

A vision for digital transformation in the emergency services

Digital innovation in the Blue Light technological landscape and the potential benefits that the ESN could bring



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1 Introduction

Providers of emergency services in the UK are facing a challenge. For example, the Chief Fire Officer’s Association predicts that over the next four years, emergency fire and rescue services will face - on average - a 22 percent reduction in their budgets¹. However, despite having access to fewer financial resources, demand for services continues to rise².

The Home Office’s new Emergency Services Network (ESN) has the potential to provide police, fire and rescue, and ambulance with a cheaper, faster and more sophisticated communications system. Utilising the communications network that most enterprises take for granted has not been possible for the UK’s Bluelight services, meaning that tools such as email, mobile applications, GPS mapping, completion of paperwork remotely has not been possible. The ESN has the potential to allow the emergency services to start to harness these tools, and could revolutionise the way the organisations work in the field, leading to leaner, smarter and safer delivery of services to the community.

This paper explores the challenges that the emergency services will face as they transition onto the new network, and the benefits that will be achieved if visionary decisions are made which will lead to a true digital transformation.

2 The need to move with the times

In 2012, Her Majesty’s Inspectorate of Constabulary (HMIC) undertook a study of how police officers in six forces use technology in the field. They found that of the 19 basic technology operating systems now required by a constable to carry out frontline roles away from police stations, only one – mobile telephony – was consistently available and even that was not always effective³.

The purpose of the police service is to prevent and detect crime and protect the public. This hasn’t changed fundamentally in the past two centuries but the context in which it operates has been transformed, latterly as a result of the digital revolution. The spread of technology into virtually every sphere of modern life means that digital evidence is now available at almost any conceivable crime scene. This could include smartphone footage of an assault in a public place, a social media trail relating to a missing person, or a record of which devices connected to the wi-fi router at a property that has been burgled. These are all at the volume end of the spectrum, and the potential for sophisticated data analytics tools to link previously unconnected offenders and crimes, and even to predict where and when offending will occur offer potentially huge benefits. However, policing is by and large still using traditional operating models and tactics to address a significant transformational challenge.

Digital investigation is still viewed as a niche activity in many forces. Capabilities exist and have been enhanced in recent years but are

¹ Chief Fire Officer’s Association
<http://bit.ly/2efBaMt>

² Guardian
<http://bit.ly/2cOvtzj>

³ Taking Time for Crime
<http://bit.ly/2fw1tLx>

“Since 2015, the number of UK adults owning a smartphone has increased to 71%. This allows the entire network to be updated, whether through text, photos or videos, instantly at any time and from any location.”

often siloed and are frequently inaccessible to frontline officers. This is particularly problematic for frontline officers who are increasingly confronted with incidents and crimes involving social media but who in many cases don't even have access to social media on force networks. This stems from an institutional aversion to risk which is understandable, but hardly proportionate, considering how relevant social media has become to modern life, and how much potential intelligence and evidence can be accessed through social media platforms⁴.

Over the intervening years, emergency services have started to adapt to these technological changes. For example, organisations such as the West Midlands Fire Service have started using live video streaming app Periscope and the short video clip publisher Vine to engage the public and respond to their need to engage through digital channels.

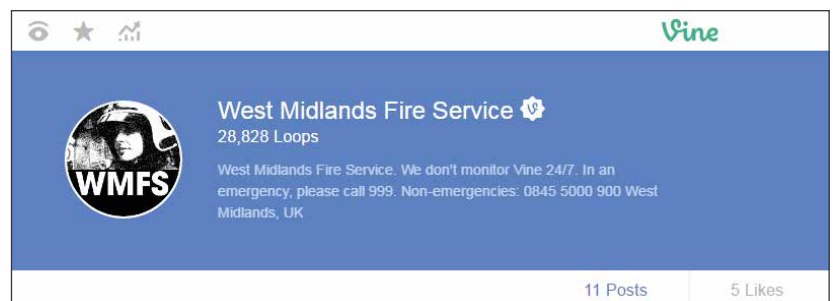


Figure 1

Almost nine in ten (86%) of UK adults now have internet access at home⁵. The UK is becoming increasingly connected via the smartphone; research suggests that it is the most widely-used device by UK adults for accessing the internet. Since 2015, the number of UK adults owning a smartphone has increased to 71%. This allows the entire network to be updated, whether through text, photos or videos, instantly at any time and from any location. The web provides a powerful way of keeping in touch with what's happening.

