



## Police Use of Technology: Insights from the Literature

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# Police Use of Technology: Insights from the Literature

## Introduction

The recent suggestion printed in the Guardian Newspaper (Usborne, 2017) that young offenders be issued with tags that block internet connections highlights just how much technology pervades all aspects of society. Whether or not the approach would be successful is immaterial and the fact that a technological solution seems available reinforces the belief that in the Criminal Justice System, as well as in other public sector agencies, the use of technology will provide solutions to many problems.

Indeed, according to Higgins (2015), development in technology for policing appears quite promising with crime mapping, crime analysis, and the use of Body-Worn cameras amongst others, being seen as important tools for the police.

Technologies are complex, often diverse means to an end (Manning, 2008), with both symbolic (they stand for something else) and institutional (they do things) consequences. The primary technology of policing is talk, or interpersonal skills. Therefore, the definition of police technology is wide and far-reaching, not just restricted to “hard” technologies such as pieces of equipment. For example, some forces have utilised heart-rate monitors to track the stress levels of officers whilst responding to incidents (Hickman et al., 2011). However, for the purposes of this article, we concentrate on the more popular and topical aspect of technology that are impacting police practice in many countries.

Whilst the use of technology for the future of policing appears to have much support, there are areas of concern, namely such issues as accountability and civil liberties. If the future of policing is to rely so heavily upon the use of technology, just what do we know about its use so far? This article considers some of the literature regarding police use of technology to provide insight that may help us to answer this question as well as highlighting some possible areas for further research.

*Literature was chosen through a systematic search of terms such as Police Technology, Police Drones; Community Engagement and Police Culture and Technology in various databases.*

## Technology in Context

Technology is often placed into categories in order to better understand its function. In the policing sphere, Manning (2003) used five different areas to explain police technology: communicative, mobility, transformative, training and analytical. These five areas are said to encompass all areas of police technology, from new methods of communicating with the public (communicative) to those which amplify human abilities in scientific investigation (transformative) (Manning, 2003). Other classifications of police use of technology include Nogala’s (1995 in Dean and Gottschalk, 2007), ‘area’ descriptions which are more focused than those created by Manning. However, there are similarities between the two. Nogala (1995 in Dean and Gottschalk, 2007) also includes mobility and communication but the other areas include surveillance, IT and administration among others. This apparent narrowing of focus may reflect the time it was completed in 1995 because society’s understanding of technology as a concept will be different to Manning’s in 2003. This understanding also reflects the speed with which technology changes.

With a greater reliance on technology in society, comes a greater technology presence in police work, as seen through the introduction of new technology for the police to utilise. It is also

emphasised by the threats presented by criminals engaging with technology. There are other categories of police technology available for academics and practitioners. These are 'hard' technologies and 'soft' technologies. 'Soft' technologies encompass those which have no definite boundaries and which need to be moulded into systems (Jin, 2011). This suggests that 'hard' technologies are those that are considered to be more traditional, hand-held technology (Jin, 2011). A practical example combining the two would be a motor vehicle ('hard' technology) which has autonomous capabilities ('soft' technology). For the police, 'hard' technologies may present a more exciting opportunity because they are something that can be used in a visible sense and tend to support the view of police work as being 'action centred' (Reiner, 2010) whereas 'soft' technology may be associated with IT systems and difficulties. The topical areas worth considering are all "hard" technology. They are Body-Worn Video Cameras, Automatic Number Plate Recognition and the use of drones. Other topical areas of interest for future research include the use of mobile devices and social media.

## Body-Worn Video Cameras

Body-Worn Video (BWV) cameras have been introduced by many police forces globally for various reasons, including building trust between communities and the police (Police Professional, 2016g). Their introduction in the UK follows trials from many different forces, such as Greater Manchester Police (Ellis, 2016). There have also been other studies completed, the most notable of which in California, USA, which has resulted in BWV cameras appearing to reduce the number of complaints made against officers with both police officers and members of the public apparently changing their behaviour because of its use (Ariel, Farrar and Sutherland, 2014). An argument has also been made by Pang and Pavlou (2016) that the cameras can reduce the use of deadly force utilised by police officers in the USA which links to the idea of police behaviour also being modified. However, this research is in its infancy and lacking any similar research, and therefore needs further investigation.

