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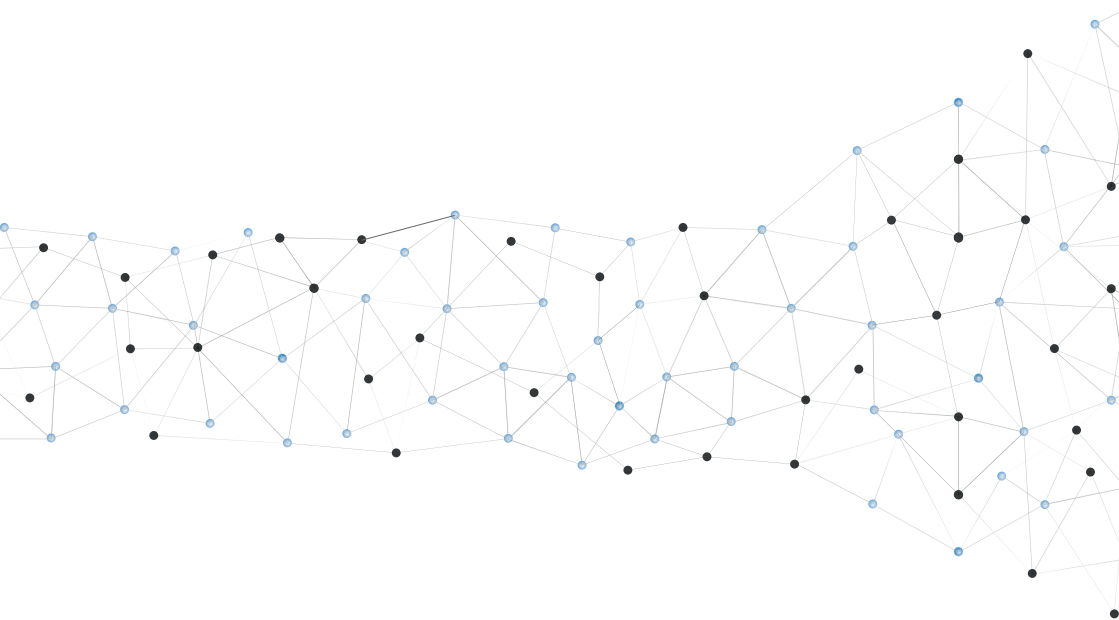# Policing, Information and Technology in the UK: A National Survey

January 2017

World Ranked – Triple Accredited – Award Winning

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Citation

Foreword

In common with all government bodies, police organisations face the challenge of delivering a service in a period of declining resources. There is a clear expectation that information and communication technology will play a key role in this change, allowing them to both reduce costs and deliver the same, or higher quality, services. However, while forces across the UK have developed very different approaches to the use of information technology, there is a dearth of research evidence available to inform policy and practice.

This report presents the first results from the *Information, Technology and Policing Research Project* which is being undertaken between February 2016 and July 2017 by Professor David Allen, Dr Alistair Norman, Mr Simon Williams, Mrs Emma Gritt, Ms Emma Forsgren and Dr Nicky Shaw of the AIMTech Research Centre at Leeds University Business School. The project explores the influence on policing of key ICT development areas, trends, and challenges over the 3 to 5 years period. This multi-method research project includes the following activities:

- **The first activity** is a survey of Police ICT use. This provides a national picture of the use, delivery, and challenges of ICT and information management in policing. This survey replicates and extends a study undertaken in 2013; providing both an understanding of current priorities, and condition of technology as well as expected change and comparator data.

- **The second activity** is a set of semi-structured interviews with representatives from all UK forces to explore their approach to the use and deployment of mobile information solutions. This study draws upon two similar studies, undertaken in 2004 and 2006, to provide not only a view of current concerns and use, but also comparative data to understand the changes that have occurred over the last decade.

- **The third activity** is the development of two Delphi Studies, the first focusing on transformational reform and technology, the second dealing with mobile technology in light of the new Emergency Services Network. These will bring the views of experts together as a basis for interactive forecasting of future trends.

These activities are extended by the concurrent development of case studies of use. Based on qualitative interview data and observations of practice, the cases will provide a deeper understanding of the following areas of activity:

- Use of social media data in decision making
- Use of technology in service performance management
- Mobile technologies
- Predictive analytics
- ICT sourcing

By drawing upon historical data, replicating earlier studies and taking a multi-methodological approach, we will provide a holistic and multi-dimensional view of technology and policing which will be useful both to practitioners and policy makers.

Martin Wyke
**Chief Executive of
The Police ICT Company**
(on behalf of the Project
Advisory Board)

Contents

Introduction & Key Findings

In this document we report on the findings of the 2016 Information and Technology Policing Survey.

The report draws on data from a structured survey sent to all forces in the UK and provides an assessment of their perceptions of the current state of, degree of expected change over the next 3 to 5 years, and priority given to, key policing technologies. It replicates and extends a study undertaken in 2013 and represents a self-reported evaluation by the forces.

In this report we have refrained from providing a detailed commentary on the results from the survey, however, we have provided a brief description of each area and highlighted the significance and use of the technologies discussed. A fuller evaluation of the results in the context of further qualitative research will be provided in the final report from this project.

The survey data indicated that the condition of IT infrastructure in UK police forces varies considerably. In some key areas of police operations key technologies were not seen as being up-to-date and the levels of change expected also vary widely, as does the level of priority attached to technologies. While forces are different, and have to police appropriately for their circumstances, greater commonality could have been expected on some of these issues.

Key Findings

Officer Oversight, Supervision and Accountability.
Forces are, overwhelmingly, providing the facility for managers to supervise and manage out of the office with over 70% of forces viewing this technology as up-to-date. However, half of the forces indicate that GPS used to locate vehicles is not up-to-date and a third of forces indicate that GPS used to locate officers is not up-to-date.

Call Handling.
In four (of the five) key technologies surveyed, over 40% of forces report the technologies as not being up-to-date. This is against the background of a significant decline in the condition of quality monitoring and virtual call centre technology (dropping from the 2013 figures of 68% and 47% respectively to 37% and 22% in 2016). Customer relationship management systems are seen as a high or very high priority by a clear majority of forces but this is not reflected in the condition of this technology, with over 40% of forces reporting this as not up-to-date.

Dispatch.
Computer aided dispatch is seen as up-to-date in just over half (56%) of forces. 72% of forces see this as a high or very high priority, but the expectation of significant or transformational change is relatively low at 40%.

Incident Management.
This area is perceived as being one which will experience turbulence. Over 90% of forces indicate that they expect significant or transformational change in all of data storage, data capture, data integration, and internal customer service and help desk systems. However, while internal customer service and help desk systems (which facilitate data capture, information sharing and knowledge management as a basis for improved operational efficiency) are described as up-to-date in under 60% of forces they are recognised as a high or very high priority in only 26% of forces.
More than 70% of forces report that their social media, remote access and laptop capabilities are up-to-date. Three quarters of forces see social media as a high or very high priority and over 80% of forces see mobile or remote access to force systems (e.g. intelligence reports, briefings) as a priority.

Virtually all forces (93%) view smartphone technologies as a high or very high priority, and all expect significant or transformational change in this area. This applies to response, community, and roads settings. The reliance placed on these technologies is reinforced by the fact that only half of forces indicate that their in-car terminals are up-to-date, and only 30% indicated that they are a high or very high priority.

Multi-agency working in the response to incidents has clearly moved away from forward command vehicles with only 15% of forces seeing these as a priority and only 25% indicating that the technology is up-to-date. The picture is, however, different with regard to integrated command centres. Virtually all forces (97%) expect to see significant or transformational change in this, although it should be noted that almost two thirds do not currently have this capacity.

Custody Management.
A small majority of forces indicate that their use of Integrated Force Record or analytic software (displaying information via dashboard) is up-to-date. In this custody context there is a significant increase in the number of forces reporting an expectation of transformational change for integrated force record technologies; up from 6% in 2013 to over 34% in 2016.

Records Management.
Over 40% of forces indicate that broadband wireless access in police vehicles is up-to-date, and the use of this technology has increased; in 2013 89% of forces did not use this technology, in 2016 this has dropped to only 55%. Integrated database technology are seen as up-to-date by 58% of forces and, in this area, there is a high expectation (70%) of significant or transformational change. Somewhat surprisingly, given the current moves towards body worn video, nearly two thirds (64%) of forces do not see image management software as a high or very high priority area.

Crime Analysis/Mapping.
60% of forces state that their predictive analytics capability is not up-to-date, and 52% of forces state that their investigative software is not up-to date. This shows a decline in condition from 2013 when 29% indicated that their investigative software was not up-to-date.

Collection and Processing of Crime Scene Evidence.
The vast majority of systems in this area are seen as either up-to-date or old-but-serviceable. The area is likely to see change with only 37% of forces describing their technologies for auto digital evidence processing as up-to-date, but nearly 90% expecting this area to experience significant or transformational change. Similarly only 46% of forces indicate that technology to support communication with criminal justice partners is up-to-date, and nearly 80% expect significant or transformational change in this area.

Securing Police Systems.
70% of forces indicate that their technologies for encryption, identification, and data management are up-to-date, the bulk of the remainder indicate that they are old-but-serviceable. However, 9% of forces report data management technologies as obsolete.

Surveillance

Of the three rapidly evolving technologies surveyed (body worn video, aerial surveillance (e.g. drones), and GPS for tracking suspects), body worn video has the highest expectation of significant or transformational change (71%) and highest level of priority (68%). All forces state that video surveillance and ANPR are up-to-date, and almost all (89%) indicate that in-car cameras are up-to-date.

Delivery of Systems

Very few forces have a high or very high reliance on any of the four categories of outsourcing reviewed. The highest reliance is given to outsourcing infrastructure (24%), and the highest priority given to temporary outsourcing on a project by project basis (27%).

Cloud Computing.

Whilst cloud computing has been a technology widely regarded as transformational in the private sector, the results here indicate that reliance on cloud technologies to deliver information systems in police forces is low. Nearly two thirds (64%) perceive either a low or very low reliance on cloud software, 60% perceive either a low or very low reliance on cloud platforms, and 56% perceive either low or very low reliance on cloud infrastructure. Both cloud software and cloud platforms are described as having either a high or very high priority (41%), whilst cloud infrastructure scores 40%.

Development of Systems

62% of forces indicate that they have a low or very low reliance on in-house development of systems and only 7% indicate that this is a high or very high priority. The highest reliance is placed upon collaboration with other police services (51%).

Internal and External Use of Social Media

Police forces are making extensive use of social media to communicate with the public with 95% of forces using Facebook and Twitter often or very often. However, the results suggest that tools used by a younger demographic (Snapchat and Instagram notably) appear to be the least utilised platforms. Internally the majority of forces use, and prioritise, a limited set of social media. The top three technologies which are used often or very often are email (all forces), video conferencing (73%) and instant messaging (64%).

ICT Challenges

Over 80% of forces indicate that the ability to effectively search information held, and the ability to use analytics to gain insight from information held, has a high or very high priority.

Comparative Data

In this section of the report, we provide an overview of the key areas identified by the forces as priority areas where transformational change is expected and areas where they see their technologies as being up-to-date. In presenting this data we have provided the ten highest scoring areas in ranked order. At this point this information is provided with a brief commentary rather than full analysis, as a full discussion of this data will be provided after the Delphi Studies have been conducted.

Top ten priority areas.

