POLICE TECH PIONEERS

HOW NEW TECHNOLOGY STARTUPS ARE SET TO TRANSFORM POLICING

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Foreword by Lord Bernard Hogan-Howe, QPM
EVERY MAJOR ADVANCE IN POLICING HAS BEEN MADE POSSIBLE BY NEW TECHNOLOGY. TODAY’S DIGITAL REVOLUTION IS NOT ONLY TRANSFORMING THE DEMAND ON THE POLICE AND THE CRIME THAT THEY CONFRONT, BUT ALSO OFFERING INNOVATIVE NEW WAYS TO IMPROVE PUBLIC SAFETY.
There are at least 46 police organisations delivering a vital service to over 50 million people. The citizens want it to be joined up, but most politicians prefer these 46 police organisations to be kept separate. Unsurprisingly, the IT landscape is fractured and inconsistent and, as such, policing often makes inefficient investments. Sadly, the winners are the criminals and the losers are the victims of crimes and emergencies.

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If you wanted to build IT and technology systems to serve the public and police in England and Wales, you would not start from where we are today.

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This report provides an excellent simple strategy for getting the best from small platforms within three core priorities of Citizen Engagement, Crime Fighting and Police Support.

It also rightly points out the small technology companies are much nimbler and more responsive to the needs of the public and the police. Such companies react more quickly to innovate, deliver solutions and address new criminal behaviour. The report recommends that small companies concentrate on the benefits of big data and automation to assist human judgement, and I agree.
These recommendations are an excellent start. But I would propose building on them and going after something even bolder. The 46-force model has provided localism and community responsiveness since 1964. Criminals have ignored those boundaries to commit minor and serious offences across borders. New technologies offer an opportunity to work better across borders and make common investments in small and big systems.

Presently, however, this is unlikely to happen. As I see it there are two long-term solutions to this problem. Either take the £850m devoted to ICT into a single national fund and invest towards a common future. Or restricted policing and create a small number of forces and funds and encourage or mandate joint IT investment.

I admit to liking big national solutions, therefore a national police force with a national system would be my preferred outcome. If there are to continue to be the same number of forces, then we should work at least to create one ICT system for them - or ensure all systems are totally interoperable - thereby maximizing the effectiveness of the £850m spend and providing a vehicle for more uniform processes and thus better outcomes.

This would help to smooth out some of the challenges posed to the strategy recommended in this report. There is a strong and credible pipeline of technology companies that could transform policing. We should work to make the pipeline larger and the Home Office should take a lead in championing new solutions and new companies.

But the current fractured system represents a major structural barrier to entry and scaling for these companies. Different existing IT systems are often incompatible, and the new software needs to consider data configuration, local policies and procedures and the potential that in 10 years’ time an excellent small software solution may have penetrated just 30% of the market, when it deserves to be a national solution.

This report shows that, even in the context of today's fractured and disconnected system, innovations at the margin can make a tremendous difference. As such, I believe it could play a large part in improving police IT, particularly where it argues for helping small software companies overcome the procurement hurdles which often knock them out at an early stage.

But my preference is to be bolder; namely, to push for a more radical restructure of policing, and the IT systems that sustain it. I believe it is more likely to deliver long term benefits although it would not be without risk and would take longer to deliver. Only then can we realise the true value that can be delivered by the technology pioneers and innovators outlined in this report.

This report articulates a good solution for the implementation of small software solutions in a fractured IT system. It works hard to make recommendations that overcome the inertia and inefficiency in a police service that is comprised of 46 parts.
Much of the embrace of technology and digitisation is being driven by a shift in crime from street onto the internet. In particular, the dark web, encryption, virtual private networks and virtual currencies have enabled criminals to conduct their business, free from traditional surveillance methods. And today most crimes have an online component - whether it is the stalker who uses social media to track their victims, or fraudsters who target passwords and bank accounts. As crime has moved online, the police have had to follow.

It is not just the internet, however, where the police are using new technology to fight theft, terrorism, economic crime and child exploitation; technology is also changing how the police respond to emergencies, conduct surveillance, manage data and improve their internal communications. Police in Durham, for example, are using a new algorithmic tool to help officers decide whether a suspect should be bailed or kept in custody. Gwent police force in Wales has launched a VR training programme to try to encourage officers to think about the dynamic options available to them in high-pressure and complex situations. And Devon and Cornwall Police began testing aerial drones with Dorset Police in 2015.

But despite this and many other digitally-driven initiatives, the rate of digital adoption within the UK police is still too slow. There is much talk about innovation, but when you consider what can be done with new technologies, and what is already being done in other countries, especially in the United States and Israel, it is clear that much of policing in the UK is not as technologically-advanced as it needs or deserves to be.
Police forces also move at very different speeds. Some have been quick to adopt new tools, others have been more averse to change. A few forces have moved away from large, slow-moving IT incumbents. But others are still locked into long-term contracts where there is little opportunity for innovation. Across the 43 police forces in the UK, there is still too great a reluctance to work with the most innovative companies, especially new companies.

This has a number of consequences, including:

- **Wasted time** as police officers are forced to use old technology, with old desktop programmes to record data;
- **Missed opportunities** as police officers cannot trace connections and people quickly enough across many different databases, or between relevant agencies;
- **Misallocation of resources** as the absence of predictive technologies means a reliance on less accurate routine patrols and intelligence-led operations, and poor triage;

Looking across the policing and security ecosystem, we found 75 promising tech startups – around a third from the UK, slightly more from North America (USA/Canada) and a smaller number from elsewhere (including Israel, Australia, New Zealand, and other EU countries). Our key findings include:

- **A stronger North American ecosystem** | Of these startups are from the US, and have already had strong traction within the US policing and security market, but many are not yet in the UK;
- **25 UK Startups** | We identified 25 innovative UK technology startups that could drive a new wave of technology-enabled policing;
- **15 Operating in UK Policing** | Of those, only 15 are currently operating within the UK policing and security market, indicating real growth potential;
- **Crime-fighting products dominate** | Of the 75 firms, 13 have a principal focus or product application around citizen engagement, 25 for supporting the police, and half (37) are tools or services to bolster crime-fighting;
- **Software products more common than hardware** | The digital policing demands mean many tech startups offer software products, with a minority of the 75 firms supplying new technical equipment or field hardware.

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This spread may seem impressive, but compared to the ecosystem of startups servicing the NHS or defence, it is actually very limited.

The result is that UK law enforcement is losing the race for digital supremacy. Moreover, police forces across the UK look set to continue to be reliant on foreign companies and large multi-national vendors, rather than helping to build a home-grown ecosystem, which can target local needs better, and provide an opportunity for British exports.

Indeed, the British police has a strong international brand, with UK officers often called upon to help foreign investigations. There is every reason to believe that digital solutions, developed for and in partnership with the police forces in the UK, would sell well overseas. But with very few exceptions, that is not currently happening.

The UK policing sector is clearly under-served by technology startups and the SME share of the market is very small. To meet future demands, policing desperately needs to embrace the agile, innovation-led approach offered by startups. While the habits and structures of the policing ICT landscape are entrenched, and culture and habits have proved hard to shift in the past, change is possible - and urgently needed. Critically, much more needs to be done to find new ways to catalyse a startup friendly ecosystem in policing. It is all of these issues - and the huge opportunities that lie ahead - that this report seeks to uncover.
INTRODUCTION
COPS CALLING TECHIES

The modern police have complex crime and public safety obligations that would be impossible to meet without the use of technology. Policing is now dependent on technology to deliver its mission in a modern society but the police - unlike some other sectors - are not yet benefiting from a vibrant ecosystem of tech startups. Some innovative companies do exist, and the appetite to embrace new technology is often there, but the incredible talents on offer in the startup world are yet to be taken advantage of by police forces.

The core policing mission – to prevent crime and guard the citizenry – may be essentially unchanged, but the operational realities of policing in the diverse and networked society of the twenty first century would be impossible to address without the tools that modern computing and other technology has enabled. From the earliest examples of intelligence-led policing strategies built upon data analysis in the 1980s, to the advances in forensics, mobile telephony, and digital surveillance methods, today’s police officer is dependent on technology like never before.

Across major public services, there is a burgeoning ecosystem of British startups bringing innovative digital products to market. Whether it is agriculture (WeFarm, Teralytic), defence and cybersecurity (Headlight AI, DarkTrace), health and care (Cera, Forward Health), housing and planning (LandInsight, Commonplace), justice (CrowdJustice, JustTranslation) or welfare (Pockit, Adzuna), these companies are beginning to show that they can take on larger, international and often inefficient incumbents. As they do so, they are providing higher-quality, cheaper services, facilitated by cloud-based software that is making front-line professionals’ work easier to execute and enabling smarter, data-driven decisions.

Policing in England and Wales is a notable exception to this promising trend. Not only are policing startups deficient in terms of volume and financial backing when compared with the emerging HealthTech or AgriTech movements, for example, but many police forces still display the absolute worst tendencies of public sector technology procurement. Many forces are still locked into ten to fifteen year partnerships with large international vendors, with little or no competitive pressures, and are lumbered with last generation technologies that are rarely updated or maintained.

Combined, this approach to technology can mean that, far from police forces catching up with developments in the outside world (or the criminals who operate within it), they are often falling further behind. And all the while, technology is being taken advantage of by criminals to cloak their activities, find new victims and grow their illicit empires. Given the pressures of budget constraints, rising public expectations and shifting crime demands, the police cannot afford to stand still. The police sector needs to do more to embrace new technologies, especially those offered by startups.
The Police Sector Needs to Do More to Embrace New Technologies, Especially Those Offered by Startups

Internationally, however, there are many promising companies that are beginning to change that culture and revolutionise policing processes and practices. For example, Mark43 was founded by a group of recent Harvard graduates who worked with the DC Police to create a cloud-based public safety platform. It has transformed the workflows of major police departments in the US, cutting paperwork dramatically, and allowing police to collect, manage, analyze and share information seamlessly. Mark43 has already raised over $50 million, and with a client growth of 550% in 2017, has shown that startups can achieve high growth and substantial venture investment in this market.

Other examples abound, in both the US and Europe: from facial recognition tools such as Amazon Rekognition and EYN and critical event analytics firms like DataMinr and Babel Street to predictive policing companies like PredPol, CivicScape and HunchLab. There are even body-worn camera companies like VisualLabs that have eliminated the need for hardware (i.e. the camera), instead using mounted mobile phones combined with powerful software enabling searchable video and real-time footage.

As they expand internationally, companies like these will no doubt be able to help improve policing processes in England and Wales, and UK-based tech startups will play their part too. With the Police Transformation Fund, the Home Office is able to directly invest in local innovation, some of which could be directed at fostering a strong pipeline of tech startups offering innovative products. Even before we know what size and shape the PTF will assume after 2020, this approach is an incredible opportunity to help shape the market and build a new, world-leading ecosystem of technology companies right here in the UK.

In this report PUBLIC identifies 75 of the most innovative tech companies serving the policing market today. The vast majority are still early-stage startups, funded less than 5 years ago and with a few important clients in the law enforcement space, but very far from being mainstreamed throughout policing. Others have been around longer, but have reshaped their offer and now have a wider imprint on the policing sector.

Whether the companies originate in the British, European or North American markets, they have all demonstrated a product or service that meets a common policing need - and invariably not just a local fix but a need shared across many jurisdictions. In fact the companies that have the greatest potential to grow and expand internationally - including some UK-based firms - are those that address a pressing operational need that is not specific to a given ICT architecture in a domestic setting, but rather one that can apply to the same problem that other police agencies in other countries are also facing. These impressive firms are the type that have found their way into our Police Tech Pioneers Index (p.64).
THE KEY PURPOSE OF THE REPORT IS TO ILLUSTRATES THE WIDER TECHNOLOGY MARKET AND THE POTENTIAL SERVICES ON OFFER.

**About this report**

The subject of police technology, and especially the police use of information technology, has received significant attention in recent years. A combination of shifting operational needs, misaligned policy interventions, poorly managed and misdirected national government programmes and uncoordinated investments, have all contributed to a fragmented landscape that has yet to deliver many of the benefits that tech-driven transformation is bringing to other public services. While we do not underestimate the complexity of this process, or the importance of current efforts to address the capability deficit in police technology, that is not the focus of this report. The work of transitioning large and cumbersome legacy systems that are not interoperable, into cloud-based, open architecture with common standards and APIs, is vital, and has to happen. And it ought to be accelerated. But on its own it is not enough.

For this report, PUBLIC focuses on the smaller companies that have (mostly) built brilliant products to help the police in a myriad of ways, and which are already active. The police do not need to wait to embrace some of their offerings. And if we wait for these large and often poorly-procured national transformation programmes to sort out the mess of legacy infrastructure, the opportunity to benefit from incredible, innovative startups will pass us by. There are solutions ready to be used today that can make a demonstrable impact on police business processes and crime fighting right now - and this report gives the clearest picture to date of which firms offer them.

This report begins by outlining the policing marketplace in the UK today, and explains how technology is bought and sold, and what type and scale of investment and suppliers make up the present landscape, with a particular focus on three forces who represent the different type and scale of buyer in the market today. We then explore the big themes that are driving police demand for technology, whether that is here in the UK, or in Canada, America, or further afield.

We then explore some of the current barriers to having more of this operational demand met successfully by technology, and why more of it is not serviced by the innovative tech companies that are now beginning to emerge. The report showcases 20 of the most exciting of these examples, from a cross-section of policing domains, to illustrate how tech startups are already providing benefits to policing agencies, and why these firms should be of particular interest to customers in the UK.

We conclude by outlining some critical success factors, and propose some key steps for how UK policing could transition to much greater use of smaller start-ups to address their technology needs, and how this ecosystem can be nurtured by the right set of policy interventions. We make a series of recommendations that will serve to catalyse this transition. These include top-down influences like re-focusing future investment by the Home Office via the Police Transformation Fund, as well as bottom-up changes designed to harness internal talent and private sector expertise, encourage collaboration and create the right space for the service to engage with, explore, and trial technology innovations, before any decision to buy.

A view shared by many that we interviewed for this report is that it is even more important to support the police to buy than it is to support tech startups to sell to the police. We think there is a need to do both, and that this report serves both ends by beginning with the opportunity - describing the operational and societal demands that policing confronts today, before exploring the variety of innovative, young firms who are already meeting a vital service need somewhere in the world of law enforcement.
Our Research Proposition

The Sector | The UK policing sector is underserved by technology startups - compared to the health sector, the market for SMEs is small.

The Role of Startups | To meet future demands, policing needs to embrace the agile, innovation-led approach offered by startups.

Growing the Ecosystem | More needs to be done to find new ways to catalyse a startup friendly ecosystem in policing.

Change is Possible | The habits and structures of the policing technology landscape are entrenched. They cannot be worked around or replaced overnight, but change is possible.

How companies were selected

Companies were identified and selected through extensive desk research, outreach to PUBLIC’s large VC, angel and incubator networks, and the authors’ access to UK and North American policing communities. To qualify, they had to currently be an active company at the time of writing, operating in the security or law enforcement space (or related fields). Companies had to be an SME (according to EU definitions), meaning they had fewer than 250 employees and: annual turnover not exceeding €50 million; annual balance sheet not exceeding €43 million.

There are solutions ready today that can make a demonstrable impact on police business processes and crime-fighting right now.
1. THE POLICE TECHNOLOGY LANDSCAPE

In every operational domain, technology has already made the police more efficient. But modern digital technologies have also led to a step-change in their capabilities and enabled a more comprehensive policing posture that is able to address much more than simply reacting to the traditional crime that might occur in public spaces. And policing will continue to be dependent on technology to meet the expectations society places on them, and so the importance of investing in the innovative products and services that will yield the biggest benefits is only growing.

Many current features of the police service’s approach to technology is a barrier to this proactive, horizon-scanning and future-oriented approach - and there are a number of common complaints from those inside and outside the industry. A few specialist functions require bespoke solutions, but in reality many of the technology requirements of policing are not actually special or unique. Many key institutional actors play an important role in addition to the shifting influence and control of national government at the centre, which defines the technology landscape which tech startups must navigate.

Historically one of the police’s functions - though not the only or even the most important one - was to patrol locations in a way that increased the chances that they would detect criminality themselves and could swiftly detain those responsible. Since the widespread adoption of the patrol car in the 1960s and the spread of Closed Circuit Television Cameras (CCTV) from the 1980s and accelerating in the 1990s, the police have sought to leverage technology to detect more of the crime occurring in public spaces and to make their officers more efficient at apprehending offenders once crimes have occurred.

The consequence of this trend is that policing has become more reliant on technology and the police’s operational footprint in society has grown, and is no longer limited to where individual officers patrol. It is an obvious benefit to victims of crime that technology gives the long arm of the law a longer reach, but it is not without consequences for the police themselves.

The rising importance of technology for policing

The police force has been a human monopoly since the late eighteenth century, when the first civilian constabularies were created, drawing recruits from the communities that they served. Even today, over 80% of a police force’s budget is spent on people - both officers and civilian staff. However, modern technologies are offering new operational benefits and digital tools that can not only supplement, but also in some cases substitute, traditional staff roles. These developments are being driven not just by resource constraints, but by a recognition that in some domains, performance can be vastly improved by technology, and can surpass what can be achieved by a human operator alone, however well trained. Over time, this could mean that even as agency budgets rise overall, policing will see a gradual resource shift towards non-staff costs - investing more in good technology, and unmanned processes, and proportionately less in people.

Nevertheless, much of what we understand as technology innovation in policing is about making the individual officer more efficient, and in making
police agencies better able to live within their means, delivering the public goals set for them by citizens and government within finite budgets. However, technological developments today do not just make processes cheaper, or the individual officer safer. They make them orders of magnitude more capable. The equipment the police can carry and wear, and the systems they can remotely access, make the human officer a far smarter asset, even when walking a traditional beat. For example, new generation portable biometric devices like fingerprint scanners are now being rolled out as part of a new Biometric Services Gateway so local constabularies can connect officers on the street with national databases containing biometric profiles.1 Tablets and HD body-worn cameras are becoming ubiquitous.

This step change in capability is both informational – police know far more about their immediate context – and technical, too: they can now see and monitor more of their environment and the people around them. Together, big data and advanced analytics platforms, body cameras and mobile video and sensor devices represent a step-change in the monitoring capability of the police, where individual officers are now able to access information about people they encounter, and monitor communities more closely than ever before. The obvious benefit is that policing will be able to intervene more quickly to prevent crime and harm, and to have smarter targeting of their resources to deliver the biggest impact.

As society continues to place great expectations on policing, and against a backdrop of rapidly changing crime threats – themselves often fueled by new technologies – the operational capabilities of the police will be under constant pressure. For example, policing has gone from seeing mobile technology as a bonus – a shiny new toy that a few lucky officers will get to use – to it being a force-wide necessity, with every officer needing and expecting networked tablets and smartphones at their disposal. That expectation has still not been met everywhere, but forces have made significant progress in the last few years. Chief officers have recognised that the body-worn camera and the mobile tablet are becoming as fundamental to the patrol officer’s role as the truncheon and whistle were to their constabulary forebears.

**Police technology shortcomings**

The challenges of transforming policing through technology are well-known. In addition to poor procurement practices and poorly conceived and misdirected efforts by central government, there is a cultural barrier: police officers are highly practical and pragmatic in their outlook. They often accept what is good enough – and the phrase “we’re not trying to build a Rolls Royce, we only need a Mini” is still a reasonably familiar one. And so what often tends to happen is that a ‘patch’ is applied – leading to inelegant solutions that place the burden on the people, as new technologies are ignored, worked around or abandoned altogether.

Nevertheless, the growing importance of technology is recognised across the sector, and within policing agencies, the senior leaders in the service are working to develop a range of programmes to enhance the technology on offer for their staff. A recent recommendation from HMIC was for every police force to develop a plan for digitally enabled services – one of the key prongs of any technology strategy. However at present, the majority of forces do not have a published plan of this type, and technology investment is lagging.

Many politicians who scrutinise the police have passed judgement on the poor condition and capability of police technology in the past2 and, even recently, large forces like Police Scotland have been prepared to publicly argue the necessity of spending significant sums to modernise systems in order to maintain basic

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1 GOV.UK. 2018. Police trial new Home Office mobile fingerprint technology.