BWV cameras are used to capture encounters between the public and police, with cameras being turned on only during this contact period and persons being told that this is going to occur (Jameel and Bunn, 2015; Press Association, 2016). This is due to concerns over privacy and the existing amount of surveillance in public areas. It has been suggested that only turning on the BWV camera during an encounter can help to reduce tension in potentially dangerous situations (Gayle, 2016) because both the officer and other persons know that the incident is being recorded. For example, this can be seen when police officers attend domestic abuse incidents and are required to record the encounter (Jameel and Bunn, 2015). This has also been found to be very positive for evidence because BWV cameras provide the ability to record exactly how the victim was acting and any injuries (Jameel and Bunn, 2015). Similarly, in a trial conducted in the USA, all contact with the public was recorded '*with the exception of incidents involving sexual assaults of minors and dealing with police informants*' (Ariel, Farrar and Sutherland, 2014, p520). However, there is also an argument for keeping the cameras on at all times, suggested by Ariel and Sutherland (2016) due to results of a trial suggesting that turning on BWV cameras could cause a member of the public to become agitated. Therefore, it can be suggested that further research is needed in order to truly understand the impact of this new technology because of this discrepancy.

A separate and equally important aspect of the use of BWV cameras is the storage of data, with vast amounts of digital data becoming '*overwhelming*' (Police Professional, 2016b). With the increase in cameras being estimated at one million by the next decade (Police Professional, 2016g), the need to have a large and secure storage space is paramount. The Metropolitan Police Service in the UK are beginning to utilise the 'Cloud' (Police Professional, 2016f), a "virtual" storage space, allowing for

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3 large amounts of data to be stored without the need for multiple hard drives. Some models of BWV  
4 cameras used in the UK can automatically upload data via a docking system to cloud storage  
5 (Spencer, 2016). The available storage for data is something that may need to be continually  
6 developed, as the amount of data generated may be considerable (Spencer, 2016) as the use of BWV  
7 cameras increases, especially if this technology is used at all times on patrol. Therefore, BWV  
8 cameras will continue to not only have an impact on daily policing practices, but also the existing IT  
9 infrastructures.

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11 An application of BWV cameras that is still in its initial stages is their use at crime scenes as live-  
12 stream devices which allow expert investigators to use augmented reality to point out important  
13 items to officers at the scene, ensuring that the scene is secure and any significant evidence is not  
14 overlooked (Police Professional, 2016e). It can also be used to ensure that any searching officers at  
15 such scenes are safe by allowing the experts to locate any dangerous items or materials and  
16 notifying the officers (Police Professional, 2016e). The Dutch Police, who trialed the technology,  
17 also discovered that it allowed for multiple teams to observe the same information at the same  
18 time, allowing for both greater information sharing between units and seeing the BWV cameras as a  
19 positive contributor to police work, not just something to keep police officers accountable (Police  
20 Professional, 2016e). This again shows that BWV cameras will continually have an impact on policing  
21 and that their current use is still in its infancy.

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24 Being a functional, hand-held device, BWV cameras are a 'hard' technology used by the police. Their  
25 acceptance, though somewhat marred by the notion of officers being less independent in their  
26 management of incidents (Jameel and Bunn, 2015), appears to be at a good level with officers  
27 understanding their usefulness. This suggests that because the outcomes are visible and easy to  
28 understand, officers are willing to engage with this 'hard' technology and may be more inclined to  
29 engage with other 'hard' technologies. However, it does not explain or consider a police reaction to  
30 a combination of both 'hard' and 'soft' technology in one piece of equipment, such as Automatic  
31 Number Plate Recognition systems.

