



The Royal Academy  
of Engineering

## Policing in the 21<sup>st</sup> Century

Response from the Royal Academy of Engineering to the Home Affairs Select  
Committee

February 2008

## Introduction

The Royal Academy of Engineering is pleased to contribute to the Home Affairs Select Committee inquiry on '*Policing in the 21<sup>st</sup> Century*'. This response has been compiled using contributions from key Fellows of the Academy. Whilst we recognise that the inquiry covers a wide range of matters, we have restricted our attention to the issues concerning the use of technology to enable police officers to return to the beat. Supplementary evidence can be provided if required.

Our response covers the following:

1. Science and IT in the Home Office
2. The police radio system "Airwave"
3. Mobile data technology and advanced communication technologies
4. Networked systems for operational coordination
5. Digital information storage
6. Conclusions

### 1. Science and IT in the Home Office

- 1.1 In the Home Office there is a lack of integration between Science and IT (in relation to policing). The Police IT Organisation (PITO) is now part of the National Policing Improvement Agency (NPIA), which is a non-departmental public body. There is a disparity between science in the NPIA and the Home Office, partly due to separate budgets. There is also insufficient clarity and understanding of the major differences between the supply of computers and administrative networks, and the use of advanced communications and IT. Consequently there is an overall lack of coordination, policy and strategy for advanced systems in policing.
- 1.2 The Home Office has a programme of research into future technologies which utilises the facilities of the Home Office Scientific Development Branch (HOSDB). There are many useful technologies being developed and maintained, including body armour, fingerprint detection and sensors. However science, technology and engineering in the Home Office are under-funded and the NPIA has recently suffered budget cuts. More funding and resources are needed to improve research into technologies for policing.

### 2. The police radio system "Airwave"

- 2.1 Radio technology expenditure has been dominated by the Airwave system, provided by BT and Motorola. This is based on Terrestrial Trunked Radio (TETRA) digital technology, which replaced analogue systems. This platform is capable of supporting text and video formats but is primarily used for secure voice communications, and has been fairly successful. However, the amount of voice traffic is now reaching the limits of the current system's spectrum resources in some areas (particularly in London). This suggests that the Airwave system will be inadequate for the future needs of the police forces, particularly in densely populated areas where information needs are likely to exceed the TETRA network's capacity.
- 2.2 Airwave has limited (narrow) bandwidth and data capability. Existing equipment is capable of carrying more traffic but additional spectrum is required. Rather than use another band it would be easier and less expensive to expand the band assigned to Airwave to the full range. In the UK, military

users occupy the part of the band not assigned to Airwave, so this expansion would need to be managed carefully. Spectrum-based solutions are unavoidable because officers on the beat have to be mobile.

- 2.3 While it is a relatively simple solution, expanding the Airwave band may still not be sufficient to cope with future policing needs. As the requirements for data transmission increase, bandwidth needs will also increase. A wireless broadband technology system will be necessary to cope with this, such as Worldwide Interoperability for Microwave Access (WiMAX). The high capacity technology may be used on a local or temporary basis, as required. Terminal devices with appropriate graphical and textual interfaces will be vital.
- 2.4 The TETRA-based Airwave system could also be improved using the compatible TETRA Enhanced Data Service (TEDS).

### **3. Mobile data technology and advanced communication technologies**

- 3.1 Better mobile data and communication technologies will reduce time spent at stations, enabling officers to spend more time on the beat.
- 3.2 The efficiency of information gathering could be improved in various ways. Information gathering using multiple choice options could speed the entry of information into records, with automated analysis for simpler aspects of reporting. More complex information could be recorded by dictation, with officers simply correcting the automatically generated transcription.
- 3.3 Transmission of good quality images would improve the knowledge and capability of officers away from the station. There is increasing interest in using video services for policing. Communication of high-quality visual information can have a significantly positive impact on cooperative action in a variety of situations (e.g. suspect identification). However, the spectrum issues already mentioned will restrict the volume of visual information that can be transmitted. Also, higher data rate channels may be required for the high resolution images that would be needed for evidential purposes.

### **4. Networked systems for operational coordination**

- 4.1 A significant revolution would occur if the military concepts of Network Centric Operations (NCO) were properly applied to policing. The fundamental concept of NCO is based on situational awareness. The aim would be to deter or defeat criminals by achieving and maintaining 'information superiority' through the robust networking of well informed officers, i.e. communicating precise information accurately to officers who have the capability to examine and act upon the data rapidly. NCO increases connections between officers, vehicles and control centres, leading to more rapid responses, accuracy and personal protection of officers.
- 4.2 An essential enabler of NCO would be a local encrypted network with broadband capability and mesh technology. This would increase coverage, reliability and secure connections between officers, vehicles, stations and control centres. However these requirements cannot be provided by Airwave.
- 4.3 Examples of NCO enabling technologies could include:
  - Intelligent CCTV and analytical software (e.g. Aralia Systems software) to allow control centres to identify disturbances immediately

- Transponders in vehicles and carried by officers to signal their locations to command local posts
  - Facial recognition using high resolution police camera technology
  - Deployable sensors with wireless access and links to emergency services (e.g. for chemical release emergencies)
- 4.4 Network-centric operations require an information system able to give controllers the right data at the right time. This would require changes to network architecture. This architecture would link data streams and analysis from many sources, including legacy systems. Existing systems must be integrated into the architecture without change. The result would be rapid development of integrated operations for police controllers, transforming policing. The networked police officer will be able to access data sources, call for rapid assistance and communicate instantly with control centres and stations. Emergency co-ordination and response will be significantly improved, particularly if there is integration with the other emergency services (e.g. fire and ambulance).
- 4.5 National standards and interfaces (including technical and information standards) will be essential to allow systems and technologies to evolve in the future.
- 5. Digital information storage**
- 5.1 Digital storage technologies would allow officers to be personally equipped with significant repositories of information before going on the beat, although this would only be suitable for low confidentiality non-sensitive information. Digital storage could also be used for information collection during operations. This would minimise the need for paper based systems and provide a richer and more accurate source of intelligence and reports. Data would be secured and time stamped to ensure evidential quality.
- 5.2 Where information from officers on the beat could not be relayed back reliably in real time, temporary storage on a personal device would be possible using appropriate short-range, high-speed wireless interfaces.
- 5.3 Non-sensitive information suitable for digital storage could include community briefings, mapping and hazard identification (potentially using Global Positioning Systems (GPS) to enhance information).

## **6. Conclusions**

- 6.1 There should be better integration of science in the Home Office (i.e. the HOSDB) and the NPIA's police IT functions.
- 6.2 To meet the needs of the police in the 21<sup>st</sup> century it is necessary to create products rather than invent new technologies, (although research into emerging technologies is still vital). The spectrum needed to deliver certain information services is not currently available, and this is a severely limiting factor.
- 6.3 The overheads and cost of transition to new systems can be significant, especially as individual police forces represent relatively small operations. In addition, many police forces operate in an autonomous manner.

Implementing solutions on a force by force basis risks fragmentation, which would be a barrier to integration across police forces and wider emergency services. In addition, a fragmented approach may not attract the attention of the global technology companies who would implement new complex programmes. Therefore effective management of transitions will be as critical as the technology itself to secure ultimate benefits. Technologies should be introduced as part of a wider re-engineering of operational processes, particularly information systems.

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