Business area	Technology	High & very high scores
Incident management 3: Tactical (Quick time)	Smartphone/PDA - access to force systems	93%
Call handling	Customer relationship management systems (e.g Storm)	89%
Incident management 2: Community response	Remote access to force systems (e.g. intelligence reports, briefings)	91%
Incident management 2: Community response	Social media	74%
Collection and processing of crime scene evidence	Communication with criminal justice partners (i.e. probationary service)	73%
Dispatch	Computer aided dispatch	72%
Incident management 1: All types of responses including when no further action is necessary	Data integration	71%
Incident management 4: Roads policing	PDA or smartphone	68%
Surveillance	Body worn video	68%
Call handling	Automatic call distribution systems	67%

Table 1. Top ten technology priority areas for UK police services.

Front line functions are strongly represented here with incident management accounting for five of the top ten key priority areas. Call handling and dispatch account for a further three, with surveillance and crime scene evidence collection completing the set. This is a strong customer-facing emphasis with priority being allocated to what are seen, quite correctly, as core policing processes.

Top ten for transformational levels of change.

Business area	Technology	Transformational
Collection and processing of crime scene evidence	Auto digital evidence processing systems	50%
Collection and processing of crime scene evidence	Communication with criminal justice partners (i.e. probationary service)	46%
Incident management 3: Tactical (Quick time)	Smartphone/PDA - access to force systems	43%
Incident management 2: Community response	Social media	40%
Crime analysis/mapping	Predictive modelling	40%
Incident management 5: Multi-agency	Integrated control centres	38%
Officer oversight, supervision and accountability	GPS for locating officers	37%
Incident management 2: Community response	Remote access to force systems (e.g. intelligence reports, briefings)	36%
Custody management	Integrated Force Record (via ERP system such as SAP/ Northgates Identity Hub)	33%
Records management	Image management software	33%

Table 2. Top ten areas where UK police services see transformational change occurring over the next 3-5 years.

While operational areas (incident management particularly) are strongly represented there are a significant number of 'back office' technologies in this ranking. The drivers of digital transformation are often represented as social, mobile, analytics and cloud; of these four, three are strongly represented as areas which will transform processes in the 3-5 year time horizon.

Top ten areas for condition of technology being up-to-date.

Business area	Technology	Up-to-date
Securing police systems	Encryption	93%
Incident management 1: All types of responses including when no further action is necessary	Data storage	86%
Incident management 2: Community response	Laptop with access to personal information management systems & data processing	79%
Incident management 4: Roads policing	ANPR	79%
Incident management 2: Community response	Social media	76%
Surveillance	Body worn video	74%
Securing police systems	Data management	73%
Officer oversight, supervision and accountability	Mobile office via laptop	71%
Incident management 2: Community response	Remote access to force systems (e.g. intelligence reports, briefings)	71%
Securing police systems	Identification	70%

Table 3. Top ten areas where UK police services see their technology as being up-to-date.

The areas of technology listed here are the highest scored in terms of the technology being up-to-date. Some of these, such as laptops, may well decline in importance as a result of the priority given to more portable technologies. Others, such as ANPR, need to be maintained as up-to-date in order to support core policing processes and are, therefore, both high priority and well maintained – albeit less likely to contribute to transformational change in the future.

Comparison Overview of 2013 and 2016 Surveys

The sample sizes for the 2013 and 2016 surveys varied, therefore, comparison must be undertaken with a degree of caution. The 2013 survey reported on data from 21 forces whilst the 2016 survey reported from all geographical forces (other than PSNI) and one non-geographical force. The final sample of the 2013 survey included responses from across the UK, a response from all larger forces, including both urban and rural forces, and at least one response from every ACPO region. In the tables below we present, therefore, only the data where there is a change in the response of 25% or more.

Decline in perception of technology as up-to-date.

Area of activity	Technology	Up-to-date 2013 results	Up-to-date 2016 results	% Change (decline)
Call handling	Quality monitoring	68%	37%	-31%
Call handling	Virtual call centres	47%	22%	-25%
Surveillance	Video surveillance	94%	67%	-27%

Table 4. Percentage change 2013-2016 condition of technology where decline is more than 25%.

Declines in the condition of technology over 25% were recorded in the three areas above. It is notable that two of these are in call handling – an area which is seen as a core process.

Rise in perception of technology as up-to-date.

Area of activity	Technology	Up-to-date 2013 results	Up-to-date 2016 results	% Change (Increase)
Surveillance	In-car cameras	11%	63%	+53%
Collection and processing of crime scene evidence	Auto digital evidence processing systems	0%	36%	+36%
Records management	Broadband wireless access in police cars	5%	41%	+36%
Surveillance	Body worn video	40%	74%	+34%
Dispatch	Language translators (stand-alone or on PDA or other mobile device)	5%	34%	+29%
Incident management 3: Tactical (Quick time)	Smartphone/PDA - access to force systems	33%	59%	+26%

Table 5. Percentage change 2013-2016 condition of technology where increase in condition is more than 25%.

The number of technologies with significant declines in condition is far smaller than areas where there has been a greater than 25% shift towards a perception that the area of technology is up-to-date. The areas identified here had very different starting points in 2013 (0 to 40%) but have all recorded significant increases. Body worn video and in-car cameras both come from the surveillance area, and there is a clear link between in-car camera technologies and in-car broadband. The significant increase in smartphones being seen as up-to-date reflects trends towards such personal technologies.

Rise in perception of technology as transformational.

Area of activity	Technology	Transformational change 2013	Transformational change 2016	% Change (Increase)
Incident management 5: Multi-agency	Integrated control centres	0%	38%	+38%
Crime analysis/ mapping	Predictive modelling	11%	39%	+28%
Collection and processing of crime scene evidence	Communication with criminal justice partners (i.e. probationary service)	18%	45%	+28%
Officer oversight, supervision and accountability	GPS for locating officers	10%	37%	+28%
Call handling	Workforce management (e.g. CARM)	0%	28%	+28%
Custody management	Integrated Force Record (via ERP system such as SAP/Northgates Identity Hub)	6%	33%	+27%
Call handling	Virtual call centres	0%	27%	+27%
Dispatch	Computer aided dispatch	5%	32%	+27%
Records management	Integrated databases (PNC)	0%	27%	+27%
Records management	Image management software	7%	33%	+27%
Call handling	Customer relationship management systems (e.g Storm)	5%	31%	+26%
Records management	Broadband wireless access in police cars	0%	25%	+25%

Table 6. Percentage change 2013-2016, expected transformational change over 3-5 years of technology where increase is more than 25%

There were no areas where the expectation of transformational change had declined by 25%, but a quite extensive set of areas where the expectation of transformational change has increased by that amount. Most of these areas have recorded the increase from a very low base in 2013, and this paints a picture of an expectation of very significant change across a wide range of areas. This, clearly, has implications for the project management and change management capability within forces.

Many of these areas are what can be considered as back office systems and reflect advances in technology areas seen, as mentioned above, as drivers of digital transformation – social, mobile, and analytics are all represented in these areas and, while cloud technologies are not explicitly mentioned here, it is unlikely that change in the other three areas will not be underpinned to some extent by increased adoption of cloud.

Methodology

Given the plethora of information technologies used by police services a key first decision was the scoping and selection of technologies to explore. In our earlier 2013 survey technology topics were compiled from earlier research findings (generated by the AIMTech Research Group at Leeds University), open interviews with key stakeholders in the policing community and similar research studies.

Other similar projects undertaken outside the UK since then have taken different approaches. Custers and Vergouw (2015) in a survey of European Police Services use of technology identified 25 technologies most of which related to front-line policing. Koper, Lum, Willis, Woods, and Hibdon (2015) in contrast identified a limited set of five technology areas (information technology systems, crime analysis, Licence Plate Readers, in-car video, and DNA analysis) in their study of the influence of technology on policing in the US.

We approached this research, however, in a slightly different way by identifying sixteen important areas of work activity and then identifying technologies which were used within each area of activity. This reflects our view that a technological tool may be used differently in different work contexts. We took a systems based approach covering both front line technologies used by officers but also placing emphasis on the 'back-office' technologies which are critical to modern policing, enabling front line technologies and provide the backbone for the provision of digital services. The primary areas of work activity and technology use were replicated from a 2013 study. In common with the 2013 study, e-crime and cybercrime were placed outside the remit of the research.

In each of these areas we asked the respondents to indicate their view of technology in a particular business area. The responses available were: *obsolete, old-but-serviceable, up-to-date, don't use it* or *don't know.* They were then asked: to rate the extent to which they believe that this technology area will see significant change over the next 3-5 years. The responses available to this question were: *no change, minor change, significant change, transformational change, don't know.* These questions were asked for each of the technologies in turn. Formal definitions were not provided for the response categories as the survey sought to elicit the force perceptions.

Reported figures in the tables and charts in the body of the report have been rounded. This may produce a total which does not appear to add up to exactly 100%.

These questions and topics were reviewed by our advisory board and the following additions to the 2013 survey instrument were made:

1. For each technology area we asked the forces to provide an indication of the priority that they placed on the technology. This was added as the following question for all technologies listed: 'How high a priority do you see this area as being currently for your force?' The potential responses available were placed on a five-point scale from very low to very high.

2. The number of social media tools included was extended, and their use for internal communication was included.

3. A section was added which deals with the delivery of services focusing on outsourcing, cloud and development. Forces were asked two questions in relation to this area: 'To what extent do you rely upon the following approaches to deliver information systems within your organisation?', and 'How high a priority do you see this area as being currently for your force?' The potential responses available were placed on a five-point scale from very low to very high.

4. Forces were asked to respond to six key challenge areas.

5. Given the move to the ESN questions related to network use were removed and relevant areas will instead be explored in semi-structured interviews.

This provided 210 questions, set across three themes:

- Theme 1: The current and future state of technology in police forces (measured against 60 criteria in 16 topics)

- Theme 2: The delivery of services (measured against 11 criteria in 3 topics)

- Theme 3: The key areas of challenge (measured against 6 criteria in 1 topic)

The survey was piloted with members of our advisory board, with one police service and then issues via the National Police Chiefs Council (NPCC) intranet with a covering letter supported by Michael Barton, Chief Constable, Durham Constabulary. This was followed up with a copy of the questionnaire and letter sent to each Chief Constable, and by telephone contact with relevant IT Directors. Using this, alongside additional direct contact methods, responses were received from 44 UK territorial police forces and one non-territorial police force, thereby giving 45 responses in total. Despite this high response rate, it should be noted however that not all forces responded to each individual question, therefore, the base figures for each individual question differ depending upon the respondents. Source data is available which includes the volume of responses and where this is significantly low it has been noted in the report below.

We requested that the questionnaires be completed by a representative from both the forces IT Service and a senior officer with oversight of ICT. Verification that this process had been followed occurred in a sample of five police forces.