## 32 33 34 **Automatic Number Plate Recognition**

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36 Automatic Number Plate Recognition (ANPR) technology is growing day by day, with police forces  
37 across the UK increasing their arsenal of cameras (Police Professional, 2016d). It would appear that  
38 almost all major roads in the UK are covered by ANPR systems, which has led to over 11 billion  
39 detections of illegal vehicles using the motorways and other large roads so far (Wright, 2016). ANPR  
40 can be either fixed or portable cameras (Police Professional, 2016a) and they allow police forces to  
41 combat many different types of crime, including burglary, supplying drugs, domestic violence and  
42 vehicle crime (Police Professional, 2016a). This technology can also be used in intelligence-led  
43 operations focusing on monitoring offenders who are classed as high risk and sexual exploitation  
44 groups (Police Professional, 2016h), as well as against organised crime groups (National Police  
45 Chief's Council, 2016a). However, there is a growing concern that ANPR cameras are simply causing  
46 a displacement of certain types of crime, causing problems to move to areas that do not have the  
47 technology (Police Professional, 2016a). Geographical displacement of these crimes is important to  
48 highlight because it shows that although the ANPR cameras stop the crimes in a certain area, the  
49 technology lacks the ability to find and solve the root problem. This aspect of ANPR therefore needs  
50 further research and investigation.

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53 This particular type of technology can also be used to assist in major investigations, allowing the  
54 investigator to have a detailed focus for their resources (Kirby and Turner, 2007), thus hopefully  
55 leading to a quicker resolution. ANPR is generally only situated at locations that have been surveyed  
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and deemed appropriate and in need of the technology to avoid being labelled as unauthorised and indiscriminate use of surveillance (National Police Chief's Council, 2016a). However, as many cameras are in high volume traffic areas (National Police Chief's Council, 2016a) this allows investigators to use the technology when crimes occur in areas with high volumes of traffic. It could be suggested then, that as the number of ANPR cameras increases in the future, the impact on police investigations will be positive as they can aid investigators.

ANPR can be used as both a proactive and reactive tool for policing (Police Professional, 2016h). For example, some police forces, such as Dyfed Powys Police, are using the technology in conjunction with mobile devices installed with ANPR 'apps' allowing police officers to obtain information in real time (Police Professional, 2016h). This allows Dyfed Powys Police to utilise ANPR for proactive and reactive policing. As with other forms of surveillance technology, the storage of data can be problematic. However, a useful development in relation to this technology is the centralisation of the ANPR storage system, with the impending introduction of the '*National ANPR Service (NAS)*' (Police Professional, 2016c, p14), a system which should increase efficiency in storage, reading and sharing of ANPR information (Police Professional, 2016c). The development of the NAS should allow for better information sharing between forces in relation to ANPR data (National Police Chief's Council, 2016b) and also takes into consideration that there is a need for transparency in its development. This is included with the implementation of the National ANPR Infrastructure, in order for the public to have confidence in the system (National Police Chief's Council, 2016b). Similar to other technologies, ANPR appears to be a useful tool which would need to be evaluated to assess its impact.

This technology, combining both a physical camera and virtual storage appears to be another bridge between the concepts of 'hard' technology and 'soft' technology. The need for databases and information sharing using technology with no defined boundaries (Jin, 2011) illustrates the aspects of ANPR which use 'soft' technology whereas the physical cameras, either fixed or mobile (Police Professional, 2016a), are 'hard' technology. This combination of technology types is not only seen in the use of ANPR cameras, but it can also be seen in the introduction of drones.

## Drones

A further application of technology, and one that appears to be gaining momentum, is the police use of Unmanned Aerial Vehicles (UAVs), otherwise known as drones. This newer technology is being introduced by police forces on a global scale, as well as by other agencies involved in emergency and fire rescue, and environmental protection (Jones, 2014).

The military history of drones has long been documented (Hiltner, 2013; Hunter, 2015; Schlag, 2013; Keane and Carr, 2013; Gregory, 2011), with literature now beginning to evolve around the use of this technology in domestic airspace by law enforcement and other agencies, rather than just the military application of drones. Suggestions for police use of drones have included their ability to be used for surveillance (Jones, 2014; Hiltner, 2013; Schlag, 2013; Button and Underhill, 2016). In addition to this use, police forces in both the UK and the USA have discussed the possibility of using drones for other purposes, with Hiltner (2013) suggesting that drones can be used in situations that are not necessarily criminal such as '*searching for missing persons and responding to automobile accidents or chemical spills*' (p399). In the UK, Durham Constabulary has looked into the use of UAVs for missing person reports (Button and Underhill, 2016) with other police agencies in the USA using the technology during arrests as well as in search and rescue operations (Schlag, 2013). The Police Service of Northern Ireland (2015) have also declared that they have used their drones multiple times as '*Support to district policing*' (p6) and '*Search*' (p7). These are just some examples of police

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3 using UAVs, with their current impact small but growing in intensity as more trials take place, both in  
4 the UK and in other countries.