2 For example, the Greater London Authority’s criticism of the condition of the Metropolitan Police’s technology: London Assembly. 2013. Smart Policing: How the Metropolitan Police Service can make better use of technology.
and quite quickly give their officers good tech that is market-leading - and comparable with the WhatsApp, Uber or Airbnb functionality they are used to when they take off their uniforms. They do not need to put up with bad technology anymore.

**THE PRODUCTS ON THE OPEN MARKET THAT OFFICERS HAVE OUTSIDE OF WORK IS PRECISELY THE GOAL THAT POLICE FORCES SHOULD BE ASPIRING TOO**

Despite many attempts to coalesce policing around a single national strategy, tied to a single procurement model, policing exists today in a form that makes technology investments local, sporadic, and uncoordinated. This is often regarded in negative terms. Unlike defence, which also has security constraints and high reliability standards, policing is not one organisation operating under a single chain-of-command. And unlike health, that can act as a single buyer because of the funding and organisation of the National Health Service, police forces are constituted and governed as legally independent local agencies. It has therefore never proved possible to command them to buy the same kit, technology or services in a certain way. Where that has happened, it has been the result of voluntary collaboration, and only very occasionally, with mandation from the Home Office (or the threat of it) used to encourage such decisions.

With the exception of data recording and reporting standards - for which UK policing has always benefited from national consistency - operational practice and force activity, including how staff are trained, equipped and deployed, has always been a diverse picture with no one approach adopted everywhere. The fragmentation and poor coordination of police forces has been especially marked in technology, because the police have bought technology at different times in response to both operational need and policy and legislative changes, and off the back of the pressing needs of various legacy systems and redundancy timeframes.

In fact the products on the open market that officers use daily outside of work is precisely the goal that police forces should be aspiring too. Today’s developments would allow a really smart police force to radically change its business model

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3 See Police Scotland’s own recent assessment of their technology shortcomings, including that only 3,000 of the force’s 17,000 staff have mobile devices: [https://www.thescottishsun.co.uk/news/2719937/poor-police-technology-is-giving-the-bad-guys-an-edge-warns-chief-officer-as-he-urges-investment/](https://www.thescottishsun.co.uk/news/2719937/poor-police-technology-is-giving-the-bad-guys-an-edge-warns-chief-officer-as-he-urges-investment/)
According to RUSI there are at least 220 different policing databases in use. Several major efforts over the years – government-backed and otherwise – have sought to address the fragmented technology picture, in order to achieve more cohesion, short of merging the forces themselves. Most recently, we saw the proposal by Sir Tom Winsor for a new collective agreement for procurement, underpinned by a fair and structured decision-making procedure so a national network code could be set and implemented, as it is in the energy and transport sectors. This proposal is contested, and has not yet been agreed to, but it is the most recent attempt to make 43 police forces move in the same direction when it comes to common approaches and operating standards for technology.

But diversity at this scale may not be the problem it is often presented to be. The hyper-localism of the US policing landscape (with upwards of 18,000 separate policing agencies, serving over 325 million people) means a huge number of buyers. However, with the exception of big urban police departments, these are usually very small and scaling any tech product can be hard - not to mention agglomerating different clients over different systems and navigating the boundaries of State laws around data protection, procurement and access controls. In contrast, England and Wales with 43 forces represents fewer individual buyers of technology, but on their own these police forces - even the smallest ones - have the scale to offer tech startups a great opportunity to prove their product’s utility with hundreds or even thousands of users. This can allow startups to get traction in a decent-sized geography and then scale, as tech firms like Chorus Intelligence have managed in the last three years.

We need greater collaboration on certain systems that serve policing as a whole, like our national databases for forensics and intelligence, and shared airborne and other specialist assets that require major capital investments. But in terms of the innovative and agile technology products that are now on the market, we see no fundamental weakness in how British policing is constituted that results in a structural barrier. In fact the size and scale of the policing market in England and Wales should be very amenable to a thriving ecosystem in tech startups, with plenty of potential buyers and each one offering a small company more than enough scale and scope to prove their worth.

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There is also sometimes a mismatch between the products that procurement staff value and what the frontline officer will readily and willingly adopt. This is an ongoing tension. Some large national projects have failed as a result of it – most famously the Home Office investment in Blackberry mobile devices, which the National Audit Office concluded in 2012 had provided poor value for money,7 and which led reportedly to thousands of the devices never leaving their packaging.

Overall, many shared the view that policing needed leaders willing to take risks on new technology and too often, the safe option was to maintain current legacy systems, watch what others do, and then decide what to buy – but failing that, await a national solution. The aversion to using products and services from tech startups was both practical – forces were unfamiliar with the market offering (which this report hopes to begin to address) – and cultural, too many simply did not aspire to a more agile procurement approach, or preferred bespoke products because they deemed policing’s needs to be somehow special.

These problems are not new, but they have held back the opportunities for tech startups to expand in the policing sector for many years. As one leading analyst observed, ‘process and culture are very difficult to shift’. The habits and structures of those who operate in the policing technology landscape may be entrenched. We do not presume that they can be worked around or replaced overnight. However, change is possible - and, in the end, it will prove inevitable.

**Why policing is different (but not special)**

The local structure of policing and the legitimate differences between the police role and the private sector’s consumer offering has led some to argue that policing is justified in choosing bespoke technology products – making rather than buying – and not compromising on what best suits local conditions. But this attitude is being challenged. As Simon Parr, former Chief Constable of Cambridgeshire Constabulary has remarked: ‘At the heart of this, policing has got to get used to the idea that it is not different. What it does is different, what it does is really significant in terms of impact on people’s lives, but actually what policing does with information is no different to any other business. It collects it, it aggregates it, it puts rules around it, it has rules around who can see things, and it makes decisions that somebody has to go and do something.’

The technology challenges of police agencies are at one end, specialist, complex and unavailable in the vendor marketplace, and at the other, very conventional, commoditised and widely available as off-the-shelf products. When even basic software needs of investigation teams are not being met, the urgency of finding quick solutions is obvious. The public would likely be amazed to learn that some investigations teams use basic applications like Word and Excel to maintain records and databases of operational activity. Moving to a platform like that offered by Clue has offered many forces a step-change in capability, without having to procure an expensive, bespoke platform that only works for policing purposes.

The diverse needs of the marketplace can usually meet the operational demands of the police, even when factoring in security sensitivities and data protection needs. Gone are the days when strict security protocols and data security concerns were used as reasons to avoid every commercial product that was not bespoke for a given police force. Even early concerns about the cloud – also reflected in the private sector initially – have now given way to an understanding that this approach is the only game in town when it comes to having secure information architecture to cope with the massive data volume demands and mobility needs of police forces.8

**The important (and shifting) role of the centre**

The police technology market in the United Kingdom has been a mixed picture for decades, with local and national authorities both taking the lead on buying technology at different times. Before 2010, chief constables largely dictated the procurement of technology at a local level, but these efforts were eclipsed by the dominance of large Home Office-led programmes. The then National Policing Improvement Agency (NPIA), with a large budget and wide reach, was responsible for developing, owning and implementing major technology programmes, and the initiatives of local police authorities were forced to the margins. After the abolition of the NPIA and changes to governance embodied in the Coalition Government’s Police Reform and Social Responsibility Act 2011, the Home Office stepped back from a leading role in procuring police technology, and locally elected Police & Crime Commissioners (PCCs) were expected to

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8 PublicTechnology. 2018. Why cloud is no longer a dirty word in policing.
take greater responsibility. Many in policing still take the view that abolishing the NPIA without a vehicle to continue its important national functions set policing technology efforts back.

A number of core national systems remained under Home Office management, and a tender process began in 2011 for the replacement of the Airwave emergency services communication supplier (a procurement still ongoing even in 2018), but further moves by the centre to buy technology on behalf of the whole policing market did not materialise, in part due to budget constraints, but primarily because of the Ministerial preference for localism. The pendulum had firmly swung towards the local, with the centre adamant that it was best suited to playing only a strategic or superintending role.

In 2013, the Home Office created the Police Innovation Fund (PIF), which was funded via a top-slice to annual force budgets, and allowed local areas to spend on local projects, many involving technology products and services, through a bidding process signed off by PCCs. That investment of £55 million annually was not coordinated by the centre and because of the application process and the divergent priorities of local forces, a patchwork of one-off projects received funding, many of them IT-related, ranging in cost from £38,000 to £4.8 million. However there is no assessment of how the use of this fund benefited policing as a whole, and it did not amount to a coherent innovation or investment plan for policing.

The PIF programme was criticized for being a crude top-slice, and for lack of transparency, and for poor quality-control in the projects that were funded. As Gavin Hales, of the Police Foundation wrote in 2015: “The fact that £55m was allocated and exactly £55m has been committed must as a minimum raise concerns that there was no quality threshold for funding, rather that bids were funded in descending order of assessed scores until all the money was spent.” As a result of a new, and more generous funding settlement for the Home Office announced in the 2015 Comprehensive Spending Review, the Innovation Fund was replaced by the much larger Transformation Fund, which began supporting local projects after March 2016 - and this year is set to allocate £175 million, more as a proportion of overall expenditure than even the Ministry of Defence on its major innovation programme.

Police forces relying on the Home Office to provide local technology solutions have been waiting years, with very little progress. The ever-present promise of a national ‘solution’ just around the corner paradoxically serves to slow down progress, by making local actors uncertain about whether their solution will have longevity, or be overtaken by a national programme. The repeated experience of such programmes failing to deliver on time, or on budget, and often not at all, has not apparently dampened the enthusiasm of local technology buyers to pursue innovative solutions today, in favour of a ‘wait and see’ attitude, thus hampering the capabilities of local officers who have to go on relying on antiquated systems.

“National initiatives and programmes are currently waxing in influence; they will achieve many of their objectives in harmonising – and improving – police technology. But for as long as forces have local identities and accountability, control will never be entirely centralised, there will be a ceiling on the extent to which matrixed technology management is possible, and national initiatives will struggle for long-term security over funding and authority.” – Digital Policing Review: Technology Futures Operations

Many now perceive the pendulum to be swinging back towards the centre, with a desire to see more direction and coordination - exemplified by the shift in how the Police Reform and Transformation Board wants to use the remaining budget of the Police Transformation Fund to pump-prime a series of national programmes. The Home Office also appears to be more willing to take a lead, with platforms like the Biometric Services Gateway, and the ongoing project to provide a modern Emergency Services Network. It remains to be seen if a reinvigorated role for central agencies will drastically improve the ecosystem for new tech startups looking to engage in the market for the first time. Whatever is achieved in this direction, it is clear that much can be achieved in spite of top-down initiatives, and there is no reason for local forces to wait before engaging directly with companies that can offer agile, bottom-up transformation.
Local forces – the 43 police forces, their chief officers, and their procurement leads. Police forces in England and Wales are independent legal entities, established by law and led by an operationally responsible Chief Constable. Most force procurement departments are now managed by senior civilian staff, rather than senior officers, but some forces retain a Superintendent in charge of technology and digital services.

Police & Crime Commissioners.
Created by the 2011 Police Reform & Social Responsibility Act, elected Police & Crime Commissioners (PCCs) are the democratically accountable executives tasked with overseeing police forces in England and Wales (the role is assumed by the Mayor in London and Greater Manchester). As the legal authority overseeing the budget and performance of police forces, they are required to set out local priorities, and approve all major expenditure.

HMICFRS. The Inspectorate of Constabulary is responsible for reporting to the public and Parliament on the efficiency and effectiveness of police forces, which now form part of their rolling programme of PEEL inspections. Technology investments and the impact on operational business are therefore frequent areas of interest for inspectors.

National Police Chiefs’ Council (NPCC). Created after the dissolution of the Association of Chief Police Officers, the NPCC is the single professional body for the senior leadership of the police service. In November 2016, NPCC published their strategy for policing in the next decade – Policing Vision 2025 – which included ambitions around technology.9

Police ICT Company. The Police ICT Company, established in July 2015, was designed to help coordinate police investments in technology to avoid duplication and to encourage interoperability and economies of scale. The ICT company "[seeks] to ...help the service buy ICT better, manage it better and exploit new capabilities more successfully."

National Police Technology Council. This non-statutory body is a committee of senior staff leads from across the service who advise and coordinate the operational technology needs of policing, and help deliver the technology elements of the NPCC’s National Enabling Programmes.

Home Office. As the central government department responsible for policing, the Home Office is the primary source of policy and regulation affecting policing at every level. Over the years, the role and influence of the Home Office has been critical to the development of police technology and many groundbreaking innovations like DNA and the Police National Database.

College of Policing. The College is the national centre of excellence for police training, accreditation and best practice. Created in 2013, the College hosts the national ‘What Works’ centre for crime reduction and operates the principal training programmes for senior leaders in the service (‘The Strategic Command Course’).
FUNDING POLICE TECHNOLOGY

Police technology is a mixed economy funded from a number of sources. Setting aside the technology that is co-funded by local authorities and other public sector partners (for example, CCTV and some offender monitoring schemes), for what they fund themselves, the police are largely free to decide what technology they buy, and who supplies it. There are constraints around health and safety imposed by the Home Office following assessment by the Centre for Applied Science and Technology (CAST) – which includes prohibiting certain tools, or creating lists of permitted versions of products – in addition to the usual requirements pertaining to public bodies around procurement to ensure fair competition for contracts and value for money.

The principal expenditure is undertaken by local forces themselves, in addition to the national systems and programmes that originated centrally and continue to be funded by the Home Office, in part or in full, for example the Police National Database (PND). As Chief Constables are independent, they have discretion over how they allocate their resources, and can choose to invest more or less in technology, from within their resource and capital budgets, notwithstanding that they must usually receive consent from their PCC before incurring significant expenditure.

Major contracts and multi-year investments are always signed off by PCCs and any national funding for local technology projects is now exclusively channelled through one route – the Home Office’s Police Transformation Fund – either in the projects it pays for, or the national programmes it funds. In the past, there were major national technology programmes that were owned and funded by the Home Office, but more recently, central government has taken a different approach, creating funds that are used to leverage local contributions and creating a bidding process to support the most deserving local schemes. This began with the Innovation Fund, and the Police Knowledge Fund, and is now dominated by the Police Transformation Fund.

FOCUS: THE POLICE TRANSFORMATION FUND

In 2016 the Government decided to change the Police Innovation Fund into the Police Transformation Fund (PTF). The ethos of the two funds is essentially the same: to drive innovation in UK policing. However, the size of the PTF is much larger – c.700M over four years (to 2020) – and the governance of the PTF is significantly different from that of the PIF.

The Home Office has the ambition to make policing a self-reforming sector, and the transition to the PTF represents part of this ambition. A new oversight board – the Police Reform and Transformation Board (PRTB), made up of the most influential policing organizations in the UK – was formed, and plays a role in funding allocation decisions regarding the Police Transformation Fund. It plays a superintending (rather than a direct commissioning) role in regard to the four national programmes that are funded by the PTF.

When it was created, the Home Office wrote to the PRTB identifying the following priorities: serious and organized crime, blue light service emergency services collaboration and vulnerability. The PRTB also identified five priority areas for intervention, these being: digital policing, business enablers, workforce, specialist capabilities, and local policing. The PRTB’s secondary priorities are:

10  The Police Knowledge Fund (PKF), overseen by the College of Policing, is unconnected to the Police Transformation Fund. The Knowledge Fund’s primary purpose is to facilitate university partnerships with police forces and to enable individual police officers working with academics to co-design research and improve the application of evidence in policing more broadly. The PKF, in conjunction with the Higher Education Funding Council for England, has cosponsored a range of police-university partnerships.
For each year to date, Police & Crime Commissioners were invited to bid for funding to support local forces, with many projects involving a lead force and a consortia of partners. In the 2017/18 process, the police applied for approximately £375 million, of which £128 million was approved. Roughly 40% of bids received funding. There were 97 bids (plus 4 resubmissions from a previous process and 2 re-profiling requests), and 42 were approved. The remainder of the funding of £70 million has been earmarked for national programmes (see below).

Whether projects were truly innovative or just business as usual was a crucial component in deciding which proposals were approved and which were not. Projects deemed ‘business as usual’ were strongly disadvantaged. Because they do not control the commissioning, the PRTB process serves to ensure a quality threshold is met and that bids align with the stated priorities. The PRTB is highly conscious to align their recommendations with the officially (and unofficially) expressed expectations of the Home Office.

The Home Office also has complete oversight over the financial aspect of PRTB work, such as negotiating re-profiling, and is primarily responsible for assessment and oversight of ongoing work. Therefore projects not supported by the Home Office – even if they are favoured by the PRTB – are not likely to be funded.

Another key obstacle facing the PTF are the rules and politics that regulate the allocation of funding. Funds distributed from the PTF are tied to the government financial year, meaning that police forces must spend all allocated resources within a set period. This encourages wasteful spending and undermines long-term planning. And as bids are submitted by PCCs, forces that cannot persuade their PCC to back a project cannot expect to receive any funding.

The PRTB has transitioned to a commissioning system, whereby top priorities (the building blocks) drive the development and commissioning of centrally developed work. However, most PRTB resource has already been accounted for. In 2017/18, the fund totalled £175 million and, in 2018/19, it was originally expected to be double that. However, the Home Office have now indicated that funding will probably instead be kept level (i.e. ~£175m for 2018-19 and 2019-20). Most proposals have been for multi-year projects, so a great deal of resource has already been accounted for. Some amount of money has been set aside for commissioned projects, but it is less than 40% of the total PTF. The remaining sums for 2019/20 may no longer be allocated via a bidding system to which PCCs can apply, though this has not been finalised at this time.

The budget for the Transformation Fund runs out in March 2020 with final spending allocations for 19/20 from the funding left available due to be made in January 2019. Existing projects that need to be sustained beyond this date therefore face a ‘cliff-edge’ and will either end abruptly, or need to transition to other funding sources. Until the next Comprehensive Spending Review, the Home Office cannot commit to the level of available resource for the Transformation Fund beyond 2020, or even the continuation of the fund itself. The future funding model for innovation in policing needs to extend to at least the end of the Parliament in 2022, though many senior leaders in the police service would want it to extend even further, aligning with the NPCC’s Policing Vision 2025 work strands, such as the Digital Policing Programme.
2. TODAY’S POLICETECH MARKET

Policing has a complex range of data and technology needs that require constant servicing and updating, and many companies exist to meet this demand. In addition to long-established commercial suppliers, some new entrants have gained a foothold in the market in recent years, though these have also tended to be large, multinational suppliers. In reviewing how forces currently allocate their technology spend, though available data is limited, it is apparent that the policing sector is massively reliant on a small number of large vendors and procures technology with very long contractual terms, giving it limited flexibility to respond to a fast-changing tech landscape. Examining contract spend for the sector, as well as the local experience of three separate forces, this chapter outlines the market as it is today, and sets out how policing currently buys technology, with a clear bias towards large suppliers and only a modest contribution from SMEs.

An opaque market

Police & Crime Commissioners are the budget-holders for policing, but with limited staff resources, in practice it is individual forces who manage the procurement process and let contracts. Very few details of these contracts were published before 2010, and there was no central database of existing contracts, or even a published record of all technology providers servicing policing. The latter is still not published, but open data principles adopted by the Coalition Government (2010-15) have made the market more transparent.

The Blue Light procurement database11 is the closest we have to a single, public repository of current contracts for policing, covering wider spend than just technology. However, even this database is not entirely comprehensive, with often absent or redacted contract information, making it difficult to get a complete picture of the ongoing contractual arrangements in place with vendors. Spend on a basket of common police kit items is now published annually, but details by force of the much higher spend on technology services and contracts is not.12

After 2012, PCCs took responsibility for force budgets and began playing a role in major procurement efforts by the constabularies they governed. The level of engagement and direction that PCCs provided forces varied significantly, but many took the opportunity to influence the size and nature of the procurements – especially where the tenders related to frontline equipment or public-facing products, like body-worn video, that PCCs wanted to promote to their constituents. Some PCCs - though not the majority - also set out to drive more transparency around expenditure, with areas like London publishing every decision taken by the Deputy Mayor for Policing, and thus giving greater clarity over what forces were buying, from whom, and for what purpose.

One of the consequences of an opaque market where present operational needs are communicated infrequently (if at all) is that current and potential suppliers do not have a clear view of what the customer really needs. Market competition and limited incentives to cooperate also make it difficult for the police to have a clear view of what the market currently offers. This means that companies find the policing market difficult to navigate and hard to penetrate, with several examples of firms abandoning the UK sector after fruitless efforts to engage.