2.1 A new battleground

Technology has allowed for a more flexible and responsive protest community which is capable of advanced communication and immediate reaction to events on the ground. The principles of “flashmobbing” – impromptu gatherings of people, arranged by text message, for mass pillow fights or dance routines – is now being used by protesters too. It allows large groups of people to gather in one place at short notice before the authorities have the chance to block their efforts.

The 24-hour Climate Camp “flashcamp” organised in the Square Mile in London was organised along “flashmob” lines in 2009⁶. This was coupled with protests in cyberspace, as those involved in demonstrations use social networking sites such as Facebook and Twitter to co-ordinate protests. The internet has long been used by protest groups to organise and mobilise supporters and publicise campaigns. But now mobile technology, allied with social media, is providing a new platform for protest⁷.

⁴ Policing Insights
<http://bit.ly/2gesVB1>

⁵ Ofcom
<http://bit.ly/2eo077y>

⁶ Financial Times
<http://on.ft.com/2eUt4Yu>

⁷ Daily Telegraph (accessed October 2016)
<http://bit.ly/2f5BrhE>



“This use of technology leads to a higher quality of service being offered to the public. The technology offers the potential for cost savings too.”

The pace and sophistication of communication has arguably left police, particularly officers on the ground, less well informed than protesters with high specification mobile phones, who could access or post on websites and get an overview of the situation. This reality is in stark contrast to reports from the police of inability at times to communicate using the police radio. The challenge for the police is to keep pace with a dynamic, IT intelligent protest community and the technology available for use⁸.

In the health sector, the Ambulance Service has fewer, more highly skilled staff well equipped with mobile technology; the police and fire services could embrace a similar model. Social media is an increasingly important – and cost-effective – tool for managing high profile incidents, gathering intelligence and interacting with the public. And predictive crime mapping offers new opportunities to reduce crime and better deploy police officers.

This use of technology leads to a higher quality of service being offered to the public. The technology offers the potential for cost savings too. But simply providing employees with mobile devices will not guarantee greater efficiencies. The National Audit Office found that the last national roll-out of 41,000 devices to police forces from 2008 to 2011, at a cost of £71 million, did not achieve value for money⁹. Cashable savings from the scheme were minimal; and the impact on officer visibility varied widely across forces. The emergency services will need to implement new technologies carefully to ensure proposed benefits are fully realised. It must find the right device: '[staff] have got to have something that works in bright sunshine and at 3am in the freezing rain with gloves on'. Staff should be consulted about changes to working practices from an early stage. But once the organisation has decided on a new device, it must be disciplined in making sure the technology is used as intended; this requires training and supervision. This presents a risk: using tablets or smartphones at work might be straightforward for employees familiar with the technology in their personal lives; but others may struggle to adapt to new ways of working. Training will be a key part of implementing more mobile ways of working, such as in a car rather than an office.

3 The ESN will facilitate change

3.1 The scale of the transformation

The Home Office's new Emergency Services Network (ESN) will provide police, fire and rescue, and ambulance services with a cheaper, faster and more sophisticated communications system. The current terrestrial trunked radio (TETRA) network will be replaced with a 4G LTE system, which will provide the UK's Bluelight services with the most advanced communications infrastructure in the world.

ESN will be a mobile communications network with extensive coverage, high resilience, appropriate security and public safety functionality. This allows users to communicate even under the most challenging circumstances.