Theme 1
The Current and Future State of Technology in Policing
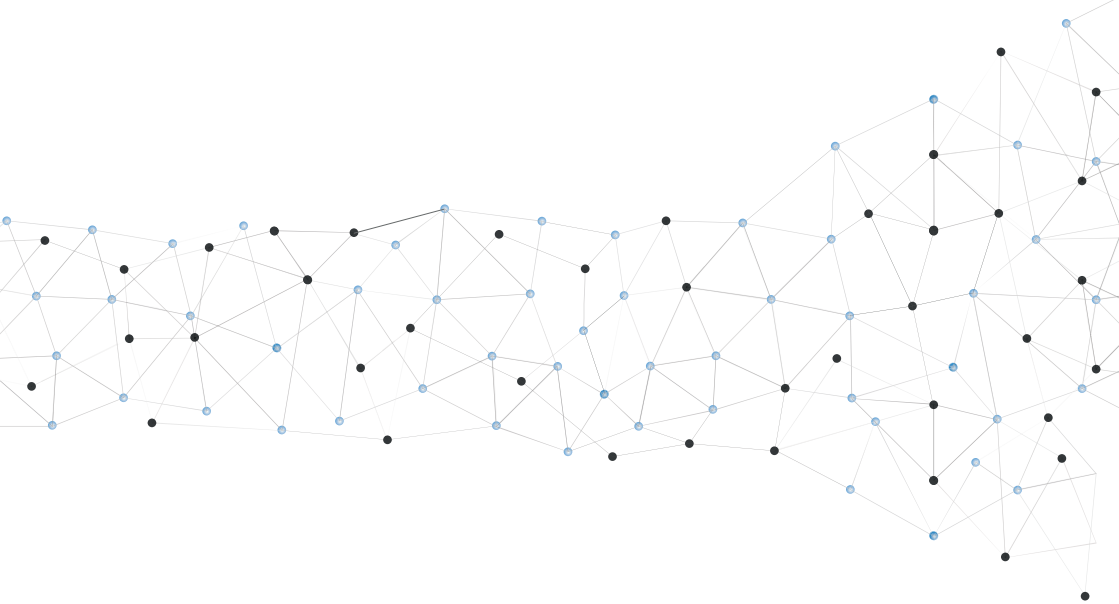
Officer Oversight, Supervision and Accountability

Background

This section of the survey focused on one of the more established technologies used for officer oversight, supervision and accountability; GPS. This was explored in two contexts: GPS for locating officers and GPS for tracking vehicles. These were selected because the data generated from these underpin core business processes such as fleet management, resource management and deployment. The technology can be used post hoc (to provide evidence on the movement of a police vehicle involved in an incident), in real-time (to locate and dispatch officers to an incident), and in aggregate post-hoc (to understand patrolling behaviours). Data from GPS are also utilised within other core systems such as computer aided dispatch. This also enables police forces to provide greater transparency and become more accountable to the communities that they serve.

Mobile office use by officers was also explored. One aspect of the drive to mobile information within policing has been the development and delivery of technologies which support the officer in their interactions with the public. An equally important aspect is, however, the provision to officers with a managerial role of the tools to manage incidents and individuals, allowing officer oversight and supervision outside the office.

Findings

This is an area of activity where most forces see change occurring, Table 7 below indicates that the majority see each of these areas as one of significant or transformational change.

Area	Condition up-to-date	Expected change significant/ transformational	Priority high/ very high
GPS for locating officers	67%	70%	61%
GPS for tracking vehicles	49%	58%	56%
Mobile office via laptop	71%	67%	67%

Table 7. Officer oversight, supervision and accountability. Condition, expected change and priority.

Just over half of forces that responded to this question indicate that GPS use for locating vehicles is not up-to-date with 19% indicating that their technology is either obsolete or that they didn't use it.

While a third of forces indicate that their use of technology to locate officers is not up-to-date these forces (with the exception of one) indicate that their technology is old-but-serviceable. GPS for locating officers is, however, an essential underpinning technology for many police service information systems and key for officer safety. Given these findings we would have expected a much higher percentage responding that their technology in this area was up-to-date and for this to be identified as a priority area for the forces (only 61% perceived GPS for locating officers as a priority).

The results suggest that most police services provide the facility to supervise and manage out of the office by providing mobile laptops to at least some of their officers. 70% state that mobile office via laptop is up-to-date with only 16% of forces indicating that they don't use it.

The findings require further qualitative research to explore the results and to understand if forces are using alternative approaches to location and provision of the information for officer oversight and supervision. It is also important to understand the impact, on forces which indicated that GPS to locate vehicles and individuals isn't up-to-date, on the performance and current use of police systems.

70% of forces identify GPS for locating officers as expected to experience significant or transformational change.
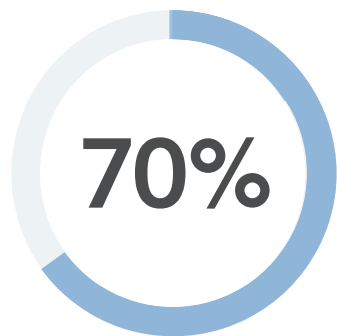
70%

Figure 1. GPS for locating officers.

Call Handling

Background

Effective call handling is a particularly important element of the communication between the police and the public. While this is a relatively mature area of technology, implementation can be challenging and problematic solutions have been linked to very negative outcomes (c.f., Penman, 2015). This survey focused on five areas: *workforce management (e.g. CARM), virtual call centres, automatic call distribution systems, quality monitoring (e.g. NICE),* and *customer relationship management systems (e.g. Storm).* It is recognised that this is not a comprehensive list of technologies used in this context, however, they are important elements of any call handling system, as described below:

- Quality monitoring systems allow organisations to improve their call agents' performance by both monitoring and measuring the interactions they have with the public.

- Workforce management software provides a range of services to support the management of staff from training through to information to support the forecasting and scheduling of staff. It can be provided as a stand-alone system or more normally function as an element of a larger solution.

- Virtual call centres allow the use of agents answering calls who are not based in a one geographically centralised location.

- Automatic call distribution systems distribute incoming telephone calls to qualified agents responsible for answering inbound telephone calls.

- Customer relationship management systems allow call handlers to access historical data related to calls from a specific number or other identifier.

Findings

Area	Condition up-to-date	Expected change significant/ transformational	Priority high/ very high
Quality monitoring (e.g. NICE)	37%	56%	48%
Workforce management (e.g. CARM)	53%	50%	57%
Virtual call centres	22%	68%	49%
Automatic call distribution systems	69%	45%	67%
Customer relationship management systems (e.g. Storm)	58%	77%	89%

Table 8. Call handling. Condition, expected change and priority.

Call handling in UK policing has been highlighted as a challenging area. The responses to this question indicate that in four of the five technologies surveyed the technology is not seen as up-to-date in over 40% of the forces. There has also been a significant decline in the condition of quality monitoring and virtual call centres technology, dropping significantly from the 2013 survey data from 68% and 47% respectively to 37% and 22% in 2016. These are both areas which are also not seen as a high priority by forces. Interestingly the area which allows automation of processes (automatic call distribution centres) was most up-to-date and was given a high priority. Technologies which allow increased quality in call handling, with the exception of customer relationship management systems, were less up-to-date and received significantly lower priority.

Customer relationship management systems are seen as a priority by the majority of forces and an area of significant or transformational change, however, the condition of the technology in 42% of the forces was not seen as up-to-date.

The findings from this element of the research provide a mixed picture in terms of the condition, degree of change and priority of technology. The lack of up-to-date technologies in key areas warrants further investigation.

Dispatch

Background

Two topic areas were focused on in the context of dispatch: *computer aided dispatch*, and *language translators* (stand-alone or on PDA or other mobile device). Computer aided dispatch forms a backbone system for police services. This technology is used with a range of other contexts from other emergency services through to private sector organisations such as taxi companies. Within a policing context CAD has been extended to provide a range of capabilities including call handling. As a core system the failure of this technology can, however, have a catastrophic impact, as was seen with the failure of the London Ambulance Service CAD (Beynon-Davies, 1995; Fitzgerald & Russo, 2005). Language translators were included as an emergent technology which was seen as a having a potential use within this context.

Findings

Area	Condition up-to-date	Expected change significant/ transformational	Priority high/ very high
CAD	56%	40%	72%
Language translators	34%	54%	17%

Table 9. Dispatch. Condition, expected change and priority.

Dispatch is a core function and CAD is a core technology in the policing environment and, as such, it is unsurprising that there is a high level of priority attached to it. The technology is seen in the majority of forces as up-to-date with a further 26% noting that this technology was old-but-serviceable. The expected level of significant or transformational change is not high and it is likely that this reflects the emphasis which is given to this area and its continued maintenance and updating. The picture is very different with language translators where a significant number of forces do not use the technology and, although the potential of the technology is recognised in the proportion of forces rating the expected level of change as significant or transformational, the priority for it is low. The use of such technologies is a larger issue for some forces, such as those with entry points to the UK from abroad, than it is for others with relatively homogenous populations. Finally, it should also be noted that one force commented: *"Language translators used by [Force] are individuals, rather than items of technology".*

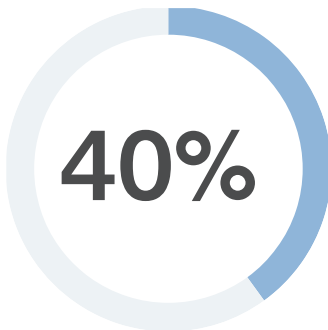40% of forces expect significant/ transformational change in CAD

72% of forces say CAD is a high/ very high priority.

40%

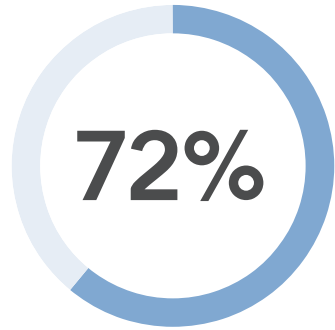Figure 2. CAD, expected change.

72%

Figure 3. CAD, level of priority.

Incident Management

Incident management refers to the ability of the forces to respond to incidents notified to them. This is, from the point of view of the public, the key visible component of the work done by police forces although the nature and the makeup of this work is changing. The College of Policing (2015) have identified that the overall volume of reported crime has fallen consistently (albeit slowing in the last few years) over the last decade. While this should represent a lower load of incidents that forces have to deal with it should also be noted that the numbers of police officers have also fallen across the same period. The same survey also identifies that the mix of incidents that forces have to deal with has changed, with proportionally large rises in rape, and public safety and welfare issues. Issues involving mental health concerns have also risen and have had recent press prominence. There has been a shift to more complex and costly incidents being reported; a specific area of concern is child sexual exploitation. The net effect of these shifts is that forces are trying, in a period of austerity with lowered resource, to provide a high level of service, and visible response, to demand which is increasing in key areas and which is showing a tendency towards more incidents which are more time and resource intensive. Technology is key in enabling efficiencies in incident response both in dispatch and in the field, and the PEEL Report (HMIC, 2015, P.6) commented:

> *The police service needs to improve its understanding of demand for its services (particularly future demand), its understanding of the capability of its workforce, and its Information and Communications Technology (ICT) infrastructure. In a number of important respects, the service has a sound understanding of its current demand but this is incomplete (for example on 'hidden' or newer crime types), and its understanding of likely future demand needs improvement.*

The survey sought to ascertain the condition of the technologies which underpin the ability to respond to incidents focusing on five contexts:

- The first is a broad category of 'all incidents' and includes those where no further action is required

- The second is the community response function which is key in reassuring citizens but may not require an urgent ('blues and twos') response

- The third is the area of quick-time tactical response where an urgent, and often highly visible, response is required

- The fourth area is that of roads policing, already highly dependent on areas of technology such as mobile and fixed ANPR

- The final area is that of multi-agency working where larger or more complex incidents require forces to collaborate with a range of other agencies and responders.

