforms. Using cloud services, these solutions can revolutionise the management of day-to-day security operations, supporting rapid response teams by providing complete operational awareness, enhancing their protection and supporting coordinated responses to threats.

Data visualisation tools are also available to help make operational sense of multiple sources of data. Built as secure web applications they can provide 2D & 3D visualisations of data as well as track events through time. Combined with state-of-the-art machine learning software these tools can supply actionable intelligence to support robust decision-making processes as well as protecting assets. Secure and robust data exchange tools are also available that provide information assurance and allow for the safe access and transfer of information across country boundaries. This is achieved through a combination of hardware network and software solutions that maintain the confidentiality, integrity and availability of data.

Homeland security demands robust communications networks that connect multiple security services together and provides links to emergency services, enabling government agencies and first responders to respond to incidents quickly, even in the remotest border areas. Where fixed infrastructure is not comprehensive in these locations rapidly deployable elevated communications using helikites/aerostats can be deployed to support mobile patrols. In order to maintain robust communications in remote areas solutions that combine secure satellite communications, radio frequency, 4G, 5G and Wi-Fi modes are also needed.

Multi-role virtual private network (VPN) platforms are also available that utilise the networks of various providers to transmit and receive data that is concentrated in a central server before being forwarded to any number of client computers, smartphones and other devices inside and outside command-and-control facilities. These sophisticated systems are capable of splitting data to offer higher throughput and resilience, offer encryption and authentication to secure traffic and can handle video feeds and other surveillance data, remote monitoring and control of assets as well as providing vehicle tracking.

Innovative and highly resilient radio systems are also a requirement, where current innovations include ground-breaking mesh communications networks that are able to provide secure sharing of data in the field without the need for a central control system. A typical application might involve connecting groups of sensors with a mobile ground unit for example. Game-changing reliable and rugged satellite bridging and rebroadcasting systems can also offer encrypted and low-cost solutions to connect operative's radios beyond line of site and can offer interoperability between separate groups of users.

Command Case Study

Effective management of borders relies on collating the many sources of information and data available to build up a full picture and then deploying resources effectively, and this typically sits within the command-and-control function. Operators and managers need to make sense of the outputs of many video feeds, sensor readings and voice communications, to a point where doing this using manual processes is not feasible. Dedicated software solutions are therefore increasingly becoming an essential tool for border management.

Domo Tactical Communications (DTC) offers their product Mission Commander to solve this problem. This is a secure, scalable, mission critical software suite that allows manual and automated configuration, management and integration of video, audio and IP (Internet Protocol) transmission equipment and networked intelligent sensors.

Mission Commander's scalability allows it to deploy as a single PC tactical installation, for example for temporary monitoring of a 'pinch point' or cross-border tunnel, through to a fully secured multi-server strategic network that potentially has thousands of video and audio feeds and hundreds of geographically dispersed viewing clients. Seamless integration with leading video management software systems, such as Milestone, provides long term storage of surveillance footage.

By combining video surveillance with inputs from a variety of complementary sensors, Mission Commander can provide the timely, accurate and actionable information required to drive critical decision-making in Border Security operations.

Domo Tactical Communications (DTC) Ltd has been at the forefront of innovation for over 50 years, developing leading-edge surveillance and communication technologies for successful operations in demanding environments. Its mission-critical solutions secure, share and communicate real-time situational awareness.

Communications Case Study

Effective communication between individual operatives and with staff in command-and-control centres is a necessity for border management. However, given that operatives might be working in the most remote and inaccessible locations, normal fixed lines and masts for mobile communications may be out of range.

One of the most sophisticated solutions available from the UK that addresses this problem is the Allsopp Helikite Ltd airborne communications/ surveillance system. Available in a variety of sizes and with a variety of components they can fly reliably for extended periods even in areas of known unpredictable or windy weather and provide sufficient height to allow the latest generation networked radios to stream video and broadband communications. For example, they can be used to stream data to and from crewed maritime vessels and coastal locations or unmanned surface vessels up to 50 kilometres out to sea, or to and from patrolling land vehicles along remote borders.

Depending on the size and volume of the helikite model selected, these extremely cost-effective aerial platforms can accommodate a variety of radios, antennas and sensors and are capable of rapid equipment changes while attracting a minimal regulatory burden. Renowned for their stability, effortless operation and small ground operator footprint this innovative development extends beyond the narrower operating window of conventional aerostats, addressing the latter's deficiencies and offering considerable savings in operating costs.

Allsopp Helikites Ltd produces helikite aerostats that are a patented combination of a helium balloon and a kite which overcome the shortfalls of normal tethered balloons and kites, as well as blimps and many types of unmanned aerial vehicles.