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6 The discourse surrounding police use of drones in the USA is constantly expanding and as documents  
7 show, drones may well be used for more than just surveillance, something that may fuel the public  
8 perceptions of drones being an infringement on civil liberties (Hiltner, 2016; Hopkins, 2013; Hiltner,  
9 2013; Schlag, 2013). It may be that more transparency over their use will aid in public acceptance of  
10 the technology because of the issues around privacy and data collection. One way of increasing  
11 confidence and trust in the UK is through English and Welsh police forces being certified by the  
12 Surveillance Camera Commissioner to use their drones. This may assist public perceptions because  
13 the police appear to be more transparent in discussing whether they have or use UAVs and that they  
14 are following the Surveillance Camera Codes of Practice (Surveillance Camera Commissioner, 2016).  
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17 In addition to the police utilising drone technology to assist in their work, they have to consider the  
18 wider aspect of society's use of this kind of technology. The potential for drone use by private  
19 companies and members of the public, particularly if they are being used in an illegal manner, is a  
20 real threat. Police in the Netherlands, for example, have an innovative method of dealing with rogue  
21 drones, employing the use of birds of prey which have been specifically trained to take out the  
22 electronic devices (Agence France-Presse, 2016). This method has also been noted by the  
23 Metropolitan Police Service as a way of combatting illegal drone use (Rawlinson, 2016), suggesting  
24 that police forces around the world are not only considering their own use of UAVs but also having  
25 to cope with increased use of technology for unlawful means.  
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28 Being a new, exciting piece of technology, a UAV falls into the 'hard' technology category. Once  
29 again, databases and storage must also be considered for the storage of images, creating another  
30 linking technology between 'hard' and 'soft'. Drone use by the police is increasing, with some forces  
31 past the trial stage (Button and Underhill, 2016) suggesting that drones are being accepted into  
32 British police work. Considering this, it is logical to believe that the police are accepting both 'hard'  
33 and 'soft' technology. The level of acceptance is currently unknown and further research into  
34 whether police offices accept the 'soft' technology and utilise it because it aids in the use of 'hard'  
35 technology or if the use of abstract systems is accepted on its own merit should be considered.  
36 However, officers may see the advantages of 'soft' technology because of unlawful activity which  
37 can be tracked and dealt with using IT systems.  
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## 40 Discussion

41 If the police and other agencies increasingly rely upon technology, then it is fair to assume that those  
42 who wish to engage in many forms of illegal activities will also utilise technology. However,  
43 acceptance of technology into the police sphere also has other obstacles including a resistance to  
44 change from within the police and possible legislative consequences.  
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### 46 *Unlawful Use of Technology*

47 Criminals can use social media to uncover personal details about police and security staff (Dukes,  
48 2016) and can use technology for their own purposes, which may affect how the police conduct  
49 investigations. The opportunities for dis-information and misinformation are many and complex,  
50 illustrating that the consequence of technological development is both positive and negative for the  
51 police.  
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54 For example, with the advent of autonomous vehicles that contain more electronics than human-  
55 driven vehicles, there is the ability for people to hack into these systems in order to cause injury or  
56 even death to their drivers or steal the vehicles (Jain and Fairley, 2016). However, it is not just high-  
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3 tech cars which are vulnerable to attack. Signal jammers are now available online and can be used  
4 to stop cars from being locked, allowing thieves to enter vehicles with no sign of forced entry (BBC  
5 News, 2016a). The lack of evidence is affecting the police ability to track the offences (BBC News,  
6 2016a), which may, in turn, affect the public opinion of the police as it may appear as though the  
7 police are not investigating fully because they have to cease investigating if no evidence is present.  
8 This appears to illustrate that not only does technology impact upon the way in which the police  
9 work, it can also impact upon the public's perception of the police, which may in turn produce a  
10 negative image of the British model of policing.  
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12 In addition to hacking and stealing vehicles, criminals are making use of cyberspace, with  
13 tremendous impact. This in turn influences strategies and policies for dealing with such criminality  
14 (Lavorgna and Sergi, 2016). The National Crime Agency Cyber Industry Group (2016) has suggested  
15 that cybercrime costs many billions of pounds to combat and respond to each year. However, it is  
16 still unknown whether online and technological crime is being integrated into existing organised  
17 crime or if new, independent criminals are seizing the possibilities in cybercrime and utilising them  
18 for their own ends (Lavorgna and Sergi, 2016). This leads to the belief that cybercrime is difficult to  
19 combat not only because of technological advances but also due to uncertainty in how much  
20 resources are needed to apprehend the perpetrators. However, in the England and Wales, there has  
21 been much development in Government policy and strategy for combatting cybercrime, with an  
22 emphasis on ensuring that there is a robust defence system against **cyberattacks** (Cabinet Office,  
23 2016; HM Government, 2016). However, further research into cybercrime may aid in creating  
24 policies and practices used to combat this new type of crime.  
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### 28 *Work Force Resistance*