Incident Management 1: All types of responses including when no further action is necessary

Background

This sub area focused on four topic areas:

- **Data storage** - the ability to manage safe and secure storage of information collected. Such storage is, clearly, subject to issues of data protection and security with cloud technologies offering potential advantages but also raising concerns over security and resilience. Volume of data is also an issue as discussed below.

- **Data capture** - the ability to capture appropriate information from a diverse range of sources. Data sources have become more complex with a significant rise in images and consequent issues both of storage and analysis. As more data is collected from sources such as body worn video, there is a consequent load on data storage capabilities both in the short term (download and use in live incidents) and in the longer term storage and preservation of such data. Analysis is also an issue that forces are grappling with.

- **Data integration** - the ability to bring together diverse data sources and manage the use of them in support of incidents. This will often involve the integration of visual data (such as maps and aerial surveillance) with print data (such as logs) and voice data (such as calls from the public and reports from officers) as well as a mix of current information as an incident unfolds together with historical data (such as that relating to persons, vehicles or addresses of interest).

- **Internal customer service and help desk systems** - the ability to provide such systems within the force in order to facilitate data capture, information sharing and knowledge management as a basis for improved operational efficiency.

Findings

Area	Condition up-to-date	Expected change significant/ transformational	Priority high/ very high
Storage	87%	90%	44%
Capture	66%	93%	60%
Integration	55%	95%	71%
Internal	54%	91%	26%

Table 10. All types of response. Condition, expected change and priority.

This is an area of activity which is recognised as being central to the operational delivery of the obligations placed on forces. As such it is to be expected that much of the technology will be central in the concerns of the forces, and well over half of forces regard the technologies which underpin the delivery of incident response as being up-to-date. Data storage is the most up-to-date at nearly 90% of forces. It is, however, an area where there is also a virtually universal expectation of high levels of change, with over 90% of forces expecting significant or transformational change across all four technology areas.

While the levels of priority vary, two particularly stand out as having high priority – these are data capture and the ability to integrate this data for use.

There is a significant mismatch in internal systems between the high expectation of change and the priority given to this which is significantly below the other technology areas.

With regard to data storage, the good condition of current technologies may underpin the lower priority given to change in this area. The rapid development, however, of technology such as body worn video will drive significant demands on data storage; although forces currently appear to be reasonably confident that storage can be scaled effectively.

It is noticeable that while the internal customer service and help desk systems were described as up-to-date in 54% of forces, it was recognised as a high or very high priority in only 26%.

" Over 90% of forces expect significant or transformational change across all four technology areas. "

Incident Management 2: Community Response

Background

Community response is a key part of the visibility of forces with the communities they serve and is usually supported by a combination of warranted officers and Police Community Support Officers (PCSO). A significant proportion of this work is pro-active and takes place away from police stations. Collaboration with other agencies such as Social Services and youth initiatives also tends to form a significant part of this aspect of the work of forces.

The community function is highly mobile, often using foot patrol to provide visibility and react to incidents reported; while such incidents may not require an instant or urgent response (such as reports of dangerous parking and behaviours by drivers at school drop off and collection times) they do require a visible response and presence. Such officers are not always supported by vehicles and so technologies have to be portable enough to be carried and used across a shift; key tools have been laptops (often used in collaborative working and in settings such as public access) and smartphones providing access to force systems including information such as Police National Computer and local intelligence. Such systems have evolved significantly over time; see for example Pica, Sorensen and Allen (2004) contrasted with the recent (Grossmith et al., 2015) College of Policing/Mayor of London/ Metropolitan Police report on body worn video. Intelligence gathering for such officers has always involved conversations with members of the public and, over the last few years, has also increasingly made use of social media as a source of information; it is also increasingly used by forces as a tool to communicate with citizens (Crump, 2011) although not always with the desired result (Goldsmith, 2015) This section of the survey refers to three areas of technology: *social media, remote access to force systems* (e.g. intelligence reports, briefings), and *laptop with access to personal information management systems & data processing*.

Findings

Area	Condition up-to-date	Expected change significant/ transformational	Priority high/ very high
Social media	76%	100%	74%
Remote access	71%	100%	81%
Laptops	79%	30%	51%

Table 11. Community response. Condition, expected change, priority.

The technology which underpins the community response function is largely regarded as being up-to-date with over 70% of forces reporting that their social media, remote access and laptop capabilities are up-to-date.

There is a very clear message that laptop technology is given both a lower expectation of change and priority than the ability to access and use force systems remotely (on devices other than laptops) and to access and use social media. For both of these areas the expectation is universal that change at a high level will be needed across the next 3 to 5 years and both of these areas are regarded as being high or very high priority.

This would appear to confirm the move away from larger and more cumbersome systems (such as in-car terminals for response officers for example, or laptops for community response) to personal technologies and, primarily, smartphones.

" *Over 70% of forces report that their social media, remote access and laptop capabilities are up-to-date.* **"**

Incident Management 3: Tactical (Quick Time)

Background

Quick time response is probably the most visible element of police work for most citizens. It is also the element which requires urgent (and usually highly visible) response – 'blues and twos' being a key symbol of this area of incident management. The traditional tool for such response has been the radio with dispatch and incident management making extensive use of voice to share information and manage the incident. Such response is often vehicle based to provide both speed and reach of response. Over the last decade the reliance on voice has decreased and shifted to providing officers with information in other forms (text to voice, satellite navigation voice prompts) and also to provide access to additional information such as direct access to PNC and intelligence systems, among others.

This has included the provision of in-car terminals as well as personal portable devices and these technologies are intended to connect officers with force systems and provide the capability to access such systems without the traditional recourse to an information intermediary in a control room; although that facility remains extant and will be used in cases where it is unsafe, or not feasible for the officer to access systems directly, for example when the officer is single-crewed in a vehicle, or there are clear safety issues.

This section of the survey has, therefore, focused on two topic areas: *In-car mobile data terminals,* and *smartphone/PDA - access to force systems.*

Findings

Area	Condition up-to-date	Expected change significant/ transformational	Priority high/ very high
In-car	23%	77%	59%
Smartphone	59%	100%	93%

Table 12. Tactical. Condition, expected change and priority.

The technologies examined under this heading are split, with in-car terminals overwhelmingly regarded as not being up-to-date with by nearly 80% of respondents, and smartphones as being up-to-date in almost 60% of cases, nearly 90% if the old-but-serviceable category is included.

As with other areas a very strong level of priority, against a unanimous perception of significant or transformational change, is given to the deployment of smartphone technologies. This is reinforced by the decline from 2013 data in forces prioritising in-car technologies; with 45% of forces reporting in-car data terminals as either not used or obsolete in 2016 as against 33% in 2013.

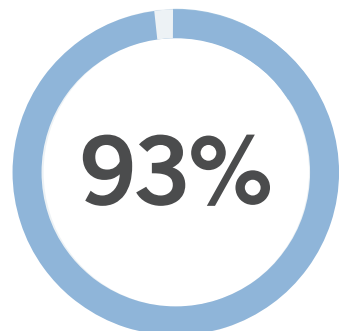93% of forces reported that smartphones are a high/very high priority

93%

Figure 4. Smartphones, level of priority.

Incident Management 4: Roads Policing

Background

Roads policing has diverse objectives including 'denying criminals the use of the roads' through to the maintenance of safe and effective traffic flows, and adherence to the applicable laws with regard to road use and road safety. The role also requires attendance at incidents/accidents involving motor vehicles across the road network. Perhaps the key, and relatively mature, technology which has transformed roads policing is that of Automatic Number Plate Recognition (ANPR) provided both as a fixed system and as a mobile tool. ANPR has provided policing with invaluable means of tracking vehicles and suspects as well as identifying vehicles which are not taxed, or insured or are otherwise of interest. A review published by Kirby and Turner (2007) provides an overview of the use of the technology in practical terms.

There are, however, concerns over the scale and period of retention of data from the systems as expressed by the Surveillance Camera Commissioner in a speech in November 2015 (Porter, 2015).

As with the above section on response policing there has also been a move to provide roads policing officers and vehicles with direct access to force information systems. Given the heavy reliance on vehicles in this role such information provision has focused on in-car terminals and, more recently, equipping officers with smartphone technologies.

This section of the survey focused on four areas of technology: *In-car APNR, fixed APNR, fixed data terminals,* and *PDA* or *smartphone.*

Findings

Area	Condition up-to-date	Expected change significant/ transformational	Priority high/ very high
In-car ANPR	58%	36%	49%
Fixed ANPR	67%	46%	56%
In-car terminals	50%	38%	30%
Smartphone	58%	70%	68%

Table 13. Roads policing. Condition, expected change and priority.

The technology areas which were examined under this heading are generally not seen as being ones of major change or of priority. Automatic number plate recognition is a relatively mature technology and, therefore, the relatively low levels of expected change at the significant or transformational level are perhaps to be expected.

The key area for attention is in the provision of smartphones where there is both a far higher expectation of change, and priority, than other areas. This reflects similar levels of emphasis on these technologies in other roles and is also supported by the relatively low figures for expected change in in-car terminals, and the very low priority (30%) given to the development of these technologies.
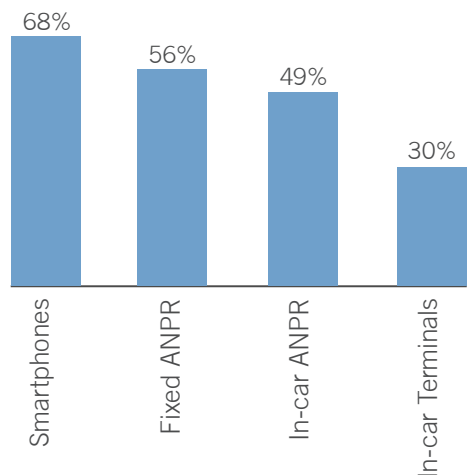
Priority high/very high

Figure 5. Roads policing, level of priority.

Incident Management 5: Multi-agency

Background

The main emphasis here is on multi-agency working in major incidents where it is recognised that forces need to collaborate and work with a range of other organisations and agencies to provide an effective response to the situation. Such settings can create issues of communication both from a technical standpoint due to differences in the actual technologies used (although the TETRA Airwave system went some way to standardising voice communication across the blue-light services) and also from differences in terminology used, and cultural issues (Allen, Karanasios, Norman 2013). Such issues of joint control and the effective dissemination of information have been highlighted (see Curnin et al, 2015 for example) as potential barriers to the effective delivery of command and control on incident grounds.

This section of the survey focused on two areas of technology: *Integrated control centres*, and *forward command vehicles.*

Findings

Area	Condition up-to-date	Expected change significant/ transformational	Priority high/ very high
ICC	17%	97%	52%
FCV	25%	30%	15%

Table 14. Multi-agency. Condition, expected change and priority.

From the data collected it would appear that forward command vehicles have effectively been written off as a technology by many forces with a high percentage, over 30%, stating that they don't use the technology at all and relatively low levels of expectation both of change and priority.

Integrated control centres would appear to be an area where, although there is currently a relatively low level of use with nearly two thirds of forces reporting that they do not use the technology, there is a strong expectation of significant or transformational change (virtually unanimous) with just over half giving a high level of priority. This would appear, therefore, to be an area where there is strong perceived potential but a relatively low level of current realisation of that potential.