⁸ Her Majesty's Inspectorate of Constabulary
<http://bit.ly/2g7xU6l>

⁹ Smart Policing Report
<http://bit.ly/28KkLIL>



Providing the emergency services with access to mobile broadband will move the communications infrastructure firmly into the twenty first century; giving users access to email, online documentation, live streaming of video, advanced mapping and other GPS related services as well as having a number of other benefits. This network forms part of the nation's Critical National Infrastructure and should improve public safety, officer efficiency and value for money.

In order to provide these services, the new ESN will be delivered over the existing 4G commercial network. The rationale behind this decision was:

- Flexible - broadband based infrastructure will allow appropriate services to be delivered based on end-user needs
- Logistical - there was no spectrum available for a dedicated bluelight sector mobile network
- Cost effective - having a dedicated bluelight communication network is expensive both for central government and end users

The government first announced plans to transition to a new emergency services network in 2011 and all emergency services have a target for completing the transition to ESN by December 2019. These timescales are ambitious; the main contracts for the provision of the network were awarded in December 2015, further enabling contracts will need to be awarded to allow the service to begin in July 2017, when users will start converting over on to the new network.

Utilising a 4G emergency services network nationwide, has not been tried anywhere in the world before. This new venture has risks across two key categories: technical (design, build and test the network) and user take-up (the transition from TETRA to 4G).

3.2 Technical challenges

According to a recent National Audit Office report¹⁰ there are four technical challenges that need to be addressed:

- 1 Increasing the percentage of Great Britain's landmass covered by the 4G network from 70% (as at July 2016) to 97%
- 2 Developing handheld and vehicle-mounted devices that will work with ESN as no suitable devices currently exist
- 3 Developing new push-to-talk software to enable 'radio-like' communications between emergency services personnel and control rooms and direct device-to-device voice calling, particularly used in covert and counter-terrorism operations
- 4 Implementing the software and protocols that are needed to give emergency services personnel priority over commercial users of the 4G network

There are challenges too for back-office systems into which the new technology will need to integrate. Industry representatives told the Budget and Performance Committee of the London Assembly¹¹ that in the past police forces have gone straight to a technology solution before working out the problem that they are trying to solve. Coupled with this, forces are

¹⁰ NAO
<http://bit.ly/2cyKLfn>

¹¹ Police Technology Report
<http://bit.ly/28KkLIL>



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failing to fully exploit the ICT capabilities they already have; they tend to buy new technologies and incorporate them into their existing systems – sometimes unsuccessfully.

3.3 User take-up

The full benefits of ESN rely on the emergency services exploiting high-speed data services. By definition, this will mean that Blue Light services will need to change the way that they currently operate. The government is seeking to encourage services to make the transition and will not enforce a change. In fact, the emergency services have been assured that they can stay on the TETRA system until ESN is ‘at least as good’ as the current system.

To move from TETRA to ESN it is predicted¹² that around 300,000 users will require new radio devices, 45,000 vehicles and 115 aircraft will need to be fitted with new equipment, and some 230 control rooms will have to be upgraded. These arrangements are outside of the core government contracts and will need to be negotiated by organisations on a ‘per force’ basis. This is a significant procurement activity.

Staff (both front line and back-office) will then need training in the use of the new equipment and it is likely that both TETRA and ESN equipment will need to be run in parallel, through testing and user migration.

3.4 Drivers for change

This new network technology will allow collaboration between employees, other regions, other emergency services and the public. As a result of this, front-line staff will have a more detailed understanding of the situation they’re about to enter, which will ensure that the best response can be planned and implemented. This could even extend to involving the general public as first responders, where 999 operatives could harness the power of technology such as smart glasses worn by members of the general public to stream video of the situation, and then advise them on the best course of action.

In order to provide more advanced communications between control rooms and personnel in the field access to a ‘broadband’ network is required. The Home Office started to look into how this could be addressed in 2011. This led to the government setting up the Emergency Services Mobile Communications Programme with objectives to:

- make high-speed data more readily available to the emergency services to improve their performance
- provide more flexibility to take advantage of new technologies as they emerge
- save money

¹²ReadyForESN
<http://bit.ly/2g39iN8>



“judicious investment in technology can raise productivity greatly”

4 Benefits of Digital Maturity

4.1 Operational benefits of the ESN

It will be possible for Emergency Services to continue to operate in exactly the same way as they do now over the TETRA radio network. At present, a police officer has to radio back to base to find out simple background for information about previous crime reports or information about particular suspects. The ESN will give officers access to the technology that many of them will already be using at home. Officers will be able to communicate verbally between one another and the control room, just as they do now, however the data service overlays that are now possible need to be implemented.