29 One problem faced by all organisations when introducing technology is the impact it may have upon  
30 working practices and belief of staff, commonly referred to as the working culture. It is well  
31 documented that there is a clear and sometimes complex work culture within the police  
32 organisation, with varying subcultures that are sometimes used to explain why the police do the job  
33 that they do (Reiner, 2010). One part of this subculture suggests that police officers wish their job to  
34 be as simple as possible in terms of equipment and paperwork which leads police officers to be  
35 resistant to any change or new development (Reiner, 2010) and the implementation of new and  
36 different technology into police practice may be a major threat to their working environment. For  
37 example, the introduction to certain US law enforcement agencies, of 'Computer-aided dispatch  
38 (CAD)' (Colton, 1979, p16) was more difficult than initially hoped because of a dislike of change  
39 (Colton, 1979). Concerns over a decrease in discretion are believed to have led to dislike of the  
40 system causing it to not be accepted. Changes to the workforce reaction to new things should  
41 reduce this obstacle and allow new technologies to be integrated into daily work more smoothly in  
42 the future. However, there may not be a simple solution.  
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46 A further problem for the introduction of technologies into the police organisation is a tendency to  
47 attempt to fit new systems into existing structures instead of developing structures to support new  
48 and innovative methods of police work. This means that the police use the new technology in  
49 'traditional ways' rather than using it for its intended or any enlightened purpose (Chan, 2001). This  
50 is problematic for the police, as much of the emphasis of creating new ICT systems comes from the  
51 need to share data between forces and external agencies as well as to improve efficiency and  
52 effectiveness (Chan, 2001). Therefore, it is understandable to expect that organisations, including  
53 the police, change their policies and structures to allow for technological development, yet **they** do  
54 not introduce new and innovative technological practices. Clearly, not only will technology have an  
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3 impact on how the police complete their daily tasks, it may also affect the policies and guidelines  
4 that govern their working practices.

### 5 *Training and Budgets*

6 In previous research into the use of computers by the police, unsuitable training was found to be a  
7 major obstacle for police officers using and accepting new technology (Northrop et al., 1995).  
8 Furthermore, it has been found in the HMIC PEEL Efficiency report that relevant and up to date  
9 training in digital literacies is urgently needed for the police service to succeed in the future  
10 (Cunningham, 2016). This is to assist in both overcoming police dislike of change and the need for  
11 officers to be able to keep up with criminals who use technology.  
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14 In addition, criminals appear to be able to acquire the same and often better technology because  
15 they are not restricted by budgets (Cunningham, 2016). Criminals may master the use of  
16 technology quicker than the police due the police requiring formal training and budgetary  
17 restrictions.  
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19 Budgets are significant because they influence the introduction of new technology as police forces  
20 need to allocate money to allow these developments to be implemented successfully. For example,  
21 when ANPR was first introduced, funding for a national rollout of the system was supported using  
22 money from road traffic fines (Watson and Walsh, 2008). Austerity has also had an impact on police  
23 budgets in the UK. Following the financial crisis, there have been many years of budget cuts and  
24 reducing the size of the workforce, with expected savings of approximately £2.5 billion over a four-  
25 year period for English and Welsh forces (Her Majesty's Inspectorate of Constabulary, 2014). The  
26 reduction in funding will have influenced the money set aside for training and resources as well as  
27 the overall size of the workforce (Her Majesty's Inspectorate of Constabulary, 2014). IT systems are  
28 discussed as a method of overcoming the reduction in funding for resources as they can improve  
29 efficiency, aid in information sharing and support everyday police tasks (Her Majesty's Inspectorate  
30 of Constabulary, 2014). However, suitable training for new IT systems is also needed. The most  
31 recent cuts to police budgets in Wales were at 0.6% (BBC News, 2016b) illustrating a continuation of  
32 austerity measures, albeit less harsh than previous budgets. This raises the question of whether  
33 technology will continue to be a challenge to implement or if IT systems are, in fact, an aid in such  
34 financial times. It may be that in the future, when austerity measures are no longer in place that this  
35 question may be answered.  
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39 Budgets are not the only restricting factor for the police. Legislation is also a concern for the public  
40 due to its nature of being one step behind the technology industry.  
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### 42 *A difficult balance*