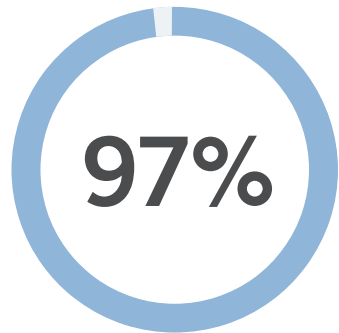97% of forces expect significant/ transformational change in ICC

97%

Figure 6. ICC, expected change.

Custody Management

Background

This focused on two areas of technology: *Integrated Force Record (via ERP system such as SAP/Northgates Identity Hub)* and *analytic software (displaying information via dashboard).* The use of analytics for automated analysis of data streams including 'big data' is an area where commercial organisations are currently placing a significant level of emphasis and resource.

Findings

Area	Condition up-to-date	Expected change significant/ transformational	Priority high/ very high
Analytic software (display via dashboard)	54%	65%	62%
Integrated Force Record (via ERP)	53%	64%	60%

Table 15. Custody management. Condition, expected change and priority.

The picture here is of technologies which are overwhelmingly serviceable and used, but where there are a significant number of systems in use which are regarded as dated, and which will require some level of updating in the relatively near future. Forces see this area as one of clear priority with high or very high priority being allocated to both technology areas at over the 60% level and similar figures for the expectation of significant change. This area has changed little in the last three years with regard to the condition of technology and priority allocated, but the expectation of significant or transformational change has moved; there is a significant increase in the number of forces reporting an expectation of transformational change with the integrated force record seeing expectation of change at that level up from 6% in 2013 to over 34% in 2016 and the use of analytic software reporting a smaller, but noteworthy, rise from 13% in 2013 to 31% in 2016.

Records Management

Background

Records management refers to the management of a document which is evidence of an action throughout its lifecycle from acquisition to disposal. A record could refer to physical documents (such as statements) or an electronic record held in a central or local database. Johnson and Hampson (2015) point to both the 'labyrinthine' nature of police records and the fact that analysis and interpretation of information held in police records is integral to day-to-day business activity. This is a particularly important area for policing, not least because the types of records that forces need to manage are rapidly changing (and now include more unstructured data such as social media), the volume of data is increasing rapidly (such as video from body worn cameras),

and the quality of records is key to effective decision making.

This section of the survey focused on technology to support records management in three areas: *Integrated databases (PNC), broadband wireless access in police cars*, and *image management software.* Integrated databases are particularly important within a policing context and form an established set of local and national databases in which information is held. Image management is an area which is both increasingly significant and challenging. With the provision of technology to support mobile work, we were interested in how forces viewed the capability of accessing and providing information into police records from mobile work environments.

Findings

Area	Condition up-to-date	Expected change significant/ transformational	Priority high/ very high
Integrated databases (PNC)	58%	70%	61%
Broadband wireless access in police cars	41%	63%	46%
Image management software	40%	76%	36%

Table 16. Records management. Condition, expected change and priority.

The condition of technologies in these three areas was surprising, less than half of the forces indicate that broadband wireless access in police cars and image management software is up-to-date. While the majority of forces felt that integrated databases are up-to-date, this was significantly down from the figure of 76% in 2013.

Integrated databases are seen as an area of importance to the forces with 61% of forces taking the view that this technology was a high or very high priority, with 70% viewing it as an area of significant or transformational change. Database technology and the integration of data in other sectors is undergoing quite significant change with the drive to 'big data' through to cloud based solutions. The results from this survey indicate that, while some forces are engaging with this change, a significant number are not.

The response to the question on Image Management Software indicates that 64% of forces do not see this as a high or very high priority area. This is, perhaps, surprising as the rapidly increasing use of body worn video (Brucato, 2015; Coudert, Butin, & Le Métayer, 2015; Mateescu, Rosenblat, & Boyd, 2016) and high definition video material is generating significant quantities of image data. The indexing, searching and storage of this data is challenging. We would have expected an investment in technology to capture the data would have gone hand in hand with the acquisition of technology to manage the data.

With the advent of the new Emergency Services Network (ESN) (which will provide mobile broadband access to mobile devices) it is interesting that a number of forces have already invested in broadband technology within-cars. In 2013, 89% of forces did not use broadband technology in police cars, however, by 2016 this had dropped to only 55% of forces, which, while relatively low is a clear change. This is also an area where there has been an increase in the degree to which this is seen as an area of transformational change with no forces seeing it as an area of transformational change in 2013 and 25% in 2016. Given that ESN will provide significant capability in this area, it was surprising that only 45% of forces indicated that it was a high or very high priority. This is despite broadband access in forces being important for two reasons; firstly that the police vehicle often acts as an information hub and point where officers can access and update records and, secondly we see a move towards reliance on wireless networks to allow the remote monitoring of systems.

Crime Analysis/Mapping

Background

This section of the survey focused on technologies which support two areas: *Predictive modelling*, and *investigative software.* Predictive modelling of crime, underpinned by Geographical Information Systems, is a key element of intelligence-led policing (Fitterer, Nelson, & Nathoo, 2015). Approaches such as 'hot spot' policing interventions are well established (Sherman & Weisburd, 1995) and opportunities exist for the use of novel forms of geo-spatial data (Hirschfield, Birkin, Brunsdon, Malleson, & Newton, 2014). Rapid development in tools for data analytics and information management mean that this is a particularly fertile area for development with a rapidly expanding number of tools and technologies that can be used to deal with both traditional forms of crime and cybercrime from data mining/automated data analysis through to the use of cognitive systems.

Findings

Area	Condition up-to-date	Expected change significant/ transformational	Priority high/ very high
Predictive modelling	40%	84%	60%
Investigative software	48%	78%	59%

Table 17. Crime analysis/mapping. Condition, expected change and priority.

The findings indicate that in 60% of forces predictive analytics is not up-to-date and that in 52% of forces investigative software is not up-to-date. This shows a decline in condition from 2013 when 61% of forces indicated that their predictive modelling was up-to-date and 71% indicated that their investigative software was up-to-date.

Given the rapid development of new technologies in this area it is, perhaps, to be expected that technology is not up-to-date, however, given the significance of evidence based policing and information management the fact that four in ten forces do not see this as a priority is unexpected, and the declining condition of the technology over the last four years is noteworthy.

Collection and Processing of Crime Scene Evidence

Background

Technologies which support the collection and processing of crime scene evidence are of clear importance to police forces, and are also an area where the technologies have been developing rapidly, where digital technologies have been seen as having significant potential both to reduce the time taken for tasks, to improve the quality of collection and processing. GPS systems can be used, often in conjunction with GIS tools, both to pinpoint crime scenes for investigation and, in conjunction with tools such as photo mapping, to record crime scenes for analysis (SceneDoc for example). Research (Leigh, Dunnett, & Jackson, 2016) also supports the use of GIS

systems to support predictive policing and GPS/GIS technologies can be used forensically to track and display the movements of a vehicle, smartphone or other GPS-enabled device such as an offender tag. Evidence collection also includes the collection and management of digital evidence relating to cyber-crime and this area of digital forensics is a burgeoning one although outside the scope of this survey. This section of the survey focused on four topic areas: GIS, GPS, auto digital evidence processing systems, and communication with Criminal Justice Partners (e.g. probation service).

Findings

Area	Condition up-to-date	Change expectation significant/ transformational	Priority high/ very high
GPS	60%	56%	25%
GIS	58%	55%	35%
Auto digital evidence processing	37%	88%	57%
Communication with CJ partners	46%	79%	73%

Table 18. Collection and processing of crime scene evidence. Condition, expected change and priority.

Whilst technology in this area is, overwhelmingly, either up-to-date or old-but-serviceable the difference between these two areas indicates that there may well be pressure for significant levels of updating in the medium term. This is reinforced by relatively high (and in two cases very high) levels of expectation of significant or transformational change. It should be noted that particularly in the issue of communication with criminal justice partners there were no forces reporting that they expected no change. This issue of communication with criminal justice partners is also one which gains the highest priority level of the four technologies examined.

This area is relatively stable when compared with the 2013 findings, although across all of the technology areas, whilst the overall level of expectation of change has remained relatively stable, there has been a shift from significant change to transformational change with, for instance, auto digital evidence processing systems being reported as expected to experience transformational change by less than 30% of forces in 2013 but over 50% in 2016.
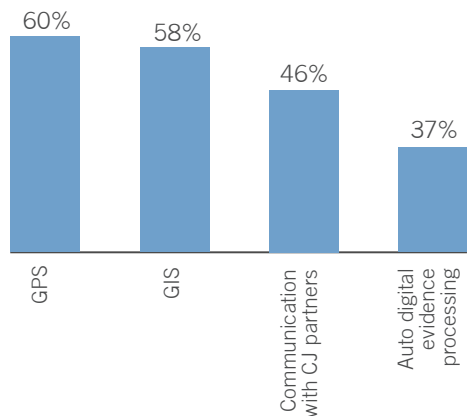
Condition up-to-date

Figure 7. Collection and processing of crime scene evidence, condition.

Securing Police Systems

Background

Security of police systems is, rightly, expected to be of the highest standard by all involved including the public, Government, and individual police forces. With the increasing shift to digital records and management of data come gains in both efficiency and effectiveness as well as, potentially, vulnerabilities, and the tools forces use to secure their systems are key. Trust in the security of systems is easily damaged and there have been high profile data losses in many organisations, across both the public sector and the private sector. Such systems have to be correctly implemented, scrupulously maintained and updated, and managed in accordance with a clear awareness of key risks and effective security in both technologies and the associated human factors/social engineering risks. Forces have to balance the need to secure systems within the appropriate legal frameworks as well as the need to manage and store data so as to be able to release information in line with Freedom of Information requests and inter-agency/ inter-force data sharing.

This section of the report refers to technologies associated with *Encryption, identification,* and *data management.*

Findings

Area	Condition up-to-date	Change expectation Significant/ transformational	Priority high/ very high
Encryption	93%	5%	50%
Identification	70%	5%	45%
Data management	73%	19%	60%

Table 19. Securing police systems. Condition, expected change and priority.

These areas of technology are perceived as being very much up-to-date – when the old-but-serviceable category is added in to the condition reporting the only area of concern is with 9% of forces reporting data management technologies as obsolete.

Expectations of change are, as is to be expected with an area that is up-to-date, low, although the confidence in the stability of technologies such as encryption may be misplaced given the speed of development of threats. Data management has shown a significant increase in the expectation of change since 2013 when no forces rated this as significant or transformational.

The key role of the technologies is reflected by the high priority attached to them, despite the low level of expectation of change – this suggests active monitoring of systems and their effectiveness, and a keen awareness both of the criticality of these systems and the potential for threats to them.

" Data management has shown a significant increase in the expectation of change since 2013 when no forces rated this as an area of significant or transformational change. "

Surveillance

Background

Surveillance technologies are important tools which are routinely used by police services in the UK. In an information society the range of technologies that can be used, and the scope for use, is changing very rapidly. It has been argued that new policing practices dependent upon the use of surveillance technologies are emerging (Pieri, 2014) and concerns have been raised about the 'stretching' of such technologies beyond their intended use (Boersma, 2013).

In this element of the study we focused on six technologies, three which we saw as well established and three which have

emerged recently. The three which we viewed as well-established within policing were *video surveillance, automatic number plate recognition (ANPR)* and *in-car cameras.* In-car cameras, for example, have been used in police cars in the US since the mid-1990s (Maghan, O'Reilly, & Shon, 2002). The three which we saw as emergent were *body worn video (Person mounted cameras), aerial surveillance (e.g. drones),* and *GPS for tracking suspects.* The use of body worn cameras has emerged only recently, however, they are seen as spreading particularly rapidly (Coudert et al., 2015).