As technology allows services to collect more data, they face a challenge in making that data useful to police officers. Officers spending more time working out of the office require stronger back office support. Addressing this challenge will require significant upfront investment, but could result in staff making better decisions, armed with the additional information they have access to.

4.1.1 Better quality service to the public

Predictive policing techniques are useful tools to help officers target crime and allocate resources effectively. For example, when police officers patrol a street, they could be alerted to properties where someone has broken a curfew, or to a pattern of repeated anti-social behaviour at a certain time of the night.

Predictive crime mapping could enable the police to reduce crime and allocate resources more efficiently. The technique uses historic crime data to predict where crimes are more likely to occur in the future. Forces can then use this information to deploy officers to these areas, and increase their chances of catching suspects. This crime prevention provides reassurance to communities and raises officer productivity.

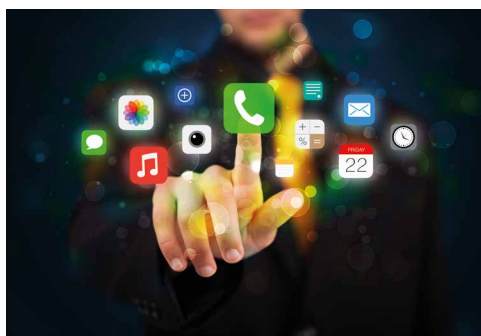
The 2013 Smart Policing report gives an example of current processes that require information to be entered into ten different systems wastes time and creates opportunities for error¹³. If emergency services personnel have mobile devices – such as tablets or smartphones – they will be able to work more efficiently. With access to these new handsets and the ESN, rather than filling in forms a number of times, staff could complete tasks once and submit information back to central systems remotely.

With situations like this, it would appear that investment in information and communication technology systems that will raise productivity are needed. Utilising the ESN with appropriate applications will mean that the same amount of work could be done by fewer officers. The report goes on to state that “judicious investment in technology can raise productivity greatly”¹⁴.

The force has identified benefits from using these devices including better data quality, quicker data capture and greater accessibility to

¹³ Smart Policing Report
<http://bit.ly/28KkLJL>

¹⁴ Smart Policing Report
<http://bit.ly/28KkLJL>



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systems. Collaborating with other regions and other emergency services will mean technology and expertise can be shared

4.1.2 More cost efficient service

Time spent logging on to computers or re-entering data into different systems is time that could be spent on the tackling emergencies. Currently, police officers are deployed without having access to the information that the service has on the activity of criminals. They are unable to communicate as effectively as they could with the public and businesses.

In the future, custom-made applications – or apps – will play an important role across emergency service organisations. These apps can be developed to support various work processes. For example, Hampshire Fire and Rescue Service developed an app for staff to book pooled vehicles; it was popular with staff, and made a business process more efficient¹⁵.

Likewise, the Ambulance Service is an example of an organisation that has reduced its number of operational staff by improving technology. Compared to the 1970s, it now has fewer, more highly skilled, staff, who have technology, intelligence and information ‘wrapped around them’.

As staff spend more time away from offices (increasing visibility to the public), this reduces the need for desk space. This real estate is very valuable and can result in significant cost savings for organisations, which can be included in investment cases for new technology adoption.