Those innovative products that get into the police space – even at the early stage of demo or free trials for familiarisation – are currently often the result of a chance encounter, a personal connection, or an unprompted professional referral. And it is not unusual for former police

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11 See the database here: https://bluelight.eu-supply.com/
officers or staff to build companies offering a single product, utilising personal connections to win new businesses with their former forces, only to find themselves unable to scale. Companies that do not have these connections, especially start-ups that may be new to the policing sector, can be disadvantaged. It is clear that there is a need for more deliberate, curated approaches to helping young tech firms to connect with buyers and showcase the transformation their products can bring.

Compared with other sectors, for example local government, the customer base in policing is relatively small, and though each force can decide how to allocate its budget, the overall spend on technology by policing in England and Wales is skewed towards the biggest forces – especially London – given their centralised procurement structure and scale.

**Leading forces**

A number of smaller police forces have built a reputation for leading on technology innovation. The leadership of a single force can be critical in persuading other forces to move, and to encourage chief officers in neighbouring forces to adopt the same approach, if not the same supplier. In West Yorkshire, with the support of the Police & Crime Commissioner, the force has become the first to roll out the new Biometric Services Gateway developed by the Home Office, giving mobile fingerprint devices to officers who are able to verify identities against the national fingerprint database without returning to the station.

**Sussex Police** under the leadership of the Police & Crime Commissioner, has secured 11.5 million over three years to fund a consortia of forces in the region to develop video-enabled justice, to improve the scope and efficiency of virtual courts and save the time taken for officers to attend court hearings. **South Wales Police** has pioneered the deployment and testing of facial recognition technology, using it in a variety of specialist operations and event scenarios, and deriving important technical and practical lessons for the wider service. **Avon & Somerset Constabulary** has taken the lead in data analytics and aggregation with the setting up of an intra-agency data hub, drawing in data from multiple agencies to identify risk and help deploy resources proactively. And **Durham Constabulary** has pioneered a new algorithmic custody risk assessment tool. All of these force initiatives have benefited from, or were made possible by, the funding they received through the Transformation Fund.

**CASE STUDY**

**DATA-DRIVING DETENTIONS IN DURHAM**

In collecting increasing amounts of data, the police can now readily use algorithmic software programmes to evaluate their own activity to root out wasteful or misguided practices, or simply giving them greater insight into how their staff work and the offenders they are processing. In Durham Constabulary, the data that the force held on offenders in their area has been used to build an algorithm to power a predictive harm model to guide (though not yet to dictate) detention decisions, allowing custody sergeants to make more accurate risk-based decisions about when an arrestee should be remanded instead of bailed. Durham’s decision-advice tool was developed with the support of Cambridge University and in 2017 began to be used routinely for local bail and custody decisions.14

The algorithm – the Harm Assessment Risk Tool (HART) – has shown early promise, achieving a high accuracy score after a two-year trial that began in 2013. HART’s assessment that an arrestee was low-risk was accurate 98% of the time and forecasts that they were high-risk 88% of the time, based on subsequent offending. Other police forces are considering using the same technique. Data in this case is guiding, not driving, a decision, but the consequences for how custody sergeants work are still significant.

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**CASE STUDY**

**MARK43 (USA)**

Having raised almost $78m since its founding in 2012, Mark43 remains the global exemplar for startups trying to scale in the PoliceTech market.

In 2012, a group of Harvard University engineers were tasked with conducting a network analysis for a Massachusetts State Police gang unit. Having experienced how time-consuming and cumbersome the process was, they decided to design a system for streamlining the recording, collection and sharing of crime data. Mark43 is a cloud-based software platform designed for police departments to manage their arrest records and incident reports in a single integrated and indexable system. Their streamlined, user-friendly record management system (RMS) allows police officers to record and search arrest and incident reports quickly and efficiently. This same data is then used to power their computer-aided dispatch (CAD) system, which allows first-responders to immediately access potentially life-saving background information on suspects. This information is integrated into a Google Map & Satellite dashboard, allowing officers to visualise incidents in their jurisdiction, and automatically identify crime hotspots.

With a recent Series C round of $38m and client growth of 550% in 2017, Mark43 has shown that startups can gain high returns and substantial venture investment in this traditionally difficult market.
The Suppliers

The multiple back-office and frontline technology needs of policing are met by a diverse range of suppliers, many of whom serve multiple forces or have at least been active in the policing market for several years, if not decades. However, when measured by size, the policing market is predominantly serviced by fewer than two dozen larger vendors, offering products that have been in use domestically for many years, with several suppliers still servicing platforms that were first introduced in the 1980s or 1990s. The preponderance of now extremely outdated legacy systems and several service-critical platforms that have long become technically redundant is one of the main reasons why the police technology market leans towards older, larger firms that have built businesses around expensively maintaining and updating these older technologies. These outdated systems are rarely interoperable and very often hinder the adoption of good point solutions or SaaS platforms.

The police technology market is dominated by a small number of established companies with many decades of domestic experience, including Capita, Northgate and BT. In the last decade, new entrants to the market with a global reputation and significant corporate clout have managed to find a place in the domestic UK policing sector. These include:

**SAAB** - The Swedish defence and security firm currently supplies their ‘SAFE’ Command and Control system to Cheshire Police, Warwickshire Police, and West Mercia Police and to up to 13 other forces as part of a framework agreement.15

**KBR** - Contracted by the Metropolitan Police in 2015 to provide a service integrator function to support estates management, and most recently appointed as delivery partner for the national Transforming Forensics programme, overseen by the National Police Chiefs Council.16

Continued over leaf...

15 Saab 2017 Saab establishes UK software team to support growing SAFE customer base.
16 KBR 2017 KBR Awarded Delivery Partner Contract for UK Transforming Forensics Programme.
Microsoft – The US software company was recently approved to service UK policing clients by going through the Home Office’s National Police Information Risk Management Team (NPIRMT) assessment. With UK data centres, their Azure cloud platform has been adopted by the Metropolitan Police to host video footage from 22,000 body-worn cameras.17 The Office 365 platform is also now being considered as a national offering which all 41 police forces would be able to access, but also to configure for their local needs.

Amazon Web Services – In addition to servicing the Ministry of Justice, AWS offers a cloud service to UK police forces and at present, offers 19 partner solutions from firms utilising the AWS platform for specific policing applications, including e-discovery, data analytics, records management, and secure messaging.18

CGI – The Canadian software and IT consulting firm has had a presence in the UK public sector for several decades but only recently ventured into the policing market.

These new entrants to the policing market, especially SAAB, Microsoft, AWS and KBR, have brought new products to market and put pressure on established suppliers. However, other large new entrants have had a difficult time, and are either experiencing major delays, or have had their primary contract terminated early.19

Northrop Grumman/Lockheed Martin – With experience of providing the same services to large US police agencies, the military contractor Northrop Grumman was selected in 2013 in a £90 million contract to supply the Metropolitan Police’s new Command and Control platform, with Lockheed Martin appointed as the systems integrator. After delays, technical problems and the repeated failure to deliver to project timescales, the contract was terminated in 2016.19

IBM / Concentrix – The American IT behemoth was contracted to modernise ActionFraud – the central e-fraud reporting and intelligence system, hosted by the City of London Police – as part of a £35 million 5-year project, in partnership with the US outsourcing firm Contentrix. Two years on, the system has still not been implemented.

These new entrants are similar in many ways to the suppliers who have a well-established presence. They are large corporate entities that service multi-million pound contracts over 5-10 years, and who are well financed to support complex and prolonged procurement processes.

18 Civica. 2018. The promise for policing in IT rationalisation.
Companies that have scaled

In today’s world, disruptive technology that proves its utility can be built upon rapidly and those tech startups that demonstrate their value can scale quickly. According to analysts, domestic security and public safety are growing markets in Europe and elsewhere, and startups that succeed can expect to grow quickly. A number of today’s most important companies in the public safety realm began less than 10 years ago as small tech startups, but have now successfully scaled.

- **SCRAM Systems (USA)** - SCRAM Systems uses a number of electronic monitoring solutions to monitor convicted prisoners and those suffering from alcohol dependency.
- **Hacking Team (Italy)** - Hacking Team provides offensive cyber capabilities to law enforcement and other agencies to disrupt and deter cyber-criminals, serving clients worldwide, including the FBI and other major state authorities.
- **Nuix (Australia)** - Nuix is a powerful data analytics and cyber security platform that helps clients process massive quantities of unstructured data and operationalise that information to improve decisions and defend against threats.
- **DigiLens (US)** - DigiLens is a Silicon Valley-based startup seeking to use ultra wide-lens AR and VR solutions to support police operations. In 2018, the company closed a $25m Series C round led by Continental AG.
- **Palantir Technologies (US)** - Palantir has developed a suite of software applications to help law enforcement agencies to integrate, visualise and analyse complex datasets relevant to police investigations. In 2017, the company was valued at $21bn, making it one of the most valuable tech startups in the world.

Police spending on technology

We conducted a rigorous financial analysis of technology spend in forces across the country, in order to assess the current openness of the market to SMEs, as well as general trends in market consolidation and monopolisation.

At a national level, we identified considerable market consolidation, with police forces across the country continuing to spend with a small group of suppliers. We took a sample of 2,000 IT and software contracts valuing £1k or more for 40 police forces (excluding the Met Police, who we analysed separately) with 415 suppliers between 2013-2017 YTD. We found that, during this period, c. 67% of contract spend went to the top 10 suppliers, while c. 79% went to the top 20 suppliers. In fact, of our sample contracts, over 27% of spend went to a single supplier (Capita), with BT (8%), SCC (7%) and Insight Direct (5%) also all receiving large proportions of spend.

List of top 5 suppliers each year

2013: Insight Direct | Accenture | SCC | KIM | Softcat
2014: Sopra Steria | Dell | Cable & Wireless Home Office | SCC
2015: Home Office | BT | SCC | Virgin Media | Softcat
2016: Capita | BT | SCC | Insight Direct | Softcat
2017: Capgemini | SCC | BT | Vodafone | Black Marble

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20  See, for instance, the following analysis from Research and Markets:

European counter terror and public safety infrastructure will go through a major overhaul, sustaining a 13.4% 2016-2020 CAGR surge. As a result, the European Homeland Security & Public Safety Market is expected to Grow from $84.8B in 2015 to $145.7B by 2020.

Despite the large amount of suppliers providing technology and software solutions to police forces, the same small group of international consultancies and integrators continue to be awarded the major, high-value contracts.

We also assessed individual force profiles in more depth to get a better picture of national appetite to work with smaller companies.\(^{21}\) We analysed IT and software contracts during the same period from the Thames Valley Police Force, Avon and Somerset Constabulary and North Yorkshire Police. These forces were selected as they offered a diverse sample, both in terms of size and geographical location, but also because there is a relatively large amount of publically-available contract data for their spend.

For all three of these forces, we analysed the consolidation of spend with the top suppliers, and also analysed proportion of spend with SMEs vs. non-SMEs.\(^{22}\) Again, we found strong supplier consolidation, but more alarmingly, we found extremely high dependence on non-SME providers - with over 90% of IT and software spend at these forces going to large companies.

When profiling Thames Valley Police, we analysed 432 contracts from 183 unique suppliers, totaling c. £55m. We found that the top 10 suppliers accounted for over 80% of spend, but also found that c. 91% of spend was with large companies, while the 116 SME suppliers accounted only for c. 9% of spend.

At Avon & Somerset Constabulary, we found a very similar pattern: analysing 429 IT and software contracts from 221 unique suppliers, totalling c. £52m, we found that despite lower levels of consolidation with the top suppliers, Avon & Somerset actually spent c. 92% with large companies, while the 144 SME suppliers accounted only for c. 8% of spend.

For North Yorkshire Police, we analysed a slightly smaller number of contacts during that time (304), and identified lower levels of market consolidation - with 240 unique suppliers for these contracts. Despite this, we again found high levels of dependence on non-SME suppliers for high-value, long-term contracts, with c. 86% of spend going to large companies.

Indeed, these large suppliers are broadly the same across all three forces. Our analysis found that just 5 suppliers accounted for c. 43% of IT and software spend at the three forces combined. As expected, these companies are all very familiar, well-established providers.

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\(^{21}\) Here, contracts were sourced from public databases, but also from data collated by Vigilant Research and researchers from Anglia Ruskin University.

\(^{22}\) Companies were analysed using DueDil, or where available, publically-accessible accounts.

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**List of top 5 suppliers 2013-2017 YTD**

<table>
<thead>
<tr>
<th>Supplier</th>
<th>Spend</th>
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<tbody>
<tr>
<td>SCC</td>
<td>£24.9m</td>
</tr>
<tr>
<td>BT</td>
<td>£10.1m</td>
</tr>
<tr>
<td>Home Office</td>
<td>£8.4m</td>
</tr>
<tr>
<td>Southwest One / IBM</td>
<td>£7.7m</td>
</tr>
<tr>
<td>Virgin Media</td>
<td>£6.2m</td>
</tr>
</tbody>
</table>

Source: 1165 IT and software contracts from Bluelight Procurement Database, Vigilant Research and Anglia Ruskin University - PUBLIC Analysis.
Finally, we profiled Metropolitan Police spend, which we excluded from national samples to avoid market distortion. Here, instead of analysing published contracts (of which there are relatively few publically available), we analysed actual financial invoices for IT and software spend between 2016-2017 (financial year). All invoices over £100k were individually analysed, but due to the sheer volume of invoices, a haphazard sampling approach was adopted to analyse all invoices under £100k. The results of this analysis confirm the same trends identified above.

First, we found that the overall proportion of Metropolitan Police expenditure which can be attributed to IT and software during that period was about 12% of total spend, with some suggestion that it is somewhat higher in the tranche of invoices between £50k and £100k and slightly lower for smaller and larger invoices. When looking at invoices above £100k, we analysed c. £57m of IT and software invoices, and again found considerable reliance on large, international suppliers. In fact, the Metropolitan Police exhibited the most acute consolidation of all forces analysed, with c. 70% of spend going to just 3 suppliers: CSC, Insight Direct and Atos. Worryingly, recent spending in 2018 has continued along the same lines: in May 2018, the Metropolitan Police committed to a reported £44m on a 10-year contract with Northgate Public Services (NPS), for the provision of an integrated operational policing system.

For certain areas of policing – for example, control room infrastructure or case management systems – the scale and complexity will typically require a vendor with a technology platform with the capability to match. It is therefore unlikely that a tech startup will offer a product that could comprehensively replace existing command and control systems, for example. However, even in these domains it is possible to imagine such platforms being implemented in such a way that smaller SMEs could offer services that docked with that infrastructure and could be adopted and bespoked in an agile way as operational needs evolved.

For example, the live and aggregated social and news media capability of DataMinr could enhance a control room’s overview of local conditions, and when going after suspects, a command and control infrastructure that had OpenALPR to detect wanted vehicles, location data from StarChase trackers to trace fleeing suspects without the need for high-speed pursuit, and Vintra live video analytics to alert response teams for wanted persons, could together change policing tactics and improve performance. Increasingly, lead technology vendors are forming partnerships with SMEs to develop and underpin the core product with many subsidiary tools and services, developed separately and designed to improve functionality and user experiences. Some of this is ‘SME-washing’, but at times it is testament to the strength of the products that the smaller tech startups are subcontracted to deliver.

Rather than considering specific business functions that offer natural opportunities for tech startups, it is more important to consider the thematic demands on policing in the present and future where we can expect innovative technology to be most sought after. In the next chapter we consider the technology needs of policing and how these are driving demand for new technology solutions.
Given the scale and pace of technology-driven innovation, policing will be impacted significantly in the next decade. The changes that new technologies herald, and the impact these will have on society and crime are unavoidable for an emergency service that must adapt to the shifting demands placed on it. The UK’s thriving technology ecosystem includes many companies that offer solutions that could easily be applied in a policing context, even if they have not yet been willing or able to enter the market. We also need to encourage innovative companies with existing similar products to focus on policing problems, so in this chapter we define where the sector’s biggest technology needs are.

In order to explore the potential contribution that technology might make, and especially the value that tech startups can offer policing, we have contextualised the developments into three broad themes. In this chapter we discuss the main areas of rising demand for technology in policing, within these three broad themes, before considering the offerings in the market from innovative start-ups.

The first theme is Citizen Engagement – which covers how technology is increasing the connections between the public and the police, facilitating better communication, and fostering engagement between police officers and the communities they serve. This covers both the ‘transmit’ dimension – a mix of both direct messaging and deliberate community engagement – and the ‘receive’ dimension – covering the many new ways that society can connect with the police, and seek help or supply them with information.

The second relevant theme for technology-driven innovation is in Supporting the Police – which covers all the areas where the traditional policing role, and the back office infrastructure that supports frontline staff, is aided or enhanced by modern technologies. This covers both the corporate processes for large police bureaucracies to make better decisions and allocate resources, and also the individual, where police officers are using new tools or platforms to fulfil their various service functions, including intelligence-gathering and other operational practices.

The third theme is Crime-Fighting – which includes those areas where traditional or novel crime types are being addressed in new ways using modern technology that was not available previously. This covers the tools that can now be used to uncover, detect and pursue crimes that may previously have gone undetected (and frequently unreported), as well as the means to combat new patterns of offending, using modern technology.

We regard these as the three biggest areas where policing is in need of technology support, or where policing has an operational need to expand the technology it currently uses, either to meet public expectations or organisational demand, or to address crime and other social harms. Below these themes sit 15 areas of business that every police force is engaged in, and which the firms in this report align to:
POLICE TECH PIONEERS

PUBLIC POLICY AND SOCIETAL TRENDS AFFECTING POLICING

Before considering the specific domains where the modern police agency is facing a demand that new products and services might address, it is important to acknowledge the macro-drivers that explain why policing is embracing, and must continue to embrace, new technology solutions. Their unique role in society does not insulate the police from these major trends and they help explain why police leaders are reaching for technological answers. Essentially, the demands are the same in any developed democracy with civilian police agencies that are operating within constrained budgets.

Budget sustainability. Ongoing fiscal pressure on policing agencies in the United Kingdom and the United States is encouraging efforts to adapt policing models to improve efficiency. And even jurisdictions like Canada that are not reducing police budgets significantly, are under pressure to deliver more for less, and to justify the relatively high cost of policing services. Technology provides true value when it can improve a process to deliver better outcomes, and at lower cost, rather than just a cheaper way to achieve the same outcome. Resources saved by a

- Biometric Surveillance
- Case Management and Investigation Software
- Public Confidence
- Cyber Security and Online Crime
- Data Analytics and Predictive Policing
- Digital Forensics
- Drones and Robotics
- Mobility and Deployment
- Offender Supervision
- Online and Social Media Channels
- Sensors and Scanners
- Situational Awareness
- Victim Services
- Video Camera Technology
- Workforce Management

CASE STUDY

VANCOUVER POLICE DEPARTMENT

Smart Uses of Data in the Vancouver Police Department – Being Transparent with the Public and Porous with Academia

In Canada, many municipalities, including cities like Victoria and Vancouver in British Columbia, publish detailed incident maps with data updated daily, including both offences and other incidents like police searches, interventions and traffic stops. The Vancouver Police Department (VPD) uses the GeoDash platform and Victoria uses the CrimeReports domain, supported by Motorola and the Socrata software platform. The VPD has also developed its own predictive analytics platform and has agreed as a matter of policy to open itself up to external academic study by sharing data with universities to inform research studies. In parallel, the Royal Canadian Mounted Police (RCMP) has a number of formal research partnerships and directly supports some universities to conduct studies of frontline policing practice as well as crime and safety issues.

In British Columbia, Simon Fraser University (SFU) is the beneficiary of RCMP funding to support their criminology department’s new crime data lab – the first in Canada to be secure, operating with an air-gap infrastructure and high security standards and biometric access protocols, and one of only three in the world to meet this standard (another is the new Institute for Global City Policing at University College London ). At SFU, security-vetted PhD researchers take policing data from VPD and RCMP databases to underpin innovative new research projects – for example, analysing repeat offending patterns or trends in vulnerability by crunching over thirty years’ of Vancouver’s 911 call data. Because of police support, other public agencies like local health boards have come onboard, and have agreed to fuse their own data to explore wider angles on complex safety issues like drug misuse and mental illness.
technology innovation can free up valuable officer time, but they can also enable reinvestments in other areas of business, where long-term value can be generated. With ongoing public sector budget pressures, the police, like other public services, need to be automating labour-intensive workflows. Some traditional policing activities have too high a cost base for a conventional human-centred model, and that model can be less effective anyway, when compared to the accuracy and reliability of modern computer platforms and data science applications.