Findings

Area	Condition up-to-date	Condition do-not-use	Expected change significant/ transformational	Priority high/ very high
Video surveillance	100%	0%	41%	41%
ANPR	100%	0%	51%	47%
In-car cameras	89%	11%	48%	26%
BWV	87%	13%	71%	68%
Aerial surveillance (e.g. drones)	39%	61%	55%	31%
GPS for tracking suspects	54%	46%	27%	14%

Table 20. Surveillance. Condition, expected change and priority.

The more established technologies in this area are overwhelmingly up-to-date with none of the technology being described as obsolete.

The importance of video surveillance and ANPR is reflected in the high level of maintenance of the technology as up-to-date. The expected levels of both expected change and priority were much lower than expected. With over 9,000 fixed ANPR cameras in the UK submitting up to 40 million reads per day this is a significant data source. This data is held for two years and the UK currently holds over 20 billion reads (NPCC 2016). New digital cameras and biometric technologies mean that the volume, complexity and ability to use this data

will bring new opportunities for use but will also raise very significant legal and ethical issues about the use of these technologies.

Probably the standout technology here is body worn video, where there is both a high expectation of significant or transformational change and an equally high level of priority allocated to the development of this technology.

Aerial surveillance is given both a lower expectation of change and a lower priority, and this may well reflect both the currently low take-up of the technology and some high-profile issues of public acceptability.

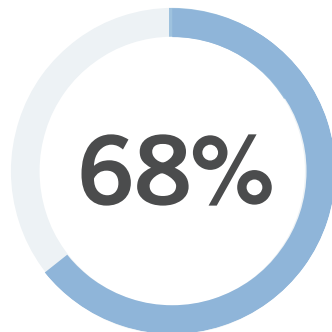68% of forces reported that body worn video is a high/very high priority

68%

Figure 8. Surveillance, level of priority.

Internal and External Use of Social Media

Background

Over the last decade or more, social media has become highly integrated into everyday life (van Dijk, 2013). As a phenomenon, it builds on Internet-based applications which allow users to create and share content (Kaplan & Haenlein, 2010). Wikis, blogs, and social networks all have the potential to change work activity, via the ways people connect, collaborate, interact and share information. Compared with traditional technologies, social media also provides increased visibility and transparency so that an individual's actions are open to others.

Social media research generally, and specifically in the policing context, can be divided into two main organisational concerns: external social media and internal social media (Leonardi et al., 2013).

In the first case, social media technologies like Facebook and Twitter are used to engage with the public, whether in the interest of developing customer relationships or communicating with the general public. For example, Twitter has been used to share real-time updates and information relating to local events, travel news, and emergencies. On the other hand, it has also been used to seek information and engage with public conversations (Crump, 2011). It can enhance community engagement and complement more traditional forms of communication (Williams et al, 2013).

In the second case, businesses are using these technologies to improve information sharing amongst employees, promote collaboration between teams, and to support workplace communities within the organisation. An enterprise social network can encourage horizontal communication that looks beyond organisational boundaries. It can simplify sharing experiences and best practices whilst increasing opportunities to find expertise and experience from other parts of the organisation where no direct connection formerly existed.

The Use of Social Media: Communication with the public

Background

In 2008, police forces started to use social media. Recent reports suggest forces have realised the potential of social media, enabling them to engage with the public and gain access to a wealth of information (Bartlett, Miller, Crump & Middleton, 2013; Denef, Kaptein, Bayerl & Ramirez, 2012). Some studies have suggested that the use of social media to communicate with the public could increase community relations and improve public confidence in policing (Copitch & Fox, 2010; Ruddell & Jones, 2013).

Studies have largely focused on police use of social media on two main social media platforms – Facebook and Twitter.

This study focussed on six topic areas that are considered popular in terms of users:

- Twitter – a microblogging platform

- Facebook – a social networking platform

- YouTube – a video sharing platform

- Flickr – an image sharing platform

- Instagram – a photo and video sharing platform

- Snapchat – a platform to send images and videos that are temporarily viewable

We wished to explore both the use of emerging platforms for communication, as well as more established ones.

Findings

For this section, forces were asked about their use of social media for communicating with the public.

Area	Use often/ very often	Expected change significant/ transformational	Priority high/ very high
Twitter	95%	63%	64%
Facebook	95%	63%	61%
YouTube	58%	51%	42%
Flickr	21%	48%	17%
Instagram	36%	55%	37%
Snapchat	8%	58%	22%

Table 21. Social media to communicate with the public. Use, expected change and priority.

All police forces are engaging with social media to some degree and appear to do this often or very often. This is particularly the case with Facebook and Twitter, with over 95% of forces using them often or very often. However, the results above indicate that Flickr, Snapchat and Instagram appear to be the least utilised platforms. Instagram and Snapchat have been active for some time, with Instagram launching in 2010 and Snapchat a year later in 2011, it is, therefore, surprising that they have not been adopted to the extent of other platforms. Although Facebook and Twitter have a larger number of active users (47% and 20% of the UK population versus 14% for Instagram and 12% for Snapchat, (We Are Social, 2016)), Snapchat and Instagram have a larger share of younger users (for example, 39% of UK Instagram users are aged 16-24, compared with 16% of Facebook users (Fleischmann, 2015; McGory, 2016)).

Although Snapchat and Instagram are reportedly on the increase in terms of users (Kuchler, 2016; Fleischmann, 2015; McGory, 2016) at present forces see Facebook and Twitter as being a higher priority. This suggests that police forces are focusing on the well-established platforms, rather than experimenting with new social media and trying to engage new audiences. It could be argued that in order to engage with the wider public, police forces should start to adopt other popular and rapidly growing social media platforms such as Snapchat.

The Use of Social Media: Communication within the organisation

Background

Internal use of social media within organisations has been defined by Leonardi et al. (2013, p. 2) as:

"*Web-based platforms that allow workers to (1) communicate messages with specific coworkers or broadcast messages to everyone in the organization; (2) explicitly indicate or implicitly reveal particular coworkers as communication partners; (3) post, edit, and sort text and files linked to themselves or others; and (4) view the messages, connections, text, and files communicated, posted, edited and sorted by anyone else in the organization at any time of their choosing.*"

These novel capabilities are incorporated into new platforms and applications such as social networking sites, wikis, forums and micro blogs amongst others (see Kaplan & Haenlein, 2010). Examining the current literature on internal social media use, it is clear that social media has been increasingly appropriated into work practices for purposes such as increased awareness of "*who knows what and who knows whom*" (Leonardi, 2014), relationships building and networking (van Osch et al., 2015; DiMicco et al., 2008), knowledge sharing (Jarrahi, & Sawyer, 2015; Ellison et al., 2015), expert finding (Jarrahi & Sawyer, 2013) and innovation (Gray et al., 2011; Standing & Kiniti, 2011). In total, social media has been described as one of the most transformative technological changes for organisations (Aral et al., 2013).

In this study, six different types of social media were considered of which some might be understood as being more traditional communication technologies such as email and instant messaging.

- Enterprise Networking Sites – platforms similar to Facebook but used within the organisation, e.g. Yammer

- Instant Messaging – chat

- File sharing – e.g. Dropbox

- Collaborative document sharing – e.g. Google Docs

- Micro-blogging – e.g. Twitter

- Video Conferencing – e.g. Skype

- Email

Findings

Area	Use often/ very often	Expected change significant/ transformational	Priority high/ very high
Email	98%	28%	46%
Video conferencing	73%	73%	70%
Micro blogging (Twitter)	24%	35%	26%
Collaborative document sharing	33%	59%	29%
Wiki	18%	34%	10%
File sharing	12%	47%	24%
Instant messaging	64%	66%	41%
Enterprise networking	22%	61%	33%

Table 22. Social media within the organisation. Use, expected change and priority.

For this section, forces were asked about their use of social media as a means of communication within the organisation. The survey found that the majority of forces use a limited set of social media platforms for internal communication. The data showed that half of the considered types of social media were rarely used. This applied to social networking sites, file sharing, collaborative document sharing and micro-blogging. Of those who used social media within the organisation, these platforms tended to be more traditional communication technologies such as email, video conferencing and instant messaging.

Regarding perceptions of current priority, the data shows that video conferencing is clearly a priority. The next highest priority is email, followed closely by instant messaging. Again, this shows how well established technologies are key tools for internal communication. In terms of contemporary social media, whilst they all had less priority than the traditional, social networking sites seemed to have the highest priority and wiki has the lowest priority.

Whilst research in government organisations has found that

internal social media can improve communication, culture and business practices (Fabre, 2015), in the context of policing, there is limited evidence for widespread usage. The data presented here shows that established communication technologies (e.g. email) remain dominant. It could be suggested that the benefits of social media have not yet been realised within policing as in other organisational contexts.

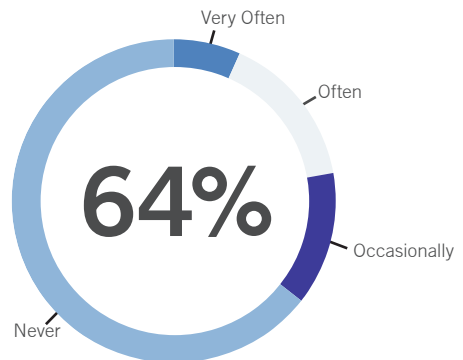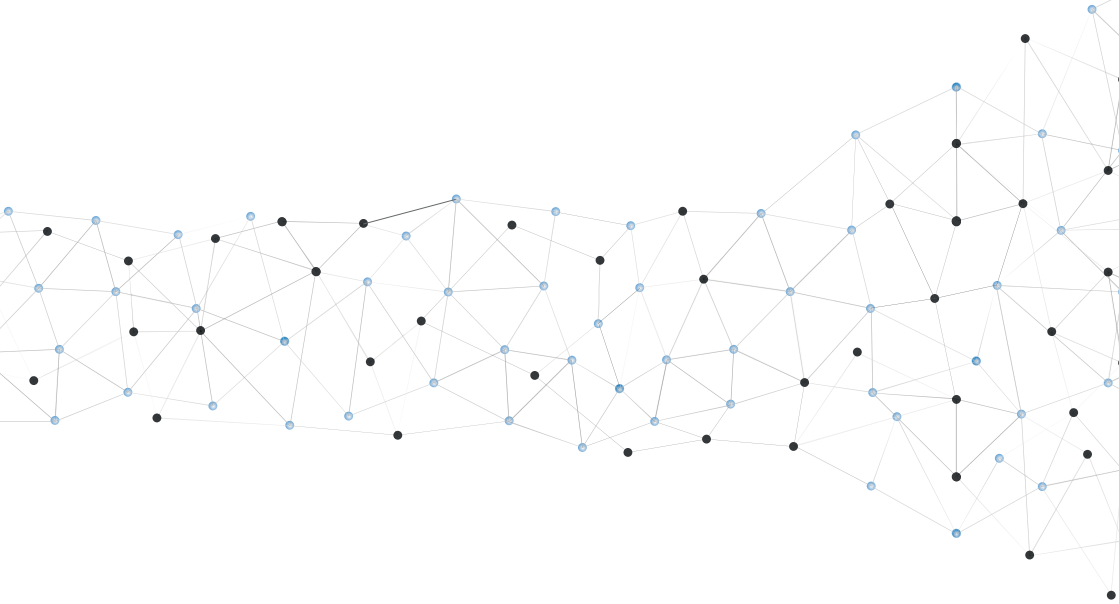64% of forces report never having used enterprise social networking sites

Figure 9. Social media use in the organisation.