4.1.3 Reduce harm, reduce cost

There are a number of new technologies that can help the emergency services to both reduce harm to the public and cut their own costs:

- Drones can be used for early assessment of a situation, ensuring that appropriate response vehicles are sent. Surveillance drones could provide a cost-effective alternative to manned helicopters. Merseyside Police were an early adopter of drones. In 2010, the force was the first in the UK to arrest a suspected car thief with the assistance of a remote-controlled Air Robot. It deployed the device when officers lost the alleged offender who had escaped on foot in thick fog. However, the use of drones is controversial and currently limited in the UK¹⁶
- With facial recognition, a camera mounted on an officer records the face of a suspect and could automatically warn them in his ear piece if the person has a violent criminal record, dispatching an armed response team automatically. Other surveillance technologies are also becoming popular with police forces. Staffordshire Police are equipping local policing teams with body cameras. It believes they will act as a deterrent, increase officer safety and improve efficiency by assisting with witness statements. Chief Constable Simon Parr told the Committee that he sees facial recognition technology playing an important role in the future of policing. This could be an important tool

¹⁵ Smart Policing Report
<http://bit.ly/28KkLIL>

¹⁶ BBC
<http://bbc.in/2fJGF3D>

“Safety of the emergency service’s own officers is paramount. With wearable technology, personnel biometrics and vitals can be transmitted back to control”

for tackling organised crime groups and identity theft. But increased surveillance by the police raises concerns over the privacy of the public. HMIC warned that with these new technologies come human rights issues that need to be carefully considered, such as whether their use is both proportionate and necessary.

- Augmented reality underpins the rise of the supported first responder. Police or fire services could send a warning to everyone’s smartphones near an incident or accident, to prevent further injuries. Health services could use AR to send civilians instructions to care for a patient until an ambulance arrives using video coaching, GPS location and building plans on the person’s smartphone or smart glasses

4.1.4 Improved officer safety

Safety of the emergency service’s own officers is paramount. With wearable technology, personnel biometrics and vitals can be transmitted back to control, for example monitoring the body temperature and heart rate of a fire officer or alerting the rest of the team when a police officer is shot.

4.2 An opportunity to transform organisations

The government’s decision to replace the current TETRA radio network with a 4G/LTE Emergency Services Network creates an opportunity to transform the way Blue Light services operate. However, this requires the Police, Fire and Ambulance Services to think differently about their processes and how they will respond.

Capgemini¹⁷ developed a matrix to explain four types of digital maturity using two separate but related dimensions:

- 1 The first, digital intensity, is investment in technology-enabled initiatives
- 2 The second dimension, transformation management intensity, consists of the vision to shape a new future, governance and engagement to steer the course, and IT/organisation relationships to implement technology based change

The research that Capgemini undertook found that the elements of transformation management intensity work together – through a combination of top-down leadership and bottom-up innovation – to drive ongoing digital transformation. However, in many organisations, these elements are overly slow or conservative, preventing the company from investing in innovative opportunities.

Emergency services are in danger of becoming what Capgemini call ‘Digital Fashionistas’. These organisations have implemented a number of new digital applications, but without creating any real value because the digital transformation strategy is not founded on real knowledge of how to maximise benefits.

The opportunity lies in moving into the top right quadrant and becoming ‘Digirati’ - having the digital maturity not only to build digital innovations, but also to drive enterprise-wide transformation. They benefit from their

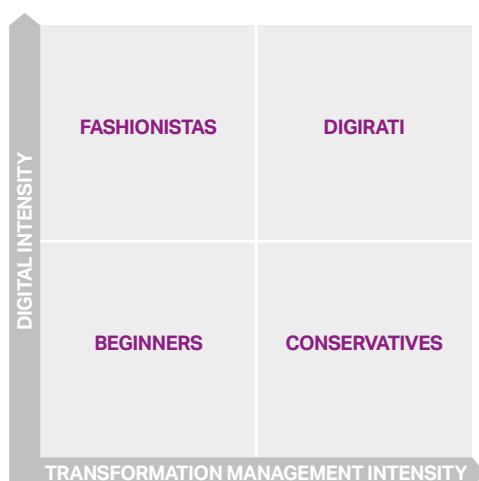
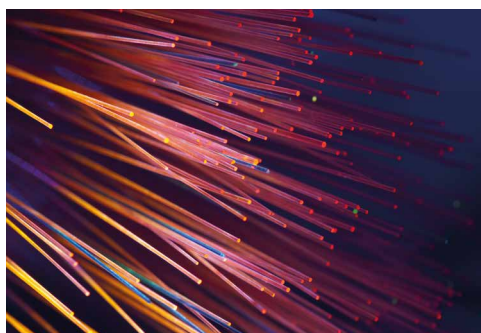