**Tackling demand through prevention.** The reactive policing model is costly and ineffective, and even though policing will always involve emergency response to safeguard life and prevent imminent harm, the optimum use of police resources is in the preventive domain. Prevention – long acknowledged as the original, core Peelian function of the police – is constantly under pressure, but especially so in times of austerity. For policing, a step-change in productivity that improved emergency response or crime investigation leading to higher arrest and prosecution rates has value, but the real productivity prize comes from technology that can enable police officers to get upstream – preventing crime and avoiding the costs of offending.

In New Zealand, a major plank of their policing strategy is ‘Prevention First’ which involved upfront investment in mobility that was tied to a clear and explicit expectation – fully costed and spelled out – that the time-saving it yielded was to be redirected towards prevention.23 Beginning in 2011, this upfront technology investment allowed officers to benefit from hours saved on paperwork, but that time was paid for and so police managers wanted officers liberated from desks to be back in the community where they could focus on their core role: prevention and problem-solving.

**INNOVATOR TOP TIP:**

**IT IS NOT ENOUGH TO SAVE MONEY – YOUR PRODUCT OR SERVICE MUST DEMONSTRATE HOW IT CAN REDUCE DEMAND ON THE POLICE IN THE LONG-TERM.**

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Some technologies could also be decisive in influencing the very posture that the police adopt, as well as the threshold for offending that they are able to pursue. Opinion research suggests that the public prioritise the prevention of crime when asked what they think the police’s principal role is, and this might indicate a preference for more proactive use of data to pre-empt criminality (and thus mitigate repeat demand).24 Methods like ‘Predictive Policing’, now in use in cities across North America and in some parts of England,25 allow officers to assume a more preventive posture, either via predictive mapping (to target places), or predictive analytics (to target people). As mobility devices spread and cloud infrastructure advances, the average neighbourhood constable, performing that preventive role by building local knowledge and fostering community relations, could come to resemble a Digital Dixon of Dock Green – the modern beat bobby now digitally-enabled and equipped with the means to work more effectively by readopting a traditional, preventive role.

25 Palantir trialled their platform in the Metropolitan Police in London in 2014-16 but the project was discontinued. PredPol ran a trial with Kent Police which was evaluated in 2014.

THE REAL PRODUCTIVITY PRIZE COMES FROM TECHNOLOGY THAT CAN ENABLE POLICE OFFICERS TO GET UPSTREAM.

VISUAL LABS (USA)

Visual Labs is a software platform that enables a smartphone camera to function as a police-grade body-worn camera.

The platform allows officers to mount their smartphones to their bodies using a rotatable clip, and capture footage through the camera, which is then assigned a digital fingerprint, before being fully encrypted, and automatically uploaded to government-grade cloud storage systems, in order to maintain chain of custody and maximum security. The software approach to body-worn cameras offers a number of benefits that cannot be achieved with traditional hardware solutions. First, videos are uploaded to storage centres immediately via the cloud, rather than imported manually at the end of a day through a docket. Videos can also be streamed live to control centres, and can be activated remotely if officers are required to capture footage in high-risk or conflict situations.

The software approach also enables police forces to capture and collect crucial backend analytics, including time-stamped geopoints of all operating officers, providing constant force situational intelligence and awareness. Spun out of a research project at Stanford University investigating automated applications of imaging in 2014, Visual Labs secured its first police client in 2015, and is now working with 20 police forces across the US. It has also gained significant traction in the private security market, with clients across America’s major sports leagues (MLB, MLS and NFL), as well as utilities management and monitoring.
Open, engaged and accountable.

Across the world, democracies continue to experience a societal shift towards transparency and public accountability that is affecting governmental agencies and bureaucracies of every type. Modern police leaders accept this change and are working to encourage a cultural shift where the advantages of openness – improved public awareness and citizen understanding – translates to operational benefits for the police, with improved confidence and higher levels of engagement from the public. Many of these efforts do not require technology, but some do, and providing policing services in a way that citizens have now come to expect is part of this. That means investing in infrastructure that makes the work of the police more transparent – for example, body-worn video – or new channels to accommodate how people live today and new tools to police digital domains. But it is also about adapting traditional policing processes to keep in mind the need for greater transparency and also for accessibility to diverse communities.

CASE STUDY

Futr. (UK)

Futr. provides a solution for 24/7 engagement with a local police force, while freeing up officers’ time for more critical tasks.

For the modern police force, communication and engagement with the citizens they are serving is crucial. Futr. has developed a platform that allows public sector authorities to create bespoke multi-channel chatbots to facilitate and improve citizen engagement. Authorities can upload their most common user questions and answers, and Futr.’s software automatically creates a chatbot that uses a combination of text, images, videos, buttons and maps to automate these interactions. Their natural language processing software is able to understand tonality, emotion and sentiment in user messages, and can automatically translate non-English questions and responses into the desired target language, allowing for multilingual communication. Not only does this streamline and triage demand on an authority’s time and resources, it also allows them capture insights on a community’s attitudes and opinions.

Futr. is currently working with Northamptonshire Police to develop a chatbot that can automate responses for low risk, high volume police 101 calls. During this project, the chatbot platform is expected to answer between 8-12% of 14.5 million Police 101 calls annually. This tool will not only transform citizen engagement, but also has the potential to become a centralised hub for data-driven reporting and case management. Futr. has integrated facial recognition into its chatbot technology allowing police officers to identify known citizens that have been reported missing via their smartphone cameras. In the future, the single multi-modal channel provided by Futr. could offer a number of smart integrations to allow citizens to contribute to case management operations in real time.

INNOVATOR TOP TIP:

Policing is about more than crime – can your product help the wider mission, by preventing hidden harms, safeguarding the vulnerable, or improving public confidence?
Police agencies around the world are living in a context that places them under greater scrutiny than ever before. At the root of many controversies is the need for police to be able to justify their actions, and to explain their decisions – in the court of public opinion, and more frequently an actual court of law – either in response to litigation, outside investigation or an inquiry. Technologies that can aid the police to justify their decisions, and help account for their behaviour will be increasingly valued. In addition, as technology becomes integral to important policing decisions, the ethics and governance of how these systems are used will need to be formalised and made transparent. One framework for the ethical use of data in policing – dubbed ‘Algo-Care’ – devised in Durham, and linked to that constabulary’s use of the HART tool to guide detention decisions, is a potential model for national adoption.26

**Co-producing public safety.**

The police rely upon individuals, businesses and wider civil society to help them to maintain order, uphold laws, and combat crime. Public safety cannot be delivered by the police alone – however technologically capable they are – and yet new innovations do enable the police to reach and enlist more partners to help them. For example, that might mean engaging directly over social media to mobilise citizens to help trace wanted suspects, like Canada’s Bolo Program, or using community networks to help neighbours to watch out for each other and address fear of crime, such as the platform offered by NextDoor. Involving the community in protecting themselves, like New Zealand’s Auror service for retailers, is a conventional policing effort now made simpler and more effective by digital tools. Even the means to allow victims to self-serve, not just through online crime reporting, but with platforms that allow evidence to be collected and shared to aid investigators, are becoming available thanks to tech startups. Whether it is the UK’s FaceWatch platform, supplying CCTV footage of suspects directly from businesses, or Callisto, allowing victims of sexual assault on campus to give time-stamped logs of their experiences to police when they come forward to report abuse, tech startups are helping the police fight crime by being open and collaborative, and by engaging with citizens.

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**CASE STUDY**

**CALLISTO (USA)**

Callisto is a non-profit organization that uses technology to combat sexual assault and harassment on university campuses. Sexual assault is a major problem on campuses in both the US and the UK, and yet less than 10% of sexual assaults that occur during college are reported to the police or college authorities – despite the majority of victims knowing their assailant. Callisto has developed a support platform for victims of sexual assault on US campuses to record and report their experiences. Callisto’s platform makes the reporting and investigation of campus sexual assault more systematic and effective, while also providing a support and safeguarding mechanism for victims. It is currently in use across 13 universities in the US, with over 150,000 active users.

Callisto offers victims three potential options for managing their reporting process. The first allows them to create a time-stamped, encrypted report of their experience, which cannot be accessed by any external parties, including employees of Callisto. The second option allows users to release their report on the condition that it matches with the alleged perpetrator of another report. About 15% of survivors who enter Callisto’s matching system are matched with another victim of the same assailant. The third option allows students to send the report they have created electronically to the college authorities, which would immediately trigger an investigation or consultation.

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MAJOR TECHNOLOGY DRIVERS OF INNOVATION

Automation and human judgement.

The skills and training of officers and civilian staff are often indispensable in a criminal investigation, and critical in the fair and respectful treatment of suspects and victims. Even as new tools are adopted, policing will continue to devote most of its budget to people, ensuring that they have the training and the capability to serve the public and address new crime threats. However, this does not mean policing is immune to automation. All industries will be impacted by the rapid development of AI and robotics, and there are areas where these will inevitably improve police performance. Whether it is the ability to expand the surveillance footprint of the police by using drones and other tools, or whether it is a smarter way to sort, analyse and log data and evidence, there are many traditional policing processes, and even whole functions, that will be ripe for automation as the technology becomes more affordable. For example, the use of investigators to watch hours of surveillance camera footage is not just expensive, it is often unproductive and unreliable, with even well trained and experienced reviewers being shown to miss critical information compared to the performance of an AI tool processing the same video.

Automation and machine learning will alleviate the effort and time required of manual processes in criminal investigations, and may also improve outputs. However, individual officers will still need to make quick decisions on the street, and will need the data presented to them in a clear way, in order to exercise good judgement. Detectives will need a different set of tools to pursue complex investigations where the criminal connections, the patterns of behaviour or the incriminating transaction is not possible for human observation alone to detect, but their skills will still be needed to ascertain motive and to pursue new lines of inquiry.

There will always be a place for human supervision, and individual officer discretion, but technology will also offer new ways to police communities, as well as enhance the traditional policing role of the uniformed constable. The ethical challenges of this are complex, and must be confronted by policy-makers and legislators, but there will be a fast-growing demand for technology companies that can offer ways to automate policing processes, so long as that can be done without sidelining the accountable, warranted officer.

Big data and machine insights.

Policing relies upon information to make the right interventions at the right time. Critically, this information can avoid the use of force, and can prevent criminality before anyone is harmed. To do that, policing is undergoing a gradual generational shift away from human intuition – often the hunches of seasoned sergeants and patrol officers – to the data-driven insights of new algorithmic tools. There will always be a place for the ‘streetcraft’ of experienced police constables – especially when reacting in the moment to an unexpected emergency. But for planned, premeditated interventions, the emphasis is shifting towards systematic data analysis and predictive modelling, to target resources on the people, or the places, where crime and social harm can be addressed, and where possible, prevented. Such a development relies on the police having the capability to handle big data and operationalise it in a way that is timely and relevant to frontline officers, and not just corporate planners. A recent study by RUSI summarised the potential benefits of big data for policing but correctly noted the current lack of a single strategy for realising these benefits.27

At present, a major operational limitation is the need to integrate existing datasets and bring together a myriad of legacy systems to enable today’s officers to make better decisions. Here, the advance of machine learning is critical, and commercial platforms, like those developed by Palantir, offer police forces the means to take their existing data and overlay analytical tools, so that a single search can extract the right information from disconnected databases, and then use AI to draw connections between them.28 That approach is especially relevant to the public sector that typically has many large legacy systems that are kept running in parallel when new IT infrastructure is procured.

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28 CNN Tech. 2017. A Rare Look Inside LAPD’s Use of Technology.
Increasingly in the future, the police will have much more data to help them pursue offenders. But they might not always be equipped to interpret that data, or to act on it unless they invest in the infrastructure and the staffing tools to ingest, process and then operationalise that data, especially when it comes from third-party sources. The use of AI will be increasingly important to support investigations where the complexity of a suspect’s digital footprint needs deciphering and lines of inquiry need examining across multiple devices, and various social media profiles – a demand that simply did not exist even ten years ago.29 Such applications already support civil cases, and are becoming commonplace in corporate litigation where disclosure is complicated by the volume of evidence and digital examination is required.

It is worth noting, however, that questions about transparency are crucial to the future of data analytics tools being legitimately used in the litigation process. One company that has taken this issue particularly seriously is US-based data analytics startup CivicScape. Indeed, two of CivicScape’s advisors have said – “It is possible to use data and technology in a way that improves transparency, openness, and community trust. It’s not the model today; most police data and technology is run in a black box that the public cannot see or understand... We post everything there is to know about our tool; what’s in it and also what steps we have taken to minimize data bias. This must become the norm if smart technology is ever going to find a lasting role in improving public safety.”30

This emphasis on transparency is an industry first and could prove critical in avoiding future legal challenges around data bias. Andrew Ferguson, an academic expert on big data in policing has written: "In general, what police technology companies largely fail to account for is how their data, proprietary algorithms, and risk assumptions will be dissected by litigants seeking to delegitimize the technology... For companies like CivicScape, the decision to embrace transparency allows them to escape the traditional limitations of other more secretive technologies. A focus on transparency provides legal, symbolic, and practical benefits, all of which minimize litigation risk... For start-ups, so much of the early stage effort is just trying to make something out of nothing, raising money, and just surviving. Litigating in court at some point far in the future seems like a

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29  The Guardian. 2018. Police ‘may need AI to help cope with huge volumes of evidence’.
30  The Hill. 2017. Technology can lead the way in better policing.
distant luxury. But, by seeing how challenges will be raised about the technology, addressing them openly, and trying to forestall criticism, companies like CivicScape stake out a strong claim to minimizing a litigation risk that some companies do not even see.31

INNOVATOR TOP TIP:

INSIGHT INTO POLICING PROBLEMS CAN COME FROM OTHER AGENCIES’ DATA – THE MOST USEFUL PRODUCTS CAN INTEGRATE SEAMLESSLY WITH NON-POLICE DATA SOURCES.

CASE STUDY

CivicScape is a transparent, predictive analytics tool that guides deployment and gives police agencies a tactical means to predict future demand.

The tool predicts the nature and location of future incidents by drawing on a diverse range of 911 call data, not just reported crimes, as well as other civic data relating to public spaces.

Built specifically for the law enforcement market – rather than being applied to it later – the CivicScape platform can integrate a wide spectrum of data, including data from other agencies, and then uses that information – from nuisance complaints, vandalism reports, and other minor incidents that would not on their own warrant police attendance – to meld them with historic crime data. The platform claims to be accurately predicting the location of crimes 75% of the time, on an hourly basis, down to a three city block radius. The tool has also accurately predicted the location of future opioid deaths in a trial in Seattle, using spatial and weather data, plus 911 calls from previous overdoses.32

Now in use by nine US cities the CEO of CivicScape, Brett Goldstein, himself a former Chicago police officer, believes predictive policing tools should complement the discretion of experienced beat cops rather than override that: “I do believe in a policeman’s gut,” he said. “But I also believe in augmenting his or her gut.”33

Current developments in drone technology, combined with the proliferation of smartphones, environmental sensors and the emergence of the Internet of Things (IoT) – especially as it develops in denser urban areas – creates many new avenues for data collection that might be of relevance to many policing functions. The data about the public space, and the people who reside in a given location, or who transit through it, is now available from multiple public, private and personal sources. This is a potentially huge enabler for greater insight and better decision-making to help the police improve public safety.

33 Daily Herald. 2017. Former Chicago cop’s firm uses technology to predict crime.
CASE STUDY

TACTISCAN (FINLAND)

TactiScan, built by Finnish startup Spectral Engines, is a handheld laboratory-grade narcotics scanner that allows officers to test street samples without the need for laboratory analysis or officer exposure.

Advances in scanning and sensor technology, particularly spectral sensing, have transformed the way that police forces can detect illegal substances and narcotics. Founded in 2014, Spectral Engines develops a series of low-cost miniaturized spectral sensors with a number of different potential monitoring and detection applications.

TactiScan, their product optimised for security services, is a portable screening scanner designed to detect samples of illegal narcotics through bags, clothes and other objects, by using infrared light. These scanners, currently capable of detecting cocaine, heroin, methamphetamine and fentanyl, use laboratory-grade near infrared (NIR) spectral sensing to accurately analyse narcotics samples without the need for sample preparation or officer exposure. Not only does this system guarantee greater accuracy compared with traditional test kits and scanning devices, but these portable scanners ensure officers are not exposed to harmful substances, and that samples are not altered when measured.

Information recorded by the scanners is encrypted after use and sent to a customer cloud by using a mobile phone as a gateway. This provides officers with a user-friendly interface for analysing and recording substance information, as well as historical data about narcotics trends in a local area.

Cross-agency collaboration. The police currently lack the capability to draw upon all of the data that might be of value to them in their work. They are also restricted in what information they can receive and how long they can retain it. Even if data protection rules are not relaxed in future, the legitimate sources of information will grow, and the cost of obtaining and storing data freely given to the police, or lawfully collected by them, will fall. As social media analytics are combined with environmental data collated by physical sensors, the police will eventually become the controllers of significant amounts of environmental as well as personal data. Much of this data will be freely generated and easy to sift, analyse and retain for every kind of policing purpose – and it will be data held in a format that can be analysed, flagged and acted upon quickly (using semantic tagging), unlike the databases used in recent decades, which have been difficult to network, slow to access, and often unusable by frontline staff out on the street.

Without a strategic investment at the local level in big data applications, the insight and understanding that police forces should have about their communities will continue to be patchy and limited. The question however is no longer whether big data is an important development for policing, or even whether more should be invested in the approach, but how and where to direct such investment to realise the greatest public safety gains. Opinion is divided between where the most productive efforts for big data policing should be directed. On one side are those who argue that efforts should be focused on vertical big data aggregation and internal corporate analytics, within a single police force, using predominantly the data that the force already owns or collects, as startups like GetTheData have shown.

Such applications have empowered police agencies to bear down on costs by isolating individuals and locations that generate repeat demand. On the other side are those who are pursuing horizontal, shared big data aggregation across police forces, or even across wider public sector agencies, like the hub approach being taken by Avon & Somerset Constabulary. The latter is likely to yield the greatest benefits to policing, even where that exchange involves data not directly about crime, and inevitably requires stronger governance as it may take agencies into a trickier data protection and privacy space.
CASE STUDY

DATA BEYOND POLICING IN AVON & SOMERSET

Avon and Somerset’s Multi-Agency Integrated Services Analytics Hub was set up in 2017, and received a total of £3.15 million funding from the Transformation Fund. Lee Howell, the Senior Responsible Officer for the project explained that the hub was designed to draw on data from multiple agencies to provide insight into some specific, common problems. The work to date has started to “unlock the perennial problem that organisations don’t think outside of their own domain” and allow Avon and Somerset to begin constructing a common risk picture, whether that is around road safety, knife crime, or missing persons. The hub uses data from local authorities, police, fire, highways and health service data, and QLIK provides the visualisation platform.

The project is governed by the existing Emergency Services Collaboration Board (including representatives from Fire, Public Health, Ambulance, Police) and the Office for Data Analytics is hosted at the Police HQ in Portishead. Partner agencies have given the police their data and a leadership commitment to support the initiative and in future the hub will migrate to a subscription model once Transformation Fund monies run out in 2019. Most recently, the hub has turned its attention to a knotty problem of repeat demand that has an impact across the system. By analysing data around missing persons, the hub sought to guide preventative interventions by the police and others by predicting who is most likely to go missing 5 times in the next 12 months or twice in the next month. Around 6,500 people go missing in the force area each year, of which 244 are high risk. The algorithm offered a 50% accuracy for predicting who is high risk just using police data, but this increased to 76% by integrated Troubled Families data. Further work is under way to examine adverse early childhood experiences as another predictor of future crime and social harms. The hub is a good example of local collaboration on data, at the scale that makes investments meaningful, and as Howell remarks, the “enabling role of PCCs to bring partners together”.