Theme 2
The Delivery and Development of ICT

Delivery and Development of Systems

An additional section was added to the survey to focus on two alternative ways of delivering IT services. The first was outsourcing, and the second the use of cloud-based services. Questions were also introduced which explored the focused on development of ICT systems, to understand the extent to which forces were approaching the development of systems in-house, or collaborating with other organisations.

Delivery of Systems: Outsourcing

Background

Outsourcing is simply an arrangement in which one organisation provides services for another where these have usually been provided in-house – it is the traditional 'do or buy' decision (Brandon-Jones et al., 2016). It is often a difficult decision and potentially hard to reverse, but can offer benefits such as cost savings, flexibility and quality. While outsourcing is a widely used approach to delivery of services there has been a suggestion that approaches taken to IT marketization and IT outsourcing in UK Government during the 1990-2012 period negatively influenced the ability to provide political and public value outcomes (Cordella & Willcocks, 2012); others have pointed to the political challenges of outsourcing within a policing context suggesting that the window for outsourcing is currently closed (White, 2015).

More recently there has been a suggestion that the recent decline over the last two years in IT outsourcing contracts in both the public and private sectors has been accompanied by an increase in cloud and in particular infrastructure as a service (Finders, 2016).

This survey focused on different approaches to outsourcing, including *outsourcing services and support, outsourcing infrastructure*, and *outsourcing total IT*. We also asked about the use of *temporary outsourcing on a project by project basis.*

Findings

Area	Reliance high/very high	Priority high/very high
Outsourcing (services and support)	20%	18%
Outsourcing (infrastructure)	24%	18%
Outsourcing (temporary on project by project basis)	16%	27%
Outsourcing (total IT)	16%	13%

Table 23. Outsourcing. Reliance and priority.

It is firstly worth noting that for this area, a distinct trend was noticeable towards a very low reliance on all components of outsourcing in the questionnaire, and this trend, therefore, is interesting and worthy of further exploration. It may signify a more general risk aversion to the idea of outsourcing within the police, reflected in the highest level of outsourcing being on time-bound projects, i.e. where reversal of the outsourcing decision is both temporal and certain. It also may reflect a more general position where outsourcing or privatisation in policing is seen as politically controversial or as a result of risk adverse approach.

In this survey, specific feedback included 59% stating very low reliance for outsourcing total IT, this can be compared to 38% for outsourcing services and support, 33% for outsourcing infrastructure, and 31% temporary outsourcing on project by project basis.

When assessing levels of current priority for forces, again levels of very low scores could be seen for most categories. For instance, 48% perceived outsourcing total IT as a current priority, compared to

25% for temporary outsourcing on project by project basis, and 24% for outsourcing services and support. Only outsourcing infrastructure reflected slightly higher levels of priority, with 46% perceiving it as neither high nor low.

Finally, it is worth noting that when considering the priority of outsourcing, overall, forces were generally more than twice as likely to perceive this to be a low priority as high priority.

The low reliance on all form of outsourcing is particularly noticeable. While there are a small number of forces which have embraced a total outsourcing approach to IT, such as Staffordshire Police (Shah, 2016), or as part of a larger strategic outsourcing initiative as in the case of Lincolnshire Police (c.f., White, 2014) the highest area of outsourcing was temporary outsourcing on project by project basis, however this was only cited by 27% of forces as having high or very high responses.

Cloud Computing

Background

Cloud computing refers to the provision of computing resources as a service (Mell & Grance 2011). Resources can be classified as infrastructure (processing power and storage space), platforms (for developing and deploying bespoke systems), and managed software services (for hosting 3rd party software). Organisations no longer need to develop these resources themselves locally on site; instead they can pay a third party to manage the resources for them. This has been a transformational area for organisations of all types globally as they can immediately access cloud computing resources and vary the amount they require based on their current needs (Marston et al., 2011). All the management and maintenance responsibility is delegated to the provider, which removes the IT-management burden on the organisation. This can lead to increased savings on IT costs, whilst raising the level of backup and redundancy.

Cloud provision can be through public providers (such as Amazon or Microsoft), or as a private cloud accessible to the organisation only and operated in many (although by no means all) cases by the organisation themselves. Organisations with a high need for protection of some of their data may opt for a hybrid cloud model with sensitive data running on private, and less sensitive data held on (cheaper but arguably less secure) public, cloud.

However, despite the advantages, there are often concerns about cloud computing; one of the key areas is the safety and privacy of the information that might be stored on a cloud computing platform (Willcocks et al., 2013). Such concerns are perhaps especially acute when the data stored and managed is as potentially sensitive as that held by police forces. Concerns in this area have been exacerbated by recent controversies with regard to the cross border information sharing. There are also concerns in the police context with regard to the resilience of the systems – both in the resilience of the actual data access and in the resilience of the – primarily wireless and internet based – links on which access to the data depends.

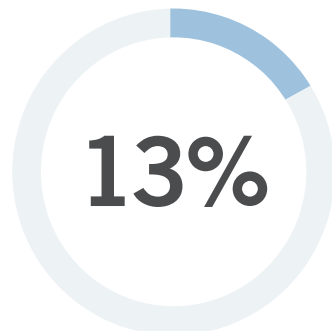13% of forces perceived a high/very high reliance on cloud software

13%

Figure 10. Cloud computing, reliance.

Findings

Area	Reliance high/very high	Priority high/very high
Cloud (software)	13%	40%
Cloud (platform)	13%	40%
Cloud (infrastructure)	18%	40%

Table 24. Cloud computing. Reliance and priority.

Overwhelmingly, the extent to which forces perceived reliance upon cloud technologies to deliver information systems was low. For instance, a total of 64% perceived either a low or very low reliance on cloud software, 60% perceived either a low or very low reliance on cloud platforms, whilst 56% perceived either low or very low reliance on cloud infrastructure.

The highest levels of perceived reliance on outsourcing to cloud technologies can still be considered to be relatively low, with the highest level of high and very high reliance stated as 18% for cloud infrastructure, whilst high and very high reliance on cloud software and cloud platforms each scored a total of 13% respectively.

Despite relatively low levels of reliance, cloud technologies were seen by some forces to be an area of relatively high priority with 40% of forces allocating high or very high priority to these technologies.

A number of forces used the free text section of the survey to point to on-going transformational change and fundamental restructuring of their IT services. These included "*huge change programme underway*" and "*transformational change*", whilst others noted that the need for change was a message from the "*Exec Team to Information Services*". Many of these noted that cloud services would play an important role in the restructuring. One force noted that they were actively considering cloud services, noting that "*Storage and Servers are also under review to see if costs can be saved under a cloud based service hosted by a 3rd party.*"

One potential rationale for the low uptake in outsourcing as an approach to service delivery noted above was that there could be an uptake in cloud based services. This does not, currently, seem to be the case in UK policing. Given the significance of cloud computing for other sectors the low reliance on it, and the fact that it is not seen as a high priority in 60% of forces, is noteworthy. The comments provided by respondents in the free text element of the survey were illuminating and suggest that in a number of forces cloud will be used as part of transformational change and have a significant impact. There is a need for further research to explore combination of delivery of cloud services with business process change, the use of other forms of cloud delivery including hybrid cloud, and the factors which are influencing low reliance on cloud computing solutions.

Development of Systems

Background

IT Service development has been historically undertaken on a force-by-force basis led by in-house IT support collaborating with vendors, or building systems in house. This reflects the police services organisational autonomy and independence. Regional collaborations have, however, emerged (such as the South West England alliance of Avon and Somerset, Gloucestershire and Wiltshire) and a number of forces have developed collaborative shared services in a range of non-IT areas ranging from procurement through to major crime capabilities. This has extended into the development of shared IT services (as has occurred in Kent and Essex). This section of the survey aimed to explore the degree to which forces were collaborating in the development to information systems not only with other forces but also with other related agencies. A number of forces are converging on the same software solutions (see for example the five East Midlands forces use of Niche) and the survey aimed to explore this further as well as exploring the degree to which police services retained in-house capacity to develop systems. The survey, therefore asked about *in-house systems development, collaboration in systems development with other police services, collaboration with other public sector bodies (such as fire or other services),* and *cloud (infrastructure)* where hybrid cloud environment is used for development by multiple partners.

Findings

Area	Reliance high/very high	Priority high/very high
In-house systems development	18%	7%
Collaboration in systems development with other police services	51%	58%
Collaboration with other public sector bodies	22%	47%
Cloud (infrastructure)	21%	40%

Table 25. Development of systems. Reliance and priority.

Interestingly, only 18% of forces noted that they had high or very high reliance on in-house development of systems and, indeed, 62% of forces indicated that they had a low or very low reliance. This suggests a shift to other approaches to systems development.

The data indicated that there was low reliance on both cloud infrastructure for collaborative development and collaboration with other public sector bodies, with approximately three quarters of forces indicating that they didn't have a high or very high reliance on these approaches. By contrast, with regard to collaboration in systems development with other police services 51% of forces indicated that they had a high reliance or very high reliance on this approach. 60% of forces also indicated that this area was of high or very high priority, followed by 46% who stated that collaboration with other public bodies was of high or very high priority, and 40% who stated that cloud (infrastructure) was a priority.

One Force noted that they had a *"Full collaborative strategy and delivery programme across two forces standardising on single EPR platform, single CJAD platform (case, custody, Intel, Crime), standardising on single CRM / Contact platform and standardised on single mobility platform and full mobility infrastructure. Started 2013 expect to complete 2018. Largest investment in technology across both forces in 20 years."*

Collaboration with the fire service was noted by one force, whist another pointed to ambitious plans to collaborate with local authorities to develop systems to support Multi-agency Hubs – linking in with other agencies to share information and improve efficiencies and service to vulnerable people, e.g. links to local Councils and the creation of a Community Service Hub with a new building (including a data centre) to support multi-agency and agile working strategies.

A further area of development mentioned by respondents was the development of cloud based digital services. Interestingly, they noted both the use of cloud to develop systems at a local level (discussed above) but also in collaboration with the Home Office and Police ICT Company to deliver on-line services including crime reporting and crime tracking.

It is significant that a number of respondents used the free text element of the survey to point to the challenge of process change and redesign involved in the development of collaborative systems. One force made specific reference to this in relation to the implementation of a collaborative records management system across three forces.