Figure 2: Four Types of Digital Maturity

¹⁷ Capgemini
<http://bit.ly/2fJEvRq>



“Implementing transformative system and processes that utilise the ESN will support improved productivity, reduce harm and cost, and provide a better quality service.”

actions by having combined a transformative vision, careful governance and engagement, with sufficient investment in new opportunities.

This leads to ongoing vision and engagement, as they develop a digital culture that can envision further changes and implement them wisely. By investing and carefully coordinating digital initiatives, they continuously advance their digital ‘competitive advantage’.

5 Conclusions and recommendations

5.1 Set a vision

ESN provides the emergency services with the ability to communicate with staff and the general public over a 4G/LTE network. Providing what Cappgemini would describe as ‘digital intensity’ however, is not enough; how Blue Light organisations will utilise this technology to change the way work is carried out is as yet unknown. This ‘transformation management intensity’, requires a strong vision to implement technology based change.

Industry representatives told the Budget and Performance Committee of the London Assembly¹⁸ that in the past police forces have gone straight to a technology solution before working out the problem that they are trying to solve. The vision of how this technology will allow systems and processes to be changes should be based on the service’s core mission and values. This will allow a strategy to be developed that links directly to the vision and deal bravely with ‘challenging’ issues critical to success of the vision.

The strategy can then be implemented. People should be involved in developing smart, feasible plans to achieve the strategy – this ensures they understand exactly what it is they have to do differently and why. Stakeholders should allowed the time they need to support any strategic changes in addition to their normal delivery priorities/commitments, e.g. researching customer perceptions, developing and embedding new procedures and systems and providing appropriate training.

5.2 Communicate with stakeholders

Implementing transformative system and processes that utilise the ESN will support improved productivity, reduce harm and cost, and provide a better quality service. However the emergency services must consider how new technologies are perceived, by both employees and the public. For example, surveillance technologies, such as drones and facial recognition technology, have the potential to be highly effective; but they also raise ethical considerations around proportionality, privacy and civil liberties.

Likewise, utilising the ESN with appropriate applications will mean that the same amount of work could be done by fewer staff or more by the current number of staff. This can create legitimate concerns from front-line and back office staff about the security of their jobs.

¹⁸Police Technology Report
<http://bit.ly/28KkLIL>



5.3 Use available information

As technology allows services to collect more data, emergency service organisations face a challenge in making that data useful to staff. For example, if mobile applications allow staff to spend more time working out of the office, they may require stronger back office support. Addressing this challenge will require significant upfront investment, but could result in staff making better decisions, armed with the additional information they have access to.

Staff can be resistant to change and may struggle to adapt to the new digital technologies. This change will need to be managed to ensure that personnel are fully utilising the wealth of information at their fingertips. The potential benefits of the ESN-enabled technologies are significant, and will bring positive outcomes for all stakeholders in the long run.

6 About telent

telent provides technology and network services to many of the UK and Ireland's largest and most 'mission critical' operational systems in the Public Safety community. Delivering to ever more exacting standards it is helping drive the development of increasingly advanced communication solutions.

Beyond the design and integration of national networks and voice and data systems in critical environments, telent has the ability to factor in the unpredictable, responding to any circumstance at speed and in the correct manner. It also has security cleared and accredited engineers providing round-the-clock support, each with a unique understanding of specific safety and operational requirements.

Building on its heritage of providing Public Safety solutions, telent has a range of services specifically designed to help emergency service organisations successfully transition to the new ESN environment.

telent's credentials and technological expertise enables it to respond at speed, reducing costs, but never at the expense of quality.

From Public Safety to Defence, Transport to Service Provider – when it matters most, we deliver.