As part of a wider project on criminal justice transformation, work by the Behavioural Insights Team was able to take data from all the custody centres in the Avon & Somerset force area and map the bail decisions to unearth patterns in unnecessary remand. The exercise identified that more than 60% of defendants remanded in police custody go on to be bailed by the court at first hearing and their analysis shed light on some of the factors that influence bail decisions of custody sergeants. For example, defendants are more likely to be remanded simply when there is excess capacity in the custody suite they are brought to. These and other data insights have been used by the police to inform guidance and training as well as introducing feedback from the courts in order to reduce the use of overnight detentions, which can be costly.
4. WHERE TECH STARTUPS CAN ADD VALUE

The technology trends affecting policing reflect the vast number of opportunities where innovative new products and services could help improve performance. Across our three themes, there are currently pressing operational demands where technology could allow much needed progress – from tackling new trends in urban violence and online criminality, to new ways to utilise data, conduct remote surveillance, analyse evidence, and engage with the public. Across the 15 business areas, there are firms operating somewhere in the world today with a commercial offering that police in the UK could adopt immediately.

CRIME FIGHTING

Mapping and preventing serious violence.
Analytics to understand the ‘harmspots’ and to target resources to where unreported violence occurs, using data from multiple agencies.

Combating online fraud and cybercrime.
Tools the police can use to detect illegal online activity, aggregate intelligence and isolate perpetrators, and protect the public.

Drones and Robotics.
Human-controlled or autonomous machines that aid policing through enhanced surveillance or other specialist applications, replacing more expensive human assets and accessing terrains humans cannot.

SUPPORTING THE POLICE

Data analytics and predictive policing.34
Predictive analytics about people, not just places, allowing forces to target resources, prevent harm and pre-empt likely demand.

Video ingestion, monitoring and exchange.
New platforms to enable investigators to efficiently analyse, share and store vast quantities video in all formats and from multiple sources.

Social media monitoring and policing online domains.
As sources of intelligence to prevent harm, monitor local sentiment, and engage quickly to address developing issues.

ENGAGING CITIZEN

Enabling Citizens to Engage with the Police.
New online reporting channels and platforms to foster community networks and relationships with local officers.

Improving Victim Confidence.
Offering new routes to self-serve, by controlling the reporting of crimes in the way that best suits the needs of victims.

Understanding Local Conditions and Communicating with Diverse Populations.
Bridging the gap between non-English speakers and local officers with quick, accurate translation tools and apps that connect the police to micro-communities.

34 It is worth mentioning that there exists reasonable concern that predictive policing can exacerbate implicit and explicit biases against minority individuals and communities, and therefore reinforce any tendency for police to target those groups. As such, we recommend caution, and further empirical research before these techniques are universally adopted by police.
FOCUS: CRIME FIGHTING COMBATING ONLINE OFFENDING AND CYBER-ENABLED CRIME

There will continue to be rising demand to tackle cyber-enabled crime, such as fraud and extortion, and other hacking and cyber offences, such as financial and data theft, and denial of service attacks. Further investigatory challenges will grow as technologies like cryptocurrencies, encryption and virtual private networks (VPNs) become more popular, and may require new legislation to give law enforcement the tools needed to combat them. And criminals will continue to exploit unregulated virtual currency platforms and dark web portals like Tor that provide anonymity and make detection by even specialist law enforcement teams extremely difficult.

"IN AN INCREASINGLY TECHNOLOGY-DEPENDENT SOCIETY, THE IMPLICATIONS OF BOTH INTENTIONAL AND INADVERTENT CRIMINAL BEHAVIOUR WILL INCREASE. AS TECHNOLOGY BECOMES INCREASINGLY AUTONOMOUS, ISSUES OF RESPONSIBILITY AND BLAME WILL ALSO LIKELY GROW IN IMPORTANCE.'

– National Crime Agency.

The appetite for local police to go after this type of cyber offending is limited, and is already hugely constrained by a lack of skills and technical capability. Their limited capacity is likely to erode further unless and until there is a more systematic investment in a common capability that is equal to the scale of the cybercrime challenge, and this has to extend beyond intelligence (offered by the National Cyber Security Centre), to prevention and disruption. Chief Constable Mick Creedon, in evidence to the Home Affairs Select Committee argued that detection and interdiction of pure cyber offending (as opposed to cyber-enabled crimes like child abuse and trafficking) were now so complex that police forces needed to focus on where they could add value. Increasingly technology to enable offensive disruption – helping to deter or at least mitigate offending – will be needed, alongside major public education initiatives around prevention.

"Criminals are exploiting technology, and the tools to preserve anonymity online, more quickly than law enforcement is able to bring new techniques to bear." – Policing Vision 2025, National Police Chiefs’ Council (NPCC)

Linked to the upward trends in crimes like cyber-enabled fraud is the response – the burgeoning market in personal security verification and other biometric tools and software products that cater to a growing need to ensure digital access can be controlled and authenticated. As passwords and two-step methods make way for biometric ID access, innovative firms like EYN and iProov offer facial recognition products that can verify users with a glance, directly from their smartphone. As public services grow dependent on proving the identity of users, the applications in law enforcement will be significant, with the police themselves needing mobile tools to verify identities on the street.

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35 As argued for by the former FBI Director James Comey:

36 Computer Weekly. 2018. Technology continues to transform crime, warns NCA.

Police forces have used aircraft and helicopters for decades, typically to aid search and rescue, or to track suspects or support pre-planned operations. In the last five years we have seen the emergence of ancillary policing tools that perform autonomously, like drones. Drones will become increasingly attractive to the police as costs fall, and the scope for using drones to harvest data and augment surveillance operations becomes apparent.

CASE STUDY

ACCELERATED DYNAMICS (UK)

Accelerated Dynamics is tackling a major emerging security issue: ensuring that commercially-available drones are used safely, and can interact with and accommodate the activity of other drones in the same vicinity.

Accelerated Dynamics uses machine learning, planning and multi-agent technologies to develop a full-stack robot intelligence solution optimised for unmanned aerial surveillance missions. Their technology, which integrates with almost all commercial drones, allows users to create strategies and mission schedules for robot fleets to execute autonomously, using neural networks and reinforcement learning to plan and control from historical mission data. Their swarm management platform allows drones to automatically configure collision-free flight paths and safely navigate around ‘no-fly’ zones defined by the user. Users can then monitor drone flight missions and watch captured video surveillance footage in real time, through an intuitive interface inspired by gaming software.

The scope for autonomous mission and operation management in the security space is vast, with potential applications in crowd management, situational intelligence and perimeter surveillance. With the management and monitoring of personal drones becoming an increasingly important policy initiative in the UK, AI-driven platforms such as the one Accelerated Dynamics offers a significantly less labour-intensive enforcement solution. Existing projects include a partnership with an American aerobotics company for the surveillance of NASA space launch sites, as well as partnership with Drone Aerial Ops in Scotland for aerial agricultural planning and mapping.
Already in the United States, police agencies in 43 states have reported using drones\(^38\) and constabularies in the UK are already purchasing drones and training operators as an alternative to aerial reconnaissance by force helicopter.\(^39\) The rapid advancement in drone technology now affords police the opportunity to replace manned aerial vehicles with drones capable of providing cheaper and more extensive airborne surveillance.

Aerial drones that are autonomous, and that could eventually incorporate facial recognition, are an obvious development that would give police forces much greater operational reach, especially over less populated areas. Indeed, advanced machine vision technology is now becoming commercially available, like that provided by Headlight AI, which allows drones and service robots to operate and record in the dark, fog, or even underwater.

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### CASE STUDY

**ELISTAIR (FRANCE)**

Elistair has built a micro-tethered drone solution that allows security services to monitor areas of several kilometers in size for continuous periods during day or night.

Elistair’s ultra-durable system has been designed for easy portability and rapid deployment, without the need for flying or operating expertise - armoured with kevlar providing 500 Newtons of traction, and a claimed unbreakable and unjammmable data transfer system with speeds of up to 200Mb/s. In comparison with untethered security drones, its micro-tether system ensures a secured and continuous power supply from the ground, which guarantees safer longer-term use. It also enables a more reliable, robust and secure data transfer between the drone and the operating station. It is hardly surprising, then, that many police and security forces around the world have opted for tethered drone systems, regarding them as more reliable and less prone to disruption. The company is supported by the DGA (French Defense Procurement Agency) as well as the Horizon 2020 European program award. Elistair’s system is currently being deployed by police forces, public safety departments, private security companies and government across over 30 countries.

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**DRONEDEFENCE (UK)**

DroneDefence is a specialist drone security company, offering a number of services to ensure the safe and compliant use of drone technology.

Founded by an ex-army officer with experience of military drone operations, DroneDefence is aiming to tackle increases in illegal and non-compliant civilian drone activity. Their SkyFence system creates an electronic barrier around protected or high-security airspaces, including government organisations, prisons, airports, and other ‘no-fly’ zones. The company has also developed a portable drone-jammer system that fits into a backpack, allowing security officers to disrupt the command, video and navigation of commercial drones.

DroneDefence’s most recent product, Omniscient, offers comprehensive drone management and tracking capabilities, including early warning systems to enable prompt operational response in case of suspicious or illegal drone use. Platforms such as Omniscient will become increasingly important following the imminent passing of the Drone Bill, which will lay out a new series of regulations for UK drone users, with an expected bill publication in Summer 2018.
Partly as a consequence of budget constraints, but also in anticipation of the likely operational benefits, police forces are already exploring whether distinct policing roles might be undertaken in future by smart (but less expensive) machines – or at least have the police operation be advised or directed by such machines. For example, a semi-autonomous drone might provide aerial surveillance of a crowd, or close visual recording of an environment where hostages are being held. Or even, at a future stage of development, a robotic officer performing crime-scene guarding duties. Indeed, Silicon Valley-based startup Knightscope has already started deploying compact autonomous robots for monitoring and patrolling public spaces, and similar initiatives have been launched by police forces in Abu Dhabi.40


Since the concept was first tested by the Los Angeles Police Department (LAPD) and Greater Manchester Police in the late-2000s, ‘predictive policing’ as it came to be known, has offered great promise – and some real, tangible benefits – to the modern police operation. Companies like PredPol, HunchLab and Palantir have pioneered analytics software that has enabled police resources to be allocated to the places and at the times when offending is predicted to occur, and so to deter potential criminality.
The first generation of this approach, now embedded across the LAPD, has been proven through independent evaluation to deliver reductions in location-based crime, principally acquisitive and property-related offending.\textsuperscript{41} Other trials in the UK have shown benefits, but not all trials have yet lived up to their promise.\textsuperscript{42}

\textbf{CASE STUDY}

\textbf{CHORUS INTELLIGENCE (UK)}

Chorus Intelligence can help police forces to better collect, manage and deploy the vast amounts of data at the disposal of the modern police force.

It is well-established that the smart collection and analysis of digital data can transform how police forces manage live investigations, helping to secure more leads and catch more criminals. However, the amount of data available for a given investigation is vast and often comes from disparate and disconnected sources, making it extremely difficult to collect and analyse.

Chorus Intelligence has developed an end-to-end operational intelligence and analytical platform to solve this problem, by providing information on live cases from a number of different datasets. First, their software can automatically cleanse up to 10 million rows of data quickly and correctly, saving up to 97\% of an analyst’s time in the cleansing and formatting stage. Next, it can analyse complex datasets, including call data records, handset downloads, computer forensics, financial transactions, and ANPR and Wi-Fi data to detect any potential connections in this information, and provide analytical tools to efficiently manage intelligence and investigations. Finally, evidence gathered on the Chorus platform can be quickly exported as a full report, including a full and robust audit trail, and can be used in court as admissible evidence.

Since its formation in 2011, Chorus Intelligence is now the leading provider of data analytics software to UK police forces, with over 90\% of forces as clients.

\textbf{‘MANY FORCES HAVE BEEN TRIALLING METHODS FOR ADDING PREDICTIVE WEIGHT TO ANALYSIS, EITHER WITH ACADEMIC PARTNERS, SPECIALIST FIRMS OR GENERALIST ANALYTICS PROVIDERS.... THERE’S NO EVIDENCE YET OF ANY PROPRIETARY PREDICTIVE METHODOLOGY IMPRESSING ENOUGH TO BE AT THE HEART OF TACTICAL PATROLLING CHOICES FOR ANY FORCE.’}


While geographic prediction has clear utility and is being refined and improved as new products come to market, the next generation of this approach is turning attention to people in an attempt to develop robust methods for predicting which individuals are most likely to commit crime and also which are most likely to be victimised.

\textsuperscript{41} PredPol. 2015. UCLA Study Proves Predictive Policing Successful in Reducing Crime Over Several Months of Deployment with The LAPD.

The explosion in video throughout the modern economy is enabling a vast web of potential video evidence for crimes that occur in the public realm. The security infrastructure of the past – static, publicly-owned CCTV cameras – is being gradually upgraded, and expanded, and will continue to provide a core network of video surveillance, especially in urban areas and transport hubs.

In addition to this, the security dimension of video is being expanded by individual body-worn devices, as more patrol officers and security staff are equipped to record video on the frontline, wherever they operate. Added to this is the rise in industry-led video integration that features in consumer products – many of which might have public safety applications. For example, when every new car sold is equipped with dual cameras front and rear, recording continuously in near-real time. But the biggest growth in video surveillance is citizen-led, uncoordinated and spontaneous, as smartphone usage grows and almost every police incident attracts and inspires instant video recording from witnesses and bystanders.

The closed, static networks of the past could be managed and controlled by the police using conventional technology infrastructure. But the open, dynamic video landscape of the present and future is much harder to manage and is already posing a major operational challenge. The volume and variety of incoming video from multiple sources risks overwhelming traditional systems, and police agencies are in need of smart ways to receive, process and interpret that video, not merely store it.
Even with major cloud storage solutions available to law enforcement, the cost and future demand on that data storage from the rapid expansion of video is substantial. For example, a single fixed CCTV camera operating at 720dpi resolution and 20 frames a second records 5 terabytes a year if operating continuously 24/7. Then there is the challenge and upfront cost of replacing legacy infrastructure and shifting to digital. According to Vintra, today in the USA, the digital to analogue video ratio is approximately 1:1 but projected to be almost 100% digital in 5-7 years, with 25 million new cameras entering the market per year – to add to but also to replace existing ones. Despite that, the best case assumption is that analytics penetration today is just 5% of the total number of cameras in operation.

As police adapt to store and process this new wave of visual media, the public will come to demand a quick, simple channel to share their own video with the police. Modern citizen expectations are behind this shift. Increasingly, for crimes in public spaces, it is people outside policing who will often hold the crucial footage, and will expect to be able to easily submit it.

CASE STUDY

BLUELINE GRID (USA)

BlueLine Grid is a secure communication platform for emergency personnel and first responders to message, share media and team-build.

Emergency service personnel often struggle with outdated technology when it matters most - in frontline duty where rapid communication and data sharing is critical. BlueLine Grid was conceived as a way of equipping teams of first responders with a secure, reliable platform for instant messaging, group conversations, and mass notification, helping officers to collaborate and providing a way for them to find and connect with their counterparts inside and beyond their own agency.

Founded in 2013 by the former Commissioner of the NYPD, Bill Bratton, and co-founders Jack Weiss and David Riker, the product was first trialled in the specialist SWAT divisions of the LAPD but is now in use across the United States.

BlueLine Grid connects users through a mobile app and access to the platform is now open to (but restricted by verification) to all public service employees, not just police staff. The latest platform incorporates a push-to-talk function, plus location tracking and location-based triggers, 1-click conference calling, virtual command, and file-sharing tools. As a replacement for traditional top-down police radio systems, BlueLine Grid allows any user with a mobile phone to use it like a mobile radio and to speak with other users on an open channel. This level of bottom-up cross-agency communication is an important catalyst for collaboration and coordination but is not always easy with separate 999 command and control platforms.

‘WE HAVE BECOME A SEE SOMETHING, SEND SOMETHING SOCIETY’

- Brent Boekestein, CEO & Co-Founder, VINTRA.
For the police, such video can be critical in building a strong case to secure a conviction, but it also presents major resourcing challenges. And in those time-sensitive and critical cases, where resources are invariably limited, the most likely choke point is how quickly investigators can collect video and interpret it.

CASE STUDY

**CARBYNE (ISRAEL)**

Carbyne is a smart emergency communication platform, allowing citizens to engage with emergency services in real-time via multiple channels.

In critical or life-threatening situations, citizen smartphones can provide deep and rich data for first emergency services to analyse and process what is happening in real-time, provide accurate support to victims, slash dispatch and search times, and ultimately save lives. However, the current process of contacting emergency services through dial-up phone calls does not properly leverage the opportunity offered by multi-functionality smartphones.

Carbyne’s communication platform allows citizens to share real-time encrypted video, voice, images, chat, and accurate location information via their smartphones to first response centres. Instead of traditional phone calls, Carbyne allows citizens to use their smartphones to stream live video directly to emergency services along with their exact location, as well as the ability to discreetly text and share images with first responders.

This functionality is not only available to users who contact emergency services through the Carbyne app, but - even more impressively - call centres using Carbyne’s software allows all phone calls to be transformed into an enhanced media and video sharing live stream.

CASE STUDY

**VINTRA (USA)**

Vintra was founded in San Jose, California, and offers an advanced video analytics platform for law enforcement agencies in several US states.

Video is becoming critical to an increasing number of criminal cases and yet despite the high stakes, law enforcement often has the worst video, or simply lacks the capacity to analyse it quickly and efficiently. The large variety of legacy systems from defunct suppliers complicates the picture – with over 600 known video codecs in the market today, that all need to be converted so the video can be analysed. In addition, much of the CCTV reviewed as part of a police inquiry is watched by investigators who manually sift through footage for hours at a time.

Vintra’s FulcrumAI platform provides clients with a machine-learning tool to process video footage and help them handle the explosion in sensors and the exponential growth of visual data. Using software developed at their deep learning laboratory in Barcelona, Spain, Vintra’s product is able to process footage from multiple sources including in-car, dash, body, and drone-based cameras, and recorded video of historic events, as well as real-time analysis.

The Vintra platform is flexible, allowing users to set parameters and train the software to search for certain activity, save objects, and share with other agencies. The collaborative nature of the product also enables training opportunities and shared insights that can help agencies to coordinate across jurisdictions on the same criminal case – a valuable feature in the fragmented policing model in the United States.

Working for the Dublin police department in California, Vintra’s technology processed 70 hours of surveillance footage in less than 6 hours, saving just one investigative team 1.5 weeks of work at a salary cost of $4,500.43

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In a digital environment, the critical need to ensure data integrity, access controls, and fully auditable systems is implicit, and the professional need for these elements goes beyond accountability in the present moment. As investigations become increasingly reliant on multiple digital records, proving to a court the origins and the veracity of extracted data becomes vital in establishing a robust chain of custody. This authenticity imperative will increase as new methods of faking video, audio and internet records emerge. And a minority of current investigations can also give rise to internal reviews, or even external, judge-led inquiries, involving retrospective interrogation of the decision-making or compiled evidence years or even decades later.

**CASE STUDY**

**CLUE (UK)**

Clue is a secure browser-based case management and investigations platform that gives staff new capabilities to gather, share, and log digital evidence.

Clue has developed a single API for live investigation case management, allowing officers to easily record and collate information from a number of sources, including witness statements, financial and legal records, surveillance devices, and online and social media platforms. Investigation teams can then easily gather, access and share this information, and use it to prepare and present court-admissible evidence. Although the platform tends to be used to support the management of standalone investigations, its open API can integrate with other third party systems, facilitating rapid interoperability and information exchanges. In 2018, Clue secured funding from Innovate UK for a two year Knowledge Transfer Partnership with Newcastle University to embed a causal analysis and process modelling capability into their platform, providing investigators with the ability to identify patterns of criminal behaviour at the earliest point in an investigation.

In terms of market traction, Clue is one of the UK's most successful police technology SMEs, currently in use with 18 UK police forces, as well as a number of private and non-departmental investigation committees, including the NHS Counter Fraud Authority, the City of London Dedicated Card and Payment Crime Unit, and the League Against Cruel Sports.
As today’s inquiries into policing, such as the Hillsborough Inquiry and the ongoing Undercover Policing Inquiry, have shown record retention is always necessary and can no longer be compromised on simple cost grounds. Public inquiries of the future will rightly expect and demand a level of data retention that enables investigators to understand and account for police behaviour, and digitisation should make such a process easier and more reliable than the cumbersome reappraisals of policing decisions taken decades ago and recorded and stored in paper files. Technology products to support policing should be designed to reflect this reality, and in the case of records management or decision-supporting platforms, be secure enough to be fully auditable many years into the future, as some of the major cloud-based infrastructure already is. In addition, there will continue to be demand for suppliers of software that can interrogate and isolate relevant human activity in existing systems in order to support internal investigations.