Training, Capacity Building & Contracting

Training, Capacity Building & Contracting

In order to be effective in their role, border agents require training in a wide range of disciplines. For those working in the maritime environment for example, their skill set needs to include maritime interdiction operations and security techniques such as boarding and search and seizure procedures as well as all aspects of fast boat operations. Training delivered by experienced staff drawn from the police, military and border security can also provide surge capacity to jurisdictions with specific requirements and be augmented by expertise in areas such as covert surveillance and intelligence-gathering.

With extensive experience of operating in multiple and complex environments these individuals typically have the skills to be able to instruct small tactical teams in the use of world-class organic and technical collection methods, delivered through a combination of classroom teaching and extended practical fieldwork.

In an increasingly uncertain world, the threat of attacks involving hazardous materials including chemical, biological and radiological agents (CBRN) also continues to increase. In order to effectively address these threats a comprehensive range of services are needed, from prevention and containment through to aftermath measures using high quality equipment. To ensure their effectiveness these should be supported by thorough technical and practical advice and comprehensive training packages.

Additionally, Rule of Law, capacity-building and investigation services are a key requirement in border security. Training operatives to address these demands requires specialist support in a wide variety of criminal justice fields from forensics, CBRN preparedness and intelligence to core investigate doctrines, surveillance and counter-terrorism operations. Solutions here are available in both conventional and remote digital formats and are typically designed in partnership with clients. For the most complex cases direct specialist investigation support, from discreet covert deployments to embedding members within a team, is also needed. Criminal justice capacity-building initiatives are available from companies who have a track record of delivering to national governments, public sector authorities and academic institutions, which can enhance the capability of organisations working within the criminal justice and law enforcement sectors.

Complementary capabilities, including fully managed end-to-end ‘software as a service’ investigation solutions that combine digital intelligence and investigation software that turns data into evidence to support prosecutions, are also a necessity in the fight against criminal activity. Digital transformation consulting services can also help to design more effective operations, processes and applications with security and investigation capabilities at the forefront.

A specialist service that is employed in some jurisdictions is the deployment of sniffer and detection dogs. These animals are used to counter various aspects of contraband and crime including explosives detection. Training of handlers and dogs is available which can be delivered in a local setting, where these animals represent a valuable addition to border security operations.

Where domestic security and border authorities do not have sufficient capacity or have not developed skillsets to handle novel situations, external service providers can fill these gaps. In the maritime space security services can be contracted to protect maritime business and trading opportunities by mitigating risks to ships, crews and their cargos in the world's most dangerous maritime regions.

Deployment of cost-effective airborne maritime and land intelligence, surveillance and reconnaissance can complement existing national capabilities and provide surge capacity to address challenges such as evolving migration patterns, or to sustain national border security roles during periods where major equipment recapitalisation programmes are taking place. This range of bespoke service provision can include full-time support or complementary services accompanied by parallel training programmes that evolve over time as local forces gain new skills.

Circumstances where external support might be needed are as a response to sophisticated operations by organised crime groups in border areas, where experienced covert surveillance operatives and equipment are needed in the field in order to gather hard evidence of illegal activity to support arrest and prosecution. Deploying specialist investigative knowledge and surveillance technologies quickly when activity is detected can enable border security organisations to take early corrective action.

Training Case Study

Effective training is important to support activity to protect borders, and UK companies can offer an extremely specialised service in this area. The country has a long history of employing detection dogs that can be trained to detect very precise odours, from the chemical residues left by explosives and precursor materials to contraband including several types of illicit drugs. Dogs can be employed in many difference scenarios, such as checking for items concealed on persons in public areas or illegal goods hidden within baggage and vehicles.

Wagtail UK Ltd offers a service employing dogs that are trained to detect explosives, firearms, drugs, cash, tobacco, criminal suspects, pangolin, ivory, illegal meat, products of animal origin, and more. The company's dog handlers have extensive experience of working within both international military and civil operational environments.

The company is currently supplying detection dog and handler training to several governments in Asia. A current initiative involves identifying illegal animals and meat products on the China/Hong Kong internal border for example. Domestically, they fulfil several roles including checking stadiums and concert venues for explosive components before major events take place.

Established in 2003, Wagtail UK Ltd has become a leading company specialising in detection dogs. They provide the detection dogs, dog handler training and related services to government agencies and private clients in the UK and around the world.

Capacity Building Case Study

Border protection can only be successful if it is underpinned by a strong criminal justice system that is capable of investigating, prosecuting and adjudicating cases. Capacity building services provided by the UK are available to provide criminal justice officials with the skills that they need to carry out these roles effectively.