43 Legislation is a major influence on technological advancement (Sheldon and Wright, 2010). With the  
44 impact of crime using technology being widespread, especially that of cybercrime (Sheldon and  
45 Wright, 2010), **legislation** can be seen as significant because it not only impedes police in their work  
46 but it indirectly affects the public, which can in turn, impact the police/community relationship.  
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49 This is due to legislation impacting the public's perception of police use of some technologies. For  
50 example, the Investigatory Powers Act 2016 (Great Britain, 2016) requires all internet providers to  
51 store every individuals' web histories for twelve months and allows police and security services to  
52 have almost unlimited access to the data (Travis, 2016). This law came into being with little  
53 discussion within Parliament (MacAskill, 2016), potentially due to a preoccupation with the vote to  
54 leave the European Union (Travis, 2016). The lack of public discussion and the implications on  
55 individuals' privacy may lead the public to perceiving the legislation as being intrusive and  
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3 considering any work the police do in relation to it in a negative light. This shows that the impact of  
4 technology is not simply limited to the policing sphere; it affects the whole of society which includes  
5 a **reappraisal** of individuals' rights.

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7 The protection of human rights can be complex one for the police. The police, as an institution,  
8 must protect people's rights, with certain exceptions, which are set out in the Human Rights Act  
9 1998 (Home Office, 1998). Conversely, they are expected to use and enforce any new legislation  
10 that is passed through Parliament which may well be seen as impinging upon the public's civil  
11 liberties, for example the Investigatory Powers Act 2016 (Home Office, 2016), as the public may see  
12 it as an invasion of their privacy. This illustrates that legislation can have a significant impact on the  
13 police in relation to the use of technology.  
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## 15 Conclusion

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17 Many public agencies involved in attempting to keep society safe from harm employ new  
18 technologies in order to increase effectiveness, efficiency and economic viability. Some of these are  
19 accepted by the workforce, others are resisted as the **integration** of new technology continues. We  
20 live in an age of technological innovation and application, which is appealing to emergency services  
21 struggling to maintain a provision in difficult economic times.  
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24 However, as can be seen from the discussion surrounding the implementation of technological  
25 advances and applications in the police service in England and Wales, they are not without their  
26 disadvantages. Public concerns about new technology, new laws and the way in which both are  
27 being used, focus on individual rights and the amount of data **collected** (Bellamy, 2011). This may be  
28 due to simply not wanting that much information stored or it could be more complex, with citizens  
29 expecting their rights to privacy, as set out in the Human Rights Act 1998, to be protected and  
30 respected.  
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33 Additionally, the public, and in the case of policing, criminals, may have access to the same, if not  
34 technologically better, equipment, which may mean more and more public finances being spent in  
35 what could develop into a technological version of an "arms race". Ensuring the workforce is  
36 adequately trained and receptive to the use of new technology has been problematic for agencies in  
37 the past and this is an area that needs careful thought and investment. Whilst the greater use of  
38 technology by the police and other agencies will undoubtedly continue, the use will bring with it  
39 challenges that need to be identified and overcome, if the technological revolution in Public Services  
40 is to be successful.  
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43 Examining the literature on police use of technology, utilising the three topical areas discussed  
44 herein, allows us the opportunity of understanding some of the negative and positive aspects of its  
45 use and to recognise some areas for further research.

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