**CASE STUDY**

**GRIFFEYE (SWEDEN)**

Griffeye is a digital media investigation platform, providing investigation teams with an automated analysis of large amounts of image and video data, including eliminating and prioritising information, and detecting and highlighting critical clues.

Analysing large amounts of video and image files for an investigation is a time-consuming and labour-intensive process. Griffeye, also part of the Safer Society Group, has developed a versatile and user-friendly investigation management platform, allowing analysts to quickly review and grade vast amounts of digital information in one place.

Griffeye’s software uses artificial intelligence to automatically prioritise certain videos and images, filter irrelevant content, and flag critical clues. This process dramatically streamlines the existing process of grading and reviewing every individual file contained within an investigation database. Additionally, Griffeye’s tool includes a number of functionalities that make the human review process even more efficient - including smart filters for file grading and storage, intuitive keyboard shortcuts, and a tactile video scrolling function that shows analysts quick previews of videos. Most interestingly, Griffeye’s software features a digital marketplace, which, like an increasing number of popular consumer SaaS platforms, gives users access to integrated applications developed by Griffeye and third-party developers.

Having been founded in 2015, the company has achieved high domestic and international growth, with analysts from over 4,000 law enforcement agencies in over 80 countries using the platform.
One of the complexities of modern policing is the diverse communities that neighbourhood officers need to communicate with, often in many languages and with limited access to on-demand translation resources. Tools like Microsoft Translator or Futr can now offer police forces a user-friendly conduit to speak to non-English speaking communities, or to produce public information in the right language so it can be quickly broadcast or communicated in a chatbot. Future developments could see demand for such tools in mobile devices, so patrol officers can have ready access to a translator in their pocket, helping to bridge any language divide and improve community relations. The cost that police forces currently incur in translation services can also be reduced with investment in translation technology that is now coming to market.

CASE STUDY

ELUCD (USA)

ELUCD is a data-driven public confidence platform that provides police forces with hyper-local survey data about public trust, confidence and safety.

Founded by the former-manager of the in-house analytics department for Barack Obama’s 2008 presidential campaign, ELUCD launched its product in 2017, after graduating from the Y-Combinator accelerator.

ELUCD’s open API integrates with other smartphone applications to ask citizens sentiment questions through simple surveys. This data is then presented to police officers and analysts through a simple, user-friendly dashboard, which updates in real-time. In contrast with traditional polling techniques, this platform allows police officers to gather sentiment data from vast sample sets, tagged with exact geo-located and time-stamped information. As such, police officers can gain an extremely granular understanding of trends in public sentiment, across different city streets and neighbourhoods, and over different time periods. This system can enable a new form of evidence-based policing, allowing forces to effectively measure public response to new strategy and operational interventions. ELUCD’s first contract was with NYPD, to support their neighbourhood policing programme, and since then the company has begun to scale across other major US cities.
# Key Police Tech Opportunities & Potential Startup Involvement Across Policing

## Strategic

### Performance Oversight
- Office of the Police & Crime Commissioner

### Transparency & Consultation
- Citizen Engagement
- Online and Social Media Channels

### Demand Analysis
- Data Analytics and Predictive Policing

### Commissioned Services
- Victim Services
- Offender Supervision

## Human Resources

### Workforce Management
- Workforce Management

### Case Management & Investigation Software
- Case Management and Investigation Software

## Estates/Fleet

### Drones and Robotics
- Drones and Robotics

## Training

### Video Camera Technology
- Video Camera Technology

## Criminal Justice

### Victim Services
- Victim Services

### Case Management and Investigation Software
- Case Management and Investigation Software

### Offender Supervision
- Offender Supervision

## Intelligence

### Situational Awareness
- Situational Awareness

### Online and Social Media Channels
- Online and Social Media Channels

### Biometric Surveillance
- Biometric Surveillance

## Neighbourhood Policing

### Mobility and Deployment
- Mobility and Deployment

### Data Analytics and Predictive Policing
- Data Analytics and Predictive Policing

### Public Confidence
- Public Confidence

## Emergency Response

### Mobility and Deployment
- Mobility and Deployment

### Video Camera Technology
- Video Camera Technology

## Specialist Teams

### Drones and Robotics
- Drones and Robotics

### Cyber Security
- Cyber Security

### Sensors and Scanners
- Sensors and Scanners

## Control Room

### Sensors and Scanners
- Sensors and Scanners

### Online and Social Media Channels
- Online and Social Media Channels
The tech startups profiled in this report all offer UK policing new opportunities to cut crime, improve outcomes, and deliver a better service to the public. Several of today’s police leaders have already decided to take advantage of the offerings of these 75 companies, but there are many more who have not. There will also be other companies that we have not included that are worth consideration. However these 75 firms fair in the next few years, and whatever competition arises, we need a clear shift in attitude and culture to create an environment that is more conducive to using startups in a policing context – even when such firms have a limited track record or originate overseas. Some steps can be taken to catalyse this shift, so the policing market becomes more porous for new firms like these, and this chapter proposes some interventions that would support a more vibrant startup ecosystem and equip SMEs to engage more successfully with police forces.

**BREAKING IN**

Many small startups aspire to global domination but, in practice, have to focus on near-term market opportunities on their doorstep. Successful transfers have happened into foreign markets but it is a risky and sometimes costly move. Less than a fifth of the 75 firms profiled in this report are currently in the UK market. But this picture is not static. The UK remains an attractive proposition – especially for growing firms that have had success with law enforcement clients in other comparable Common Law jurisdictions.

And the innovative and emerging companies in the UK can expect to face competition from new international startups in the decade ahead. In fact, a similar study of the technology landscape in 2025 would reveal many new companies and innovative products that cannot yet be foreseen. Our purpose has not been to point to an approved list of new business partners, but to illustrate the breadth and diversity of technologies and services now available.
BUYING TECHNOLOGY: 
FIVE LESSONS FOR POLICE LEADERS

1. Engage the market long before you are ready to buy

Once a procurement is underway, engagement with the market is controlled. But even before you know what you want to buy, you need to tell the market that a solution is needed. Engage openly and be transparent about the operational realities. A PCC’s office can be the right vehicle for this, with the North Yorkshire PCC setting an example with their soft market testing exercise in 2017. Simply signalling that police are seeking help from the private sector with a given issue will galvanise potential suppliers and attract attention from unlikely sources.

2. Be clear about what you need from the market and give feedback

Operational demands may shift over time, but police know their business better than anyone and need to be clear with the market what their goal is. Do not over-specify what you think the solution might be – spend time instead defining the problem, and clearly stating the outcome you want. Let the market respond with possible solutions. Once decisions are taken, keep the dialogue going. Encourage those who have lost out to understand how and why their product was not selected. This will assist those who have not been successful to stay in the market and seek out new opportunities in future.

3. Shiny new technology is not a silver bullet

Technology should be seen as an enabler of transformation, when a given product or service is well implemented and has support from the right kind of leadership. A single product or service is never going to solve all your problems, and policing is too complex a discipline to be radically improved overnight by any one piece of technology.

4. Embrace some risk and be prepared to fail fast

Police leaders are experts at managing risk. They should be willing to embrace innovation from tech startups and buy new products, even if they are the first in the UK to do so. Smaller companies will not have the same track record, but that does not mean their product is risky, or cannot be right for you at this time. It is here that the most groundbreaking, innovative solutions will be found. By being agile and trying new suppliers, you will be giving your staff access to the best tools.

5. Think big, buy small and tread softly

Do not constrain your ambition because of the narrow or limited scale of the application that might first be practical – think about what might be possible in the future. Equally, do not expect a startup to be able to scale overnight or to have limitless resources for adapting to your every request. New companies with small staff are already making sacrifices to engage in a public procurement process. They do not have the resources or back office support to endlessly chase opportunities. But working together they can help you achieve big goals.
POLICE TECH PIONEERS

CRITICAL SUCCESS FACTORS FOR A DIVERSE STARTUP SECTOR

Why do more tech startups not already exist in the policing market and what conditions are needed to foster a more vibrant ecosystem for SMEs? There are a number of factors that will help to catalyse a more diverse startup sector.

Creative Leadership

This report found many examples of impressive leadership that have driven forward new approaches using technology. Certain forces – including Durham, Cheshire and Avon & Somerset – were singled out as providing an example of good leadership in police technology, with the ambition and the chief officer support, to try new approaches and take a risk with new products. However, in almost every force there are likely to be good examples of technology innovation and pockets of creative problem-solving to address a technical deficit.

The willingness of a police procurement team to consider a provider whose product is unproven in the UK market is often dependent on what direction is set by the chief constable. If they communicate a clear appetite for change and make staff aware that digital innovation is to be encouraged and explored, not resisted or curtailed, then the organisation will be a more productive environment for tech startups offering their services. Much of this boils down to the appetite for risk. Policing is full of risk and real leadership is those who are prepared to take calculated risks, if the benefits for officers, staff, and the public are worth it. The opportunity costs and even the operational risks of not innovating - and of keeping redundant, deficient, legacy technology alive when a better alternative is available - are too rarely considered.

Smarter procurement

Procurement will remain a rules-driven process with layers of complexity that many senior officers will not want to directly involve themselves in. However, PCCs and Chief Constables can set a strategic approach which is more conducive to getting the right outcome – more technology spend directed towards innovative startups and less spent servicing incumbent vendors. The application of new products is easier at every stage if the customer is after a smaller solution, procured for a shorter initial period, and with a sharper focus on addressing a clearly defined problem. At a roundtable convened by PUBLIC for this research, Professor Bernard Silverman, former Chief Scientist at the Home Office, argued that the health sector is “simply better at articulating what it wants from the market”. If local police forces sought a narrower solution, they would achieve tangible benefits more quickly. They should also avoid limiting options by insisting on historical case references across UK government; by definition, such a requirement will not work for new, innovative digital companies only formed recently.

Most solutions cannot promise to get there in one leap, so if technology investment continues to be seen by senior leaders in revolutionary terms – as an enabler of massive system-wide transformation – then police forces will continue to gravitate towards only those providers with the scale to match the (unrealistic) ask, however expensive this might be. Startups may offer innovative products that eventually scale up to become transformative for the organisation as a whole, but most offer more niche products, and even these bring incremental benefits as more staff learn to use them.

Greater Transparency

Research for this report has had to confront the current limitations of the available information on how policing currently spends taxpayers’ money on technology. Though not an uncommon problem in the public sector, the lack of transparency is an important barrier to many new entrants who cannot easily see what products are already in use, and when and where new procurements might be coming up.

‘[W]HILE MUCH OF THE PUBLIC DEBATE CONCERNING POLICE TECHNOLOGY FOCUSES ON HOW VARIATIONS IN CAPACITY CAN BE MITIGATED, AND VARIATIONS IN TECHNOLOGY REDUCED, THE MOST IMPORTANT FACTOR DRIVING DIGITAL POLICING MATURITY IS THE FIRST: APPETITE FOR CHANGE.’

Vigilant Research – Capability Assessment 2017
A clear and transparent marketplace will encourage competition, and help create a more level-playing field so prospective suppliers of all sizes can see where opportunities to sell into the policing market might arise. Transparency rules that revealed the current contracts in force with technology suppliers, regardless of their value or duration, would enable PCCs to provide greater accountability to taxpayers, and empower those SMEs with limited market penetration or professional networks, to weigh up where they should devote their efforts. Selling an innovative product into policing should no longer be a lucky break where the procurement opportunity was lucky timing, or discovered through informal networks on the grapevine.

**POLICY INTERVENTIONS TO CATALYSE THE STARTUP MARKET**

A few steps could be taken to help diversify the market and each of the following policy interventions, or a combination, could support more tech startups to enter the policing sector, including many that might currently not consider it.

**Creating an open, competitive framework for new startup products**

Many of the companies we spoke to agreed that given the spend with incumbent suppliers and the long contractual terms, smaller startups were locked out from participating even if their product could add value to an existing platform. Mandating open APIs and interoperability as a condition of all current and future technology contracts would create a potential opening for tech startups to complement the existing services and would foster more innovation as new firms saw opportunities.

As one company has argued, the ambition should not be about centralising or harmonising, but rather requiring open standards and interoperability, so that a patchwork of locally bought systems can at least talk to each other.

‘**THE ANSWER IS NOT TO HAVE ONE NATIONAL SYSTEM THAT EVERYONE USES. AN ECO-SYSTEM OF DIFFERENT TECHNOLOGIES AND SOFTWARE PRODUCTS WILL ALWAYS EXIST, BUT IF THEY CAN ALL INTEROPERATE WITH EACH OTHER AND FOLLOW COMMON STANDARDS, THE DATA CAN BE AVAILABLE FOR ANALYSIS BY ANY FORCE AND AT ANY LEVEL.**’

– Clare Elford, MD, Clue

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44 Clue 2017. Why is data analysis such a challenge for UK police, and what can be done about it?
Police Tech Pioneers fund, and sustain a culture of innovation in policing for decades to come. These efforts could include funding one or more of the following:

Creating a neutral space for police-vendor engagement

For technology firms, the product that wins the hearts and minds of those staff who have to use it is the ultimate goal. But a period of testing and play, and the endorsement of practitioners who have experienced the product, is not a standardised component of a public procurement process. In fact, many examples exist of products that were chosen for their high efficiency and productivity scores, only to be deemed much less useful by the staff that were ultimately expected to use them. Canada has ‘police vendor labs’ where frontline staff can interact with technology products and give user feedback to procurement teams to inform their decision-making. A neutral space would be needed to host such a ‘sandpit’ style exercise but it would allow multiple products from competing vendors to be explored by the officers ultimately in line to use them.

Operational police officers will be the users of digital products and services and so time should be taken to understand their challenges and opinions of your solutions. Officers offer incredible insights and ideas on how you can improve your systems …so include them from initial concept design right through to delivery.”

– Neil Beet, Founder, Blue Lights Digital

Transformation can happen in a thousand different ways, emerging from the smallest of pilots. Fundamentally, police leaders need to learn that the world has changed - and organisational transformation does not have to mean large, top-down and planned change programmes implemented by vendors bigger than the police forces themselves.

The Home Office still needs to be strategic, and has a crucial role in creating a more competitive market. First by setting open standards for interoperability and mandating open APIs, and second by putting pressure on incumbents to open up their systems so that smaller players can plug in on top.

Developing and refocusing the Police Transformation Fund

The future of the Police Transformation Fund is currently uncertain, awaiting wider decisions about departmental budgets after the upcoming Spending Review (SR) later in 2018. In the sector there is more support for the approach taken to the PTF than the previous Innovation Fund, and PCCs and Chief Constables would now oppose any decision to eliminate it or scale it back.

The options involve either extending the current scheme, or developing and refocusing the fund, or both. To avoid the 2020 cliff edge in funding, the government could extend the current approach to future years, with the Home Office setting a notional budget allocation for the Police Transformation Fund until at least 2022/23. If this was communicated to PCCs then bids for new projects to be funded from 2020 could begin to be prepared.

The Home Office could also choose to refocus the PTF so it could play a more proactive role in seed-funding new tech startup initiatives, albeit this would mean devoting less spend to the local bids that come in directly from forces. Even if the Transformation Fund continued but was reduced by 20% of the original 2015-2020 size, that would still represent approximately £560 million over the five years of the next SR, or £112 million each year. If just 10% of this annual allocation was set aside between 2020-25, it would allow over £10 million each year to consciously fund a network of innovation efforts designed to stimulate the police technology ecosystem for startups. In other words, the Home Office could help to make a market - one that could act as a true force multiplier for the rest of the fund, and sustain a culture of innovation in policing for decades to come. These efforts could include funding one or more of the following:

Creating a neutral space for police-vendor engagement

For technology firms, the product that wins the hearts and minds of those staff who have to use it is the ultimate goal. But a period of testing and play, and the endorsement of practitioners who have experienced the product, is not a standardised component of a public procurement process. In fact, many examples exist of products that were chosen for their high efficiency and productivity scores, only to be deemed much less useful by the staff that were ultimately expected to use them. Canada has ‘police vendor labs’ where frontline staff can interact with technology products and give user feedback to procurement teams to inform their decision-making. A neutral space would be needed to host such a ‘sandpit’ style exercise but it would allow multiple products from competing vendors to be explored by the officers ultimately in line to use them.

“Operational police officers will be the users of digital products and services and so time should be taken to understand their challenges and opinions of your solutions. Officers offer incredible insights and ideas on how you can improve your systems .so include them from initial concept design right through to delivery.”

– Neil Beet, Founder, Blue Lights Digital
Harnessing tech talent in police ranks

Under the former Commissioner in 2012, the Metropolitan Police started an initiative to allow junior officers to raise frontline problems and complaints and directly pitch their solutions to the Met’s senior management team. The ‘Commissioner’s 100’ initiative offered a short-cut through the standard hierarchy to elevate the concerns of frontline staff directly to the bosses. It served to engage younger officers who were empowered to find a solution and have it taken up. One of the byproducts was the ‘Hack the Police’ project, which brought together serving officers in 2013 and again in 2017 to develop creative fixes for frontline services. More recently, a new social enterprise - ‘Police Rewired’ - has been founded to enable young coding talent to work together on policing problems.

Other forces could learn from this approach, and should find ways to allow more tech-savvy, junior staff the space to identify issues, develop fixes and help forces overcome what are often technology barriers - even if that means allowing them to do so through external vehicles and on their own time. A similar scheme to the Met Police’s C100 initiative, scaled up for the whole service, and owned by the College of Policing, could have even greater impact, and would help channel the expertise of frontline staff. An annual tech talent showcase that invited the staff of the service from all ranks to demonstrate their expertise and award prizes would help give recognition to the staff who are innovating, despite the constraints of the ageing infrastructure in which they operate.

45 See more at: https://hackthepolice.com/
46 See more at: http://www.policecoders.org/

CASE STUDY

KASEWARE (USA)

Founded in 2016, Kaseware is a shining example of how lean, software-driven startups can outperform large incumbents.

In 2006, the FBI paid a major US defense contractor over $400m to build its award-winning Sentinel case management system. Four years later, despite hundreds of people working on it, the project was behind schedule and over budget. In response, the FBI decided to wrest control of the project from the prime contractor, and instead assigned it to a small in-house team of software developers and engineers. In under two years, the system - which has since won critical acclaim across the industry - was fully deployed and operational, at a fraction of the cost of the original contract.

In 2016, the small FBI team that led this project went on to found their own security startup: Kaseware. Kaseware is a case management and computer-aided dispatch platform that allows security services to collect and share case information, evidence and analytics. Kaseware offers a single, fully indexable platform that includes evidence and investigation management, visualised computer-aided dispatch and NIBRS compliant reporting. Particularly notable is their powerful data analytics system, which automatically generates otherwise undetectable connections between disparate datasets, and visualises this information via a user-friendly web.

THE HOME OFFICE COULD CHOOSE TO REFOCUS THE POLICE TRANSFORMATION FUND SO IT COULD PLAY A MORE PROACTIVE ROLE IN SEED-FUNDING NEW TECH STARTUP INITIATIVES.
FINDING, BUILDING, AND GROWING POLICETECH STARTUPS

Taken together, these efforts to encourage innovation, promote tech talent, and give practitioners the chance to engage with new technology, also need to be combined with a better way of bringing the right people together around an idea and building a company that offers that solution.

This really means we need an avenue for entirely new companies to be formed to address specific problems. The challenge is how to develop an ecosystem where:

i) Police officers and forces can identify the opportunities for new technologies;

ii) Potential company founders know that there is a real market for innovative products; and

iii) Current innovative UK-based companies, such as they exist, are helped to achieve scale and deliver transformative value.

As a comprehensive effort to meet these three objectives, ‘PoliceLabs’ would seek to identify problems, call for ideas, and then help co-create solutions, with expert input from the technology, science, and academic communities.

The first strand is about changing the culture, such that there is a clearer understanding of the value of tech startups, and more people in the police are able to see opportunities for new technology and inclined to want tech startups to help them seize them. The second strand of a police ecosystem would allow more engagement and transparency so potential startups could see the market opportunities and were confident to pursue them. The third strand is the ability to take promising firms to scale more quickly, serving as a catalyst so the best products and ideas can spread to new police areas without delay.

How PoliceLabs could work

PoliceLabs would bring a select group of high-flying police officers together for an intensive programme with leading technologists, developers and investors. Officers could bring problems, or outcomes they want to achieve, and then work with the engineers to find the solutions. They would work together to develop their ideas and co-develop breakthrough proof of concept products, with support in areas such as product development, market analysis, strategy, business development, fundraising and sales.