UK-based Sustainable Criminal Justice Solutions (SCJS) is a trusted delivery partner supporting the development of criminal justice processes and 'Rule of Law' initiatives globally. SCJS has operated in over 60 countries across the world, using its internal expertise and a network of over 600 specialists to deliver a broad range of investigation-themed initiatives. SCJS have provided support to East African and Pakistani law enforcement organisations for financial investigation, the Turkish Coastguard, Sierra Leone Police and Nigerian Air Force on forensic investigation procedures, Jamaican authorities on anti-corruption investigative practice and many others. The company has extensive knowledge and understanding of legislative regimes around the world so can support initiatives globally.

Sustainable Criminal Justice Solutions (SCJS) is a not-for-profit global capacity & capability building organisation and is widely regarded as an agile, flexible and trusted provider with the ability to turn around a request for service in a short timeframe using experienced and credible experts.

SCJS
SUSTAINABLE CRIMINAL JUSTICE SOLUTIONS

Contracting Case Study

Effective aerial surveillance is a key component of any robust solution to secure a country's international borders, particularly to protect the remotest areas where access by road is limited or unavailable.

DEA Aviation Ltd is a service provider of bespoke airborne surveillance solutions using modern, reliable, low carbon footprint aircraft and cutting-edge sensors, underpinned by the highest safety standards. Although platform and sensor agnostic, DEA selects the most capable, cost-effective and flexible aerial solutions to meet client requirements, in order to deliver comprehensive all-source real-time networked information to optimise employment of complementary capabilities; while enabling information to be shared securely with trusted stakeholders, partners and allies.

As an accredited UK and European training provider, the company can provide a reliable cost-effective service over the length of a contract, or taper services over time. They can also provide training programmes aimed at producing greater local capability to enhance a customer's future detection and enforcement activities.

DEA Aviation Ltd has an extensive track record of delivering tailored operations globally using specialised solutions to meet customers' specific and varied requirements. Their team, drawn from a pool of experts with an extensive military and security service background, use best practice to run a flexible, low carbon multi-platform aircraft fleet specialising in airborne surveillance and aerial survey.

Services

Services

Specialist consultancy services can be employed to provide expert advice on current and future border security strategies, including innovative solutions such as intelligence-led controls and digital borders that deliver improved long-term capabilities.

These organisations can deliver transformation of existing services including the implementation of more efficient visa processes, automated border controls, intelligence-led targeting, identity verification, immigration and customs facilitation, compliance and more cost-effective management of multiple borders and entry points. These services are suitable for both government-level and private sector clients who are involved in the various aspects of border security.

In order to create safe and secure borders governments might also wish to engage leading security consultants, technology suppliers and systems integrators to develop a networked digital borders solution, that has rapid decision-making at its heart and is supported by information sharing with partner organisations, neighbouring nations and international agencies.

For example, conducting a comprehensive security review of maritime and land border security risks can lead to the development of coherent and integrated agency or corporate plans, inform transition arrangements while improvements are implemented and provide follow-up audits in order to embed operational changes and consolidate the experience that has been gained.

For those countries that have maritime borders specific support is available to address the wide range of security threats that countries can face, including advice on creating a comprehensive and coordinated command and control environment that brings parallel departments and agencies together, while establishing effective cross-government information sharing. Consultancy can also be brought to bear to help exploit the highly specialised space environment, involving the launch, tracking, monitoring and management of monitoring satellites that can vastly increase the effectiveness of efforts to secure border areas.

Systems integration consultancy may also be needed to act as a conduit between specialised technology suppliers and border security agencies. These consultancies combine technical security knowledge and operational security experience to identify, design and deliver the most suitable solution to the complex problems that countries face at their borders. This might include command and control rooms, network security and design, information technology infrastructure, radio links and systems as well as CCTV and IP radio networks.

In some areas, bespoke end to end design and build services that are packaged with ongoing training and support are required, such as the development of bespoke vessels, immigration enforcement systems and secure communications networks as well as forward-looking areas including software analysis and threat visualisation.

At the wider level there is also a growing international recognition that solving the challenges to national security requires a combined effort from government, industry and academia. Consequently, academic institutions are increasingly involved in the study of international security concerns and support a wide range of specialist research and trend analysis into regional, historical, cultural, topical, ideological and geographical topics.

In the UK the Academic Resilience and Security Community (A-RiSC), founded in 2014, coordinates greater academic involvement in solving national security challenges. Chaired by Cranfield University it is composed of over 50 UK universities involved at the forefront of global security research, skills and development. This academic community offers an array of expertise which is trusted by governments, armed forces, industry and security services around the world. Their research portfolio includes areas as varied as biosecurity, data analytics, forensic science, personal protective equipment, resilience, sensing and surveillance and weapons detection.

Consultancy Case Study

End to end solutions are sometimes needed in order to support the development of improved border security in the most highly specialised areas, particularly those where new and innovative technologies and operational models are being brought to bear.

For example, BMT Global is a leading design, engineering, science and risk management consultancy in the maritime arena. They have a reputation for engineering excellence and over 35 years of experience in designing high-performance bespoke vessels for national and international customers and offer a complete solution for high performance hull and vessel designs.