Theme 3
Key Areas of Challenge
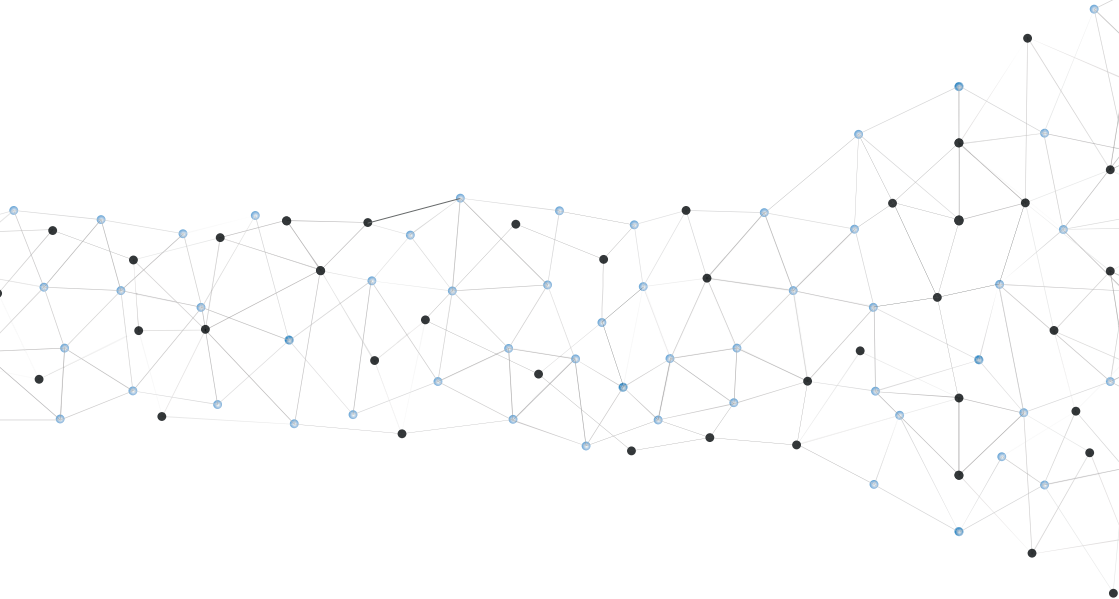
ICT Challenges

Background

In this section of the survey we turned to key challenges for information management in policing. Here we moved away from specific technologies to focus on wider issues which are both known to be challenging and also known to be a high priority in other sectors. The areas selected were:

- Enterprise Content Management (ECM)

- Management of legacy systems

- Ability to effectively search information held

- Maintaining data and information in a secure manner while using it more intensively

- Ability to use analytics to gain insight from information held

- Information governance

Research from academia and from industry organisations has indicated that each of these areas are both particularly challenging and important for both public and private sector organisations.

The first topic, Enterprise Content Management, has been defined in multiple ways (Grahlmann, Helms, Hilhorst, Brinkkemper, & van Amerongen, 2012) , however, the most commonly accepted definition is that it is a set of *"the strategies, tools, processes and skills an organization needs to manage all its information assets (regardless of type) over their lifecycle."* (Smith & McKeen, 2003: 648). The benefits linked to successful ECM have been described as substantial and stem from increased use of information (Sprehe, 2005) through to compliance and management of risk. The most commonly used type of

information system associated with ECM is SharePoint, however, many organisations deploy multiple systems in parallel (Miles, 2016). It is, however, an area many business struggle with (AIIM, 2016) and these concerns are accentuated by concerns about the impact of cloud on ECM (Miles, 2016).

During our earlier research studies it became clear to the authors of this report that UK police services have a plethora of legacy systems. The on-going maintenance and management of these systems will, we expect, remain key to delivering digital systems in the short to medium term as forces do not have the resource to replace them. The research evidence suggests that both managing existing legacy systems (from updating through to integration with other systems) and migration to new systems can be

particularly challenging (c.f., Argyropoulos et al., 2015; Bennett, 1995; Matthiesen & Bjorn, 2015).

The third topic of information governance relates to "*the specification of decision rights and an accountability framework to encourage desirable behaviour in the valuation, creation, storage, use, archival and deletion of information. It includes the processes, roles, standards and metrics that ensure the effective and efficient use of information in enabling an organization to achieve its goals*" (Gartner, 2014). It is seen as an important area for most organisations and one which has taken on increasing prominence in the light of recent high profile leaks, hacks and email issues (AIIM, 2016). The concept of information governance has been embraced within a number of other sectors, most notably in the UK in the NHS (Gillies, 2015) where there also seems to be recognition that the introduction of new technologies can raise additional concerns (Lea & Nicholls, 2016)

As police forces digitise information, their ability to search and capture information should improve as data, which was held in paper format and was difficult to access, becomes available to be searched and used. Indeed, recent research has indicated that this is the single largest driver for scanning and data capture in many organisations (AIIM, 2016). Police forces in the UK have, however, a plethora of often incompatible information systems in place which makes information search within forces problematic and information search across forces (outside centrally provided and managed systems) very

difficult. Police forces are not alone in finding this area challenging and Miles indicated that a key driver strong search was one of the most important aspects in making the choice of acquiring new ECM systems. Miles argues that this fact reflects a weakness in many existing ECM systems (Miles, 2016: 20).

It has been argued that the ability of organisations to develop the ability to use analytics to gain insight from information held is of critical importance to organisations (Seddon, Constantinidis, Tamm, & Dod, 2016). As, however, we see the data analytics movement mature there is an increasing realisation that gaining business benefit from analytics is not an easy process and can be particularly challenging. Ransbotham, Kiron, & Prentice 2015, for example, argue that the key challenge for organisations is not in the mechanics of analytics but in translating analytics into business actions.

As organisations deploy and use new and emerging technologies which allow the gathering and use of electronic data, maintaining data and information in a secure manner while using it more intensively will become a priority for police forces – as it is for many other organisations. Current trends towards mobile and social, noted within this report, also mean that this will remain an area which is both a priority and challenge for forces.

Findings

Area	Reliance high/very high	Challenging/very challenging
Ability to effectively search information held	84%	53%
Ability to use analytics to gain insight from information held	80%	58%
Maintaining data and information in a secure manner while using it more intensively	73%	44%
Enterprise content management	65%	60%
Information governance	64%	52%
Management of legacy systems	47%	60%

Table 26. Key areas of challenge. Reliance and level of challenge.

The survey results indicate that for the majority of organisations surveyed, the issues raised are a high or very high priority with over 80% of forces indicating that the ability to effectively search information held, and the ability to use analytics to gain insight from information held, was a high or very high priority.

It is noticeable that the management of legacy systems, which we felt would be a high priority, wasn't seen as such by the majority of forces – but was ranked as the joint top challenge with Enterprise Content Management.

Our expectation was, for the reasons stated above, that each of the areas would be seen as very challenging by the vast majority of participants. We are surprised that this wasn't the case, and this opens the opportunity to understand more about how the forces are approaching each of these issues.

Conclusion

The survey sought to elicit the perceptions of forces with regard to the technologies on which effective delivery of service depends, or will depend. It revealed a very diverse landscape and one which has not become significantly more homogenous since 2013. There are very high levels of variability between forces in condition, expectation of change and priority areas.

Forces have, compared with 2013, an increased expectation of very significant change over a wide range of technologies. These expectations, if fulfilled, mean that there is a very high potential need for replacement of, and investment in, ICT in the 3-5 year horizon. It should be remembered that this is against the background of the introduction of the Emergency Services Network (ESN), which is a major change programme in its own right, and continued austerity. While ESN will, undoubtedly, have influenced the expectation of change for some of the technologies this still raises a question over the capacity of forces to both deliver and absorb such high levels of change and project activity.

Overall most technology areas are seen as up-to-date or old-but-serviceable and, in most cases, technologies are seen as more up-to-date than they were three years ago. In three areas of activity there has been a significant (25% or greater) decline in condition and six areas of activity have seen an increase (25% or

greater) in the number of forces that see them as up-to-date. The areas which are seen as being-up-to-date tend to have a lower expectation of transformational change. The results highlight call handling, dispatch, custody management, crime analysis, and mapping as areas where technology was significantly described as not being up-to-date. The most noticeable decline in condition since 2013 has been in technology areas which support call handling.

Forces are prioritising areas of work which support front line functions, with incident management accounting for five of the top ten key priority areas. Mobility is a key priority and this is increasingly through the provision of personal and portable technologies as opposed to fixed (in-station, in-car) technologies. There is a clear move towards smartphones and away from less portable devices. The use of smartphones reflects an existing investment in technologies which do not use Airwave as a bearer, and already use commercial networks offering mobile broadband.

The key areas where forces see transformational change occurring, in contrast to the areas of priority which are more front-line oriented, are focused on back office technologies. It is, noticeable that back office technologies were also identified as being not up-to-date. This is also where there seem to be significant challenges for some forces: 60%

of forces saw Enterprise Content Management (ECM) and the management of legacy systems as challenging or very challenging. The fact that over 80% felt that the ability to effectively search information held, and the ability to use analytics to gain insight from information held, was a high or very high priority may also be related to the complex and fragmented nature of most police force ICT back office infrastructures, together with a growth in new forms of semi-structured or un-structured data, which many are poorly equipped to manage.

We were surprised to note that while 64% of forces saw Information Governance as a high or very high priority only 52% described it as challenging or very challenging. We expected both of these figures to be very much higher. Concerns have been raised about Information Governance capabilities in UK local councils (Information Commissioners Office 2016) and in health and social care providers (Care Quality Commission 2015). Police forces in the UK have much in common with these organisations. They have complex information architectures, multiple stakeholders, need to be transparent and accountable to both the public and government, face significant technological and regulatory changes, and rely upon the integrity of data and information to make decisions with potentially very far-reaching consequences.

The approach to delivery of police systems contrasts significantly with that seen elsewhere. Reliance on cloud computing is low, as is the reliance on outsourcing in all its forms to deliver and support IT capability. This is also a low priority for most forces. This is in stark contrast to the experience in other sectors. In March 2016 cloud computing was reported to be one of the top three IT topics for UK digital leaders for the next 12 months (British Computer Society, 2016). We also noted that just over 50% of forces indicated that they had a high or very high reliance on collaboration in systems development with other police forces, and 60% of forces also indicated that this area was of high or very high priority. Other forms of collaboration were seen as much lower priority, and there was significantly lower reliance upon them. This stands in stark contrast to the approach suggested by central government which supports further collaboration between police services and between police services and other agencies (see for example the draft Policing and Crime Bill 2015-16 to 2016-17)

The Association of Police and Crime Commissioners (APCC) and the National Police Chiefs Council (NPCC) document 'Vision for Policing 2025' (APCC and NPCC 2016) points to the potential of ICT to improve how forces protect the public, accelerate business processes and revolutionise the criminal justice process. It talks of the alignment and integration

of local policing with other local public services, establishment of joint technological solutions, the significance of new technologies and social media to communicate with the public, and points to the importance of information management in relation to digital evidence and data analytics. The research reported in this study provides some evidence of the degree of challenge police forces in the UK face in achieving this vision.

The research results provide an overview of the current ICT landscape in police forces in the UK. In interpreting these data we exposed gaps in the research literature which need to be fully addressed before we can more fully interpret the data. Equally, while the report points towards some important trends and areas of interest, it is important to note that we also saw significant variability in the condition of force infrastructures, approaches to development of systems, and priorities given to technology areas. It is clear that there are a number of forces which are embracing novel approaches to delivery of systems, who see their technology infrastructures as up-to-date, or who are innovative. It is to these which we will turn in the next phase of this research.

About Leeds University Business School

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About the AIMTech Research Centre: Adaptation Information Management and Technology

Founded in 2002, AIMTech (Adaptation Information Management and Technology) is a Research Centre within Leeds University Business School. The group's work is focused on the inter-relationship between new technologies, information management and organisational change. The main academic research areas within

AIMTech are information behaviour and practices, information systems innovation, evaluation of information systems and the design of information services and systems. A prominent component of AIMTech's activities is the on-going transfer of knowledge to both the public and the private sectors.

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