The next stage of this growth programme for existing startups, or companies with technology products that could have powerful policing applications, would be a ‘build’ stage, during which a firm could be offered a guaranteed pilot with a police force to prove the value of their product or service in the real world. Then the final step - the accelerate phase - would help to take existing companies to the next level, raise capital, and build out their product to help them access the policing market at scale.

To be sufficiently credible and dynamic, PoliceLabs would have to be independent and separate from any government department or agency, and not aligned to any strategic national policing objectives other than to foster great new companies that can deliver tech innovation to serve policing demands, whatever those may be. Other lessons learnt from the Home Office’s BlueLightWorks initiative, which closed in 2017,47 would have to inform PoliceLabs, but despite this experience, there is still a need for more creative collaboration between industry and policing on technology.

**CASE STUDY**

**IN-Q-TEL**

The CIA-backed venture capital organisation that collates and distills operational needs, scouts for tech talent and helps fund and grow the most innovative firms

One key role for PoliceLabs would be to act as an innovation scout and seedfunder. In a similar vein, the intelligence and security services in the United States benefit from a close connection to the dispersed and rapidly evolving tech sector by using conduits like In-Q-Tel to spot opportunities and grow the tech startups that offer the most potential to help the CIA and other agencies that safeguard national security.

The essential elements of the In-Q-Tel approach – funding staff embedded in agencies to understand their operational needs, clarifying the ‘ask’ and educating suppliers, identifying and scouting innovative new firms and products, and capitalising financial leverage to invest directly in such companies to help them scale – are all clearly translatable to policing.

Indeed, an initiative like PoliceLabs, if it were independent of government, could undertake a similar role to In-Q-Tel. After all, each of In-Q-Tel’s three core functions addresses a problem that both policing and tech startups recognise – insufficient collaboration and a lack of mutual appreciation of each others’ needs and abilities, and often inadequate funding to take good ideas from prototype or pilot to a point where forces are confident to buy them and over time, allow system wide implementation.

**Funding for a new ecosystem**

Central government funding is too constrained to expect the Home Office alone to initiate such a programme, and even were it to rebalance the Police Transformation Fund as we propose, the ecosystem that we need will benefit from local as well as national financial support. Experience suggests that such an effort will be better aligned to local needs and more sustainable if it arises out of a shared investment by all forces who would directly benefit.

Resource budgets are heavily constrained, but if police forces could agree to set aside some of their existing reserves – which despite austerity, currently still amount to £1.6 billion across 41 forces – to invest in a Cop-Q-Tech body, with the same mission as In-Q-Tel, then such an organisation could deliver real benefits to every force.48 Even 3% of the reserves of each force would yield almost £50 million to invest in this new body and that would enable nationwide coverage in all forces.

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Not all decision makers wear uniforms

A common misconception for those outside policing is that police forces are uniformed hierarchies when it comes to decisions about what to buy and when to go to market. Modern police forces are large public sector organisations with a diverse mix of staff involved in procurement who frequently (though not always) report to a senior non-uniformed member of civilian staff. Some forces retain a senior officer (typically a superintendent) in a decision-making role, and some chief constables are happy to delegate, but even more forces now have a force ICT director and/or head of procurement with commercial skills who make all the most important decisions. Many smaller companies need to build relationships across the organisation and not assume that the chief constable is the person who will decide what technology is purchased.

Get the attention where it counts

Many Police & Crime Commissioners can directly commission products but these tend to be those services that directly benefit public users, especially citizen engagement and victim service offerings that can be part of a pitch to voters at the next round of PCC elections. These types of products and services, for example, the original TrackMyCrime project, does not fundamentally challenge the operational practices of the force, and are low down the scale of ‘threat, risk and harm’ for the police. There is a lot of scope for public-police engagement tools – beyond incident reporting and online triage – and even for products that can help hold the police accountable to citizens locally. Some PCCs have an open-door to innovative companies that want to demo their product, and even within procurement rules, it is possible for these politicians to be exposed to a startup’s product without jeopardising any procurement that might follow.

Getting a trial is not the same as getting a contract

Offering the police a free, no obligation trial of your product is not an irresistible proposition – it happens often. But many vendors think this either short-circuits the procurement process, or guarantees a contract later down the line. Neither is true. Some of the world’s largest companies have sunk labour and resources into running large trials at no cost, only to have the project end and for there to be no future tender issued. Equally, some companies have borne all the cost of running a free trial and ultimately were selected, like Axon, who managed for the supply of over 20,000 body-worn video cameras for the Metropolitan Police. If the police try it, they might like it, or they might decide to buy something else, or not buy anything at all.

Share the mission, respect the rules

Policing is a vocation and the duty of those who uphold the law is a solemn one. Their sense of duty and passion for the public safety mission can make the police very rewarding clients, but also demanding ones. Share that passion and come to the market with a sincere desire to improve public safety. If this is all about profit and sales for your firm, you are in the wrong market. Your company may be unique, and your product or service might be disruptive. It might even invite a radical departure in business practices. But selling to the police means going by the book. For good reason, the rules around procurement and the Bribery Act are strict – do not expect any special favours. The police are used to ‘snake-oil’ salesmen and even more familiar with fraudsters. Let your product speak for itself, be honest about the potential, and play by the rules.

Collaborate with incumbents to build profile and trade on your record

Aspiring tech startups are entering a difficult market with a relatively small number of buyers. Forming partnerships with existing suppliers is one route: filling a gap where big existing platforms may benefit from a new capability. Cooperation with the entrenched supplier base may be a smarter move than seeking to displace them. This approach offers opportunities to supply metropolitan police forces that may be too large for an SME to compete for directly. Many major suppliers are now favouring this route to augment their own service offering. Those SMEs that have a track record of delivery may fair better in a market where the vote of confidence from other uniformed peers goes a long way. For startups seeking to access the UK market, relevant domestic experience is valuable, and for overseas firms, it may prove more powerful to point to customer testimony for those working in a friendly, comparable Five Eyes jurisdiction (UK, USA, Canada, Australia, New Zealand).
6. CONCLUSION

The opportunities to use technology to improve policing are immense, and we have barely begun to realise the benefits for the police and the public that innovative technology can offer. Rather than dwell on what has held back the policing sector in the past, the main goal of this report has been to focus on the future and to be optimistic. In capturing the most important themes in the policing sector and illustrating the wider technology market and the potential services on offer, this report brings together the policy issues confronting the service, with the private sector solutions that are now coming to market. It is now up to the government, PCCs, police leaders, and the startup community to move forward with deeper collaboration to seize the opportunities available.

Whatever technology landscape exists in five or ten years time, policing in the UK will continue to need specific tools, products and applications to meet operational needs, and these will continue to be sourced and procured locally in most cases. Even as national programmes and centrally-procured infrastructure are rolled out, local police forces will retain the ability to purchase technology that suits their immediate practical demands, and any market that exists to supply that will need to be diverse, with suppliers that are nimble and able to integrate their offering with whatever national standards and systems are eventually stood up.

It is therefore important that the National Strategic ICT Principles for policing, developed by the Police ICT Company, are shared and understood, but on their own they describe an approach to procurement and a philosophy to govern investment – they are not a roadmap for technology transformation in policing.

In the research for this report, PUBLIC has therefore not sought to validate or challenge any of these principles, or to revisit some of the technical disputes that have arisen in recent years over why British policing struggled – and continues to struggle – with technology. Instead, we have concluded that technology transformation is unlikely to happen simply as a result of any nationally-commissioned project that may be taken up. Instead, we reason that the transformation scenario that is most plausible is one where local police forces start to embrace innovative products, from new sectors or novel suppliers, and spend more of their resources in this arena, instead of continuing with procuring the usual products, from the usual suspects. The 75 firms included in this report represent a fruitful starting point for a police force looking for a new answer to an old question.
Imagine a medium-sized county force, with fewer than 1,500 officers, but with massively enhanced capabilities, thanks to the integration of new services from tech startups in almost every area. This force enjoys sophisticated data platforms to map crime and service demand, and allocate resources to prevent harm in the community. It understands the drivers of the most expensive and intractable social problems and works with partners to coordinate responses. Every patrol officer is deployed with cutting-edge mobility tools that allow them to utilise facial recognition, access every one of the force's data systems to draw on intelligence, and be automatically notified about at-risk individuals, predicted harm spots, and areas of low public confidence.

They are backed up by a sophisticated command centre able to integrate social media sentiment analysis, live video network analytics, ALPR alerts, and a myriad of sensors in the community to ensure officers remain alive to changing conditions and new threats in real time. The specialist teams of such a police force would not only have new robotic tools and advanced camera technology to confront hostage threats and public order challenges, but would have their eyes and ears massively enhanced with the help of biometric surveillance tools, and data-feeds from autonomous aerial drones. The force's contact centres would have the ability to receive every type of digital media directly from the public and to share that rapidly with frontline staff and investigation teams. The latter would have the software to process masses of online material and advanced algorithms to uncover fraud and suspicious activity in digital material and quickly build cases. Criminal justice teams in this pioneering force would be more than case file administrators - they would be dealing directly with the evidence collated by victims, drawing upon time-stamped diary software and other self-serve tools. And in meeting public expectations, this force would be tracking attitudes to the police at the micro-neighbourhood level, equipping its neighbourhood officers with all of this data, along with the live translation tools and engagement products that would help connect their local beat officers with the public they serve.

Achieving all this would make this force in 2025 dramatically more effective than it is today, and would improve the professional performance and morale of its staff, who would finally have the technology at their disposal to do their jobs really well. And embracing technology in all of these domains would not just have realised savings for this force, it would have shifted the police towards a more preventive posture - responding more quickly to emerging problems, anticipating where demand will peak, and intervening early to stop issues escalating. Whatever is happening with crime trends in this force in 2025, its activity will be targeted and much less reactive, with officers and staff deployed to meet the shifting demands across any given day, and operating with purpose to problem-solve issues it already knows about and can monitor, rather than endlessly scrambling to meet some unanticipated but all too familiar emergency.

With less time in reactive mode, this pioneering force has been able to use technology to liberate officers and to buy space - finding the time to prevent crime, and allowing more of their staff to invest in local relationships to build good community relations, ultimately resulting in better intelligence, more cooperation from local citizens and crime victims who feel confident to report, with all users satisfied that the police have the tools to keep them safe, hold offenders to account and get them justice.

This scenario may seem too aspirational, but given what products and services are already on offer - not to mention what might be available seven years from now - it begins to look attainable. How many of the 75 firms profiled for this report would be needed to deliver this transformation scenario to help create such an organisation by 2025, and which police force today will be the first to embrace tech startups to get there?
This report has framed the existing PoliceTech market, unearthed some of the most interesting and innovative companies in the UK and abroad, outlined the near-term demands, and, through case studies, has painted a picture of the operational possibilities for technology-enabled innovation in policing.

If you are a policing leader who wants to take a lead in technology innovation, this report should inspire you to seek out new providers and to try new products. If you are a tech startup that is looking to expand in the UK policing sector, or enter it for the first time, this report should help you navigate the landscape.

We have also set out what needs to change to improve the ecosystem for startups so we can break through the institutional aversion to embracing risk and working at speed, and build a new pipeline of world-class British technology companies dedicated to improving public safety and cutting crime.

By embracing these opportunities and working closely with the startup community, police forces can get ahead of the crime curve and better serve the public. We hope that before too long, police forces across the country will join other areas of the public sector and benefit from the UK’s burgeoning industry of tech startups in the years ahead.
A NEW WAVE OF DIGITAL INNOVATORS ARE SET TO COMPLETELY TRANSFORM HOW MODERN POLICE FORCES OPERATE. FOR THE FIRST TIME EVER, WE PRESENT A DIRECTORY OF THE 75 LEADING POLICE TECH STARTUPS AND SCALE-UPS FROM AROUND THE WORLD.

PUBLIC
### Company Name |
- **ACCELERATED DYNAMICS**
- **AIMBRAIN**
- **ALADTEC**
- **APRILAGE**
- **ASI DATA SCIENCE**
- **AUDAX BODY WORN VIDEO**
- **AUROR**
- **BABEL STREET**
- **BEARTOOTH**
- **BENCHMARK ANALYTICS**
- **BLACK MARBLE**
- **BLUE LIGHTS DIGITAL**
- **BLUE LINE GRID**
- **BLUE VIGIL**
- **BOLO PROGRAM**
- **BOUNCE IMAGING**
- **BRAINCHIP**
- **BRIEFCAM**
- **CALIPSA**

### Sector |
- **Drones & Robotics**
- **Cyber Security & Online Crime**
- **Workforce Management**
- **Case Management & Investigation Software**
- **Data Analytics & Predictive Policing**
- **Video Camera Technology**
- **Data Analytics & Predictive Policing**
- **Online & Social Media Channels**
- **Workforce Management**
- **Data Analytics & Predictive Policing**
- **Mobility & Deployment**
- **Workforce Management**
- **Workforce Management**
- **Data Analytics & Predictive Policing**
- **Online & Social Media Channels**
- **Video Camera Technology**
- **Digital Forensics**
- **Digital Forensics**

### Description |
- Accelerated Dynamics uses machine learning, planning and multi-agent technologies to develop full-stack robot intelligence solutions that are optimised for unmanned aerial surveillance.
- AimBrain offers a multi-module biometric authentication solution in a single platform, allowing financial services organisations to prevent against financial cyber-crime.
- Aladtec software helps law enforcement agencies in scheduling and rostering staff for 24/7 shifts where planning ahead for demand and necessary leave is too often a antiquated or paper-based exercise.
- AprilAge has developed age progression software that can age any person’s face from a photograph and, when paired with facial recognition software, can provide a valuable aid in criminal and missing person cases.
- ASI Data Science, in partnership with the Home Office, has developed an anti-terror content tool which automatically analyses and blocks content that is considered to be ISIS propaganda, before it is posted.
- Audax has developed a number of body-worn surveillance and recording solutions, including the first wearable biometric body-worn video system available on the market.
- Auror is a platform for private businesses to report retail theft, supply information, and draw connections to aid police and investigators to share information and prosecute shop thieves.
- Babel Street has developed a suite of platforms that collect and examine multiple data sources through advanced statistical, linguistic, and crowd-sourcing techniques, allowing the user to generate situational awareness and intelligence on global security issues.
- BearTooth is a smart, ultra-secure walkie talkie system, allowing forces to use their smartphones to communicate and share location data in areas without WiFi or cellular connectivity.
- Benchmark Analytics deploys a data analytics platform to identify police officers most likely to be involved in adverse incidents enabling early intervention, training and support.
- Black Marble supports police clients to transition to the cloud and with app development to enable mobility for officers.
- Blue Lights Digital has developed a digital support tool, EVOLV, providing police forces with decision workflows and a live chat function to help them through the investigation process.
- Blue Line Grid is a secure communication platform for emergency personnel to message, connect and team-build, and with push-to-talk capability for teams that all but replaces the traditional police radio.
- Blue Vigil has developed tethered hovering drone observation technology, designed to provide a low altitude vantage point for law enforcement officials, first responders and event organizers and others.
- The Bolo Program has developed a proprietary engagement engine to communicate via social media and amplify the police requests for information on fugitives to modernise police ‘most wanted’ appeals.
- Bounce Imaging has developed throwable 360 degrees cameras and sensors for first responders and security applications.
- BrainChip analyses large amounts of archived or live streaming video, with the capability to run across multiple feeds in real time, to rapidly identify objects or faces.
- BriefCam has developed a deep learning solution for rapid video review and search, real-time alerting and quantitative video insights, transforming raw video into actionable intelligence, and predictive analytics.
- Calipsa has developed cutting-edge deep learning software to monitor and analyse CCTV videos in urban areas.
<table>
<thead>
<tr>
<th>COMPANY NAME</th>
<th>Sector</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CALLISTO</td>
<td>Victim Services</td>
<td>Callisto has developed a platform that provides investigators with a time-stamped victim diary for sexual assault reporting.</td>
</tr>
<tr>
<td>CARBYNE</td>
<td>Mobility &amp; Deployment</td>
<td>Carbyne is a national emergency communication platform that allows citizens to share real-time encrypted video, voice, images, chat and location information from their phones to first response centres.</td>
</tr>
<tr>
<td>CHORUS INTELLIGENCE</td>
<td>Case Management &amp; Investigation Software</td>
<td>Chorus Intelligence is an end-to-end operational intelligence and analytical solution that provides information on a live case from a number of disparate and disconnected datasets.</td>
</tr>
<tr>
<td>CIVICSgef</td>
<td>Data Analytics &amp; Predictive Policing</td>
<td>CivicScape is a fully transparent, predictive analytics tool that guides deployment and gives police agencies a tactical means to predict future demand.</td>
</tr>
<tr>
<td>CLUE</td>
<td>Case Management &amp; Investigation Software</td>
<td>Clue provides a single API for live case management, including referral, incident, risk, intelligence, investigation, case and outcome management.</td>
</tr>
<tr>
<td>CODA DEVICES</td>
<td>Victim Services</td>
<td>Coda Devices has developed narcotics analysis hardware with three models of spectrometers, enabling identification of unknown substances, product quality control, quantitative analysis, and identification of mixture ingredients.</td>
</tr>
<tr>
<td>COEUS SOFTWARE</td>
<td>Mobility &amp; Deployment</td>
<td>Converus has developed a mobile solution for officers to access current police ICT databases in a quick, simple app-based platform.</td>
</tr>
<tr>
<td>CONVERUS</td>
<td>Case Management &amp; Investigation Software</td>
<td>EyeDetect, that measures micro-changes in pupil diameter, eye movement, reading behaviour, blinks and fixations to provide lie detector and credibility assessments with 86% accuracy.</td>
</tr>
<tr>
<td>CRIMEWATCH</td>
<td>Online and Social Media Channels</td>
<td>CRIMEWATCH is a single intelligence and data-gathering platform for police forces and local communities: collating information from a number of online sources in real-time to create powerful analytics about crime cases in a local area.</td>
</tr>
<tr>
<td>CYBERLYTIC</td>
<td>Cyber Security &amp; Online Crime</td>
<td>Cyberlytic has developed web-threat detection tools in partnership with MoD and GCHQ, using AI to detect, uniquely prioritise and prevent cyber attacks depending on the risk they pose to organisational data.</td>
</tr>
<tr>
<td>DATAMINR</td>
<td>Online &amp; Social Media Channels</td>
<td>DataMinr transforms live social media updates from across the world into information about high-impact events and critical breaking news, enabling security services to act faster and stay one step ahead.</td>
</tr>
<tr>
<td>DRONE DEFENCE</td>
<td>Drones &amp; Robotics</td>
<td>Drone Defence is the UK’s first specialist anti-drone security company, using drone monitoring and geofencing software to protect government organisations, prisons and airports from illegal drone invasion.</td>
</tr>
<tr>
<td>EAGLE EYE INTELLIGENCE</td>
<td>Situational Awareness</td>
<td>Eagle Eye Intelligence provides comprehensive real-time intelligence solutions for public safety and security for improved situational awareness and operational efficiency.</td>
</tr>
<tr>
<td>ELISTAIR</td>
<td>Drones &amp; Robotics</td>
<td>Elistair has built a noise-limited tethered UAV solution that allows security services to monitor areas of several kilometers in size, for long periods of time during day or night.</td>
</tr>
<tr>
<td>ELLIPTIC</td>
<td>Cyber Security &amp; Online Crime</td>
<td>Elliptic identifies illicit activity on the bitcoin blockchain and provide actionable intelligence to financial institutions and law enforcement agencies to reduce bitcoin transaction risk.</td>
</tr>
<tr>
<td>ELUCD</td>
<td>Public Confidence</td>
<td>ELUCD is a data-driven citizen engagement platform that provides police forces with hyper-local survey data about public trust, confidence and safety.</td>
</tr>
<tr>
<td>ENVISAGE TECHNOLOGIES</td>
<td>Workforce Management</td>
<td>Envisage offers a platform that allows first responders to securely collaborate, share advice and practitioner knowledge, as well as access training and tips and communicate with other users.</td>
</tr>
<tr>
<td>EXCESSION</td>
<td>Case Management &amp; Investigation Software</td>
<td>Excession is a digital analysis platform that allows government bodies and police forces to aggregate and analyse data relating to critical security threats from a variety of media sources in real-time.</td>
</tr>
<tr>
<td>FACEWATCH</td>
<td>Biometric Surveillance</td>
<td>Facewatch is a secure, cloud-based platform that uses facial recognition technology to proactively prevent, deter and protect businesses against theft.</td>
</tr>
<tr>
<td>FUTR</td>
<td>Public Confidence</td>
<td>Futr. allows public authorities to build bespoke multi-modal chatbots and automate high volume, low priority communication with citizens.</td>
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</tbody>
</table>
## 7. THE POLICE TECH PIONEERS