The company provides tailored designs to meet demanding customer requirements that enhance operational capability. With a wide range of crewed and unmanned surface and sub-surface capabilities, BMT Global can supply a complete solution from requirements definition and systems engineering to construction oversight, integrated logistic support and through life management. Their team of experts has vast experience of designing high-performance vessels for government and security organisations around the world.

With a broad range of existing vessel designs from which to select, BMT designs combine speed with excellent seakeeping and crew comfort to produce award-winning vessels for an evolving and demanding security sector. With speeds up to and beyond 50 knots proven designs include high-speed patrol boats, riverine solutions, submarine capabilities and frigates, to theatre support vessels ranging in size from 10m to 80m. Their products are in operation across the globe including the Middle East, the Americas and Europe, providing vital support to border security.

Design Case Study

A comprehensive approach to the design of a border security system can be a key factor in ensuring that the solution is comprehensive and deals with any potential gaps that could be exploited to gain illegal entry or to smuggle contraband.

Established in 2013, UK company Fortinus Global is a specialist border security consultancy, supplying advice and support to both public and private sector clients on all aspects of strategic border management, border modernisation and border transformation. They have expertise in helping countries to develop end-to-end modern border strategies and transformation programmes, including elements such as pre-entry clearance, document verification, targeting systems, risk assessment frameworks, digital borders and advanced passenger profiling.

The company has helped to develop transformation programmes for countries across the world, including Kuwait, Malaysia, Australia, Canada and the United Kingdom.

Analysis Case Study

In order to support greater understanding of potential national or regional risks, database development and management tools supported by evolving machine learning are now emerging. These systems can provide new perspectives and knowledge on areas as diverse as demographics, transportation hubs and links, logistics routes, evolving infrastructure developments and patterns of life.

Bristol-based 4 Earth Intelligence (4EI)'s Country Intelligence suite contains a diverse range of metrics that provide a deep level of insight into the social, political and environmental history of each country, incorporating data on demographics, transportation links, points of interest, wealth, land cover and significant physical, cultural and political events. Updated on a regular basis these datasets also include a wide range of spatial data and the best available satellite imagery.

This product is currently use by the security and defence sectors to provide situational awareness of potential hazards and risks, such as disease outbreaks in border zones. In the maritime arena it has also been combined with satellite derived bathymetry (SDB) and marine habitat mapping data to enhance the understanding of potentially vulnerable coastal areas and landing zones relating to border security.

4EI's team is built on decades of expertise in Earth Observation, Geographic Information System (GIS) and remote sensing analytics, as well as the creation of strong partnerships; they work with a diverse range of data providers to supply clients with innovative intelligence solutions specifically tailored to their needs. The company also has extensive experience in providing consultancy for database deployment, data management and machine learning support across government departments.

About Us

As part of the Department for Business and Trade, UK Defence & Security Exports' role is to help the UK's defence and security companies to export, and to provide the specialist advice and practical help that overseas buyers need.

We do this by building close relationships with industry and with overseas governments as well as working closely with our own Government departments including the Home Office, the Ministry of Defence, the Foreign, Commonwealth and Development Office and others.

In addition to the military, security, fire and resilience specialists in the Department we also work through a network of over 3,000 trade staff based in our Embassies, High Commissions and Consulates around the world. We also support the major trade shows for the defence, security and cyber security sectors that take place in the UK and overseas.

Next Steps

This brochure, which focuses on UK industry's expertise in providing security solutions for the protection of border areas, represents the combined expertise of companies from across the sector. It contains case studies that give a snapshot of the world-class solutions the UK can offer, but the list is not exhaustive.

If you are interested in any of the capabilities presented here, our security industry stands ready to help. The depth of knowledge and expertise that companies in the UK provide can help you to keep your next major event safe and secure from threats.

For further information please contact the UK Defence & Security Exports staff locally or the domestic team based in London, Cardiff and Darlington.

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About Our Contributors

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Paul's career has covered a broad range of roles in the Ministry of Defence, the Home Office and the Cabinet Office. Immediately prior to his current role, he held the position of Director General of the Crime, Policing and Fire Group in the Home Office.

Tony Smith CBE is a former Head of the UK Border Force. In 2012 he was Gold Commander for the Olympic Border Security Programme, and in recognition of this he was made a Commander of the Order of the British Empire (CBE).

He is now a global border security consultant, Managing Director of Fortinus Global Ltd and chair of the International Border Management and Technologies Association (IBMATA).

The Department for Business and Trade would also like to thank the UK Security & Resilience Industry Suppliers Community (RISC) and DEA Aviation Ltd for their support in the production of this brochure.

This document is also available on our website at gov.uk/dbt-ukdse

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