A DIRECTORY OF THE 75 MOST INNOVATIVE POLICE TECH STARTUPS

<table>
<thead>
<tr>
<th>COMPANY NAME</th>
<th>Sector</th>
<th>Country</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>GET THE DATA</strong></td>
<td>Case Management &amp; Investigation Software</td>
<td>UK</td>
<td>Get The Data provides a number of open-source datasets about the UK public sector, including locally-organised UK police crime data, allowing security services to drill down into UK crime data by street.</td>
</tr>
<tr>
<td><strong>GRIFFEYE</strong></td>
<td>Digital Forensics</td>
<td>EUR</td>
<td>Griffeye is a digital media investigation platform, providing investigation teams with an automated analysis of large amounts of image and video data, including eliminating and prioritising information, and detecting and highlighting critical clues.</td>
</tr>
<tr>
<td><strong>HEADLIGHT AI</strong></td>
<td>Drones and Robotics</td>
<td>UK</td>
<td>Headlight AI uses signal processing technology to deliver enhanced vision and material analytics in extreme or low-visibility conditions.</td>
</tr>
<tr>
<td><strong>HEALTHIM</strong></td>
<td>Victim Services</td>
<td>USA</td>
<td>HealthIM has developed a platform that provides police with an intelligence driven system to prevent crisis and reduce risk when supporting persons with mental illness.</td>
</tr>
<tr>
<td><strong>HUNCHLAB</strong></td>
<td>Data Analytics &amp; Predictive Policing</td>
<td>USA</td>
<td>HunchLab is a web-based proactive patrol management system, employing advanced statistical models to forecast when and where crimes are likely to emerge, and calculate the best way to respond.</td>
</tr>
<tr>
<td><strong>KASEWARE</strong></td>
<td>Case Management &amp; Investigation Software</td>
<td>USA</td>
<td>Kaseware is an end-to-end case management and computer-aided dispatch platform that allows security services to collect and share case information, evidence and analytics in a single, integrated system.</td>
</tr>
<tr>
<td><strong>KNIGHTSCOPE</strong></td>
<td>Drones &amp; Robotics</td>
<td>USA</td>
<td>Knightscope is a Silicon-Valley based startup that has developed a suite of compact autonomous robots for monitoring and patrolling public spaces.</td>
</tr>
<tr>
<td><strong>LABFORGE</strong></td>
<td>Situational Awareness</td>
<td>Other</td>
<td>LabForge is a low-power, high-endurance situational awareness solution that employs a series of sensors and cameras around a given site to detect for criminal invasion.</td>
</tr>
<tr>
<td><strong>MARK43</strong></td>
<td>Case Management &amp; Investigation Software</td>
<td>USA</td>
<td>Mark43 has developed an end-to-end law enforcement and case management platform that allows police to collect, manage, analyze and share information.</td>
</tr>
<tr>
<td><strong>MOBILEPD</strong></td>
<td>Public Confidence</td>
<td>USA</td>
<td>MobilePD develops bespoke citizen communication platforms for police forces, allowing officers to receive anonymous crime tips directly from local residents, as well as providing a clear dashboard for citizens to view recent news alerts and crime data.</td>
</tr>
<tr>
<td><strong>NETCLEAN</strong></td>
<td>Online &amp; Social Media Channels</td>
<td>EUR</td>
<td>Netclean has developed an AI-powered solution that can effectively detect online child sexual abuse material and safeguard against crime on local intranet networks.</td>
</tr>
<tr>
<td><strong>NEXTDOOR</strong></td>
<td>Public Confidence</td>
<td>USA</td>
<td>NextDoor is a community social network platform that allows local police departments to share updates, local crime tips and statistics and offer a new way to engage with safety concerns at a hyper-local level.</td>
</tr>
<tr>
<td><strong>NOVOVILLE</strong></td>
<td>Public Confidence</td>
<td>UK</td>
<td>Novoville is a citizen engagement application for citizens, with an accompanying sophisticated web dashboard for local authorities to track citizen needs, preferences, and views while automating performance management.</td>
</tr>
<tr>
<td><strong>OPENALPR</strong></td>
<td>Video Camera Technology</td>
<td>USA</td>
<td>OpenALPR is a cloud-based automated licence plate recognition tool that agencies can use to search for vehicles and monitor locations, without the high cost and network demands of local database driven systems.</td>
</tr>
<tr>
<td><strong>PALISCOPE</strong></td>
<td>Case Management &amp; Investigation Software</td>
<td>EUR</td>
<td>Paliscope is a software platform for investigators that provides a single portal to search, gather and record open-source intelligence from across the web, with a fully auditable process to ensure data integrity and traceability for all exhibits.</td>
</tr>
<tr>
<td><strong>PREDPOL</strong></td>
<td>Data Analytics &amp; Predictive Policing</td>
<td>USA</td>
<td>PredPol is a SaaS company that enables law enforcement agencies to better prevent crime in their local communities by generating AI-driven daily predictions on the places and times that crimes are most likely to occur during any patrol shift.</td>
</tr>
<tr>
<td><strong>QUICKET SOLUTIONS</strong></td>
<td>Case Management &amp; Investigation Software</td>
<td>USA</td>
<td>Quickset Solutions provides a cloud-based operational intelligence and record management solution designed for sensitive government security workloads, enabling efficient data capture along with real-time data sharing and analysis.</td>
</tr>
<tr>
<td><strong>RIDEALONG</strong></td>
<td>Victim Services</td>
<td>USA</td>
<td>RideAlong is a software tool that gives patrol officers key information and de-escalation techniques for vulnerable people, including those with mental illness.</td>
</tr>
<tr>
<td>COMPANY NAME</td>
<td>Sector</td>
<td>Description</td>
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<td>---------------------------------------------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>SAFETONET</td>
<td>Online &amp; Social Media Channels</td>
<td>SafeToNet is an AI-powered safeguarding tool designed to protect under-age children from sending and receiving inappropriate messages and content online.</td>
<td></td>
</tr>
<tr>
<td>SCUTUM</td>
<td>Mobility and Deployment</td>
<td>Scutum has developed a fleet of electric two-wheeled scooters, which provide greener mobility solutions optimised for police forces.</td>
<td></td>
</tr>
<tr>
<td>SEEQUESTOR</td>
<td>Digital Forensics</td>
<td>SeeQuestor is a post-event analysis solution for large quantities of video footage, automatically detecting movements, faces and people, and indexing each video for faster reviews and searches.</td>
<td></td>
</tr>
<tr>
<td>SHOTSPOFTER</td>
<td>Case Management and Investigation Software</td>
<td>ShotSpotter is an end-to-end gunshot detection and reporting solution that uses triangulated acoustic sensors to help law enforcement officials and security personnel to rapidly identify, locate and deter gun violence.</td>
<td></td>
</tr>
<tr>
<td>SIEMPLIFY</td>
<td>Data Analytics and Predictive Policing</td>
<td>Siemplify is a data-driven security orchestration and automation tool that enables police forces to capture, clean, fuse and contextualise data relevant to an operation from multiple sources.</td>
<td></td>
</tr>
<tr>
<td>SKYDROID</td>
<td>Drones and Robotics</td>
<td>Skydroid is an anti-drone security company that aims to protect prisons from illegal narcotics deliveries via UAVs. They have recently launched a £237,000 pilot with the Ministry of Justice.</td>
<td></td>
</tr>
<tr>
<td>SPIDR TECH</td>
<td>Public Confidence</td>
<td>SPIDR Tech has developed a citizen engagement platform that allows police forces to design automated texts and emails to crime victims, reporting parties, and citizens who call for non-emergency requests.</td>
<td></td>
</tr>
<tr>
<td>STARCHASE</td>
<td>Offender Tracking and Supervision</td>
<td>Starchase is a self-adhesive GPS tracking bullet that officers can fire at vehicles in order to eliminate the need for expensive, risky and unpredictable high-speed pursuits, thus increasing suspect apprehension, and reducing risk of harm.</td>
<td></td>
</tr>
<tr>
<td>TACTISCAN</td>
<td>Sensors and Scanners</td>
<td>TactiScan, developed by Spectral Engines, is a portable screening scanner designed to detect illegal narcotics through bags, clothes and other objects, by using infrared light to detect the samples.</td>
<td></td>
</tr>
<tr>
<td>UNBLUR</td>
<td>Case Management and Investigation Software</td>
<td>Iris, developed by Unblur, is an intelligent assistant for commanders in the field, integrating dynamic information (drones, cameras, GPS) with static information (databases, maps).</td>
<td></td>
</tr>
<tr>
<td>UNCHARTED SOFTWARE</td>
<td>Case Management and Investigation Software</td>
<td>Uncharted Software offers a suite of data visualisation products, allowing law enforcement agencies to analyse and understand phone records, financial records, open source data and disparate citizen datasets to uncover criminal networks.</td>
<td></td>
</tr>
<tr>
<td>VIGILANT SOLUTIONS</td>
<td>Digital Forensics</td>
<td>Vigilant Solutions has developed a licence plate recognition (LPR) tool that takes photos of license plates capturing date, time and GPS coordinates of where the photo was taken.</td>
<td></td>
</tr>
<tr>
<td>VINTRA</td>
<td>Video Camera Technology</td>
<td>Vintra uses machine-learning to deliver a video analytics capability which can be used with non-static cameras and customised to learn to spot and flag specific activity relevant to the user.</td>
<td></td>
</tr>
<tr>
<td>VISUAL LABS</td>
<td>Situational Awareness</td>
<td>Visual Labs is a smartphone-enabled software platform that allows a smartphone camera to function as a body-worn camera.</td>
<td></td>
</tr>
<tr>
<td>WEALERT</td>
<td>Public Confidence</td>
<td>WeAlert is an app that lets users connect with their neighbors easily, stay informed about their communities and share safety and security concerns.</td>
<td></td>
</tr>
<tr>
<td>WSEE</td>
<td>Biometric Surveillance</td>
<td>WeSee uses computer vision technology to not only automatically recognise faces, but also detect suspicious behaviour through deep learning-based emotional recognition algorithms.</td>
<td></td>
</tr>
<tr>
<td>WHAT3WORDS</td>
<td>Mobility and Deployment</td>
<td>what3words has developed a platform that divides the world into a global grid of 3mx3m squares, giving each square a preallocated, unique &amp; fixed 3 word address.</td>
<td></td>
</tr>
<tr>
<td>XANVIEW</td>
<td>Video Camera Technology</td>
<td>Xanview provides a single, indexable platform for managing and reviewing multiple security devices, including video cameras, alarms and locks.</td>
<td></td>
</tr>
</tbody>
</table>
8. KEY PLAYERS IN THE POLICING LANDSCAPE

Local forces – the 41 police forces, their chief officers, and their procurement leads.

Police forces in England and Wales are independent legal entities, established by law and led by an operationally responsible Chief Constable, overseen by a directly-elected Police & Crime Commissioner (PCC).

Each metropolitan force or county constabulary is overseen by a directly-elected Police & Crime Commissioner. As publicly-funded organisations, police forces are governed by public sector accounting rules and procurement protocols, but they are distinct from each other, and free and able and (very often) willing to procure the technology or product that meets their local need. Individual forces are also governed by a hierarchy where many procurement decisions are signed off by chief officers, with supplier engagement and bid processes run by procurement departments led by senior civilian staff.

HMICFRS.

The Inspectorate of Constabulary is responsible for reporting on the efficiency and effectiveness of police forces, which now form part of their rolling programme of PEEL inspections. Technology investments and the impact on operational business are therefore frequent areas of interest for inspectors, although they are not examined as a standalone category.

As part of the new Force Management Statement regime, introduced in 2018, each police force is asked (in section 9) to document their current ICT platforms and assets and explain how these meet current and future demands. HMICFRS has not produced a dedicated report on police technology in recent years, however the inspectorate has sought to move forward the debate about technology, for example, with the proposal of HM Chief Inspector Sir Tom Winsor to institute a network code and a new cross-service voting model for collective investments.

www.justiceinspectorates.gov.uk/hmicfrs

Police & Crime Commissioners.

Created by the 2011 Police Reform & Social Responsibility Act, elected Police & Crime Commissioners (PCCs) are the democratically accountable executives tasked with overseeing police forces in England and Wales (the role is assumed by the Mayor in London and Greater Manchester). As the legal authority overseeing the budget and performance of police forces, they are required to set out local priorities, and approve all major expenditure.

Because of their role in setting Police & Crime Plans and authorising budgets, some PCCs have taken a keen interest in technology, with a minority also involving themselves in procurement discussions when police forces are exploring the operational services they are seeking from the market. PCCs often devote most attention to those technologies and other innovations that improve the policing service to the public. As the authorities responsible for local victim services, which they commission and fund, PCCs have led the police in supporting and investing in a number of successful schemes that use technology to improve victim experiences. A few PCCs have taken a wider interest in ensuring value for money in all areas of spending, and have influenced the procurement choices around technology, even in non-public facing arenas like support services and back office suppliers.

www.apcc.police.uk

National Police Chiefs’ Council (NPCC).

Created after the dissolution of the Association of Chief Police Officers, the NPCC is the single professional body for the senior leadership of the police service. In November 2016, NPCC published their strategy for policing in the next decade – Policing Vision 2025 – which included ambitions around technology.

The NPCC plays a key role in developing operational policy and doctrine for the service, and in agreeing common positions around legislation and other factors affecting policing. The NPCC does not have a budget to invest in technology and does not directly commission programmes. However, it coordinates and oversees a number of nationally-funded projects, and contributes to the assessment and approval of Police Transformation Fund projects through its membership of the Police Reform and Transformation Board.

www.npcc.police.uk
Police ICT Company

The Police ICT Company, established in July 2015, was designed to help coordinate police investments in technology to avoid duplication and to encourage interoperability and economies of scale. The ICT company [seeks] to act as a bridge between the policing, technological and commercial worlds. [They] help the service buy ICT better, manage it better and exploit new capabilities more successfully.

The company is now evolving to adopt a new role, after agreement by the Police Reform and Transformation Board in 2017, with the aim to become the “delivery vehicle for the national technology programmes” - a departure from the original purpose agreed when the company was incorporated. This shift in role was approved by the company’s board in February 2018 and necessitates additional investment to fund an expanded delivery and implementation capability, drawing on the Transformation Fund. The company will remain owned by Police & Crime Commissioners, but will need to resolve the inherent tension between their understandable focus on local priorities and the nationally approved investments that have value for the service as a whole, but which PCCs do not fund. Currently devising their five-year strategy, the Police ICT Company is also continuing to work on developing common standards to improve efficiency for forces, including around procurement, data, and core technology platforms like Microsoft’s Office 365 which is becoming the favoured option for many police forces. In addition, the new CEO, Ian Bell has said that “We want to be able to keep leading on assessments to ensure readiness to consume new products. We cannot be hindered by legacy forever.”

www.ict.police.uk

National Police Technology Council

This non-statutory body is a committee of senior staff leads from across the service who advise and coordinate the operational technology needs of policing, and help deliver the technology elements of the NPCC’s National Enabling Programmes.

One of the main outputs of the NPTC’s work has been to devise and promulgate a set of principles to guide the service in how it buys, operates, and plans for technology. These 26 principles – issued by the Police ICT Company in October 2017 – cover architecture, data, and applications, and exemplify the emerging consensus across policing for example, in respect of cloud services, and the importance of interoperability. There is an expectation that the principles will find support but the NPTC has no mechanism to mandate compliance with them, or the means to monitor their adoption. Future technology challenges facing policing will be deliberated by the NPTC and their advice will guide the position taken by NPCC in respect of national policy, change programmes, and legal requirements.

The Home Office

As the central government department responsible for policing, the Home Office is the primary source of policy and regulation affecting policing at every level. Over the years, the role and influence of the Home Office has been critical to the development of police technology and many groundbreaking innovations – such as national record databases and forensic techniques like DNA profiling – have been invented, trialled and promulgated by the Home Office and its agencies. Since 2010 and the localism drive of the then Coalition Government, the Home Office has taken a less pronounced role in the development of technology for the police service and stepped back from funding or leading national reform projects. Former agencies with this remit, like the National Policing Improvement Agency, were closed down and not replaced. The department retained an interest in encouraging local forces to innovate, creating a Police Innovation Fund, then later, a larger Police Transformation Fund (PTF) to allow local forces to draw on central government resources to support local projects (see Chapter 2).

https://www.gov.uk/government/organisations/home-office

College of Policing

The College is the national centre of excellence for police training, accreditation and best practice. Created in 2013, the College hosts the national ‘What Works’ centre for crime reduction, in partnership with University College London, and operates the principal training programmes for senior leaders in the service (‘The Strategic Command Course’). The College is responsible for leadership, workforce development and serves as the repository for evidence being generated by pilots and field trials taking place throughout police forces in England and Wales. As new technology is adopted in a range of areas, the College has been influential in building the evidence-base to justify further expansion or wider adoption, for example in the work done to study body-worn Video initiatives, including the partnership with the Mayor’s Office for Policing And Crime (MOPAC) in 2014-15 to design and evaluate the world’s largest randomised control trial of 1,000 BWV devices in the Metropolitan Police. However the College, under its first Chief Executive, decided to focus on people, and workforce standards and training, rather than technology.

www.college.police.uk
9. METHODOLOGY

The proprietary data for the Police Tech Pioneer index was constructed using an aggregation of UK procurement contracts, DueDil, inbound introductions from the London venture capital and angel community, Crunchbase, AngelList and the CIA In-Q-Tel startup database.

For companies to qualify as startups, we use the same criteria for company size as PUBLIC’s other flagship reports. That is the European definition of SME (i.e. less than 250 employees, annual turnover not exceeding €50 million, annual balance sheet not exceeding €43 million).

It is worth noting that almost none of the companies included in our index came close to these thresholds, and that almost all of them are venture or incubator-backed small companies that have been founded in the past 5-10 years. Finally, only companies with corporate status qualified – joint ventures or subsidiaries were excluded.

When conducting technology spend analysis of UK police forces, we analysed public contracts from a variety of sources. This includes data sourced from contract databases - Tussell, TenderScout and the Bluelight Procurement Database - as well as force FOI spend documents. Contract information for individual force profiles was supported by data provided by Vigilant Research and researchers from Anglia Ruskin University. Analysis for Met Police technology spend was taken from a statistically-significant sample of supplier invoices.

The contract data used for this analysis was by no means complete due to the scarcity of publicly-available information. We have taken all reasonable steps, and have cross-validated data where possible, to ensure that our analysis is accurate and representative of actual spend.
ACKNOWLEDGMENTS

The authors would like to thank the many people who gave their time to be interviewed for this project, and to those who attended the discussions that PUBLIC hosted. We are also grateful for the insights into current policing challenges and operational uses of technology from serving officers who wished to remain anonymous. Special mention should go to those who spoke candidly about the issues that need addressing now that they have left the service, including Neil Beet, William Bratton, Chris Greany, Jon Murad, Stephen Otter, Charles Ramsey, Rory Geoghegan, Mark Rowley and Chris Sims.

Several people played a key part in shaping our early thinking on this subject including Robert Beckley, Clare Elford, Robert Leach, and Stephen Roberts. Ryan Workman provided invaluable support around the operation of the Police Transformation Fund. The authors also want to acknowledge the guidance provided by Robert Wasserman about innovative new firms operating in North America and the author of the foreword, Lord Hogan-Howe for his reflections.

Finally, Nick Gargan and Professor Bernard Silverman deserve particular mention for their generous efforts in reviewing and commenting on multiple drafts of the report.

With too many individuals to name, we nonetheless wish to thank all those representatives from companies and individual police forces who agreed to be interviewed for a case study in this report. Any errors or omissions are the authors’ own.

Blair Gibbs & Johnny Hugill
WE BRING TOGETHER EXPERIENCE FROM THE PUBLIC SECTOR, TECHNOLOGY AND FINANCE TO HELP STARTUPS SOLVE PUBLIC PROBLEMS

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